INDUSTRIAL DESIGN

February 1957 · 0.50 per copy

2

Design as a political force

Aids and sources for the designer: Modelmaking

Cars '57: review and questions

Martin Rosenberg 3

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FEBRUARY, 1957 VOLUME 4, NUMBER 2

INDUSTRIAL DESIGN

A monthly review of form and technique in designing for industry. Published for active industrial designers and the executives throughout industry who are concerned with product design, development and marketing.

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COVER: Markers on the Kabul plains announce sites on which the pavilions of competing nations rose for the Afghanistan Trade Fair last fall — among them the U.S.A.'s geodesic dome (page 51).

Frontispiece: A close-up of the geodesic structure that housed the U.S. exhibit at Kabul, Afghanistan, shows the simple construction joint that enabled Afghan workmen to erect the dome within two days. The role of the U.S.A. in overseas Trade Fairs is covered on pages 37-55.

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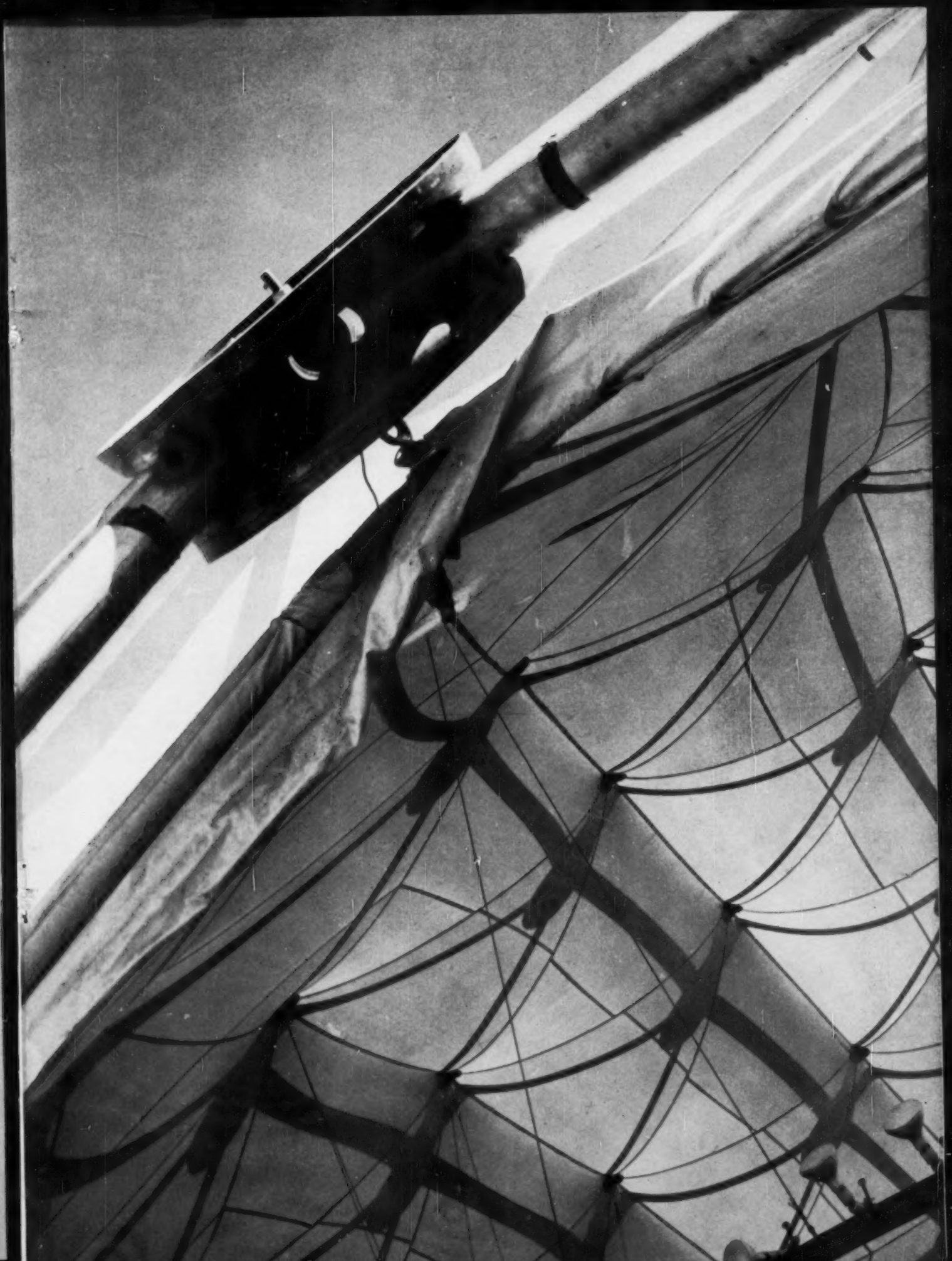


in this issue...


Aarnio


Pfriem


Snaith


Shaw


Witteborg and Gardiner


Masey


Spilman


Waterman


Harnden


Oestreich


Reynolds


Peter


Weidlinger

Reino Aarnio, born in Finland and educated here, designed the Stockholm Fair. Both an industrial designer and architect, he is now designing a department store, shower stalls, a Fair for Poznan, Poland.

Bernard Pfriem, designer of the Trade Fair at Salonika, Greece, is a painter, graphic designer and former art director of *Interiors*. Last fall he left the U. S. Office of Trade Fairs to establish his own design service.

William T. Snaith, as managing partner of Raymond Loewy Associates, supervised the Fair at Damascus, Syria. Such diverse projects as modernizing retail stores, designing boats and a Trade Fair for Milan, Italy, now claim his attention.

Charles Shaw is an architect, designer and display specialist. At the Bari, Italy, Fair he attended to every detail down to designing attendants' uniforms. He is now studying display systems for future Fairs.

For the Fair at Izmir, Turkey, the Dept. of Commerce went to the American Museum of Natural History for **Lothar Witteborg**, chief of the art and exhibition department, and **Henry Gardiner**, exhibition designer.

Jack Masey, planning officer of the development branch of the U.S.I.A., drew on his long experience in presenting the American point of view overseas in visual terms for the Fair at Kabul, Afghanistan.

Raymond Spilman heads his own design firm which worked out the Fair at Zagreb, Yugoslavia. On-the-spot work was done by **Don Waterman** and **David Wurster** (not shown). Spilman's newest project is the organization and planning of visual design for all Underwood products.

Peter Harnden got his graphic training in Germany, studied architecture at Yale. Since 1949 he has been directing government fairs and exhibitions. Last year he started on his own with the Vienna Fair contract.

Dr. Hans Dieter Oestreich, who designs in Darmstadt, Germany, discusses machines and appropriate form on pages 75-76. As background for his current interest in industrial design, he obtained degrees in art history and architecture.

Dr. J. Bronowski (not shown), speaks out on art and industry on pages 69-74. He is both mathematician and literary man: he has two books on literature and one radio play to his credit. Director of the Coal Research Establishment in Britain, he is now in this country as Carnegie Visiting Professor at M.I.T.

Richard S. Reynolds, Jr., as president of Reynolds Metals Co., formally announced the results of a three-year, $500,000 project (pp. 64-68): the two-volume *Aluminum in Modern Architecture*, a recording of architects discussing their craft, and an annual $25,000 architectural award. **John Peter**, editor of Volume One, is trained for both editorial and design work, has been art director for *McCall's*, an editor at *Life*. His firm offers editorial service to such clients as *Look*, Bendix Corp. and Simon & Schuster. **Paul Weidlinger**, technical editor, is an architectural engineer who has practiced in Europe with Le Corbusier, designed for the U. S. Air Force and State Department.

To spark up design–

Dip-coat in soft, colorful vinyl

Old products take on new sales power, new ideas become practical—when you incorporate dip-coated vinyl surfaces in design.

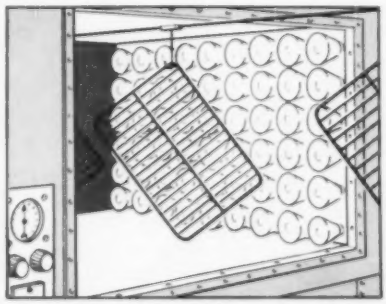
Dip metals or cloth in vinyl dispersions. Then cure with moderate heat—the result is a tough, even layer of soft, colorful plastic that resists abrasion, chemicals, heat, and cold. You open up whole new approaches to design for products ranging from kitchen equipment and outdoor furniture to tools, toys, and countless others.

Vinyl dip-coating offers more than just beauty. It insulates against electricity, heat, or cold. It muffles sound; it offers pleasing warmth to the touch.

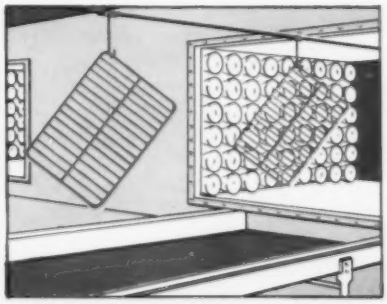
New grill-shelf kitchen cabinet features high visibility ... even of shelves higher than eye level. Soft vinyl shelf-coating guards precious china against chipping.

3 steps build in end-product qualities

Consult your supplier for exact formulation—Your supplier can "tailor" the vinyl formulations to your exact requirements—speed of fusion, high-gloss or matte finish, resistance to soapy water, and many others. You have wide latitude in choice of processing characteristics and product traits.



Pre-heat to control thickness—By adjusting temperature and pre-heating period you can, with a single dip-coat, build coating to any thickness up to 60 mils.



Bake for permanent finish—Final baking at moderate temperatures permanently fuses the vinyl to metal. No further finishing is required ... color is an integral part of the coating.

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Monsanto manufactures plasticizers and vinyl resins but does not produce or distribute the finished dip-coating formulations. For a list of manufacturers of plastisols or other solution and dispersion forms of vinyl, write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, Dept. ID-7, St. Louis 1, Missouri.

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LETTERS

The Guilty Ones

Sirs:
Mr. Nelson's argument, in the article on obsolescence, that the middle and lower levels of our society have been enriched almost in direct proportion to the rate of obsolescence in such products as cars and major appliances is most convincing and even startling.

However, with these rewards has come an increasing emphasis on materialism and possessions of the moment, a frantic keeping up with the Jones' and a certain cultural depreciation that is dulling our traditional pride in "progress."

This is, of course, more or less the moralists' province and only time will properly evaluate the results of the obsolescence bugaboo.

Obsolescence needs no apology from the designers — let us instead point to the guilty ones — the hucksters, promoters and short-sighted "long range" planners who apparently have no idea of the difference between styling, ornamentation and this year's "trend," and that of honest design, creative engineering and, let us say, industrial evolution.
Stowe Myers
Evanston, Illinois

What Next?

Sirs:
George Nelson's article on obsolescence brought to mind this cartoon.

Reprinted from "Cosmopolitan," December 1956

"But where can we go from here? We've got everything."

Richard S. Latham
Latham, Tyler, Jensen
Chicago, Illinois

Definitions

Sirs:
Your introductory article "This brings us to the question of Design" caught my eye and brought to my mind a discussion some months ago on the meaning of industrial design.

I said then that I think you owe it to your readers to explain that "design" is more than just a "new look". Your article is a step in the right direction and your magazine is getting better with every issue.
William F. Stefurak
Melanie Kahane Associates
New York, New York

Sirs:
Good industrial design should involve more than simply making a product "pretty". It should make a product that does a better job and shows it in its appearance.

The automotive industry employs a large percentage of the designers in this country. They worship at the shrine of design and more than any other industry have failed.

The accident figures for this past holiday and for this past year underscore that failure. They have not designed a good vehicle but a piece of steel and chromium sculpture for a showroom floor. (A "good vehicle" must be defined as one that will function well in the hands of anyone who can get a driver's license and has the price to buy an automobile or access to one.)

The present-day product has as its most prominent characteristic the capacity for causing its own destruction when driven by an average driver on an average road. . . .

Should not the responsibility for this continuing carnage belong to the designer?
James M. Anderegg
Sweet's Catalog Service
New York, New York

Controversial

Sirs:
In reference to your Report on Chicago: As you know, there are a good many people who consider Serge Chermayeff to be "controversial." I quite agree with them and I would like to add that this is precisely why he is a first-rate teacher. Our schools are much too full of noncontroversial knuckleheads and the result is that we get a crop of students who have never been encouraged to think, to debate or to criticize. In our increasingly conformist society such students may conceivably make a killing in business. I venture to guess that this is just about the only thing they may be remembered for.

It happens that I started out in architecture as an apprentice in Serge Chermayeff's office in London. For those two years and for all the years since then I have found him to be insufferable, fascinating, brilliant, annoying, intensely stimulating, quite impossible and quite charming. I think he was the best teacher I have ever had and for precisely those reasons. My guess is that the Institute of Design misses him very much and that the students of the Harvard Graduate School where he now teaches can tell you why.
Peter Blake
New York, New York

Sirs:
After reading your article "Dramatis Personae," in which the Institute of Design was discussed, it is my feeling that in the interest of this "bold experiment" the following may be of interest.

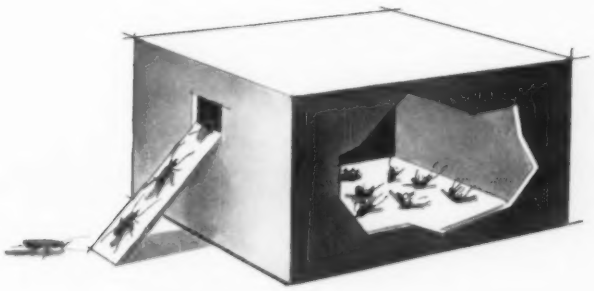
In my opinion, the majority of these conclusions are premature. With no previous school-to-industry liaison, it was by no means an easy transmutation for the graduates of this school. It is my belief that a survey of its alumni will show that many of these graduates are serving industry in unique and increasingly responsible capacities where design concepts are more than words or a well-rendered sketch.
Ysidore M. Martinez
Warwick Manufacturing Corp.
Chicago, Illinois

Omission

Sirs:
I was unhappy to see that you failed to credit Mr. Charles Kratka as my design associate on the Revell train display in December ID.
Saul Bass
Hollywood, California

—unlikely uses for Homasote

Vermin exterminatorium



Not the "definitive" design, perhaps. But the fact is that vermin (four-legged up to centipedes) die of starvation when they look to Homasote for any nourishment, whatsoever. Similarly, Homasote offers absolutely no hospitality to *pullularia pullulans* (sometimes known as mildew). When your specifications call for this kind of protection, investigate Homasote.

Ship's funnel

Unlikely? Yes. *Impossible?* Maybe not. Weatherproof Homasote has *size* — big sheets up to 8′ x 14′. And *strength* — tensile: 650 lbs. per sq. in.; transverse: 1100 lbs. per sq. in. And it curves without loss of strength — on an 18″ radius solely by wetting; on a 4″ radius by steam and molds. Takes paints, stains, and laminates. Are there any curved surfaces in your current designs?

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We invite your inquiry to Department B-27.

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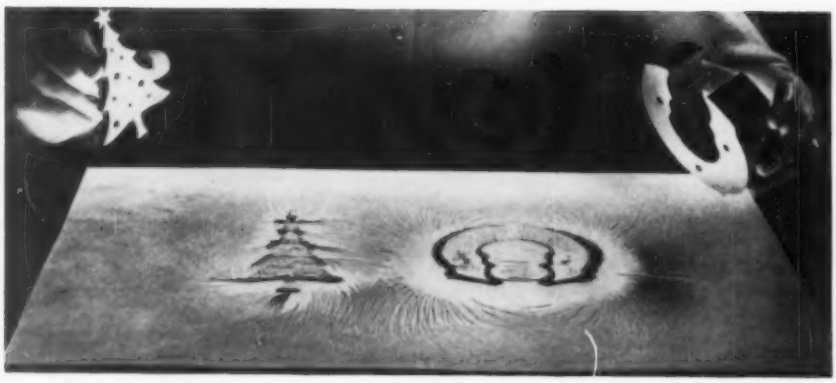
NEWS



GE announces revolutionary new magnet using fine-particle iron

On December 26, General Electric's Lynn, Mass. Instrument Dept. announced it had trumped the company's own Alnico magnet (born in 1935) with a new stronger-than-Popeye *Fine Particle Iron Magnet* that is predicted to beat Alnico's strength ten times over. The new Fine Particle Iron Magnet promises to open up the landscape for the designer. Unlike the magnets we are used to (see picture, right top ones), the new ones can be machined, drilled, tapered, soldered and molded precisely into any shape. Because they are formed of sub-microscopic iron particles embedded in a binder of plastic, metal, rubber or glass, they are more malleable, probably will be more economical and certainly will be more diverse in their possible applications. Another positive improvement is that ordinary iron is used in making the new magnets, thus saving scarce metals like nickel and cobalt. (The Alnico magnets are a combination of nickel, cobalt and aluminum.) A further virtue of the new magnets is that they can be used in nuclear reactor applications.

Aligned iron particles (top) give greater strength; unaligned particles below.

GE's research team started with what was only the speculation of theoretical physicists that ultra-fine elongated iron particles *might* have a high resistance to demagnetization. Iron particles tend to grow round, so the laboratory research problem was to produce the needed elongated shapes whose atomic configuration would have a permanent magnetic power. The major breakthrough came when the experiments produced elongated iron particles so small that there are more than a billion billion in a pound, visible only through powerful electron microscopes.

Although it will be "quite some time," according to GE, before the new magnets come out of the laboratory, the door is open to new magnet designs as significant as those that followed the introduction of Alnico. Anything in which permanent magnets are used will be open to design re-appraisal: electric instruments stand to become smaller, lighter and more accurate. Improved photographic exposure meters and aircraft instruments should also be possible.

Automation comes to the main-line

Electronic controls have been expanding on the railroads as well as in other forms of transportation and communication, as indicated by the recent opening of the New York Central's $6¼ million centralized traffic control system—the longest stretch of electronically-controlled double track in the world, it claims. Passenger trains will be able to move at a sustained speed of 80 miles an hour, and freight trains at 60 miles an hour, over the 163 miles between Buffalo and Cleveland, while greater accuracy in switching will enable the present four-track line to be reduced to two tracks handling the same load.

Trains moving over the new system will be under the constant observation of two dispatchers located at huge control panels in Erie, Pennsylvania—one in charge of traffic between Buffalo and Erie, and the other covering the trackage between Erie and Cleveland. They will be able to run fast express trains around slower freights at cross-over points located at every seven miles of track, instead of the previous twenty-mile distribution of cross-overs. Yet the line is expected to be safer than ever, for with built-in safeguards a leverman cannot throw a wrong switch and an engineer cannot fail to obey a signal. If he does, the train is brought to an automatic stop and the train cannot proceed until the engineer complies with the signal. Even weather conditions can be controlled from the central control panels, which activate snow melters at all switches to insure their operation during snowstorms.

The Central plans to extend its CTC system from New York to Chicago by 1963, making possible substantially faster travel from the East to the Midwest.

Notice to the space-minded

The Innovations Division of the U. S. Air Force's Air Research and Development Command is eager to receive and evaluate any serious ideas on aerial vehicle design, in the hope that they may be applied to present problems of design and may open up new possibilities. Address the Innovations office (RDGPEI) at Baltimore Maryland.

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Organization news

The **American Society of Industrial Designers** has elected the following designers to full membership: **William C. Atkinson, A. Peter Augusztiny, James M. Conner, Theodore G. Daher, Harry J. Giambrone, Harrison K. Linger** and **Eugene R. Russell. Warren A. Dillen** was named Associate Member. Teachers of design **James M. Alexander, Jr., Hin Bredendieck, Joseph Carreiro, Robert A. Kolli, Arthur J. Pulos** and **James R. Shipley** were elected Educational Members.

The Pacific Coast Chapter of ASID elected **Harry Greene** as President and **John Maguire** as Secretary-Treasurer for the coming year.

The Chicago Chapter of the Industrial Designers Institute re-elected its officers for another term. They were **Walter Granville**—Chairman, **Herb Carpenter**—Vice Chairman, **Benj. E. Werremeyer**—Secretary and **Carl Bjorncrantz**—Treasurer.

Dorothy Fontan has been named Executive Secretary of the Industrial Designers Institute, following the resignation of **Henry Hagert.** The IDI office at 18 East 50th Street, New York is now staffed full-time, in keeping with recent growth.

AT THE PRESS of a button, the 14-ton aluminum truck expands to five times its size. While the sides telescope outward, accordion-folded floors drop into place to form a 780 square foot area. It's all done with electrically operated hydraulic and chain drive mechanisms in five minutes. Made of Alcoa aluminum by the Gerstenslager Co. of Wooster, Ohio, it is suited to transporting military equipment, traveling exhibits, and even as a mobile home, the manufacturer suggests.

The light that lasts

Using radioactive Krypton as its prime energy source, a new type of lamp for highway signals and markers burns brightly with little electrical power and a minimum of care. Light from the lamp is clear-

ly visible at distances of 500 yards. Hermetically sealed in a weather-proof, transparent capsule, it needs no maintenance and will function for 10 years, according to the developer, United States Radium Corp., Morristown, N. J.

Light is produced by passing radioactive Krypton gas over phosphor crystals in the lamp. The crystals become agitated to the point of luminescence. Above is the Isolamp, one of the first applications, which is equipped with green and red lenses.

Tracking the satellite on an international scale

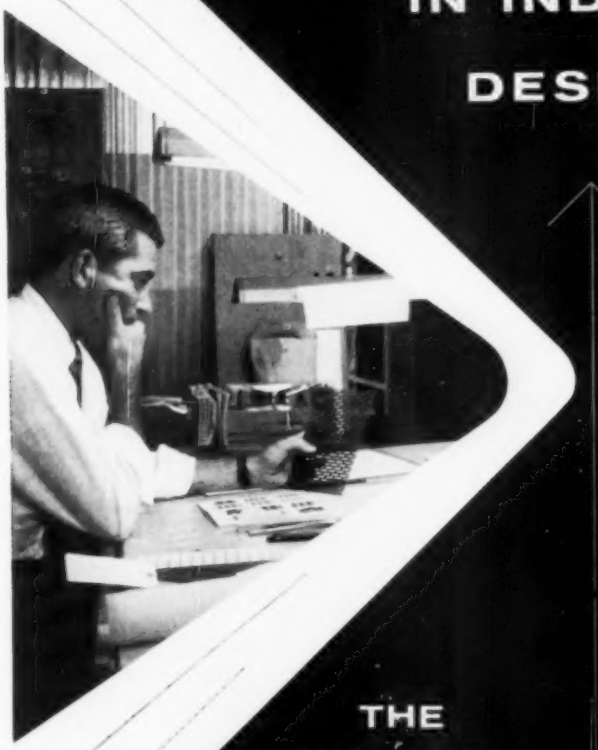
Many "eyes" will follow the man-made satellite as it reaches around the earth. Official watchers are nine radio tracking stations stretching south from Blossom Pt., Md., to Santiago, Chile. Planned by the Navy Department, the satellite will have astronomers and scientists throughout the world looking through their telescopes. The sum of these observations, fed into an IBM electronic calculater at Vanguard Computation Center in Washington, D. C., will tell the man in the street when to look up to catch a glimmer of the no longer earth-bound sphere.

The satellite, equipped with a miniature transmitter, will make its whereabouts known to tracking stations by a continuous radio signal. In twenty minutes, two angles of measurement and time of measurement will be flashed to the Vanguard center, screened, then teletyped to the IBM installation, directed by Dr. Paul Herget. With a speed that puts the satellite to shame — electronic signals travel 186,000 miles a second — the IBM 704 computer will perform the complicated mathematics that will come up with the satellite's orbit.

Since the transmitter in the sphere is powered by lightweight batteries to save precious space, it will last only a relatively short time. When the signal stops, scientists will have to rely on optical observation alone. To keep track of it through a telescope, however, one must have the time and elevation of its passage and angular velocity. Since it is only visible when its metallic outer skin is illuminated against a darkened sky, the sphere might become lost without such an exact timetable.

The satellite will be fired from Patrick Air Force Base, Florida, some time after July as part of the celebration of the International Geophysical Year. A three-stage rocket will carry it 200 to 300 miles above the earth and start it on its rounds. The shiny magnesium ball, 20" in diameter, 20½ lbs., (see ID December '56) will be the first object to leave earth behind and exist in the outer reaches of space. To do this is must travel at 18,000 miles an hour. Once it slows down and falls into denser air, it will burst into flame. The satellite may last only a few weeks.

2 VITAL FORCES IN INDUSTRIAL DESIGN



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Bigger, sleeker tugboat launched

The first of two new tugboats rated as the most powerful harbor tugs in the United States was commissioned recently at Baltimore, Maryland. The "Kings Point," and her sister ship, the "Fells Point," soon to be completed by the Curtis Bay Towing Company, are designed with lines approaching those of a racing vessel to provide maximum speed and maneuverability. Powered by 16-cylinder ALCO turbo-supercharged diesel engines rated at 2100-hp, they are intended for the handling of large-tonnage ships such as ore-carriers and super-tankers, but can also be used in towing operations by virtue of their large unobstructed afterdecks, and can do ocean-going service.

Largest generator going up

The world's largest electric generating unit will be housed in a $58,000,000 power plant on the Wabash River south of Terre Haute, Indiana, the Indiana and Michigan Electric Company reported recently. Scheduled for completion in 1958, the generator is designed to have a capacity of 450,000 kilo-watts—73% larger than any unit operating today and capable of supplying the residential electric requirements of a city of four million people. The boiler for the plant will be as tall as a 23-story building, with a smokestack over 500 feet high, and will be supplied by a new coal-mine over a specially-built six-mile railroad.

The company expects its new plant to show an improvement of 5% in thermal efficiency over the world's best to date. It is also designed to occupy only a third more cubic space than units of half the power now under construction. Increasing unit size should bring considerable reductions in cost, as well, by the integration of savings in the components of the plant, the company said. An added opportunity opened up by the building of the mammoth unit is its greater adaptability and efficiency than smaller generators in the application of atomic reactors as energy sources, when these are sufficiently developed.

The turbine-generators for the Indiana and Michigan plant will be built by the General Electric Company and the boilers by the Babcock & Wilcox Company.

Events

The **American Management Association's** Calendar of Events for February through June lists more than 300 meetings, including large-scale conferences, workshops, seminars and courses. Coming up this month are the annual marketing conference (Feb. 4-6), at the Hotel Statler in New York, on the impact of a shift to a marketing concept in the selling field; a special conference on "Managing the Atom," also at the New York Statler on February 7 and 8; and the Finance conference, which will pay special attention to the electronics industry.

The **Pacific Coast Plastics Exposition** in Los Angeles March 18 through 21, held in connection with the National Conference of the Society of the Plastics Industry, will feature new products, processes and applications in the aviation, packaging, electronics and building industries. Robert W. Prescott, president of the Flying Tiger Line, and Brig. Gen. Thomas L. Bryan, Jr., USAF, Commander of the Wright Air Development Center, will be the two featured non-technical speakers.

The **National Institute of Managment's** winter and spring list of training programs in general management and industrial engineering have been announced. Courses will be held in Cleveland and information may be obtained from the firm's office at 1008 National City Bank Building, Cleveland 14.

The **American Society of Industrial Designers** will sponsor a symposium. "What Price Packaging?" at the Museum of Modern Art in New York on February 14. Egmont Arens will moderate, and designers Donald Deskey, Francis Blod, Robert Sidney Dickens and Walter Landor will participate in the discussion.

The speakers will be A. P. Bondurant of Glenmore Distilleries Company, Jinx Falkenburg—representing the consumer's viewpoint, and Dr. Charles Glock, Director of the Bureau of Applied Social Research at Columbia University, who will discuss packaging on a sociological basis.

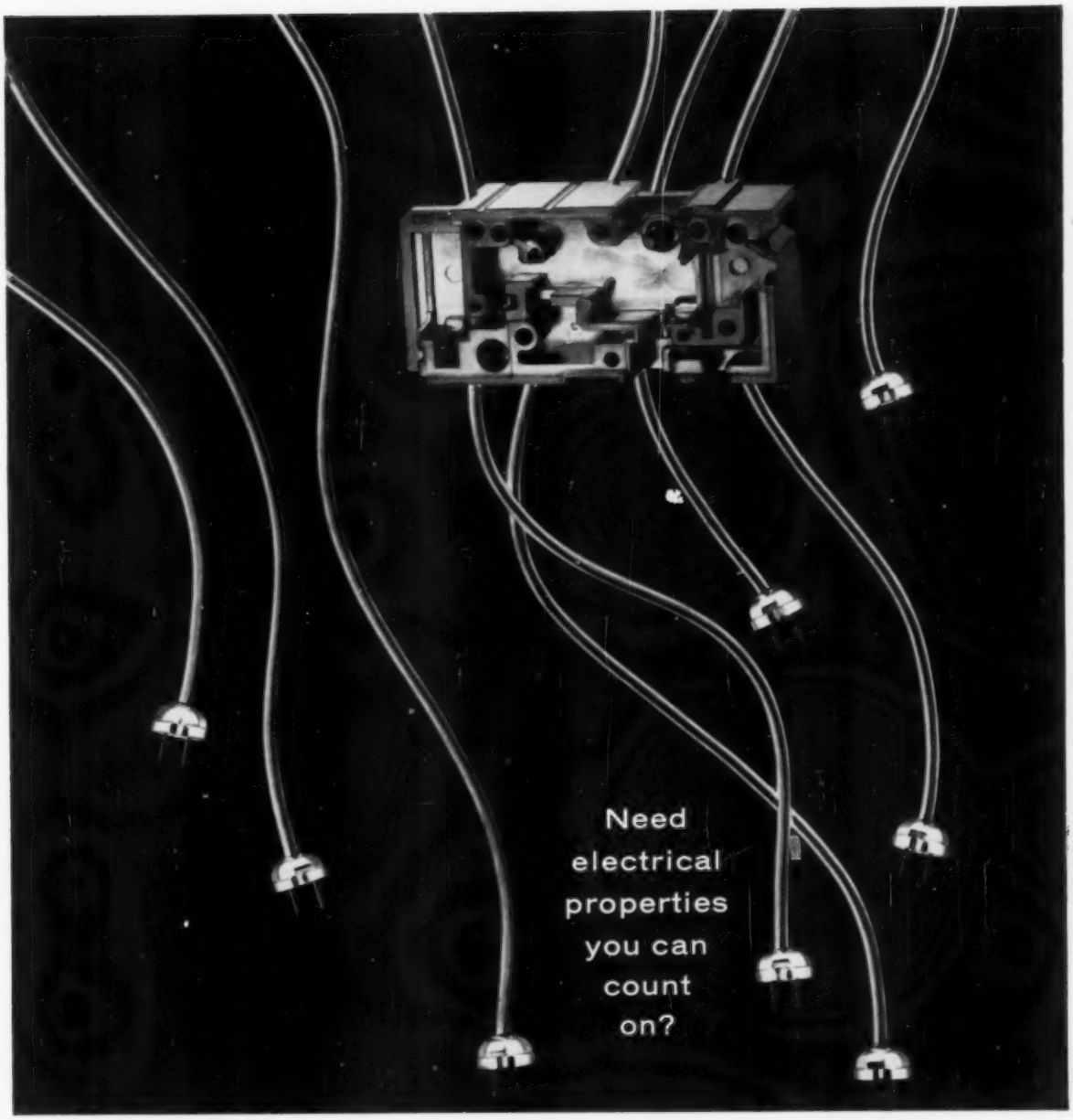
The meeting is planned in conjunction with the **Package Designers Council's** annual contest, winners of which will be announced February 15. Another ASID meeting on "The Future of Mass Produced Housing" is being planned for April 11, also at the Museum of Modern Art.

Seagoing parking lot to ship out

An 8,000 ton vessel designed for transatlantic hauling of loaded truck trailers and other motor vehicles will be put in operation at the Brooklyn Army Terminal. The 475-foot Carib Queen, converted from the incompleted hull of a government-owned LSD (landing ship dock) by TMT Trailer Ferry, Inc., will carry up to 92 truck trailers, 97 automobiles, and 500 tons of bulk cargo. The ship has been chartered by the Army Transportation Corps for three voyages to test shipment. Some half-dozen American steamship lines have been developing similar roll-on, roll-off vessels which would allow the military to be independent of conventional ports in an emergency.

The Boston Institute of Contemparary Art's "Job Opportunity Bulletin" is now soliciting subscriptions ($3 a year for individuals, $7.50 a year for organizations). Address: ICA, 230 The Fenway, Boston.

AMERICA'S FIRST supersonic bomber, the B-58 Hustler, combines delta-wing construction and four General Electric J-79 jet engines for operation at altitudes above 50,000 feet. Built by the Convair Division of General Dynamics Corporation, the plane is 95 feet long, has a wingspan of 55 feet, and carries a crew of three.



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German architecture sums up postwar achievement

Touring exhibit shows how architectural tradition has been modified to meet new conditions

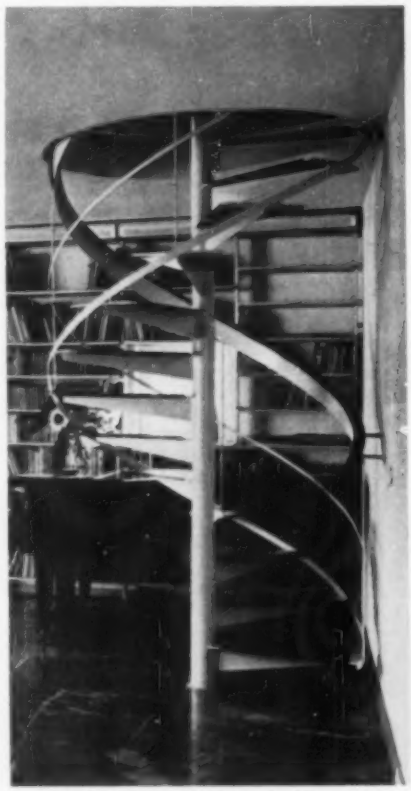
"German Architecture Today," a 151-photo exhibit of postwar German buildings, was shown in Washington in October by the American Institute of Architects. Prepared by the Bund Deutscher Architekten (League of German Architects), the exhibition indicates how the functionalist tradition has been modified in that nation's recovery from economic devastation.

The works of Gropius, Mies van der Rohe, Behrens and others who have influenced the present generation of architects serve as an introduction to the show. Against this background, the change from austerity in the first postwar buildings to refinement, and even luxury, in later structures makes a coherent pattern. Perhaps no item in the show better illustrates this development than Herman Mackler's house in Frankfurt (2, 4). Though it makes use of a variety of materials (Brazil wood and glass outside, marble and brick within), it manages to suggest—through the abstract geometry of its spiral staircase—that economy, too, can generate its own elegance. Similarly, the Evangelical Church at Ubach-Palenburg (3) by Fritz Gottlob Winter is built and decorated on a modest scale, yet shows that light can be spiritualized by glass bricks as well as by stained glass. Among the wide variety of buildings included is the plant exhibition house by Bernard Hermkes (1), which creates variety with simple means: the framework of rolled section steel forms a parabolic dome glazed without putty.

Larger projects include the much-discussed giant garage at Dusseldorf (5) by Paul Schneider-Esleben, in which reinforced concrete trestles are used to suspend the parking floors and ramps.

The show is being circulated in many American cities by the Smithsonian Traveling Exhibition Service.

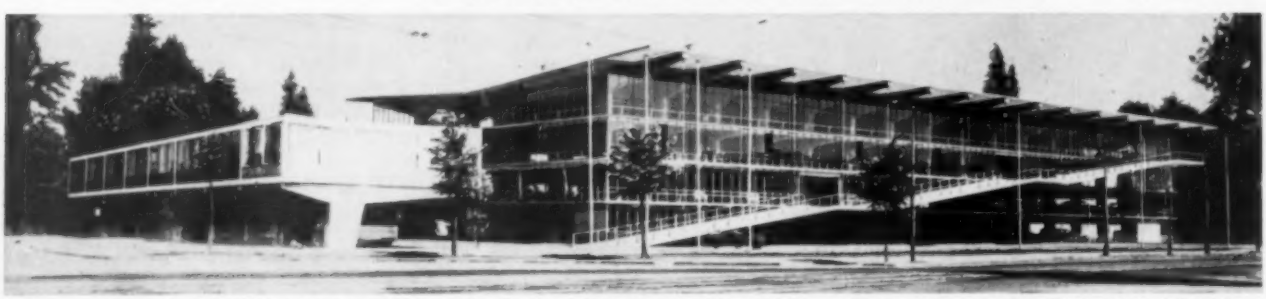
1. *Plant exhibition house by Bernhard Hermkes adds tent-like flaps to glazed dome*



2. *Spiral staircase by Mäckler (Frankfurt)*

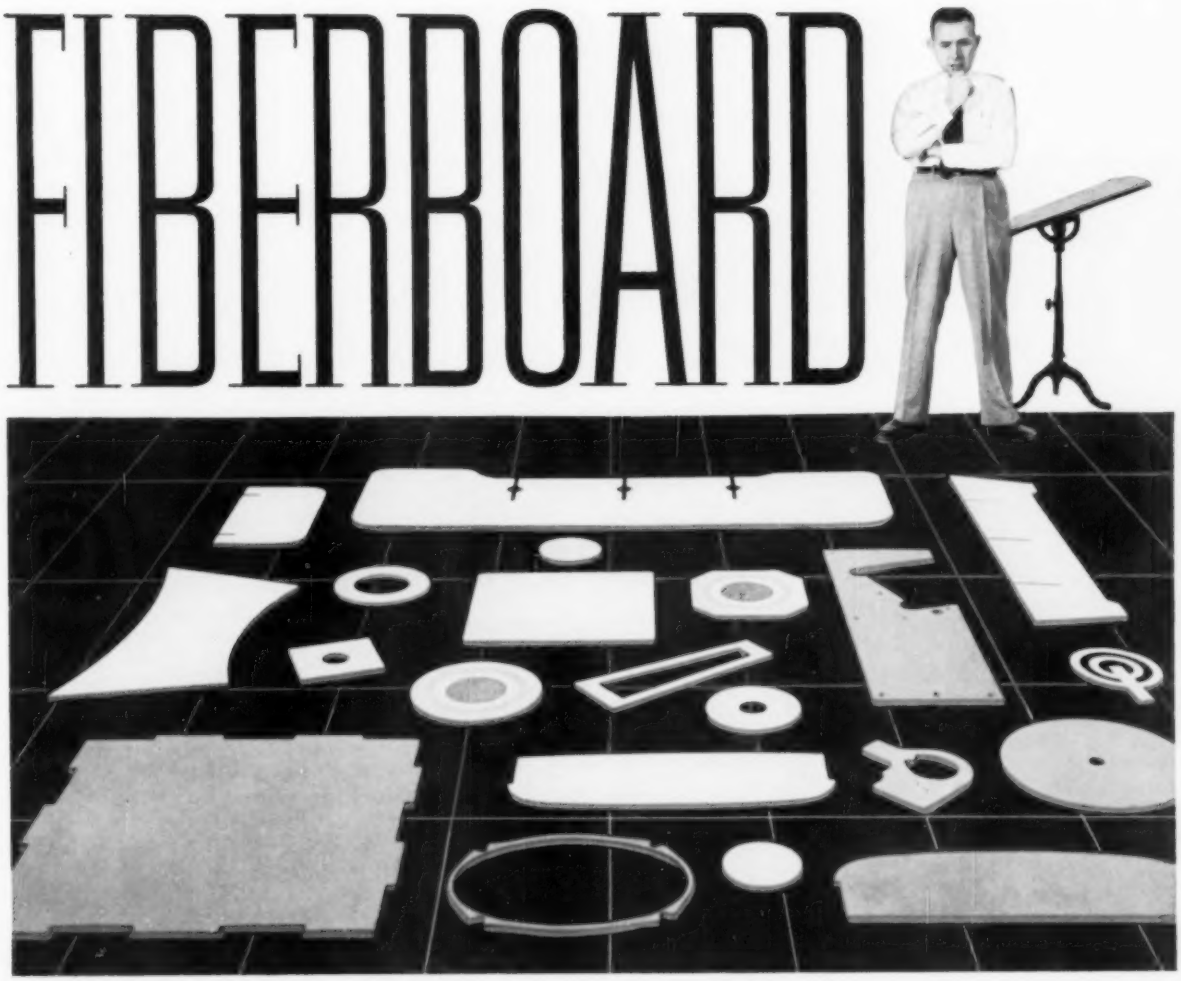
3. *Evangelical Church by Fritz Gottlob Winter*

4. *Mäckler's Frankfurt house from garden*



5. *Giant garage and small hotel by Paul Schneider-Esleben feature massive trestles, exterior auto ramp to full height of building*

FIBERBOARD



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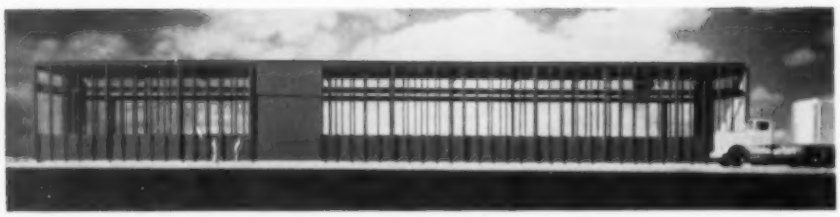

Prizewinning rendering of proposed plateshop by Jacques C. Brownson

Awards

The Fourth Annual Design Awards Program sponsored by **Progressive Architecture** magazine has been concluded, and an award citation in the Industrial Category went to **Jacques C. Brownson** for his design of the proposed plate shop for Allied Lead Construction Company in Chicago (above). Difficulties in properly bracing the building without destroying the architectural concept were ingeniously solved by structural engineer Thomas G. Morrison. The award-winning projects were selected by a jury including architects Marcel Breuer, Gordon Bunshaft, Huson Jackson and Harry Weese, and engineer Emil H. Praeger.

