Only Structural Glazed Tile offers all of these performance, esthetic and economical advantages for wall construction.

Only Stark offers Structural Glazed Tile in such a wide variety of types to satisfy requirements of fire safety, sanitation, economy and design versatility.

STARKUSTIC
... Structural Glazed Tile with outstanding acoustical properties
... control noise with a wall tile that offers durability; fire, moisture and vermin resistance; easy-to-clean glazed finish in a wide choice of colors. Available in a wide range of perforation patterns, sizes and colors.

SUPER-TILE
... New 8" x 8" x 16" Super-Tile can reduce wall installation costs by as much as 50%. Vertical coring permits easy handling, easy cutting and finished end units. Available — glazed one or two sides.

SCULPTURED
... Exclusive Stark Sculptured Glazed Tiles have all the advantages of Structural Glazed Tile plus deep-sculptured face designs offering almost unlimited design freedom. Available in 5 patterns and 32 colors.

FULL SERVICE
... We will be most happy to be of service at any time during your planning, specifying, bidding or building. Full information including sizes, colors, samples and prices are available ... You'll find us convenient to write or call.

LUTHER LEE ODA—INDIANA REPRESENTATIVE
P. O. Box 17
BLUFFTON, INDIANA (Indianapolis ME 4-1361)
WITH ACRYLITE® YOU CAN CREATE THE MOST ELEGANT INTERIORS

This shoe salon is a good example. See how the ACRYLITE luminous wall softly glows, setting an inviting mood of relaxation. And back lighting the facia eliminates glare . . . provides an even distribution of illumination.

The semi-circular divider combines solid color and patterned ACRYLITE panels in matched hues to add an interesting touch of fashion.

With ACRYLITE® you can let your imagination go. Choose from more than 70 different patterns and solid colors . . . some transparent, some translucent, some opaque; in both textured and smooth surfaces. ACRYLITE beauty is permanent . . . never fades or discolors. Panels can be heated and formed, worked like wood.

Use ACRYLITE® in any interior that requires lifetime beauty and versatility of design at a reasonable price.

© American Cyanamid Company, 1964
THE ACRYLITE®
COMPASS COLLECTION
OPENS UP A
WHOLE NEW WORLD
OF DESIGN

Here are forty fabulous new decorator panels to add color and excitement to your designs. Whatever your motif, whatever your mood, you can express it brilliantly with these translucent sheets of Acrylite acrylic plastic.

Flawless as a jewel, sparkling as crystal, Acrylite is the luxury plastic that retains its beauty for a lifetime. It's simple to work with too. Shape it. Cut or saw it. You can easily achieve a delightful diversity of design with this exciting material.

UNLIMITED APPLICATIONS IN EVERY FIELD
Designers in every field, as well as fabricators and interior decorators, will welcome the refreshingly unique appeal and versatility of Acrylite. Among the most popular uses are: room dividers, screens, wall and ceiling panels, sliding cabinet doors, bath enclosures, shower doors. In beauty shops, restaurants and lounges partitions of decorative Acrylite divide without darkening. Versatile Acrylite works wonders in homes and schools, as well as in churches, hospitals and office buildings.

9 IMPORTANT FEATURES OF ACRYLITE
1. lifetime beauty — never yellows or ages
2. safe — up to 16 times stronger than ordinary glass of equal thickness
3. moisture proof
4. works as easily as wood
5. formable — from simple line bends to complex deep drawn shapes
6. clarity unmatched by imitators
7. wipes clean with a damp cloth
8. never needs waxing, polishing, refinishing or painting
9. lightweight, easy to handle — ⅔ the weight of glass

WIDE VARIETY IN STOCK
Decorative Acrylite is available in sheets of the following sizes: 28 x 54, 30 x 60, 36 x 72, 48 x 72, and 48 x 96. All patterns and colors are stocked in ⅛" thickness. Sheets ⅛" and ¼" also are available cast to order.

MAIL THIS COUPON FOR MORE INFORMATION

INDIANAPOLIS PLASTICS
Division of Meyer Materials, Inc.
5101 East 65th Street—Indianapolis 20, Ind.

Dear Sirs:
Please send me your 8-page, full-color catalog on decorative Acrylite.

Name
Company
Address
City Zone State

DISTRIBUTORS AND DEALERS COAST-TO-COAST
MATERIAL STOCKED IN INDIANAPOLIS
SPECIFY and CHOOSE

Guard® Vinyl Wall Covering, Prince Guard and Satinesque. More than 500 patterns, colors and designs grouped to meet varying requirements of style, durability, maintenance and cost.

Distributed in Indiana by

Hatfield Paint Co., Inc.

29 E. MARYLAND
INDIANAPOLIS, INDIANA

GUARD VINYL WALL COVERING MEETS FEDERAL SPECIFICATION CCC-W-408. UNDERWRITERS’ LABORATORIES APPROVED.

ISLANDS OF LIGHT

Created with . . .

LUMINOUS CEILINGS

We offer . . .

1. Design Assistance
2. Complete Flexibility
3. Coordinated Ceiling Construction with LIGHT - AIR - SOUND CONTROL

Also . . .

ACOUSTIC-PAULIZED PANELS
For Better Visual Efficiency

Suppliers, Fabricators and Designers of Plexiglas® and other plastic products and materials for Industry, Laboratory, Product Development and Promotion.

Exhibits • Displays • Point of Purchase

customcraft, inc.

3930 COLDWATER ROAD, U. S. 27 NORTH
FORT WAYNE, INDIANA
How much will your new building cost?

Build the most economically with the

DUWE SYSTEM

NEWEST ADVANCE IN PRECAST CONSTRUCTION

There are several sound reasons why the Duwe System offers economy and permanence. Among them are these significant points—

- 2-Hour Underwriters' Rating.
- Exceptional insulating and acoustical values.
- Fast construction—no delay of other trades; saving in time, money.
- Immediate and continuing savings, including insurance premiums.
- Strength and permanence.
- Low maintenance.

Precision casting, pre-curing, installation by factory-trained crews—all assure you of the finest construction. There's more to tell. Phone or write for full facts on the unique, new Duwe System.

DUWE PRECAST CONCRETE PRODUCTS, INC.
P. O. Box 1277 • Phone 414/231-3980
OSHKOSH, WISCONSIN
Today, 23% of the total production of plastics of all types goes into construction and new uses for this versatile material are continually being developed.

The construction industry finds itself with more than two dozen major plastics challenging more traditional materials.

By definition, plastics are a large and varied group of materials, consisting wholly or in part of combinations of carbon with oxygen, hydrogen, and other elements. These arrangements are capable of being readily made into many forms through the application of heat and pressure.

What makes plastics so hard to define is that they start from so many different raw materials and end up in so many different end materials. But basically, there are two major divisions into which all plastics fall: thermoplastics and thermosets.

Thermoplastics are much like candles, in one respect. The synthetic resins when exposed to sufficient heat become soft, only to harden again when the heat is removed. This process continues no matter how many times it is repeated. It may require a high temperature.

Thermosets are analogous to the whites of eggs. Heat initially applied to the resins permits forming of the material. Additional heat applied at a later date will char the material and destroy it.

The big three of the plastics business — polyethylene, vinyls and styrene — are all thermoplastics. Epoxies, melamine, polyurethanes, set by chemical reaction, and polyester, are typical thermosets.

The building industry hardly realizes the inroads made by plastics in the last decade in paints, laminated counter tops, flooring, brushes, handles, insulation, piping and tubing, roofing, fencing, daylighting, screening, paneling, glues, etc.

Decorative-utilitarian high-pressure laminates are standard now for counter tops, furniture and wall covering. Vinyl-chloride based flooring is also standard and has introduced a new level of quality and variety. Toplighting of acrylic, reinforced plastics and vinyl chloride is in common use and formed acrylic illuminated signs have swept that field. The same materials provide luminous ceilings and have transformed outdoor lighting. Polyester reinforced canopies are especially adaptable as pavilions for drive-ins, service stations, concession stands, parks and other outdoor shelter and “dress up” purposes. They admit daylight and reflect light at night.

