

VOLUME 35  
FALL 1998  
NUMBER 4

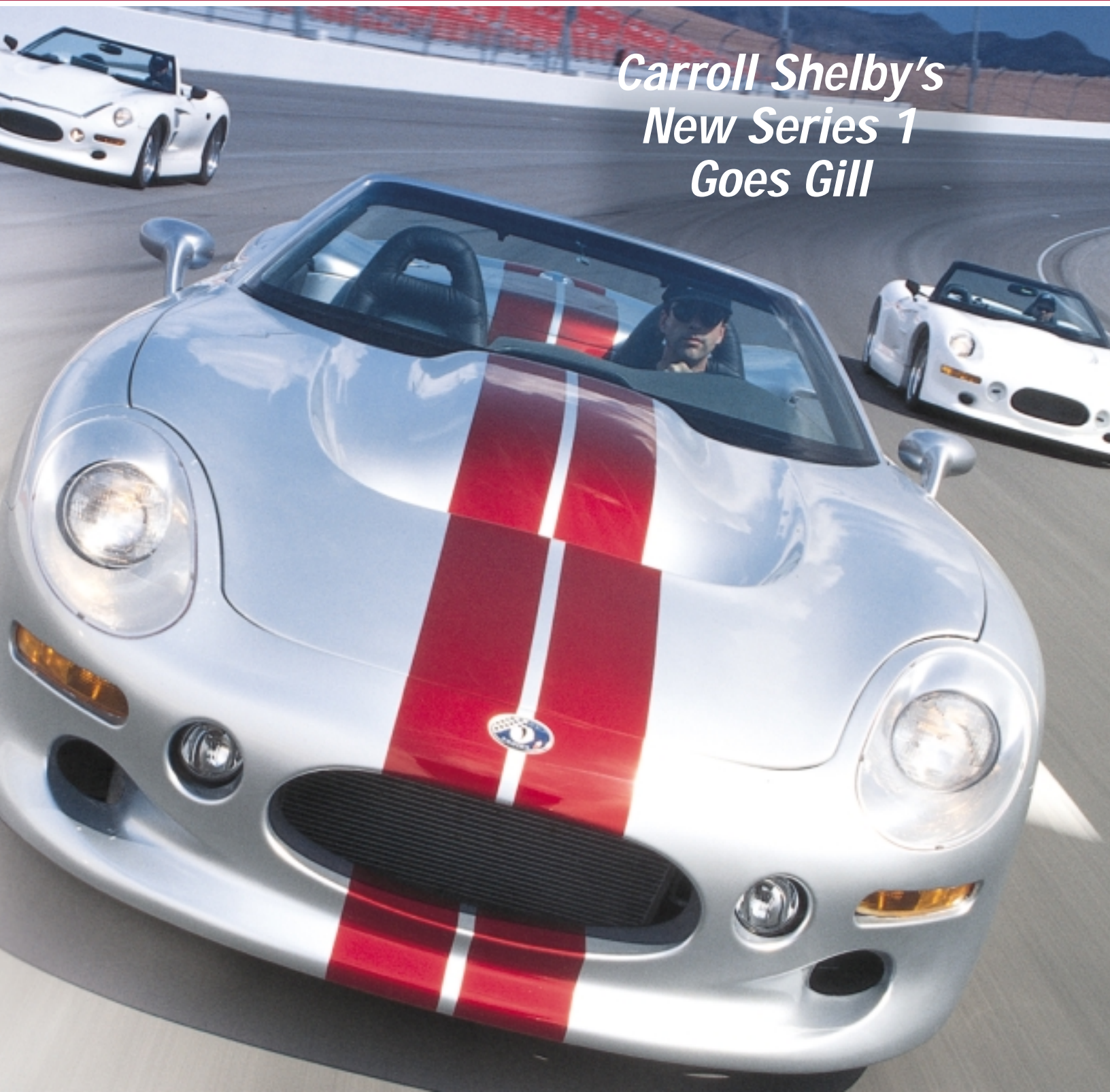


# THE M.C. GILL DOORWAY

*New Vistas in Composites*

M.C. GILL CORP., 4056 EASY ST., EL MONTE, CA 91731 • PHONE (626) 443-4022 • FAX (626) 350-5880 • <http://www.mcgillcorp.com>

