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The citations cover the performance, structural design, strength, and fire and weather resistance of plastics for construction materials. Some of the applications include plumbing fixtures, molding fixtures, laminates, roofing materials, and concrete additives. (Contains 112 abstracts)
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COAL GASIFICATION FOR ELECTRIC POWER GENERATION.
LEMEZIS, SYLVESTER; ARCHER, DAVID H.
WESTINGHOUSE ELECTR CORP, LESTER, PA

DESCRIPTORS—*COAL, POWER GENERATION, FUELS,
CARD ALERT - 522, 524, 6L5
CODEN-COMBAM SOURCE— Combustion V 45 N 5 NOV L973 P 6-12

THIS NEW MULTIPLE FLUIDIZED-BED CONCEPT HAS THE POTENTIAL FOR OVERCOMING THE INHERENT LIMITATIONS OF OTHER GASIFICATION PROCESSES AND PROVIDING AN ECONOMIC GASIFICATION SYSTEM FOR POWER PLANTS. A WIDE VARIATION IN FUELS INCLUDING CAKING COALS AND HIGH-ASH COALS CAN BE USED WITHOUT COSTLY AND INEFFICIENT PRETREATMENT. THIS FLEXIBILITY WILL ALLOW POWER PLANTS TO UTILIZE LOCAL COAL RESOURCES AND MINIMIZE TRANSPORTATION COSTS. WHEN SCALE-UP PROCEDURES HAVE BEEN VERIFIED, A COMMERCIAL-SIZE GASIFIER PLANT WILL BE CONSTRUCTED. 2 REFS.
The following citations contained in this document are copyrighted by Engineering Index, Inc. (Ei) and are reproduced with their permission.
This paper discusses two principal aspects of avoiding fire hazards in building and equipment made of/with plastics: 1) use of flame retarding agents in plastics compounds employed in structural applications, and 2) building design and other constructional aspects (use of fire proofing surface coatings). Effectiveness of flame retardants is discussed, and some flammability tests used for plastics are briefly reviewed and critically evaluated. 12 refs. In German.
ID NO.- EI771179567 779567

OPTIMUM DESIGN OF A REINFORCED PLASTIC BRIDGE GIRDER.
Alper, H.; Barton, F. W.; McCormick, F. C.
Univ of Va, Charlottesville
Comput Struct v 7 n 2 Apr 1977 p 249-256 CODEN: CMSTCJ
DESCRIPTORS: (*BUILDING MATERIALS, *Plastics), (PLASTICS, REINFORCED
, Applications), (BEAMS AND GIRDERS, Computer Aided Design), (BRIDGES,
Design).
CARD ALERT: 415, 817, 408, 723, 401

This paper describes the results of an analytical and experimental
investigation concerned with the optimum design of a
fiberglass-reinforced plastic flexural member. In the initial phase
of the study, seven members were designed, fabricated, load-tested and
subsequently analyzed. In order to achieve a more efficient and
economical structural system, an iterative algorithm for optimum
gemetric configuration was developed and used in conjunction with an
optimality criterion for optimum member sizing. This procedure was
applied to the design of five separate flexural members and final
design data for these members are presented and discussed. 10 refs.
This is a review of plastics uses in building applications. In this survey particular attention is paid to the production and applications of expanded plastics profiles. Assortment of panels, window frames, moldings and structural members is illustrated along with their structural applications (roofs, walls).
This paper reports on the use of plastics sheets in building applications in Great Britain. It is pointed out that as the building market stays down, UK processors are finding polymers go up, in roof repairs and renovations. This applies equally to domestic and insurtrial premises; as far as the latter is concerned there is a further need for the use of roofing lights to improve working conditions, ventilation, and fire fighting. A healthy market is served by the manufacturers of rigid plastics sheet such as UPVC, GRP, acrylic and polycarbonate to improve roof illumination. The use of plastics sheets in the German building industry is also included in this market review.
ANWENDBARKEIT VON GP-UP-BAUSTOFFEN UNTER BRANDSICHERHEITLICHEN GESICHTSPUNKTEN.

Applicability of GFRP as Construction Materials from Fire Protection Point of View.

Becker, W.
Kunstst Ger Plast v 66 n 12 Dec 1976 p 810-817 CODEN: KSGPA7

Descriptors: (PLASTICS, REINFORCED, FLAME RESISTANCE), (BUILDING MATERIALS, Plastics), GLASS FIBER, POLYESTERS,

When glass fiber reinforced, unsaturated polyester resins are used as materials of construction, the fire protection considerations which are normal for all building materials must be taken into account. The suitability of GRP building materials and the resultant potential applications, are determined by the various relevant rules and regulations of the local authorities, and classification according to DIN 4102. In special cases the range of applications of GRP materials can be extended through special proof of sufficient flame resistance by natural-scale fire tests. This should be borne in mind in cases where GRP materials are intended for constructional applications, or contain flame proofing agents, if the structural components made from them cannot be judged as free from risk according to official regulations. 8 refs. In German.
In this continuation of an article series the author discusses the following subjects related to the performance evaluation of plastics used in construction applications: the state of the test specimen; comparison of impact strength with stress cracking behavior; crack formation. Microphotographs of crack formation and crack propagation are included. 5 refs. In German.
APPLICABILITY OF CONCRETE POLYMER MATERIALS FOR USE IN GEOTHERMAL ENVIRONMENTS.
Kukachka, L. E.
Brookhaven Natl Lab, Upton, NY

DESCRIPTIONS: (*GEOTHERMAL ENERGY, *Corrosion), (CONCRETE CONSTRUCTION, Plastics Applications), BUILDING MATERIALS,
IDENTIFIERS: BRINE, HOT BRINE, SCALING
CARD ALERT: 615, 641, 481, 539, 405, 817

The feasibility of using concrete polymer composites as materials of construction for handling hot brine was demonstrated in 1972. The results from these tests indicated that the composites had long-term stability in seawater at 177 °C and in acid solutions. Since then the work has been extended to develop materials for use in geothermal systems. To date, high temperature polymer concrete systems have been formulated, and laboratory and field tests performed in brine, flashing brine, and steam at temperatures up to 240 °C. Results are available from field exposures of up to 12 months in four geothermal environments. Testing at two other sites is in progress. Good durability is indicated. Based upon these results, potential applications in geothermal processes have been identified. 16 refs.
This article deals with the use of plastics in the construction industry, particularly that of Italy where consumption reached 227,000 tons in 1974. Characteristics and applications in the building industry of various plastics, including polyvinyl chloride, polystyrene, ABS resins, polyolefins, acrylics, etc., are discussed and listed in tabular form. The future possibilities of plastics use in the building sector are outlined, and Italian consumption of plastics in construction is compared with Europe's and the U. S. 's. 7 refs. In Italian.
This paper reviews the present status of plastics applications in the following construction industries: housing; furniture; concrete structures; containers as temporary shelters for people and storage; hydraulic structures; sanitation and old buildings; various structural applications. Forecast for the future development is included. 27 refs. In German.
This review paper discusses the most important principles used in production, processing and applications of synthetic organic polymers which represent useful and increasingly important engineering materials in the construction of buildings, vehicles, engines, applicances, textiles, packaging, printing and writing materials, plastics, rubber goods and household articles of all kinds. This review is presented under headings $\&$ introduction; molecular weight; crystallinity; molecular engineering of elastomers; molecular engineering of fiber formers, molecular engineering of polymers for building construction. 21 refs.
This review paper demonstrates that soaring demand for lightweight, corrosion-resistant pipe is notably by the water/wastewater market is encouraging innovative concepts in composite plastic pipe construction and production. Highlights include: new composites ranging from reinforced polyester/polysulfone for high-pressure steam lines, to reinforced epoxy/PVC for underground pressure lines; a hybrid approach that combines pultrusion and filament winding to overlay liner pipe continuously formed by ultrasonic welding of thermoplastic sheet; and mass production of large-diameter (up to 144 in.) RP and RP/mortar pipe by continuous winding. Advances in technology are discussed in some detail.
A number of waste product systems have been examined over the past four years. These include: incinerator ash, shells, coral, and crushed glass for use as aggregate; scrap steel and scrap polymer fibers as reinforcement; and lignite fly ash, and blast furnace slag as cementing materials. Of the various combinations investigated, crushed glass was found to be an excellent aggregate replacement (80% of compressive strength of conventional materials); scrap steel fibers to be excellent reinforcement (100% increase in flexural strength over reinforced materials); and fly ash/slag cement to be an excellent cementing material (85% of compressive strength of standard building blocks). 22 refs.
Amidst controversy over fire safety, building code writers and the plastics industry have entered a new era of cooperation. Foam insulation, object of much recent codes activity, will be the first application to benefit, followed by such others as pipe and home trim. Signs of the new era are amendments by means of which model building codes now give greater attention to plastics as performance alternatives to conventional materials. Also evident from these changes is the beginning of a national trend toward code uniformity, caused in part by the increasing demand for plastics by builders faced with pressing economic problems. New codes deal chiefly with foam. The paper reviews recent codes issued by various involved in supervision of the construction industry and its branches.
The Proceedings contain 38 of the 70 papers that were presented at the Conference. Manuscripts of 16 papers were released and published in the open literature. The sessions covered the following subjects: impact of fire safety on the public; role of government in fire safety; role of organizations in fire safety; consumer product safety; fire and its legal aspects; medical care of fire victims; aircraft and fire safety; progress in the fire services; earthquakes and fire safety; progress in fire research; testing tools and techniques; large scale tests; human behavior in fires; fire toxicity; and polymers in fire situations. Some papers are presented in abstract form only. Selected papers are indexed separately.
COATINGS FOR WEATHERED PLASTICS.