Tough transparent plastic films protect the surfaces of a wide variety of building boards and acoustical tiles. Other films form vapor barriers and flexible sheets are made into easily-formed flashing. Plastic piping is forging ahead rapidly for both outdoor and indoor uses. In rising from an annual volume of $500,000 in 1948 to the $63 million level of today, the plastic pipe industry cracked a market long dominated by traditional materials.

Electrical components have long depended upon plastics and now plastics are firmly entrenched in hardware where toughness, silent operation and resistance to corrosion are important. Foams provide a new range of building insulation. Adhesives, coatings and sealants have been transformed by plastics-based materials.

The World’s Fair makes extensive use of structural and semi-structural plastics.

American Cyanamid Company’s World’s Fair House is a showcase of the latest in plastics for light, glazing and new finishing materials. Over 20,000 square feet of melamine laminates and acrylics were built into this ranch style house.

Reinforced panels, sandwich panels, glazed plastic panels, acrylic sheet, solid vinyl siding — the plastics used to enclose space take every form at the Fair from siding barely detectable from the traditional materials to the ultra modern vacuum-formed butyrate sheet used as cladding on IBM’s ovoid theatre.

At the Fair, also, three-dimensional acrylic grillwork is used for the enclosure screens and the carillon tower of the Coca-Cola Company Pavilion. The basic building blocks for this grillwork are 2-ft. x 2-ft. square units, injection molded of colorless transparent acrylic plastic.

Sheets cast from acrylic monomer are used in glazing on the second floor level of DuPont’s World’s Fair exhibit. The exterior walls of the two connecting circular buildings that make up the Schaefer Center at the Fair are constructed of bubble-bearing acrylic sheet. For the walls, restaurant and exhibit areas, the architects wanted a transparent, sparkling effect to enclose the two circles, one 90-ft. in diameter to house the restaurant, the other 50-ft. wide. The decision was for specially designed bubble patterned rigid walls made of heat-formed ½” thick acrylic. In addition to providing a pattern that is reminiscent of a glass of good beer, the bubbles contribute to the rigidity and strength of the walls.

New York World’s Fair structures serve as prototypes of innovations in architectural design and interior and exterior decoration that may be applied to industrial and.
Uses of acrylics for residential applications are myriad. Domed acrylic skylights provide natural lighting. Cast acrylic sheets with decorative emblems are ideal for dividers, cabinet doors. Translucent acrylics perform as weather-resistant window walls.

In the near future, the large scale use of plastic in the home and commercial buildings should be observed. Special fully-insulated skylights in the principal living areas of the house will provide even filtered light to the entire room night and day. Translucent ceilings will become more practical and efficient. Translucent sections of the wall or entire walls will be combined with translucent ceilings to obtain the desired effect.

The time will soon come when the curtain walls of large buildings are made of plastics. Since these plastics can be readily formed, the architect will no longer be limited to flat or slightly shaped mullions between windows. His freedom of design will be greatly expanded and buildings should become much more beautiful.
A wall in the employee lounge of the Lilly Varnish Company is laid in stack bond of alternating shades of Cloud Blue and Silver Gray Colorshield wall units.


COLORSHIELD PLASTIC FACED BLOCK
ANOTHER MILLER PRODUCT

WE INVITE YOUR INQUIRY for detailed information about COLORSHIELD wall units. Fresh modern look... quality you can rely on. Available in a wide choice of permanent colors and intriguing texture designs for endless applications.

AMERICAN BLOCK COMPANY INC.
PHONE ME 2 1-432
2200 N. MONTCALM STREET • INDIANAPOLIS 7
63 bodies taken from rest home

NORWALK, O. (UPI) — The last body of the 63 elderly patients who died in a fire at a rest home here has been removed from the ruins. The investigation has been launched by Gov. James Rhodes into the cause of the tragedy. Authorities continue the grisly and difficult task of identifying the charred bodies.

YOU CAN STOP SUCH TRAGEDY

Specify TOTAL FIRE SAFE Concrete Products by General Dredging Company

63 persons died in this tragic fire which destroyed a rest home near Norwalk, Ohio on November 23, 1963. Such a catastrophe is unnecessary because buildings can be constructed of fire safe materials that cannot burn. Particular attention must be given to roof and ceiling materials and architects who specify fire safe floor and roof systems or precast concrete columns and beams can be assured that such a tragedy will never strike.

Call or write for complete details now. Detailed literature and engineering assistance available.

General Dredging Company, Incorporated • Masolite Division
2200 LaFontain • Fort Wayne • Indiana
Phone 742-1453 • Area Code 219

Manufacturers of fire safe precast concrete products.
Why plastics in building? First, above all other materials of construction, plastics offer true ease of maintenance. When properly used, plastic building products are truly maintenance free over the span of their useful life. The second reason for existence of plastic building products lies in the flexibility of building techniques they make possible. Many plastic products can be manufactured to closer dimensional tolerances than is possible with wood fiber or masonry. A third basis for the use of plastics in building is the lightness of weight. Only with plastics can building components or whole buildings be designed with the strength to do the job and a lightness of weight which cuts loads on soil, foundation and supports. The use of plastic foams for their structural properties as well as their insulation is still in its infancy but lightweight buildings are surely a coming development.

If plastics can provide these three basic advantages — freedom from maintenance, unlimited design flexibility and lightness of weight, what then are the obstacles to their overwhelming success in the major building markets? First, there is cost. By and large, plastic building products are far more expensive than the established competitive materials. Plastic siding sells for 25% more than aluminum, double the price of the cheap coated-fiber boards. In residential building, a second obstacle is the consumer himself. There is something different about a building that causes the adventurous individual to suddenly become extremely cautious. This caution is manifested in two ways: a resistance to the aesthetic properties of plastic products and a demand for performance far in excess of the performance expected from more familiar materials. However, researchers in the plastics industry believe tomorrow’s house may well be “shot in place.” A balloon structure could be inflated on the site, sprayed with foamed plastic and then the balloon removed. Still others predict huge cast structures that will be transported by helicopter and “dropped in place.” Some firms even predict that the day will come when houses are poured from barrels of on-the-spot molding chemicals.

Probably the most persistently asked question respecting plastics in building is how long they will last and what is the proof. For many plastics there are no long-time histories of use in building or of exposure to either indoor or outdoor conditions. For these, principal reliance must be placed upon an estimate of their probable performance based upon their chemical-physical nature. There are no completely reliable accelerated laboratory tests that predict accurately the long-time behaviors of materials, especially under outdoor conditions. This constitutes a major challenge to the plastics and building industries.

Another obstacle to the acceptance of plastics in buildings lies in the myriad of regulatory agencies in the U.S. The regulatory systems of the U.S. are indeed a problem for plastics but they are also a problem for any new materials or products in the building industry. Plastics need not feel discriminated against, nor need they feel discouraged. Codes and restrictions may retard their acceptance but if the product is right, the acceptance will come.

* * *

(Many articles have been written about Plastics in Building by such authorities as R. P. Conger of Congoleum-Nairn Company, Albert Dietz of M.I.T., D. S. Plumb, of Monsanto Chemical Company. Some of their thoughts have been included in this summary-type article. The author acknowledges their assistance).
There's nothing easy about designing college or university dormitories. Universities demand economy; parents and students demand comfortable and attractive living accommodations. You can offer both with Amos Mod-U-Line Molded Drawers in your specifications.

Amos Molded Drawers are completely pre-built—eliminating high labor costs for fabricating and fitting wooden drawers. Shrinking, swelling, sticking, warping and splitting are impossible . . . these drawers are impervious to moisture and hard usage, easy to clean and snagproof. Amos drawers are also interchangeable — students can change dormitory rooms just by switching the drawers. Available in six standard sizes.

Already, the convenience of Amos Molded Plastic Drawers has reached colleges and universities like those illustrated on the left. If you are designing university facilities, investigate the economy and practicality of Amos Mod-U-Line Molded Plastic Drawers. Send today for free bulletin.

INDIANA LIMESTONE panels, 4x9 ft., with only two bolts top and bottom, with a rubber gasket between panels, have reduced the cost of the University School, Bloomington, Ind., and made possible an "expandable" school. Panels can be easily moved to enlarge even one classroom in this complex of grade and high school buildings now under construction.