*Carroll Shelby's  
New Series 1  
Goes Gill*



# The New Series 1:

***Production Limited to 500!***



*Photos courtesy of Motor Trend magazine*

*There's no glovebox, no cupholders, no spare tire (nor room for one). No airbags, no automatic seat adjustment. And there's only three cubic feet of cargo space (for about one suitcase). Yet, people are standing in line to pay just over \$100,000 for this vehicle.*

*Such is the magnetism of the Carroll Shelby name and virtually any automobile to which that name is attached. The Shelby Series 1, the all-new modern lightweight two-seater, made its public debut on October 19, 1998 at Shelby's manufacturing facility in Las Vegas, Nevada.*

*In its November 1998 issue, Motor Trend magazine calls the Series 1 the "most significant car Carroll has ever produced." Yes, even more so than the Shelby Cobra, the car that won the LeMans beating some of the world's finest racing machines.*

**In Motor Trend's November '98 issue cover story author Matt Stone reports on his two days of test drives,** interviews, and background material compilation. He gave high marks to Shelby's new Series 1 for almost every facet of the car's performance. Given the following data, those marks come as no surprise; and, judging from the comments overheard at the early October public introduction, his impressions were shared by many in the crowd.

Acceleration, sec.	Standing quarter mile, sec/mph	12.8/109.9
0-30 mph 1.8	0-100-0 mph, sec	14.7
0-40 mph 2.5	Braking, ft:	
0-50 mph 3.4	60-0 mph	129
0-60 mph 4.4	100-0 mph	345
0-70 mph 5.7	Lateral acceleration, g:	0.94
0-80 mph 7.1	Speed thru 600-ft. slalom, mph:	67
0-90 mph 9.0	EPA fuel economy, city/hwy, mpg:	16/27
0-100 mph 11.0	Estimated range, city/hwy, mpg:	320/540



## *The focus on the car's light weight put the focus on M.C. Gill*

In a departure from our usual product applications in the commercial aviation industry, the M.C. Gill Corporation played an integral role in the development of the Series 1. It all started in early '98 when we received an inquiry concerning mechanical property values of our Gillfab 4030 sandwich panel of aluminum facings bonded to an aluminum honeycomb core. This particular construction is used for many different applications and has been a standard in the aviation industry for years, where light weight and strength are essentials.

The caller identified himself as Mark Visconti and stated that **the end use was for a prototype sports car.** That was the extent of the information. We sent him a Product Data Sheet and marked the calendar for a follow up in a couple of weeks.

In the course of following up we learned more and more about what was expected of the panel; that it

was for the Shelby America Series 1, and that Shelby was going to do the fabrication on the raw stock panels by hand! Finally, Mr. Visconti suggested that it would be appropriate for us to contact his company's purchasing department in Las Vegas to provide pricing for specific quantities of specific parts. We did so, submitted a quotation for raw stock 4030-type panels in varying thicknesses.

Cindy Walker, the M.C. Gill sales representative that received the original call and had done all the follow up, concurred that a trip to the Las Vegas was in order. She wanted to learn more about the company, the car, and to further determine what was expected of M.C. Gill's part in this venture. It was a worthwhile trip. While there she learned more about the Series 1, that Mark Visconti was the Production Manager, and that our panels were to be used for interior components, ***primarily flooring.***

### **Familiarity with Prototype Development**

During M.C.'s early pioneer days and the composite industry's formative years almost everything he did was a prototype. He was always looking for new end uses and still does for that matter.

In fact, the basic combination of aluminum facings bonded to an aluminum honeycomb core has been used as integral components time and time again in such prototype constructions as discussed in previous Doorway issues:

- The hull of the Miss Budweiser unlimited hydroplane racing boat (Spring 1987);
- A high tech food serving cart that simultaneously keeps some foods heated and others chilled (Summer 1987);
- Quality cabinetry, where semi-structural qualities are required, in executive business jet aircraft (Summer 1987);
- The bed on a flat bed plotter used for drafting CAD/CAM drawings (Winter 1984); and,
- Large doors (up to 14" wide and 84" high) on electronic equipment storage cabinets used in military aircraft (Fall 1994).



**Carroll Shelby has been thinking about race cars since before he was a teenager.** He had his first racing experience in 1945 in a borrowed car on a half mile track near

Dallas, Texas. His first international race was the World Championship event in the Argentina 100 kilometers in 1954.