The **American Society of Tool Engineers** has established the Annual Eli Whitney Memorial Lecture Series as an honor to outstanding contributors to industrial progress. The first lecturer will be **Louis F. Polk**, vice president of Bendix Aviation Corporation, who will deliver his address to the Society's coming Houston meeting

The **Lawrence Sperry Award** of $250.00 for significant contribution to automatic flight control systems has been awarded to **George F. Jude** of the Sperry Gyroscope Company.

Contests

Nominations are now open for the 1957 Doehler Award, which recognizes outstanding contributions to the die casting art. The Award, consisting of a plaque and a cash prize of at least $500, is made by the **American Die Casting Institute.**

A student contest in original usages of woven wire cloth, with prizes ranging from $50 to $150, is being sponsored by the **New York Wire Cloth Company**, York, Pa. Closing date is April 30.

People

G. Harold Hart has joined the staff of Dave Chapman Industrial Design.

Robert Wolaver has been appointed to the industrial design division of J. M. Little and Associates.

The *Hartford Courant* recently described how the establishment by **Jens Risom** of a furniture factory in North Grosvernordale, Connecticut started that town back to employment after its only important factory had been shut down.

Design Research Unit of London has been appointed to design the British Electrical and Allied Manufacturers' Association exhibit at the Brussels Universal and International Exhibition in 1958.

Designer **John Vassos** has formed an association with architect T. H. Yardley; among their first projects are a New Haven Railroad station and footbridge at Larchmont, N. Y. and a beach pavilion for the city of Stamford, Conn.

Leon Gordon Miller was guest speaker at a General Electric Company conference on Christmas lighting in New York January 8.

Michael Melack has recently resigned as chief designer and supervisor of design of the Television-Radio Division, Westinghouse Electric Corporation.

Dr. Stuart F. Faunce was named Director of New Product Development by the **John Wood Company.**

The **Lewyt Corporation** is experimenting with a vacuum cleaner about the size of a shoe box whose dirt collection will have to be removed only once in one or two years.

The **Radio Corporation of America** is applying the principles of its electronic refrigerator to an air conditioning system that will both heat and cool rooms from large areas of the walls.

"Closed circuit television will eventually outstrip entertainment television in importance," said Colonel John R. Howland, General Sales Manager of the **Dage Television Division of Thompson Products, Inc.** Dage is currently installing what it claims is the world's largest closed-circuit television network in New York's Pennsylvania Railroad Station. In line with this prediction, the **Upjohn Company**, pharmaceutical manufacturers, have acquired 33 large-screen projection television systems from **General Precision Laboratory.**

Bendix Aviation Corporation recently acquired the business and assets of the **Sheffield Corporation,** manufacturers of measurement and control systems.

Wolaver

Hamlin

Thomas

Faunce

Company news

Conde Hamlin, president of the DeWalt subsidiary of **American Machine & Foundry Company**, has been appointed deputy group executive of AMF's General Products Group.

A $1,500,000 civil anti-trust action was filed against the **Sperry-Rand Corporation** by **The Narda Corporation** as a counterclaim to Sperry-Rand's suit against Narda for alleged infringement of radar patents.

Philco Corporation has filed a $150,000,000 suit against Radio Corporation of America, General Electric Company, American Telephone and Telegraph Company and two of the latter's subsidiaries, charging them with violation of the anti-trust laws in the operation of a "patent pool" in the radio, television and electronics industries.

ACF Industries, Incorporated will supply Italy with a heavy-water research reactor —the first sale of an atomic reactor abroad by a U. S. firm, it reported.

Albert G. Thomas, holder of many patents for electrical and mechanical engineering developments, has been appointed Research Consultant by **The Teller Company.**

"Because of the industrial use of atomic energy and the development of greater manufacturing flexibility, coupled with higher productivity, it will be economically sound and physically possible to build goods better and faster with smaller plants," predicted Ralph E. Cross, executive vice president of **The Cross Company.**

Philco Corporation will guarantee its all-transistor home radio for five years, due to the fact that long-lived transistors now replace vacuum tubes in the set.

Plastics production passed the four billion pound figure last year, **The Society of the Plastics Industry** estimated recently. Production increased by 10% over 1955.

The lamp industry enjoyed its biggest volume year in history in 1956, said Donald L. Millham, vice president and general manager of the **General Electric Company Lamp Division** in a year-end review.

Stephen F. Keating, vice president of the Aeronautical Division of **Minneapolis-Honeywell Regulator Company**, said that the aircraft controls and instruments industry will supply a record-breaking $1.5-billion of automatic systems in 1957.

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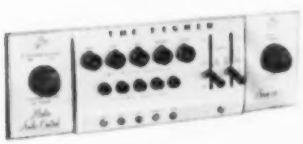

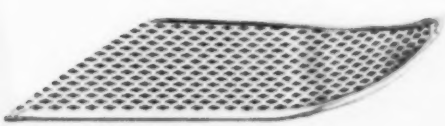

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Designer Albert Sokol talks plastics:

"Molding plastics, in comparison to working with other materials, is comparatively simple. From a drawing, I make a clay mockup. From there, it's one step—making the die—until the end result is seen. Eliminated are the steps of cutting, grinding, milling, and drilling that would be necessary in working with metals. It is extremely gratifying for a designer to be able to see the end result, and in several colors, in a single day," says Albert Sokol, Art Director and Designer, Channel Master Corporation, Ellenville, N. Y., world's largest manufacturer of TV antennas.

"A designer's responsibility is to create articles that are functional, have suitable strength and still please the eye. By using plastics, it is much easier for a designer to fulfill this function. The day of using plastics primarily as an economical agent is passing. Today, manufacturers are taking advantage of its aesthetic qualities.

"Developing our new Channel Master 'Showman' indoor TV antenna was a problem of electricity and aesthetics. Our research engineers did their job by compressing the shape into a unit that had greater efficiency. Then, designers utilized the shape, color and finish offered by plastics. *Vogue* magazine said that our 'Showman' antenna was 'the most eye-appealing indoor TV antenna ever designed.' I feel the endless possibilities of plastics allow designers in all fields to run the gamut of imagination."

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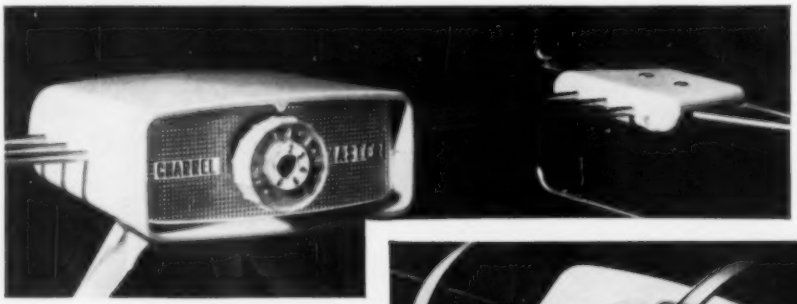

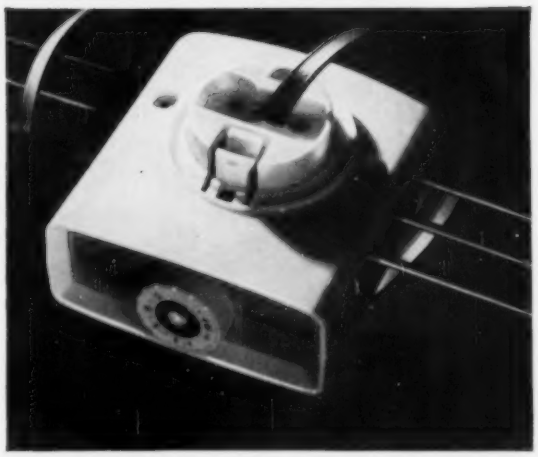

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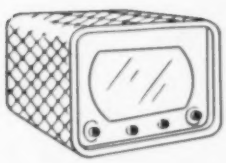

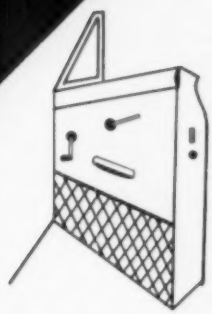

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DESIGNING WITH ALUMINUM

This is one of a series of information sheets which discuss the properties of aluminum and its alloys with relation to design. Extra or missing copies of the series supplied on request. Address: Advertising Dept., Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California.

NO. 23

JOINING ALUMINUM TO COPPER AND STEEL

When aluminum must be joined to other metals, particularly copper or steel, virtually any metallic bonding process may be used. The most desirable process for a particular application depends on considerations of cost, speed of production or service requirements of the finished joints.

Of course, in all construction involving dissimilar metals joined together or in close proximity, care should be taken to minimize the possibility of galvanic corrosion.

Small Electrical Connections

The electrical industry has found that small connections between aluminum and copper can be made using ordinary soldering iron techniques and common solders selected for the specific application. In simple soldered joints such as these, tin and tin-zinc solders are most commonly used.

One automotive manufacturer uses a resistance soldering technique for joining aluminum to steel in its car's electrical system. An aluminum wire is staked in a slot cut into the top of the steel stud to which it is to be connected. Flux is applied to the contact area and the head of the stud heated by two copper electrodes located on opposite sides of the joint. A pure tin solder is then applied manually to the joint area. A subsequent water quench also serves to remove flux residues.

Heaters and Engine Radiators

In the automotive field there has been an increasing interest in the use of soldering for joining brass and aluminum parts in heaters and engine radiators.

The cellular type of construction used in heater cores lends itself well to dip soldering techniques. The assembled core may be dipped in a reaction flux before furnace heating to 600F. The face of the assembly is then dipped ⅛ inch into a 750F solder bath. By capillary action, the solder rises half way through the thickness of the core. After the back of the assembly is dipped, the core is cooled and washed with water.

The tube-fin and cellular-tubular radiator constructions can be assembled by furnace soldering (see figure 1). In this method, the brass tubes are coated with a 20% tin-80% lead solder before the core is assembled. After assembly, the cores are fluxed and heated for two to four minutes in a 750F furnace. Flux residues are then removed by a water wash.

In both the dip soldering and the furnace soldering methods, conventional procedures used in making copper radiators are followed. For heater cores and engine radiators, tin-zinc base solders are finding the most favorable acceptance.

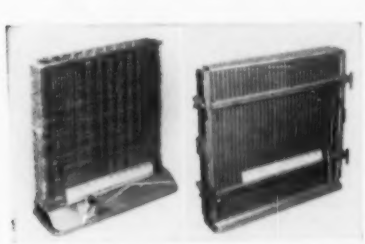

FIGURE 1. Furnace soldered aluminum-brass radiators. Left, aluminum fins, brass tubes. Right, aluminum cells, brass tubes.

Electrical Conductor and Connectors

Sound, strong joints are now being made by pressure welding single strands of aluminum to copper wire. On wire up to about ⅛ inch in diameter, this is done with hand tools resembling wire cutters. Very much larger sections are also joined by pressure welding, using larger power operated equipment.

A recent Kaiser Aluminum research development uses either pressure or flash butt welding to join the bases of elongated aluminum and copper cups. The ALCUnector,* as this new device is called, is believed to be the most corrosion resistant and efficient connector yet devised for joining aluminum and copper electrical conductors.

FIGURE 2. The ALCUnector consists of elongated aluminum and copper cups whose bases are butt welded together as shown in this cross section. A dielectric ball is then molded around the joint to minimize galvanic action between the two metals.

Made in a wide range of sizes, the ALCUnector is compact, easy to use and as strong as the conductors it joins. Its design is the reason for its success, and the welded joint is an important part of the design. The ALCUnector structure and method of making same are protected by patent rights of Kaiser Aluminum & Chemical Corporation.

Bus Bar Connections

The use of aluminum electrical bus is becoming standard in production plants and other large installations that consume large quantities of electricity. In these heavy load electrical systems, it is frequently necessary to connect aluminum bus to copper or steel. Whenever there are extremes or moderate fluctuations in temperature, bolted connections may be unsatisfactory.

To solve this problem, special joint designs and welding techniques have been devised by Kaiser Aluminum welding research engineers. Figure 3 shows how some of these welded connections are designed. The welds must be made with a moderate amount of care.

There are several ways by which these joints can be made, but one of the

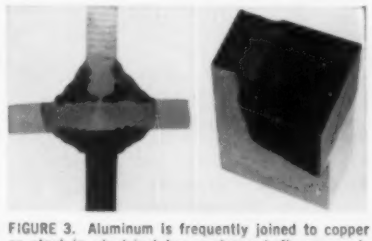

FIGURE 3. Aluminum is frequently joined to copper or steel in electrical bus systems. Left, copper is braze-welded to aluminum in a double Tee joint. Right, aluminum and steel are braze-welded. In neither case is the copper or steel melted during joining.

*A registered trademark of Kaiser Aluminum & Chemical Corp.

best methods is a braze-welding technique.

In the braze-welding of aluminum to copper by the consumable electrode, inert gas welding technique, the copper is first "tinned" with a coating of silver solder in the joint area. This silver solder layer is applied to prevent the formation of a brittle aluminum-copper alloy at the joint. The arc is then directed on the aluminum in the joint area in such a way that it does not bear on the solder-coated copper.

When joining aluminum and steel, a zinc-aluminum solder should be used for coating the steel in much the same way that silver solder is used on copper. Or it may be applied by a hot dip or galvanizing technique. The joint is then gas welded or brazed.

In either type of joint, keys cut in the copper or steel help to add strength to the joint. This type of joint eliminates the problem of differences in thermal expansion. It has given excellent service at operating temperatures up to 500F. The braze-weld joint and method of making same described herein are protected by Kaiser Aluminum & Chemical Corporation patent rights.

A GENERAL GUIDE FOR SOLDERING ALUMINUM TO COPPER AND STEEL

Application	Soldering Method	How Solder is Applied	Solder Used	Type of Flux Used
joining aluminum cable to copper lugs	dip soldering torch	by solder bath manually fed	30 tin–70 zinc 60 tin–40 zinc	zinc chloride type zinc chloride type
intricate assemblies (e.g., brass tube aluminum fin automotive radiators)	furnace	tubes precoated with solder	30 tin–70 zinc	zinc chloride type or hydrazine type
joining steel tubing to aluminum sheet (e.g., refrigerator evaporator plates)	furnace	tubes precoated with solder	95 zinc–5 aluminum	zinc chloride type
joining aluminum generator field coils to cadmium coated steel pins	resistance	manually fed	pure tin	organic boron trifluoride type
joining aluminum to zinc castings	torch	manually fed	82.5 cadmium–17.5 zinc	zinc chloride type
thin sections (e.g., aluminum pigtails to copper tabs)	iron	manually fed or sections previously "coated" with the solder	34 tin–63 lead–3 zinc	zinc chloride type or organic boron trifluoride type

FIGURE 4. Ultrasonic welding units look much the same as spot and pressure welding equipment. However, the principle is entirely new to welding and is expected to find wide use in the future.

Thin Sections of Aluminum and Copper

Ultrasonic welding is a new technique that will undoubtedly find wide use in the joining of thin sheets of aluminum and copper. This process, effective on sheet up to 0.040 inches thick, uses ultrasonic energy to break up the oxide film on the metal surfaces being joined. A small amount of pressure then completes the weld.

In this type of welding there is no "heat-affected zone" flanking the joint, and the original tempers of the metals are retained.

These are but a few of the many applications in which aluminum is being joined metallically to copper or steel. For further information or assistance in techniques for joining these metals in your own applications, take advantage of the wide design experience offered by Kaiser Aluminum engineers. Their information or advisory service is available, upon request and without obligation, to any manufacturer interested in these metal joining processes.

Contact the Kaiser Aluminum sales office or distributor listed in your telephone directory. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois; *Executive Office*, Kaiser Bldg., Oakland 12, California.

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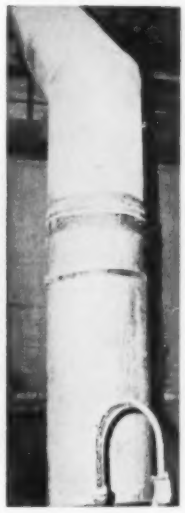
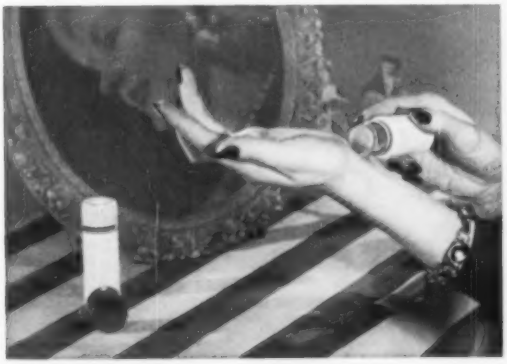
PLASTICS NEWSFRONT

THREE YEARS IN CORROSIVE SERVICE WITHOUT MAINTENANCE

That's the record established by reinforced LAMINAC® polyester resin in venting service on alum digesters at Cyanamid's Warners plant. The carbon steel breech (left) in an alum evaporator required frequent maintenance, failed after less than three year's service. Glass-reinforced LAMINAC stacks (right) in even more severe alum digester service, have needed no maintenance in more than three years. The LAMINAC units cost less in the long run, and were easier to erect and assemble, using either telescope joints wrapped and polyester-welded on the site, or flange-type joints.





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Six new scents of Avon Stick Cologne are packaged in smartly styled, practical cases molded of BEETLE® urea molding compound. Cases have a white base with contrasting closures in a different color for each scent. Airtight, the BEETLE case stops evaporation of the cologne. Yet the closure opens easily, and with a twist of the wrist the stick pops up for use. The case resists alcohol, essential oils and chemicals as well as staining from perspiration and grime, which wipe off easily.

FUNCTIONAL HANDLES GRACE CARAFES

Any dining or buffet table would be graced by this attractive carafe with its stylish, beige-colored handle molded of CYMEL* melamine molding compound. Elegance and function are combined in the handle, balanced for easy, comfortable pouring. Harmonizing with the carafe's gold decoration, the molded-in color won't chip or wear off. In keeping with its function, CYMEL is exceptionally strong, resistant to heat and flame, and stays cool even when the carafe, made by Club Aluminum Products Company, is full of hot coffee. *Trademark

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** *Quoted from Jens Risom, I.D.I., Jens Risom Design, Inc., New York, N. Y., statement in Industrial Design magazine.*

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CORNING GLASS BULLETIN

FOR PEOPLE WHO MAKE THINGS

Practical pampering

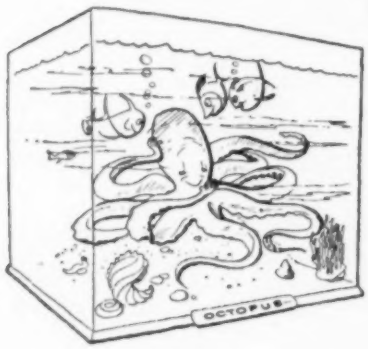
At Marineland of the Pacific, Palos Verdes, California, you'll find a tank of contented, though captive, cephalopods.

But life was not always rosy for these octopuses. (Cephalopod is the order to which octopuses belong.)

Time was when the aquatic zoo keepers at Marineland were octopus-deep in trouble. It began with trying to provide water cooled to the same temperature as the natural environment of an octopus.

Turned out that the heat-exchanger system left copper pickup in the cooled water. And copper is death to octopuses. A concentration of 0.04 parts per million will snuff out the life of an octopus in about two hours. With the going price of about $100 the head, that's a lot of money if you let copper stay in the plumbing.

But the octopuses now happily cavort the day long in water that's cool and pure. The answer—three Corning Glass Works PYREX brand Shell and Tube Heat Exchangers.



O.K., you don't own (or intend to acquire) a pet octopus that needs pampering. Still, there's considerable to be learned from a practical standpoint. To wit—there might be a PYREX brand glass that will answer that knotty problem you're working on right now.

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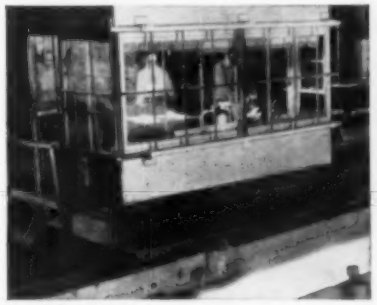
Or, spell out exactly what you need in terms of your problem and let us see if we can't come up with a *glass answer.*

Helping hand in "hot spots"

That's a *glass* shield you see in front of the steel mill shear pulpit operators in the picture.



The glass is a PYREX brand infrared reflecting type. It's heat-resistant, chemically stable and coated on one side with a thin, transparent film of metallic oxide.

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Details on all these (along with facts about blue observation glass and the astounding VYCOR brand glass No. 7900) are summed up in the revised version of our Bulletin PE-34. Get a free copy and be set to lend a helping hand in "hot spots."

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Dampness is no laughing matter to museum keepers—or for that matter for makers (and users) of TV sets, pianos, and such.

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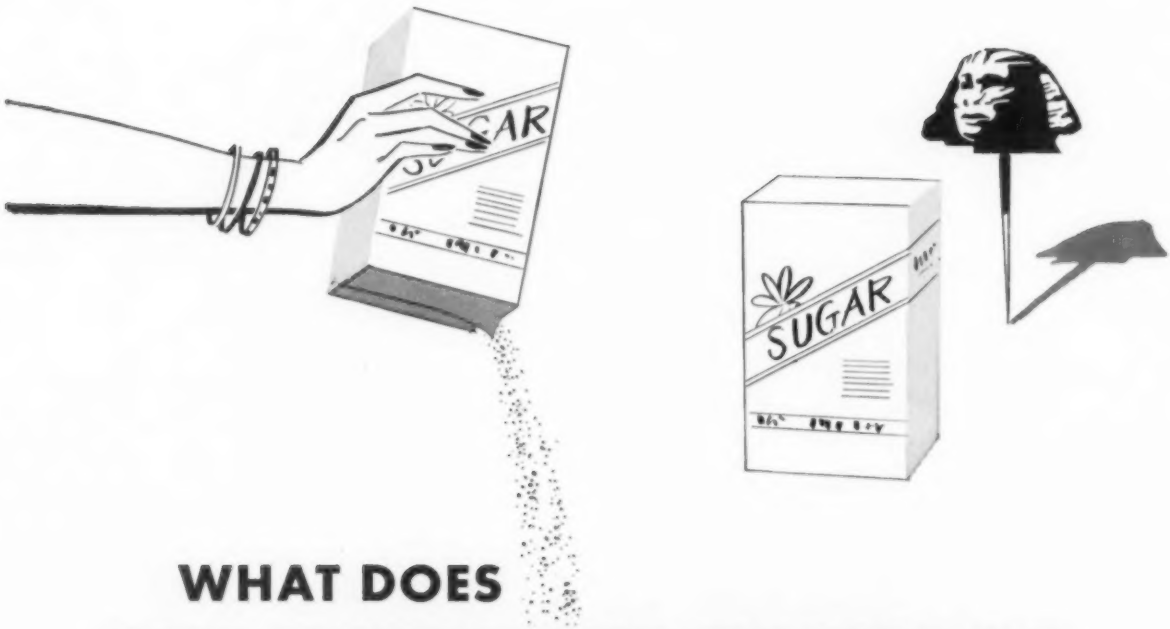

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Afterthoughts on the automobile symposium

The symposium on "Forecasts from Detroit," sponsored by the A.S.I.D. in connection with the 1957 National Automobile Show, offered an opportunity for the design profession to hear five top stylists discussing America's favorite subject. It also suggested some questions that never seemed to get voiced . . .

It is no small assignment for a designer to discuss his work in full view of God and his public relations men; when he must defend it against barbed questions from his colleagues there is even less chance for profound discussion; the auto symposium did not encourage it. TV's Dave Garroway, elected as interrogator, cheerfully posed such questions as **"Are cars going to get bigger or smaller?" "How will air conditioning affect the car?" "Can we expect drastic innovations soon?"**

Judging by questions from the floor ("Where can I get a station wagon without chrome?" "How much will European design influence the American car in the next decade?"), there was no desire on either side for a meeting of minds. We left feeling disappointed, not at what had been said, but at questions not asked and views not volunteered.

Since forecasts were the subject of the evening, here are some of the prognostications offered by five executives of a major industry:

Robert Maguire (Chief, Advanced Styling, Ford): There will be a new relationship of hood, body and deck.
William Schmidt (Vice President, Director of Styling, Studebaker-Packard): A new rail-type highway system, with power supplied by an outside plant, could be introduced for greater safety.
Edmund Anderson (Director, Automotive Styling, American Motors): We shall see the emergence of three basic cars—the personal or sports car, a compact car, and a long-distance family car.
Carl Reynolds (Assistant Director of Styling, Chrysler Corp.): The need for a special long-distance car may increase—virtually a living-room on wheels.
William Mitchell (Director of Styling, GM): The consumer is becoming increasingly conscious of style, safety, and comfort.
Maguire: Luxury cars will continue to be the desire of the average person..
Reynolds, Maguire, and Schmidt: Cars can be lower if we solve certain problems, like steering, entrance, and getting power from front engine to rear wheels.
Schmidt: There will be more sculptured metal to accent car lines, offering new styling possibilities.

As they talked, we found ourselves wondering if these important panelists fully appreciated their impact on the economy, on the environment, on American life and death and its scale of values. Several of their most interesting ideas were never actually spelled out, presumably because Detroit regards them as truisms. These unvoiced conclusions raise a series of questions in our minds.

When styling came under discussion, the panelists as a body implied that the consumer is responsible for the car as it is today—he wants it to be "big and stylish" and doesn't fasten safety belts if he buys them. **Is it good sense for our major industry to let the consumer bear responsibility for product and planning?**

On the face of it, obeisance to the consumer seems like a democratic way to run an industry—and a profitable one. But, putting it another way, **Is the consumer capable of directing our major industry by his purchase vote?** We also question the basic assumption. **Does the consumer in fact design the car? Or does he merely react to the dazzle of the only design he knows?**

We don't question one fact: the automobile is a very special product in our society. Its ability to perform a critical function—to provide individual transportation for large numbers of people—is no more important than the value function it has taken over. The car is bought for the pleasure of possession: it gives us pride and power; it means more psychological satisfaction than almost anything else in our buying power.

Given these facts, **is there a reason why Detroit presses its annual surface changes on cars that are unclear in their original concept? Is the industry willfully building up a taste for the sugar coating on a basically tasteless product?** We don't charge the designer to "raise public taste," but neither should he discredit design at the level where it is valid. A stylist can defend his work as popular design, but there is a difference between good popular design and bad popular design. **Has it ever been realistically proved that we consumers won't buy a car that is well designed from start to finish?** *(continued overleaf)*

It was suggested that sales depend heavily on annual styling changes. One panelist remarked, "Changes are introduced slowly each year to protect the customer's investment in his present car—to make him dissatisfied but not disgraced." Aside from the fact that this reduces the consumer to a cog in the economic system that is supposed to serve him, it represents a delicate balance indeed. **What would happen if minor changes failed to spark the consumer's interest for three years in a row?**

Other remarks by the panel suggested that stylists depend on technical progress, on new production methods, to open the door to styling changes. But **are the stylists looking for opportunities in the provinces where they have major control—the total concept of the machine that transports humans?** The Detroit stylist, more than any other designer, has his way with technology. Research and engineering pursue the goals **he** selects. **Are lower cars and curved windows the stylist's most important goals?**

There were several references to radical changes in our mode of transportation that might open up "new styling possibilities"—overhead rails and powered roads, for instance. Designers' dreams, we were told, but they raise a question nevertheless: **Is the automobile here to stay? If technology promises revolutionary modes of transportation, are they only avenues to bigger and better styling?**

Certainly they have another meaning for our planners. **If radical changes are actually in view, hadn't we better plan for them?** Detroit is not unaware of its increasingly chaotic effect on population centers. One panelist remarked, "Architects should make cities to fit the automobiles people want, not cut down automobiles to fit the cities." He may be right. But we see no sign that Americans are ready to abandon their cities; we are still investing millions in the most crowded of them. **If Detroit, with its vast knowledge of the automotive age and the industry's future, concludes that our present building patterns are already outmoded, shouldn't it let the rest of us in on this foresight?**

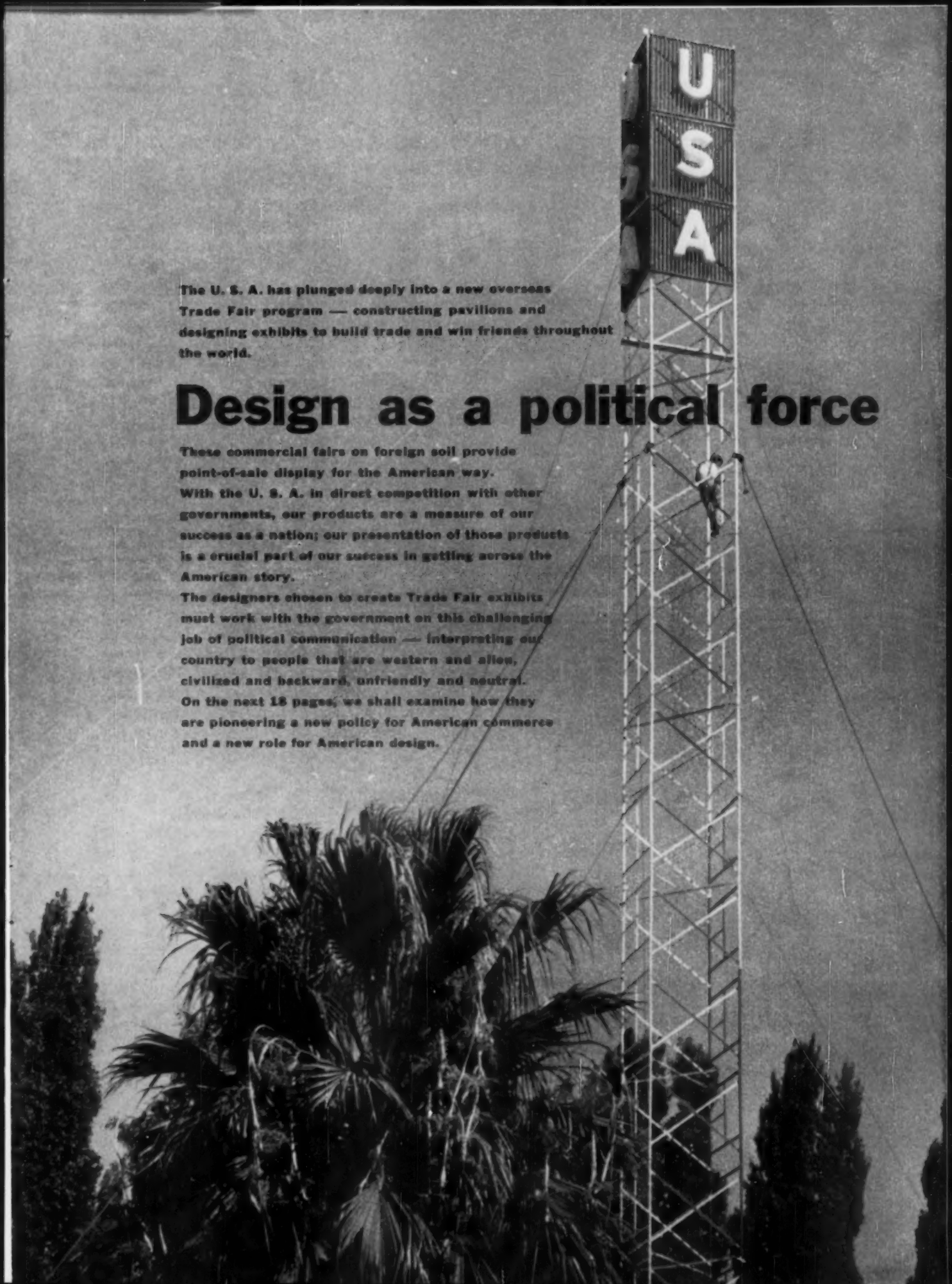
The postwar auto boom has made one thing clear: the automobile is no longer an isolated "product" that can be conceived and designed in units of one; it is part of a vast system that involves our countryside, cities and people. The future of the auto industry ultimately depends more on the comprehension and design of that system—whatever it will be—than on the styling of the product.

Who is capable of reconciling city and car? The city planner lacks resources for major experimentation. There is hardly a city that is not dwarfed by Detroit's productive power and the army of her customers; no town, state, or region is equipped with enough organization and vision to defend what remains of order against a world on wheels.

We have been called a nation "All dressed up with no place to go." **Is Detroit concerned with keeping the USA from running out of space, from burning up our reasons for enjoying unlimited mobility?**

The responsibility that faces Detroit is not limited to landscapes and freeways and products to move people around. Automobiles today, the most visible construction on our horizon, affect our entire visual environment and pentrate deeply into our sensibilities. **If the car industry recognizes its weight in keeping the economy healthy,** as the panelists seemed to imply, **should it not accept the consequences of its size and success in other human areas as well?**

No one expects the industry to create products the customer won't buy. And no one can expect the industry alone to answer the questions we all must ask. But by facing up to them in future planning, it can help everyone else find solutions. The car industry has the greatest resources for problem-solving in the nation —enormous manpower, technical resources, brainpower, research facilities, and contacts with the American marketplace. What it faces is a design problem of a scope our biggest industry has never yet known. This brings us back to our first question: **Can the auto industry dare accept its answers from the individual customer buying his annual dream car?**—d.a., j.f.m.



The U. S. A. has plunged deeply into a new overseas Trade Fair program — constructing pavilions and designing exhibits to build trade and win friends throughout the world.

Design as a political force

These commercial fairs on foreign soil provide point-of-sale display for the American way. With the U. S. A. in direct competition with other governments, our products are a measure of our success as a nation; our presentation of those products is a crucial part of our success in getting across the American story.

The designers chosen to create Trade Fair exhibits must work with the government on this challenging job of political communication — interpreting our country to people that are western and alien, civilized and backward, unfriendly and neutral. On the next 18 pages, we shall examine how they are pioneering a new policy for American commerce and a new role for American design.

pros and cons

by Jane Fiske Mitarachi

U.S. EXPANDS ROLE IN TRADE EXHIBITS

American Way to Be Shown at Fairs in Many Areas, Including One in Poland

The United States' program of official participation in international trade fairs became a "going business" last year.

Since its initiation by President Eisenhower just over two years ago, the project's dual aim has been promotion of two-way trade and better understanding of United States. Central exhibits and trade missions provided the method.

At the start, the United States was an uncertain newcomer to the foreign trade-fair circuit. For long it had been conspicuously absent from the great international exhibits in which other nations gained profit and prestige. The Soviet Union and other Communist countries for long have found them a ready-made propaganda medium.

Until recently, the new trade-fair program of the United States was on a temporary basis and a slim budget drawn from the President's emergency fund.

Under direction of the Commerce Department's Office of International Trade Fairs, and with substantial cooperation by American industry, the program's record is an impressive one. In relatively short time, the United States has become an "old pro" at trade-fair productions. To date it has participated in forty-five fairs.

Techniques Perfected

Last year, it perfected its techniques with participation in nineteen fairs. Ten more are on the schedule for the first half of 1957. This year, for the first time, the program will reach behind the slightly unhinged Iron Curtain with an official United States exhibit in the International Trade Fair at Poznan, Poland, June 9 to 23. It was during this fair last year that Polish rebellion against the Soviet Union first flared forcefully.

Last July, Congress made the trade-fair program permanent and provided it with a current fiscal year budget of $3,650,000, its highest to date.

Most of this is used for what the President has called "seed money," to create the basic central exhibits that provide the means for cooperative participation by private American business.

Some of the exhibits, which have drawn a total of some 30,000,000 visitors to date, have featured typical American homes, voting machines, "atoms for peace" applications, United States farm production, "do-it-yourself" workshops, American art and design, electronic devices and automated factories.

The central exhibit provides not only a means by which private business may display appropriate products but is also a main attraction to which individual private exhibits throughout a fair may be keyed. This "tying in" with the official exhibit also multiplies indentification of United States products elsewhere in the fair. So far, about 2,500 private concerns have contributed or loaned goods and display materials for the

New York Times, January 3, 1957

of America's program to win friends and

The clipping at the left was published only a month ago, some 30 months after the start of a crash program for American participation in overseas Trade Fairs. Since the original exhibit in Bangkok in December, 1954, the Department of Commerce's Office of International Trade Fairs has engaged designers to create a total of 45 exhibits of American wares and American ways in countries from Yugoslavia to Afghanistan. That these exhibits have been totally successful has never been doubted by the American press, which has published numerous enthusiastic reports, like the one in *Time* in 1955: "Last week more than 30,000 visitors a day poured through the gates to see the first TV show ever broadcast in Indonesia. The U.S. Exhibit, from an aqua-green Thunderbird to an automatic voting machine . . . easily outdazzled competition from Red China. . . ."

The whole matter of U.S. participation in these shows is full of novelties. It has made the government an important client of the design profession; it has given industrial designers — who have done much to create the American scene — an enormous challenge in presenting that scene to people abroad — a challenge verging at times on foreign policy planning. And it has opened up a series of questions about the purposes of our participation and the effectiveness of the shows we have sent abroad. Have they really "outdazzled" the competition, and does design dazzle make successful shows in the terms that the government now employs them?

What IS a Trade Fair?