These unusual effects in Indiana limestone are indicative of the many attractive and imaginative designs provided by this famous stone which is so easily carved and shaped.

AMOS MOLDED PLASTICS...division of Amos-Thompson Corporation • Edinburg, Indiana

Please send descriptive literature on these molded plastic drawers to:

Name

Firm

Street

City

State
In nature's affinity for spheres, man has found a continuing engineering challenge. The sphere is strong; it uses material efficiently— as in a skull, or the shell of a turtle or an egg. Architects have long noted this and profited as they designed for applications from pressure storage to deep sea research vessels.

Our forebears fashioned spheres of ice or thatch or adobe. And even with today's prevailing rectangular construction, curved shapes have provided points of departure and interest. Some examples: Frank Lloyd Wright's Round house; Buckminster Fuller's geodesic structures; Pier Luigi Nervi's many dome designs.

RESEARCH ON CURVES
Dow in its research has recognized these principles:
1. There is a need, as yet unsatisfied, for lower cost enclosures.
2. The most efficient use of materials must heed and take advantage of trends toward automation, toward prefabrication and toward ever-growing requirements for more insulation (for humans, for livestock, for food storage), against either hot or cold.

In these considerations, curved architectural shapes assume an important role.

Many architects and engineers are familiar with the company's applications research on Styrofoam extruded polystyrene foam as a form liner for thin shell construction. Forming and thermal insulation are accomplished in a single step, with resulting efficiencies.

SPIRAL GENERATION
This report concerns a new approach to structural use of foam as a free-standing form. Dow calls it "Spiral Generation"—an ingenious system which can form singly or doubly curved structures of plastic foam. The inventor is Donald R. Wright, an engineer in the company's long Range Plastic Applications Research Laboratory. Early findings of a continuing research and development program indicate significant reductions in construction time and building costs. A dome of Styrofoam 45 feet in diameter with walls four inches thick has been erected in approximately 20 man hours, exclusive of foundation work.

The Spiral Generation method involves use of a specially designed machine which bends, places and fastens pieces of plastic foam together into a pre-determined shape. A variety of shapes can be produced by modifying and "programming" the machine. In forming a dome, the machine head is mounted on a boom, which swings around a pivot like the hand of a clock, laying and sealing layer upon layer of foam board in a rising spiral.

USE OF STYROFOAM
Much of the work to date has involved use of Styrofoam extruded polystyrene foam as the structural material. This is so because Styrofoam has an unusual combination of characteristics that contribute to an automated method of enclosing space: Styrofoam is stiff, but capable of controlled deformation; it can be bonded to itself through application of heat (and other methods); it is extremely light weight; it has good structural rigidity; it has high and permanent insulating efficiency; it is easy to work; and it forms an excellent base on which to apply a variety of surface finishes. Dow is also working with other materials, including polyurethane foams.

For more than five years, Dow has directed research to the application of foam to curved shapes. Sections of hemispheres have been built by Spiral Generation varying in
A 25-ton gas-fired Arkla Chiller Heater provides cool comfort for employees at the Great Lakes Chemical Corporation, no matter how hot and humid the weather.

The quiet running, GAS operated cooling and heating equipment maintains even temperature and humidity the year around, regardless of outside weather. Modern GAS is more dependable, and more economical.

GREAT LAKES CHEMICAL CORPORATION, Lafayette

JOHN H. LOOMIS & ASSOCIATES, Lafayette, Architects
C. W. STRUBELO & ASSOCIATES, Lafayette, Engineers

GAS air conditioning and heating for your clients — in store, office, factory, motel, apartment, school, or home — assures carefree comfort at lowest operating cost and minimum maintenance. For year-round comfort at lowest all-round cost, specify GAS. For specific information on types and sizes of equipment, gas rates, engineering data and list of users,

Call or Write our air conditioning division.

Indiana GAS & Water Company, Inc. 1630 N. Meridian Street Indianapolis, Indiana 46202

Masonry Wall Bonding Operation
Wall Board Bonding Operation
Finished Wall—Sound-Insulated-Dry

A Low Cost System of Insulating and Finishing Masonry Walls

• STYROFOAM® FR

• STYROTAC®
A Dow Adhesive for Bonding STYROFOAM® to Masonry Walls and Gypsum Wall Board to STYROFOAM®.

• GYPSUM WALL BOARD
Endorsement of System and Specifications Now Available From Major Manufacturers of Gypsum Products.

A method developed by Dow—gives you the quality of double-laminated walls with just a single thickness of wallboard; the excellent insulating values of Styrofoam brand insulation board without furring strips or other time-consuming preparations. No more unsightly “nail pops” or nail holes to fill, because there are no nails. No more insulation “hollows.” No more wallboard warping or bowing.

SEWARD SALES CORPORATION

ELKHART, INDIANA 740 South Main Street
INDIANAPOLIS, IND. 2070 East 54th Street
CINCINNATI 8, OHIO 3650 Michigan Street
diameter from only a few feet to more than 50 feet—from a fraction of an inch in thickness of foam to four inches. Most recent efforts have involved domes 80 feet in diameter with eight-inch foam wall thickness.

**SHAPES AND STRUCTURES**

Formation of an unlimited number of variations of spherical sections is possible, although the hemisphere is most common and most easily achieved. The joining of sections of different shapes to enclose rectangular areas is a part of the continuing research.

Developmental structures at The Dow Chemical Company’s Midland, Michigan, headquarters have included industrial shelters, warehouses, offices, tank covers, and municipal waste disposal pond covers. A 45-foot diameter dome has been constructed near Ann Arbor, Michigan, as a golf course starter house.

Types of structures under research consideration include agricultural shelters, low temperature warehouses, vacation housing, athletic enclosures and disaster housing.

**DOME FORMATION**

The majority of research structures generated by this method have been hemispherical domes, made from strips of Styrofoam FR.

Construction begins on a leveled site. A foundation necessary to support and anchor a base ring for the dome is completed prior to the generation of the dome. Specific foundation design depends upon architectural and engineering considerations.

After preparation of site and foundation, a base ring, made of angle iron preformed to the diameter of the sphere, is assembled, located on the foundation and anchored. A starter strip of Styrofoam is then attached to the base ring.

The forming machine boom is pivoted from a centrally located point of support. The structural formation begins with timed feeding of Styrofoam strips to the electrically driven forming head. The generation process is continued as successive strips of Styrofoam are thermally welded together by the traveling head to form the hemispherical dome. After the structure has been completed, the desired cut outs for windows, ducts and doors are made using templates where necessary.

The dome interior and exterior surfaces are then coated to produce the desired surface characteristics. Latex paints, epoxy resin system, or cementitious coatings can be used.

**CONTINUING RESEARCH**

The continuing research and development program includes work in such areas as weatherproofing, fireproofing, structural reinforcement, acoustical treatment, economics and building code requirements. For example, a current project involves use of Styrofoam as the spirally generated form on which to place reinforced portland cement concrete on the outside and plaster on the inside. A variety of coatings are under study, ranging from these materials of cementitious nature to intumescent paint.

Among mechanical procedures under study are optimum methods of fenestration, entry and exit, utility mounting and protection against mechanical damage.

A factual economic analysis that may enable accurate prediction of finished building costs is a key to ultimate utility.

Until the discovery and its directions are more fully developed, Dow is pursuing a carefully controlled applications program.
For many years, the great majority of practicing architects in Indiana have proclaimed the dire need for a state-supported school of architecture and planning here in the Hoosier state. The profession has maintained, and rightly so, that the absence of such a professional educational facility is one of our State's greatest cultural deficiencies and economic weaknesses.

Almost one year ago, a united profession asked that a special legislative study committee, composed of legislators, educators and practicing architects, be created to determine if such a school were feasible. The Legislative Advisory Commission of the Indiana General Assembly granted that request, and a blue ribbon committee assembled for its first meeting in December. No group could have performed its assigned task with greater skill and understanding, nor with such devotion and dedication.

