




Pioneers in the formulation of high-performance LAST-A-FOAM® cellular solid polyurethane and polyisocyanurate products.

General Plastics Manufacturing Company

GENERAL PLASTICS MANUFACTURING CO.

Over the past four decades General Plastics has earned an outstanding reputation by developing unique foam-based technical solutions to difficult problems.

General Plastics Manufacturing company works closely with customer design and engineering teams throughout the world to produce exceptional products utilizing superior LAST-A-FOAM® technology. General Plastics provides technical assistance in developing new products, improving existing products and making components to customer specifications.

Rigid Foam

Engineered High Density Rigid Polyurethane Foams.

LAST-A-FOAM® CFC-free rigid polyurethane foams are flame-resistant, versatile, and available in a wide range of densities and sheet sizes. In all cases, the last two digits of a product designation describe the foam density in pounds per cubic foot (e.g., FR-6710 is a 10-pound per cubic foot material).

LAST-A-FOAM® is made via a unique process using polyether-based polyurethane resins, uniform and consistent in all properties. They are chemically cross-linked, dimensionally stable, chemically inert, and resistant to most solvents. Many LAST-A-FOAM® products have temperature use limits in excess of 200 degrees F.

Because of its closed-cell structure, LAST-A-FOAM® resists water absorption, and will not swell, crack, or split on exposure to water or many solvents. It is easily shaped with common tools, and performs well as primary structural material. Strong and durable, LAST-A-FOAM® can replace wood and many other materials in a variety of applications.

LAST-A-FOAM® RIGID FOAM PRODUCTS:

LAST-A-FOAM® **FR-6700** is CFC-free, rigid, closed-cell, flame-resistant polyurethane foam available in densities ranging from 6 to 25 pounds per cubic foot. It is self-extinguishing in aircraft flammability testing. LAST-A-FOAM® **FR-6700** meets the requirements of several aircraft and military specifications.

LAST-A-FOAM® FR-3700, very similar to **FR-6700** in strength, temperature resistance, and flammability performance, is made in grades similar to those available in **FR-6700**. However, **LAST-A-FOAM® FR-3700** is also available in lower densities of 3.5 to 6 pounds per cubic foot, and in 30-, 40-, and 50-lb. densities. **LAST-A-FOAM® FR-3700** meets the requirements of several aircraft and military specifications.

LAST-A-FOAM® FR-4500 Tooling Board is dimensionally stable, uniform, and grain-free. FR-4500 works extremely well for making models, prototypes, vacuum-forming and lay-up tools. **LAST-A-FOAM® FR-4500 Tooling Board** is available in densities from 15 to 50 pounds per cubic foot.

LAST-A-FOAM® FR-7100 is low-cost polyurethane foam available in densities from 3 to 40 pounds per cubic foot. This product is made in more densities and sizes than any other product we offer. Very large blocks are available in most **FR-7100** grades. **LAST-A-FOAM® FR-7100** is also used as low-cost composite core for fiberglass-laminate applications, combined with appropriate fiber and resins.

LAST-A-FOAM® FR-10100 foams are isocyanurate-based foam formulations with greater resistance to high-temperature conditions, with reduced flame-spread and smoke-development in potential fire-exposure applications. These foams are available in densities from 6 to 20 pounds per cubic foot.

LAST-A-FOAM® FR-10720 and FR-10730 High-Temperature Tooling Boards are for use at 300-350 degrees F, and under autoclave-pressure conditions. These boards provide composite-tooling makers with economical material alternatives that are easy to machine while withstanding challenging cure schedules.

AIRCRAFT COMPOSITE APPLICATIONS:

LAST-A FOAM® FR-6700 is used extensively as high-strength, light-weight flame resistant composite-core material and as "edge-close-out" for honeycomb structures in:

- Aircraft passenger cabin walls and ceilings
- Passenger compartment overhead stow bins
- Service-class divider partitions
- Food-service galleys and lavatory structures

LAST-A-FOAM® FR-6700 is qualified to Boeing Material Specification **BMS 8-133**, McDonnell-Douglas Material Specification **DMS-1937**, Federal Aviation Regulation **FAR 25.853 (a) and (b)**, and numerous other aircraft, aerospace, defense contractor, and MIL-specifications.