Literally dozens of Trade Fairs take place all over the world every year. A Trade Fair, on a large scale, is to European and Asian business roughly what the Housewares Show is to the small appliance industries — a week's chance to buy and sell and vie for competitive advantage. One difference is the fact that Fairs are international: with countries of the East and West competing for commercial leadership, competition has taken on a particularly strong flavor. Another difference is the audience: most Fairs, open to the public, are a good free show for the people. They are attended both by businessmen and by workers and farmers and others who, having virtually no hope of owning the goods on display, come out of curiosity — an impressionable curiosity. What they see may represent to them either fantasy or frustration.

The U.S. government makes no bones about the fact that the prime mover in its new program was Russia. Alarmed that Russia had peddled its goods at 133 Fairs in four years, while U.S. exhibitors stayed home, the President obtained a grant in 1954 to build

influence nations through Trade Fair exhibits abroad. Are we doing our best?

trade and good will on the world Fair circuit. In its first year, more than 12,000,000 visitors in 15 countries saw the American exhibit, while 25,000 trade inquiries were received from foreign businessmen. In July, 1956, after 18 months of experimentation, Trade Fairs were given a permanent status by an act of Congress. This year's appropriation was $3,650,000, and the 8 fall exhibits alone drew 4,000,000 observers.

America's motives at the Fairs

There is little doubt that measurable trade is only part of what the U.S.A. wants from its overseas exhibits. Other exhibiting nations do need, and expect, to sell merchandise; the U.S.A. wants and needs to establish its influence in politically uneasy countries, to promote capitalism as a system superior to communism. The first goal, then, is eminently political despite its commercial garb. In the process of conveying this message, an exhibit also does a good deal to stimulate trade for industry at home, both through its central national display and through parallel side shows that private business may sponsor. Business has, in fact, been deeply involved in the entire program: over 3,000 concerns have contributed material for the exhibits to date, and some firms have sent executives as part of the trade teams that accompany each exhibit, to instruct foreign businessmen how to sell to U.S. markets. The final purpose is to promote general good will among our foreign neighbors — again, a goal seemingly much closer to the aims of the State Department than to those of Commerce.

Because it is eminently viewed as a propaganda problem, the preparation of a Trade Fair exhibit might easily be a job for specialists — experts in foreign trade, foreign relations, public relations, or economics. The fact that interests us here is that, during the past year, the problem has been thrown open instead to designers, several of whom have been primarily associated with product design. The story of why those designers were selected goes back to the beginning of the Trade Fair program, and to recent changes in it.

A change of policy

The first American exhibits, at the end of 1954 and 1955, were designed and/or supervised by the Office of Design and Production, maintained in Paris by the Office of International Trade Fairs; Roy Williams was then Director of the OITF. These exhibits (ID: August, 1955) demonstrated a consistently tasteful, modern style, and showed much of the same material. A typical display at the Paris Fair, for instance, included a house (decorated by *House Beautiful*) in which "mother"" prepared meals in a modern kitchen equipped with freezer, garbage disposal unit, dishwasher, mixer, and other gadgets. "Father" puttered with the car in the carport, worked with power tools in the home shop.

As the program gained momentum in its second year, the OITF was placed under the direction of former advertising executive Harrison T. McClung, and it soon showed a change of direction. Closing the Paris design office, OITF decided that design contracts should be put out for bid among designers and architects of varied experience. Even more significant, it decided to seek outside advice on its approach. Members of OITF contacted various professional groups, among them the Advertising Council and the American Society of Industrial Designers, asking them to form a committee to help them in reaching designers about bids. A.S.I.D. felt its Office could handle that job, and proposed a committee to advise OITF on professional procedures. When the committee did not materialize, A.S.I.D. provided a list of members who might be capable of handling the jobs. In May of last year, the OITF issued, to over a dozen A.S.I.D. members and others, an open invitation to bid on Fairs that were to open in early September.

Behind this new tactic lay not only an unprecedented bulk of exhibition work, but a search for a new and better way to reach Fair-goers abroad. During its first round of shows, the Office had been able to record both attendance and attitudes among visitors, and felt it could do better in both. In throwing the problem open to designers, it not only gave members of the profession a good chunk of government work; it also gave them a new kind of responsibility for presenting America, and in some cases formulating America's approach to other nations. Designers were being asked to be propagandists; design became a tool of communication and the visual composition of an exhibition a secondary problem.

The paradox of leadership

The situation facing the OITF overseas is not basically different from the one that has been faced by every American diplomatic mission abroad since the war — probably the most difficult political role any nation has ever faced. The U.S.A., as a world leader, is in a position to be feared but not liked. It is an accepted paradox that nobody really loves a leader, however much he may need or depend on him. When that leader also is the richest nation in the world, and everybody's benefactor to boot, it is all the more an object of resistance and resentment.

Because this role of world leader is one for which the U.S.A. was never formally schooled, the pains and perils of unaccustomed authority have been especially

(*continued on page 52*)

The Salonika Fair is the only trade fair of major size held regularly in Greece, and is by common consent a battleground for the Soviet bloc countries and those of the West. This year both Turkey and Great Britain withdrew from the Fair, leaving America the only major country representing the West.

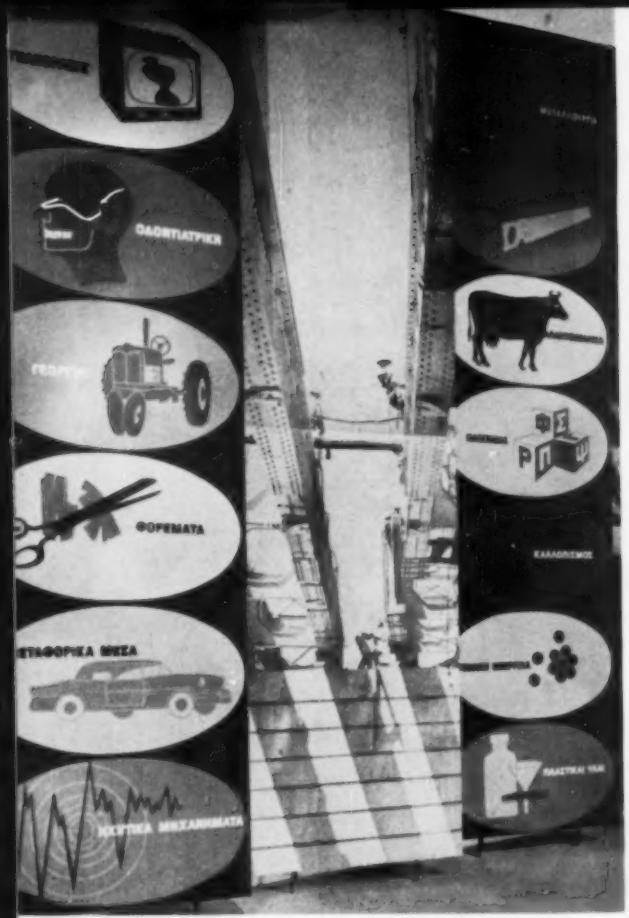
Under these precarious conditions, designer Bernard Pfriem had the task not only of creating a strong statement of the American way of life but also a sympathetic one. Pfriem, who was Director of Design for the Trade Fair Program and now operates his own exhibit design office, presented the "Fruits of Freedom" theme with major emphasis on activated exhibits: every section of the American pavilion had one or more animated elements in which the U. S. objects were brought to life through actual demonstrations.

The U. S. Department of Agriculture joined with the Office of International Trade Fairs in illustrating how industrial and agricultural progress is reflected in Americans' work and leisure. Farm equipment—including tractors, tillers, sprayers, fertilizers and methods of irrigation—was demonstrated in 15,000 square feet of outdoor display area, and the care of livestock and poultry was carried on in an appropriate setting.

Since most Greeks attending the Fair would compare American consumer goods with those of the Soviet bloc countries, our purpose was not merely to show our most advanced products but to break away from the "department store" method of displaying them. Major attention in our 29,000 square feet of indoor display was directed toward a closed-circuit television operation, a children's playground illustrating a psychological approach to child training, a completely equipped auto repair shop, metal and woodworking shops, modern surgery and dentistry installations, model trains, and a home dressmaking and fashion show.

SALONIKA, GREECE

A typical international fair: battleground of ideologies, ways of life



U. S. pavilion at Salonika Fair (in yellow frame below) draws crowds of Greeks eager for a glimpse of American life. Panel at entrance brings together symbols of major sections in 29,000 square feet of indoor display area, while outdoor exhibits of agricultural machinery lead visitors on to extensive field demonstrations by Department of Agriculture.

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Salonika posed a typical communications problem:

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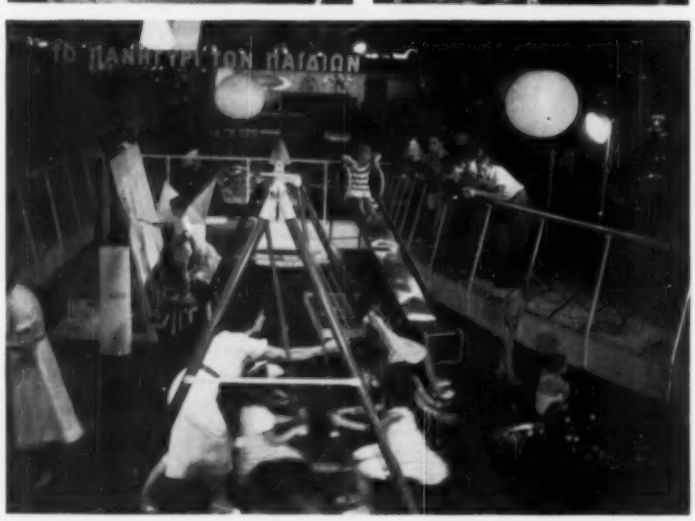
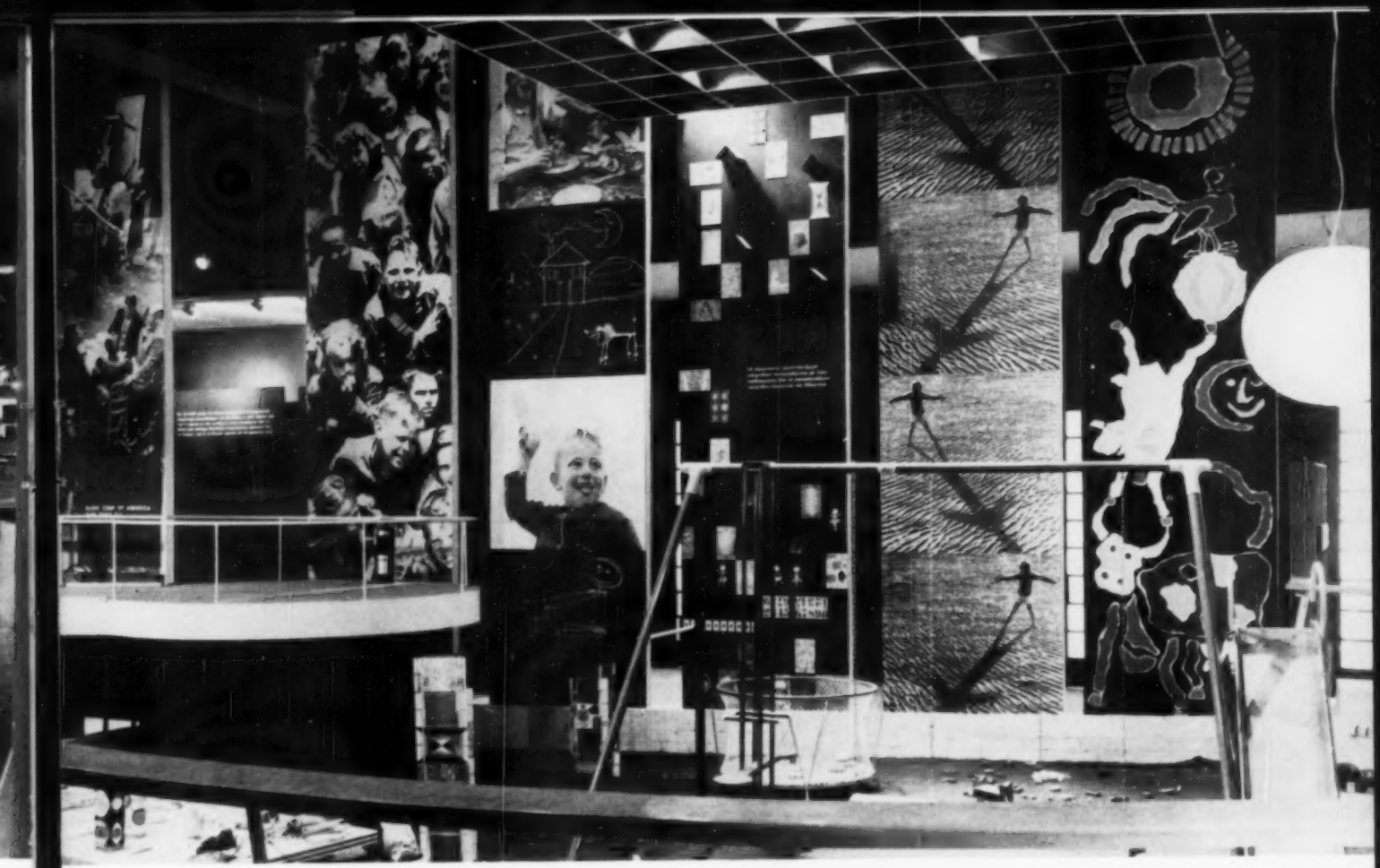


1. *Main exhibit hall of U. S. Salonika pavilion, with ramp suspended above shallow pool, becomes scene of fashion show* 2. *with models parading dresses made by sewing machine on the spot. Miniature mannikins stud pool to symbolize home-dressmaking exhibit.* 3. *Power tools make up another feature of do-it-yourself displays.* 4. *Doughnut-maker proves popular, illustrates mass-production technique.* 5. *Children at play communicate benefits of America for the younger set, against background* 6. *of products of our ingenuity in keeping them amused.* 7. *Fully equipped surgical exhibit indicates high development of techniques for sustaining human life.*



6

how to relate American achievements to Greek attitudes and needs

7

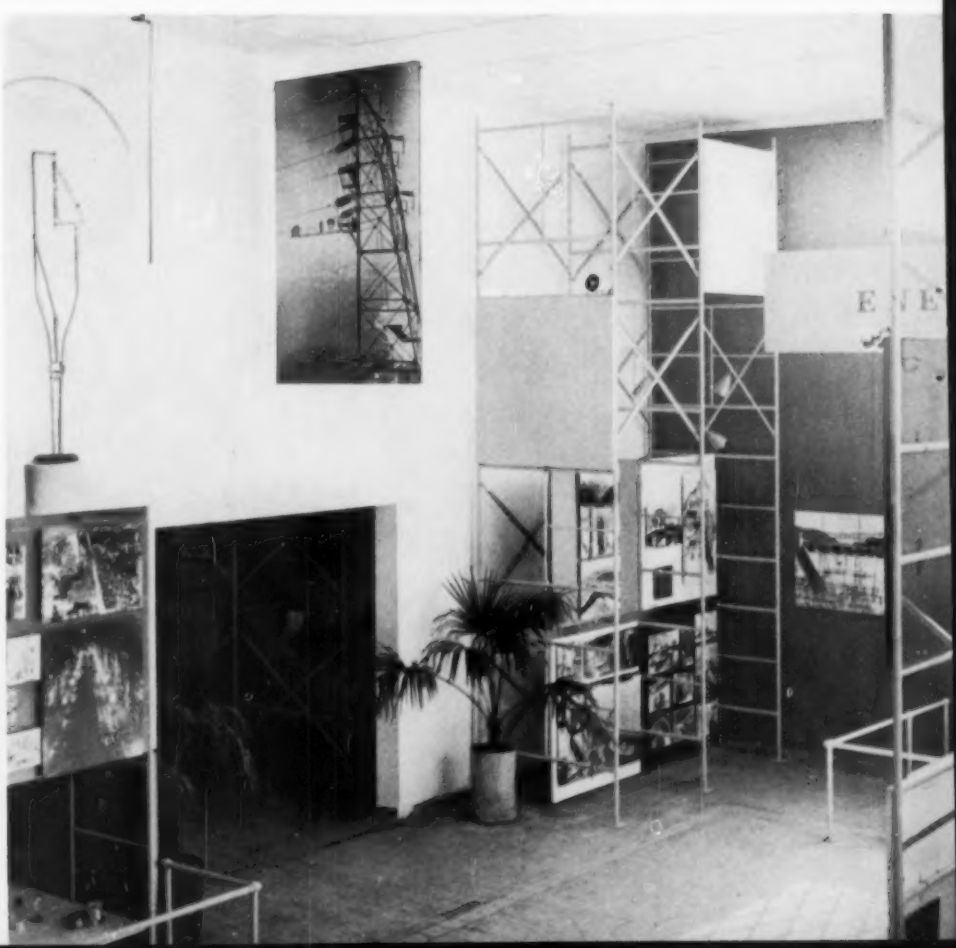
BARI, ITALY

At the annual Levant agricultural fair in Bari, the U. S. effort was to help Italian farmers by offering technical information on their pressing cultivation and marketing problems. The tone of our exhibit was one of sharing experiences: "Your agricultural problems are similar to ours—here's a sample of our work that may interest you." Designer Charles Shaw developed the show as a method of comparing notes, as well as a demonstration of new agricultural machinery. A photo-story gave the south Italian farmers an understanding of similar American regions with similar crops—the almond industry of Southern California being featured. The now-familiar tractor told a new story, answering questions from the audience by means of a lecturer with microphone, concealed behind a one-way transparent shield. And our display of Italian crafts sold on the American market seemed to say that we think they can help us too.

"Talking tractor" answers visitors' questions on agricultural problems; hi-fi mechanisms are exposed in transparent cases in garden; cheese-wrapping machine (right) is demonstrated.

IZMIR, TURKEY

The exhibit at the Izmir trade fair was, like Bari, intended for information rather than trade purposes, but covered the entire economy of a nation disappointed in the slowness of its progress toward industrialization. Designers Henry Gardiner and Lothar Witteborg (right and left, below) spelled out the theme, "150 Years of American Industrial Progress," to show the Turks that industrialization is not an overnight process but the gradual result of planning, evolution and the cooperative effort of an entire people. Contrasting the earliest and latest models of familiar American inventions, they singled out specific resources of our economy for explanation—industrial design among them. Some 450 photographs and 250 tons of heavy machinery went into the show's panorama of industrial growth.



Mason frames used in display are stacked to form 100' tower.

Telephone exhibit explains slow growth of modern technology.

Solar-battery-powered radios, tape recorders and other electronic devices display benefits of industrialization to Turks, many from agricultural areas.

DAMASCUS, SYRIA

The United States exhibit at Damascus was for a time one of the front-lines in the tense war of political influence in the Middle East, and the atmosphere in which it took place was made tenser by public demonstrations protesting our presence at the fair. In a nation of such poverty that the 30¢ admission fee to the fair grounds ruled out a majority of the population, our most direct channel of encouraging the Syrians to regard us as friends lay in setting a tone of mutual exchange. The exhibit and new pavilion by Raymond Loewy Associates, with William Snaith as project chief and Phil George, Joe Lovelace and Raoul Du Bruhl as design team, tried to build a bridge of understanding between Syrian and American life by emphasizing not only our spectacular technological resources but also Syrian products exported to the U. S. and valued here.

The display was divided into four categories: agricultural pursuits, woodworking and metal working, electronics, and consumer products. A wide range of products and techniques were demonstrated in an effort to show that Americans are engaged mainly in the production of peacetime goods, of the kind the Syrians might be able to use. Although many of these were new and bewildering, the designers refused to talk down to their audience and maintained interest by straightforwardly displaying them as advanced achievements.

Syrian girl explains to her countrymen the complexities of a modern kitchen installation. Below, view of U. S. pavilion from Damascus street highlights TV exhibit under pentagonal form of intersecting parabolic arches; concrete structure was temporary.

ZAGREB, YUGOSLAVIA

The Zagreb International Trade Fair was the first opportunity the United States has had to stage an industrial exhibit in a Communist country. While little was expected in immediate trade, the fair offered a chance to counter Soviet propaganda and present an approach to American life and resources.

Designers of Raymond Spilman's office, including Don Waterman and David Wurster, developed the theme, "America at Home," against the background of a photostory of an average American industrial worker, Ed Barnes (which has been shown at other fairs in the past). Displays of model prefabricated houses—one of them, by John Johansen, of unusual design in sprayed concrete construction—were completely furnished and supplied with kitchen, garden and recreational equipment. The method of approach was to invite the Yugoslavian worker to compare his daily life with that of his American counterpart.

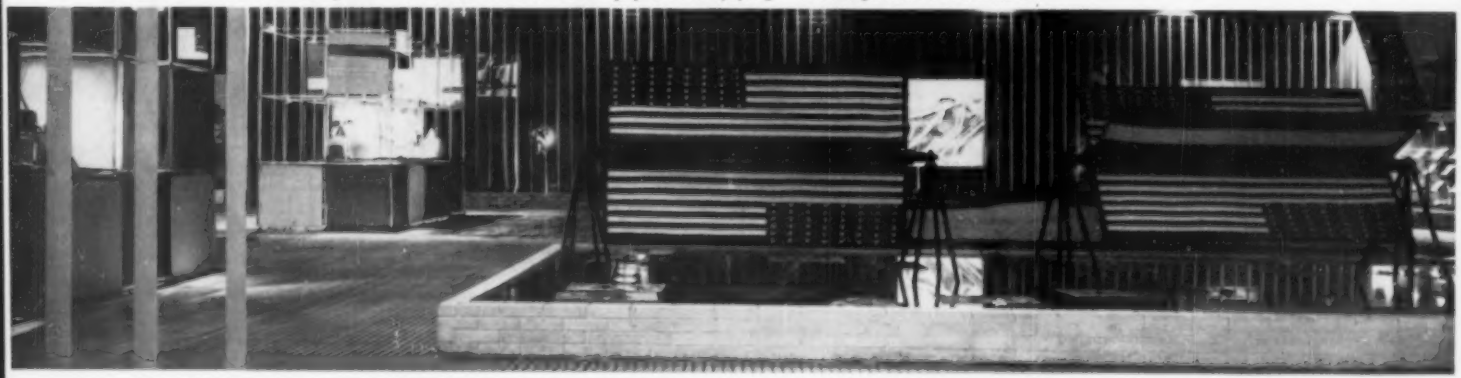
The industrial equipment shown was selected for its applicability to Yugoslav problems, and included a butcher shop in operation with modern refrigeration and packaging devices, a Department of Agriculture display of dairy processing machinery, and a sewing machine production line. Do-it-yourself tools, automobiles, cameras, a children's playground, hi-fi and television equipment presented other aspects of American life.

Marshal Tito, standing to right of his wife, watches demonstration of meat-processing machinery with obvious interest. Behind him is one of the exhibit designers, Don Waterman. Below, prefabricated sprayed concrete structure is shown in U. S. outdoor area, housing an exhibit of American architecture.

VIENNA, AUSTRIA

The cosmopolitan visitors at the Vienna International Fair needed no introduction to the refinements of Western culture, but in a country recently freed of the influence of Soviet occupation it was the U. S. exhibit's role to tell them "What's New"—what has been happening on the frontiers of American science, industry and daily living. Our exhibit, designed by Peter Harnden, former Chief of Design and Production at our Trade Fair office in Paris, concentrated on a relatively few large units of display. The most popular was a demonstration of the use of color television in surgery and medical education, in which a hospital operating room was built to perform a simulated operation on a mannequin patient. Advanced technical devices, including a high-fidelity phonograph built into the dashboard of a car, solar-battery-powered radios, and ultra-modern kitchen equipment, introduced other recent living habits to the Austrians. Modern transportation developments—motels, jet passenger liners and radar landing-controls—were elaborated through models and illustrated lectures on American travel trends. The display technique itself was a subject of interest and a different way of providing visual attractions for a sophisticated audience.

Linear elements of display materials are used to develop pattern of flags marking American exhibit.



Fashion show, in co-operation with Department of Agriculture, tells "What's New" in cotton fabrics as well as style.

Latest trends in daily living are reflected in choice of dining accoutrements.

STOCKHOLM, SWEDEN

Permanent U. S. pavilion modifies glassy international style with suggestion of Scandinavian use of wood at rear. TV monitors dot surrounding garden area. At right, scenes from a pantomime of do-it-yourself apartment decoration danced by Swedish couple. Interior view below shows mixture of "department store"-type displays, right, and theme of home craftsmanship developed in exhibit island at left.

The U. S. exhibit at St. Erik's Fair, both architectural and display design by Scandinavian - American Reino Aarnio, managed to express both our debt to the Swedes' tradition of craftsmanship and our ability to make skillful use of their idiom and materials in our own culture. Our theme was the do-it-yourself trend in America, in which the craft-conscious Swedes have expressed an interest. Do-it-yourself on the sewing machine was made more engaging by a fashion-show of dresses produced on the spot; children were busy making model airplanes, creative paintings and prefabricated toys; a young Swedish couple danced a pantomime of apartment decoration. The tradition behind our skills was indicated by a display of colonial furniture, and two Navajo Indians — skilled workers in metal and fibres—showed another aspect of American resources that was unusually popular. The good-humored and sympathetic character of the show was summed up in a collection of cartoons spoofing the do-it fad, in which the graphic hand that symbolized the amateur artisan throughout the exhibit appeared for the last time—with the thumb bandaged. By such means, the exhibit suggested what Americans are really like.

KABUL, AFGHANISTAN

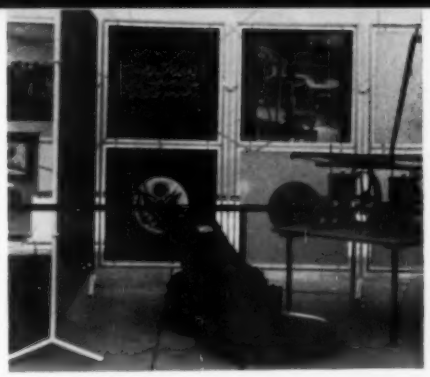
While some 200 Soviet technicians labored on a $2,000,000 pavilion for the Jeshn Fair at Kabul, the American pavilion was flown in on a single airplane and, with four Americans directing unskilled Afghan labor, completely erected in two days. It was the largest geodesic dome ever designed by Buckminster Fuller —100 feet in diameter—and its dramatically simple method of construction was an impressive demonstration of American ability to be ingenious rather than lavish.

This was the first American exhibit at an Afghan trade fair, and one of the first hints the Afghans have had about the Western world. Designer Jack Masey tried to create a panoramic view of American life, starting with such fundamentals as a photomural of the New York skyline. The exhibit featured the technological miracles that are synonymous with America throughout the world: TV, solar batteries, hi-fi, tape-recorders, model planes and trains. Perhaps our biggest drawing card was an outdoor Cinemascope theater adjoining the dome, which impressed the spectators with scenes taken in their own country. But the Afghans also showed interest in objects that help us perform tasks similar to their own—a miner's lamp, agricultural equipment, home heating stoves, water heaters, portable coolers and a textile handloom. Our selection showed that we can approach remote civilizations with objects on a human scale as well as with the merely colossal.

The fair pointed, too, to the long-range usefulness of a flexible and portable system of exhibit construction for the Trade Fair program. The Fuller dome, identifiably American, was used at our exhibit in Bangkok, Thailand, in December and will be used in the Tokyo fair this spring.

Stages in building exhibit dome show meeting of East and West: Afghan workmen learn to assemble prefabricated framework, U. S. technicians add finishing touches, and completed dome glows from interior lights near outdoor movie.

Display features at Kabul were selected for comprehensibility to unsophisticated audience. "Talking" cow and chicken below, giving interested farmers transcribed information on raising livestock, were animated to show internal processes. Mechanical equipment at right was explained by native guides, like the one third from top, who were used throughout.



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disconcerting. Only at the war's end, when the country abruptly found itself in the center of the international stage, were our leaders forced to realize that the conduct of peace is even more of a psychological problem than the conduct of war. We learned, though experiences in postwar Japan, that physical conquest does not automatically change a way of life: to decree democracy by law did not produce a democratic people overnight. We faced the fact, too, that the presence of ambassadors does not always produce good will, just as the presence of information does not always constitute a desired communication. In the early days of its new and difficult role, the U.S.A. might easily have come to the conclusion that almost nothing it could do was totally right. And in some respects it would have been true.

Nevertheless, after 10 years of experience and error, the country has grown wiser in the techniques of leadership, and quicker in the perception of the fact that our own conduct — not only national policies but the conduct of servicemen and tourists and foreign service employees abroad — continually form the attitudes of other nations toward us. There is little doubt that today American politicans are more aware that people of the world, like any group of constituents, are deeply sensitive to America's attitude toward their own interests. What is best for a citizen of the U.S.A. may be entirely meaningless for life in Bangkok; an Afghan or Syrian may be deeply attached to his somewhat tedious and unsanitary life, too proud to want it disrupted by ideas that we may consider superior.

Soviet Pavilion, Kabul Fair

This point of view—based on a body of research in the increasingly important social science of anthropology —has almost had to find its way into America's foreign policy. But — whatever it is called — this viewpoint has made one fact inescapable at a moment when a bitter contest for world-wide "friendship" is being waged: friends are won and not bought; half the winning is in knowing how to overcome the obstacles to friendship, the other half is in the wanting to be friendly.

How others saw us

In terms of these subtle political problems, the OITF set about evaluating the pros and cons of its initial efforts. One of the hardest facts to face —and the most revealing — was the relative response drawn by Soviet and American exhibits. Despite the fact that U. S. shows and products did outdazzle the competition, they did not always provoke the most dazzling reactions. When Russia and the U.S.A. showed similar equipment — the Russian often technically inferior —the Soviets would be applauded while the Americans suffered indifference or criticism. When both nations displayed helicopters in Damascus, for instance, the incident was reported by Henry Tanner in the New York Herald Tribune: "Each afternoon, when the Russian (military) plane appears, the American (commercial) follows, waves, wiggles, moves up and down, does all the things the Russian can't do. The Syrians love it. But do you think the United States really scores a point? I watched the spectacle one afternoon with a group of Syrians. They had nothing to say about the differences in performance. They all agreed that the Russian plane was 'bigger,' hence by implication superior. . . ." Part of this problem goes back to continual propaganda and suppression of facts in Soviet-dominated newspapers. Another part can be traced to attitudes that are more human than political. Many visitors in underdeveloped countries can appreciate Russian achievements because they *identify* themselves with people who have recently overcome physical and economic handicaps. The same achievements by Americans look like the work of a privileged nation with which they have no personal identification.

Chinese Pavilion, Kabul Fair

On the positive side of the ledger, the OITF had a chance to analyze successful episodes: Sears, Roebuck catalogs on display in Berlin had been eagerly thumbed and frequently stolen. (Reason: a chance to actually visualize goods and compare prices without salesmanship.) A replica of an American supermarket had been popular in Vienna. (Reason: a method close to what the Viennese knew, different enough to be interesting, in a relatively well-fed country.) And Cinerama had been a hit in Bangkok and elsewhere. (Reason: fun, with few economic overtones.) By and large, while other national exhibits gauged their extravaganzas to definite economic possibilities within the country, the American spectaculars were being put on in the best tradition of the Big Top. Thus, if they failed it was not for lack of showmanship, or even of clear American identification. The underlying problem emerged cleanly as one of *how we are being interpreted.* As a young Italian said after the 1955 Milan Trade Fair: "Americans show us beautiful refrigerators, and these only show us how poor and ugly our own are; Americans overwhelm us with displays of products based on

an abundance of electricity — when in Italy we never know if the little costly current we have will operate at all. The exhibits don't relate to the realities of our life, nor do they offer positive help — and they seem, without meaning to, to cast a negative light on what we have struggled to accomplish."

With this insight to help formulate the communications problem, the OITF turned to outside designers for help in solving it. Before final results can be weighed, it is necessary to examine in some detail how the government, as the client, employed its designers.

How the program was organized

The fact that the eight fall Fairs shown on the preceding pages were able to open at all is perhaps the most remarkable thing about them. They were all created under virtually breakneck conditions as follows:

For each Fair, OITF prepared a budget. In some cases, such as Damascus ($124,000), this included a new exhibition building; in others it covered only the expense of installing an exhibition in a given interior or outdoor space on the Fair grounds, including products that could be solicited from American business or purchased by local trade teams. In Salonika, for instance, the total appropriation for the 29,000 square feet of indoors area was roughly $166,500. For Bari, it was $110,000. For the recent Bangkok Fair, it was $340,000, including a new pavilion. Design fees and all construction had to be covered by these sums.

Late in May, 1956, the office issued an open invitation to bid to a selected group of designers, on the basis of their charge for "1) survey and preparation of a concept of the exhibit and related preliminary plans; 2) preparation of final, full and detailed plans, designs and specifications of the exhibit; and 3) assistance in supervision of the construction, assembly, erection and installation of the exhibit, including selection of building firms and individual items for exhibit. Compensation is provided separately for each of these three stages and the Department may treat each stage as a separate contract."

In the letter of invitation, the Department outlined briefly its objectives and the material available for exhibition. Because bids were submitted prior to the preliminary survey, this explanation was the basis on which bid estimates had to be made. Within a few weeks, the eight bids were awarded on the basis of "quality plus price." Of the designers awarded contracts, only one was a native of the area involved (Finnish-born Reino Aarnio worked in Sweden.) Peter Harnden and Bernard Pfriem, exhibition designers of the Salonika and Vienna Fairs respectively, had previously headed design in the OITF's Paris office. The remainder were to be largely dependent on their survey trips, research, and embassy and governmental guidance for their acquaintance with local conditions.

Bid guesswork was just the first of their problems. The preliminary surveys, averaging several days to a week, permitted consultation with embassy officials, but the pressure of the schedule — with some contracts signed 60-70 days prior to the opening dates — did not make it easy to do basic research about national attitudes and problems. (The Raymond Loewy organization was unique in sending two researchers for three weeks to explore the Syrian political scene and construction situation in detail.) Charles Shaw's Bari exhibit was entirely designed and installed within 60 days. Aarnio, in another instance, arrived on his Stockholm visit to find that, by some oversight, there was no building to hold the American exhibit. He was able, by virtue of being an architect as well as an industrial designer, to design a permanent (as specified by Swedish law) American pavilion in four days. The time pressure was not the only obstacle: designing the exhibits was made even more complicated by the method in which the themes were developed and carried out. The contract, as previously noted, specified that the designers should work with the OITF in developing a particular theme for each country. These themes, without question, were actually the most critical aspect of the "design," for they established not only what material would be shown but at what *level* the U.S. chose to communicate with the foreign peoples.

And the themes had to be projected partially with material on hand from previous Fairs (if for no other reason than time) and partially from ideas that the designer might have — based on what he knew, was told, or could project about the country in question.

Facing the questions

There was no simple set of policies to guide designers about communication with foreign countries; no one individual had all the answers — in fact, there was no totally right answer. Each country posed a special situation, and the special answer — whether to be helpful, or impressive, or modest, or educational — had to grow out of the fact that the situations were varied indeed. Designers working in what we call "underdeveloped" countries faced the perplexity of 20th-century agrarianism: what is the view of those countries toward industrialization, and what is their best route to it? Some are equipped to develop it

from within; some in need of having it stimulated from outside: some will accept the atomic age directly, without romantic attachments to earlier technological eras. Western countries, while more familiar, pose another set of attitudes that are not perforce easier to cope with: by their very acquaintance with American ways, Europeans often have emphatic feelings about the difference between them and our traditions, manners, and general values. Audience literacy and construction conditions were considerations everywhere.

How they saw us

Successful design, under these conditions, is hard even for someone acquainted with local attitudes; for Americans accustomed to equating popular success with impressiveness and extravagance, it is full of hazards and surprises. The model kitchen, for example, with its washers and disposals and mixers, might seem like a legitimate statement of American accomplishment in Paris; but in Damascus, an electric kitchen actually has no relation to middle-eastern cookery. The electric mixer, on the other hand, could prove to have great meaning and influence to the Syrian audience if it were demonstrated as a tool for making the creamed and mashed chickpeas and eggplant that are a middle-eastern staple. The American supermarket, with its acres of disposable paper packages—a hit with westernized audiences — could easily annoy undernourished Greeks at the display both of waste and of plenty. Conversely, turbines and reactors and such technological miracles would probably have no effect on an Afghan herdsman, while in central Europe they would indeed symbolize American technical prowess — or, without the help of more humanly appealing material, they might represent another inviting display of American superiority to people who knew that, in their lifetimes, there would never be room for them on the U.S. immigration quota.

The subtlety of the situation extends in its most critical forms to decisions between foreseeable alternatives: our habit of giving out free doughnuts and ice cream, for instance, drew crowds in many countries and dramatically demonstrated our productivity and the effectiveness of our machinery. It also drew criticism in many quarters, particularly from other exhibiting nations who could not afford the lure of handouts. At a point like this, somebody has to decide which course best serves the total effort at international good will. It was frequently the designers.

To evaluate the overall success of the fall Fairs is, at this time, virtually impossible except in relative terms: In 1956 Director Williams had claimed enthusiastically, "In 1957 we'll double last year's attendance or bust." At the eight recent fairs, most newspaper accounts here cited higher attendance at the American exhibits than at any others; reporters and officials alike have stated that Americans have been much more popular than ever before.

Attendance figures, of course, are not a definitive measure of the effectiveness of propaganda in the minds of the viewing crowds. Perhaps nothing really is. But in terms of the potential effectiveness of our effort, there are a few conclusions to be drawn from what we tried to do — and here the great range of style and content of the fall shows reflects at least a sober acceptance of the specialness of each regional problem. In Afghanistan — one of the most difficult Fairs we have yet tackled — the U.S.A. was the only exhibitor to employ Afghan attendants throughout, to explain the products in vernacular; the products themselves were modest and more workaday than elsewhere.

In Greece and Italy there were educational agricultural demonstrations on how Americans use farm machines and prepare foods for market. The Stockholm exhibit appealed to the Scandinavian identification with handcraft traditions by demonstrating what Americans do with do-it-yourself. In Damascus, the U.S.A. purposely framed a sophisticated technical exhibit—despite the fact that the audience was not educationally equipped to grasp many of the electronic devices; the designers discovered in their local study that Syrians are highly sensitive to being "talked down to" by Americans, and decided that addressing the Syrians as equals was more important than detailed communication.

Government as client

In selecting industrial and exhibition designers to prepare the Trade Fairs, the OITF expressed a belief in their ability to solve an entirely new kind of problem — one on which others had already stubbed their toes. It is worth examining, in summing up, whether this role was a proper one for designers or whether it is rather one for specialists and, in evaluating what has happened, to ask how it might be better done hereafter.

An industrial designer is, by training and experience, a problem solver — whether the problems he

tackles are in the area of products, manufacturing, marketing or communication. An exhibition designer, though working in a more specialized medium, is a problem solver in visual communication. Because each must solve a tremendous variety of different kinds of problems, what each has to offer is an *approach* to problem-solving; thus it seems entirely reasonable — extremely perceptive, in fact — that the OITF assumed that a good designer could solve even a large and difficult communications problem — *provided that the problem was properly stated*, or that the information needed to formulate the problem was made available to the designer.

It is part of the experience of every practicing designer, of course, to know that the first step with many clients is to re-state the problem for him: a client who thinks he wants a gas pump designed frequently needs a re-evaluation of the way his gas stations function first. The situation was not much different in the case of the Trade Fairs, and the client was generally aware of it: OITF needed not merely bigger or bolder exhibit installations, but a fresh look at its whole method of communications. It did look to the designers for help in this area, and got some measurable results.