Each member of this Study Committee deserves the warmest praise and staunchest support from the entire architectural profession. It is with deep pride that we salute the members of this committee:

Representative M. Maurice Goodnight of Lafayette, the chairman
Senator V. Dewey Annakin of Terre Haute, vice-chairman
Robert J. Schultz, AIA, South Bend architect, secretary
Senator Keith McCormick, Lebanon
Senator Wilfrid J. Ullrich, Aurora
Representative George L. Fisher, Leesburg
Representative William T. Sebree, Anderson
Dr. Frederick L. Hovde, president, Purdue University, Lafayette
Dr. Raleigh W. Holmstedt, president, Indiana State College, Terre Haute
Dr. Elvis J. Stahr, jr., president, Indiana University, Bloomington
Dr. John R. Emens, president, Ball State College, Muncie
Dr. George E. Danforth, AIA, director, School of Architecture, Illinois Institute of Technology, Chicago

Dr. Frank Montana, FAIA, dean, School of Architecture, Notre Dame University, South Bend
C. Eugene Hamilton, AIA, Muncie architect
Raymond S. Kastendieck, FAIA, Gary architect and former treasurer of The American Institute of Architects
James L. Walker, Jr., AIA, New Albany architect

Equally deserving of the profession's thanks are the administration and faculty of each of the four state schools, and the many civic leaders throughout the State who support this cause.

Also warranting the profession's appreciation is the announcement by Walter Scholer, Jr., that his firm, for many years the campus architects for both Purdue and Ball State, was withdrawing from consideration as architects for the new school proposed for Ball State, to eliminate any possible conflict within the profession, and suggesting that the design of the facility rightly should be the responsibility of the selected dean of the school.

The first major steps towards establishing a state College of Architecture and Planning have been taken; but they are only the first. An almost overwhelming task remains: Convincing the people of Indiana and their elected representatives in the next General Assembly that such a College is essential.

This task will require the whole-hearted support of every architect in Indiana, and even then, the chances of passage in the first attempt are only marginal.

Conceivably the findings of the study committee might not agree with the opinions of every registered architect, but these findings were made only after the most careful consideration of all relevant facts. They were not based upon personal opinions, emotion, or ignorance.

As a profession, we must honor those findings; we must support those recommendations; and we must do so with every resource at our command.

To do less than this is to put to rest forever our long-cherished dream. It's up to us.
the architectural school itself, the character of
students and staff, area cultural opportunities, freedom of
educational philosophy available, existing library facilities,
administrative interest, size and orientation of actual physical
site for the architectural school itself, the character of
the campus, civic relationships, and the other important
consideration which must go into such a decision.

Each member of the sub-committee individually graded
each of the five facilities, and on the evening of July 16th,
the four professional members of the sub-committee met to
make the final determination.

Following the addition of each individual's scores, the
four committee members then went through the grading
sheet, agreeing on a score on each point for each of the
facilities. In this manner, unanimous agreement was
achieved on the exact rating to be given each facility
on each point.

On the basis of this evaluation, also, Ball State received
the highest vote, and accordingly was selected as the proper
site by all the professional members of the sub-committee.

The following morning, July 17th, the four professional
members of the committee met with the two legislative
members, who had declined to vote except in the case of a
tie, since they believed that the location was a matter to
determined solely by those active in the profession.

Other decisions reached by the Study Committee included:
1. A state-supported School of Architecture and Planning
in Indiana is needed and the establishment of such a school
is feasible.
2. The school should provide for a total enrollment in the
five-year curriculum of approximately 200 students, main-
taining a student-to-faculty ratio of approximately 15 to 1.
3. A new physical plant would have to be created for the
school, containing approximately 40,000 square feet and costing
approximately $1,000,000.00 to construct and an additional
$100,000.00 to furnish and equip.
4. A new architectural library would have to be collected,
at an initial cost of approximately $25,000.00.
5. The annual operating budget of the school, once it is
in complete operation, would be $300,000.00.
6. The school would be established in stages. In the first
year, the dean of the school and one secretary would be
selected and employed, requiring a budget of $30,000.00. This
first year would be spent in creating the curriculum of the
school and planning the program. The second year, two
additional faculty members would be recruited, increasing
the budget to $40,000, and the first approach would be made
to prospective students and faculty. During this year, the
physical plant itself would be constructed.

The first students would be enrolled in the third year of
operation, at which time the physical plant and library should
be ready. Each year thereafter a new class would be added
until all five class years were in operation and the faculty
complete, at which time maximum budget requirements
would be realized.
7. Accreditation of the school could not be obtained until
the full five-year curriculum were in operation.

It is anticipated the Ball State officials will petition the
next Indiana General Assembly for university status, and
that the name of the facility will be changed to Ball State
University.
Now's the time to call the man from BARCOL

When it comes to determining the right overhead-type door for the right project, call the man from Barcol... he's best qualified to work with you at the preliminary planning stage.

He'll help you anticipate and prevent common door problems... identify penalty your client would pay with inadequate, inferior-quality doors... justify initial cost of door equipment... determine a firm, accurate budget figure... AND provide the proof that Barcol saves money for your client.

Barcol Overdoors with exclusive "Cam-Action" and perimeter gasketing are the tightest sealing doors on the market. For added dependability, specify Barcol's springs that are guaranteed for 100,000 cycles or 10 years.

If the buildings you're planning now require efficient materials handling, more accurate temperature control, more convenient door operation, Barcol Overdoors, electric operators and automatic controls assure more efficient performance. Barcol's superiority is fully documented... providing you proof of performance that justifies initial cost. We're as near as your phone!

See Barcol insert, Sweet's Architectural File.

There's a BARCOL man near you...

FT. WAYNE
Roethele Builders Materials, Inc.
3000 Wells Street
Phone: 219-748-1191

INDIANAPOLIS
Barcol Overdoors of Indianapolis
2747 N. Emerson Avenue
Phone: 317-546-6087

SOUTH BEND
Builders Store, Inc.
1315-19 Mishawaka Avenue
Phone: 219-287-1528

BARCOL OVERDOOR COMPANY
SHEFFIELD, ILLINOIS
Subsidiary Barber-Colman Company, Rockford, Illinois
In a special membership meeting held August 7th, the members of the Indiana Society of Architects approved new bylaws and new name for the present I.S.A. Chapter, and new bylaws and name for a new state association.

The present I.S.A. Chapter will become, on January 1, 1965, the Central-Southern Indiana Chapter of The American Institute of Architects, and will be one of two Chapters (with the Northern Indiana Chapter of the American Institute of Architects) in a new state association to be known as the Indiana Society of Architects.

The new structure will permit stronger representation of the profession on those matters affecting the practice of architecture in Indiana—particularly in the fields of legislative and governmental representation, public relations, relations with the construction industry, and education and registration. These duties will be the main responsibility of the state association, while other professional matters will be handled by the individual chapters.

Officers and directors of the new association will be elected at the first annual meeting scheduled for October 23, 24 and 25 at French Lick, in conjunction with the present I.S.A. Chapter convention.

The program of the convention will concentrate on the proposed state-supported College of Architecture and Planning at Ball State, and the technical portion of the convention will feature a Specification Workshop, put on by members of the Indianapolis Chapter, Construction Specification Institute.

Also at the August 7th meeting, Walter Scholer, Jr., of Lafayette, immediate past president of the Indiana Society and newly-installed Regional AIA Director from the East Central Region, was honored by the I.S.A. Board of Directors for his services during his term as president. Former President Wayne M. Weber and current President Alfred J. Porteous presented Director Scholer with a plaque expressing the board's appreciation of his services.

* * *

The Fourth Governor's Conference on Aging will be held at Purdue University beginning at 8 P.M. Sunday, September 27th and closing with a luncheon, September 29th. A number of nationally known speakers as well as state leaders in the field of aging will appear on the program. Rather than deal with some one concern, practically all of the major concerns of the Commission will be touched on by the speakers. The Program Committee has chosen as a Conference theme, NEW HORIZONS IN THE FIELD OF AGING, and the speakers have been selected with a view to acquainting our conference guests with new programs in the field of aging and the development of new concepts concerning aging.

Registrations will be in the Memorial Center, Purdue University, beginning at 5:30 P.M. September 27th and at 8 A.M., September 29th.

