50 Years of Progress

VOLUME 32
WINTER 1995
NUMBER 1

THE M.C. GILL DOORWAY

"We try hard enough to make it happen"

M.C. GILL CORP., 4056 EASY ST., EL MONTE, CA 91731 • PHONE (818) 443-4022 • FAX (818) 350-5880 • FAX (818) 279-6051

Introducing Structural Strength

GILLFOAM®

LOW SMOKE • LOW TOXICITY • LIGHT WEIGHT • FIRE-RESISTANT •

The following is an excerpt from the January 1993 *Fire Research Plan* prepared by the Federal Aviation Administration (FAA) at the FAA Technical Center in Atlantic City, New Jersey.

"There are enough newly emerging material technologies that achieving a 'totally fire resistant cabin' now has a high probability of success within the next ten to fifteen years...The reality of this goal means that cabin materials will be developed which slow down ignition and flame spread so much that there is ample time for passenger escape."

All segments of the commercial aviation industry continually explore ways to improve aircraft safety and the M.C. Gill Corporation is no exception. Articles in past DOORWAYS* have addressed this issue and outlined the steps the company has taken to improve its products as they relate to aircraft safety.

A PHENOLIC RESIN-BASED RIGID STRUCTURAL FOAM

Gillfoam is the latest in a long line of low smoke, low toxic emissions, and fire retardant products to come from M.C. Gill's Research and Development Group. It is a blown cellular gas-filled polymeric thermosetting foam based on phenolic resin and containing a preponderance of closed cells. In addition to its fire-retardant properties it is a tough, moisture-resistant foam with low thermal conductivity, good acoustical properties, high compressive strength, and good shear strength. Finally, Gillfoam is manufactured without chloroflourocarbons or any other product which could be instrumental in depleting atmospheric ozone.

**Among them: Summer 1988, Spring 1989, Winter 1990, Spring 1990, Summer 1992, and Summer 1993.*

A BRIEF HISTORY

The current Gillfoam project began in 1990 and resulted from a request from a major OEM for a fire-retardant foam to be used for an Environmental Control System (ECS) duct. In fact, M.C. Gill had begun work on a phenolic based foam in the early 1980's.

It would be nice to report a multi-million dollar contract for ECS ducting, but such was not to be. What did happen is of far greater consequence – a fire-retardant, low-smoke producing phenolic resin based foam, dubbed Gillfoam 2019.

Phenolic resin is one of the oldest synthetic resins. It has been eschewed for advanced composite construction because it gives off volatiles during cure, thus creating micron-sized voids in the composite. This is not a problem in making foam, because the foam consists of millions of micron-sized voids.

GILLFOAM'S FIRE RELATED FEATURES

Low Smoke

The most important features are fire retardancy and very low smoke evolution in a fire (see following tabulation) compared to almost any organic polymer. As a result, it is highly desirable for use in aircraft interiors. In low smoke applications, it is the most cost effective choice available.

GILLFOAM Density (pcf)	SMOKE DENSITY (4 min. flaming, D_S)	FAA Standard (max.)
4.5	13.0	200.0
7.0	18.3	200.0
10.0	19.7	200.0
18.0	17.0*	200.0

(By contrast, an 18 pcf polyurethane foam produces a smoke density of 263.0, more than 15 times greater than the same density of Gillfoam.)

**As the foam density increases, smoke density peaks and begins to decrease because higher density foam is more resistant to combustion.*

Coupled with its low toxic emissions and fire-retardant characteristic, Gillfoam is ideally suited as the product of choice where foam is specified in commercial aviation applications.

Fire and Heat

Using the test methods required by the FAA's FAR 25.853 and 25.855, Gillfoam's other fire-related physical properties are equally impressive. (See Table 1, page 5).

Toxic Emissions

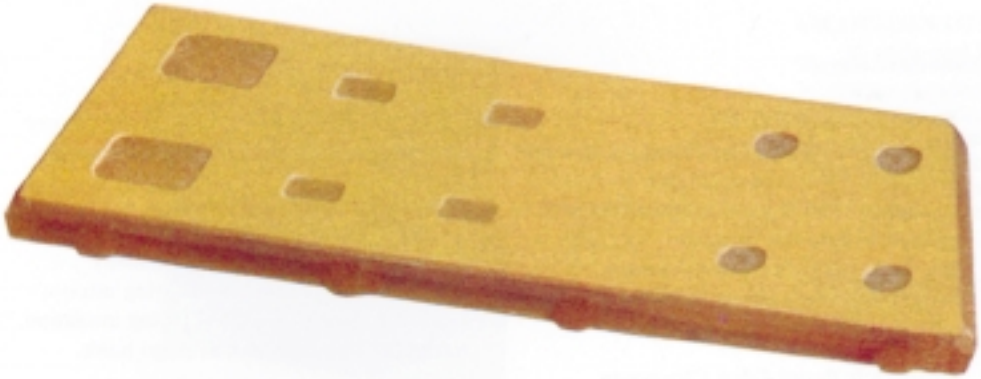
The FAA does not have a standard for the toxic emissions of foam when exposed to intense heat or flame. However, a major airframe manufacturer has set a maximum parts per million limit on six toxic gasses. Compliance with these maximums is required for any material that is used in their commercial passenger aircraft. These gasses are: nitrogen oxides (NO_X), carbon monoxide (CO), hydrochloric acid (HCl), hydrofluoric acid (HF), sulfur dioxides (SO_X), and hydrocyanic acid (HCN).