But, had the OITF been more experienced in the role of a designer's client, it might have done more in several areas to assure those results. In terms of future programs, these might be outlined this way:

1) **Guidance:** A designer, as a generalist rather than specialist, needs full information in order to communicate with an audience he does not know; if such information is not part of the statement of the problem by the client, access to it should be provided. The OITF could provide a variety of sources — political analysts and observers, government specialists, foreign advisors — from whom the designers could compile sufficient information to make their *own* conclusions on not only the safest but the most effective approach. Some such steps have already been taken.

2) **Material:** Though the designers have not been under obligation to utilize all the material pre-selected by the OITF, there would be opportunity for better and more consistent exhibitions if they were encouraged to exercise more control over all the material to be presented. The freedom given to designers has been appreciated, and could well be increased.

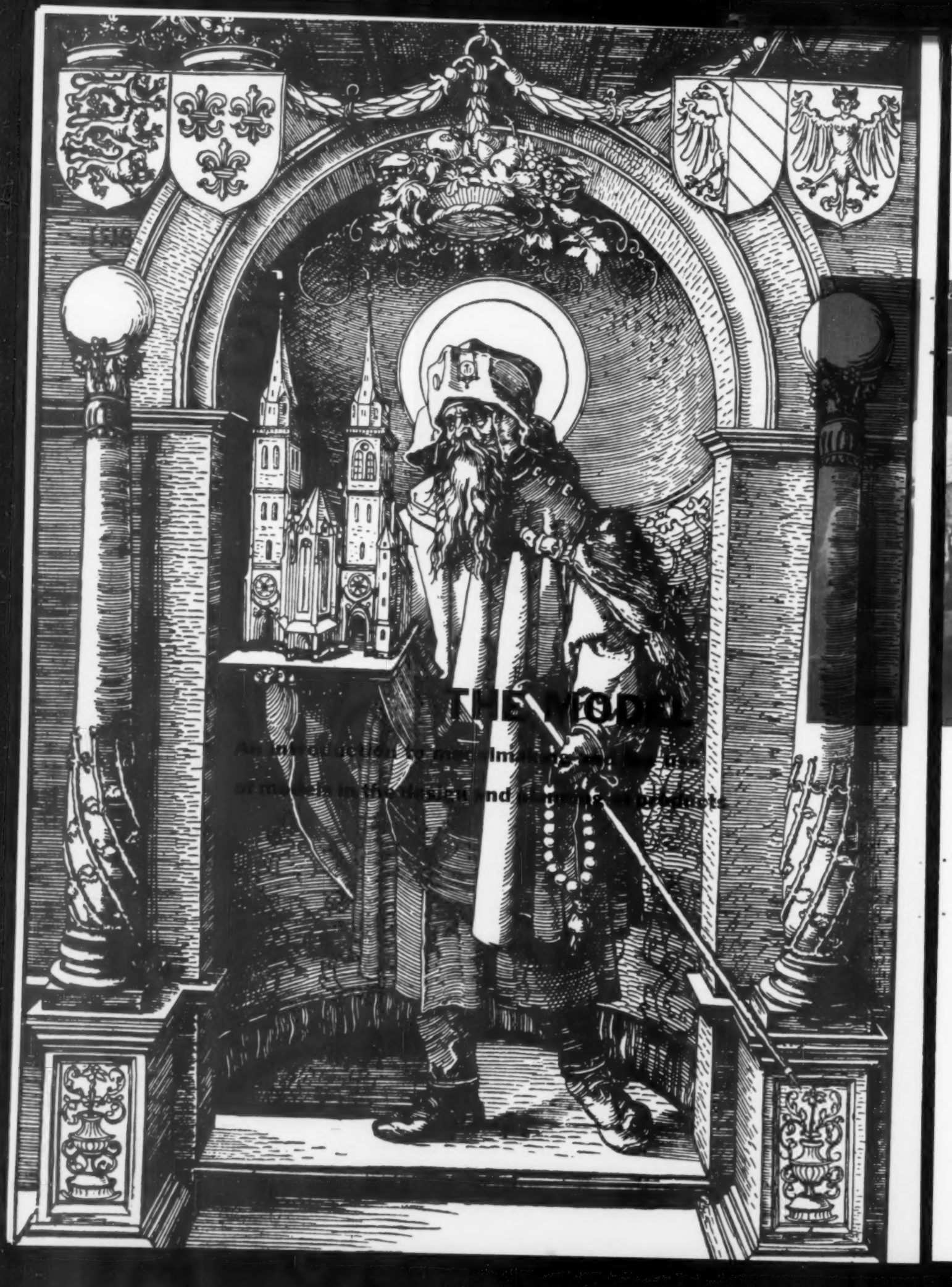
3) **Evaluation:** As a client, government can evaluate more realistically what a designer's talent is worth in both time and money. The pressure of time, as previously mentioned, need not be so bad again. But the fact remains that design, as a creative as well as physical activity, cannot be successfully conceived or executed under pressure.

Though the fees for each exhibit are not, of course, public information, it is worth questioning whether the method of arriving at these fees is a workable one — and whether design should be selected on the basis of bids at all. The bid, of course, is a governmental convention for assuring an open and uncorrupted market and free competition. Bids certainly are workable when the problem is to select materials or even to contract for construction. But talent is not that easy to measure; the selection of designers on the basis of "quality plus price" is a vague criterion at best.

The problem of a governmental agency employing designers is not much different from that of any client: its job is to be a skilled enough judge of design, and of people, to select the talent that will best do its job. If, because of inexperience, it does not feel qualified to make such selections, it would be possible to form a committee of selected professional advisors to instruct or advise in its program. When the A.S.I.D. offered to form such a committee to advise on professional practices and on design policy for the Fair exhibits, it suggested one plausible answer. It is to be hoped that in the future, instead of approaching the design as a simple competition among individuals, OITF will also seek liason with groups that can provide the collective advice of experienced professionals.

4) **Criteria:** The OITF has made no statements on its choice of designers to date; neither has it defined its standards of "quality" or "price" or the relative weights of each. Hereafter, it would undoubtedly improve both design results and designer relations to have its standards more specifically aired.

The Trade Fair program has, in a sense, really just begun. On the basis of this crash program, and the success of the December Bangkok exhibit (Cushing & Nevell, designers) the OITF has high hopes for even better results in the 6 Spring shows for which designers have already been selected: Loewy Associates: Milan; Becker & Becker Associates: Paris; Charles Shaw: Casablanca, Barcelona; Cushing & Nevell: Tokyo; Reino Aarnio: our first exhibit in Poland in June. There will be a chance for designers and the government to perfect their working methods and their effectiveness in winning friends for the U.S.A. These improvements are more than desirable; they are essential. The Trade Fair program is undoubtedly one of the most serious responsibilities that the design profession has ever assumed.



THE MODEL

An introduction to the materials and techniques of modelmaking in the design and engineering professions

DESIGNERS' AIDS AND SOURCES, Part I First installment in a series investigating the contribution of the special services—both technical facilities and personal talents—available to both designers and manufacturers.

Company president (Frank G. Hough) reviews working model of Payloader with designer (Jon Hauser) and chief engineer (Ralph Beyerstedt) in company conference room.

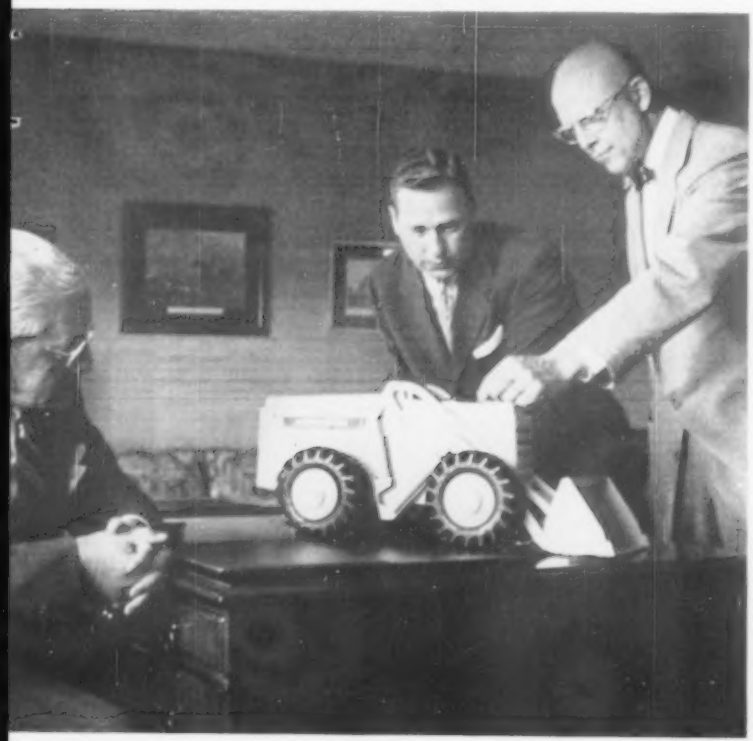


Photo Tom Rago

There are probably few designers with any experience in industrial products — whether furniture, appliances, machine or toys — who have not known the anxious moment when a new design is unveiled for a client or company executive. Although the weeks of preparation of the idea itself center around problem-solving in the design area, the moment of presentation stirs an entirely new problem: communication, conveying the idea to the client and, if necessary, convincing him that it does the job he really wants done.

The center of attention at such moments is frequently — more and more frequently — a model: a small and sometimes rough replica of the actual product that may have taken hundreds of hours and thousands of dollars to create. Despite the labor and cost and worry (some models have been known to cost $15,000 and to take 2000 manhours) the model is virtually worthless, except as a memento, once the object is in production. Nonetheless, models are themselves the product of a major small industry today. Some independent model shops have staffs of over 150 and equipment worth many thousands of dollars. Some companies in the major industries, such as the automobile industry, have their own equally large model shops. Some designers have their own modelmaking staff, while others swear by one or two special modelmakers whom they regard as indispensible as their own design assistants.

What are the reasons for the importance of this industrial activity and how has it come about? Who are its artisans, and how do they serve the industrial world? How does the industrial model relate to modern industrial methods? Is the high maintenance of the model shop a sound investment?

Presentation meetings have become standard practice for the simple reason that they are essential; there has to be a link between the manufacturer who has the problem and the designer who must solve it. The model is a dynamic, immediate method of communication between them — not only for arriving at a final solution but in finding areas of agreement by defining the problem from the start.

Essentially there are two types of models which the designer can present to the client: appearance model, or working model. References to two familiar figures will help to illustrate the relative usefulness of each. A scene, not unlike the one in the industrial conference room, might have taken place in any flourishing kingdom or duchy of the Renaissance. If the artist were Benvenuto Cellini presenting his concept of a saltcellar, coin, chalice or statue to a patron who might have been the King of France, the object of such a presentation was presumably to test the appearance of the commissioned design which might later be executed in gold and precious stones. Presenting a model to the King of a foreign country meant that Cellini was called up to communicate his point in spite of an atmosphere to which he was not accustomed and a language he very likely did not know. Interpreters and advisers could have helped, of course, but it is obvious that nothing could have presented his message more clearly than an actual model. And if — to mention another familiar example — the artist had been Leonardo da Vinci and the patron Cesare Borgia, the purpose of such a presentation might have been to show one of the artist's inventions in model form to illustrate not so much how it looked, but how it worked and how it might be used to aid his patron's cause.

In both cases, the model, whether to indicate appearance or function, was the best possible medium for not only illustrating a point, but for permitting an idea to come alive and let it speak for itself, just as today the model serves in a number of ways as the expressive link between the designer and his employer.

Saint Sebald holding a model of the Church of Saint Sebald at Nuremberg. Woodcut by Dürer.

Models are a traditional means of communication

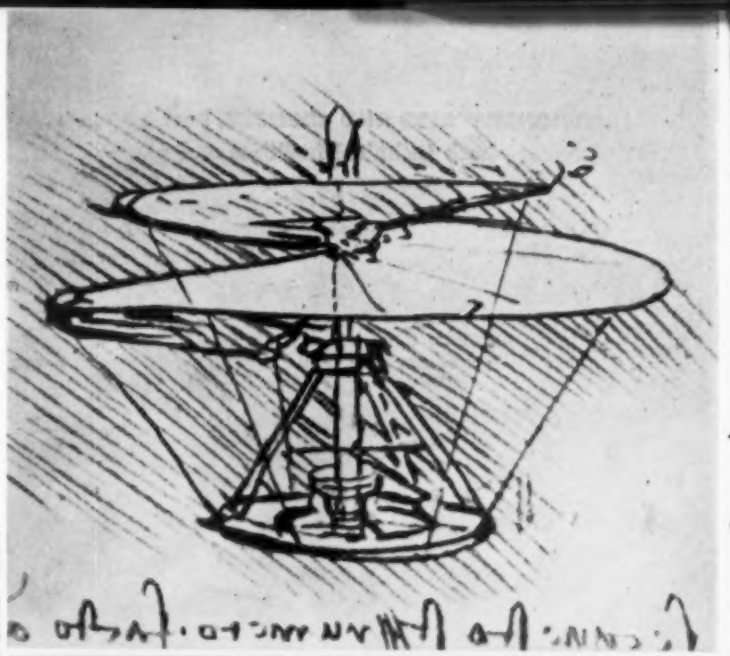
However much we may take models for granted in design procedure today, they are not an invention of our time. Scale models go back to earlier civilizations, for the obvious reason that the problem of sculptural visualization has been pretty much the same throughout history. The reason for wanting that visualization, on the other hand, was often quite different. In antiquity, the use of models was significant in religious ceremonies in which models presented to the gods were meant to symbolize the full-scale works carried out in their honor. The use of models in connection with burial rites was also widespread. In ancient Egypt a model of a house was placed in each tomb, regardless of the rank of the deceased, to make sure the deceased would not be homeless in the beyond; tombs of the wealthy nobles contained replicas of their important possessions, such as the boats, homes, granary, brewery, etc. found at Thebes in the tomb of Meket-Re, a chancellor around 2000 BC. Also entombed with the pharaohs were solar barques that symbolized the ruler's journey to the sun.

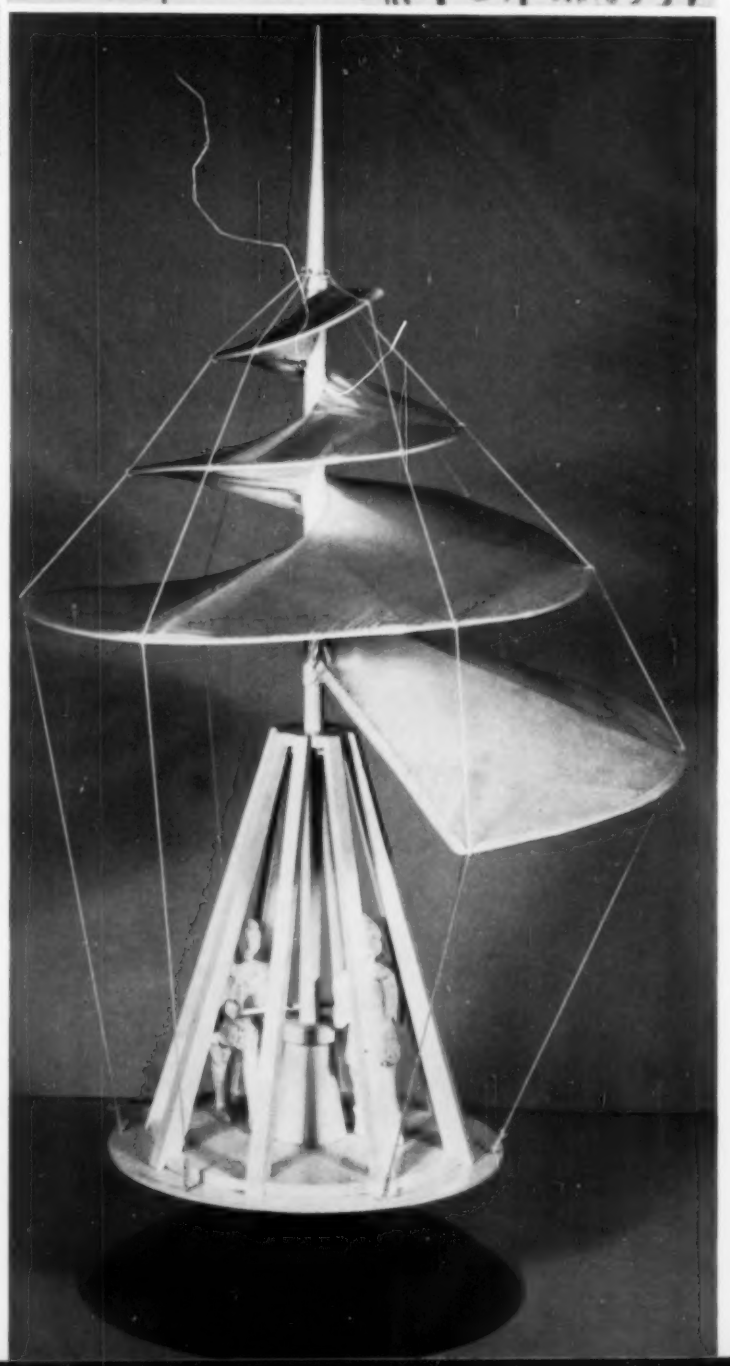
In all periods noted for abundant activity, the model was an indispensible step in the development of objects of all sorts. They were used to form molds by which articles such as bowls, coins and tools could be reproduced in number. They were used for studies by the sculptors of Greece and Rome, and later, by the goldsmiths and silversmiths of the Renaissance to perfect their ideas and elicit the patron's approval before finishing the object in precious metals. Shipbuilders have always relied on scale models from which the actual boat was to be reconstructed; and the beginning of the industrial revolution was clearly marked when James Watt demonstrated the harnessing of steam with a model of the steam engine in 1736.

Models remain a traditional means of communicating the intent behind an object, as well as its appearance. Objects have become mass-produced products, and the reasons for some objects have changed as drastically as the period in which they were made — a new tractor today and a new chalice in 15th century Rome express the different general attitudes and values of each period — but the traditional use of models for study and communication remains unchanged.

The significance of models today

It is impossible to say just when in any period of history a preliminary expression of a final object becomes essential. It probably occurs whenever the generally accepted forms and values of a period begin to change. In classical Greece, when a uniform philosophy made for a few precepts which were alive and true for all,





Collection: International Business Machines

←**Da Vinci's aerial screw** *was reconstructed by IBM from a drawing of Leonardo. This design — a forerunner of the modern propeller — heralded the helicopter of the present day. Model is one of IBM's collection based on Da Vinci's inventions.*

it was possible to have a standardized style for stage design which needed only minor adjustments to take care of each specific drama. But in later eras, when a rediscovery of humanistic values as well as travel expanded the elements of man's world, the stark, universal symbols no longer worked, and a more personalized approach to ideas took hold: communication became dependent on conveying specific ideas or techniques, forms or materials. With the continuing expansion of factual, technical and ideological possibilities the past two centuries, the model has served, and today more than ever, serves a critical need for ever more specific communication.

The need for specific interpretation today can be illustrated in the field of sculpture. After the completion of a group of buildings at the Harvard University Graduate Center, the architects — Walter Gropius and The Architects Collaborative — in 1950 commissioned Richard Lippold to create a piece of sculpture for the central courtyard. Lippold's problem was not only to compose a work of art, but to relate it to the existing outdoor space and buildings; yet this idea for what was later called the "World Tree" involved a 40-foot structure in stainless steel — a piece that could not possibly be mocked up for visualization at full scale, as a piece of Renaissance portrait sculpture might have been in clay or plaster. Lippold worked out his idea in two different presentation models, which he used to consult with Gropius as he went along. His first attempt was nothing more than paper; the second was copper and brass and the third steel rod and wire, each incorporating changes suggested by the architect. The last of these, only 18″ high, was not only a final presentation but served as a "blueprint" from which the final piece of sculpture was fabricated.

Models in contemporary life and industry

It is easy to forget that even today the term model has many connotations. It is applied to the toy plane that comes flying through the living room, to the small building, miniature furniture, boat or what-not that the youngster brings home from shop at school, as well as to any do-it-yourself item. But on an adult level, models are also used for a variety of things. In law they serve in the court-room to reconstruct the scene of an accident, and in visual education they are, of course, a most essential implement — from cardboard constructions used for teaching children, to expensive models of medical, engineering and nuclear equipment for demonstration purposes in adult education. Still their most extensive use, and that upon which the modelmaking industry is built, is in the fields of architecture, advertising and industrial design.

In architecture scale models are made for not only the most complicated buildings but even the simplest houses. In a three-dimensional art, drawings are not sufficient to convey the concept, and models are needed to enable the architect to judge the massing of the whole building, the relation of its parts and details, and its relation to its site.

In advertising, scale models enable the advertiser to *display and demonstrate* articles that could not easily be transported in actual size. In aeronautics scale models of aircraft are an excellent means for *preliminary testing*, such as wind tunnel testing. In civil engineering models of bridges built to scale, and of road intersections, are essential for the study of particular problems. In fact, in all branches of engineering, models of all kinds of machinery are built for *experimental purposes;* while models demonstrating plant-layout fulfill the needs of industrial engineers for *plant arrangement* and future plant operation.

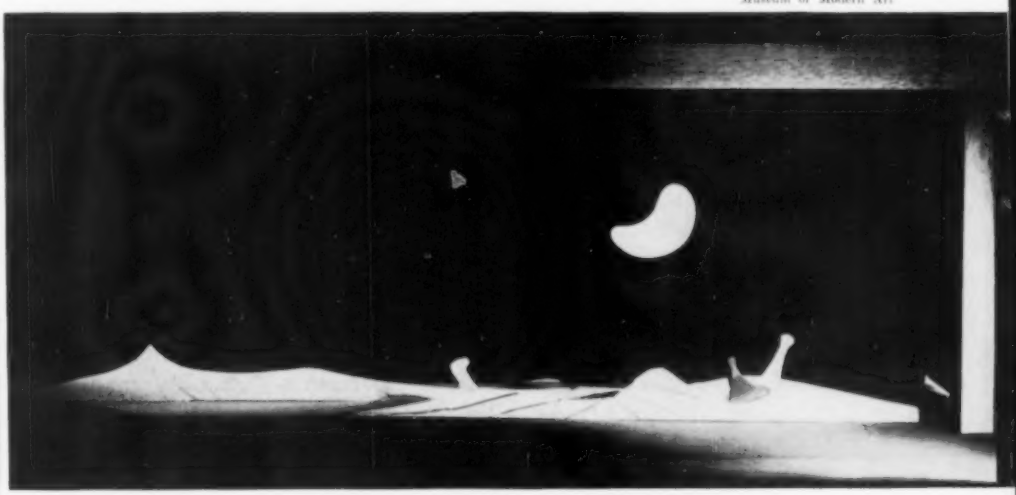
In industrial design — to review briefly for those not familiar with the many phases of modelmaking — preliminary models are used before the final appearance or working model is actually ready for display and inter-departmental purposes. To develop ideas, *clay models* are generally used at the beginning of the design program, followed by *plaster models* for those products where surface design and accurate contouring is important. Full-size mock-ups for cases where a close check of interior details is necessary, as, for example, with a railroad car, are constructed from the *scale model* which is usually built after approval of the preliminary design.

For the designer, the approved presentation model — scale, or full-size mock-up, depending on the situation — is the final model, but it is frequently followed in the client's factory by a full-size operating model, *the prototype*, made of the same materials that the mass-produced item will be made of, and from which engineering drawings are made and tooling is begun.

The man who makes the model was, and is, an artisan, a man whose talent is a combination of skill and imagination. At one time, the man who made the model for study also executed the final object. Today, when the final item is in most cases produced by machines, the model remains the final representation of idea, a creative phase of product development. Although modelmaking is becoming a major industry in a product-conscious era such as ours, the creative ability expected of the modelmaker has not diminished and his craft remains an art among the arts of communication. The use of models and their importance today to clients, modelmakers and designers are further illustrated and discussed on the following four pages.

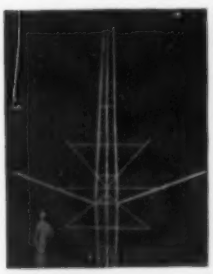
The model: from ancient funeral rites to modern sculpture, a way of bringing

Museum of Modern Art



Cardboard model *of stage set, designed by Isamu Noguchi for the ballet "The Seasons," in* 1947, *was exhibited by the Museum of Modern Art.*

Paper mock-up, *presentation model, and final steel construction of "World Tree" by Richard Lippold for Harvard Graduate Center,* 1950.



Photos courtesy Richard Lippold

Drawing *of the 17th Century (Italian School, anonymous) served as two-dimensional "model" from which stage decor could be painted.*

all kinds of ideas to life

Exact structural *model of a section of a boat's hull enables marine engineers to establish empirically the exact positions of ribs and other structural elements. Model Atkins & Merrill.*

Metropolitan Museum of Art

In funeral rites *models were used in antiquity, as this replica of a fishing and fowling boat, one of the many models depicting the chancellor Meket-Re's possessions entombed with him at Thebes, Egypt, about* 2000 *BC and excavated in* 1920.

The model: client, modelmaker and designer each see it differently

What the model means to the client

Models, as we have said, are costly. More than one designer has complained that too frequently a client sees only this immediate cost and not the ultimate value of the model. A manufacturer who relies on independent modelmakers sometimes must pay thousands of dollars to have a model made, while the cost of keeping a modelshop, as some large companies do, would appear inordinately high to most people. What value does the model *really* have for the maunfacturer? What are the ways by which a model can pay its own way and prove to be a sound investment?

One answer is simple, and certainly one any businessman should want to hear: A model can save him time and money — because it is crucial for more than accurate visualization of a product. It may be used for consumer surveys, costs analyses, tooling guide, and development of manufacturing and packaging procedures. The model enables the manufacturer to investigate the planned item from every angle, and should he decide to put the design in production, he knows pretty much what to expect. The model is a means by which the finished product is not only determined but controlled. A dimensionally stable, highly accurate prototype model from which tooling and production procedure are determined makes for the same properties in the mass-produced item. For these reasons some companies, such as GE, have gone to considerable research and expense to develop a better technique of "mass producing" a number of models at a time. Manufacturers frequently feel that determining the appeal to consumers and sales potential of a new item before production is as important as accurate visualization of it. It is also becoming apparent that the model is an essential implement for production planning. Such preliminary investigations, whether carried out by the manufacturer himself or by the industrial designer with the aid of a research organization, are made possible by the existence of a good replica of the product itself.

There are other areas in industry where the value of the model is gaining more recognition. Because of possibilities of multiple model fabrication, large corporations with divisions scattered through various parts of the country are now finding it helpful to send a number of models of a new design among their divisions for pre-production discussions. They find this kind of direct visual communication means departmental action can be based on clearly understood facts. Later these multiple models, if exact enough, may be used by the sales people in stores or at trade shows for display purposes and order taking.

The model as a challenge to the modelmaker

Designers' methods of working with modelmakers vary widely and depend largely on each designer's own approach to his art. Some designers wish to control every last curve, and hand over to the modelmaker all their preliminary studies as well as complete drawings. Other designers rely so heavily on the modelmaker's judgement for working out details that, as one designer put it, "We'd give them instructions over the phone, if we could."

In a poll among designers throughout the country, ID learned that in spite of considerable differences in their methods of working with modelmakers, they expressed certain common expectations. These were, above all, professional skill in determining and handling materials and mechanisms accurately. The designer expects an appreciation of design elements, and a suitable feeling for curves, contours, and all detail. Regardless of the material or the type of model the modelmaker is given to work on, the designer expects him to know its structure and function inside out, while at the same time seeing it purely for external appeal as well. "Years of experience with engineers, production men and designers have given them a sophisticated approach to problem-solving," said one designer of the modelmakers he works with.

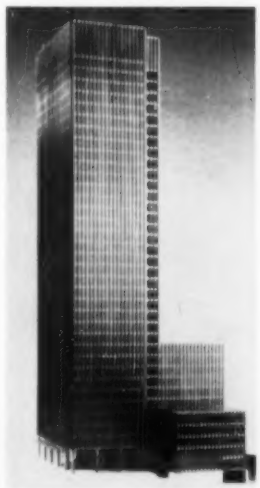
The modelmakers at work today come to the industry with a background that varies from art to engineering. "The one thing that our men seem to have more in common than any other," comments Mr. Don Atkins, president of Atkins & Merrill, Inc., one of the largest modelmaking shops in the country, "is the love of creating and doing work with their hands, and being capable of visualizing quickly the end product . . . " Some, like Sidney Smith of Van Nuys, California, started in industrial design; others, like the staff of Model Builders of Chicago, had training in tool and diemaking, wood pattern work, art and painting, while to the firm's president, Bill Chaffee, his sizeable business is an expansion of a lifelong fascination with miniatures; still others, like the heads of the New York firms Treitel-Graetz and Arnkurt Associates, are graduate engineers with long practical experience.

They look upon the model as a *logical* expression of intuition and a *practical* item in terms of application, at all times bearing in mind the particular situation for which the model is being built. The finished model is, of course, a producible item. But more than that, modelshops make it producible in terms of the manufacturing facilities available. The model is not only the designer's expression of a given need, but also a three-dimensional indication of production techniques.

Atkins & Merrill, New York

Model of plant layout *for aircraft industry helps industrial engineers to organize complex plant operation. Model by Atkins & Merrill.*

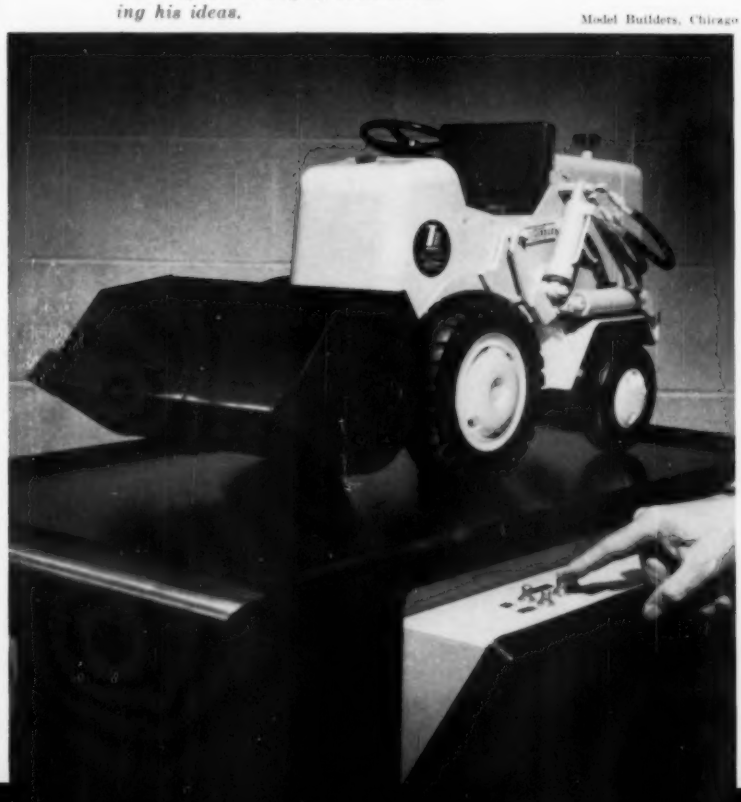
A. A. Schechter Associates



Architectural scale models, *such as the one of the House of Seagram now on display at the building's site on New York's Park Avenue, enable architects to study massing, relation of parts and details.*

Working model *of industrial product (Payloader) illustrates function as well as appearance and, despite cost, is often the designer's most expedient way of demonstrating his ideas.*

Model Builders, Chicago



Designer's view

The designer is, of course, first and foremost among those who *need* the model. It is his method of visualizing his design from the start. This explains the many stages of modelmaking some products go through: from crude paper mock-ups and studies in clay and plaster to the final model which expresses the thought developed in these earlier studies. A product may be viewed in as many as five or six forms before the designer perfects it to his own satisfaction. The automotive industry, like many appliance concerns, always develops their designs in a series of full-scale models on which critical contours and highlights must be worked out at full size and in the actual finish, and changes are often made up to the zero hour on many a finished model. Working in three dimensions from the start also gives the designer a business tool: with a chance to discuss an idea with management or the client before the final model is undertaken, he can avoid misunderstandings and *ex post facto* complaints.

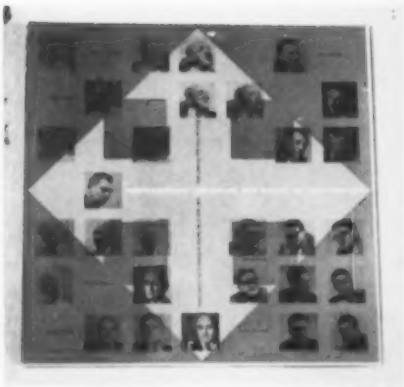
If there is a selling job to be done, or if the designer wants to communicate an unusual idea, the model helps the designer in another way. It is a good *psychological* tool in situations where a verbal sales pitch might do more harm than good. If the client begins to understand from the actual model what the suggested design encompasses, he will feel that *he* has discovered its meaning. A working scale model, like the tractor shown on this page, can illustrate the answers to all his questions about appearance and function.

Future installments

The general background presented in this article will be followed in subsequent installments by specific examples of works in the field from which these statements were derived. Future articles in this series will present case studies showing how the industrial designer approaches a specific situation, plans his direction, chooses the best modelmaker for his particular job, consults with department heads of the client's company, and concludes the pre-production phase of a new design. Other articles will deal with problems that come up in the modelshop in regard to special types of models. In-company design procedure will also be discussed, and later, varied services that aid the designer in his job of seeing his design through its pre-production development. At the conclusion of the series, modelmakers, their special fields, facilities and location, as well as all other services will be listed to give the designer a cross-country GUIDE TO DESIGNERS' AIDS AND SOURCES.

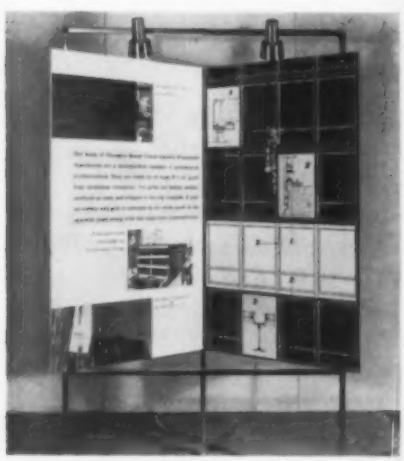
In April: Modelmaking procedure in companies with own design staff, modelshop and testing facilities.

1—BOOKS



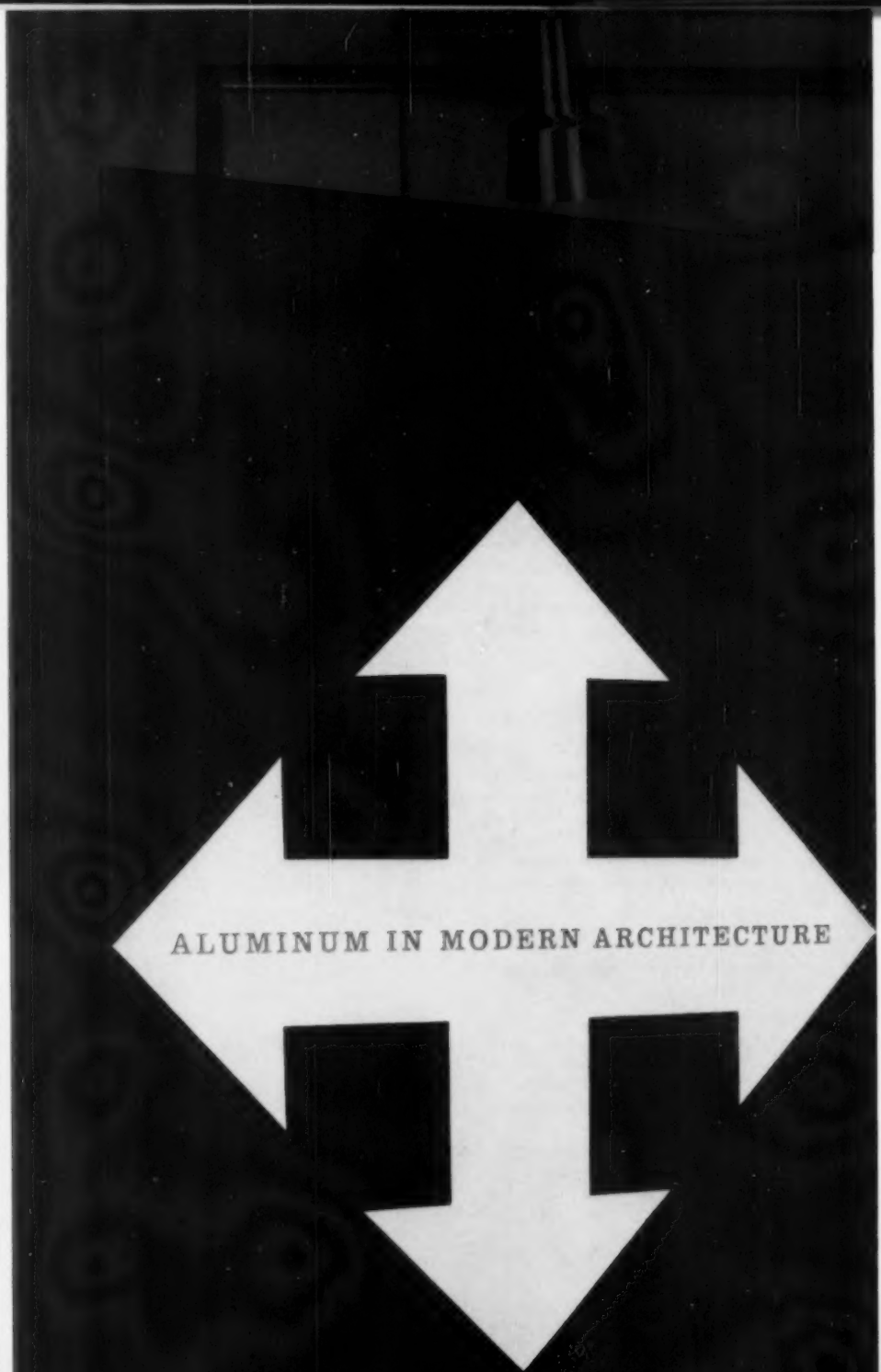
2—RECORD

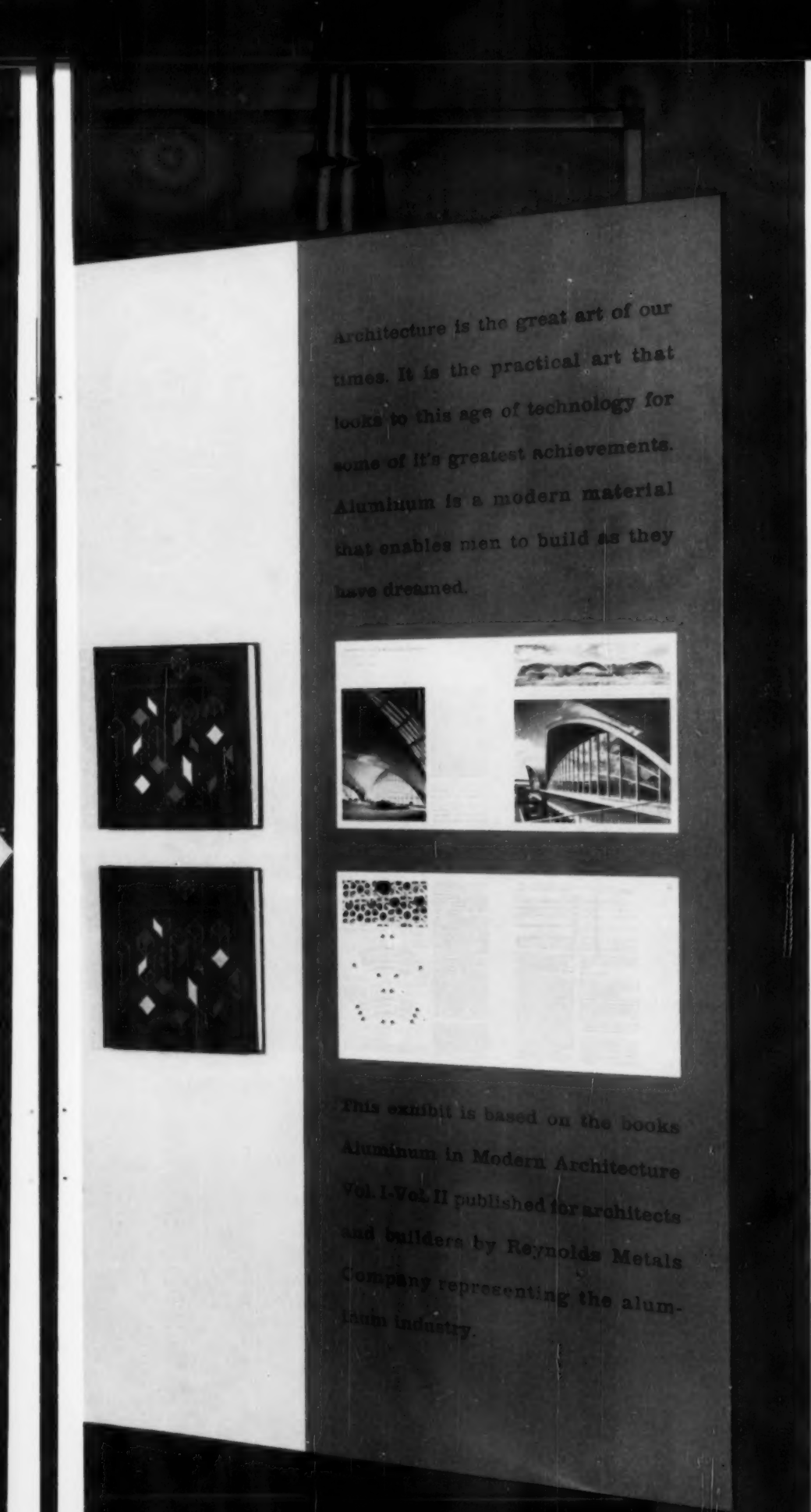
3—AWARD



4—EXHIBITION

5—BUILDING





REYNOLDS ACTIVITIES GIVE DESIGNERS IMPORTANT ALUMINUM WHEREWITHAL

Displayed across this spread is a spate of realized and projected plans for the further expansion of aluminum markets, property of the Reynolds Metals Co. They amply demonstrate that this primary producer's missionary zeal (which ID has discussed before: August 1956) is more fervid than ever; these latest efforts, happily, are on a plane of remarkable quality, and promise to have a wide-spread importance. Briefly stated, the projects are:

1—Two volumes entitled *Aluminum in Modern Architecture*—the first is essentially a layman's guide to modern architecture, while the second is the most complete technical treatise on the use of aluminum in architecture that has ever been published;

2—A 12-inch LP record of taped conversations with seven architects;

3—A $25,000 award, to be given annually to the architect judged to have made the most significant use of aluminum in building;

4—An exhibition in 12 double panels of "Aluminum in Modern Architecture," 12 editions of which will circulate in this country and abroad;

5—A new company headquarters (and showcase of aluminum applications) designed by Skidmore, Owings & Merrill, to be completed this summer on the outskirts of Richmond.