After a long, successful relationship with Astor-Martin he retired from the race circuit. In 1960 he began to pursue his goal of

manufacturing race cars. He combined the chassis of a Bristol Aircraft Company AC Ace with a Ford V-8 engine and the now classic Shelby Cobra was born.

In the next five years his cars won two world championships, the 1965 GT (with the Cobra) and the Prototype World Championship for Ford in 1966. In 1969, he announced his Company's withdrawal to concentrate on manufacturing.

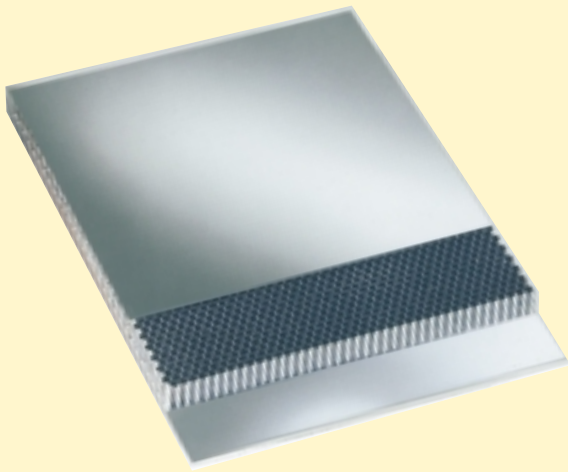
Between 1962 and 1970 Shelby American built more than 1,000 Cobras and almost 3,000 of the original Ford GT Mustangs. In

1982 he contracted with Chrysler to build performance cars based on Dodge products. Working with Chrysler engineers, he developed a series of cars over the next ten years, including the Dodge Viper.

In 1992 he drove the Viper pace car at the Indy 500. That fall he was inducted into the Automobile Hall of Fame.

The Oldsmobile powered Shelby American Series 1 is merely Carroll's latest project.

As he puts it, "All we wanted to do was have some fun and beat the Corvettes and Ferraris."



# Aluminum/ Aluminum...

**The first Shelby Series 1 prototype** utilized carbon faced/aramid honeycomb core sandwich panels (not M.C. Gill's). But the final decision was made to use a panel with aluminum facings and aluminum honeycomb core for all other prototypes and production cars. The decision was made for several reasons, among them:

- Shelby engineers were concerned that the carbon facings of the original panels would not have the durability required to withstand road debris, e.g., gravel, sand, dirt, and other foreign objects continually hitting the bottom side of the panels under normal driving conditions;
- Shelby engineer's requested that 2024-T3 aluminum be used for the M.C. Gill parts. Although the parts would be subjected to such climatic conditions as rain and snow, and 6061-T6 aluminum is more corrosion resistant, pound for pound it is not as strong as 2024-T3. To increase that strength would require heavier aluminum and, in this case, lighter weight was a more important consideration than exposure and resistance to the elements; therefore, 2024-T3; and,
- Although there was some weight penalty using aluminum/aluminum instead of carbon/aramid honeycomb it wasn't significant enough to override the other concerns. Also there was a certain advantage in the commonality of raw materials. With few exceptions, the Shelby Series 1 is constructed almost entirely of aluminum.

As stated previously, Gillfab 4030 has been a standard material used in the commercial aviation industry during our entire 53 year existence. It has a high strength-to-weight ratio with a service temperature range between -70°F and 160°F and higher depending on the adhesive used, with short term at 250°F. Because of its versatility, it has found a multiplicity of uses in other areas--automotive and boats, [building] to name just two. The data in Table 1 offer property values for various cell sizes and densities on page 6.

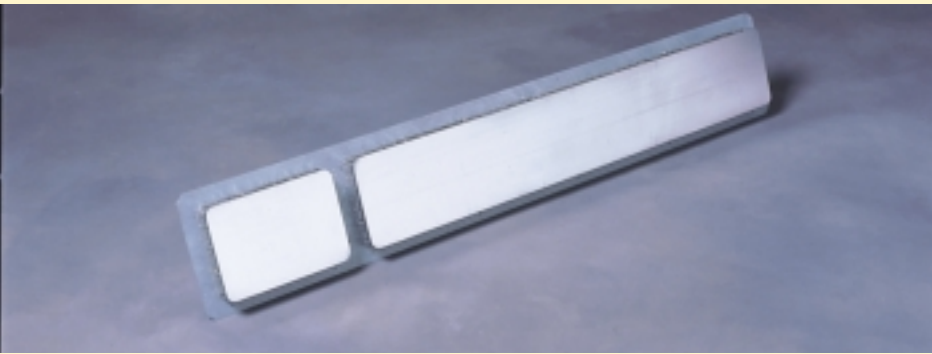


*The small panel is a front rocker panel and measures 10" x 14"; the larger one is for the seat back and is 32" x 34". Both panels are 1 1/2" thick.*