The following tabulation identifies the amount of each, in parts per million, found in Gillfoam and the corresponding airframe manufacturer's maximum.

Toxic Emissions (ppm) of 18 pcf Gillfoam When Exposed to Flame

TOXIC GAS	GILLFOAM	MFR'S. MAX.
NO_X	10	<100
CO	600	<3500
HCl	7	<150
HF	0	<150
SO_X	70	<100
HCN	9	<150

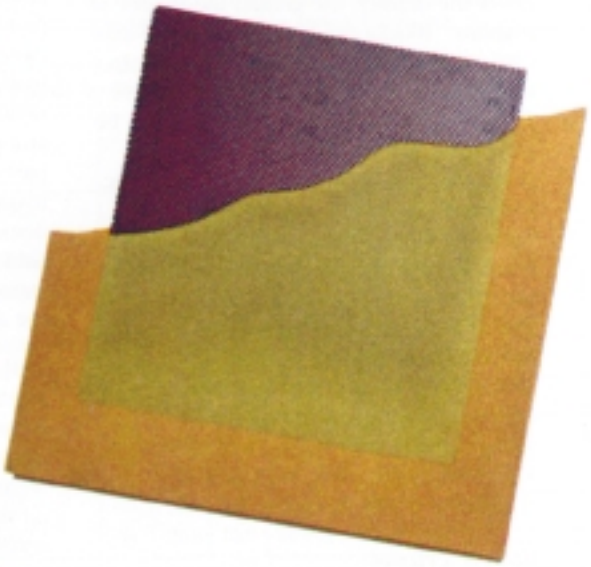
Although 18 pcf Gillfoam is the only density for which data are available, there is generally a linear decrease in the amount of each toxic gas, in terms of ppm, as the density of the foam decreases. In other words, as the mass of the foam decreases the amount of each of the toxic gasses does likewise.

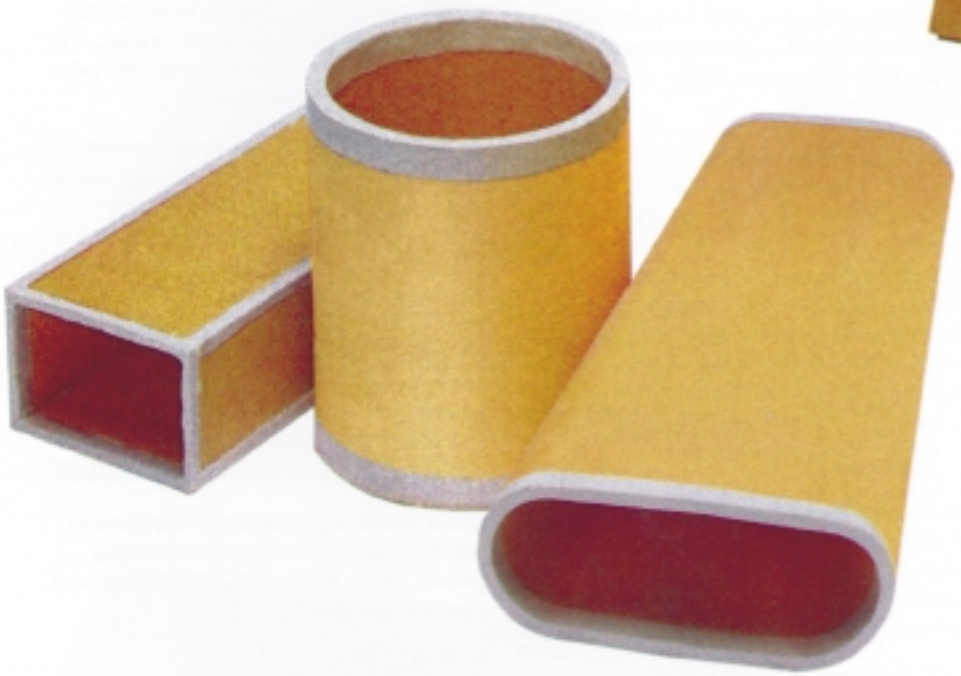


Gillfoam molded as a core material for an automotive flooring panel. Its light weight, heat resistant characteristics, and the ability to mold it in almost any configuration make it the material of choice for many components of today's modern transportation needs, be they for automobiles, aircraft, light or heavy rail, or marine.

MOLDED AND FORMED FOR A MULTITUDE OF APPLICATIONS

Sections of ECS ducting made with Gillfoam. Left, below, woven fiberglass cloth is bonded to both sides of 4 pcf Gillfoam with a phenolic adhesive. The duct utilized a cut-and-fold technique that results in a clean finished product. Center, similar construction except that the fiberglass cloth was laid up in a mold and Gillfoam poured into place. Right, an elliptical shaped duct made solely of Gillfoam. Gillfoam can be molded to fit virtually any size or shaped opening, making it an extremely versatile material for transporting conditioned air.





Cutaway view of a phenolic reinforced fiberglass cloth faced, Nomex honeycomb core sandwich panel using 18 pcf Gillfoam as an edge close out. Foam closeouts represent a considerable savings in time and money over routing and potting the edges with a standard two-part epoxy compound.

Molded 11 pcf Gillfoam which will ultimately serve as the core material for a structural "beam" that will be one component of an assembly supporting an automobile floorboard. Gillcore's strength (and commensurate light weight) and heat resistant properties make it the ideal choice for this application.