See Product Data on **LAST-A-FOAM® FR-6700**-series foams for specifics regarding physical properties, flammability-performance, and processing guidelines for laminated-panel applications. Appropriate engineering-safety factors should be used in all structural design applications.

LAST-A-FOAM® FR-10100 foams are produced in densities from 6 to 20 lbs/cubic foot, and offer another choice for core-material in autoclave, hot press, pultrusion, and RTM applications where temperatures and pressures exceed the performance limits of **LAST-A-FOAM® FR-6700.**

BUILDING CONSTRUCTION AND INDUSTRIAL APPLICATIONS:

LAST-A-FOAM® FR-6700®

LAST-A-FOAM® FR-6700 is used as insulating structural core in laminated panels for emergency shelters, as well as walk-in freezers, coolers, and dry-kilns. **LAST-A-FOAM® FR-6700** works as insulating core in sports flooring, as in the Tacoma Dome (Tacoma, WA), and in cryogenic insulation applications. It also performs very well in pipe-supports for both hot and cold lines in process plants.

LAST-A-FOAM® R-9300® COLUMN BEARING (THERMAL ISOLATION) BLOCKS

LAST-A- FOAM® R-9330 is high-density (30 pounds per cubic foot) rigid cellular-solid polyurethane capable of supporting structural loads while providing a barrier to the passage of thermal energy to (or from) a building interior to the supporting ground.

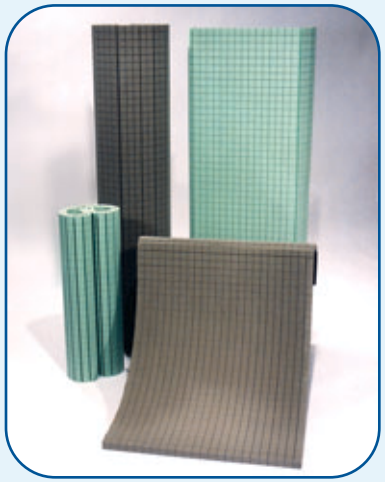
LAST-A- FOAM® R-9330 series makes excellent thermal-isolation blocks in cold-storage building applications, replacing rot-prone wood blocks. Since **LAST-A- FOAM® R-9330** does not absorb water, nor will it rot or corrode, it retains structural integrity over the life of the building. At room temperature, **LAST-A- FOAM® R-9330** resists compressive loads of 1000 psi with less than 2% deflection. **LAST-A- FOAM® R-9335** and **LAST-A- FOAM® R-9340** are available for higher column-loading applications.

MARINE AND COMMERCIAL FIBERGLASS COMPOSITE APPLICATIONS:

LAST-A-FOAM® is used in boat building and other fiberglass composite applications where structural strength, resistance to moisture, rot and decay, and compatibility with laminating resin-systems are important factors.

LAST-A-FOAM® TR-SERIES and LAST-A-FOAM® FR-7100

LAST-A-FOAM® TR-SERIES and **LAST-A-FOAM® FR-7100** are formulated to meet the demands of composite boat builders at competitive prices. **TR-SERIES** cores replace wood with a top-quality, non-decaying product fully compatible with fiber glass-laminating production methods, toughened to resist structural stress in marine structures.



Ideal for resin-infusion processes, **LAST-A-FOAM® TR-SERIES** and **LAST-A-FOAM® FR-7100** foams are uniform, grain-free, closed-cell polyurethane. They do not absorb liquid water, and are unaffected by solvents and paints. Polyester, epoxy, and vinyl-ester resins bond readily to these products.

LAST-A-FOAM® TR-SERIES and **LAST-A-FOAM® FR-7100** foams are made in a range of densities to allow the designer/engineer to match physical properties with structural needs. No strength-compromising glass-fiber fillers are used in TR-SERIES foams.