All of these projects attest to, in fact are attributable to, one salient fact—aluminum is a popular metal, and an ill-understood one. Its use, and therefore its markets, are immature as long as it is specified as a replacement for older, more traditional materials without due consideration (in structure, fabrication, finish) for its special characteristics. Produced at a cost exceeding $500,000, the books are an important addition to the literature on aluminum. The second volume, particularly, with its wealth of original research into aluminum engineering, should encourage more candor in designing with this metal.

With these various projects, Reynolds is attempting to close the gap that Alcoa has always enjoyed in the architectural field. Indeed, the company feels that in their energetic contest they have just gone around Alcoa's end for a first down.

Taken from the introduction to Volume I are photographs showing characteristic structures in three materials: (above) aluminum, in an advantageous long-span use for the English "Dome of Discovery"; (to the right) concrete, and steel. Below are random building examples from Volume I: (1) tower of Federal Telecommunication Laboratory, Nutley, N. J., Giffels & Vallet, Inc., L. Rossetti, architects; (2) Sao Paulo Pavilion, Icaro De Castro Mello, architect; (3) Centro Simon Bolivar, Caracas, Cipriano J. Dominguez; (4) Pan American Life Insurance Office, New Orleans, Skidmore, Owings & Merrill and Claude E. Hooton.

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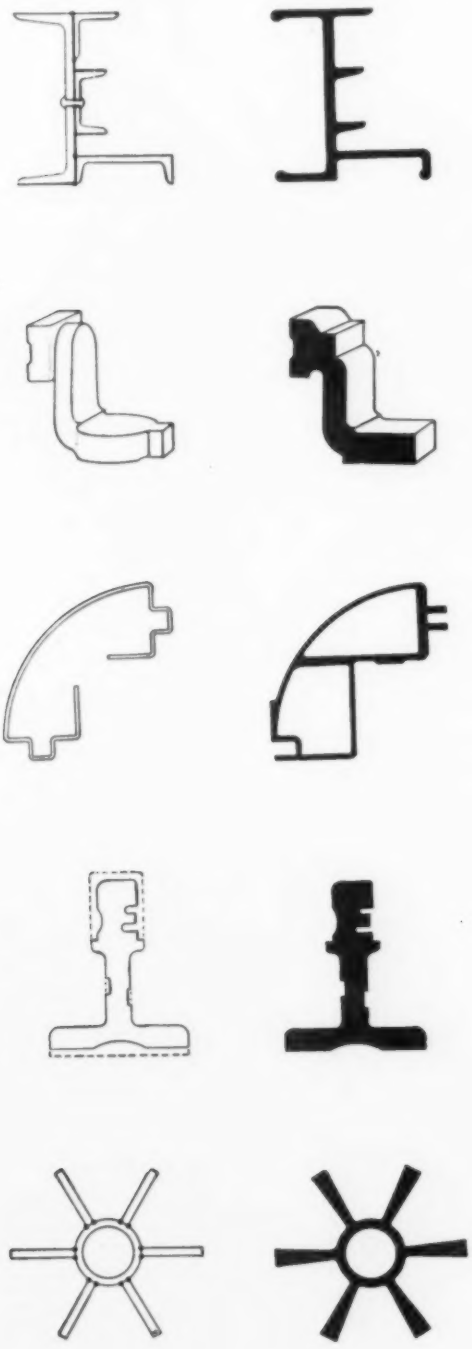
BOOKS TRACE AND PROPEL DEVELOPMENT OF FORMS UNIQUE FOR ALUMINUM ALONE

Aluminum in Modern Architecture. Volume I: John Peter, Editor; 255 pages. Volume II: details by Paul Weidlinger; production by John Peter Associates; 403 pages. Over 400 photographs, 1200 drawings in both volumes. Published by Reynolds Metals Co., Louisville, Ky. Distribution by Reinhold Publishing Co., New York.

Drawings from Volume II show how aluminum extrusions can be designed to replace: (top to bottom) several rolled structural steel shapes; a small machined casting or forging; a roll-formed sheet section; a long cast-iron frame member; a welded assembly.



Peter

Weidlinger

Volume I, edited by John Peter, is primarily a word-and-picture report on the use of aluminum in today's buildings. The case for proper use of the material is presented in photographs (with accompanying text) of 101 buildings, in this country and elsewhere. It is an impressive record of the use of aluminum in a myriad of architectural applications, most significantly as a material for structure and skin. The book is also, quite incidentally, an interesting album of modern architecture — interesting because such albums are scarce, indeed, and interesting on its own merits because many of the inclusions are first-rate and because most of them are recent, nearly all of postwar vintage.

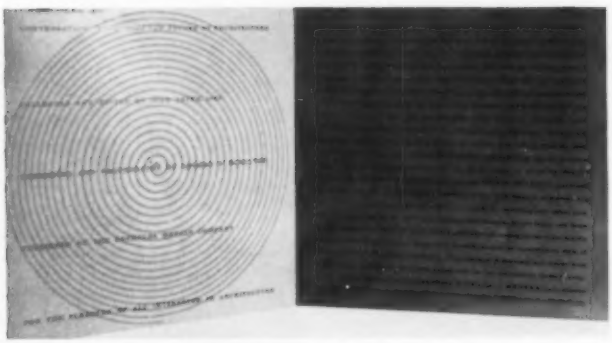
However, as the reader goes through this volume, he must bear in mind that the presentation is strictly in terms of the use of aluminum. As the title fairly indicates, the buildings are shown primarily for their aluminum applications, which are not always their most interesting architectural features. Some of the most exciting examples in the book are not even buildings, strictly, but they are certainly aluminum. The Arvida Bridge in Quebec, for instance, and the English "Dome of Discovery" (photo opposite page) are beautiful (and economical) aluminum structures.

The last 25 pages are taken up with excerpts from interviews made by Mr. Peter with 27 outstanding architects and engineers (only seven of whom are heard on the LP record). It is quite a pleasure to find statements here by architects who don't often get into print — like Catalano, talking of architecture interpreting social structure; and Philip Will, Jr., who would see the structures of the future flexing like reeds.

Volume II is the contribution of Paul Weidlinger, an eminent architectural engineer. Bringing to the subject, also, a wide experience in aeronautical engineering, Mr. Weidlinger discusses and puts into usable manual form all of the important aspects of designing and detailing in aluminum: historical and economic facts about the metal; physical and mechanical properties; production, fabrication and finishing; joints and connections; potentialities and limitations of aluminum as a structural material; piping, ductwork and insulation.

This volume, beyond its value as a technical manual, puts aluminum into sharp focus for the first time as a structural material. Mr. Weidlinger points out that there are no unsuitable materials, only unsuitable applications. Chapter Five gets to the heart of the matter. Here the author explores interrelationships between the cost of aluminum and the way it behaves, and then pinpoints applications where use of the metal represents true economy. It becomes obvious that design in aluminum cannot be a translation from steel forms, that it should be used only to answer specific design problems which it can answer best, and that not only the shapes of individual members but the forms of entire structural systems must be characteristic of aluminum alone.

New forms will evolve from its proper use in its present economic context. Not only that; one also feels that with a change in energy sources (aluminum production presently relies on enormous amounts of electrical power), that economic context itself may change quite radically, again affecting these forms and the ways aluminum can and will be applied.



Gropius *Saarinen*
Johnson *Neutra*
Mies *Bunshaft*

An LP record, perhaps even more than a pair of books, is an unusual product for a company in the aluminum business, and this is how it happened. John Peter, before he was ever designated to edit the books, had had "as a personally-financed Guggenheim" the habit of carrying a tape recorder into interviews with architects and engineers. During discussions with Peter about material to be included in the books, Reynolds executives said that something about the future of architecture ought to be there. After futuristic sketches had been suggested, especially sketches of possible uses of aluminum in future architecture, Peter offered the idea of publishing tape-recorded comments by architects. These, he argued, would not be as specific but perhaps more exciting than one artist's sketches could possibly be. The Reynolds men took to his suggestion, and Peter proceeded to collect the tapes. The record (like the exhibition) emerged later as a tempting by-product that could be produced at relatively low cost largely with material that had been collected in making the books. For the record, Peter spliced his tapes in an Ed Murrow ("I Can Hear It Now") fashion, intercutting in places the remarks of the seven chosen architects to create the effect of an actual symposium: **Ernest Kump**—"We have no unity today (in American cities). Just drive up any of our streets. And the idea that there can't be variety with unity is entirely wrong. There's only chaos without it." **Walter Gropius** — "There is no such thing as international style. . . . What we looked for was a new approach, not a new style. . . . Modern architecture is not a few branches of an old tree. It is a new growth coming right from the roots." **Eero Saarinen** —"I would say I have been most influenced by Mies in the MIT Auditorium, not by his form but by his principles . . . the principles of making structure the dominant element. . . . The use of a building can change, but the structure always stays." **Philip Johnson**—"It's amazing to realize that the multi-story building is quite a new problem in architecture." **Richard Neutra**—"I have no doubt that the most precious of all materials, even including aluminum, is the human material." **Mies van der Rohe**—"The structure is the basic grammar. . . . You can make a garage out of it or you can make a cathedral." **Gordon Bunshaft** — "Today, buildings are primarily being built as they were 40 years ago—just the skins are different, the basic construction is the same."

Graphic design of monumental proportions—for all of the book pages, book dust covers, record jacket and label, exhibition, and related press material—was executed by Robert J. Doherty, Jr., Graphic Design Director in the Reynolds Styling and Design Department, and A. Richard DeNatale. The largest part of this assignment were the page layouts for Volume I, and for these the designers chose a conservative "museum-without-walls" idiom. Nothing—not text, not dramatic layout—was allowed to interfere with the quiet viewing of photographs. The achievement here, with white always surrounding disciplined rectangles of text and photograph, is graphic passiveness, the sedateness of a museum, whereas elsewhere in the program the designers were out to stir up a storm, with their bold arrow motif and an assertive use of layout. A number of designs in the series, most notably the book dust covers (shining facets of blue and red on a black field), are handsomely executed on aluminum foil. The designers show a deft familiarity with all manner of current graphic modes. When they get down to designing on foil, however (which is the specialty of their department), their graphic facility combined with their experience in designing on foil gives them a considerable splendor in that new and demanding medium.

Two European views of Aesthetics and Technology
Dr. Bronowski's article is based on a Design Oration before the Society of Industrial Artists, London.
Dr. Oestreich's statement is based on an article translated from *Baukunst und Werkform* by Edith S. Gilmore.

The Shape of Things

by Dr. J. Bronowski

A prominent British mathematician and author, criticizing the false opposition between design and technology, unfolds an aesthetic theory that declares:
—science liberates rather than constrains the artist
—good design is not prescribed by inherent conditions; no object has a single best design
—preoccupation with shape is a revolutionary attitude in this age, found in both science and art

Though I am a mathematician, I have been occupied for several years with the problems of aesthetics, and I shall begin by stating some of my principles. I do not regard aesthetics as a remote and abstract interest. My approach to aesthetics is not contemplative but active. I do not ask, "What is beauty?" or even, "How do we judge what is beautiful?" I ask as simply as I can, "What prompts men to make something which seems beautiful, to them or to others?"

This is a rational question and it deserves a rational answer. We must not retreat from it into vague intuitions, or side-step it with hymns of praise to the mystical nature of beauty. I am not talking about mystics: I am talking about human beings who make things to use and to see. A rational aesthetic must start from the conviction that art (and science too) is a normal activity of human life.

All the way back to the cave paintings and the invention of the first stone tools, what moved men either to paint or to invent was an everyday impulse. But it was an impulse in the everyday of men, not of animals. Whether we search for the beginnings either of art or of science, we have to go to those faculties which are human and not animal faculties. Something happens on the tree of evolution between the big apes and ourselves which is bound up with the development of personality; and once our branch has sprung out, Raphael and Humphry Davy lie furled in the human beginning like the leaves in the bed. What the painter and the inventor were doing, right back in the cave, was unfolding the gift of intelligent action.

If I am to ask you to study this gift, I must point to some distinction between animal behavior and human behavior. One characteristic of animal behavior is that it is dominated by the physical presence of what the animal wants or fears. The mouse is dominated by the cat, the rabbit by the stoat; and equally, the hungry animal is dominated by the sight and smell of food, or of a mate, which make him blind to everything else present. A mastiff with food just outside his cage cannot tear himself away from the bars; the food fixes him, physically, by its closeness. Move the food a few feet away from the cage, and he feels released; he remembers that there is a door at the back of the cage, and now that he can take his eyes off the food, away

he races through the door and round to the front.

This and many other experiments make plain the compulsions which hold an animal. Even outside the clockwork of his instinctive actions, his needs fix and drive him so that he has no room for maneuvers. A main handicap in this, of course, is that the animal lacks any apparatus, such as human speech, by which he can bring to mind what is not present. Without speech, without a familiar symbolism, how can the mastiff's mind attend to the door behind him? His attention is free, his intelligence can maneuver, only within the few feet in which the food is not too close to the cage and is yet within range of sight or smell.

Man has freed himself from this dominance in two steps. First, he can remember what is out of sight. The apparatus of speech allows him to recall what is absent, and to put it beside what is present; his field of action is larger because his mind holds more choices side by side. And second, the practice of speech allows man to become familiar with the absent situation, to handle and to explore it, and so at last to become agile in it and control it. To my mind, the cave painting as much as the chipped flint tool is an attempt to control the absent environment, and both are created in the same temper; they are exercises in freeing man from the mechanical drives of nature.

In these words, I have put the central concept of my aesthetic: **evolution has had, for man, the direction of liberty.** Of course, men do at times act from necessity, as animals do. But we know them to be men when their actions have an untroubled liberty; when children play, when the young find a pleasure in abstract thought, when we weigh and choose between two ambitions. These are the human acts, and they are beautiful as a painting or an invention is beautiful, because the mind in them is free and exuberant. And you will now see why I framed my opening question so oddly; for it is not the thing done or made which is beautiful, but the doing. If we appreciate the thing, it is because we relive the heady freedom of making it. **Beauty is the by-product of interest and pleasure in the choice of action.**

Science as liberator

These are the principles in which, I believe, an active and living aesthetic must be rooted. I have developed them once again, and in detail, because I do not think that we can talk sensibly about practical design without them. Indeed, they have a special relevance to industrial design. The industrial processes have been the busy liberators of man in the last two hundred years. They have themselves sprung from a most human impulse; the impulse to use and, in order to use them, to make tools. Benjamin Franklin at the beginning of the Industrial Revolution called man the tool-making animal; and the modern tool, the machine, is a characteristic human invention. In turn, the machine gives man an enlargement of freedom, and that in two ways. It gives him the choice of making new things, and thereby it opens up new uses for the things he makes. The new machine or process, the new material, and the new use: each is a work of exploration, a feeling-out of the freedom which each creates.

Let me give an historical example. In 1779, John Wilkinson, with the help of another great ironmaster, Abraham Darby the younger, for the first time built a bridge of cast-iron parts, at the place which is still called Ironbridge in Shropshire. This may seem a modest technical advance. But in fact, it was a break with the centuries of timber, of stone and of brick—a breakthrough into a new dimension of the possible. It opened a new boldness in design; for example, the bridge had a semicircular arch. It invited new uses for the material, and in 1787 John Wilkinson launched the first boat made of iron. When he died in 1805, he had himself buried in an iron coffin.

Wilkinson's contemporaries felt, as I do, that the iron bridge was a true enlargement of human freedom. This is why of all men Tom Paine was enthusiastic for it. Paine had no interest in bridges for themselves. His interest was in American independence, in the coming French Revolution and its echoes in England, and in the Rights of Man. Yet, in these crises of liberty, Tom Paine found time to make and exhibit a model of an iron bridge for London; and this, for the same reason, is the same search to widen the human vision which might prompt him today to speak up for ram-jet aircraft or the paintings of Georges Braque or the odder implications of quantum physics.

And the exploration of the bridge did not end with these pioneers. Kingdom Brunel designed the great suspension bridge which now crosses the gorge at

Clifton. In our century, a succession of bold thinkers has built new bridges, first in reinforced concrete and then in pre-stressed concrete. What they have made has been useful and beautiful together, an enrichment which step by step has opened the potential of nature to us—the potential of human use and the potential of human appreciation together.

There are people who acknowledge this physical expansion, but who refuse to see in it what I also stress; **growth of the mind and widening of appreciation have come with a scientific society.** To them, the technician is a gadgeteer but not a liberator. He seems to them constantly to impose limitations on what they would like to believe possible. "You cannot do this with the material," the technical man seems always to be saying to them; or worse, "You must do that." They take a simple view of human life, and it is this: that the artist is indeed a liberator, but that the scientist more and more binds and constrains it. And lest you should think that this view is held only by dilettantes and by dealers in antiques, let me remind you rudely that it is the common view; it is indeed the commonplace view, which does duty for thought, and lightly springs to the lips, whenever a non-scientist today lays down the law about science.

It is, of course, true that the freedom which a new discovery brings is not boundless. Iron and concrete, steam and electricity, printing and television, each new potential has its limitations. But these limitations are not imposed by the scientist; they are *found* by him, and by the artist, slowly as they explore the virgin field. And neither can work in the new field alone. If the artist refuses to learn, in his own person, what the scientist is discovering about the materials in which he must work, then of course he will find these limitations a burden. And equally if the scientist is too bigoted to feel himself into the sensibility and the living values of the artist, he will propose only dead structures. Both must share, both must enter into all the knowledge of their time. **Knowledge which another man supplies is always a constraint; every addition to your own knowledge is a liberation.**

The deepest change in the habits of Europe and America in the last hundred years has been made by the growing use of electricity. The dynamo, the electric motor, the switch and the valve, the telephone and the thermostat, the vacuum cleaner and the refrigerator have changed our ways of living. The electric light has added to the life span and, yes, to the culture of Western peoples, simply because it has made their day longer. Can we really accept all these from the technician, and yet suppose that somehow he and the artist are at odds? Can we think that the designer is outraged by having to learn about voltage and the load factor, or humiliated by having to think of insulation? The very questions are nonsense. On the contrary, the coming of electricity has set some of the most interesting problems in domestic design, and because the artists who have solved them have taken pleasure even in the technical difficulties, they have done much to form the taste of our age.

The meaning of a triangle of forces

I have glanced, with little patience, at the false opposition between the designer and the technician. This is the fallacy of the ivory tower: the notion that we live in a world whose measurements are inexorably fixed by science, and that the designer can do no more than languidly to embellish it here and there with a silk bow and a lily.

Nevertheless, this false answer does remind us that, behind it, there is a question. If the designer is not merely to decorate the thing made, what is he to do to it? Where is his place in the making of the thing? And if, as I have said, he must himself understand the techniques which go into it, how far do they fix what he is to do?

These are, in their different forms, the one fundamental question in industrial design. **The object to be made is held in a triangle of forces.** One of these is given by **the tools and the processes** which go to make it. The second is given by **the materials** from which it is to be made. And the third is given by **the use** to which the thing is to be put. If the designer has any freedom, it is within this triangle of forces or constraints. How should he use his freedom there?

There was a time when there was a ready-made answer to this question. Thirty years ago it was widely believed that, under a careful scrutiny, the triangle would be found to have no area at all. The tools, the materials and the use together were thought in them-

selves to imply and to fix the design. Let the designer steep himself in the industrial process they said, and beautiful works will flow from his hands of themselves.

The technician's fallacy

We have come to see then that this also is a fallacy: **The triangle without freedom was the technician's fallacy, which I call the fallacy of the iron tower.** Indeed, it is difficult now to understand how anyone could ever have been deceived by it. Here we live in a world in which a thousand daily objects surround and encumber us: the chair and the lamp, the book and the cigarette lighter, spectacles and keys, men's shoes and women's hats. In the bright variety of shapes in which these are used every day, could it ever have been sensible to suppose that each has a best form? **Even so universal a thing as a bottle, or so specialized a thing as a watch, does not have a best design.**

There is of course a truth hidden in the fallacy of the iron tower. It is a negative truth, and it is this. You cannot be certain how to design something well, but you can be certain how to design it badly. If you make a thing in a way which goes counter to the tools with which you make it, or counter to the materials of which you make it, or counter to the use for which you make it, then you can be sure that what you make will be bad. This truth has a place, and industrial design has profited from it in the last thirty years. But it remains a negative truth; it says no more than that, **if you make something which falls outside the triangle of forces, that thing will be bad; but within, alas, it will not necessarily be good.** The triangle is not a point, and it does not help us to prefer one point in it, one acceptable design to another.

Nevertheless, there are some industries in which the tools, the materials and the use come nearer to fixing the design than in most; and we should ponder what these industries are. The search for the principles of good design is bedevilled when it tries to range through all industries at once. For there is a difference between two kinds of industry; between the traditional industries and the pioneer industries.

Consider the things, the simple household things, which have been pioneers in the last fifty years. I have already spoken of electric equipment, all the way from the pocket torch to the refrigerator. Go on to the gas cooker and the controlled solid fuel cooker, to the mixer and the telephone, the radio and the television set. And beyond these, consider the things which have been at the head of technical progress: the motor car, the airplane, the calculating machine and the electronic devices which serve it.

It will strike you at once that these are the very things which are well designed today. The industries which make them are pioneers, making new things in new ways; and the new problem, the unheard-of adventure of flying through the air, influences design in two ways. First, of course, it liberates the designer from convention; and second, it comes nearest to determining of itself the logical structure and with it the shape of the thing made. This is why the pioneer industries are leaders in design; because we sense that the things they make conform not to history but to logic. And this has been so in the past whenever a new technical advance has been made; the slung carriage, the yacht, and the cooling tower imposed their own designs, and were beautiful in their day, exactly like the jet aircraft and the delta wing today.

Because the pioneer things interest and satisfy us, there grows from them a custom in the eye which forms our taste for other things. There is, for example, a good deal of banter about the word "streamline," and designers are asked why an electric iron should be made to look as if it could fly through the air. The streamlining of such things is, of course, an echo of functional design which was appropriate in airplanes and, rather less so, in motor cars, where it began. **But streamlining is not necessarily inappropriate to stationary things, to which it extends the taste which has been trained elsewhere.** We are now distressed by protruberances on an electric iron or a piece of furniture, not because we want either to fly through the air, but because machines that fly through the air have taught us to question the purpose of such decorations. In this way, **the pioneer industries create a unity of appreciation, and bring home to us that no design can be made or judged in isolation from others.** The boldness which they teach becomes a model for all design.

Even the pioneer industries do not conform to the fallacy of the iron tower. There are many makes of motor cars; it is possible to make the most modern

airplanes in a dozen shapes, all of them dazzlingly handsome. What is true, however, is that in the pioneer industries the technical needs determine the design more nearly than in others. The chief determinant in the traditional industries is history; but in the pioneer industries, the chief determinant is *logic*. Here the layout of the process and the mutual arrangement of the functions impose an order of their own, which makes some overriding demands of structure. **The logical relations imply certain spatial relations: above all, they imply that the important element in the design shall be the shape.**

A new and radical approach

We have grown used to the notion that what is to be designed is the shape of a thing, and it now seems to us self-evident. But it is, in fact, a revolutionary notion. The Victorian designer was not asked to shape things but to decorate them. Ours is not the first age to be preoccupied with shape, of course: the Greek sculptors were, and the Gothic masons. In recent history, however, the trend of art was away from the logic of structure in space, and we should recognize that **our preoccupation with shape is a new and radical approach to the world about us that is not confined to industrial or, for that matter, to any other art.** The streamlined iron and the Scandinavian chair are expressions and, more, are explorations of a universal interest in the shape of things, as much as the sculpture of Brancusi and Henry Moore. This new interest, and the shift from Victorian interests, is as striking in the sciences.

For the sciences equally have changed their preoccupation. A hundred years ago, it was the pursuit and manipulation of exact measurements. The great advances in physics and chemistry in the nineteenth century rested on this, and so created the picture (it is still the popular picture) that science is wholly concerned with quantity. But the concern of science today is very different: it is with relation, with structure, and with shape.

Today we hardly ask how large space is, but whether it is open or closed on itself. We say that rubber stretches because its atoms are strung out in chains, and a diamond does not because the atoms are locked in a closed pattern of rings. We believe that the enzymes in the body fit the chemicals which they rebuild as a key fits a lock. And when we are asked why bacteria absorb the sulfa drug on which they cannot grow, we answer that the drug deceives them: its molecules have the same shape as the body chemical which the bacteria seek.

The most striking example of this geometrical way of thinking, as it were, is in the researches of the last years on the nature of life itself. How are living things able to reproduce themselves in exact copies? We have had our first inkling in recent work on the structure of the nucleic acids which are important in all living things. The molecule of a nucleic acid appears to consist of a pair of spirals, each wound round the other and held to it by crosslinks. If one spiral of a pair splits away from the other, it seems likely that new atoms can only join it at the links in such a way that they form a spiral of precisely the same kind. Thus the arrangement seems designed to reproduce itself, and we glimpse the reproductive process in the very shape of its parts.

These examples illustrate that **in our society, we express logical relations as structure, and we express structure in shape.** The interest of the industrial designer is part of the interest of our whole society and, in the pioneer industries, he leads this interest. Such an interest is natural in an age of discovery, when new tools, new materials and new uses crowd round us and carry us headlong to new ways of ordering our lives. Our age is, like all great ages, an age of transformation: this is why, like other great ages, we are still looking for our own taste, and will go on doing so until the great days are over. In an age of transformation, it is clearer than at other times that a sound aesthetic must grow from the actions that are practised and the things that are used, the characteristic actions and the new things, every day.

It is easy for us, living in this thought, to blame the Victorians for their indifference to aesthetics in the things they made. But of course the Victorian indifference *was* an aesthetic—a poor aesthetic, but a positive one. Their furniture and hardware are often thought to have been bad because their taste in pictures was bad. This is not so; it is the other way about; the Victorian taste in pictures was debased because it was not founded on a bold and active taste in the things

they made. The taste of an age is a unity, and if we want to avoid the monumental boredom of the Victorians in painting and literature, we must first avoid making mud huts in modern materials.

Pure art grows from practical art

I should like to end with some reflections on the fine arts, and to do so I ought first to glance at the place of decoration in industrial art. After all that I have said, why do we take pleasure in the decoration of things, which adds nothing to their use? The engraved glass, the silver candlestick, the painted cart have already solved all their functional problems before they are engraved, chased or painted. If the maker does not stop at the formal solution, it is because the very handling of the materials fills him with a desire for more. He is conquered by a sense of pleasure and of exuberance. The freedom which the materials give him makes him boldly stretch and reach; and his ease in them makes him, as it made the baroque architect, gay and extravagant. Each of us can picture this feeling best in his own profession, and since my profession is mathematics, I will sketch it for you there.

Mathematics is a language: the language in which in the first place we discuss those parts of the real world which can be described by numbers or by similar relations of order. But with the workaday business of translating the facts into this language there naturally goes, in those who are good at it, a pleasure in the activity itself. They find the language richer than its bare content; what is translated comes to mean less to them than the logic and the style of saying it; and from these overtones grows mathematics as a literature in its own right. Pure mathematics grows from what began as an application, just as good decoration may grow as a poetic projection of the object.

I am by temperament as well as by profession a pure mathematician. It is natural therefore that I like literature better than the newspapers, poetry better than prose, and the imaginative film better than the documentary. To tell you the truth, I like pure art better than industrial art. But for just this reason, I am alive to the importance of applied mathematics and the newspaper, of prose and the documentary film and industrial art. **No true appreciation of pure mathematics or of poetry can grow except from these strong roots. If you neglect the seed-ground of a lively industrial art, then all art withers.**

We can see these origins, I think, in modern painting. The rise of abstract painting is, of course, a part of the universal interest in structure and shape. Indeed, the phrase "significant form" was used by Clive Bell before abstract painting was regarded, when the main influence was that of the Impressionists. There are critics who believe that the appreciation of these forms is inborn in men, as a sensuous pleasure in abstract shape. I do not share this belief, which I think is contradicted by the art of many earlier ages. To my mind, **pleasure in abstract structure is part of the thought of our age, as much as the scientific speculations which I have quoted.** And the structures, the shapes which give us pleasure take their significance from our own experience: from the delta wing and the Meccano set, and from the biological research and our growing understanding of the patterns which make plants and animals work.

I have presented an active aesthetic, in which **pure art grows from practical art, beauty from the pleasure in choice of action.** To me, art and science belong to the everyday of human action, and are essentially human because they explore the freedom which man's intelligence constantly creates for him. Because ours is an industrial age, this freedom is expanding fast, in new tools, new materials and new uses. The designer must understand their techniques at first hand, for they form the logic for his design. It is characteristic of our age that we express logic as structure, and structure in shape. This is striking in the designs in our pioneer industries, where logic comes nearest to fixing the shape, and which therefore form our taste. Yet even there, the techniques do not wholly fix the design, because no design exists in isolation from others. There is a unity among the things we make, a unity of purpose and of action, which shapes their design towards the image of an age. The practical artist expresses, and at his best he leads, the unification of our age, in which its growing points and its intellectual monuments become one. This is why I regard the work of the industrial artist highly and critically; why I see in his struggle with the shape of things the preoccupation of all thought today.

Humanizing the machine by Dr. Hans Dieter Oestreich

A German designer and author calls for greater exploration of non-geometric shape in the design of machines—for a search for form appropriate to our more humanized view of the machine.

The machine, when man invented it, was so totally different from anything that he had ever known in nature that its form showed no conscious connection to its function, no expression of any innate law. As machines became more complex, they began to display this complexity with vigorous pride—laying bare their interiors as a kind of totem to the human inventive spirit.

Later, however, we began to take the machine for granted, and it was no longer necessary to display its internal details to make it comprehensible. On the contrary, the obtrusive display of technique now actually seems disagreeable, and there has been a general tendency to simply encase the exterior of the machine: the machine withdraws itself like a snail into a shell, leaving free only those organs which are needed to connect it with the outer world. This drive to subjugate the individual parts to an emphasis on the whole form arises, for one thing, from a need to protect the worker and keep the works clean; it shows an attempt to reduce the expenditure of material, energy and time that is expressive of our whole period.

But these simplified housings are not purely practical: they also fulfill an esthetic need. They conform to the contemporary trend toward closeness and concentration—a kind of drive toward the organic.

Our aesthetic needs have always been as real as our need for shelter, food, or sleep. No other cultural epoch has ever viewed its tools merely as means to an end—which explains why many old tools convey to us a quality of completeness, distinction and validity. Even the simple knives of the Neolithic era often show evidence of taste, care, and skill. **What gives us pleasure in these objects, as in any objects, is form, not function.** "No form, not even the most completely functional ones," architect Peter Mayer has written, "is the simple result of mechanical processes: a hand guided by intelligence and feeling must prescribe it... Technical form springs from a living intuition that grasps and sees the inner being of the machine, rather than merely seeing the machine itself."

This form-need of our era can certainly be seen in architecture. As Kandinsky has commented: "It is not in the clearly displayed and visible geometric constructions that we find the richest expressive possibilities—but rather in the concealed, unnoticeable element addressed less to the eye than to the spirit." Kandinsky, though later concerned with the Bauhaus, where his work was influenced by elementary geometry, had earlier felt dissatisfied with "pure" construction that becomes dogmatic the moment it becomes an unalterable demand.

Now it is certainly true that every living form evolves out of "inner necessity," the nature of the object or organism itself. At the same time, however, it cannot help being a visible expression of the concepts of its own period—and **the idea of what "function" is may vary greatly from period to period.** There is no point in finding fault with a Renaissance chair because it is uncomfortable. It may seem a matter of course to us that a chair is designed to serve personal comfort; but at an earlier period, its function was to represent rank and social dignity.

And it is for this same reason that the design of today's machine differs from its predecessors: its function in our lives has changed. When first invented, it was less a servant than a boastful monument. ("Le Corbusier, in the '20s, addressed a hymn to this new idol that was very much in the Bauhaus spirit: "We are the first generation to see the machine . . . With polished and glittering dials, globes and cylinders—cut with a precision unmatched in nature—the machine is all geometry. Geometry is our great creation and enchants us. Man, creator of the machine, works, like a God, in perfection.") But this was a swan song; **now the machine has ceased to be an idol and has become a reliable friend.** Like the contemporary room, it is subordinated to man, and there is no longer an exclusion of the human element that we once had in both the machines and rooms of the '90's. That is why a geometrically-designed housing for a machine has become limited and unsatisfactory.

Man's more intimate relation with the machine, marked by a slow but persistent change in form, can best be seen in the private sphere, where there is a direct connection between man and the machine: in the home, office, or small workshop. We can perceive the change less frequently in a power station, for instance, or in a factory, despite the fact that it was the birthplace of the machine.

The reason for this discrepancy is chiefly economic: typewriters or vacuum cleaners are far less complex than machine tools, and their functions are simpler and more limited. Frequent turnover allows for quick amortization of machine tool expense, so that it is much easier to experiment with changes of form in small consumer machines than in expensive specialized ones. There is also the fact that many manufacturers offer virtually the same tools in different forms, and the individual merchant is often forced to experiment with new forms in order to stay in business. Nonetheless, improvement in the design of capital equipment is equally important. Research shows that workers will take better care of a well-designed machine, and will find more pleasure in his work and do it better. Good design, in other words, can have important economic consequences as well as cultural and social ones.

Until industrial designers began to be recognized in the '30's, machines had been the more or less simple result of rational calculations by engineers. Yet even among designers, there were—and are—only a few with the ability to think clearly, and also with the design talent to raise a product beyond mere functionalism to that of a living form. Even today, many engineers — and especially machine manufacturers and toolmakers—use no tools except a right angle, T-square and compass. With these, they can reduce all the subtle contours of a product to straight lines and curves—taking out of it in 3 minutes all the feeling that a designer worked 3 weeks to put into it.

In only a few fields—ships and planes, notably—has the engineer been forced to make use of forms which, even with the help of elementary geometry, cannot be pressed into a strict geometric scheme; they can be evolved only by feeling, trial and error. The result—the so-called streamline—originally happened to be determined by functionalism; but it also happened to meet the aesthetic need of our period—to such an extent, in fact, that it is carried over into objects in which streamlining is functionally absurd and contradictory. But even so, this phenomenon reveals a valid dissatisfaction with rational, prosaic construction: **viewed as a concern with shapeliness, streamlining tells us that there is a continuing search for form appropriate to modern man and his modern machine.** Circles and lines—the latter as a border or axis—are of course justified when they arise from economic necessity, or from the actual functional requirement of the machine or part, or from the method of fabrication (turning, for example). But even with the latter, there is a compulsion to use geometric outlines only in very specific cases, and they are hardly ever necessary when the forming of the material occurs without stress or tension—by pouring, forging, or pressing—because it is possible today to make a plastic negative for any desired model with almost incredible exactness.

Machine parts made by these new methods, are, therefore, the easiest ones to design with feeling. The severely rational objects formed by machining, whose aesthetic appeal comes chiefly from shimmering surfaces of high precision, can be brought into interesting contrast with the irrational plastic forms. When the two are combined, of course, design must be handled with particular care. Rotating parts, like wheels and screws, must be set with their axis perpendicular to the surface of the housing, and the latter must be carefully formed to receive them—which means, in many cases, the most practical design treatment.

These operating parts—levers, handles, pushbuttons —may often be given an agreeable form for the hand and eye, and the indentations that are required to give a better grasp can also be used to add charm and beauty to the design. Similarly, air vents, reinforcing ribs and other rigid forms can be used for interesting contrast with more flowing forms.

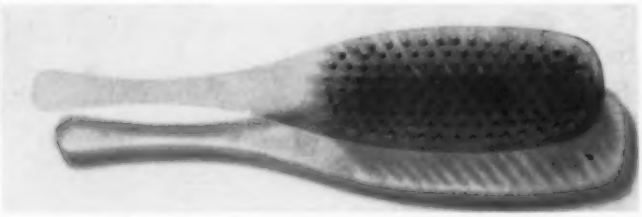
The designer's basic problem is to work closely enough with the engineering to bring the various functions of any machine into an organic whole. **Engineer and designer together must find in the machine a form that originates from inner necessity, that will be a true expression of its nature.** Compromise will be required on both parts—and the support of an imaginative and cultivated manufacturer is extremely important.

Our era—like all eras—will be judged some day by the way we set about and accomplish our particular tasks; not the least important of these tasks is the true mastery of the machine through design.