 (continued from page 2)

AVAILABILITY
Gillfoam is currently available in blocks, slices, molded parts, and sandwich panels. Large molded loaves of Gillfoam are sliced on a computer-controlled horizontal band saw to as thin as .25" (with a ± .005" tolerance over the entire sheet). The sizes and shapes are virtually limitless.

Molded Gillfoam, like any other foam, has a thin outer surface skin of locally elevated density over all surfaces. All machined or saw-cut surfaces consist of severed cells and therefore exhibit some friability – the lower the density, the greater the degree of friability. Blocks can be shaped on a 5-axis CNC (Computer Numerically Controlled) machine, although densities less than five pcf are difficult to handle. Gillfoam can be faced with any of Gill's reinforced polymeric matrix skin materials. Phenolic, polyester and epoxy matrices bond well with Gillfoam cores. Both carbon fiber and fiberglass (woven or unidirectional) are being used in current applications. Aluminum facings also bond well. Phenolic or epoxy are normally the adhesives of choice. Another core option is Nomex® honeycomb filled with Gillfoam, which results in enhanced sound dampening and increased compressive and shear strength.

APPLICATIONS
Gillfoam's primary benefits are its low Flammability, low Smoke emission, and low Toxic emissions (FST) when exposed to flame. Thermal stability at temperatures up to 450°F (232°C) also makes it an ideal core material for recyclable high temperature thermoplastic components. Therefore, the advantages of a material with proven low FST features, coupled with its light weight, make Gillfoam the material of choice for the following applications.

Aviation Ducting
When Gillfoam replaces aluminum ducting, the additional advantages over that material are:

- Little, if any, additional thermal insulation required;
- Less damage during installation and replacement – aluminum dents easily;
- Safer to handle – aluminum, when cut, leaves sharp edges that can result in injury; and
- Much lighter than the aluminum it would replace – generally one-third to one-half.

Sandwich Panel Core
Gillfoam serves as a more than satisfactory substitute for honeycomb core for such aircraft sandwich panel applications as galleys, bulkheads, lavatories, food and beverage carts, overhead stowage compartments, garment modules, ceilings and any other non-structural use.

Sandwich Panel Edge Closeouts
Rigid polyurethane and polyvinyl chloride/urea-amide alloy foams have long been used as edge closeouts. They prevent moisture penetration into the panel which results in degrading the properties of Nomex honeycomb and the adhesive used. Because they are bonded into the panel, foam closeouts represent a considerable savings in time and money over routing and potting the edges with a standard two-part epoxy compound. However, these foams have high heat release, smoke density values and toxic emissions. Gillfoam does not, and it is thermally stable. Gillfoam is the obvious answer – all the advantages, none of the drawbacks

Rail Transportation
Rail transit is beginning to specify lighter weight materials for its rolling stock for, among other reasons, fuel savings. Lighter weight also results in less wear and tear on the road bed which means lower maintenance costs.

Low density (<8pcf) Gillfoam as a core in sandwich panels does not have the structural strength for flooring, but it can be used as ceiling, sidewall, and other nonstructural vertical interior panels as well as ECS ducting. Water absorption poses severe problems and Gillfoam offers a sensible solution. After a seven-day water soak test, peel values of sandwich panels with Gillfoam as the core were virtually unaffected and no visible damage was noted.

Finally, the Urban Mass Transit Authority (UMTA) has published "Recommended Fire Safety Practices for Rail Transit Materials Selection". The report proposes guidelines addressing the following criteria:

- Increased resistance to (flammable) ignition;
- Decreased flame spread rates;
- Decreased smoke emission; and,
- Increased time for egress.

To facilitate implementation, UMTA has suggested use of the FAA's FAR 25.853, Appendix F, Part V. Needless to say, interest in the selection of Gillfoam as core material in sandwich panels is on the rise.

Marine
The many potential uses for low smoke Gillfoam in the shipbuilding industry include core for non load-bearing interior sandwich panels, as well as piping insulation, refrigerated containers and cargo holds.

Automotive
The combination of light weight, low FST, and structural stability at high temperatures bode well for Gillfoam in the automobile industry for such uses as cores for molded structural beams, flooring, and other interior panels. Refrigerated truck and rail car interior sidewalls and ceilings offer potential for Gillfoam core panels as do cryogenic tank trucks and ground storage facilities.

Architectural
A leading architect is considering the use of sandwich panels with a core of Gillfoam for portions of the ceiling in a state-of-the-art concert hall. Admittedly, the panels are more expensive than normal acoustical ceiling tiles, but the possibility exists that the use of Gillfoam panels will obviate the need for a sprinkler system in those areas where the panels serve as the ceiling. The resultant savings will more than offset the increased cost of the panels.

The prospect of reduced sprinkler system requirements and the resultant cost savings make Gillfoam core panels a viable alternative for current materials of choice. Certainly, fire extinguishing systems will be necessary for the foreseeable future but if they can be reduced in scope without losing their effectiveness, major cost reductions can be attained. And the benefits of a reduced amount of smoke generated in high rise buildings in the event of a fire need no further elaboration.

Other Gillfoam architectural applications include non-structural wall and ceiling panels, office walls, divider partitions, and elevator cab panels.