Whiteley, P.; Gardiner, D.

Build Res Establ, Garston, Hertfordshire, Engl

Sponsored by Plast and Rubber Inst, Build and Constr Group, London, Engl, 1976 Pap D14, 12 p

DESCRIPTORS: (*POLYVINYL CHLORIDE, *Protective Coatings), (PLASTICS, REINFORCED, Weathering), (PAINT, Testing), ADHESION, (BUILDING MATERIALS, Plastics),

CAPD ALERT: 421, 423, 539, 801, 813, 817

The increasing exterior use of plastics building components creates a need for paint systems suitable for on-site refinishing. A wide range of paints has been tested for durability and adhesion in natural weathering on polyvinyl chloride and glass reinforced polyester claddings. Loss of impact strength in the former caused by abrasion and/or overpainting is demonstrated and means by which it may be minimised are indicated. Attention is drawn to the need for careful choice of paint and the avoidance of normal paint stripping techniques or plastics substrates. Problems associated with the repainting of plastics coated metals are illustrated by an extensive failure of a nylon coating on steel window frames. 3 refs.
IMPROVED CONSTRUCTION MATERIALS $EM DASH$ CUMYLPHENOL DERIVATIVES AND TITANIUM COUPLING AGENTS.
Seeman, D. J.; Sugerman, G.; Monte, S. J.
Kenrich Petrochem, Inc, Bayonne, NJ
DESCRIPTORS: (*POLYMERS, *Fillers), TITANIUM COMPOUNDS, PHENOLS, VISCOSITY, (BUILDING MATERIALS, Plastics), (PLASTICS REINFORCED, Physical Properties),
IDENTIFIERS: COUPLING AGENTS
CAPD ALERT: 415, 631, 804, 815, 817, 931

There are two methods for obtaining high solids and viscosity reduction in filled polymer resin systems. One approach is to lower the effective molecular weight of the resin system by substitution with a low molecular weight extender or diluent. This diluent should be compatible with the base polymer while not adversely affecting properties. The net result will be lower viscosity or higher solids. This paper describes derivatives of cumylphenol for consideration as the first approach. The second approach is to modify the inorganic so as to lower its surface energy and improve its compatibility with the polymer system. Titinate coupling agents form monomolecular layers on the surface of the inorganic. This results in viscosity reductions heretofore unobtainable while maintaining or improving physical properties. Test data are presented for filled rigid PVC and PVC plastics in which both coupling agents were used. Refs.
WEATHERING PROCESS MORE COMPLEX THAN PREVIOUSLY IMAGINED.
Tipp, G.; Goodger, A.
Greater London Counc Sci Branch, Engl
Plast Rubber v 1 n 5 Oct 1976 p 203-204 CODEN: PLRUDI
DESCRIPTIONS: (*PLASTICS, *Weathering), (BUILDING MATERIALS, Research)
(RUBBER, SYNTHETICS, Weathering),
IDENTIFIERS: ARTIFICIAL WEATHERING
CARD ALERT: 415, 421, 423, 817

This is a report on international Symposium "The Weathering of Plastics and Rubbers" held in London, June 1976. Proceedings of papers delivered at the meeting are summarized. Topics covered included chemistry of the weathering process; photooxidation and photostabilization of nylon, ABS and polymer blends; measurement of weathering conditions in material and accelerated weathering; weathering of GFRP in adverse environments and under stress; weathering of PVC compounds; outdoor exposure of polyurethane elastomers in tropics; degradation of polychloroprene joints used in buildings; etc. The general feeling which emerged from the symposium was that, although the understanding of the weathering process may have advanced considerably in recent years, the result seems to have been to reveal a process even more complex than was previously imagined.
The durability of a product is not only a function of the aging of the material from which it is made. It depends on all the environmental agencies to which it is subjected during service. This proposition is discussed in the context of the use of polymers in building. 3 refs.
This paper reviews recent development in the field of creep in plastics products used in structural applications. Effect of time, temperature, and surrounding atmosphere on the strain of plastics is discussed with the use of viscoelastic theory of creep.
This is a technological-economic survey of the plastics use in the combustion buildings. The building industry occupies an important place in the business of plastics production. About a quarter of all plastics produced find their way into the building-construction industry. They have steadily moved into the large, profitable and all-important business of building. Plastics are an indispensable constituent in building construction. They meet their needs and provide versatility in properties. Plastics supplement the offering available to the architect. Included are fabricated elements combining plastics with other materials. The biggest part of plastics employed in building is for nonstructural application, such as tubing and piping, flooring, paneling, wire insulation, acoustic and thermal insulating materials, adhesives, sealing compounds, protective and decorative coatings, light fittings, and finishes. Only a small proportion is used for load-bearing elements, mostly in combination with other building materials.
AND NOW FOR THE REALLY TOUGH JOBS IN BUILDING AND CONSTRUCTION.

Anon

Mod Plast v 54 n 1 Jan 1977 p 38-40 CODEN: MOPLAY

DESCRIPTORS: (*BUILDING MATERIALS, *Plastics), (PLASTICS PRODUCTS, Mechanical Properties), (POLYVINYL CHLORIDE, Extrusive), (PLASTICS, FOAMED, Processing), PIPE, PLASTIC, MARKETING.

CARD ALERT: 415, 421, 619, 816, 817, 911

This paper reviews new development in the use of plastics solids and plastics foam in construction applications with emphasis on the trend for the future. It is pointed out that available in 1977 will be new panel composites, materials for pipe and profiles, wood-replacement options through foam molding and extrusion, and other materials and systems that improve the traditional cost-performance advantages of plastics. These innovations will tend to be not glamorous but practical and problem-specific a good way to describe how the role of plastics is now viewed in construction. The survey is presented under headings rigid vinyls advance on all fronts; panels and whole structures; high performance pipe resins. Statistical data for plastic uses in specific construction applications in 1975 and 1976 are tabulated.
NEW PRODUCT $EM DASH$_ STRUCTURED NONWOVEN FABRIC LAMINATES.

Damiani, Mario

Montefibre, Milan, Italy

Nonwoven Technol $EM DASH$_ Challenges and Achiev, Tech Symp, 4th, Atlanta, GA, Mar 2-3 1976 Sponsored by INDA (Int Nonwovens and Disposables Assoc), New York, NY, 1976 p 173-184

DESCRIPTORS: (*TEXTILES, *NONWOVENS), LAMINATED PRODUCTS, PLASTICS LAMINATES, PHENOLIC RESINS, PAPER, BUILDING MATERIALS,

IDENTIFIERS: KRAFT PAPER

CARD ALERT: 819, 816, 817, 811, 415

Manufacture, main characteristics and applications of a new product, structured nonwoven fabric laminates, are detailed. The product, on one side, is a thick needlepunched nonwoven fabric and, on the other, a normal kraft paper and phenolic resin laminate. This new concept, which consists of combining the components during the laminate manufacturing process, is a considerable innovation. The product has already found two important applications: prefabricated buildings and furnishings in general.
This is a report on some European advances on the continuous production of sandwich structures based on polyurethane or PS foams cores and facings made of plastics sheets or such conventional materials like plywood, particle boards, asbestos cement, etc. Design details of production lines are given and applications for loadbearing panels in the construction industry are indicated.
CONTRIBUTION A LA RESISTANCE CHIMIQUE DES RESINES EPOXYDES CHARGEES ET LEUR CONTROLE.