In an Italian Gallery

Italian designs of 1956, *including Golden Compass winners, may be inspected in the high Baroque setting of the Circolo Della Stampa. Together they raise the question: Is there an Italian style? The following pages seek an answer, taking up some examples.*

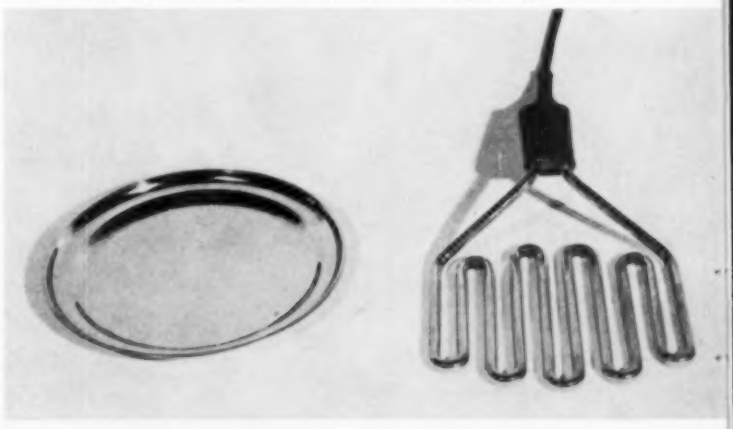
SCULPTURAL FLUENCY



Compare Max Bill's brush (left) with the Italian Verbania—the former, a Golden Compass winner. There are marked differences, particularly in the sculptural approach. A German constructivist, faithful to his purist interpretation of "form equals beauty," Bill reduces the brush to the utmost simplicity of shape, and silhouettes in clean lines the translucency of the material, Lucite. The handle is incorporated into the strictness of the whole form. Through the warmth and grain of wood and the comfortable shaping of the handle, the Italian brush is sensuously, rather than intellectually, appealing; it anticipates—even invites—the hand. One feels that the Italian, in his approach to form, is influenced much more by a physical appreciation for nature than by an admiration for chemistry, geometry or for the machine as such. And he desires in machine-made products the nuances of a personal expression. None of the objects on this spread simply occupy space; they displace it with their weight and describe it with their tapering outlines, whether linear (below) or taut and bulky (right). Rounded—sometimes with extreme frivolity—Italian designs spring not from a doctrine of function or mathematics but from a fluent sculptural sense.

Steel tools, made in Siniscola (Nuoro); design by Giacomo Sotgiu.

Electric heater, made by C.R.E.C. Pavia; designed by G. Franco Testa.



Thermos in anodized aluminum; designed by Piero De Vecchi.

"Autoselz 56/S" has anodized aluminum housing, nylon top; designed by Sergio Asti and Sergio Favre for S.A.C.C.A. B., Milan.

SENSUOUS APPEAL

Many Italian products make you want to touch them. They appeal both visually and tactilely—either through form or texture, or a combination of both. The skintight bursting form of the polystyrene piece presses for attention, while the rug is purely textural in its invitation. The suede valise is characteristically Italian; its vibrant surface and voluptuous flexibility are a graphic expression of the nature of the material, as is the polyethelene container reinforced by visible ribs.

"Jungla" rug (right) was designed by Giuseppe Ajmone.

Polystyrene dish designed by Ufficio Tecnico Samco and Gino Colombini.

Polyethelene container, made by Kartell-Samco, designed by Gino Colombini.

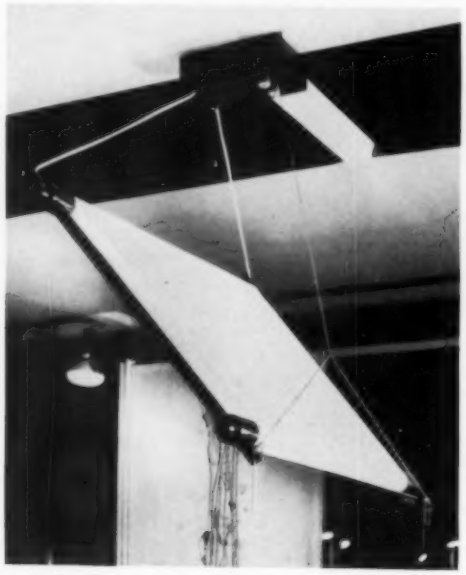
Reversed calf valise, by Natale Beretta, Milan.

AN APPETITE FOR DETAILS

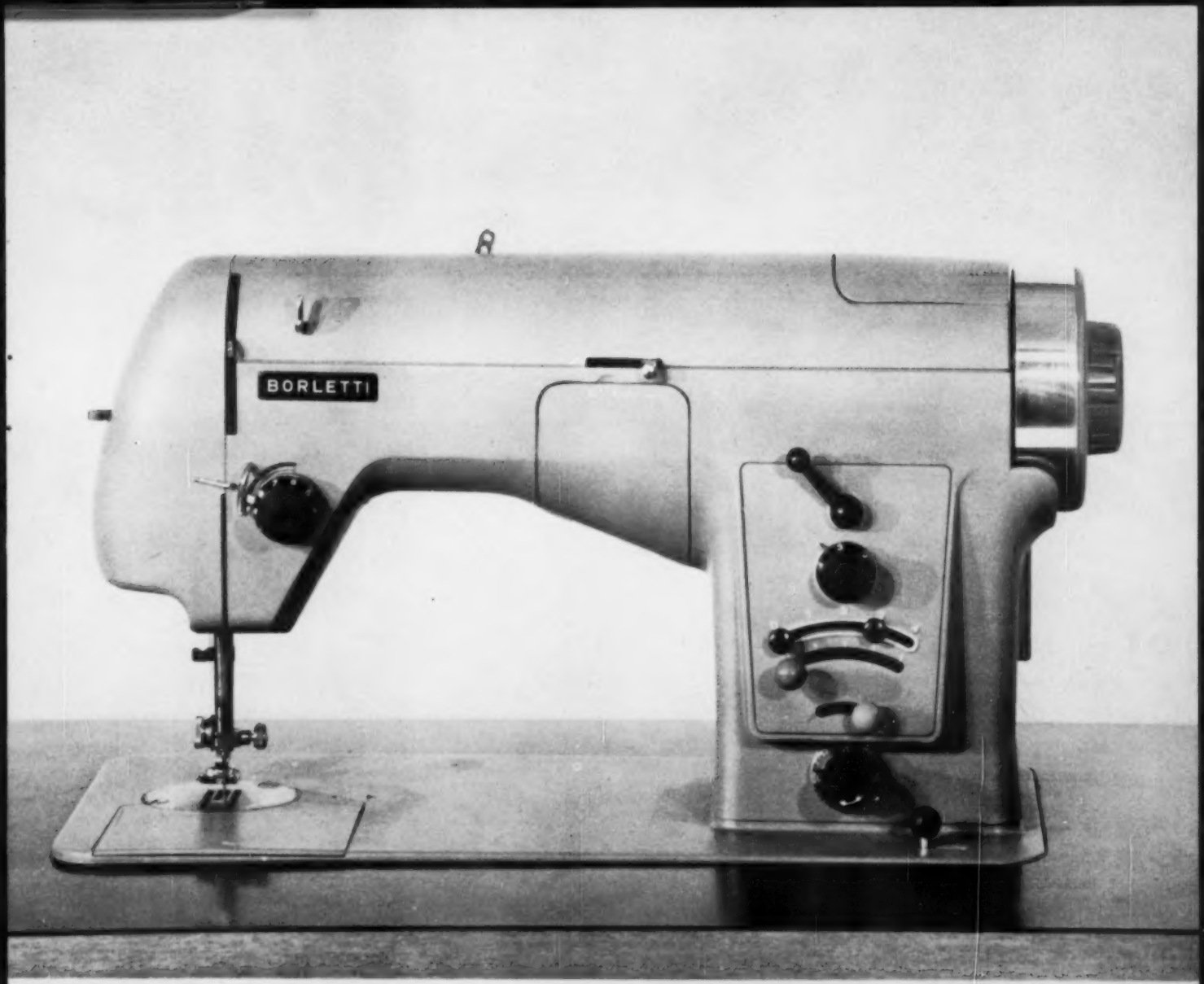
The purist tendencies of Modern Design seem not to have bothered Italy; she continues to relish pattern, color and the multiplicity of forms existing in one complex machine (right). Her Baroque heritage (see the Circolo Della Stampa) testifies to her ability to deal with details freely and copiously—without imposing a rigid pattern. These mechanical products are carefully considered with respect for each part, junction, and change in materials. In its contemporary expression the Italian enjoyment of details is kept from excess—and yet it excites the realization, as no mere sense of precision could, of the most dramatic ways to make a sculptural whole of all the parts—*s.b.*

"Atlantic" spinning reel, manufactured by L'Alcedo Di E. Rolandi, Turin, was designed by Carlo Alinari.

Luminous panel that operates on a special cantilevering principle is by Gino Sarfatti, for Arteluce, Milan.

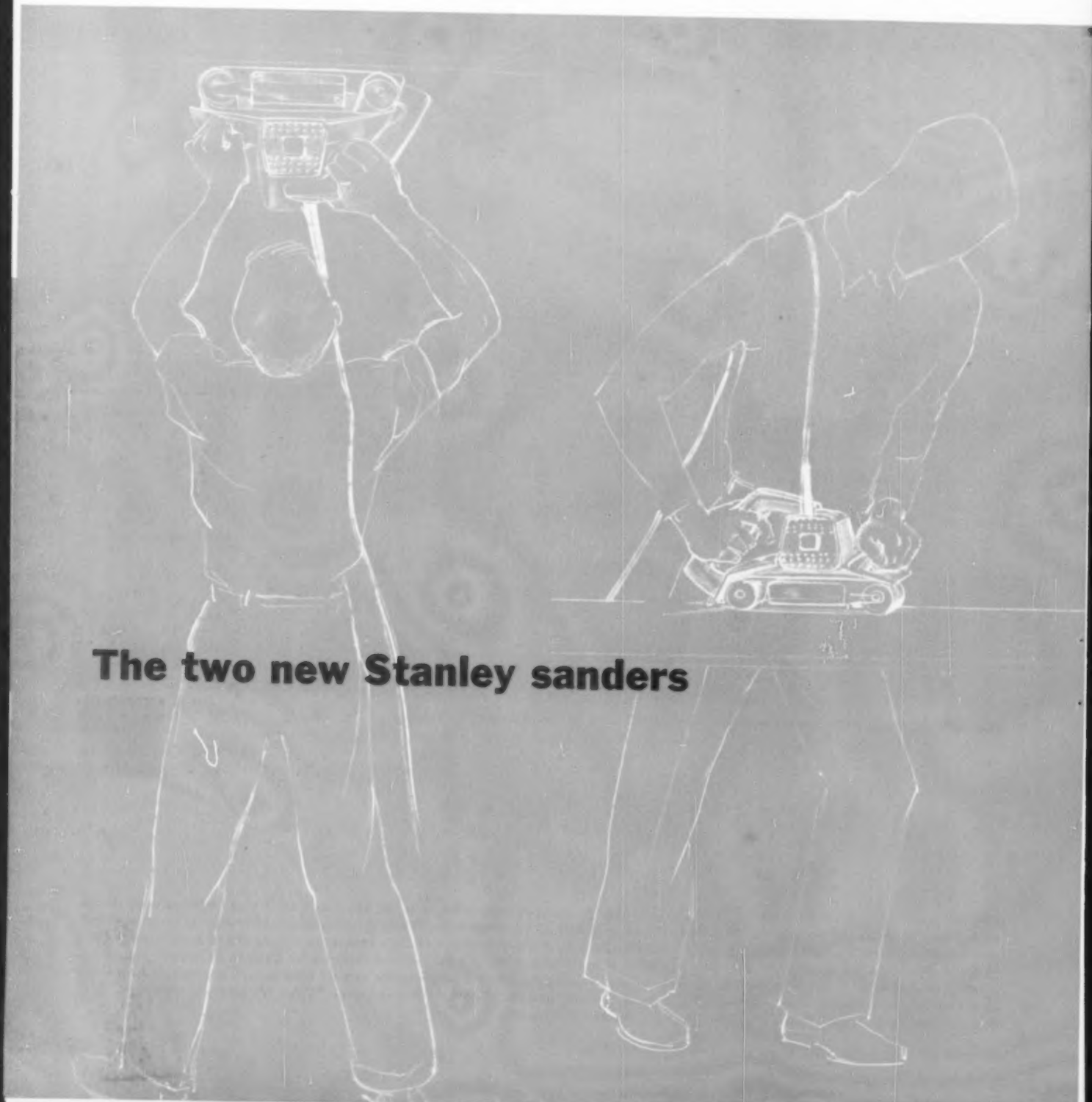


Infrared heater "Sorriso" is manufactured by Fargas in Milan, and was designed by Lucian Misani.

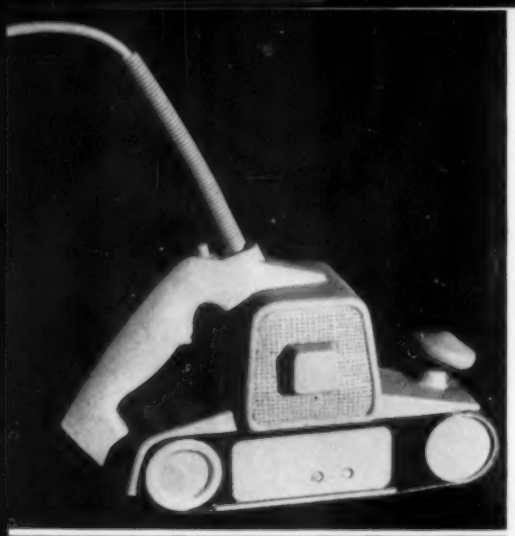


Borletti's superautomatic sewing machine, model 1102, *was designed by Marco Zanuso.*

The five designs on these pages marked with La Rinascente's compass were winners in the third annual Golden Compass competition, 1956, *juried at the end of the year by Aldo Borletti, vice-president of La Rinascente; Cesare Brustio, General Director of La Rinascente; and architects Giacomo Castiglioni, Franco Albini and Alberto Rosselli, Director of* Stile Industria. *Among the* 96 *products exhibited in Milan five other compasses were awarded. The other winners are: a set of steel platters designed by Roberto Sambonet; an assortment of kitchen tools in stainless steel by Massimo and Adriano Lagostina; a polyethelene conical bucket with a graduated lip made by Smalterie Meridional S. P. A., designed by Roberto Menghi; and an electro-mechanical clock "Cifra* 5" *made by Solari R. & C. and designed by Gino and Nani Valle, John R. Myer, Michele Provinciali.*



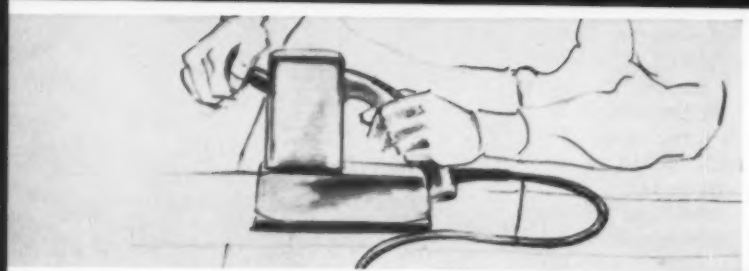
The two new Stanley sanders



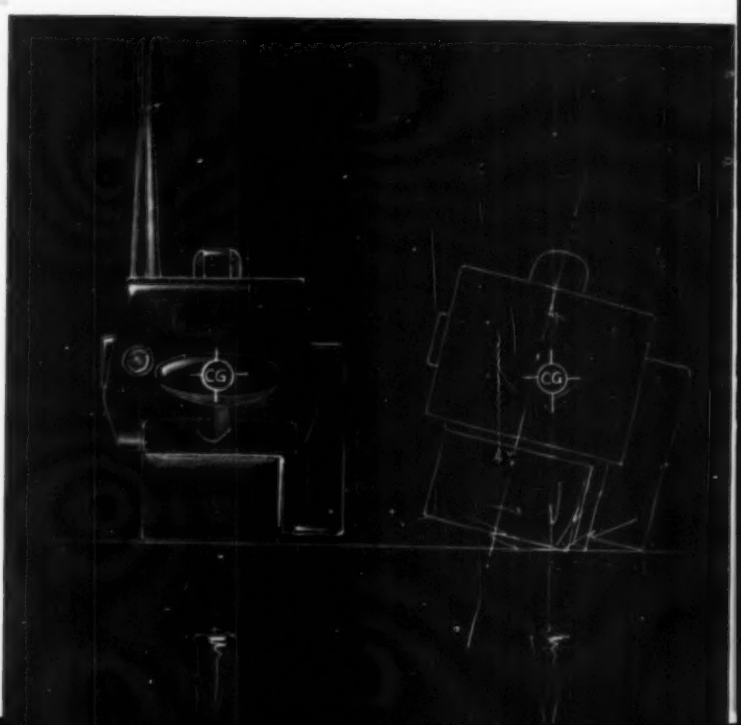
The Stanley belt sander, one of two sanders in their new line, and (above) the clay model from which it grew. The sketches (left) show how the belt sander can be used in horizontal or overhead positions.

A century-old name in quality tools and hardware, New England's Stanley Electric Tools, a division of The Stanley Works, enters the highly competitive bailiwick of portable sanders with the two machines pictured on these pages. But the design solution behind these entries is of more than specialized interest: Portable sanders, far from new, are well established equipment with industry and in the cellar haunts of the do-it-yourselfers. When Stanley branched out to include sanders in their line, they were after two products that would stand out by virtue of improved function and would have, as well, a distinctly different look even though they operated on fundamental principles common to all competitive models. Besides designing two sanders that would be better sanders, industrial designer Laird Covey, working closely with The New Goods Committee of Stanley Electric Tools (headed by Chief Engineer J. H. Godfrey), wanted to create a basic character for the two machines that would give them clear identity in the mind of the buying public . . . Even in the very first clay model, whose pictures we have matched here with those of the products now on the market, this identity can be seen emerging despite the fact that the two machines are not really identical. It emerges through similar treatment of the crisp radii, detailing, clear sculptured organization, and an over-all work-hugging balance.

Stanley's orbital sander and (below) the designer's clay model. The strain relief on this and the belt sander is both a safety device and a visual trademark.



The orbital sander in horizontal and vertical position shows the versatility of the grip position. The high front knob and hooked handle of some competitive models contrasted (top) with Stanley's positioning of the grips. The Stanley handles (center) are in balanced relation to the weight of the sander versus the imbalance found in some competitive models (bottom).



The *handling comfort* of a portable tool is probably the most important consideration with the buyer. Basic to any portable tool design is the size and shape of the grips and their relation to the weight and shape of the machine. In the case of Stanley's belt sander, which can be used in horizontal *or* overhead position, one objective was to find a grip that would be comfortable overhead as well as downward. Comfort, in this case, meant finding a balanced relationship of the machine's bulk and weight to its handles. The solution arrived at by Covey and the committee members was to give the tool a versatile rear handle that the operator can grip comfortably in either ordinary or overhead working positions. An additional virtue of the handle is a trigger-switch for power control reachable when the hand is in either position. The front T-grip provides leveling and lift control and, like the rear handle, is carefully centered to the machine's weight, allowing less chance for one side of the abrasive to dig a groove in the work.

The Stanley orbital sander is especially good for close-quarter work like recessed paneling and stair risers. In the normal horizontal sanding, the angle of the rear handle with its flat top provides a natural direction toward the platen. (This top grip was tapered to fit the hand.) The low position of the forward knob close to the work was designed to give better control. For tight T-square corners, this projecting front handle is arranged so that it can be unscrewed and temporarily removed. A positive slide switch frees you from constantly triggering the power unit.

The electric cords on conventional sanders have an annoying habit of pulling in front of the machine only to be grazed or tripped over. Stanley solved this problem by designing a rubber strain relief that carries the cord out and away from the work. This practical safety device was then exploited as one of the visual elements that link and identify the two machines. Other marks of identity — the air vents, which are similarly shaped and which were given the particular shade of blue that Stanley uses on all their lines, the tapered cube housing of the motor, the texture used on the handles—also contribute to a distinct family character.

The fabrication of the housing is accomplished by a straightforward die-casting technique; the central part of the belt sander is a rather complicated piece, notable for having been cast in one piece.

Price of the belt sander: $84.95. Price of the orbital sander: $49.95.

Stanley experimented to achieve

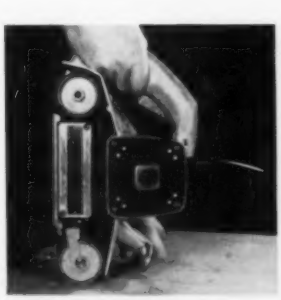
a balanced relation

between the size of the grips

and the whole machine

A tiny lever releases the clamp bar for sandpaper insertion at each end in the orbital sander. Clamp bar raises to lock paper in place for sanding.

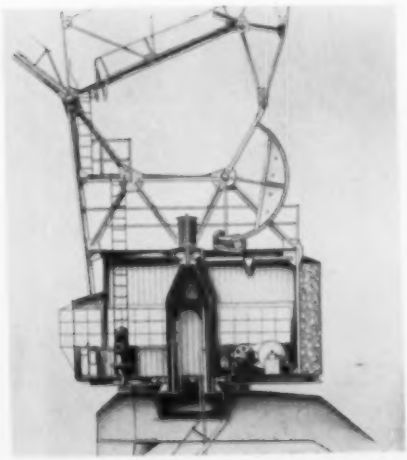
The sandpaper is removed by pushing down on the forward drum aided by the weight of the sander. Paper (left) is replaced by pulling down on the forward drum or by setting down the sander on a bench with a sharp impact (right).



DESIGNS FROM ABROAD

The Germans redesign the prosaic crane for economy, efficiency and beauty

Cranes take different forms but employ new principle shown in diagram: center-post supports slewing section, moves with it. Roller bearings at top and bottom of post absorb vertical and horizontal forces respectively. Counter-weight is now placed in legs; either three (left) or four (above) legs are used.



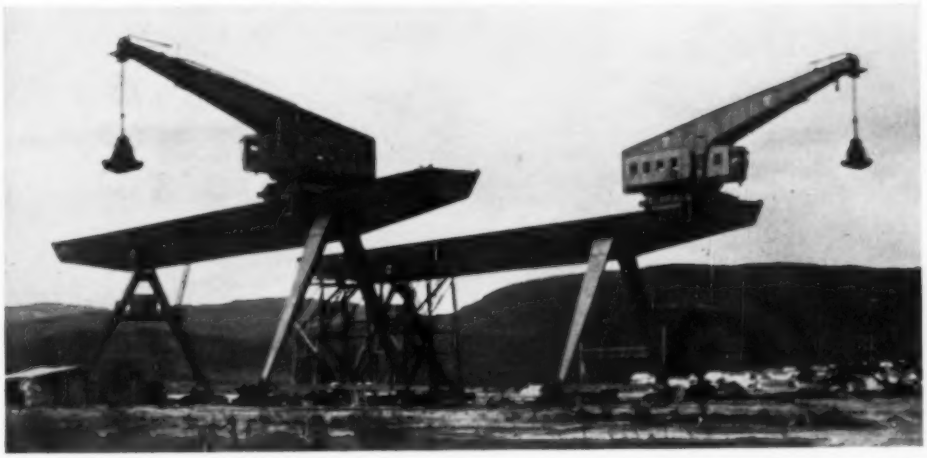
It has been said that novelty springs up best on a clean slate, and developments in materials handling equipment prove the adage anew. Perhaps no area of postwar Germany was as close to a clean slate as its harbor installations. On this rubble the Germans have managed to recreate not only a flourishing trade but a new face—and no feature shows this better than the once-homely dockside crane.

The first requirement for design engineers was a *light* crane that would use small amounts of iron and metal supplies—and one that would preserve materials expended in them. But in the handling of heavy loads, a light crane is about as useful as a light anchor for a steamship: the load requires a counterbalance in the crane itself. Demag, MAN and Kampnagel, the three largest German firms in the field, employ a new method of weighting the crane: instead of placing the ballast on the turntable, they fill the legs with cement, leaving the upper housing light and maneuverable. The new function of the legs led to their redesign and rearrangement in a triangular or trapezoidal pattern, and by this arrangement a minimum of area on the quay is taken up. The cranes are welded rather than bolted together, and their large, flat surfaces are easier to maintain and paint — another way of preserving scarce metals.

The ingenuity of the new cranes lies in a new way of relating their mobile element (slewable section) to the stable weighted member. By replacing the traditional ringrail, on which the slewable section moved, with a hollow center-post, great savings in weight are achieved. The center-post, because it not only supports the moving piece but actually moves with it, can have relatively small dimensions and yet be able to absorb strong forces. Another saving emerges when the old rollers and rails, which were subject to great wear, are replaced by smoothly flowing spherical roller bearings. A fringe benefit of this mounting is the safety feature. An operator could enter the control cabin of previous cranes only by climbing over an exterior platform—from which he could be swept by the turning cabin itself. Now he enters through the hollow center-post, even when the crane is in motion. Further, eliminating the platform, ladder and railing saves on material, weight and maintenance. That the crane design takes in even these minor elements shows that *saving* need not mean merely stripping down.

Spidery shapes of cranes using telescoping tube jibs, though they may appear more interesting than practical, are actually more powerful than others of their size. Hydraulic system allows arm to reach any point within its maximum and minimum radii. Tubular arm harmonizes well with curved welded surfaces of housing.

New trends in structural engineering are reflected in unusual lines of loading bridges and ore-cranes. Two transporters shown are at Norwegian steel plant. Developing different shapes, they employ same box and shell construction as others on these pages.



In most conventional cranes, whatever ugliness we find does not arise from its crude form (for such a form is appropriate to a crude operation like lifting), but in the separation of carrying and enclosing elements into unrelated and almost antithetical parts. The new "box and shell" construction integrates its members—making a better-looking crane that at the same time does a better job. The variety of forms that the new cranes take may be seen in the unfamiliar shapes on these pages.

The most controversial of these forms is the telescope jib at far left. Latticework frames, steelplate and tubular jibs are all employed in cranes of different classes, but the issue among them is still unresolved. The obvious advantage of the standard lattice-work is its open lightness: it presents no wide surfaces to the pressure of the wind, and is thus both maneuverable and stable. The steel-plate arm below offers another advantage, a smooth surface which may easily be maintained and painted for resistance to corrosion. The debate between them is closed when a radius of more than 65 feet is desired, for the light latticework is more suitable for long booms. But the third type of arm is coming into more use, especially where space is at a premium. The hydraulically controlled telescoping tube can be extended or retracted to a variety of lengths, and a small crane can have a long reach where formerly only large cranes could be used. This crane appears disproportionate when the arm is extended to full length, but it harmonizes better with the curved welded surfaces of the crane house. Some critics claim the hydraulic system is inefficient, uneconomical and subject to mechanical failure, while the simpler booms are more consistent.

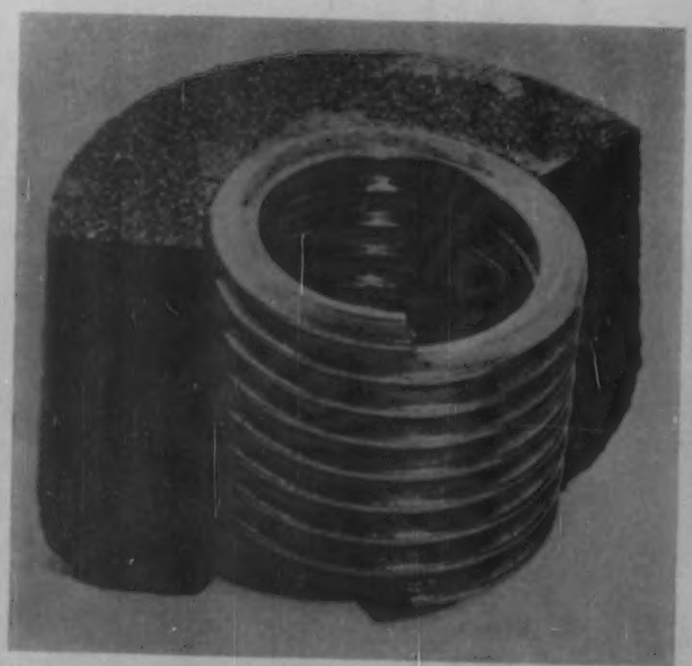
Steel-plate jib construction is used for easy maintenance, but gets more pressure from wind, is heavier than latticed jibs (left).

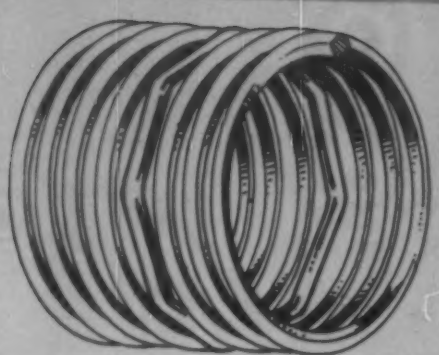
The search for greater operating efficiency goes on, and the operator is not being left out of account. The new crane houses give him not only a full range of vision, but include accurate and accessible control-instruments, hydraulic luffing gears, infra-red heating, electro-acoustical communications systems and load limiting devices. From his glassy tower, the operator looks out on a machine rebuilt, like the docks he works on, from the ground up.—*a.f.*

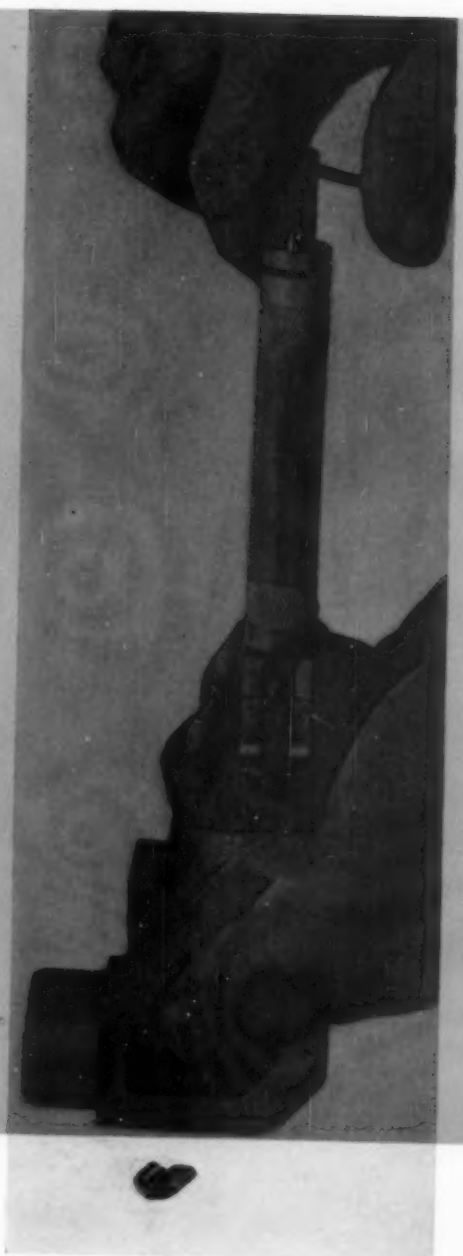
Material in this article was originally presented by Hans W. von der Recke in an address to the American Society of Mechanical Engineers.

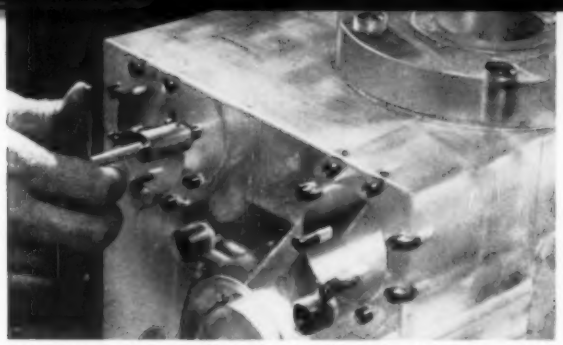
Inserts make materials more versatile

Heli-Coil inserts are self-locking. Installation tool at right.









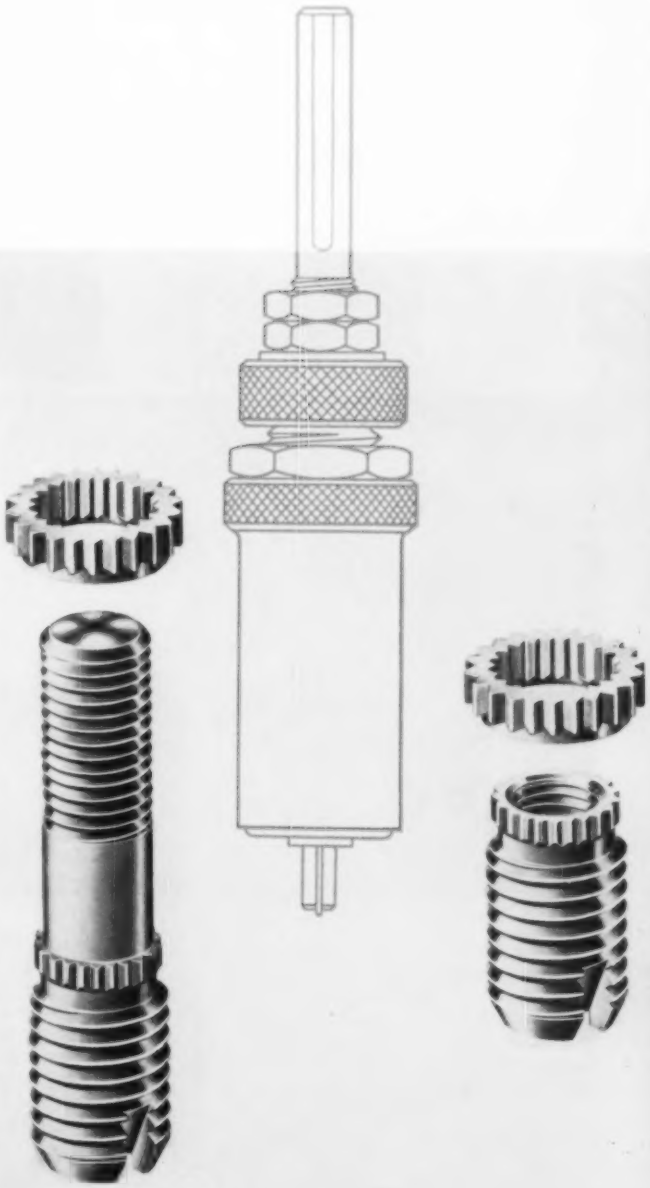
The flow valve at the top of this page is designed to handle highly corrosive materials. Engineers at American Water Softener Co. of Philadelphia knew that acrylic was highly desirable because it is corrosion resistant and would permit observation of fluid flow, but they also knew that the low wear resistance and tensile strength of some 124 female threads tapped in the plastic would result in a very limiting mechanical deficiency. The problem was solved by reinforcing all internal threads with wire inserts. The result: A valve with both the necessary strength and the advantages of a transparent plastic.

Rarely is any one material ideally suited to a specific application. In spite of the great strides that have been made in the production of materials, compromises are invariably called for. The final selection of a material does not mean, however, that because strength or some other characteristic is sacrificed for weight or cost, that the product will be necessarily structurally weak: many material disadvantages can be minimized and even eliminated through a combination of foresight, design, and an understanding of available aids.

The metal insert is one such versatile device which has been applied on an increasingly broad scale in recent years to improve products, decrease manufacturing costs, and to take greater advantage (or make possible the use) of materials. They are precision-formed screw threads: two types and their installation tools are shown on these pages.

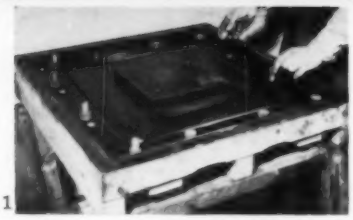
The Heli-Coil, left, is a coil that is inserted under tension into a tapped hole with a special tool. The tension (or the insert's tendency to expand) holds it securely in place. The Rosan insert, right, is a two-piece solid assembly resembling a threaded bushing. It, too, requires a tool for insertion and is held in place by a serrated lock ring which is installed over the insert; it engages the serrations on the collar of the insert on the inside and broaches into the parent material on the outside. Compared to standard bushings, the installation of these inserts is simpler: A bushing must be held in place by a pin or some other device which is installed separately, and then tapped.

Metal inserts are widely considered a tool to repair damaged, worn, or stripped threads. But this is only part of their utility and, from the designer's point of view, the least important. By designing inserts into a product initially, light metals, plastics, alloys, laminates can be used which would otherwise be eliminated because of lack of strength. Appearance, too, can be improved when nut-and-bolt assemblies can be eliminated in some applications; and when strength is added with inserts, the size of flanges, bosses, and fasteners can be reduced, resulting in cleaner and more compact designs as shown on the following pages.



Rosan inserts are installed with special tool (center) and held in place by serrated lock rings.

Cast in **IRON,** *metal inserts cut material handling costs.*



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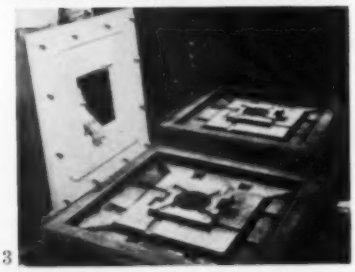

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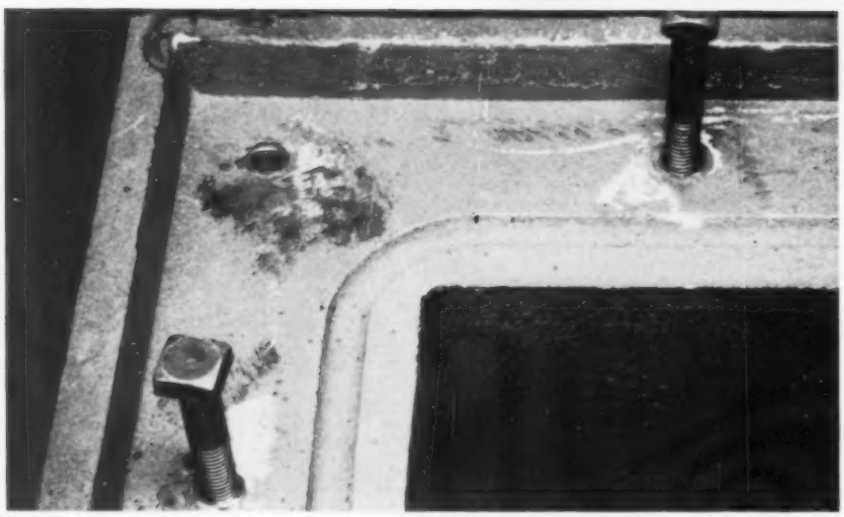

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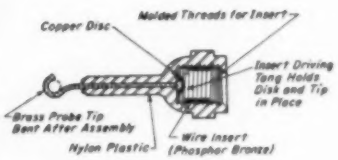
Casting wire thread inserts directly into gray iron by a new method reduces material-handling costs and eliminates expensive drilling and tapping on large parts. Previously, drilling and tapping threads in castings weighing up to 400 pounds required each casting to be moved to the machine shop, set up, and a drilling template to be made. Direct casting of inserts improved the product and speeded up manufacturing.

In production, small sand cores are made on which inserts are placed in mold (1). Large corebox is filled with sand (2), hardened, and the core with the inserts is removed and placed in the mold (3). The result is stainless steel threads virtually fused into iron, ready to receive standard bolts.