INDIANA ARCHITECT consulting artist Bob Willis, of Design Associates, Indianapolis, gathered four of nineteen awards in the recent Sixth Annual Exhibition of Advertising and Editorial Art and Design, sponsored by the Art Directors Club of Indiana. Some 350 entries were submitted in the annual competition.

Two of his awards, both Merit Awards, were for covers of the INDIANA ARCHITECT, the April "Prayer Rug" presentation and the March interpretation of the "Dynamic Clear Span", the aluminum dome concept which won the Reynolds Student Award for Notre Dame architectural student John Torti.

Ninety-four entries were chosen for exhibition at the John Herron Art Museum during the month of June; judging was by a jury of well-known American art directors. The awards are given to recognize outstanding graphic design and to promote better advertising art in Indiana.

In the photo above, artist Willis (left) receives one of the Merit Awards from the Art Directors Club president at the Awards Banquet held in June.

This month's cover presentation is an artistic salute to plastics in construction, specially created by artist Willis.

* * *

Indianapolis Plastics, Division of Meyer Materials, Inc., 5101 East 65th Street, Indianapolis, have been appointed distributors of Acrylite® acrylic sheets. Newest product in the Acrylite® line is the Compass Collection of forty translucent acrylic decorator panels expressing moods and impressions from the colorful cities, churches, mountains and playgrounds of the world. Possible applications include shower and bath enclosures, room dividers and screens, illuminated wall and ceiling panels and cabinet doors and panels.
LOOK UP TO A PERMANENT CEILING OF GENUINE LATH and plaster

CEILINGS OF LATH AND PLASTER PROVIDE—
ECONOMY OF FIRST COST • FIRE SAFETY •
EASE OF MAINTENANCE • CHOICE OF PLASTER FINISH •
FOR PERMANENCE—SPECIFY
DURABLE CEILINGS OF LATH & PLASTER

Lathing & Plastering Bureau of Indianapolis, Inc.

Business Manager: WALTER J. STROUGH, 130 Winona Dr., Carmel, Ind., Victor 6-5394

WAL-LOK NOW IN 3 GRADES!

No other reinforcing has all these features—found on all three grades of WAL-LOK—WAL-LOK is double deformed for maximum bond • The tensile strength of WAL-LOK is retained after welding • WAL-LOK has rectangular design for stronger welds and more steel in the mortar • WAL-LOK Crossrods project for 4 extra strong mortar locks at each weld • Crossrods hold WAL-LOK up off the blocks for complete embedment in the mortar. Write for free brochure today.

P. O. BOX 516

ADRIAN, MICHIGAN

PUBLIC SERVICE COMPANY OF INDIANA, INC.

Again, Architects Specify Flameless ELECTRIC HEATING

Here is another example. Architects are specifying safer, cleaner, more dependable electric heating in modern schools, churches, hospitals and commercial buildings. Flameless electric heating is practical for home use, too. See us today for complete details!

Nathaniel Scribner Junior High School, New Albany, Ind. Architects: Walker, Applegate, Oakes and Ritz

This ultra-modern school, serving 1,200 pupils, includes clean, flameless electric heating.
As a material of construction, plastics are assuming greater importance in the process industries. Plastics are resistant to a large variety of chemicals and, thus, play an important role in reducing construction, maintenance and corrosion costs. Plastics are fabricated by many methods into many useful shapes and forms, and this industry has grown in volume and in variety of materials. Each generic class of plastic has certain superior characteristics which make it ideal for many applications. The main criteria for selection of a plastic is chemical resistance to the proposed environment, suitable mechanical properties for the vessel or structure, and low economic cost. Light weight, ease of repairs, and minimum maintenance are also important. By the same token, it must be recognized that plastics have some shortcomings which must be taken into consideration. They have poor resistance to solvents and heat, a high coefficient of thermal expansion, and low tensile strengths. Exposure to sunlight and weathering has a tendency to age certain of these materials.

PHENOLIC PLASTICS

The first synthetic polymeric materials were introduced to industry in 1901 when Dr. L. H. Baekeland discovered that useful resins could be produced by reacting phenol and formaldehyde at elevated temperatures in the presence of an alkali. Phenol formaldehyde resins are cured with an acid catalyst which converts the liquid resin to an infusible and highly cross-linked thermosetting plastic. The basic properties can be improved by the addition of reinforcing agents and fillers such as asbestos, carbon, graphite, wood flour, cellulose, mica, paper, silica, cotton cloth, and glass fiber. The phenolics are naturally dark brown in color and darken further on aging; they have limited colorability. These materials come in a variety of forms and can be specifically compounded for casting, molding, or laminating.

For the process industries, the basic resin, filler, and catalyst are carefully mixed, molded into shape, and cured under heat and pressure or by heat alone. Items used in quantity are produced by the compression and transfer molding techniques, while most process vessels are produced in one piece through the use of light weight and inexpensive open molds. Large and complicated vessels are readily molded in sections that are later joined either by flanging and bolting or by cementing to make a complete unit. On the largest pieces of equipment, external reinforcement is required for structural strength.

The physical and mechanical properties of the phenolic plastics are little affected by the type and amount of filler or reinforcing agent. In the chemical industry most phenolic plastics are reinforced with asbestos or glass. A typical specific gravity for an asbestos-reinforced phenolic, for example, is 1.7 which is between that of wood and aluminum. This plastic shrinks 0.5% during curing, dimensional stability is excellent, and thermal expansion is low. The phenolics are non-conductors of heat and electric current. An outstanding property is their resistance to heat. In chemical applications, maximum service temperature is 300°F for continuous operation and 350°F for intermittent operation; around 375°F, the chemical grades begin to decompose but do not support combustion.

Phenolics are strong and light; the tensile strength ranges from 5,000 to 7,000 lb./sq. in. and the compressive strength from 11,000 to 13,000 lb./sq. in. The hardness, Rock-
A unique property of plastic is the ability to match perfectly the surfaces of different structural materials. Here, in a view of a hospital pediatric pavilion (looking from a patient room), Moderncote wallcoverings and Modernfold folding doors (New Castle Products, Inc., New Castle), a continuity is achieved that enhances the plush, finished effect desired. Another unusual installation of Moderncote: background for Michelangelo’s famed “Pieta,” an exhibit in the Vatican Pavilion at the New York World’s Fair.

Relative low cost, excellent chemical resistance, good balance of mechanical properties, and ease of fabrication make the phenolics a useful plastic for the process industries. Available equipment includes ducts, stacks, tanks, towers, jets, condensers, heat exchangers, agitators, pumps, valves, piping and fittings. When properly designed, fabricated, and used in accordance with manufacturers’ directions, reinforced phenolic plastics have performed excellently for over 20 years with a minimum of maintenance.

FURANE PLASTICS

Although the phenolic plastics have been widely accepted in the chemical process field, they are somewhat limited in their applications because of poor alkali resistance. Fortunately, the furane plastics possess good alkali resistance and can be used in these environments. For improved properties, this plastic is generally reinforced with asbestos, carbon, wood flour, mica, paper, silica, cotton cloth or glass fiber. The furanes are black to dark brown in color and possess limited colorability. The furanes can be fabricated by the same techniques used for the phenolics. The furane plastics can be laminated, cast, or molded into a variety of structures for employment in chemical processing.

The specific growth of asbestos-reinforced furane plastics is about 1.7 which is 1.5 that of steel. The rate of thermal expansion is low and the dimensional stability is excellent. The thermal and electrical conductivity values are low and the furanes are excellent thermal and electrical insulators. The upper temperature limit of this self-extinguishing plastic in continuous operation is 250°F.; in intermittent service, the limit is 300°F.

The cured plastic has good rigidity and strength; tensile values vary from 4,000 to 6,000 lb./sq. in. and compressive strength from 11,000 to 13,000 lb./sq. in. The hardness is Rockwell R 110, which is relatively high for plastics. The impact strength is low, but the reinforced material is tough and resists moderate blows and shocks; for added strength, external reinforcement may be used. The resistance to abrasion is good.

The chemical resistance of the furanes is equal to that of the phenolics in outdoor serviceability, water exposure and acid media but is superior to that of the phenolics in alkaline media and solvents.