Ettel, W. P.; Schulze, W.; Storm, O.
Hochsch fuer Bauwes, Leipzig, E Ger

DESCRIPTORS: *EPOXY RESINS, CHEMICAL REACTIONS, (BUILDING MATERIALS, Plastics),
IDENTIFIERS: CHMICAL RESISTANCE
CARD ALERT: 802, 815, 817

The durability of filled epoxy resins used in building industry has been tested. Lyes, organic and inorganic acids different concentration, solvents and fuels have been used as corrosive substances. With the corrosive attack of these substances the swelling behavior of the epoxy resins plays a fundamental part. The physical and chemical processes taking place have been analyzed. 12 refs. In French with English abstract.
HOURLY AND MONTHLY VARIATIONS IN SURFACE TEMPERATURE OF OPAQUE PVC DURING EXPOSURE UNDER CLEAR SKIES.

Yamasaki, R. S.; Blaga, A.
Natl Res Council of Can, Ottawa, Ont

DESCRIPTORS: *STRUCTURAL PANELS, POLYVINYL CHLORIDE, (BUILDING MATERIALS, Plastics), TEMPERATURE MEASUREMENT,
CARD ALERT: 408, 415, 817, 931, 944

To characterize weather as it affects plastics, measurements of surface temperature of opaque PVC panels subjected to outdoor exposure at five orientations in Ottawa, Canada, have been taken hourly for a year. Readings taken during Clear Hour periods, both day and night, have been selected, and for each panel the corresponding average daily surface temperature-time curve for each month was determined. 21 refs.
As structural foam moves into larger and more highly engineered applications, quality and uniformity become increasingly vital. This article shows how emerging technology provides a clearer picture of the design and process variables that control the quality of structural foam, and points the way to consistent, reliable parts. While the first section of the article explores the qualitative effects of the key process and design parameters on foam quality, the second section deals with another aspect of the problem: how processing conditions and material selection affect the design properties of the molded foam.
DIAMOND MACHINING OF GLASS-PIBRE REINFORCED FACING SLABS.
Groebner, J.
Flachglas, Weiden, Ger
Ind Diamond Rev Sep 1976 p 332-333 CODEN: INDRA9
DESCRIPTIONS: (*CUTTING TOOLS, *Diamond), (PLASTICS, REINFORCED,
Machining), (SAWS, Diamond), (POLYESTERS, Machining), (BUILDING
MATERIALS, Plastics),
CARD ALERT: 605, 606, 482, 816, 415, 817
This article from Germany describes sawing and drilling operations
on GRP facade slabs whose surface is decorated with crushed marble.
It is shown that the use of diamond tools, compared with conventional
tools, produces significant cost savings in both dry and wet
machining.
Application and performance criteria of polyester resin anchors are discussed by examples from the point of view of improved speed and economy to construction operations. 3 refs.
In this article, a well-known European expert traces the inroads made by plastics into the building sector during the past few years. In the past 20 years, the value of plastics fabricated products destined for the West German building industry has almost doubled. In 1975, this value was put at DM6.072 million by the German Institute for Plastics in Construction (IBK). The biggest percentage of this total was accounted for by the following sectors: floor coverings, PVE and polyethylene tubing, plastics laminates, rigid expandable materials, transparent sheets, sheeting for waterproofing and roofs, skylight domes. Several structural applications of plastics in construction are detailed, and the use of plastics in building in Europe is presented in tabular form for the years 1970-1974. In Italian.
MORE REALISTIC TESTING OF SMOKE GENERATION.

Meisters, Mats
Celanese Plast Co, Summit, NJ
Plast Eng v 32 n 8 Aug 1976 p 49-51 CODEN: PLEGBB
DESCRIPTORS: (*PLASTICS, *Combustion), MATERIALS TESTING APPARATUS,
(BUILDING MATERIALS, Plastics), (SMOKE, Testing),
IDENTIFIERS: SMOKE GENERATION
CARD ALERT: 415, 421, 422, 521, 804, 817

The smoke generated when a building burns is often the most hazardous product of combustion. One of the major threats is light obscuration, which impairs vision and either hinders or prevents escape from the fire itself. Accordingly, construction materials must undergo smoke-generation tests, and building costs exclude materials which produce too much smoke during combustion. These laboratory tests, however, cannot duplicate real-life situations, so a movement to create more realistic experimental programs, especially in the plastics industry, has been underway. This paper describes a new developed smoke test chamber and its operation procedure. It is pointed out that since samples are not always burned completely in conventional smoke density chamber tests, the light-obscuration data thus obtained is often misleading. The new technique that burns the entire sample and keeps molten material from dripping produces more reliable results. Test data are tabulated and evaluated.
FIRE RETARDANT ANALYSIS OF AN FRP COMPOSITE BEFORE AND AFTER THE TUNNEL TEST.

Fountain, Roger; Amembal, Amar
Bell Aerosp Co, Buffalo, NY
J Fire Retardant Chem v 3 n 1 Feb 1976 p 22-33 CODEN: JFRCDO

* MATERIALS, *Fire Resistance), (BUILDING MATERIALS, Plastics), COMPOSITE MATERIALS,
CARD ALERT: 817, 914

Two defined FRP composite systems used in bathroom fixture applications were subjected to the ASTM E-34 Tunnel Test. The materials contained flame retardants which were measured via elemental analysis before and after burning the composite in the tunnel. Comparisons were made between (a) the manner in which the phosphorus and chlorine elements were distributed and consumed by burning and (b) the type of analyses (surface or bulk). The two composites had different structural reinforcement and hence different burning rates. 6 refs.
The surface facts are that rigid plastics platforms (replacing wood) have not only played a key role in reviving the moribund skateboard industry but, along with higher-performance plastics wheels, have also helped to upgrade the product from a child's faddish plaything to a legitimate sporting-goods item. The deeper significance to processors generally is that the plastics skateboard platform has become the proving ground for structural design that satisfies a demanding set of requirements: thin-wall section, light weight, a balance of stiffness and flexibility, and the ability to withstand $EM$ $DASH$ with a great deal of repeatability $EM$ $DASH$ the rigors of suddenly applied high torque and jolting impact. Plastics used in skateboard-platform applications include: polyurethanes; ABS resins; polycarbonates; and acrylics.
This paper discusses some aspects of weather resistance of plastics used in construction building applications. Particular attention is given to the photodegradation of GRP cladding panels exposed to sunlight, moisture, atmospheric oxygen and temperature. Because GRP can have a high strength-to-weight ratio it can be used structurally, but there is only inadequate knowledge of its performance when exposed to the weather under stress over long periods, so that uneconomic over-design is often employed for GRP structures. Outdoor weathering trials are normally carried out unstressed but GRP specimens exposed under tensile stress will provide long-term data for more satisfactory structural design in GRP. Short-term mechanical tests on specimens retrieved after exposure are used to follow changes in the material. The evidence after only two years is that, unlike stress-corrosion effects in metals, the additional stress does not have a major effect in promoting weathering breakdown. 5 refs.
PROGRESS IN TOXICITY TESTING FOR PLASTICS COMBUSTION PRODUCTS.

Carroll, Jerome P.

Soc of the Plast Ind, Inc


DESCRIPTORS: (*PLASTICS, *Combustion), (CARBON MONOXIDE, Toxicity), (BUILDING MATERIALS, Plastics), MATERIALS TESTING,

IDENTIFIERS: COMBUSTION PRODUCTS

CARD ALERT: 402, 415, 423, 521, 802, 817

This is a summary of a paper which discusses results of recent research, the difficulties of hazard analysis in relating the research to actual fire situations, consideration of options in the use of various building materials, and possible courses for future testing programs.
This discussion presents a great deal of information on new materials, structural design, shelter technology, and large area covers. The panelists demonstrate the feasibility of the existing technology to cover large areas with thin films or plastics and enclose an environment with the appropriate control systems managing the temperature and humidity. Low cost inflatables and similar structures are compared with conventional large-scale structures on an economic basis.
STRESS RELAXATION STUDIES OF POLY(VINYL CHLORIDE) SIDING BY THERMOMECHANICAL ANALYSIS.