In **PLASTIC** *electronic probe, inserts give strength and act as conductor.*

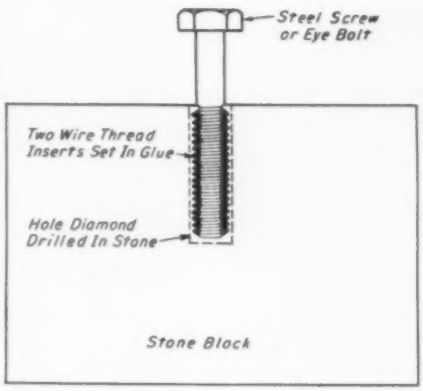


A molded nylon probe, part of an oscilloscope apparatus made by Tektronix, Inc., Portland, Ore., was designed to hold several interchangeable tips which could be screwed into the plastic. The problem of obtaining thread strength to permit tight electrical contact and to resist thread wear in the molded nylon part was solved by a wire thread insert. Made of phosphor bronze, the insert is also an important part of the electrical circuit.

In **WOOD,** *inserts simplify production, reduce furniture costs.*

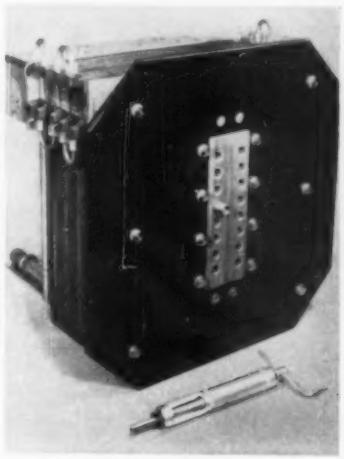
The assembly of wooden furniture frames can be simplified with the use of metal inserts, resulting in faster production and lower costs. Previously, front legs were screwed into tapped holes in the center of steel plates on the frame. This involved drilling 5 holes in 2 sizes in the plate, tapping the center hole, countersinking 4 wood screws, drilling 4 starting holes for wood screws, and counter-boring the frame under the tapped hole for the hanger bolt in the leg (top). With a special carbon steel insert, a hole is drilled, an insert installed, and the leg screwed on (bottom).

STONE *products with inserts can be fastened with standard bolts or lifted with eye-bolts.*



By gluing inserts in stone products, such as granite surface plates, they can be given threads as strong as steel. The method of installation shown above starts by diamond-drilling a hole of proper diameter in the stone. Two tight-wound inserts are assembled in line on a steel screw or eye-bolt coated with an anti-seizing compound. Glue is put in the hole and on the exteriors of the inserts which are pushed into place and allowed to set. Tests with a 600-pound granite block, fitted with two ⅜-16 inch inserts showed no slippage after hanging half an hour and an ultimate shear block test of 3000-5000 psi.

Soft **COPPER** *threads are protected by metal inserts.*

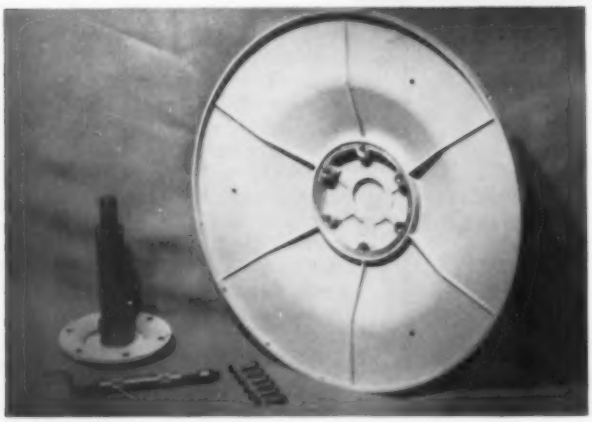


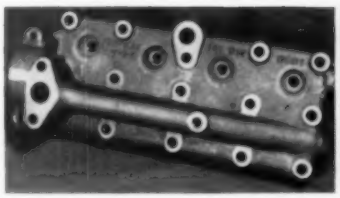
Frequent removal of copper plates serving as transformer outlets in TOCCO induction heating units manufactured by the Ohio Crankshaft Company resulted in constant stripping of the unprotected copper threads. The installation of stainless steel inserts in every tapped hole of the copper plates gave greater thread wear, provided secure electrical and physical connection between inductor blocks and outlet plates. The success of the application led the Ohio Crankshaft Company to try other uses for inserts. They found that inserts permit copper bus bars to be fastened more securely and allow greater installation torque.

Lightweight **ALUMINUM** *gains strength and wider application with inserts*

Strength is given to German products by designing-in Heli-Coil metal inserts. The door handle assembly by Leichtmetall-Verarbeitungswerk Gebruder Vieler (above) is made of aluminum yet resists wear by having inserts where removal and replacement is apt to strip threads.

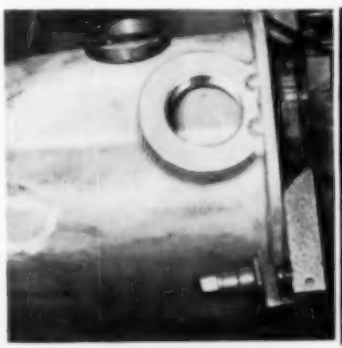
Rondo-Werk's automatic washing machine has metal inserts in the shaft which holds the washing drum and gains operating durability.

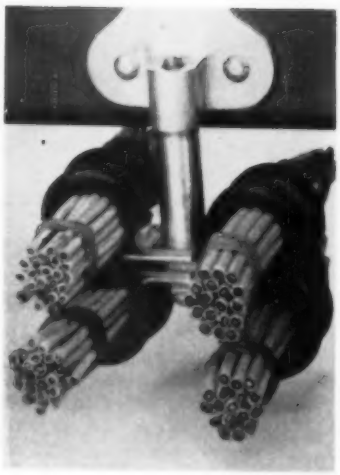




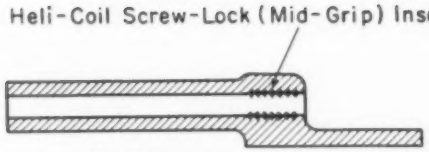
Compactness and better design are attained through the use of inserts in these castings. The cylinder head for Daimler-Benz (above) is cast from Silumen, an aluminum alloy, and has inserts in every tapped hole. This application, of course, also offers important weight reduction.

By replacing cast iron with cast aluminum reinforced with metal inserts, the gas meter (below) was redesigned to be more compact while 66% lighter. Special 4-inch Heli-Coil inserts were made for inlet and outlet orifices and proved to provide a gas-tight seal with the pipes at pressures far above normal working pressures.





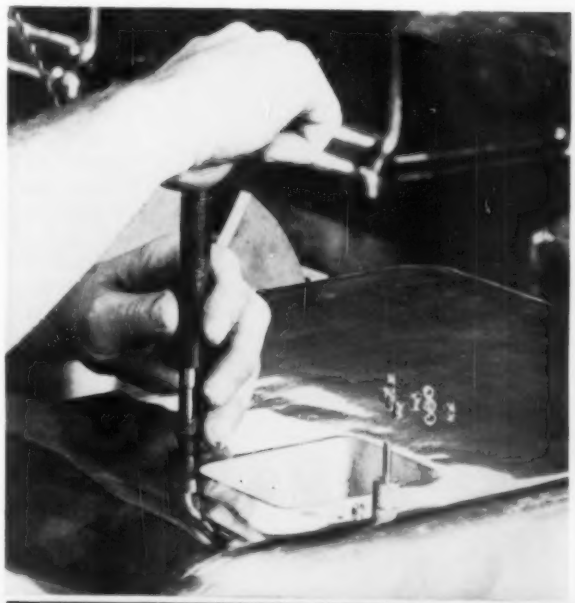
Heli-Coil Screw-Lock (Mid-Grip) Insert



Weight is the essential factor in these aviation applications of inserts. The aircraft fitting (above), which holds hydraulic tubing, plumbing lines, insulation blankets, demonstrates how inserts can simplify design, save installation costs, and take advantage of inherent weight properties without jeopardizing strength. The use of inserts saved up to 31% in installation costs over conventional methods, and Heli-Coil's new self-locking insert, which has a grip coil near the center, eliminated lock washers, nuts or wires, usually needed as a guard against loosening from vibration.

The Rosan insert (below) is molded into a fuel cell fitting. The lock ring prevents loosening and pulling out, saving maintenance and replacement time and dollars.

Maintenance cost reduction is the result of the introduction of metal inserts in the aluminum vegetable shredder shown below. Qualheim, Inc. of Racine, Wis., had a serious thread repair and service problem in the covers of their shredder. Frequent disassembly—3 or 4 times a day for cleaning—resulted in rapid thread wear. The original design specified steel screws which were screwed into unprotected aluminum threads in the main casing. Only minor changes were necessary for the introduction of steel inserts, shown being installed below.



Student project:

CARNEGIE TECH TESTS THE DESIGNER AS ENTREPRENEUR

school: Carnegie Institute of Technology
instructor: Robert L. Lepper, Professor of Design
participants: fourth year industrial design majors
problem: to develop a product that might be manufactured in a small shop and sold at a profit.

Professor Robert L. Lepper

At design schools senior problems are usually devised to initiate the student into the realities of the world. For the last ten years Professor Robert Lepper of Carnegie Tech has been presenting one to his graduating class that could tax the originality even of a professional. He calls it a "business enterprise at pilot scale"—and it is a much more romantic rounding off of the industrial design course than the mere discussion of business practices in a small design office. It also illustrates Professor Lepper's educational approach: combining the searching analysis of a complex problem with individual invention and responsibility.

Conjuring up, in effect, the American dream of the lone entrepreneur seeing his idea through from a sketch on the back of an envelope to a million dollars in the bank, Professor Lepper told the class of 1956: "Develop an article which you believe in esthetically and ethically, one that promises to be saleable in such quantity as to produce a satisfactory profit for the risk and effort involved in *your* manufacturing it." The essence of the problem is that it forces the student to think in terms of his own financial risk. But since in the long run his prosperity is to depend primarily upon design ability, his is not quite the same relationship to the investment as in a Junior Achievement rehearsal for business. And, for once, he is not to assume that the normal consequence of designing a product is that he satisfy the request of a manufacturer, or that he persuade someone to manufacture it. Though he may start with little more actual sense about the problems of going into business than he learned as a child from setting up a lemonade stand, this assignment will enable him to experience something akin to what his future clients always face, and he can end up with a feeling that he is designing not just for himself or for his teachers but for a real world with its tough market.

The analytical prelude

To stir his students to realize the nature of the problem and to interpret it according to their own facilities, Lepper asks many questions over the course of eight weeks, as each student, given considerable freedom, comes for criticism at an individual pace. The most recent group began by analyzing the problem statement. What does saleable mean? If it is the offering of certain values to the public, what values do you visualize for your product, and for what public? Quantity, materials used, assembly time: all these factors determine *satisfactory profit.* Lepper urged the student to ask himself, How am I to make sure whether or not I have a realistic standard of satisfactory profit? What return should I consider adequate? To carry it a step further, even if I make 20 per cent profit on an investment of a thousand dollars for 500 hours' work, might I be overlooking in my calculations payment to myself for skilled labor, plus salary for administrative time? What hidden costs must be taken into account—rent, light, power, telephone, correspondence, packing, shipping, depreciation, scrap?

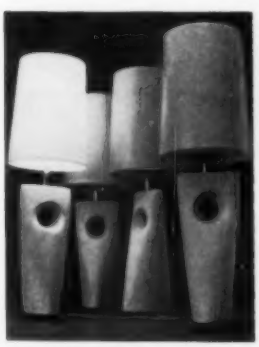
In posing the questions, Lepper's intent was to keep the student from hedging the facts of his own situation. The student tends to presume that he can carry out the design as a big business man, equipped to make a complicated apparatus on a large-volume basis. In this problem, it is essential to check such imaginative leaps, to point out constantly to the student that he is to face the enterprise in an actual sense, as though it were in the realm of

immediate possibility that he might set up shop as a designer-entrepreneur (*not* as an artist or a craftsman for whom each object would be a unique effort, but as an industrialist, "producing a number of uniform products which will stand inspection as the equal of his first samples.") He is to plan out every cost and production detail in terms of a design: 1) that he believes in esthetically and ethically, 2) that is within his own means to manufacture, 3) that will market itself at a profitable price.

The product: wide open but limited

After the first enthusiasms for shapes and novelty are subjected to a period of constant analysis, Lepper finds that the student makes the inevitable discovery that the *simpler* the materials and the manufacturing process for his product, and the less expensive, the more likely the profit; there is considerable risk in stocking an inventory of parts. But simplicity without a competitively strong design is not enough—and though ease of production is important, Lepper points out another risk. To what extent may the original design, in the form of a sketch and a working model, have to be modified by the realities of the production cycle, or the availability of materials? If sacrifices of quality required by economics reach the point of destroying the design, a decision *not* to manufacture is not only valid but good business. (Since the project is undertaken to expose any such possibility, its educational value is unimpaired.) If the designer should decide at this point that his primary goal is profit, even at the expense of esthetic values, then he is operating and thinking solely as a business man. If, on the other hand, he is indifferent to profit, he misunderstands his relationship to the business enterprise. Solutions from modest to exceptional, the items on this page represent four possible pilot-scale businesses, according to students Little, Miller, Ashworth and Wasserman. Each model was presented with a thorough breakdown of the capital which would be needed to launch the enterprise and keep in business for a reasonable trial period. (Their breakdowns correspond to the factual data which would be necessary to raise a loan.) All of their articles need only a few steps of processing and none would require a large inventory. Nevertheless, as student Wasserman's working out of the problem demonstrates (overleaf), the breakdown is complex enough even in an assembly of welded steel rods to require careful study on the part of the would-be entrepreneur before taking the plunge.

Wasserman's "to put" is a slight object as far as use is concerned, but original and whimsical in concept. As he explains it, "The product grew from a purely sculptural concept. A four-foot wire and plaster piece served as the inspiration (right, top). Passersby seemed unable to restrain themselves from putting objects—pencils, scraps, etc.—into its enticing pouch-like cavity. Finally the designer took the hint and evolved a welded steel rod form which attempts to evoke, for utilitarian purposes, the same desire—to put." Following the assignment, he projected the production of "to puts" in a step-by-step breakdown, mapping out the cost ratios of materials, equipment tools, and jigs, and also the electricity that would be used per unit, estimating the time spent on the production of each unit—figuring it on the basis of a price tag of five dollars. The essential details of Wasserman's presentation are shown on the next spread.



Cast stone base lamp, by Jack Little.

Stainless steel salt shaker, walnut base, by Robert Ashworth.

Welded wire, asbestos fiber lamp, by Cynthia Miller.

Plaster-wire sculpture inspired Arnold Wasserman's "To Put" (r.)

$596.55 - INITIAL CAPITAL NEEDED

PLUS $.797 CONTINUING MATERIALS INVESTMENT FOR EACH PRODUCT

THE DESIGNER HAS ACCESS TO A RENT FREE, HEATED SPACE WITH SUITABLE WORK AND STORAGE AREAS AND WITH PHONE AND POWER

UNDETERMINED AS YET ARE INSURANCE RATES AND PACKAGING AND POSTAGE COSTS, HOWEVER, THE DESIGNER FEELS CERTAIN THAT THE EXCELLENT STACKING QUALITIES OF THE PRODUCT WILL ALLOW PACKAGING COSTS TO REMAIN NOMINAL.

OPERATION	MATERIAL	AMT.	EQUIPMENT	MACH. TIME MIN.	TOTAL OPERATION TIME-MIN. (STANDARD)
Bend rods for hand-made model	1/8 welding rods	10 pcs.	Pliers		170
Weld hand-made model			Spot Welder	10	10
Cut jig forms	1/2" maple	14 sq. ft.	Band saw	20	360
Finish jig forms			Belt sander	15	15
Nail and complete jig	nails	40	Hammer, Pliers	30	240
Bend pcs. A and A1 5 stages	1/8" welding rod	2 pcs.	Jig	1	1
Bend pc. B, 4 stages	"	1 "	"	.5	.5
Bend F,F1,G,G1- 24 stages	"	4 "	"	4	4
Bend H1,H, H2, H3, 24 stages	"	4 "	"	4	4
Bend J,J1, J2,J3, 20stages	"	4 "	"	4	4
Bend K1 , K2 10 stages	"	2"	"	2	2
Bend K - 3 stages	"	1/3 "	"	2	2
Roll C, C1 into 11½" diam.circles		2 "	Rollers	1	1
Roll D into ¼ circle of 19" diam.	"	1	Rollers	1	1
Mark pieces for welds	"		File	3	3
Roll sub-assembly #3 on 9" radius arcs.			Rollers	2	2
Roll sub-assembly #4 on 12" radius			Rollers	2	2
Weld	"		Spot Welder	4	20
Finish	"		Grinding wheel	8	8
			File	3	3
Spray	Copper enamel	.1 pint	Compressed air and Spray gun	5	5
Put on rubber feet	Rubber feet	4		.1	.1

795 - TOTAL MINUTES SPENT IN DEVELOPMENT
13.2 HOURS

82.6 - TOTAL PRODUCTION TIME IN MINUTES FOR 1 PRODUCT
APPROX. 1 HOUR

EXTENDABLE EQUIPMENT	AMT.	UNIT COST	TOTAL COST
Pliers with side cutters	2	$3	$6
Hammer	1	$4	$4
File	1	$1	$1

$ 11.00 - TOTAL INITIAL EXPENDABLE EQUIPMENT EXPENSE

MATERIAL	QUANT.	UNIT COST	TOTAL COST
½" Maple	14 sq. ft.	@ .65	$9.10
13/4" Nails	40		.10
1/8" welding rods	10		.35¢

$ 9.55 - TOTAL MATERIAL COST FOR DEVELOPMENT

EQUIPMENT	MACHINE TIME PER PRODUCT	AMPERAGE	AMP-HRS.
SPOT WELDER	4 min.	20 at 220 Volts	1.3
Grinding Wheel	8 "	2.25	.30
Fluorescent fixtures	1 hour	.19	.19

1.79 - TOTAL AMP-HRS. PER PRODUCT

.00179 - TOTAL KILO-AMP HRS.

.2838 - TOTAL Kilowatt-HRS. PER PRODUCT

@ 5¢ per KW. HR. - .14¢ IN ELECTRIC POWER FOR EACH PRODUCT.

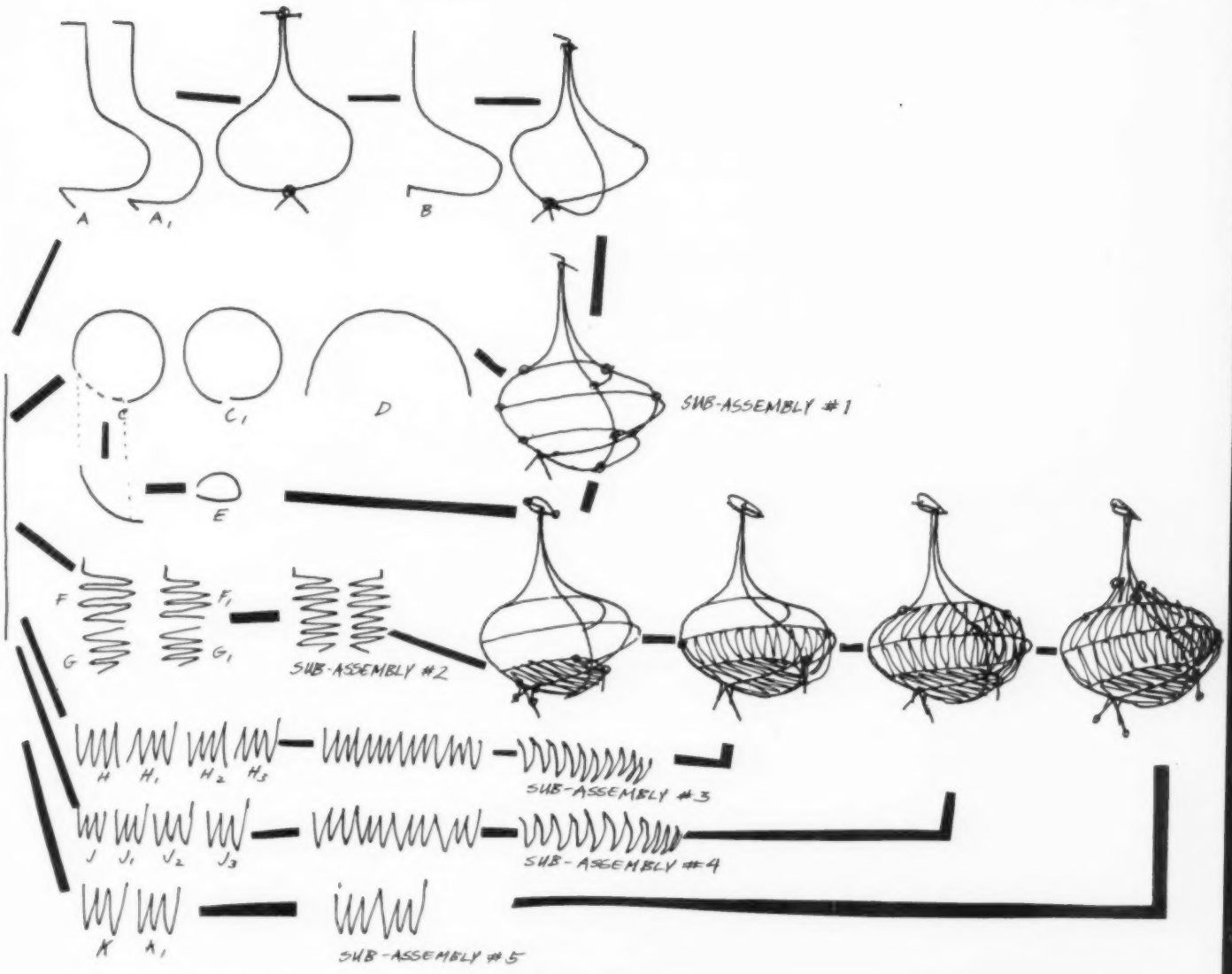
CAPITAL EQUIPMENT	PURCHASE PRICE	RENTAL FEE	YEARS DEPRECIATION
Band Saw	$ 400	$10.00	$ 22.22
Belt Sander	$ 150	$5.00	$ 30.00
Emery wheel	$35		$1.75
Compressed air tank with gauge		$35	
Rollers	$300		$ 40
Spot Welder	$200		$ 30
2 6' Fluorescent fixtures	$ 24		

ASSUMING RENTAL OF BAND SAW AND SANDER

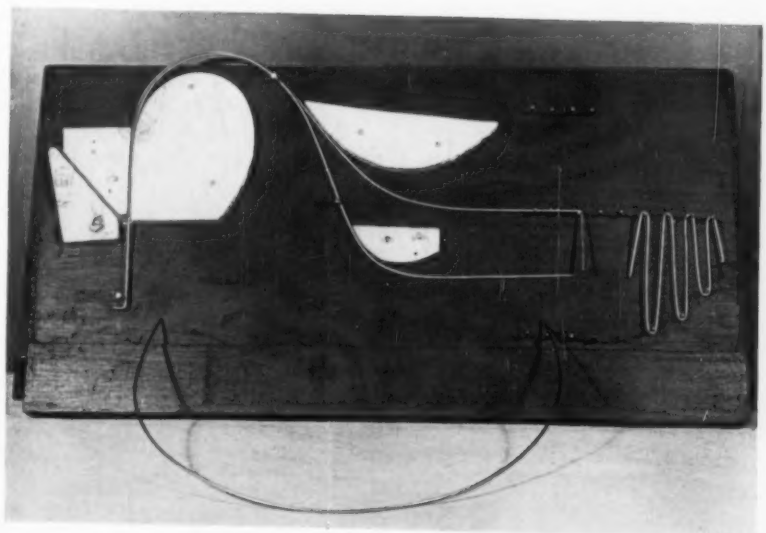
$ 574 - TOTAL INITIAL CAPITAL EQUIPMENT INVESTMENT

RAW MATERIALS	SPECIFICATIONS	SOURCE	COST	TOTAL COST PER PRODUCT
Welding rod	1/8 x 3' 1 ft. weighs .042lbs. 3 ft. weighs .126 lbs.	Williams & Co.	27.5 ¢ per lb.	20 pieces or 2.52 lbs.- 69.3 ¢
Rubber tips	fit 1/8" rod negligible weight	West Penn Lacquer	in lots of 5000, 1¢	4 tips- 4¢
Copper enamel		Scarboro & K.	$1.00 per pt.	1/10 of a pt.- 10¢

79.7 ¢ - TOTAL COST OF RAW MATERIALS FOR ONE PRODUCT



This spread shows the major part of Arnold Wasserman's presentation for "to put," his breakdown of the product into costs for tools, parts and time for each unit (left). Sketches of the parts are shown above and, to the right, the bending jig for the wire parts which would then be welded together.



"To Put" won highest rating.

How the assignment is evaluated: on the product itself, whether or not the breakdown is convincing, and finally, on its comparative merits within the class.

While the three products shown on the first spread rank as honest tries, Arnold Wasserman's "to put" solution won Professor Lepper's highest rating for the originality of the concept and because the breakdown, though loose compared to a few of the best from other years, was adequate as far as it went. (Lepper had had to discourage Wasserman from carrying out three or four earlier ideas which fell short of promising to compete on the real market, so that the student was pressed for time to complete the assignment within eight weeks.) Of considerably more importance than the chicken-like charms of the product, in any case, is the *process* by which its production has been realized. Wasserman has worked out his manufacturing details in an imaginative yet concrete fashion, as the figures accompanying the sub-assembly sketches on the previous page indicate. Although the marketing aspect of the problem has been more closely figured by students in previous years, Wasserman's presentation is convincing. He has put down cost ratios strictly according to single-handed production, basing his accounting on certain advantages. He assumes that he would have access to a rent-free heated space, having work and storage space and telephone service. He estimates the cost of electricity to run his power tools ($.14 for each product) but does not determine insurance rates, packaging and postage costs because "the designer feels certain that the excellent stacking qualities of the product will allow packaging costs to remain nominal." He does not concern himself with packaging design either, which is frequently costly for the manufacturer.

In the solution to the pilot-scale business problem, Professor Lepper always finds—and encourages—individual variations, and he evaluates the results on a comparative basis. Although students are encouraged to do as much with the merchandising costs as they can, Wasserman developed the costs of his particular project within a specific production volume. He estimated that 15 days' work producing eight products per day would repay the initial capital investment of $594.55. (It was pointed out to him, as the problem was graded, that charging off the entire capital outlay to the first 120 units was an erroneous accounting concept.) "And continuing at that rate of production, working at five days a week, the designer would receive $200, almost all of which would be clear profit, with a materials' reinvestment of only $47.82 for every 60 products." He concludes, still on the basis of that happiest of circumstances, a large advance order: "In practice, of course, the capital investment would be amortized so that the designer would always be receiving a profit and would be justified in setting up his shop for an order of 240 or more products."

The problem as a problem

What Professor Lepper finds most valuable about this assignment perhaps cannot be fully estimated on the face value of Wasserman's solution: it rests on the extent to which the student is able to project himself into the business risk of design. At one level, Professor Lepper also finds the "pilot" a good final exercise to expose muddy thinking: 1) on the manufacturing details of a design, 2) on the student's ideas of market values—and it is, of course, a basic challenge in invention, requiring the closest attention on the part of the teacher to guide solutions in a direction that is both ingenious and practical.

This Carnegie Tech senior assignment also has other implications for design education. "Whatever names these planning techniques go by in business school terminology," said Lepper, " 'market analysis,' 'production methods and controls,' 'operations analysis,' 'cost analysis' and the like, the question that this assignment serves to answer is this: Can these activities be explored at a level which exposes and makes clear all the tangible considerations that bear on the making and marketing of a product? If the student becomes emotionally involved (to the point of feeling the risk of his own money), then the questions that are posed in class about saleability and values, risk and profit, may become realities and take on a personal rather than an academic meaning. Having made an actual investigation of manufacturing costs on a small scale, he may not be so indifferent when somebody in the future screams about the money *he* has at stake. And the experience is transferable to another scale. Does not a corporate giant make its decisions through a similar process of research? This assignment challenges design ingenuity within the very vivid context of business enterprise."

The dream cars come true again

In 1957, as far as we can make out, the American cars are as expensive, fuel-hungry, space-consuming, inconvenient, liable to damage, and subject to speedy obsolescence as they ever have been. To put it another way, they are longer, lower, fleeter, and further in the future than ever before. In addition, they are the most unavoidable, costly, and popular example of industrial design on the American market, and of all popular American products they are the most aesthetic in concept and purpose. In 1957, comfort, safety, convenience, and cost have all given ground at one point or another before the image various people have of what a car should look like. We can't say this is wrong, any more than Eve was wrong. It is, rather, inescapable, and it gives us a deep and serious interest in the '57 car.

The '57 cars are like the cars of other years in one major respect: each one is a mishmash, in varying proportions, of good and bad. The least successful are almost impossible to discuss seriously—one is inclined to say "Why don't you just go back and start over again." For this reason, our lengthiest criticisms are directed at the cars that seem to us most successful. Criticism is our sincerest form of flattery.

In general, what are the reasons for the mishmash? There are sociological and economic reasons that we won't go into here, and we are willing to assume that for some reason a lower, longer, fleeter *look* is desirable. Designwise, what gives?

We feel that the cars of '57 show first that the automobile designer is deeply and boldly concerned with form as a means of expression—as he should be. Chromework, square footage, and inhuman engineering are all fair targets for criticism, but the success of an automobile design depends ultimately on its overall shape. The second thing the cars of '57 seem to show is that the automobile designer—perhaps the machines and the toolmaker and the salesman and the engineer, but particularly the designer—is not as adept as he should be at handling this great mass medium—the form of the automobile.—*d. a.*

Plymouth

A

B

C

The '57 Plymouth (A) looks a good deal racier than the '55 model, but we venture it will not keep its looks for as long. The '55 Plymouth (B) was unique for its neat avoidance of a series of pitfalls that American car designers seem almost to enjoy falling into. An unflattering view of Plymouth's twin, the Dodge (C), shows several popular faults that have recently been adopted in the Plymouth body—the two-dimensional side body, unconvincing side windows, and overextended, overloaded cantilever.

A-window

The Chrysler Company has not gone along with the reverse-pitch front post found on GM and Ford cars, but it has compromised this year by putting a jog in the front post. From the side (D), it makes a lively outline for the windshield, but since the jog is essentially two-dimensional, it makes a strange juncture between front and side windows from most other angles. Even in profile, the new post, in conjunction with a cascading rear post, gives the roof the appearance of being poorly supported. As the detail shows (E), it took a tricky bit of design to provide a hinge for the new A-window (or K-window, as it now appears).

D

E

Rear end

As wings go, Plymouth's wings are fairly convincing; in profile (F) the line seems, for reasons we cannot define, a strong one. But the wing does have shortcomings. The fact that it starts behind the body of the car and well out on the cantilever only emphasizes the fact that it was unnecessary in the first place. The soft line of the wheel cutout detracts from its strength and weakens the body where it should be sturdy.

From the rear we find other problems: though the fender is given importance by careful modeling in the profile view, from the rear it is disregarded; the line down the car is ruler-straight (G). And the tip of the smoothly curving wing, we find, is heavily weighted with a severely outlined taillight (H).

F

G

H

I

J

K

Front end

The front end of the Plymouth provides another contrast to its svelte side. Square hoods over the headlights destroy the effect of roundness carefully achieved in the profile view and give the body the plump squareness of a sofa cushion.

The bumper that adorns this broad surface is surprisingly brief; a large area beneath it is protected by a curtain of rather vulnerable sheet metal.

Compared to many cars, we should add, the Plymouth is well stacked and its proportions are pleasing.

Ford and Mercury

A

Ford

In its '57 cars the Ford Motor Company has reverted to the deep body modeling that characterized the heavy-haunched cars of the early postwar period. The persistent failure of such modeling on American cars lies in the fact that it is always designed to enhance one view of the car and becomes meaningless from the wrong angle. The Ford sculpturing appears at its best in the top-price cars (A), where chromework emphasizes the outward-flaring wing and carries its line down the body. In less expensive models (B), where the trim deserts the wing, it is clear that the modeling is not richly sculptural but a simple application of draftsmen's curves to a plain surface. From the rear, the sculpturing is even more disappointing (C); the wing turns out to be a slightly tilted version of the familiar fin atop the familiar round light. From the front corner, we see how the two-dimensional body modeling fights with the over-emphasized windshield frame and other decorative lines (D). The elaborate front end, with its cantilevered bumper (E), is another example of the superficial decorations that characterize the Ford this year. When they are cut away there is not much left.

B

C

D

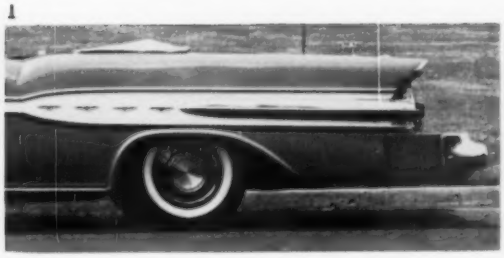
E

F

G

H

I

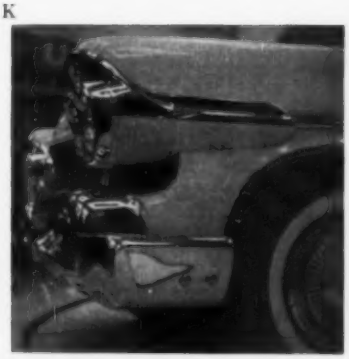


Cantilevers

The Ford Motor Company is the only car maker that talks much about increased length in 1957, but it is not alone in the use of cantilevered bumpers to achieve new length. The overhanging bumpers of Plymouth and Buick (F, G) are partially disguised by overhanging headlights, but on the Lincoln (H) and a special Pontiac (I), shelf-like bumpers are boldly extended from rear ends that are remarkably long in their own right. These overextended cantilevers do have one advantage, of course; if the tide turns to shorter cars it will be easy to crop them.

J

K



Mercury

There is nothing superficial about the trim on Ford's big sister, the Mercury (J-M); it is slashed into her boxy sides and whittled out of her front and tail. Mercury is a difficult car to criticize. Her square greenhouse is an interesting reminder that it is possible to give the passengers a view while protecting them from sun and sightseers (M), but the designers' main concern seems to have been to challenge gravity and defy reason.

L

M

A

Chrysler in two variations

B

For several years Chrysler has been distinguished by neat lines and real shapeliness. This year the basic concept of a long, low line, sloping windows, rounded sides, and tapered nose is reasserted in cars that are flashier than ever. Unfortunately, Chrysler's flaws are also exaggerated. Here we show the "experimental" 300C and the Imperial, two variations on the basic Chrysler that emphasize its virtues and its faults.

The Chrysler 300C

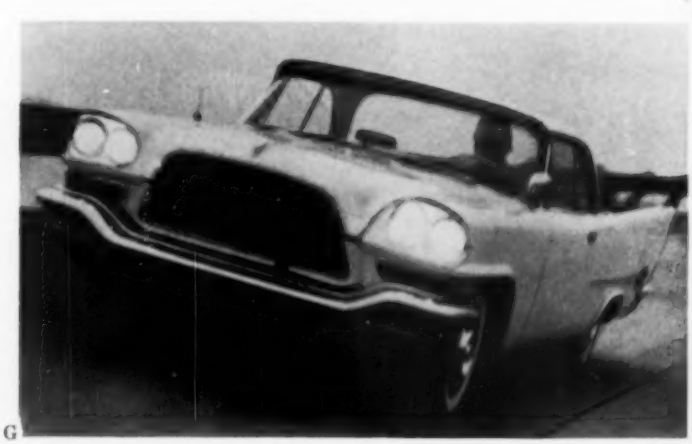
The 300C (B) differs from standard Chrysler (A) mainly in its sporty grille and abbreviated sweepspear, two small changes that help make it the most elegant and exciting of '57 cars. The grille offers the tapered line the Chrysler body suggests; the trim argues less loudly against the roundness of the car than the standard sweepspear. Plain white, barely adorned, 300C invites attention as a car worth looking at for its shape. Curved glass and sloping posts make the greenhouse a glassy membrane against which the metal is tightly drawn (C, D). Heavy bumpers and square glittering lights (E, F) are a jolting contrast to the sheet-metal's suaver lines. Seen from a bad angle (G), the 300C loses its shape. Though it appears amply sculptured from side or front, it is quite flat in its long dimension. The wing is seen as an arbitrary bend against the beltline curve, where one would expect the metal to be most unyielding.

C

D

E

F



G

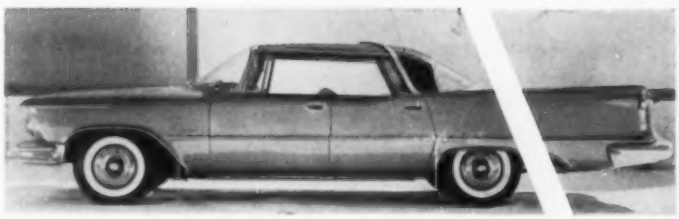
The Imperial

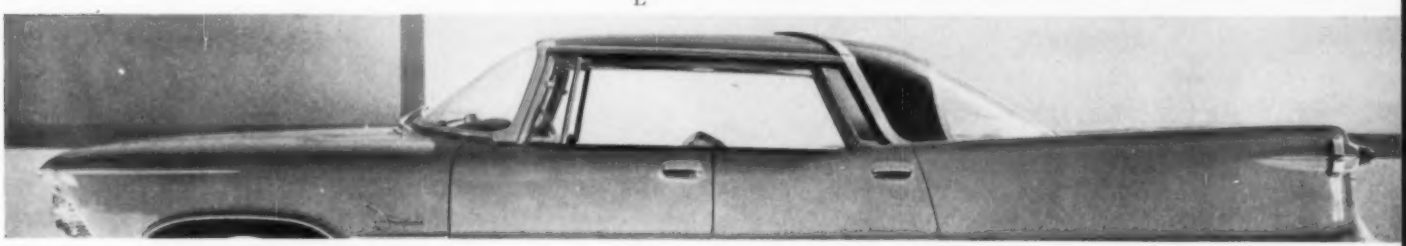
Chrysler's curves are exaggerated and multiplied in the rakish Imperial. The expanded windshield, sweeping well back into the roof, has the shimmering effect of blown glass (H, I). Curved side windows, the first in car history, have a practical excuse: it isn't easy to fit large areas of flat glass into a curved plane, and Chrysler windows are lower this year. But the bowed center post adds surprisingly little to the overall shape; its simple one-point arc looks artless beside the windshield's subtler curve. The curve that hoods the headlight (J) is another unrelated line, making a strangely distorted joint with the curved front cant. As the split photo at right suggests (K), Imperial's membrane roof might have capped a taut and compact car. The wing, though undeniably effective, splits the car at its center (L). The long cantilever is made heavier by the fact that its top and bottom edges are nearly parallel. The side, in effect, is a slab arbitrarily bent at the middle and hung on the wheels in a strangely unbalanced position.

H 

I 

J 

K 

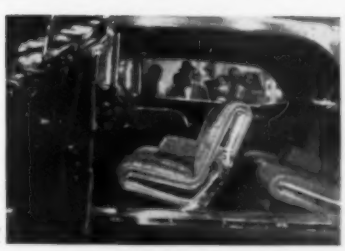
L 

Cadillac and Eldorado

This year's Eldorado is the dream car of a few years ago (M). Its bubble roof is similar to Chrysler's, but the elements of which it is composed—the stainless steel surface, heavily outlined front window, and limpid rear post line—are essentially dramatic rather than plastic. The structural freedom this wide-springing roof suggests is emphasized by opposite-opening doors (N).