Furane plastics are very versatile; however, they are more expensive than the phenolic materials. Therefore, the
1. LAUREL BEDFACE

2. FREE FORM PATTERN

3. BLUE RIDGE OFFSET RUBLE

4. STRIP-RANDOM

5. NATURAL FACE COBWEB

6. SHADOW

7. SEMI-POLISH COBWEB

8. LEDGEFACE VENEER

9. BLUE RIDGE SPLIT-FLAG

The Architects' Choice . . . .

for distinctive color, distinctive texture, distinctive beauty . . .
at a practical cost

INDIANA MARBLE VENEER

BLUE RIDGE QUARRIES
Waldron, Indiana
Phone: 317-525-6231
Donald L. Sanders, Manager

MAIL COUPON TODAY

BLUE RIDGE QUARRIES
WALDRON, INDIANA
— Please send full information and sample specifications on WALDRON STONE
— Please have representative call for appointment

NAME

FIRM

ADDRESS

CITY .............. STATE .........
Specify WALDRON STONE for
Interior and Exterior Veneer; Hearths, Sills, Steps, Sidewalks; Semi-Polished Flooring; Natural Flagstone; Retaining Wall Flag; Structural Building Stone

Choose from nine beautiful patterns, all reasonably priced—

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LAUREL BEDFACE</td>
<td>$ 24.00</td>
</tr>
<tr>
<td>2. FREE FORM</td>
<td>24.00</td>
</tr>
<tr>
<td>3. OFF-SET RUBLE</td>
<td>24.00</td>
</tr>
<tr>
<td>4. STRIP RANDOM</td>
<td>32.40</td>
</tr>
<tr>
<td>5. COBWEB</td>
<td>24.00</td>
</tr>
<tr>
<td>6. SHADOW</td>
<td>24.00</td>
</tr>
<tr>
<td>7. SEMI-POLISHED COBWEB</td>
<td>36.00</td>
</tr>
<tr>
<td>8. LEDGEFACE</td>
<td>24.00</td>
</tr>
<tr>
<td>9. RUSTIC</td>
<td>24.00</td>
</tr>
</tbody>
</table>

OTHER ITEMS

- RETAINING WALL FLAG (Palletized) 13.20
- RETAINING WALL FLAG (Dump) 6.00
- NATURAL FLAG (Approximately 2” thick) 20.00
- SEMI-POLISHED FLAG (Approximately 2” thick) 36.00

LIST PRICE PER TON F.O.B. WALDRON, INDIANA

MAIL COUPON TODAY FOR FULL INFORMATION

BLUE RIDGE QUARRIES
WALDRON, INDIANA
PHONE: 317-525-4231
POLYESTER PLASTICS

The term polyester represents a large family of resins which are cured with selected catalysts to form a hard, brittle, thermosetting plastic. When the polyester resin is compounded with suitable reinforcing materials, a tough plastic is produced. Glass fibers in the form of mat, cloth, rovings, and rope are the most generally used reinforcing agents; for special application, organic fibers and asbestos find occasional service.

Polyester plastic structures for the process industries are made by hand laminating, either over mandrels or in molds. Multiple layers of glass fiber are impregnated with mixed polyester resin, laminated to shape, and cured at room or elevated temperatures with little or no external pressure. A proper laminate is of uniform thickness, dense, and free of voids, cracks, crazing, and dry spots; delamination seldom occurs. The surfaces in contact with the corrosive media are smooth and have no exposed glass; the other surfaces are reasonably smooth and free of exposed glass. The structure under fabrication can be made in one piece or in sections. The sections can be field or shop joined by flanging or by cementing with polyester resin and glass mat.

Polyester glass laminates are characterized by their light weight which is ½ to ¾ that of carbon steel. The specific gravity ranges from 1.3 to 2.1 and depends on the amount and form of the reinforcement. Dimensional stability is good; cold flow is non-existent. The thermal conductivity is very low and the dielectric characteristics are good. Most polyesters are combustible; the rate of burning is directly proportional to the styrene content. Certain grades can be made self-extinguishing and some fire retardant grades are available.

Reinforced polyester laminates are stronger than wood and approach the strength of soft carbon steel. For a plastic, the tensile strength is high and ranges between 13,000 to 15,000 lb./sq. in.; this makes the weight to strength ratio very high. The flexural strength is around 26,000 lb./sq. in. Upon immersion in water or chemical media, the glass-plastic laminate shows some loss of tensile and flexural strength in a relatively short time. After the initial drop, the strengths remain quite constant on continued exposure. The material is tough and possesses high impact resistance; it withstands mechanical shocks and blows exceedingly well. It is unaffected by thermal shock or sustained temperatures up to 225°F and intermittent temperatures up to 275°F. The rate of water absorption is low and resistance to vapor transmission is excellent.

Polyesters possess good aging and weathering characteristics; continuous outdoor exposure for over 10 years does not have any adverse effects. Fresh, brackish, and sea water also have no effect. The resistance to concentrated and dilute non-oxidizing mineral acids is excellent at room temperature. At elevated temperatures, the resistance falls off and only moderate and dilute concentrations can be handled. The resin is unaffected by hydrofluoric acid and fluorine compounds, but the glass reinforcing is rapidly attacked by these media; therefore, organic fibers are substituted for the glass in these environments. The polyesters are more resistant to dilute chromic acid, dilute nitric acid, sodium hypochlorite, and other oxidizing media than either the phenolics or furanes. Concentrated sulfuric acid, concentrated nitric acid, chlorine, and hydrogen peroxide cause degradation, especially at elevated temperatures. Salt solutions containing carbonates, chlorides, cyanates, nitrates, phosphates, and sulfates have no harmful effects. The alkaline resistance is fair, and only dilute solutions can be tolerated. This plastic is suitable for use with many organic chemicals; those with a strong solvent tendency cause some degradation. The performance in aliphatic solvents, straight chain paraffins, alcohols, formaldehyde, and refinery crude oils is good. Certain aromatics are safely handled at room temperature, but at elevated conditions, the solvent action is excessive. Chlorinated hydrocarbons cause softening and degradation.

The most widely accepted use of reinforced polyesters is in the form of ducts, hoods, and duct systems for handling corrosive vapors, and for this purpose, polyester fans and blowers are available. Piping, fittings, and troughs are readily available. Circular tanks having a diameter of 15 ft. and a height of 20 ft. are in common usage, and rectangular tanks can be built in almost any size. The method of fabrication is quite versatile and the variety of shapes is almost limitless. The smooth surfaces can be readily cleaned and do not cause contamination of the product. Unpigmented polyester is translucent; therefore, liquid levels can be determined with the aid of minimum lighting, and sight glasses and liquid level gauges are not required.

EPOXY PLASTICS

Epoxy plastics are the newest thermosetting plastic to be used by the process industries. Epoxy resins are cured with the aid of selected catalysts. Usually glass fiber reinforcement is used to strengthen the plastic and to provide flexibility.

In most respects, the fabricating techniques used for polyester plastics are also applicable for the epoxy plastics. Hand laminating is commonly employed for making chemical processing equipment whereas machine laminating is used to produce sheet and piping.

Glass-reinforced laminates possess light weight; they are ½ to ¾ as heavy as steel. The specific gravity depends on the reinforcement and ranges from 1.3 to 2.1. Dimensional stability is excellent and cold flow is absent. The coefficient of thermal expansion and specific heat are low and the resistance to thermal shock is excellent. Epoxy resins have excellent electrical insulating characteristics and can be used to eliminate stray currents. The service temperature is 250°F for continuous usage and 300°F for intermittent applications. Some special resins are available for service in the 300 to 400°F temperature range.

The reinforced thermosetting epoxies possess the highest tensile strength of any reinforced plastic. Laminates with a tensile value of 17,000 lb./sq. in., a compressive strength of 28,000 lb./sq. in. and a Rockwell M hardness of 95 are quite common. The excellent chemical resistance of these materials assures adequate retention of these properties when in contact with corrosive media; with increases in temperature, there is some loss of strength. Because of the reinforcing materials, the laminate combines toughness, high impact resistance and excellent mechanical shock. The plastic is durable and abrasion resistant.