LAST-A-FOAM® FR-6700

LAST-A-FOAM® FR-6700 is used in fiberglass boat construction for hull stringers, motor mounts, and for transoms, as well as in deck and superstructure applications. Most structural applications will use foams in densities from 6 to 40 lbs/cubic foot.

LAST-A-FOAM® R-3300 HYDROSTATIC-PRESSURE RESISTANT FOAM:

LAST-A-FOAM® R-3300 is special hydrostatic-pressure resistant foam with outstanding (up to 500 psi) resistance to penetration by liquid water. It is available in densities of 15 and 18 pounds per cubic foot. It can provide permanent flotation in semi-deep submersible craft. **R-3300** has been employed in neutral-buoyancy applications and for liquid-penetration resistance with a variety of fluids.

CONFORM-A-CORE 4506 AND 4509

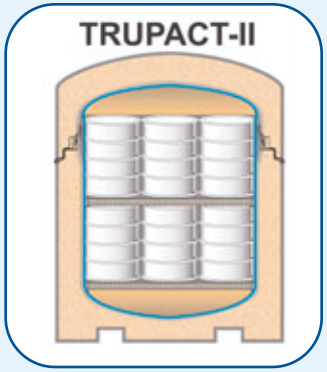
CONFORM-A-CORE 4506 AND 4509 (6-lb and 8.5-lb per cubic foot density) are toughened score-cut polyurethane foams for use in marine and other composite panel cores where matching contoured surfaces of FRP structures is important.

CONFORM-A-CORE 4506 AND 4509 has superb compatibility with all laminating resin systems and infusion processes. It has fine cell structure, and its narrow score lines limit resin consumption.

LAST-A-FOAM® FR-4300 HEAT-FORMABLE POLYURETHANE FOAM

LAST-A-FOAM® FR-4300 is unique heat-formable, flame resistant structural polyurethane foam. It is useful in composite panel cores where compound-curved surfaces can be made with low-temperature (250 degree F) heat-forming methods. A closed-cell material, it is easily bonded and will accept a wide variety of adhesives and coatings. This formulation is available in 5-, 10-, and 15-lb densities.

LAST-A-FOAM® FR-3700 for 10 CFR 71 CRASH AND FIRE PROTECTION APPLICATIONS:



LAST-A-FOAM® FR-3700 protects radioactive nuclear materials from shock, impact, and fire damage in crash situations. It is specifically formulated to produce an insulating "char" in fire conditions, preventing excessive heat from damaging dangerous cargoes.

Nuclear packaging design services recognize **LAST-A-FOAM® FR-3700** as one of the best solutions for the protection of hazardous payloads. Please contact General Plastics for more information on the uses and relevant specifications for this range of products.

Over the past 20 years, General Plastics has participated in the design and construction of approximately 20 different kinds of impact limiters, over-packs, impact pads, and missile shock-isolation systems.

MODELS, PROTOTYPES, PATTERNS, AND CNC-PROOFING APPLICATIONS:

LAST-A-FOAM® FR-7100

LAST-A-FOAM® FR-7100 is economical polyurethane foam made in 3-to-40-lb. densities, suitable for uses from

hand-carved models to CNC-machined topographical maps, composite lay-up tools, and industrial patterns. **LAST-A-FOAM® FR-7100** is made in more densities and sizes than any other product we offer. Very large blocks are available in most **FR-7100** grades.

LAST-A-FOAM® FR-7100 allows "proofing" of CNC-cutter paths using a stable, grain-free material that contains no abrasive fillers to damage expensive cutting tools. **LAST-A-FOAM® FR-7100** has fine, consistent cell-structure, and can be finished or painted with ease, using virtually any materials you wish.

FR-4500 TOOLING BOARD

FR-4500 Tooling Board is tough, high-density polyurethane tooling board intended for use in master models, mold and foundry patterns, vacuum-thermoforming tools, and composite tooling applications where a uniform,

grain-free, dimensionally-stable substrate is desired.