DESCRIPTORS: (*POLYVINYL CHLORIDE, *Stresses), (BUILDING MATERIALS, Plastics), MATERIALS TESTING, THERMOANALYSIS, (STRESSES, Analysis), MATHEMATICAL TECHNIQUES,
IDENTIFIERS: STRESS RELAXATION, PVC SIDINGS, THERMOMECHANICAL ANALYSIS

CARD ALERT: 408, 415, 421, 801, 817, 921

Results of an experimental study are presented which show that thermal recovery of stresses induced during the production of horizontal PVC siding causes shrinkage and surface distortion at elevated temperatures. Shrinkage values of PVC siding as measured by the thermomechanical analysis method at 82 °C were in good agreement with values determined by existing specification methods. Furthermore, the TMA provided a convenient method for following the shrinkage process up to 500 h. Results show that the rate and extent of shrinkage decreases with decreasing temperature. Concurrent with shrinkage in the horizontal direction of the siding an expansion of the siding in the transverse direction occurs. Shrinkage studies showed that 95% of the induced stresses in siding could be relaxed if annealed at a temperature of 90 °C for 2.6 minutes. The relationship between the fraction of stresses removed at different temperatures could be useful in the design of cooling equipment. It was also shown that the strain-time relationships at different temperatures could be reduced by the Williams Landel and Ferry equation. The theoretical and experimental values of the shift factor were in good agreement above the glass transition temperature. 4 refs.
In its dozen-year market history, vinyl siding has prettified and protected about three-quarters of a million homes. But all that now seems like prelude. A new generation of richly colorful siding will put many times that number on the best-dressed list. This will be achieved mainly through coextrusion, or some other technique that makes deep-color siding practicable and affordable. Already the wave is foaming. After years of development by suppliers and extruders, on the horizon are the first deep-color panels $\textit{e.g.}$ walnut, avocado, brick red, barn red, and others $\textit{e.g.}$ DASH$^*$ and coextrusion is the key to all of them. This report contains much information on processing technology, formulations, properties and performance of PVC sidings. Forecast for the future development is included.
The volume contains five papers presented at the Conference. The topics covered are: prospects for fiber reinforcement in civil engineering materials; fibers as reinforcement in structural engineering; glass-fiber-reinforced cement; carbon-fiber-reinforced cement; and general design considerations for fiber-reinforced materials used in monocoque constructions.
A report on the extensive test programs Factory Mutual has conducted on insulated metal roof deck and foamed plastic building insulation. The tests have produced new information leading to the development of adequate protection standards.
This report describes polymers, produced by one of Swiss companies, which found application in construction industries. All the polymers are highly reactive, crosslinkable and fast hardening. Most of them are based on epoxy resins. They are particularly suitable for repair work in bridges, roads, building structures, etc. Examples of repair works done with Sika reactive resin formulations (adhesives and binders) are illustrated. In German.
Test Criteria for Non-Textile Floor Coverings.

This is a specification list for testing materials designed for resilient floor coverings. This specification has been prepared by the Society of Plastics Industry and Construction Building Industry in Switzerland. All aspects of materials performance testing are covered. In German.
Polymers have been impregnated with hardened cement pastes and mortars have been prepared and their properties compared to those of unimpregnated specimens. Specimens were made by impregnating, under pressure, dried and evacuated precast hardened cement pastes and mortars with methyl methacrylate, which was subsequently thermally polymerized. The effects of the microstructure of the cement pastes and mortars on the performance of polymer impregnated cement pastes and mortars were investigated using specimens with a wide range of porosities which were prepared by varying the water to cement ratio and the curing times prior to impregnation. The properties of impregnated and unimpregnated specimens were investigated by: scanning electron microscopy; porosity determinations; fracture mechanics studies; and strength determinations. 53 refs.
LOW SMOKE AND FLAME MATERIALS FOR CONTROLLING NOISE IN ARCHITECTURAL APPLICATIONS.

Brueggemann, Walter H.; DeFranco, Paul J.
Ferro Corp Tech Cent, Independence, Ohio

DESCRIPTORS: (*BUILDING MATERIALS, *plastics), (PLASTICS, Fire Resistance), SOUND INSULATING MATERIALS, SMOKE ABATEMENT,

CARD ALERT: 413, 451, 751, 817, 914

This paper gives information about materials which have been developed for controlling noise whose impact on human life is of increasing concern and this impact is present as loss of hearing but also present are more subtle occurrences, such as speech privacy, changes in work habits, production rates, etc. Materials for attenuating noise are available. Use of these materials for architectural applications requires consideration of hazards to human life. The three new developments discussed here attempt to show what can be done. The materials discussed are commonly referred to as isolators, dampers, barriers and absorbers. Each of these types of materials provide noise reduction in the system of source-path-receiver. 5 refs.
This paper reviews various plastics materials, manufactured by the West German Company, Hoechst, which have found applications in construction buildings. The survey covers cellular plastics used as thermal insulations as well as plastics pipes used in modern heating systems and environmental protection. Test techniques used for evaluation of plastics designed for structural applications are also briefly reviewed. In German.
This paper discusses marketing aspects of solar heating industry whose potential is revolutionary for plastics products. Solar-heating components for which plastics have been or could be used are listed and discussed. They include flat-plate collector covers; concentrating collector mirrors and lens; light absorbing structures; collector frames and housings; insulation; pipe, storage and hot water tanks, etc. Advantages of plastics in solar heating are pointed out. Some future developments are indicated.
This paper describes a new developed adhesive system, based on epoxy resin, which found application in the production of building panels prefabricated in a plant by adhesively bonding two skins to a corrugation. A test program was carried out in order to evaluate the performance of the new adhesive in structural applications in experiments, effect of fillers, particularly pigments, on the aging behavior of adhesives, was investigated. Experimental data are tabulated and discussed in terms of practical considerations.
This paper reports on recent developments in the use of plastics in bathroom furniture, equipment and accessories. Emphasis is placed on modular bathroom containing such features as tubs, showers, basins, and bidets. Forecast for the future is included. Examples of plastics applications in bathroom gear are given; they are taken from United Kingdom, the Federal Republic of Germany and France.
DER KUNSTSTOFF-VERBUNDVERBAU ALS NEUARTIGES AUSBAUSYSTEM FUR
HOHLRAEUME UND BAUGRUBEN. Use of Synthetic Material in
Composite Construction as a Novel Structural System for Cavities
and Excavation.

Rotter, E.; Habenicht, H.
Gebirgssicherung, Salzburg, Austria
Oesterr Ing-Z v 19 n 3 Mar 1976 p 84-89 CODEN: OSIZAN
DESCRIPTORS: *COMPOSITE MATERIALS, (BUILDING MATERIALS, Plastics),
EXCAVATION,
IDENTIFIERS: COMPOSITE CONSTRUCTION
CARD ALERT: 405, 415, 502, 817
2 refs. In German.
The explosion of the population in this world leads, especially in the developing countries, to an increasing shortage in houses. Plastics in general offer properties that are required in building, in combination with mass-production techniques. They could help to bring relief in a relatively short period and therefore should play an important role. Examples of applications and future possibilities of plastics in the construction of shelters are discussed. 10 refs. In Dutch with English abstract.
This paper is concerned with the optimal physical values such as particle size and particle size distribution of various fillers used in insulating materials for building applications. Materials discussed are quartz, dolomite, talcum, calcium carbonate, etc. Effect of specific surface (porosity), moisture contents and thermal expansion coefficient of fillers and the usability of plastics-based compounds are also discussed in this report. 4 refs. In German.
Over the centuries the game of cricket has been played on many non-turf surfaces; most of them inappropriate. Although the turf cricket pitch is recognised as the finest, some would say the only surface on which to play the game, interest in non-turf pitches is increasing with the rise of maintenance and labor costs. RAPRA has been asked to prepare a specification for non-turf pitches and eventually act as a test house. This article gives a background to the project. Plastics and rubbers are considered as main components of new cricket pitches. 8 refs.
PVC PROFILE EXTRUSIONS FOR THE CONSTRUCTION INDUSTRY.

Katz, Harry
Variform Plast Inc


DESCRIPTEORS: (*POLYVINYL CHLORIDE, *Extrusion), PLASTICS PRODUCTS, (BUILDING MATERIALS, Plastics),

CARD ALERT: 415, 816, 817

PVC has been the major plastic material used in construction applications. Some of the reasons for this widespread usage are examined. The profile extrusion applications are discussed covering the broad range of building products. Exterior as well as interior applications, residential, commercial, institutional and agricultural uses are cited. The future of PVC profile extrusions in construction is explored, with emphasis on what may be required to further stimulate the growth of this material in building products.
REINFORCED PLASTIC BRIDGES: A FEASIBILITY STUDY.
Rondal, J.; Vidouse, P.
Univ of Liege, Belg
Publ by Brit Plast Fed, Reinf Plast Group (53/9), London, Engl, 1974

This paper reviews properties and structural applications of
composites based on GFRP. Particular attention is given in this
survey to design considerations with emphasis on the necessity of uses
of design methods for heterogeneous and anisotropic structures. An
introduction is followed by a discussion of the following subjects:
principal characteristics and comparison with other
materials; design of GFRP; bridges and pedestrian bridges in GRP;
and conclusive remarks. Many structural elements made of GRP are
illustrated. 27 refs.
This volume contains proceedings of 13 papers delivered at the meeting which was organized in order to confront the fire-research problems directly, and to set a course for future research in the field of fire and smoke hazards related to plastics. Among others the main topics include \$EM DASH\$ toxicity and thermal degradation products of plastics; products of combustion of building materials. Analysis of the combustion products from wood and synthetic polymers, the fire protection; fire safety in urban housing. Some papers area accompanied by bibliographic data. Individual contributions are abstracted and indexed separately.
LIFETIME MOBILE HOMES SET THE PACE FOR NEW PLASTICS GROWTH IN HOUSING.