CONCLUSION
Suffice it to say, the M.C. Gill Corporation is extremely pleased with the successful development of Gillfoam and excited with its potential applications. If you would like additional data and information, and a product sample, please contact the Marketing Services Department at the address, phone or fax numbers on the cover of this Doorway.

A sandwich panel of a Gillfoam core with facings formed for cabinetry components.

Slice of cured Gillfoam with a density of 13 pcf. The ability to manufacture Gillfoam in a wide range of densities make it highly suitable for sandwich panel cores or as a stand alone material.

A slice of Nomex honeycomb with Gillfoam-filled cells. The result is a material with greatly improved acoustical and insulating properties, and higher compression and shear strength. The honeycomb slices can be cut to virtually any thickness. Typical applications would include sound deadening bulkheads of marine vessels; temporary or permanent partitions in offices, laboratories and other architectural environments; and, sandwich panel cores in refrigerated railroad cars and trucks.

Another example of Gillfoam used as core material for an automotive flooring panel. Again, its light weight, resistance to heat, and relative strength make Gillfoam the material of choice for today's automotive applications.

GILLFOAM'S OTHER IMPORTANT PROPERTIES

Thermal Conductivity

In addition to its fire and smoke related properties, Gillfoam has excellent thermal conductivity properties, making it highly suitable as an insulation material. Sheet materials in 7, 10, and 18 pcf densities were tested using the heat meter methodology outlined in ASTM E-518 at two temperature ranges: 140° ± 2°F and 245°± 8°F with the results shown in the following tabulation.*

	GILLFOAM DENSITY				POLYURETHANE
THERMAL CONDUCTIVITY	4.5 pcf	7 pcf	10 pcf	18 pcf	4.5 pcf
At 138°F–142°F,					
BTU-in/Hr.ft^2.°F (k factor)	.220	.257	.293	.408	.330
R factor	5	4	3	2	3
At 237°F–253°F					
BTU-in/Hr.ft^2.°F (k factor)	NA	.342	.377	.468	.350
R factor	NA	3	3	2	3

**Gillfoam ducting has been tested to 250°F with no failures noted.*

To put this into perspective, Table 2 (below) shows that Gillfoam at 4, 5, 7 and 10 pcf exhibits thermal conductivity comparable to common insulating materials used in the construction industry and on commercial aircraft.

Table 1–Selected Fire-Related Physical Properties of Gillfoam by Density in Pounds per Cubic Foot (pcf)

	DENSITY (pcf)					
PROPERTY	4.5	7	10	18	18 pcf polyureth.	FAA Maximum
60 second vertical						
Burn length, in.	1.70	1.30	0.47	2.30	3.30	8.0
Extinguishing time, sec.	1.10	0.67	0.87	1.20	1.70	15.0
Drip extinguishing time, sec.	0	0	0	0	0	5.0
45° Flame Penetration						
Exting. time, sec.	NA	0.70	0.90	1.20	NA	15.0
Afterglow, sec.	NA	0	0	0	NA	10.0
Penetration	NA	0	0	0	NA	0
OSU heat release						
Total at 2 min., KW-min/M^2	NA	53.9	57.5	64.6	164	65.0
Peak, KW/M^2	NA	38.6	43.7	54.4	144	65.0

Table 2–Thermal Conductivity of Gillfoam vs. Common Insulating Products

MATERIAL	DENSITY (pcf)	BTU-in/Hr ft^2 °F (k Factor)	(R Factor)
Asbestos-cement board	120.0	4.00	<1
Cellular glass	8.5	.35	3
Expanded perlite	1.0	.36	3
Cellular polyurethane	2.0	.14	7
Mineral fiber w/binder	15.0	.29	3
Expanded polystyrene	1.8	.25	4
Gillfoam	4.5	.22	5
Gillfoam	7.0	.26	4
Gillfoam	10.0	.29	3

Compatibility with Aluminum

R & D tests have demonstrated that Gillfoam does not cause pitting or corrosion when placed in contact with an anodized aluminum plate at 95% humidity and 160°F in a humidity chamber for 10 days.

Compressive and Shear–Strength and Modulus

Table 3 shows Gillfoam exhibits very good mechanical properties when subjected to compressive and shear forces. The data in Table 3 provide various mechanical properties for several different foam densities.

Table 3–Typical Compressive and Shear Test Values of Gillfoam, Selected Densities in Pounds per Cubic Foot (pcf)

	TYPICAL VALUES (.5" thick slice) Gillfoam				Polyurethane
PROPERTY	7 pcf	10 pcf	18 pcf	40 pcf	18 pcf
Compressive strength (psi)	190	334	1,257	3,116	877
Compressive modulus (psi)	3,799	6,741	22,935	63,566	8,750
Shear strength (psi)	103	152	320	NA	548
Shear modulus (psi)	3,647	6,408	9,488	NA	16,322

GILLPATCH® II

THE NEXT GENERATION—WORTH THE WAIT

To paraphrase John Cameron Swayze in the old Timex® commercials, *"Gillpatch II takes a licking and keeps on sticking."* And, they're durable as well.

Ever since the FAA mandated that cargo liner repair methods must meet FAR 25.855, airframe manufacturers and airlines have encouraged appropriate suppliers to develop a repair system that will conform to that regulation *and* meet those critical requirements.

Easy and Quick to Apply–Just Like a Band-Aid®

M.C. Gill's Research and Development group went to work on this project more than two years ago. Their mandate was twofold: conform to the FAA's specifications and make it easy for our customers to apply.