This economical material is available in a wide range of densities and sizes. **FR-4500 Tooling Board** has excellent machining characteristics and contains no tool-damaging micro-balloon fillers, extending tool life. By using a special anti-static formulation, **FR-4500** creates shavings – not dust – when machined. See our **FR-4500 Tooling Board Selection Guide** in Product Data for more information on suggested uses for this product.

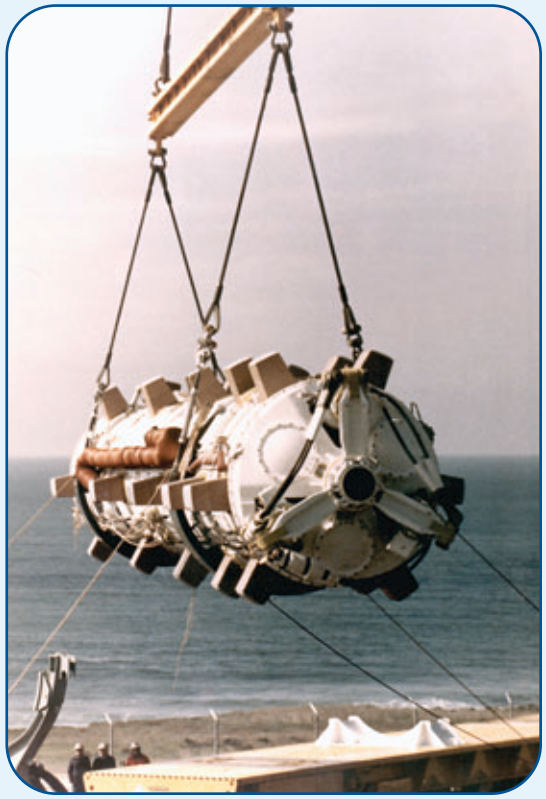
PROVEN APPLICATIONS FOR GENERAL PLASTICS' LAST-A-FOAM® PRODUCTS:

The possible applications for **LAST-A-FOAM®** rigid foam products are diverse, and wide-ranging:

- Grain-formers for solid-fuel rocket motors
- Topographical maps and architectural display-models
- Tooling for composite structures, patterns and plugs for fiberglass lay-ups
- Ballistic targets, explosive-blast mitigation systems
- Movie props, amusement-park figures
- Shaped-charge explosive holders
- Structural core material (transoms, stringers, decks) for fiberglass boats
- Fuel-level floats, neutral-buoyancy flotation
- Vacuum-form tooling
- Test media simulating human bone
- Industrial design models and prototypes
- Structural core material for radome and antenna structures
- Structural core material for snow boards, skis, surf-boards, bathtubs, showers
- Packaging for sub-munition weapons systems
- CNC-program "proofing" material
- Resin-infusion and pultrusion core material
- Structural core for aircraft interior assemblies
- Lightweight structural core for X-ray and diagnostic-machine tables
- Impact-limiter material, hazardous-waste crash-and-fire protection

SIGNS AND ENVIRONMENTAL GRAPHICS:

SIGN-FOAM®, a special grade of **LAST-A-FOAM®**, is used worldwide for both indoor and outdoor signs. Whether it is routed, carved, sandblasted or machined, **SIGN-FOAM®** is the sign-maker's substrate of choice. **SIGN-FOAM®** is marketed and distributed exclusively for General Plastics by **SIGN ARTS PRODUCTS, INC.**



Typical Compression Load-Deflection Curves for
LAST-A-FOAM® EF-4005 & TF-5070-10
Tested Per: ASTM D-1564-64T, Suffix D.
Continuous 3rd Cycle Curves