Epoxy possess outstanding chemical resistance. They are equal to the polyesters in acid resistance, slightly inferior in solvent and organic chemical resistance and superior in alkaline resistance.

Reinforced epoxies are supplied to industry as tanks, towers, hoods, ducts, stacks, and piping. Casting resins are used for potting and encapsulating electrical and electronic equipment. Filled resins are formulated for patching and repairing metal and plastic equipment. This thermosetting plastic is more expensive than the polyesters, and its high cost puts a definite limit on its uses.
Blue Prints  White Prints  Photo Copies  Offset Printing

MARBAUGH Engineering Supply Co.

INDIANAPOLIS, IND.
MAIN OFFICE — 140 E. Wabash St.
NORTHSIDE BRANCH — 4145 N. Keystone Ave.

FOR
Quality
BUILDING MATERIALS
CALL
Schuster's
824 E. TROY AVE.
STate 6-4351
INDIANAPOLIS, INDIANA

ALUMINUM or
BRONZE TABLETS

SIGNs • MARKERS • MEMORIALS
NAME PLATES • DOOR PLATES
HONOR ROLLS • DONOR TABLETS

ARCHITECTURAL
LETTERS

Good Lumber  Imported & Domestic Hardwoods
Fine Custom Millwork  Pre-assembled Components

BURNET-BINFORD LUMBER CO.
1401 West 30th Street and 8502 Westfield Blvd. (Nora)  Wa 6-3315
ABS PLASTICS

The ABS plastics are compounds or blends containing acrylonitrile, butadiene, and styrene in varying amounts. The ABS plastics combine the rigidity of plastics with the toughness of elastomers. They are available as compounds for molding, extruding, and calendering.

An outstanding property of this plastic is its lightness which is roughly 1.7 that of steel; its specific gravity is 1.07. Dimensional stability is excellent and thermal expansion is low. This plastic is considered a non-conductor of heat and electricity. The upper temperature limit for continuous service is 180°F, although intermittent service at 180°F is feasible for short periods of time. This material is odorless, tasteless, and non-toxic; it is classed as a combustible plastic.

These blends are strong, rigid, and tough; the tensile strength is 4,000 to 6,000 lb./sq. in., the compressive strength is 6,000 to 7,000 lb./sq. in., the elongation is 26 to 30%, and the Rockwell R hardness is 90 to 100. The strength, hardness and rigidity decrease as the operating temperatures increases. The notched impact strength at room temperature is 4 to 6 ft.-lb./in. and most of this is retained at low temperatures. The resistance to abrasion is good.

Acrylonitrile - butadiene - styrene blends resemble hard rubber in chemical resistance. Ozone, sunlight, and outdoor exposures induce some degradation; thus, the material has limited outdoor durability. Rain, moisture, and water have no harmful effect, and the rate of water absorption is very low. Non-oxidizing mineral acids, alkalis, and their salts are readily handled. Oxidizing media cause degradation and deterioration; only the mild dilute solutions of these media can be considered harmless. The greatest weakness of this plastic is its poor resistance to organic chemicals and solvents; common solvents like gasoline, turpentine, and cleaning fluids cause swelling and softening.

Most ABS plastic is extruded into pipe or molded into fittings which are joined by solvent welding or threading. Sheet stock can be fabricated into many different shapes. The sheets are readily formed by heating above the softening point and shaping over suitable molds. The sections are joined by solvent welding or cementing; heat welding is not applicable. The process industries utilize tanks, fume hoods, ducts, covers, bins, troughs, and other equipment made from this plastic.

POLYETHYLENE

Polyethylene was introduced in 1942. Many types are available and for convenience the ASTM has classified them into three groups based on density: Type I or low density, Type II or medium density, and Type III or high density.

All types have a characteristic wax feel. This surface phenomena enhances the cleanability and provides a low coefficient of friction.

The usual machining methods such as injection molding, compression molding, extruding, and drawing are applicable. Thin films may be fabricated by cementing, or by heat sealing. With the development of hot gas welding, hot air is used to fuse a polyethylene filler rod to the parent material; penetration is very limited, but the joint efficiency is about 90%. This plastic can be easily sawed, drilled, tapped, threaded and machined by simple woodworking techniques.

The polyethylenes are among the lightest of all commercial plastics. With a specific gravity of 0.92 to 0.96, the material is about 1/3 as heavy as steel; it will float on water. The rates of water absorption and moisture permeability are low. Thermal expansion is high and thermal conductivity is low. The temperature limitation of low density polyethylene is 130°F for continuous service and 170°F for intermittent usage. Increasing the density of the base plastic will increase the tolerance to heat and decrease the permeability to gases and vapors; thus, high density material may be continuously used at 220°F and intermittently at 250°F. Polyethylene is a nonconductor of electricity and has excellent dielectric properties. The material is odorless, tasteless, non-toxic, and resistant to bacterial growth. It has a tendency to burn slowly.

The tensile strength of the high density grade is about 4000 lb./sq. in. and compression strength is poor. The plastic lacks rigidity and deforms very easily; it is susceptible to creep or growth. It is very tough and flexible over a wide temperature range; flexibility decreases as the thickness of section increases. Polyethylene has excellent impact strength and is very resistant to breakage. The surface is sufficiently hard, Rockwell R 45, to withstand normal handling, but it has poor resistance to abrasion and cutting. Regular polyethylene has a tendency to fail in service from stress cracking which is caused by a combination of excessive stresses and an active chemical media; however, this phenomena is completely eliminated in the high density type.

All types of polyethylene have about the same degree of weatherability and chemical resistance. They are well-known for their zero moisture absorption; thus, they can be extensively used to handle and transport all types of process water and sea water. Because of the susceptibility to embrittlement by ultraviolet light, all types must be compounded with carbon black for outdoor exposures. Hot and cold non-oxidizing mineral acids and alkalis do not damage the inherent inertness of these plastics. Cold nitric acid in dilute concentrations has no visible effect, but hot concentrated acid does impair the tensile strength and elongation. Chromic acid and sodium hypochlorite, which are damaging to most other plastics, are not harmful to the polyethylenes. Carbonate, chloride, dichromate, fluoride, nitrate, phosphate, sulfate, and sulfide solutions are easily handled and processed. Compared to other thermoplastics this group of materials has unusual insolubility and inertness to solvents and other organic chemicals. Acetic acid, when cold and dilute, is safely contained, but at elevated temperatures, the plastic becomes permeable to this chemical. Most organic acids and their salts are harmless. The only common solvents that have any effect at room temperatures are the chlorinated hydrocarbons, the ketones, the aromatics, and some aliphatics. These solvents tend to soften but do not dissolve the plastic at ambient temperatures; dissolution may occur at elevated temperatures.

Polyethylene is a familiar material of construction. The largest quantity of polyethylene is extruded into pipe and tubing; tubing is available in long coil lengths and requires few fittings. The joints are made quickly and easily with insert fittings and clamps. When buried, its flexibility allows snaking and following of the trench contours; above ground, it needs almost continuous support. This pipe has been widely employed to convey potable water, process water, mine waters, chemical sewage, and corrosive solutions. As a film, this plastic is used as drum liners, bags, and moisture seals. The rigid plastic can be fabricated into containers, duct systems, liners, fans, valves and assorted shapes. Some small storage vessels and tanks have been built and placed in chemical service.

POLYVINYL CHLORIDE PLASTICS

Rigid polyvinyl chloride can be extruded, calendered, laminated, compression molded, and injection molded. This rigid thermoplastic can be machined, sawed, drilled, tapped, threaded, and milled on conventional metal and woodworking equipment. It can be joined by bolting, screwing, cementing, and hot gas welding. There are two types of rigid polyvinyl chloride (PVC): Type I has normal impact resistance and higher chemical resistance; Type II has high impact resistance and somewhat lower chemical resistance. Type I is
also known as unplasticized polyvinyl chloride or UPVC. For identification purposes, Type I is dark gray in color and Type II is light gray.