Cadillac is not far behind Eldorado with its smooth body and suave roof shell (O). To insure the long roof line, Cadillac has given up the center post in all but its limousines. A smoothing over of Cadillac's billowing sides has not made them any more meaningful; what is really required is a tauter, subtler line and a more reasonable distribution of weight.

M 

N 

O 

A

B

Why American cars die young

Reluctantly, we turn to European car design to make a point. Whatever one's personal reaction to them may be, Volkswagen (A) and Citroen (B) are sounder as designs than any American cars of 1957. This is not a matter of proportions—a subtlety in the difficult field of car design—but of basic concept. Volkswagen is simply composed of sides, nose, and roof, each clearly outlined yet neatly joined as parts of the whole. The Citroen is cleverly built up of many complex, interjoining facets. These vastly different cars are alike in one respect: every curving plane is a distinct yet integrated part of a sculptured whole. By contrast, American cars break down as a collection of views, or concepts, which may or may not relate to each other and usually disdain the real joints in the material.

The bubble top

The wrap-around windshield has provided irritating opportunities for improvement since its inception. Conceived as a dramatically sculptured entity without regard for the sheet materials around it, it has never been fully absorbed. Chevrolet (C) shows the primitive effect of a wrap-around windshield encroaching on a flat side body. On the Buick-Cadillac body (E), GM pursues the wrap-around to its logical conclusion by repeating the line at the rear, so front and rear windows are parts of one shell. This, however, simply relocates the problem, offering a three-dimensional greenhouse on a flat-sided body. On the Buick-Oldsmobile body (D) the rear window divides into three curving planes; the side window remains unsolved. Chrysler's new front post (F), though not as uncooperative as the swept-back post, distorts the side windows and confuses the transition from front to side.

C

D

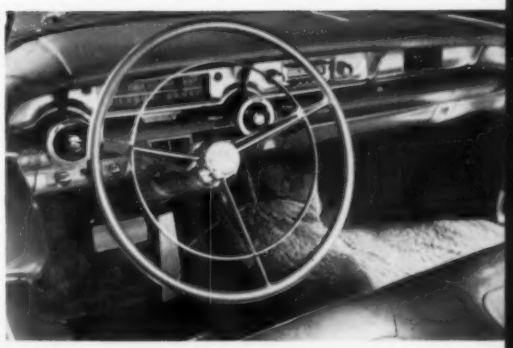
E

F

The long low interior

For many years admirers of the compact European cars have been told that American cars owe their bulk to their status as family cars. In '57, the American car remains ample in length, but the height is decidedly sporty. To achieve the low line, the floor is often dropped into the frame, creating a deep threshold under the doors and a hillock at the driveshaft (G, H). Several of our family cars seat only two comfortably in front, since the niche between driveshaft and heater barely admits an adult leg. A view through a '57 windshield (I) illustrates another problem of the long low car: though exposed from chin to shin to a low sun or the driver of an outdated car, the occupant of a new car may have to crane to see a traffic light.

G



I

H

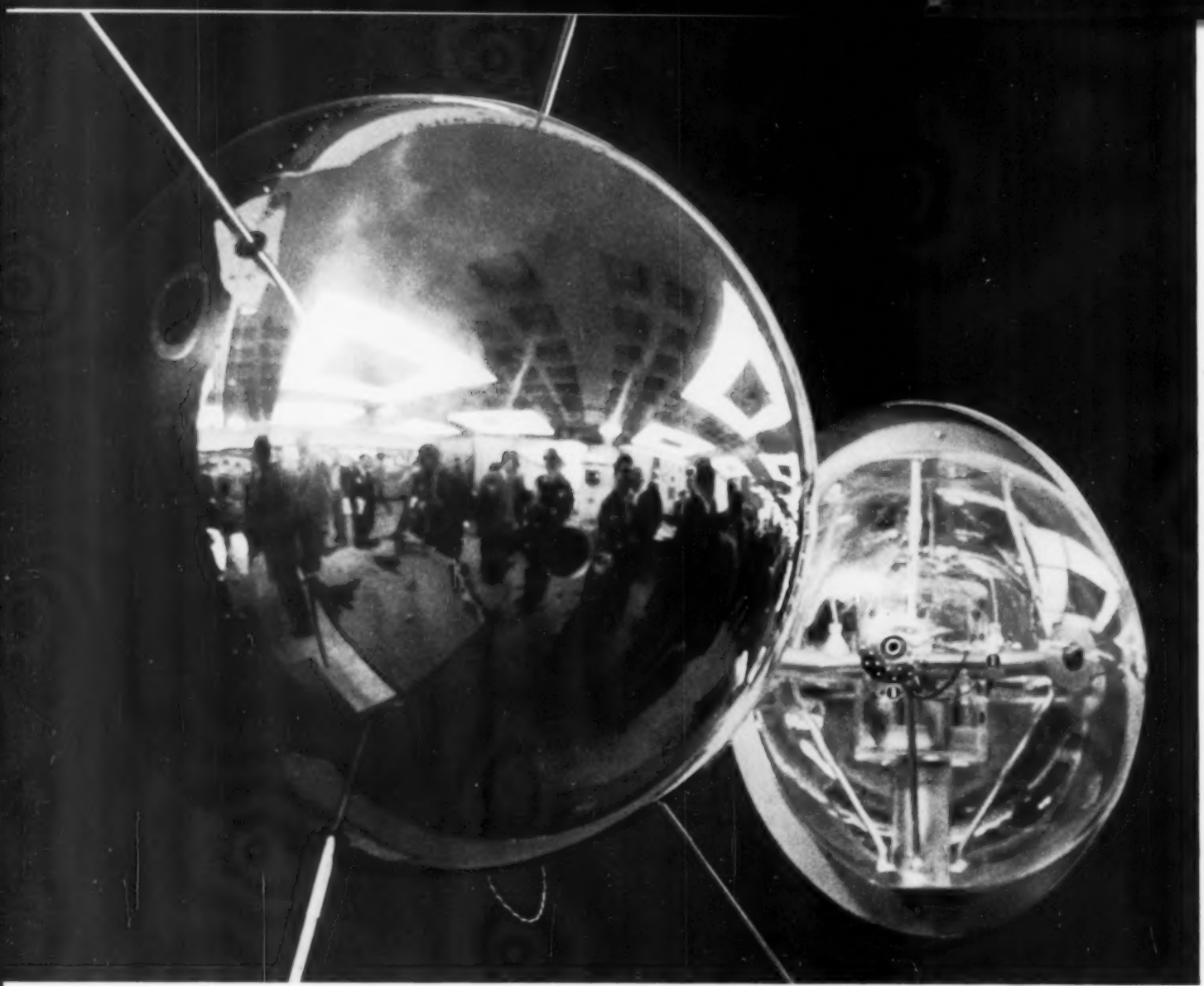
J

K

The winged tail

Though the '55 Plymouth looked very handsome in 1955, a '57 Chrysler shows it up as blunt and dowdy. This is not simply because the Chrysler (K) is longer, lower, and winged, but also because the Plymouth (J), though sound, was unsubtle. The Ghia VW (L) suggests that the '57 Chrysler is not a solution to the problems of '55 but an alternative; it is possible to make a car look elegant, fast, and expensive without exaggerating its length. Someday, no doubt, a trend to more compact cars will make the rear cantilevers on '57 cars look ridiculously out of balance.

L



Magnesium satellite and instruments it will carry

TECHNICS

Roundup of technical shows

Four recent shows—Instruments, Power, Computer, Automation—were organized for the benefit of the industries directly involved, providing company inter-communication, exchange of scientific ideas, and display of research and product development. Though the shows were grouped in four categories, some of the exhibited products turned up at several shows, which is a sign of the overlapping trends of the shows themselves: expanding use of atomic energy, rockets and missiles, and computers of large enough capacity to meet the demands of the aviation, chemical, nuclear, automobile and machine industries. All the shows featured the operating and measuring equipment necessary to carry out the major trends (really the main theme of the Instruments show), as well as the final products (computers at both the Automation and Computer shows), and reports of companies involved in building nuclear reactors here as well as abroad.

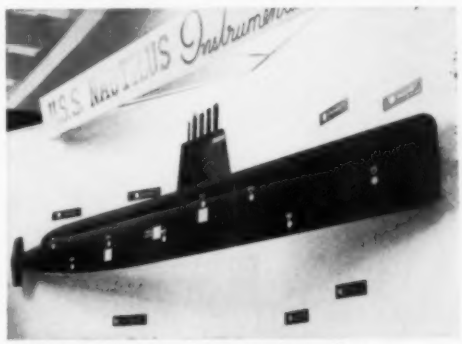
photographs this spread by Leonard Cohen

THE INSTRUMENT SHOW

Organized by the Instrument Society of America, the 11th Annual Instrument-Automation Conference and Exhibit was held at the New York Coliseum last September. The topics at the opening morning session — Instrumentation in the International Geophysical Year, and, the World Circling Satellites— marked the more significant moments of the show. The exhibits of such research groups as the Naval Research Labs (Project Vanguard, USS Nautilus) and the booths of Grand Central Rocket Co. and the Scientific Instrument Division of Beckman Instruments, among others, indicated that the job of instrumentation is, of course, to keep in pace with the technological strides made in power and electronics, both for control and quantity recording. For example, the danger of overexposure to gamma rays makes new instruments for reaction control and atmosphere analysis, developed by the Naval Research Labs, essential equipment. One, the radioactive air particle detector, indicates reactor malfunction; another, the atmosphere analyzer, samples air for contamination. Controls for automatic data handling, computers and servomechanisms were also featured, along with developments in standard precision instruments and test equipment: guarded Wheatstone bridge—Leeds & Northrup; datagraph—Consolidated Electrodynamics Corp., and many others.

Beckman showed EASE computer

Leeds & Northrup, new control equipment



USS Nautilus uses two atomic analyzers

Helicoid added 3½" gage to line of pressure gages

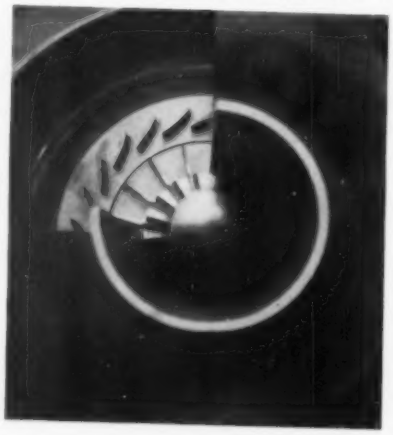
CED's sales truck displayed measuring equipment

The Power Show

The dominant theme in the more interesting quarters of the 22nd National Power Show, at New York's Coliseum last November, was expansion — expansion of power industries, and the atomic power revolution. Expansion in applications in the air was notable along Rocket Row — a number of booths displaying rockets and missiles like the Terrier shown on this page (a supersonic rocket-propelled anti-aircraft guided missile in use on the guided-missile cruiser USS Boston). Power expansion in and under water was demonstrated by display models of American Turbine Corp.'s new closed-cycle gas turbine nuclear propulsion plant for ship propulsion and mobile power plants. Atomic activity also dominated in the booths of Alco, Con Edison, Sylvania, Westinghouse, Atomics International, and others who displayed in miniature the type of atomic work they are engaged in — mostly the building of reactors for various applications.

But expansion was not limited to new power. The standard plants — steam power plants — have become portable by the use of self-contained package boilers (Cyclotherm) which include equipment usually installed separately —burners, blowers, etc.—and make for smaller and more compact, mobile as well as stationary, power plants.

American Turbine Corp.: ship propulsion



Con Edison: nuclear fuel elements

US Navy: missile on cruiser USS Boston

Cyclotherm: generators for hot water systems, packaged with all parts

photographs this page by Hugh B. Johnston

The Computer Show

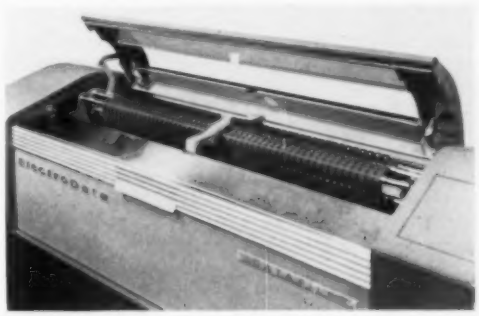
Eminently evident at the 1956 Eastern Joint Computer Conference at New York's Hotel New Yorker, Dec. 10-12, was the fact that as technology and business become more complex, computer users demand more and more equipment to solve their problems. To meet these needs, the leaders in the computer field have developed appropriate systems that either store more or do more—among them Remington Rand's Univac Scientific, well adapted to large-scale calculations; Underwood's Elecom "50," capable of handling greater volume by combining several operations into one; Burrough's Datafile, with a capacity to store vast amounts of data and to produce any of it within seconds; and new indicating equipment, such as Hughes Products' Memo-Scope, which permits visual display of problems being solved by computers.

The Automation Show

The endless variety of products—from test meters to complex data handling equipment (Beckman's EASE computers)—displayed at the 3rd Automation Show in New York in November, did not help in making clear automation's real meaning. Automatic machines (lathes, grinders with automatic gaging of parts being ground) contributed to the impression that automation can be anything made to operate automatically by electronics—an impression many observers probably found hard to accept.

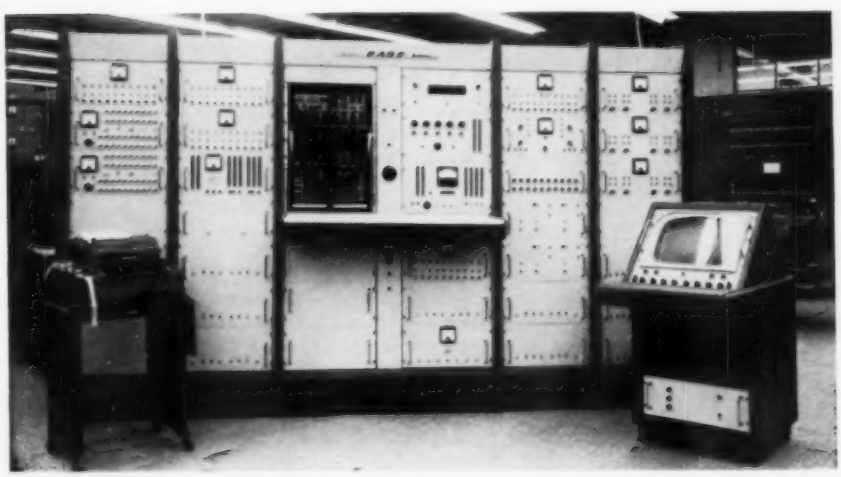
Visitors listen to taped talk about Remington Rand's Univac Scientific

Underwood's Elecom "50" combines computing and analyzing in one operation



Burroughs' Datafile stores and delivers data

Hughes' Memo-Scope



Beckman's new computers accommodate variety of uses and complexity of problems

Manufacturers' Literature Supplement

A bibliography of currently available technical brochures dealing with materials, methods, components, and machines

MATERIALS 1—Metals

Aluminum Forgings. Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pennsylvania. 16 pp., ill. "Technical Data on Alcoa Hand Forgings" is this booklet's self-explanatory title.

Brass, Bronze and Nickel-Silver Casting Alloys. Henning Bros. and Smith, 91-127 Scott Ave., Brooklyn 37, New York. A comprehensive wall chart describing 37 standard alloys with their Navy, S.A.E., A.S.T.M. and Federal specification designations.

Brazing Alloys. Handy and Harman, 82 Fulton St., New York 38, New York. 4 pp., ill. Describes a group of high-temperature brazing alloys for brazing stainless steel and a variety of heat-resistant alloys.

Carbide Blanks. Metallurgical Prods. Dept., General Electric, Detroit 32, Michigan. 35 pp. A new price list covering made-to-order Carboloy carbide blanks, including solid cemented carbide cylinders.

Metals. Stanat Mfg. Co., Inc., 500 Shames Drive, Westbury, New York. 12 pp. This booklet discusses in detail the special equipment employed in rolling and fabricating the new metals required for the atomic energy program.

Nickel Lined Pipe. Bart Mfg. Co., Belleville, New Jersey. 8 pp., ill. Fabrication techniques and technical information are given on applications of Bart Lectro-Clad nickel-lined pipe and fittings. Photomicrographs illustrate the pore-free and adherent characteristics of the pure nickel lining which protects against contamination of the product and corrosion.

Perforated Metal. Standard Stamping and Perforating Co., 3131 W. 49th Place, Chicago 32, Illinois. 114 pp., illustrated with silhouettes of various perforated patterns. The catalog is pocket-size and spiral-bound for easy reference.

Precious Metals. D. E. Makepeace Co., Pine and Dunham Sts., Attleboro, Mass. This booklet contains technical information for producers of chemical and electrical equipment using precision-rolled solid and laminated precious and base metals.

Tubing Metals and Alloys. Superior Tube Co., 1712 Germantown Ave., Norristown, Pa. 3 pp. A listing of 121 metals and alloys from which Superior produces its standard and special small-diameter tubing.

Tubing. Uniform Tubes Inc., Collegeville 2, Pennsylvania. Covers their line of small seamless tubes and small tubular components. The company also offers complete forming and machining facilities.

Zinc Coating. Amercoat Corporation, 4809 Firestone Blvd., South Gate, California. 4 pp., ill. Describes general, physical and chemical properties of Dimetcote, an inorganic zinc coating for structural steel, tank interiors and exteriors, towers and equipment that must be resistant to weathering, abrasion, salt and fresh water, solvents and petroleum.

2—Plastics

Coated Fabrics. The Connecticut Hard Rubber Co., 407 East St., New Haven 9, Conn. 4 pp. The bulletin discusses COHR-lastic Silicone rubber coated fabrics and Nylon Resin Coated Nylon Fabrics.

Corrosion Resistant Plastic Equipment. Haveg Corp., 900 Greenbank Road, Wilmington 8, Delaware. 31 pp., illustrated with pictures, diagrams and charts. The bulk of this catalog details equipment: pipes and fittings; tanks, towers and accessory supplies; heat exchangers; pressure and vacuum equipment; and agitators.

Epoxy Resins. Smooth-On Mfg. Co., 572 Communipaw Ave., Jersey City 4, New Jersey. 4 pp. This technical bulletin contains a complete description of the techniques involved in using epoxy resin compounds for casting. This information should be of value to those using epoxies for making models or patterns, vacuum forming molds, dies, jigs, and fixtures, potting and encapsulation of electrical and electronic parts.

Fabrics. Wellington Sears Co., 65 Worth St., New York 13, New York. 24 pp., ill. Describes the composition and many of the end uses of textiles combined with other materials, such as rubber, plastics and special-purpose compounds.

Fiberfil. Fiberfil, Inc., Fox Farm Road, Warsaw, Indiana. 4 pp., including chart of physical properties. Discusses Fiberfil Styrene G and Fiberfil Nylon G reinforced glass injection molding compounds for all injection molding.

Geon. B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland 15, Ohio. 7 pp. A hundred successful applications of Geon in the house of today showing the versatility of this flexible vinyl.

Grex. Polymer Chemicals Division, W. R. Grace and Co., 225 Allwood Rd., Clifton, New Jersey. 12 pp., ill. Describes the first in a group of polyolefin resins, Grex high density polyethylene.

Masonry Surfacing. Permagile Corp. of America, 37-23 Thirty-Third St., Long Island City 1, New York. This brochure describes three new plastic compounds for joining, filling, cladding and surfacing masonry materials. The bond formed is said to be stronger than the masonry itself.

Molded Plastics. Molded Products Division of Admiral Corporation, Washington Ave. at Creamery Rd., P.O. Box 338, West Chicago, Ill. 15 pp., ill. An invitation to "Plan It For Plastics," outlining the facilities of the company.

Pressure-Sensitive Tapes. Mystik Adhesive Products, 2635 North Kildare Ave., Chicago 29, Illinois. 70 pp., ill. A manual of over a thousand applications of pressure-sensitive tapes including a Tape Finder to aid in the selection of the appropriate tape for your application.

Silicone Rubber Parts. General Electric, Silicone Products Dept., Waterford, New York. 4 pp. including chart. The selector chart lists the major categories of silicone compounds with the typical properties of each.

METHODS

Chemical Milling. United States Chemical Milling Corp., 1700 Rosecrants Ave., Manhattan Beach, California. 2 pp. Three optional procedures are given for producing the templates required to chemically mill flat or formed parts in aluminum and magnesium.

Cold Forging. Impact Products, Inc., Orangeville, Ohio. 3 pp. Intricate parts cold forged to close tolerances are described.

Cut-Off Saws. Wallace Supplies Mfg. Co., 1300 Diversey Parkway, Chicago 14, Illinois. 44 pp., ill. Covers Wallace abrasive cut-off saws including their portable combination cut-off and deburring chop saw.

Edge Control For Steel Strip. Askania Regulator Co., 240 East Ontario St., Chicago 11, Illinois. 8 pp., ill. Description of the Askania Edge Position Control which hold the lateral position of strip traveling up to and over 5000 feet per minute.

Finishes. The Norton Co., Worcester, Massachusetts. 74 pp., ill. Barrel-finishing with abrasives is described.

Finishing equipment. The Osborn Manufacturing Co., 5401 Hamilton Ave., Cleveland 14, Ohio. 20 pp., ill. Describes Osborn's Brushamatic finishing machinery and systems which give every degree of mechanization from semi-automatic and automatic to fully automated finishing.

High Vacuum Systems. Central Scientific Company, 1700 Irving Park Road, Chicago, Illinois. 24 pp., ill. This is a guide for laboratory plan ing the installation of a high-vacuum system. Outlined in detail are the procedures involved and what equipment should be used for various installations.

Hot Spray Application. The Spee-Flo Company, 720 Polk, Houston, Texas. 27 booklet-size pages. Case history stories of finishing materials applied by hot spray.

Induction Melting. Inductotherm Corp., 412 Illinois Ave., Delanco, New Jersey. 8 pp., ill. Induction melting furnaces and related equipment are described. Performance tables giving melting times of various quantities of molten metal are also included.

Lead Testing. Jerpbak-Bayless Co., Solon Rd., Solon, Ohio. 1 pp. The bulletin illustrates the portable Lead Testing Comparator. The Comparator checks thread error by inspecting from one flank or centralization.

Lubricant Testing Machine. The Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn. 2 pp. The machine described tests both bonded coatings and liquid lubricants.

Lumber Drying. Orr and Sembower, Inc., Reading, Pennsylvania. 8 pp., ill. The Dryalator, a packaged device for automatically drying lumber, is described.

Metal Products. D. E. Makepeace Co., Attleboro, Massachusetts. A fabricated metal products brochure suggesting solutions for a variety of electrical and electronic manufacturing problems.

Plastics Processing Equipment. The Pfaudler Co., Rochester, New York. 6 pp., ill. This particular bulletin of The Pfaulder Co. describes the latest advances and accessories available in their glassed steel polymerizers.

Portable Length-Width Comparator. Jerpbak-Bayless Co., Solon Road, Solon, Ohio. 1 p. Checks over-all length of parts; measures from one end to shoulder; gives shoulder to shoulder dimensions; center to shoulder; under head length; widths of grooves; thickness of flanges, etc.

Powdered Metal Parts. Powdered Metal Parts Division of The Lux Clock Mfg. Co., 100 Johnson St., Waterbury, Conn. 11 pp., ill. The brochure outlines the care and precision demanded in the manufacture of powdered metal parts and the advantages of their use. Included is a chart for design engineers which gives various standards, specifications and references for powdered metal parts.

Silver and Rhodium Plating. Sel-Rex Precious Metals, Inc., 229 Main St., Belleville 9, New Jersey. Two 4-page brochures and several charts. One brochure describes the Sel-Rex High Speed Silver Plating Process for industrial applications. The other brochure covers the Sel-Rex Bright Rhodium Process and includes several charts which give the time required to electrodeposit a specified thickness of rhodium at given current densities.

Tank and Bin Weighing. The A. H. Emery Co., Pine St., New Canaan, Connecticut. 12 pp., ill. The bulletin describes the force measuring systems used to weigh tanks and bins.

Ultrasonics. Aeroprojects, Inc., 310 East Rosedale Ave., West Chester, Pennsylvania. 4 pp., ill. This booklet describes Sonobraze which is ultrasonic equipment for fluxless brazing and for coating of aluminum.

Vacuum Forming. Product Packaging Engineering, Culver City, California. 4 pp., ill. Plastic vacuum forming and vacuum packaging machines are described.

Zinc Die Casting. Henning Bros. and Smith, 91-127 Scott Ave., Brooklyn 37, New York. 31 booklet size pages, ill. This booklet is designed as a guide for plant managers and die casting machine operators working with zinc base alloys.

COMPONENTS

Ball Bearings. The Abbott Ball Co., Hartford, Connecticut. 8 pp. The applications of carbon steel bearing balls is discussed with a light touch.

Caster Catalog. Gleason Corp., 250 N. 12th St., Milwaukee 3, Wisconsin. 4 pp., ill. The folder lists over 40 new models of medium and light-duty casters.

Couplings. Morse Chain Co., Ithaca, New York. 16 pp., ill. Specifications, dimensions, ratings, and applications are given for silent chain and roller chain couplings. There is also general information on the purpose and function of flexible chain couplings.

Flexible Couplings. Morse Chain Co., South Aurora St., Ithaca, New York. 24 pp., ill. Morflex couplings, employing pre-loaded rubber biscuits as the flexible medium, are explained and pictured.

Gears and Pinions. Gries Reproducer Corp., 125 Beechwood Ave., New Rochelle, New York. 2 pp., ill. The bulletin discusses die cast zinc alloy gears and pinions available from stock.

Nuts. National Machine Products Co., 44225 Utica Road, Utica, Michigan. 8 pp., ill. This booklet is a condensation of the company's 144 page catalog especially arranged for the use of the design engineer. Basic engineering data and specifications are given on hexagon nuts sizes ¼" to 3"; 12 Pointer Nut sizes ¼" to ⅝"; the Huglock and Marsden locknuts sizes ¼" to 1½".

Screws. The Cleveland Cap Screw Co., 2917 East 79th St., Cleveland 4, Ohio. 4 pp., ill. A complete listing of this company's line of socket screws.

Screws. The Chicago Screw Co., 2701 Washington Blvd., Bellwood, Illinois. 4 pp., ill. Chicago Screw describes its services which include the design, development and manufacture of screw machine products and cold upset parts.

Screws. Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, Long Island, New York. 8 pp. This booklet is a condensed stock list of Allmetal stainless steel fasteners. Thirty-seven different basic fastenings are illustrated.

Screws. The Cleveland Cap Screw Co., Box 883, 2917 East 79th St., Cleveland, Ohio. 4 pp. The increase in diameters

of large size socket head cap screws is described and listed.

Solderless Wiring Devices. Electric Terminals Corp., 2021 Center St., Cleveland 13, Ohio. 6 pp., ill. This brochure announces a line of solderless terminals and connectors.

Steel Springs. Alco Products, Inc. 16 pp., ill. The bulletin describes Alco's adaption of automation techniques in producing springs. Also included are two pages of design recommendations and a chart listing physical properties for calculating springs in 22 materials.

Steel Tube Fittings. The Weatherhead Co., Fort Wayne Division, 128 West Washington Blvd., Fort Wayne, Indiana. 48 pp., ill. This catalog gives complete engineering data on hydraulic tube fittings.

ELECTRICAL AND ELECTRONIC

Autopilot Control. Minneapolis-Honeywell Aeronautical Division, 2600 Ridgway Road, Minneapolis 13, Minnesota. 6 pp. Includes a cutaway drawing of the plane that will use the system. This is the first electronic autopilot developed for supersonic aircraft.

Company Catalog. Fischer and Porter Co., Hatboro, Pennsylvania. 32 pp. This is a company catalog describing those products which are available for immediate shipment. Their line includes indicating, recording, controlling and transmitting instruments.

Computer. Bendix Computer Division, 5630 Arbor Vitae St., Los Angeles 45, California. 6 pp., ill. Describes the Bendix general purpose digital computer and its new accessory, a digital differential analyzer.

Electronic Products. Superior Tube Co., 1712 Germantown Ave., Norristown, Pennsylvania. 19 pp., illustrated with pictures, charts and diagrams. Contains information on Superior's cathodes and other tubular electronic parts. Includes chemical analysis and listing of mechanical and physical properties of the electronic materials used.

Electronics. American Machine and Foundry Co., 261 Madison Ave., New York 16, New York. 20 pp. The Electronics Facts Handbook is a reference collection for people concerned with government and industrial R&D activities.

Electronics. The Burroughs Corp., Electronic Instruments Division, 1209 Vine St., Philadelphia 7, Pennsylvania. 15 booklet-size pages. The art of using digital techniques for testing, information handling and control.

Industrial TV. General Precision Lab., Inc., 63 Bedford Rd., Pleasantville, New York. 4 pp., ill. A general application brochure on industrial and institutional tv.

Industrial X-Ray. North American Philips Company, Inc., Instruments Division, 750 So. Fulton Ave., Mt. Vernon, New York. 11 pp., ill. Descriptions of various industrial radiography instruments that help achieve quality control on the production line.

Instrument Design. Servo Corp. of America, New Hyde Park, New York. 48 page pocket-size book entitled "Murder In The Model Shop" recounts in mock-Mickey Spillane style the solution of servo system and instrument design problems by use of Servoboard electro-mechanical assembly kits.

Loudspeaker Enclosures. Rockbar Corp., 650 Halstead Ave., Mamaroneck, New York. 12 pp. Many charts and sketches. "Baffles Unbaffled" gives a technical evaluation of speaker enclosures with particular emphasis upon new techniques in 'friction loading.'

Meters. The Narda Corporation, 160 Herricks Road, Mineola, New York. 1 page bulletin. Two Coaxial Impedance meters (frequency range: 1500 to 12,400 megacycles) and six Waveguide Impedance Meters (2600 to 18,000 megacycles) are described.

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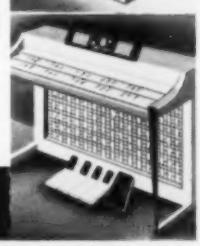

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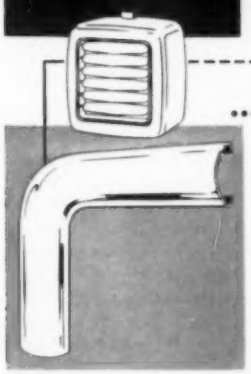

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Nuclear Products. Superior Tube Co., Nuclear Products Division, Norristown, Pennsylvania. 6 pp. The products, fabrication services and facilities of Superior Tube's Nuclear Division are illustrated and described.

Nuclear Scorecard. Industrial Division of Minneapolis-Honeywell Co., Minneapolis, Minnesota. 8 pp. Written for laymen, this booklet gives thumbnail profiles of various reactor types and how they compare or differ.

Office Records. Remington Rand, Division of Sperry Rand Corp., 315 Fourth Ave., New York 10, New York. 8 pp., ill. A general guide to reducing the stack of records in the modern office to manageable size by way of better filing procedures and the proper equipment for a given job.

Panel Instruments. Simpson Electric Co., 5200 West Kinzie St., Chicago 44, Illinois. 6 pp., ill. This bulletin contains descriptions and specifications along with price lists of over 800 panel meters, shunts and current transformers.

Picture Tube Replacement Chart. General Electric, Tube Dept., Schenectady 5, New York. This wall chart aids service dealers in selecting picture tube replacements. Both aluminized and non-aluminized tubes are listed.

Relays and Switches. The Jaidinger Mfg. Co., Inc., 1921 West Hubbard St., Chicago 22, Illinois. 10 pp., ill. The catalog shows approximately forty different switches and relays, ranging from standard size units to the miniature, with operation descriptions and characteristics of each.

Resistors and Switches. Electronic Components Div., Stackpole Carbon Co., St. Marys, Pennsylvania. 32 pp., ill. Dimensions, mounting styles, ratings, standard modifications, and performance characteristics for its line of variable composition resistors and snap switches are covered.

Storage Batteries. Nickel Cadmium Battery Corp., 66 Pleasant St., Easthampton, Massachusetts. 6 pp., ill. To help engineers evaluate the practicality of miniature nickel cadmium batteries for switch gear, diesel engine starting and portable electrical equipment, Nicad's high output sintered plate nickel cadmium storage batteries are described. Details of development, construction and operation are discussed.

Switches. The Mercoid Corp., Chicago 41, Illinois. 56 pp. The catalog describes sealed mercury contact switches.

Switches. Donald P. Mossman, Inc., Brewster, New York. 4 pp., ill. This catalog covers Mossman's complete line of push button, lever and turn switches.

Terminal Blocks. Curtis Development and Mfg. Co., 3250 No. 33rd St., Milwaukee 16, Wisconsin. 8 pp., illustrated. Includes a selector chart designed to pin point the best block for each application.

Temperature Control. Fenwall Inc., Ashland, Massachusetts. 6 pp., ill. Fenwall's complete line of Thermoswitch temperature controls is described. The literature gives specifications, performance data and temperature ranges of these precision thermostats.

Thermostats. Fenwal Inc., Ashland, Massachusetts. 4 pp., ill. The brochure describes two types of Fenwall Thermoswitch units which are encased in plastic for service in highly humid or corrosive environments. These encapsulated thermostats can be immersed directly in acid solutions, alcohols, buried in oil, or exposed to highly humid atmospheres, corrosive mists, sprays, etc.

Ultrasonics. Acoustica Associates, Inc., Glenwood Landing, L. I., New York. Ultrasonic generators adaptable to almost any type of tank configuration and dimension are described in this illustrated bulletin.

X-Ray Spectrograph Chart. North American Philips Co., Inc., Instruments Division, 750 South Fulton Ave., Mount Vernon, New York. A revised X-Ray Spectrograph chart showing characteristic secondary X-ray beams for elements from Magnesium (atomic #12) to Californium (atomic #98).

MISCELLANEOUS

Atomic Power. Alco Products, Inc., Schenectady, N. Y. Power from the atom and the capabilities of Alco to supply reactor power plants are covered.

Corrugated Boxes. Hinde and Dauch, Sandusky, Ohio. 24 booklet-size pages, ill. This is the eighth booklet in a series on packaging. This one gives aid on designing corrugated boxes.

Industrial Brushes. The Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio. 100 pp., ill. Included in the catalog are power brushes, paint and varnish brushes, brush-amatic machines, and others. Plus Osborn's Brushing Analysis Service.

Industrial Periscopes. Lenox Instrument Co., 2010 Chancellor St., Philadelphia 3, Pennsylvania. 4 pp., ill. Describes periscopes used in observation of inaccessible places and the study of hazardous processes from a safe viewing distance.

Hand Tool Catalog. The Wright Tool and Forge Co., Barberton, Ohio. A hand tool catalog that includes sockets, ratchets and handles.

High Temperature Lubrication. Acheson Colloids Company, Port Huron, Michigan. 5 pp., ill. High temperature lubrication using colloidal dispersion is discussed.

Insulation. Pittsburgh Corning Corp., One Gateway Center, Pittsburgh 22, Pennsylvania. 20 pp., ill. Brochure discusses the proper methods for installing Foamglass cellular glass insulation on walls, floors, ceilings and roofs of refrigerated spaces operating between — 50 degrees F. and + 50 degrees F.

Motors. Brevel Products Corp., 601 West 26th St., New York 1, New York. The bulletin describes spur motors of the type used in powering rotisseries and other small electrical appliances, motion displays, vending machines and other mechanical devices for home and industry.

Photography. Ansco, Binghamton, New York. 88 pp. Contains 53 four-color illustrations. This is the first official Ansco handbook of color transparency and motion picture films. A great deal of detailed technical information and tips is included. Price: $.75.

Optical Specialties. Compass Instrument and Optical Co., Inc., 104 East 25th St., New York 10, New York. A 1957 company catalog of imported and domestic optical specialties. Their line includes prismatic binoculars made in Germany, France and Japan, field, opera and sport glasses, telescopes, microscopes, magnifiers, barometers, compasses, stop watches and other related items.

Technical Writing. Minneapolis-Honeywell Regulator Co., Philadelphia 44, Pennsylvania. 24 pp. Annoying pretentious technical jargon is criticized in this booklet with great humour and a number of positive suggestions.

Transportation. General American Transportation Corp., 135 South La Salle St., Chicago 90, Illinois. 28 pp. Profusely illustrated. General American describes their services and products which include Kanigen, a nickel alloy coating; Wiggins Conservation Systems, floating roofs, lifter roofs, vapor balancing systems; plastics molding; Parker-Kalon fasteners; tank and specialized freight cars; and, a host of other things.

Wire and Strip Weight Calculator. National-Standard Co., Niles, Mich. This giveaway circular slide-rule calculator aids in determining spring weights.

Wood Frames and Windows. Architectural Woodwork Institute, 332 South Michigan Ave., Chicago 4, Illinois. 21 pp., ill. Brochure No. 10 contains photographs and details of fifteen outstanding woodwork installations in schools in all sections of the country and Canada.

Classified Advertisements

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Index to Advertisers

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For Your Calendar

January 17-February 10. Contemporary American Glass, The Philadelphia Art Alliance, Philadelphia, Pa.

January 28-February 18. Five Management Programs, National Institute of Management, Inc., 1008 National City Bank Bldg., Cleveland 14, Ohio.

Feb. 1-28. Industry Designs: Olivetti (from Lionni's collection), Freedom House, New York City.

February 4-6. First Annual Home Improvement Products Show, Hotel Statler, New York City.

February 4-8. National Auto Accessories Exposition, New York Coliseum.

February 5-7. New England Production Ingenuity Show, The Hotel Bancroft, Worcester, Mass.

February 5-7. 12th Annual Technical and Management Conference of the Reinforced Plastics Division of The Society of the Plastics Industry, Inc., Edgewater Beach Hotel, Chicago, Ill.

February 7-8. Special Conference on Nucleonics in Industry to be conducted by the American Management Association, Hotel Statler, New York City.

February 15-16. National Meeting of Industrial Designers' Institute, Los Angeles, California.

February 16-24. National Photographic Show, New York Coliseum.

February 19. 13th Annual Quality Control Clinic, Rochester Society for Quality Control, War Memorial, Rochester, New York.

February 24-March 17. Contemporary American Glass Exhibit, Duke University, Durham, North Carolina.

February 25-27. The third annual conference on Electronics In Action, sponsored by the American Management Association's Finance Division, Hotel Statler, N. Y.

February 25-28. 63rd Annual Meeting of the American Society of Heating and Air-Conditioning Engineers, Conrad Hilton Hotel, Chicago, Illinois.

February 25-March 1. Thirteenth International Heating and Air-Conditioning Exposition, Conrad Hilton Hotel. Chicago, Illinois.

February 25-March 1. Last year's course in Electronic Data Processing for Business and Industry will be given again. Address: Sheraton-Blackstone Hotel, Chicago, Ill.

March 1-31. 50 Packages and 50 Record Album Covers of the Year, Freedom House, New York.

March 11-15. The 1957 Nuclear Congress will be held at Convention Hall, Philadelphia, Pennsylvania.

March 18-21. 1957 SPI National Conference and Pacific Coast Plastics Exposition, Los Angeles, California.

March 25-27. Technical Meeting and Convention of The American Society of Tool Engineers, Shamrock Hilton Hotel, Houston, Texas.

April 9-11. The Fifth Welding Show sponsored by the American Welding Society, Convention Hall, Philadelphia, Pennsylvania.

April 15-17. The Building Research Institute's Annual Meeting, The Drake Hotel, Chicago, Illinois.

May 15-June 15. Design and Printing For Commerce Show sponsored by the AIGA, Freedom House, New York City.

May 20-23. The Design Engineering Show will be held at the New York Coliseum.

June 1-30. The Chicagoland Commerce and Industry Exhibition will be held at the International Amphitheatre, Chicago, Illinois.


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