Martino, Robert

Mod Plast v 53 n 2 Feb 1975 p 48-50 CODEN: MOPLAY


.IDENTIFIERS: MOBILE HOMES

.CARD ALERT: 402, 415, 817, 911

High-performance materials move into mobile homes, establishing practical cost/performance concepts that can be adapted to other construction markets. This report is presented under the headings $EM DASH$ new direction homes, new jobs for plastics; new insulating $EM DASH$ efficient, modular and safe; high-spec components for utility systems; and growth begins for large-part processing. Materials described in this review include $EM DASH$ structural foam, vacuum-formed sheet, and rigidized acrylic or ABS, and GFRP.
In this continuation of a series of articles on the evaluation of test results on structural parts made of thermoplastics materials, the author discusses some factors affecting damages and crack formations sustained under long-time stressing. Mechanisms of fracture, including the notch test and pressed ball test, are dealt with in detail. Techniques and evaluation of standard short-time test and long-time test according to DIN 53449 are described. 8 refs. In German.
General considerations of fire hazards related to the use of plastics in construction building applications are followed by a review of materials flammability tests employed in the Federal Republic of Germany, with emphasis on German standards. Results of a test program are presented in which extruded and cast acrylic glass samples were used in flammability experiments. Measuring data are compared with those obtained for polyester-based GFRP transparent materials. Test data are evaluated and discussed in terms of practical recommendations in regard to the possibility of use of acrylic glass in domes and building applications. 7 refs. In German.
This paper is concerned with building code regulation related to materials used as finish materials. In 1961 the Code regulations were changed so that the tunnel test was utilized exclusively as the test standard for both interior finishes and for plastics. In adapting to the tunnel test, the regulations on toxicity, which were previously reserved for plastics, were extended to include all finish materials. A regulation on smoke density based on the tunnel test was also added for both finish materials and plastics. In each instance, the smoke-density limitation was in terms relating to wood, thus indicating that the smoke produced by the burning of untreated wood under the tunnel test represented an acceptable or practical maximum. The amount of finish materials that could be utilized in a building and, therefore, the amount of smoke that could be produced, was left entirely to the nature of the occupancy and the vacancies of the fire.
This paper discusses some problems related to evaluation of toxicity of smoke and compounds generated in fires, particularly of plastics combustion products. In generating data on smoke and toxic compounds from plastics used or to be used in buildings and furnishings, one would like the following kept in mind: nature and concentration of toxic compounds, and rates of generation of smoke and toxic compounds. The generated data can be validated by real fires or on the basis of established modeling principles. One can then present results in terms of relative degree of danger. This can then formulate criteria for the control of dangerous materials from being used in buildings and furnishings. It is not very simple to generate information on smoke and toxic compounds in a form which can be used for safety precautions, such as time to safe exit, protection method against generated-fire products, time elapsed between actuation of a fire alarm and safe exit, or protection from smoke and toxic compounds as a result of application of fire-extinguishing or suppressing agents. The author presents some recommendations which should be followed in practice to diminish the problems encountered in fire of plastics materials.
MONOMERICALLY PLASTICISED PVC ROOFING SYSTEMS
Watson, C. D.
Dynamit-Mobel (UK) Ltd

Descriptrors: (*ROOFS, *Polyvinyl Chloride), (BUILDING MATERIALS, Plastics),

Identifiers: FLAT ROOFS

Card Alert: 402, 817

The system is used in sealing flat roofs, and comprises a single waterproofing layer and a vapor check, both lossed layed, in sheet form. The individual lengths are overlapped and solvent welded; the seams receive a further seal and T-joints are injected ro prevent capillary attraction. A covering of 50 mm of round gravel is then applied as ballast. The roofing sheet and the vapor check sheet are vapor permeable, the former more so than the latter, thus allowing the roof to breathe while ensuring that the thermal insulation is kept dry. This material is exceedingly elastic to an extent that building movement can be no problem, and expansion joints are unnecessary.
PRESENT STATE OF WATERPROOFING OF BUILDINGS USING SYNTHETIC POLYMERIC ROOFING SHEETS.
Totsuka, Terumi
Archit Inst of Jpn
DESCRIPTORS: (*ROOFS, *Coverings), (BUILDING MATERIALS, Plastics),
CARD ALERT: 402, 415, 818
The various classes of such synthetic materials are reviewed in relation to applicable Japanese Standard Specifications. The defects occurring in roofs covered with such sheeting have been investigated by a Committee of Japanese Synthetic Polymer Roofing Sheet Association, and the causes have been analysed. The results of the survey and recommendations for avoiding such defects are given, with detail drawings to illustrate correct methods of fixing and finishing.
ASSESSMENT OF PLASTICS SHEETS FOR WATERPROOFING ROOFS.
Martin, K. G.
CSIRO, Div of Build Res, Aust

DESCRIPTION: (*ROOFS, *Coverings), (BUILDING MATERIALS, Plastics),
IDENTIFIERS: WATERPROOFING MEMBRANES, BUILT-UP ROOFING
CARD ALERT: 402, 817

The sheets are assessed in terms of mechanical properties in tension and the ability to retain these properties after having been exposed outdoors. Peel strengths have been determined to indicate the ability of the sheet to be lap-sealed, and some sheets have been fixed to a moving joint tester to assess the capability of the system to accommodate movement in the substrate. The results indicate that a number of systems offer promise of improved mechanical performance and durability compared to the conventional bituminous roofing membranes. Refs.
LES REVETEMENTS D'ETANCHEITE DE TOITURES A BASE DE HAUTS POLYMERES EN FRANCE.

Parhi, E.; Chaize, A.
Cent Sci & Tech du Batim, Paris, Fr.

DESCRIPTORS: (*ROOFS, *Coverings), (BUILDING MATERIALS, Plastics),
CARD ALERT: 402, 817, 411

High polymer based coverings have appeared on the market in France fairly recently (e.g. polyisobutylene, chlorosulphonated polyethylene and glass-reinforced polyesters). The properties of these materials are given and applications of these materials are described. More recently still, composite roofings have been developed, using bitumen and high polymers. The properties of these roofings are given as well as examples of their application in France. In French with English abstract.
LARGE FOAM-MOLDED PARTS: 'BASIC SHAPE' OF THINGS TO COME.

The commercial debut of some large molded parts signals a new stage in the evolution of markets for structural foam. The parts are basic structural shapes panels and lineals in applications where extrusion, thermo-form/sprayup, or RP molding could have been used to advantage, but where still greater advantage was achieved with foam molding. Two large molding applications are discussed all-structural foam swimming pool, and door frames made of foamed high-impact PS which surpass wood in performance.
Zimmer, Karlheinz
Tech Univ, Dresden, E Ger
Plaste Kautsch v 22 n 7 Jul 1975 p 575-579 CODEN: PLKAAM

DESCRIPTORS: (*BUILDING MATERIALS, *Plastics), (PLASTICS INDUSTRY, German Democratic Republic), (SANDWICH STRUCTURE, Mechanical Properties), (DOMES AND SHELLS, Mechanical Properties), (BUILDINGS, Plastic Applications), PLASTICS, REINFORCED,

CARD ALERT: 402, 408, 415, 421, 817

This paper reports on recent advances in the use of polymers, particularly plastics, in building applications. Details are given related to design of sandwich structures, domes, shells, and other structural parts which are made of/with plastics or GRP. 7 refs. In German.
Thermoplastic Polyesters as Structural Materials

Structural materials have, in recent years, been supplemented by thermoplastic polyesters. Of these, polybutylene terephthalate in particular has become popular for many industrial applications on account of its ease of processing and balanced range of properties. This partially crystalline material may be reinforced by means of short or long glass fibres as well as by glass beads. The article reports on the properties of PBTP materials reinforced in this manner.
STOICHIOMETRY OF CYCLOALIPHATIC EPIDE RESINS REACTED WITH PRIMARY AMINES.