Flexible Foams

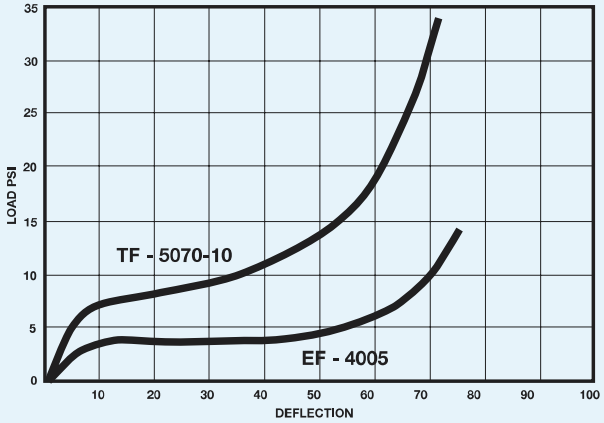
LAST-A-FOAM® EF- and **TF-series** flexible high-density polyether polyurethane foams are formulated to absorb large amounts of energy while protecting payloads from high g-stress levels. Each of these foams exhibit relatively "flat" load-deflection curves, which means they absorb energy over a broad range while exposing delicate parts to consistent lower-level stresses.
LAST-A-FOAM® EF- and **TF-series** foams are available in several densities, many of them relatively flame-resistant.

- **LAST-A-FOAM® EF-4000**-series (available in 3 to 7 lbs/cubic foot density)
- **LAST-A-FOAM® TF-5070**-series (available in 8.5 to 15 lbs/cubic foot density)

EF-4000 and **TF-5070** have been used extensively as "spring-damper" shock isolation systems protecting missiles in underground silos and submarine launch tubes. Minuteman, Peacekeeper, and Trident programs all have employed these foams.

OTHER APPLICATIONS FOR LAST-A-FOAM® FLEXIBLE FOAM PRODUCTS:

- Shock-isolation systems for earthquake-prone buildings.
- Shock mounts and pads for delicate equipment in shipping containers.



General Plastics' Manufacturing Capabilities:

Besides manufacturing unique **LAST-A-FOAM®** rigid and flexible polyurethane foam sheet stock in several types and densities, General Plastics Manufacturing Company molds, fabricates and assembles parts for a diverse set of commercial, industrial, military and composite-manufacturing customers.

General Plastics Manufacturing Company also has a variety of special processes available to customers. These services include custom foam formulation for specific applications, and special testing and material-characterization processes.

INTEGRAL-SKIN MOLDED FLEXIBLE FOAMS

LAST-A-FOAM® Integral-skin polyurethane foam seals offer substantial advantages over other materials used for this purpose in commercial aircraft. Low-cost molds make it possible to have many different parts available to suit specific customer needs. These flexible-foam products install easily, and are attractive, durable and easy to clean while meeting aircraft flammability requirements.

LAST-A-FOAM® Integral-skin polyurethane foam crash-pads offer light weight, durability, an attractive appearance, and safety advantages in impact-force reduction. General Plastics makes complete flight-deck crash-pad assemblies, and can make tooling and fixtures to duplicate older parts if necessary.

LAST-A-FOAM® special flame-resistant integral-skin foams are used for aircraft interior crash padding. Low resilience enables foam to absorb most impact energy to minimize rebound and reduce injuries. These materials are available only in finished, molded parts.

FABRICATION SERVICES—MOLDING, MACHINING, BONDING, ASSEMBLY

In addition to molding parts from liquid chemicals, General Plastics Manufacturing Company also machines and fabricates rigid and flexible foam materials to customer specifications. Painting, adhesive-bonding, potting, and resin-infusion processes are also all within General Plastics' skills-range.

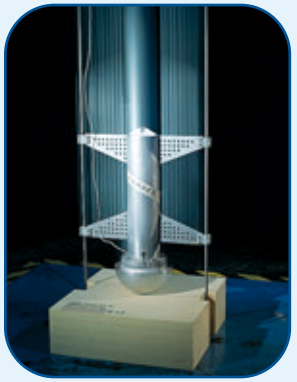
We are expert at meeting demanding **LAST-A-FOAM®** application requirements, and can manage your project from initial materials consultation, all the way to manufacturing production parts. We have pattern and tooling capability, and accept customer-supplied CAD data. We have broad CNC capability to make parts fitting your requirements. This is backed with assembly capabilities designed to deliver competitively-priced, high-quality parts with on-time delivery.