Rather than hurriedly produce and market a patch that would not meet all our customers' requirements, we set out to develop a product that could be applied quickly and simply, rain or shine, hot or cold, if the aircraft is in a maintenance hangar or at a gate ready to depart.

A little more than one year ago we introduced a patch that met both the FAA's and our customers' requirements. It passes the rigorous burn through test and, like the original Gillpatch, features a simple "peel-and-stick" application principle–meaning it can be applied in seconds!

In Service Testing–The M.C. Gill Way

When first producing Gillpatch II, we made no formal announcement either in the Doorway or other trade publications. Our sales force and Customer Service personnel notified our customers that the patch was available, but word of mouth and a limited mailing was the extent of it. In keeping with a long standing company policy, we wanted to test the product in service before the announcement was formalized.

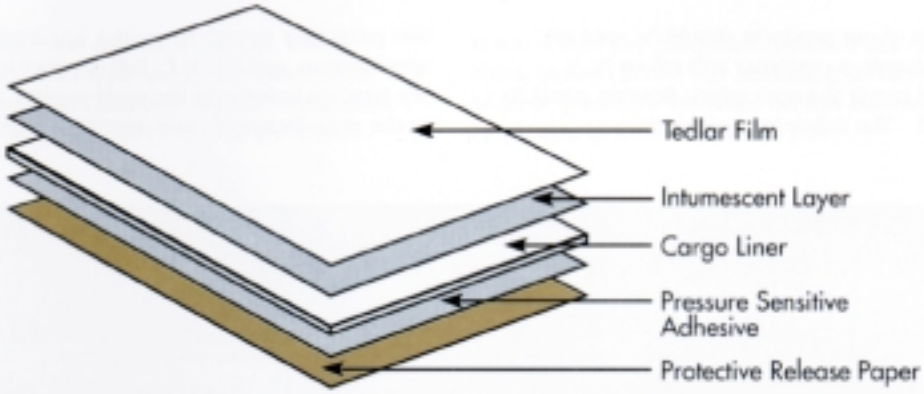
In November 1993 we made arrangements with a major airline to place more than 20 patches in high abuse locations throughout the cargo compartments in four of its aircraft and observe the resistance to wear and tear over time.

In the following twelve months, Sales and R & D personnel made several trips to Los Angeles International Airport to examine the cargo compartments on the aircraft when they were at LAX for a stopover. As of this writing, the last visit was made on November 11, 1994, exactly one year after the patches had been installed.

The reports were all the same – all patches, regardless of size or location within the cargo compartment, were firmly in place with minimal signs of service use. We had confirmed what we believed all along - we had the quickest, easiest and safest Gillpatch on the market, i.e., the greatest value!

GILLPATCH II CONSTRUCTION

The patch itself comprises the five components shown here.



The Tedlar overlay can be cleaned, increases resistance to moisture damage, provides continuity of surface finish, uniformity of color, and after installation makes any subsequent damage to the patch easier to see. The intumescent coating completely covers the patch material and provides an excellent thermal and insulating barrier.

Gillpatch II is thicker (an overall thickness of between .090" and .100") than those used prior to the aforementioned FAA mandate. The reason is that the FAA's Long beach, CA office recommended the patch meet minimum impact values of the cargo liner it repairs. The thinking was that a patch is of no value if it falls off the first time an object hits it, a premise with which the M.C. Gill Corp. heartily concurs. The patch is also stiffer, but any minor inconvenience caused is more than offset by the superior strength of Gillpatch II and its excellent impact values.

This and our in-service test results should dispel any concern about it being knocked off – even by a glancing side blow.

How It Works

In the event of a fire in the cargo compartment, the coating begins to swell (intumesce) when the temperature reaches 700° to 800° F. and will withstand a temperature of 1700° to 1800° F for at least five minutes. The patch material consists of the same construction as M.C. Gill fiberglass reinforced epoxy resin cargo liner that is certified to FAR 25.855. Once the easy-peel backing has been removed, the pressure sensitive adhesive secures the patch to the area surrounding the cargo liner damage.

How to Order

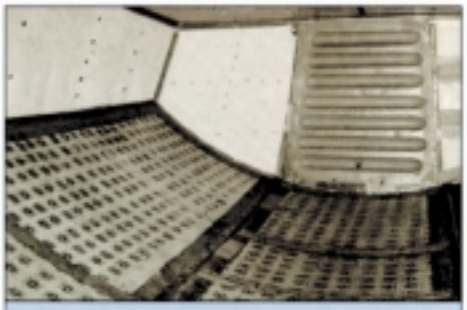
Ordering Gillpatch II is as easy as ordering any of our other products. Simply call our Customer Service Department at 818-443-4022 or fax us at 818-350-5880 with the following information.

1. Size – Gillpatch II is available in three sizes: 6" x 6", 9" x 9", and 12" x 12".
2. Quantity – There is a minimum order requirement of ten (10) Gillpatch II patches of the same size. A variety pack is also available – it contains ten patches: four each of the 6" x 6" and 9" x 9", and two of the 12" x 12".

We carry Gillpatch in stock and can ship your order within two working days after we receive your verbal or written purchase order; faster if it is an AOG.