This thermoplastic has a specific gravity of 1.4 which is roughly 1/5 that of carbon steel. The rate of thermal expansion is high while the rate of thermal conductivity is low. A serious disadvantage of PVC is its low temperature limit. In continuous service, it can be used up to 150°F; for intermittent service, the limit is 170°F. A new member of this family, polyvinyl dichloride (PVDC) has a continuous service temperature limit of 180°F. Because of chlorine in the molecule, the plastic is self-extinguishing. The dielectric properties are excellent and rigid PVC is a non-conductor of electricity. The rate of water absorption is low and permeability to gases is nil. Dimensional stability is good. This material is odorless, tasteless and non-toxic; it does not impart color to or contaminate the solutions being handled or processed. It is unaffected by bacterial growth.

Type I plastic is tough with high inherent strength. The tensile strength of this material is around 8,000 lb./sq. in.; the compressive strength is 10,000 lb./sq. in., and the flexural strength is 16,000 lb./sq. in. These properties decrease with an increase in temperature. Under continuous loads, the plastic undergoes considerable creep; fabricated structures and pipe require external support. The impact resistance is rather low and severe blows and mechanical abuse may cause failure. The addition of modifying agents to pure resin results in Type II PVC. The resistance to impact is greatly increased; however, it is accompanied by an increase in the coefficient of thermal expansion and a decrease in strength. Both types have excellent resistance to wear and abrasion.

Type I, UPVC, has the best resistance to ultraviolet rays and atmospheric conditions; the weathering characteristics are excellent. Equipment and piping exposed to climatic conditions for over 10 years have not shown any signs of degradation. When buried, the plastic is unaffected by corrosive soils. Fresh, brackish, or sea water has no effect. This plastic has outstanding resistance to acids including nitric, chromic, phosphoric, hydrochloric, and hydrofluoric. Most UPVC is resistant to 70% sulfuric acid but the product of only a few fabricators or converters is resistant to 93% sulfuric acid. Oleum is definitely deleterious and results in rapid deterioration of the plastic. The resistance to chlorine gas and oxidizing agents such as sodium hypochlorite and hydrogen peroxide is good. Rigid vinyl is resistant to inorganic alkalies in all concentrations. It is unaffected by all common salts; complex salts including organic compounds may have a minor effect on the plastic. Mineral oils, vegetable oils, animal oils, and greases are harmless at room and elevated temperatures. Cold fatty acids have little effect; hot fatty acids promote softening. The organic acids cause some degradation and loss of properties; this thermoplastic is not recommended for handling glacial acetic acid. The aliphatic hydrocarbons and alcohols do not affect the plastics; however, the aromatics, ketones, esters, ethers, and chlorinated hydrocarbons cause softening, swelling and dissolution. The chemical resistance of Type II polyvinyl chloride is inferior to that of Type I and closely resembles that of the ABS plastics.

The greatest use of PVC has been in pipe, fittings, and valves. Sheets have been formed into ductwork, fume hoods, stacks, vents, and fans. Small unsupported tanks can be fabricated from sheet while larger tanks are made of steel and lined with rigid sheet. Since UPVC is easily shaped and joined, it is quite practical to make field installations and to alter and modify existing installations.

**POLYVINYLIDENE CHLORIDE PLASTIC**

Polyvinylidene chloride or Saran, since its introduction in 1938, has become a widely accepted and well-known plastic. It is a thermoplastic which closely resembles UPVC in its properties and methods of fabrication.

Saran’s excellent chemical resistance is well-known and is comparable to that of PVC. This copolymer has been extensively used in the manufacture of pipe and tubing. Its many applications led to the development of Saran-lined steel pipe and fittings where the chemical resistance of the plastic is combined with the strength of steel. This combination permits the use of this plastic at temperatures up to 200 °F and pressures 350 lb./sq. in. Field fabrication is easily and quickly accomplished with the aid of conventional pipe equipment. Saran pipe by itself is weak and needs either manifolds of support or continuous support whereas Saran-lined steel requires the same number of hangers as does steel pipe of the same loading.

**FLUOROCARBON PLASTICS**

Fluorocarbon plastic are basically composed of carbon and fluorine. Several types are available: polytetrafluoroethylene, or TFE, polychlorotrifluoroethylene, or CFE, and vinylidene fluoride. They are colorless-to-light-colored materials which possess a waxy feel. CFE and vinylidene fluoride powders are readily molded on standard compression, injection, transfer, and extrusion equipment. TFE powders are molded and extruded by techniques similar to those used in powder metallurgy. All are easily machined, drilled, tapped, threaded, punched, and stamped. None of these materials can be heat welded and bonding of these materials to themselves is only done with great difficulty. The bonding of fluorocarbons to other materials is accomplished by mechanical means and by the use of catalyzed phenolic and epoxy adhesives. The techniques are difficult to master and specialized applicators are normally required.

These types of fluorocarbons are similar in many respects. The specific gravities average 2.1 which is roughly 3/4 that of carbon steel and 4/5 that of aluminum. All are non-conductors of electricity and heat. The rates of thermal expansion are similar to those of polyvinyl chloride but less than that of polyethylene. The rate of water absorption is nearly zero and the permeability to gases and liquids is very low. The coefficients of friction are very low and these plastics are known for their antistatic and non-wetting properties. The fluorocarbons are non-flammable and heat stable. CFE and vinylidene fluoride can be used over a wide temperature range, extending from below —300°F to above 300°F, without decomposition, while TFE can be used at temperatures as low as —450°F and as high as 450°F in continuous service and 500°F in intermittent service. The fluorocarbons are odorless, tasteless, non-toxic, and do not cause contamination.

TFE has a tensile strength of 1,000 to 3,000 lb./sq. in., a compressive strength of 600 lb./sq. in., and does not break during flexural testing. CFE has a tensile strength of 5,000 to 6,000 lb./sq. in., a compressive strength of 2,000 to 3,000 lb./sq. in., and flexural strength of 8,000 lb./sq. in. Vinylidene fluoride has a tensile strength of 7,000 lb./sq. in., and compressive strength of 10,000 lb./sq. in. The impact strengths are nearly identical. All these fluorocarbons are relatively flexible, elastic, and tough; the resistance to shock, wear, and abrasion is excellent.

Of all plastics, the fluorocarbons possess the greatest degree of inertness. They are unaffected by ozone, ultraviolet light, and weathering. The oxidizing and non-oxidizing acids and their salts have no effect; these plastics are even inert to aqua regia and strong sulfuric and nitric acids. The resistance to alkalis, including fused caustic, is outstanding; however, the molten alkali metals do attack these materials at elevated temperatures. Organic chemicals and solvents produce no lasting deleterious effects. Some of
Traders National Bank Building...

MINIMUM FLOOR-TO-FLOOR HEIGHT, FAST CONSTRUCTION ACHIEVED WITH MODERN CONCRETE

The twenty-story Traders National Bank Building, Kansas City, Missouri, is a dramatic example of the many advantages of concrete frames and floors.

The 11' 9½" floor-to-floor height provided by space-saving pan-joist floors resulted in big material economies. Use of lightweight concrete in the floors saved many tons of dead weight and permitted smaller columns. Use of ultimate strength design reduced column size even further, thus affording more usable floor footage.

Once above the lower floors, a story every six working days was completely framed and floored. Other trades were able to follow up immediately so that building owners gained not only in lower initial cost, but in early occupancy that reduced mortgage and interest expenses.

Write for free, informative literature, "Continuity in Concrete Building Frames" (U.S. and Canada only).

Architect-Engineer: Thomas E. Stanley, Architects-Engineers, Dallas, Texas
General Contractor: Beck-Truckee Construction Co., Dallas, Texas

PORTLAND CEMENT ASSOCIATION
612 Merchants Bank Bldg., Indianapolis 4, Ind.
A national organization to improve and extend the uses of concrete
Neither termites, nor pests, nor vermin of any kind can penetrate a wall built of durable concrete block. Its barriers are insurmountable to insect denizens.

Of course, this is simply another of the multitude of advantages offered by this versatile material. In fact, modern architects are freshly discovering and investigating the possibilities of concrete masonry. Their efforts have virtually turned it into a new building medium.

Today's concrete masonry offers structural durability, excellent insulating qualities, and above all, an exciting creative challenge.

When all is said and done, its only disadvantage seems to be its complete indigestibility.