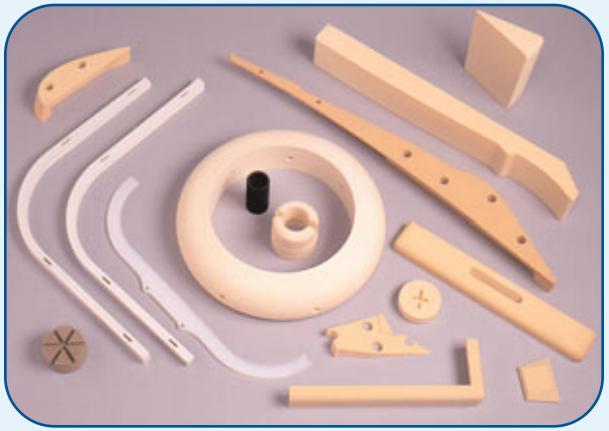
The wide range of available **LAST-A-FOAM®** densities and sizes make it suitable for many applications. Machined high-density polyurethane **LAST-A-FOAM®** components perform very well in structural applications where strength combined with light weight, chemical resistance, and ease of manufacturing are important.

AIRCRAFT TRANSPARENCIES

General Plastics Manufacturing Company has many years of experience manufacturing aircraft passenger-window and wingtip-lens transparencies.

General Plastics forms and machines both polycarbonate and acrylic sheet used in aircraft passenger window assemblies. We can fully manage all phases of manufacturing technically demanding assemblies.





Quality Assurance

General Plastics' extensive Quality Assurance program satisfies the requirements of the aircraft-aerospace industry and U.S. Department of Defense. These programs include strict traceability of raw materials, and finished products through every step of the manufacturing process.

General Plastics has excellent laboratory, product development, and fully instrumented quality assurance facilities including a 36-foot guided-wire drop tower and a laboratory scale burn-test facility.

We are currently qualified under such demanding quality systems as NQA-1, Mil-I-45208A, Boeing Company D6-82479 and several others. We are in compliance with ISO 9001:2000 / AS 9100B with third party accreditation.

Warranty

General Plastics warrants only that the products it ships to the buyer will, at the time of shipment, meet the specifications as stated in the sales contract and be free from defects in material and workmanship. Typical physical properties as stated in product data sheets are to be considered as representative nominal values and should not be treated as specifications. While all the product data information presented by General Plastics is believed to be reliable and to represent the best available physical property data on the products, the warranty of General Plastics is limited to the above expressed warranty. GENERAL PLASTICS MAKES NO OTHER GUARANTY, WARRANTY, OR REPRESENTATION, EXPRESSED OR IMPLIED, AS TO THE CORRECTNESS OR SUFFICIENCY OF ANY INFORMATION, OR AS TO THE MERCHANTABILITY, SUITABILITY OR FITNESS OF ANY PRODUCTS FOR A PARTICULAR PURPOSE. THE USER SHOULD CONDUCT A SUFFICIENT INVESTIGATION TO ESTABLISH THE SUITABILITY OF ANY PRODUCT FOR ITS INTENDED USE. If the products shipped by General Plastics do not conform to this warranty, it will correct the non-conformity by repair or replacement at its option. Liability of General Plastics for all claims, whether arising out of breach of contract, warranty, negligence, strict liability, or otherwise is limited to the purchase price of the material.

CAUTION: The flammability characteristics indicated for **LAST-A-FOAM®** are obtained from comparative tests, conducted under specific laboratory conditions. The sole purpose of these tests is to establish relative burning characteristics of foam materials. Terms such as self extinguishing or flame spread used in test data are not intended to reflect the fire hazard of LAST-A-FOAM® under actual use conditions. The test results are not accurate indicators of the flammability of **LAST-A-FOAM®** in actual fire environments.

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LAST-A-FOAM®

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