The Gillpatch Tradition

The M.C. Gill Corp. has sold hundreds of thousands of Gillpatches since it introduced its first easy-application cargo liner patch in 1962. Just as M.C. Gill's cargo liner became the industry standard, "Gillpatch" has been synonymous with cargo liner repair for more than 30 years. *It just makes good sense to buy your patches from the same source as your cargo liners.*



Hang on to those original Gillpatches!

Gillpatch II complies with FAR 25.855 and must be used for liner repair in Class C and D type cargo compartments. However, the original Gillpatch 6006 still can be used for cargo compartment repairs in Class A, B, and E compartments and, as shown above, as a protective covering for cargo flooring. In this instance, 3' x 6' sheets of Gillpatch are used. The sheets have also been used under carpeting in the passenger compartment to protect the floor. They have a cushioning effect due to the .016" rubber-like adhesive.

In addition to sheets, Gillpatch 6006 (.026" thick) is available in four sizes: 4.5" x 4.5", 6" x 6", 9" x 9", and 12" x 12". A variety kit of 5 pieces 4.5" x 4.5", 3 pieces 9" x 9", and 2 pieces 12" x 12" is also available. Minimum purchase in all cases is 10 kits.

QUICK REFERENCE:

We're often asked which of our products should be used on specific aircraft. For example, a customer will tell us he is modifying an MD-80 and needs to know which flooring panel is specified for that aircraft. The following quick reference lists passenger aircraft by model, application, manufacturers' specification, and the M.C. Gill product most often recommended. We have included only the most current products that are qualified to the manufacturers' most recent specifications.

AIRFRAME MFR. & AIRCRAFT MODEL	APPLICATION AND LOCATION	SPECIFICATION	M.C. GILL PART NUMBER
AIRBUS INDUSTRIE			
All 300 Series	Cargo sidewalls	2550M1M000300	Gillfab® 4422
A300, A300-600, and A310	Passenger flooring	TL53/5000/79, Ty 1	Gillfab 4105A
	Passenger flooring	TL53/5000/79, Ty 2	Gillfab 4105B
A319, A320, and A321	Passenger flooring	5360M1B000100	Gillfab 4205
	Cargo flooring, containerized	5360M1B000100	Gillfab 4322
	Cargo flooring, bulk	5360M1B000100	Gillfab 4323
BOEING			
All 700 Series	Cargo liner	BMS 8-2 Cl 2	Gilliner® 1366/1366T
All 700 Series	Cargo liner	BMS 8-223 Cl 2	Gillfab 1367/1367A
747	Cargo liner (ceiling only)	BMS 8-2 Cl 1	Gilliner 1076A
All 700 Series	Nomex® honeycomb core	BMS 8-124 Cl 4	Gillcore HD
BRITISH AEROSPACE			
146-200/300, ATP and 1000	Passenger flooring, under seat	BAeR 3231	Gillfab 4109 Gr L
	Passenger flooring, aisle	BAeR 3231	Gillfab 4109 Gr M
	Passenger flooring	BAeR 3247	Gillfab 4109C
	Passenger flooring	BAeR 3247	Gillfab 4109D
	Cargo flooring	BAeR 3232	Gillfab 4004
	(Note: Customer should specify core density when ordering to BAeR 3232).		
Jetstream 31/41	Passenger flooring, under seat	MAT 006, Ty 1, Ty 2, Ty 3	Gillfab 4004, Ty 1, Ty 2, Ty 3
	Passenger flooring, aisle	MAT 003, Ty 1, Ty 2	Gillfab 4017A Ty 1, Ty 2
	Passenger flooring, aisle	MAT 003	Gillfab 4017T
EMBRAER			
EMB-110, 120, and 123	Passenger flooring, aisle	FAR 25.853	Gillfab 4009
	Galley/bulkhead	MEP-15-017	Gillfab 4117
	Galley/bulkhead	MEP-02-011	Gillfab 5040
	Galley/bulkhead	MEP-15-031, Ty 2	Gillfab 4017F Ty 2
FOKKER			
100	Passenger flooring, under seat	FoN1-4350CC102, 102S, 102T	Gillfab 4018, Gillfab 4018S, 4018T
	Passenger flooring, aisle	FoN1-4354DD120	Gillfab 4019
LEARJET			
All models	Passenger flooring	LES 1149	Gillfab 4000/4001
	Passenger flooring	LES 1189	Gillfab 5040
	Passenger flooring	LES 1227	Gillfab 4201
	Passenger flooring	LES 1247	Gillfab 4101
	Passenger flooring	LES 1277	Gillfab 5101

M.C. Gill Products that Qualify to Major Mfr. Specs

We have not included superceded specifications nor, unless necessary, such details as product type and grade, dimensions, core densities, and cell sizes. Our Customer Service Department will provide this information if you don't know or are unsure.

If you would like additional copies of this Quick Reference chart, please contact our Marketing Services Department at the address, phone, or fax listed on this Doorway cover and we will be pleased to provide them to you.