McLean, P. D.; Scott, R. F.
CODEN: NRCHA4

DESCRIPTION: *EPoxy RESINS, (BUILDING MATERIALS, Plastics), (PLASTICS, REINFORCED, Mechanical properties),
CARD ALERT: 815, 817, 415, 421, 802

This report is a study of the stoichiometry and its effect on tensile properties of several five and six membered ring cycloaliphatic epide resins reacted with the primary amine methylene dianiline. The results showed that up to 100% excess of the amine could be used successfully. Possible reasons for this phenomenon are discussed. The plastics exhibited high strength, high elongation and were predominantly ductile at failure. Increased interest in these epides has resulted in applications as matrix materials for reinforcements such as glass, carbon and boron fibers or silicon carbide whiskers. 12 refs.
DIFFUSION CONTROLLED COMBUSTION OF POLYMERS.
Holwe, D. J.; Sawyer, R. F.
Univ of Calif, Berkeley
CARD ALERT: 815, 521, 817
A theoretical and experimental study of polymer combustion in an opposed flow diffusion flame (OFDF) is presented. An algebraic formula is derived, expressing the burning rate as a function of the fluid mechanic and thermodynamic variables. Regression rate measurements of twelve commercial polymers as a function of oxygen concentration and oxidizer flowrate are reported. From these measurements and the theory, values of the Spalding transfer number, B, are derived and can serve as a useful flammability index of these materials. The OFDF technique also provides a quantitative method for evaluating the effectiveness of flame retardants. 20 refs.
CRASTIN - A New Engineering Material for Injection Molding

Brunner, Juerg
Ciba-Geigy, Basel, Switz
Kunstst-Plast 22 n 9 Sep 1975 p 37-41 CODEN: KUPLAK

This paper describes a family of terephthalate polyester molding materials produced in Switzerland, trademarked CRASTIN. They are based on two thermoplastic polyesters: polyethylene terephthalate and polybutylene terephthalate. The CRASTIN family encompasses 13 commercially available compounds divided into three groups: nonreinforced polymers, short glass fiber reinforced plastics and special types. Extensive property and performance data are tabulated and plotted. Processing conditions are also dealt with and technological recommendations are included. In German.
This is a report on recent developments on the use of structural foam in construction building applications. Structural foam molders have discovered a broad utilities market for underground and aboveground enclosures that protect distribution equipment, and they are tooling up to capture it from metals and concrete. Assuming a post-recession average of two million new single-family and apartment units per year for the long run, the potential market for resins in foam enclosures could approach 100,000 tons/yr. in underground applications. The aboveground market could be as big. Several enclosures designed for various structural applications of structural foams are illustrated.
The opening up of new areas for the use of plastics will be successful only if plastics having suitable mechanical and thermal properties can be developed. This can be accomplished by adopting three approaches: crystallization, crosslinking, and the use of nonflexible chain molecules. Simultaneous adoption of two of these approaches has already led to plastics having excellent properties. In German with English abstract.
The flexural behavior of sandwich panels has been studied analytically and experimentally. Based on the results of these studies, simplified formulas which can be used for design are proposed. Equations illustrate analysis; tables are appended. 20 refs.
The research described was carried out to determine the behavior of loads of short duration (characteristic curves \( \sigma - \varepsilon \)) and of long duration (deformations due to creep) of mixtures prepared with two types of epoxy binders, of different composition (with or without solvent) and with quarry sand or ground sand (filler). The influence of variable parameters on deformation has been studied, in particular: the resin composition, the percentage of resin in the mixture, the maximum dimension of the sand-grain, the age of the material at the time of the test. On the deformations of the mixtures due to creep the effect of the unit force applied and of the high temperature in the middle of the test was observed. In French with English abstract.
USE AND MARKET OPPORTUNITIES FOR PLASTICS IN THE ROOFING INDUSTRY.

Duchon, Karman; Parker, John S.

Tremco Inc, Cleveland, Ohio


Publ by SPE, Greenwich, Conn, 1975

DESCRIPTORS: (ROOF*), (BUILDING MATERIALS, Plastics)

COMPOSITE MATERIALS, Fire Resistance), (PLASTICS, REINFORCED,

Flame Resistance), PLASTICS, FOAMED,

CARD ALERT: 402, 415, 817, 914

Although the use of plastics in roofing is increasing, little technical information on roofing systems is available to the plastic industry. The primary purpose of a roof is to protect us from the elements, but the functioning of a roof is a complex problem combining movement, aging, and weatherproofing. Roofs can be the traditional sloped roof, the relatively flat roof, or a modern complex hyperbolic paraboloid or folded shape. Sloped and complex shaped roofing presents minimum problems to waterproof, while the low slope or flat roof does create an installation and maintenance problem. Current architectural requirements are prescribing that most roofs are flat for all types of buildings. Flat roofing permits a lower cost construction, the use of the roof for other purposes, future expansion of a building and more efficient use of space. This paper is primarily concerned with the flat roof, the problems associated with it, and the uses of plastics in these roofs. Brief mentions are made to sloped and formed roofs. It is pointed out that plastics have the potential for providing much of the roof system of the future, but in order to meet the demands, engineering based on the past experiences is required and practical installation technique developed. Particular growth will be in insulation and in membranes.
The paper deals with the use of polyvinyl chloride sheets for the erection of spatial self-supporting structures. The basic idea presented is the structural action and the possible and economical use of composite beams having corrugated webs instead of planar ones, acting as the sloped planes of folded structures. Results are presented from two experiments on full scale folded plate structures where prefabrication was also taken into consideration. 10 refs.
Significant progress has been made in the development of applications for extruded structural foam thermoplastics using the controlled foam extrusion process originally invented in 1966 in France. This Celuka process is now covered by patents in 30 countries including the United States. Since 1968, licenses have been granted to 36 companies in 13 countries around the world. Considerable experience has been gained with a broad range of thermoplastics in this foam extrusion system in an ever increasing list of commercial and experimental applications. This paper discusses recent experience with this controlled foam extrusion (CFE) process for extruding structural foam profiles. The following topics are detailed: description of the process; process features and control; applications in building and furniture; future applications; and prospects for future development. Economic information is included.
A host of developmental programs now being carried out by the automotive industry are directed toward testing and evaluating new materials and older materials in new applications. The trend is toward lightweight materials which are beginning to challenge the traditional, in the pursuit of the fuel-efficient car of the future. The role of newer steels, particularly of high-strength low-alloy (HSLA) steels, in automotive uses is examined, and the potential of these steels for solving a part of the automobile weight problem is discussed. The car parts in which iron and steel might be replaced by aluminum or plastics are shown in tabular form.
Thermoplastic foams are increasingly used as materials for load-bearing structural components. One stimulus is the advantage of being able to produce rigid, light-weight components in one operation. To define the limits of application of these materials and to be able to dimension the components an exact knowledge of their behavior under mechanical stress is necessary. Here one must take into account the duration of loading and the ambient temperature. Because of the inhomogeneity of structural foams it is not possible to apply the measured values without some qualification. The measured data vary considerably. Nevertheless, designers should not be kept in ignorance of these results for at least they can serve as a guide for the first design of a given structure. Test data are presented and discussed in terms of their applications in design of structural parts made of structural foam. 1 ref. In German.
DOLLARS AND SENSE OF SELECTING WEAR MATERIALS.

Thomas, Richard A.

Eng Min J v 176 n 7 Jul 1975 p 83-88 CODEN: ENMJAK

DESCRIPTORS: (*BUILDING MATERIALS, *Wear), (MINES AND MINING, Corrosion), (METALS AND ALLOYS, Wear Resisting), (PLASTICS, Chemical Resistance),

CARD ALERT: 415, 421, 502, 531, 815

The author examines the criteria for selecting structural materials in mineral processing with particular attention paid to cost/wear ratios, downtime, material availability, and a host of other factors influencing material usage. The greatest wear logically comes in the comminuting phase of processing, when ores are mechanically reduced in size by primary and secondary crushing and grinding in various types of mills. The material properties of greatest concern are abrasion resistance and toughness. Corrosion $EM\ DASH$ erosion by chemical rather than mechanical means $EM\ DASH$ is also discussed as another significant factor in the selection of materials with special emphasis on two widely used categories of nonmetallics: natural and synthetic rubbers, and plastics. 7 refs.
BEHAVIOR OF FATIGUE AND MECHANICAL PROPERTIES OF HYBRID CFRP-Al CONSTRUCTION.

Miyairi, Hiroo; Muramatsu, Atsuyoshi; Nagai, Masahiro
Tokyo Med and Dent Univ, Jpn


CARD ALERT: 541, 817, 421

Aluminium is, in general, being used as a light structural material, but the demand for light structural materials with better mechanical properties than aluminium is increasing more and more recently. Such a demand may be satisfied with the hybrid CFRP-Al construction. This paper is concerned with the bending strength and the fatigue strength of the hybrid CFRP-Al construction which is made of the combination of aluminium and carbon fiber reinforced plastics (CFRP). The results obtained show that Hybrid-A, bonded with Redux BSL 408, has shown about 2 times the bending strength of aluminium, and hybrid-B, bonded with Redux BSL 308, has shown about 1.4 times greater strength. 5 refs. In Japanese with English abstract.
With the present need to re-examine all fire safety aspects of buildings and building materials, resin manufacturers are developing new polyester systems specifically for this market. Announced by Synthetic Resins Ltd of Liverpool is a new resin known as 'Filabond' 136 1A which achieves a Class 1 rating to BS 476 Part 7, and meets the requirements of the Building Regulations to Class O. This polyester system is used in form of GRP modules which found various applications in the British construction building industry. Applicational details are given.
FILLERS ARE CARRYING A HEAVIER LOAD THESE DAYS.