AIRFRAME MFR. & AIRCRAFT MODEL	APPLICATION AND LOCATION	SPECIFICATION	M.C. GILL PART NUMBER
LOCKHEED			
L-1011	Bulkhead/galley/shelving panels	LAC-C-28-917	Gillfab 4030L
	Bulkhead/galley/panels	LAC-C-28-1145	Gillfab 4030A
	Passenger flooring, aisle/under seat	LAC-C-28-1386	Gillfab 4017L
	Passenger flooring, pressure bulkhead	LAC-C-28-1147	Gillfab 4088
	Galley/interior	LAC-C-28-1247	Gillfab 5017
	Passenger flooring/bulkhead/shelving	LCM 28-1033	Gillfab 5020
		STM 28-033A	Gillfab 5020
	Galley/bulkhead/ceiling	LAC-LS60204	Gillfab 4122
	Cargo liner	LAC-C-22-1249 Cl 3	Gilliner 1366/Gillfab 1367
	Cargo liner	LAC-C-22-1259 Cl 3	Gilliner1366T
	Cargo liner	LAC-C-22-1249 Cl 1	Gillfab 1138
	Nomex honeycomb core	STM 28-105	Gillcore HD
MCDONNELL DOUGLAS			
All models	Cargo liner	DMS 2226 Ty 1	Gillfab 1167/1167A
	Cargo liner	DMS 2226 Ty 2	Gillfab 1167B
	Cargo liner	DMS 2419 Cl 1 and Cl 2	Gillfab 1367A*
All models	Nomex honeycomb core	DMS 1974 Gr A	Gillcore HD
MD-80, MD-90, DC-10, MD-11	Passenger flooring, aisle	Dwg 7954400 Ty 1	Gillfab 4109 Ty 1 or 4509 Ty 1
	Passenger flooring, under seat	Dwg 7954400 Ty 2	Gillfab 4109 Ty 2 or 4509 Ty 2
DC-9, 50 series	Passenger flooring, aisle/under seat	Dwg BZZ 7002	Gillfab 4017T
DC-9 and early MD-80's	Cargo liner	DMS 1946 Ty 1/Ty 2	Gillfab 1100/1100G
MD-80/MD-90 series	Passenger flooring, aisle	Dwg BZZ 7002	Gillfab 4017T
	Passenger flooring, under seat	Dwg S3932194	Gillfab 4106A
	Cargo flooring	Dwg S00096	Gillfab 5242
	Cargo flooring	Dwg S000486	Gillfab 5042C
DC-10 series	Passenger/crew flooring	Dwg 9D0059	Gillfab 4022A
	Passenger flooring, galley	Dwg S3933941	Gillfab 4022B
	Passenger flooring, lavatory/entry	Dwg S3933942	Gillfab 4022C
	Passenger flooring, aisle/under seat	Dwg BZZ 7002	Gillfab 4017 Ty 1 and Ty 2
	Cargo flooring	Dwg 3932195	Gillfab 5042B
	Cargo liner	DMS 1946 Ty 1/Ty 2	Gillfab 1100/1100G
MD-11 series	Cargo flooring	Dwg 7954401	Gillfab 4004
	Cargo flooring	Dwg S3932193	Gillfab 5042B
	Cargo flooring	Dwg S3932195	Gillfab 5042B
	Cargo flooring (low traffic)	Dwg S4931863	Gillfab 5042B

(Note: Specification call-out identities facing thickness for above three products – check with our Customer Service representative if you are unsure.)

**Gillfab 1367A is interchangeable with all other Douglas Cargo Liner specifications for thicknesses up to and including 0.040 inches.*

"Solar Flair" and "Intrepid", Cal Poly's first two solar energy-powered cars, and the support team. Dr. Michael Shelton, project advisor, is pictured seventh from left.

Going for the Gold in Golden

WITH SOLAR POWERED VEHICLES

This is the first of an occasional series we've decided to call...

"FOR WHAT IT'S WORTH"

We often get requests from educational institutions for goods and services that can be used in instructing students in the use of composites. Although we are unable to comply with all of them, M.C. makes every effort to fill these requests. He is a firm believer that the earlier an individual learns about the advantages and benefits of composites, the stronger our industry will become.

Engineering schools throughout the country have undertaken the major project of designing and building vehicles powered by solar energy. Sponsored in part by the U.S. Department of Energy (DOE), engineering students produce very interesting and efficient designs. The projects culminate with the students entering their completed vehicles in a long distance race – this year an 1,100 mile course begins in Indianapolis, Indiana and finishes (hopefully) in Golden, Colorado, ten days later.

1995 will mark the third time California State Polytechnic University (Cal Poly), Pomona, California, has entered a vehicle in the race. The bi-annual contest, known as Sunrayce, was originally an offshoot of the World Solar Challenge held in Australia. In 1990, 43 cars were entered, racing north to south across the continent from Darwin to Adelaide. Against a worldwide field, CaPSET (Cal Poly Solar Energy Team) finished 11th against such formidable competitors as Ford of Australia, Honda Research of Japan, Toyota, and Nissan. That same year the college entered their vehicle in the first U.S. race, from Florida to Michigan, and traveled the 1,600 miles in 11 days.

In 1993, 36 vehicles were entered for the 1,100 mile, 7 day run from Texas to Minnesota. In addition to Cal Poly's "Intrepid", other universities entered the competition, including Stanford, Purdue, University of Maryland, and the University of Texas. Against such formidable competition, Cal Poly finished 2nd – just minutes behind a University of Michigan vehicle rumored to have received multi-million dollar backing, most of which came from a well known automaker in the same state.

The same year CaPSET represented the United States in the Australian World Solar Challenge. This time the team fared much better. They improved their time from 68 hours in 1990 to 47 hours it took to travel from Darwin to Adelaide. CaPSET established a new record for two-person solar cars and was the top finishing team from the Americas.

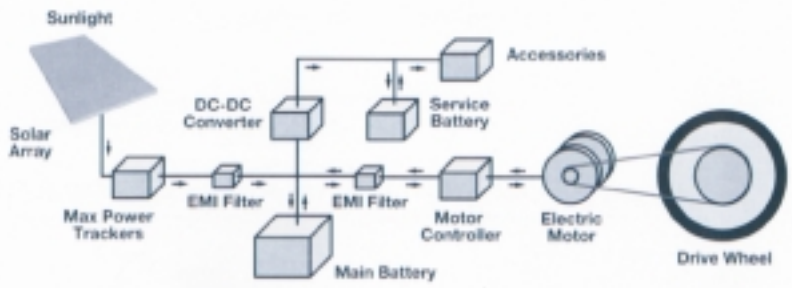
Financial requirements are enormous. Cal Poly's 1993 vehicle cost approximately $150,000 with another quarter million needed for travel expenses (to Japan and Australia) and testing. The amount was financed entirely by gifts in kind and cash donations, including a $2,000 seed grant from DOE – the only tax monies available for funding the design and construction of the vehicle.

Because new regulations for Sunrayce '95 would require extensive modifications to Intrepid, it was determined that it would be more effective to build a new vehicle. Under the direction of Dr. Michael Shelton, Professor of Mechanical Engineering at Cal Poly and Tina Shelton, CaPSET Coordinator, plans for the CaPSET vehicle, dubbed "Intrepid Too", are virtually complete and building has begun. The search for funds and contributions in kind is also underway so that the team can compete in the qualifications for Sunrayce '95 in July.

Not surprisingly, composites are the materials of choice for much of the vehicle, primarily carbon and Kevlar® reinforced epoxy facings and Nomex® honeycomb core. (Note: Intrepid won the DuPont award for best use of Advanced Composites.) CaPSET had three thick slices of Nomex but needed 15 slices of varying thicknesses cut from them before they could be used. M.C. Gill had assisted the team in the past and when they called on us again, we were pleased to accommodate them. If their track record is any barometer, this year's trophy will have "Cal Poly – Pomona" engraved on the same line that carries the 1st place designation.

We wish CaPSET and Intrepid Too sunny days in this year's race.

How the conversion of sunlight to motive power occurs.



THE FUNNY SIDE

The following are excerpts from reports of car insurance policy holders describing their particular accidents:

"Coming home, I drove into the wrong house and collided with a tree I don't have."

"The other car collided with mine without giving warning of its intention."

"A pedestrian hit me and went under my car."

★★★★

An Engineer is a man who knows a great deal about very little and who goes along learning more and more about less and less until he knows practically everything about almost nothing.

A Salesman, on the other hand, is a man who knows very little about many things and keeps learning less and less about more and more, until he knows practically nothing about almost everything.

A Purchasing Agent starts out knowing everything about everything, but ends up knowing nothing about anything due to associating with Engineers and Salesmen.

★★★★

Never buy a TV from a man who's out of breath.

★★★★

Variety may be the spice of life, but it's the monotony that finances it.

★★★★

Time is a great healer, but plastic surgery is quicker.

★★★★

If pro is the opposite of con, is Progress the opposite of Congress?

★★★★

A small boy grabbed his coat and boots, and asked his mother, "Can I go outside and help Dad put the snow chains on the car. I know all the words."

★★★★

"I don't like the bucket seats in my new car," complained the buyer. "Perhaps you have the wrong size bucket," replied the dealer.

★★★★

One of our colleagues claims he doesn't need a car alarm. To discourage thieves, he just leaves the repair estimates on the dash.

★★★★

A man loaned a friend $5,000 for plastic surgery. He complains that he was never repaid and, what's worse, now he doesn't even know what his friend looks like.

★★★★

The smug engineer felt very organized when he prepaid his funeral expenses with his credit card until the mortician asked for his expiration date.

Trivia

A rye plant can have a root network of about 380 miles

★★★★

1,455 people were injured playing pingpong in the U.S. in 1993.

★★★★

Ted Turner's land holdings in the West are two-and-a-half times larger than Grand Teton National Park.

★★★★

The cost of developing and growing the sod used for the World Cup soccer matches in the Pontiac, MI, Silverdome was $2,400,000. Its life span was 50 days.

★★★★

In 1993, there were two paramedics on duty at the speed-eating contest at Castroville, California's Artichoke Festival.

★★★★

J. Edgar Hoover, Walt Disney, Dwight Eisenhower, John Glenn, Norman Vincent Peale, M.C. Gill and H. Ross Perot were all paperboys.

★★★★

Lemon juice is antiseptic.

★★★★

People who shampoo their hair daily don't get bursitis.

★★★★

A praying mantis only has one ear.

★★★★

No Libyan river flows year round.

★★★★

New Zealand has no snakes

★★★★

Egyptians invented scarecrows.

★★★★

Mozart spoke 15 languages.

★★★★

There were 2,000 participants in the Nude Chili Cookoff held in Devore, California in 1993.

★★★★

In 1992, a thousand times more persons lost their lives in motor vehicles than commercial airplanes; almost 10 times more died in bathtubs; and, 200 times more were killed by angry spouses.

★★★★

Karl Marx is cited in more academic journals worldwide than any other author.

M.C. GILL CORPORATION

Starting in 1945...
Here's where
we're comin' from

And now...
After 50 years
of growth