Wood, A. Stuart

Mod Plast v 52 n 6 Jun 1975 p 42-44 CODEN: MOPLAY

DESCRIPTORS: (*PLASTICS, *Fillers), GLASS, (ALUMINA, Hydrated),
SILICATES, ASBESTOS, (BUILDING MATERIALS, Plastics),
CARD ALERT: 413, 415, 812, 817

This paper discusses technological, performance and economic aspects of the use of plastics filled with various materials. It is shown that a mixed-minerals "$\text{left double quote}$ recipe "$\text{right double quote}$ toughens extruded HDPE dunnage sheet; calcium silicate fibers increase chemical resistance of PP; hollow silicate spheres improve rigidizing of acrylic thermoforms, also find use in syntactic foams; glass microbubbles make rigid polyurethane foams more impact resistant with no increase in density; treated asbestos, silicas, and clays upgrade performance in many types of resin; mica flake, talc, glass beads, and glass spheres do an upgrading job on dimensional stability; and alumina trihydrate scores as a flame retardant. Loading levels of fillers is steadily on increase. Alumina trihydrate used at loadings to 60% in tub/shower units performs triple role of flame retardant, smoke suppressant, and filler (extender "$\text{EM DASH}\$" to reduce cost). Trend to treated fillers with coupling agents is indicated.
The paper presents a literature review on applied research into the performance-in-use of building materials and the products and components made from them, and constitutes a state-of-the-art of materials research relevant to the task of improving building performance. A way of representing the results of such research, in a manner immediately useful to the building design process, is suggested. 69 refs.
This paper first discusses tolerance problems encountered in plastics plants during manufacture of engineering and construction parts and then suggest a mathematical approach to resolve them. Standardization is shown as one of the most important factors affecting the accuracy and tight tolerances of molded or extruded products. Recommendations for precision molding shops are included. 16 refs. In German.
This is a summary of Swiss Codes regulating conditions under which flammable materials can be used in the construction building industry. Flame resistance requirements are followed by a description of flammability tests which are regarded as legislative standards. In German.
The use of fire retardant GFRP in many construction applications is studied. Recent resin developments in the area of smoke generation are revealed. A series of case histories describing the successful use of fire retardant GFRP in construction applications is presented. In depth examination of the development and testing required to achieve success with a GFRP product, including full scale, end-use testing, is also included.
The author updates his paper to the 26th conference (1971) by indicating that the European GFRP industry now recognizes that marketing GFRP to the construction industry is a long-term project. He instances how all participants in the building process must be, and in Europe being, included in GFRP marketing programs. The UK is quoted as an example, showing lower building costs ensue. The European Agreement Union has helped GFRP penetration in its ten member countries. The author sees no future for SMC in construction by 1980 and considers GFRP-backed thermoformed acrylic the better candidate for sanitaryware in Europe. House shells offer no prospects on cost grounds. DMC window frames may be a suitable interim measure before injection-molded thermoplastics take over. Cladding is the real growth market. 6 refs.
Two unique GFRP wall structures, each of very different types, were designed for commercial building applications. Emphasis was upon the design's special features and economic value. Two different design approaches, those of sandwich construction and thin shell construction, were applied to functionally different types of plants: one, a three story office building in Atlanta, Georgia, and the other, a food processing plant in Orlando, Florida. The customer/client requirements and engineering requirements were satisfied in each case. Special considerations had to be given to architectural aesthetics, manufacturing techniques, construction and installation. The ensuing cost savings due to the use of FRP are related to the total building concept.
THIOPLASTE IM HOCHBAU. Use of Thioplastics in Building Construction.
Enders, Siegfried; Leupold, Guenter
Chemiewerk Greiz-Doelau, E Ger
Bauzeitung (Berl) v 29 n 1 Jan 1975 p 18-21 CODEN: BAZTAP
DESCRIPTORS: (*BUILDINGS, *Plastics Applications), (BUILDING MATERIALS, Plastics),
CARD ALERT: 402, 817
5 refs. In German.
This is a report on the execution of a project which was initiated in early 1972, and had as its goal the creation of a rapidly producible structure (at least 100 houses per day) for the Delta area of Bangladesh where cyclones produce winds in excess of 150 MPH and where tidal waves had recently devastated most existing housing. An experimental prototype was produced, constructed primarily of jute reinforced polyester with an .010 in. exterior layer of glass fiber reinforced polyester. This prototype successfully underwent full scale simulated cyclonic testing. After testing, a second prototype was developed with its design changed to a more conventional panelized system and joined together by simple profiles. The new prototype produced spectacular results in deflection tests. The two prototypes indicate on a practical basis a major breakthrough in the use of plastics materials in association with indigenous raw and waste materials for low cost housing. 4 refs.
PLASTIC SHELTERS FOR SLUM CLEARANCE IN POOR COUNTRIES - A PROBLEM STATEMENT.

Benjamin, B. S.
Univ of Kans, Lawrence
SPI Reinf Plast/Compos Inst Annu Conf Proc 30th, 1975, for Meet, Washington, DC, Feb 4-7 1975, Sect 3-E, 5 p CODEN: SPCIBY

DESCRIP TORS: (*BUILDING MATERIALS, *Plastics), (BUILDINGS, India), COST ACCOUNTING,

IDENTIFIERS: PLASTICS SHELTERS
CARD ALERT: 402, 415, 817, 911

The objectives of this paper are to set forth in clear and concise terms, the problems associated with the use of plastics for low cost shelters for the poorest of the poor in the slums in the underdeveloped countries of the world. The paper first sets out to find a meaningful relationship between the cost of the plastic shelter and the income level of the slum dweller. The research is being carried out for India, but is capable of being applied with modifications to other underdeveloped countries in the world. In the context of this cost, the paper then sets down the architectural, structural, materials and manufacturing problems associated with the provision of light weight, easily transportable, packaged kit, plastics shelters for this application. Existing work on the subject carried out all over the world is reviewed and final conclusions are drawn. 15 refs.
BUILDING CODES AND STANDARDS CONTROLLING REINFORCED PLASTICS: SUMMARY AND FORECAST.

McDermott, Joseph S.

RP/C Inst. and Plast in Constr Counc, New York, NY

SPI Reinf Plast/Compos Inst Annu Conf Proc 30th, 1975, for Meet, Washington, DC, Feb 4-7 1975, Sect 3-C, 4 p CODEN: SPCIBY


CARD ALERT: 402, 415, 421, 817, 902

It is important to have information on the codes and standards affecting reinforced plastics building products. Not only must they be understood before investing in new product development, but codes must be monitored for the continual changes introduced by others. An understanding of the approval systems for reinforced plastics in construction will smooth the way for individual products and consolidate the industry's position. The current code status of eight GRP building product types is discussed, including reference to test methods which play a crucial role. The sponsoring organizations for various standards are mentioned, as well as the SPI Committees which have liaison responsibility to them. An optimistic general forecast is offered, provided market development is thoroughly researched and objectives are realistic.
EINFLUSSSE DER VISKOELASTIZITAT BEI GFK-BAUTEILEN. The effect of viscoelasticity in GRP Structural Components.

Wiedemann, J.; Griese, H.; Glahn, M.
Tech Univ, Berlin, Ger

Plastverarbeiter v 25 n 9 Sep.1974 p 543-550 CODEN: PLARAN

DESCRIPTIONS: (*PLASTICS, REINFORCED, *Viscoelasticity), (PLASTICS, Creep), (BUILDING MATERIALS, Testing), MATHEMATICAL MODELS, (COMPOSITE MATERIALS, Mechanical Properties), GLASS FIBER,

CARD ALERT: 415, 421, 812, 817, 922

To understand creep and relaxation phenomena, the usual model conceptions are explained and compared with experimental test data for GRP. Using as an example the long-term behavior of multilayer composite systems, with respect to their internal stress rearrangement as well as bars under compressive load with respect to the increase in their lateral deflection, calculations have been performed which illustrate the methods' possibilities. The influence and calculation of damping under periodically alternating load is described. The following topics are discussed: requirement of linear viscoelasticity; model conceptions; comparison with experimental creep curves, model adaptation; description of viscoelastic problems by means of integral or sum equations; correspondence between creep and relaxation functions; behavior of a composite system, determinations based on the individual layers, creep curve and stress rearrangement; viscoelastic deflection, periodically alternating load. 10 refs. In German.
This paper describes properties and performance of a new developed building board, tradenamed "$left double quote$ K Board $right double quote$; which has found its place in the agricultural industry. This board is made from packaging wastes consisting of paper coated with plastics. Results of materials testing are presented and application field in the agriculture is outlined.
This article analyzes means of overcoming the housing crisis, and puts forward practical suggestions for pre-fabricated structures that may be dismantled by the private owner or local authority for moving to another site. Ideally, such homes should be of conventional appearance in order to blend in with the surroundings. The discussion is presented under the following headings: immediate requirements; recent system; design and service properties.
This paper presents a classification of plastics and materials manufactured on their basis for structural purposes as well as a number of rules to be observed by the designers of load-bearing structures consisting of these materials. It is recommended particularly to take into consideration the low ratios of moduli of elasticity to the strength as well as the considerable creep values of plastics requiring a limitation of deformation of structural elements by increasing their stiffness, especially of flexural elements, and avoidance of slender bars subjected to compression. 15 refs. In Slovak with English abstract.
Use of Tar-Epoxides in Construction of Hydraulic Structures.

Depke, F. M.
Tiefbau v 17 n 1 Jan 1975 p 32-36
CODEN: TFBABE

Descriptors: (Building Materials, Plastics), Epoxy Resins,
Hydraulic Structures,
Identifiers: Tar-Epoxides
Card Alert: 632, 817
In German.
The paper deals with the estimation of changes of the physical and mechanical properties of plastics such as rigid PVC, PP, PE, and polyester or melamine-phenol-formaldehyde GRP, exposed to natural weathering. An approximate correlation between the results of natural weathering and those obtained in strictly defined laboratory accelerated weathering tests has been established for PVC and GRP. 15 refs. In Polish.
ZUR ANWENDUNG STATISTISCHER METHODEN IN DER BAUSTOFFPRÜFUNG.
$\left\{\text{Application of Statistical Methods in the Testing of}
\right.$
$\left.\text{Building Materials}\right\}$

Engle, Gerhard
Tech Univ, Munich, Ger
Materialprüfung v 17 n 1 Jan 1975 p 14-16 CODEN: MTPRAJ
DESCRIPTORS: (*BUILDING MATERIALS, *Testing), STATISTICAL METHODS,
PLASTICS FILMS,
CARD ALERT: 421, 423, 817, 922

Testing methods, the planning of testing programs, and methods of
evaluating the results are reviewed. Testing of plastics foils is
used as an example of applications. In German.
THERMOFORMING ABS FOR LARGE STRUCTURAL APPLICATIONS.

Gambisch, John

Centaur Eng, Borg-Warner Corp, Mount Clemens, Mich


DESCRIPTORS: (ABS RESINS, *Thermoforming), (BUILDING MATERIALS, Plastics), (PLASTICS SHEETS, Processing),

IDENTIFIERS: LARGE PLASTICS PARTS

A brief history of the development of thermoforming structural parts at Centaur Engineering is followed by a review of their structural applications. They include $^\text{2}$EM DASH$^-$ thermoformed in reinforcements (ribs, V-channels, etc); foam sandwich construction, inner and outer panels; attached reinforcements. The following applications are detailed along with relevant illustrations $^\text{2}$EM DASH$^-$ load-bearing structural part in buildings; automotive, recreational vehicles, mining; campers; and housing. It is concluded that large structural thermoformed parts are a reality giving the designer the ability to produce large molded shape, the manufacturer, an economic manufacturing process for the 1000 to 100,000 part range, and the assurance, the advantage of improved products at lower costs.
A girder composed entirely of glass-reinforced polyester resin was designed, fabricated, and tested to failure under short-term static loads. The girder was designed with a solid flange and open web by classical procedures based on a pinned-end truss configuration. Reasonably close agreement was achieved between theoretical and experimental measurements. Test specimens had open triangular shaped cross sections. The web and lower chord elements were fabricated by $\left(\text{left double quote}\right$ winding $\text{right double quote}$ continuous glass roving impregnated with polyester around preformed web stiffeners. Measured strains and deflections varied linearly with load. Structural failures usually occurred in joints formed with adhesives. An ultimate live load of 93 times the dead weight of the member was achieved for one of the specimens. 11 refs.
Favorable flexural stiffness to weight ratios are not as important in recommending structural foams as is the possibility of molding large, stress-free parts without sink marks. The stress-free feature of foamed parts can make them stronger than equivalent plastic parts. The stress-free property also makes for excellent dimensional stability in foamed parts. Good design practice in the use of foamed parts calls for placing fastening loads on the skin rather than the foam.
The author explores the basic requirements and properties of the hard-wearing composites of plastic materials.
EFFECTS OF TIME, TEMPERATURE AND CURING ON THE STIFFNESS OF EPOXY LAMINATING SYSTEMS.

Feidmann, G. W.; Gorkiewicz, R. M.


DESCRIPTORS: (EPOXY RESINS, *Structural Application), (BUILDING MATERIALS, Plastics), PLASTICS LAMINATES,

CARD ALERT: 615, 817, 8115

Relative creep moduli of a series of epoxy laminating resins were found to be the same in uniaxial tension and in torsion when measured under loads of short duration. However, their tensile creep moduli decreased with time and temperature at different rates, changing their relative stiffness. For one typical resin the short-term tensile and shear moduli decreased with cure temperature reaching minima and then increased slightly. Deflection temperature under load determined by standard tests correlated inversely with the short-term tensile modulus for the typical resin considered and failed to provide a basis for determining the relative stiffness of the different resin systems.
This paper is concerned with technological, property, performance and economic aspects of cellular rigid plastics profiles which represent an increasingly important addition to the building materials market. Easy to handle and install, they can have superior properties over their timber equivalents. Applications include skirting, architraves, cladding, window frames, doors and door-frames. This article outlines types and systems and progress in the development of the market in Great Britain. Several processing systems are briefly described.
The extrusion of rigid foamed PVC-profiles represents a rapidly increasing market, dominated by the demands of the construction industry. The article gives a brief introduction to the technical aspects of the manufacturing methods. In Swedish with English abstract.
Properties from the Point of View of Their Applications.

Vesely, Karel; Foral, Jiri
Vyz Ustav Makromol Chem, Brno, Czech
Plast Kauc v 11 n 1 1974 p 2-5  CODEN: PLKCAS
DESCRIPTORS: (*PLASTICS, *Physical Properties), (BUILDING MATERIALS, Plastics),
CARD ALERT: 415, 817, 931

The position of plastics among other construction materials is evaluated and their fundamental characteristics (mechanical properties, workability, aging resistance, incombustibility and price), as well as their service life in basic applications are dealt with in the paper. 6 refs. In Czech with English abstract.
This is a review of plastics uses in building applications in East Germany and abroad. Statistical data are given in relation to types of applications (pipe, roofing, floor, constructional members, etc) and plastics used (PVC, polyolefins, polyesters, PS foam, GRP, etc). Applications of thiopolymers in sealants are indicated, along with the use of synthetic rubber in roofing. 9 refs. In German.
A brief summary of contents of previous 5 parts of an article series is followed by a critical assessment of the West German Standard DIN53449, which describes the test procedure for the determination of critical strains of structural members made of plastics materials. A detailed description of the test method is accompanied by a presentation of measuring data and their evaluation for practical purposes. Equipment as well as auxiliary materials used are also briefly dealt with. In German.
Appearance attributes of plastics can be divided into color attributes such as hue, saturation and lightness, and geometric attributes such as gloss, texture, haze, opacity and directionality. Color is due primarily to the spectrally selective absorption of light. Gloss, texture, haze and other geometric characteristics of appearance are associated with surface smoothness, contour and structure beneath the surface. It can be shown that complete analyses of product appearance is impossibly complex. In practice, measurements are made only of critically important appearance indications. Thus, color is normally measured only for standardized conditions under which it is normally observed. Similarly, gloss and the other geometric attributes are described only for the one or two most revealing conditions of evaluation. Recommendations for practical uses are enclosed in terms of tables. 7 refs.
This paper is concerned with quality control in the sense of achieving an end product that is satisfactory. Particular attention being paid to building components made of/with plastics. Plastics parts tested are broken down under three main headings: services, surface and thermal insulants. Quality control procedure employed in the United Kingdom is detailed in appendices.
In the restoration of buildings of historic interest plastics are used as a result of the present-day approach to restoration. The first aim is to preserve an original situation without exchanging deteriorated parts. The maintenance of the old Dutch pantile is possible using ventilating plastic sheets. Exterior surfaces are coated with silicones or hydrophilic acrylates to prevent water and aggressive components from penetrating. Hydrophilic acrylates are used as salt barrier between plaster and wall to prevent plaster from being attacked by salts. Low viscosity polymers are in use for impregnation of decayed stone and wood. Decayed wood of beam and roofs can be replaced by epoxy compounds reinforced by polyester rods.