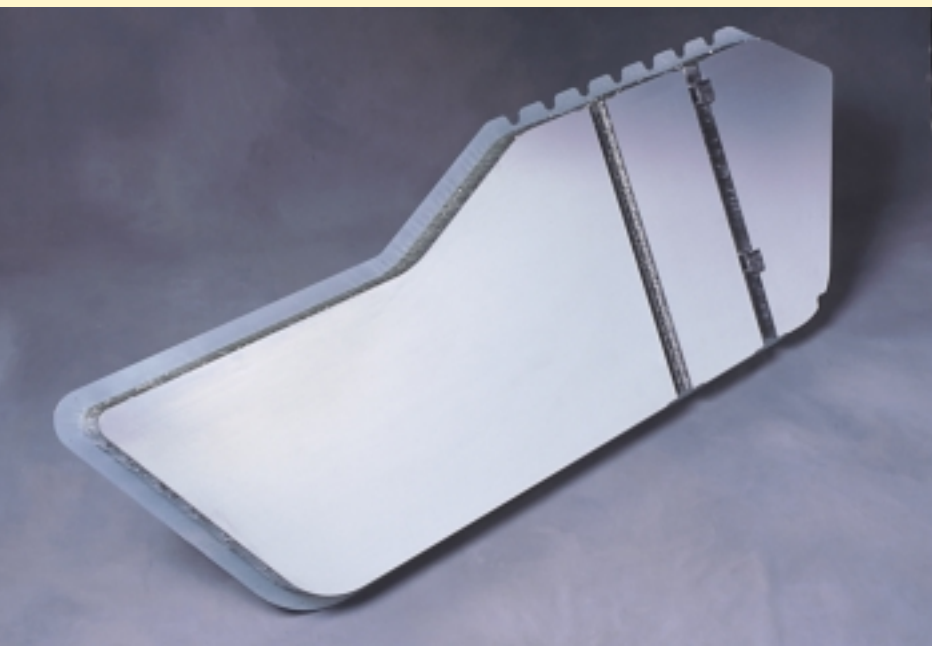
## **Four On The Floor (on each side)**

M.C. Gill manufactures eight pieces for each Series 1 car--flooring, seat backs, outside and front rocker panels. They range in length from less than 1.5 feet to seven feet; from 8 inches to more than two feet wide; and, from 1.5 to 3.0 inches thick. Four of the eight pieces are for the left side of the car, the other four are the mirror image of the right side. The first "ship set" was delivered in May 1998 and was incorporated in the second prototype.

# *Shelby's Composite of Choice*



*Side rocker panel measuring 10" x 48" and 1 1/2" thick.*



*The small panel is a front racker panel and measures 10" x 14"; the larger one is for the seat back and is 32" x 34". Both panels are 1 1/2" thick.*

## **Fabricated Panels Speed Things Up**

While in Las Vegas, Ms. Walker made a further sales presentation regarding fabrication of the panels. By this time, Shelby had completed some of that work and was more receptive to a proposal from M.C. Gill to do the work. As photographs here indicate, some of the panels are relatively intricate and would appear to be more suited for CNC profiling rather than by a hand held router. Ultimately, the decision was made for M.C. Gill to do the fabrication on our CNC machines for the life of the car's production.

Working from drawings provided by Shelby American, M.C. Gill CNC engineers digitized the data and transferred it to the CNC computers. The parts were then routed from raw stock panels manufactured by us, inspected by our Quality Assurance team, packaged and shipped in accordance with Shelby's production requirements.

## *A Gentle Reminder*

*At the beginning of this article we mentioned the price of the Shelby Series 1. To save our readers the time involved in locating one of the only 25 dealers that will sell it, we repeat the base price of the vehicle is \$106,975, glovebox, etc. not included.*



## DATA ON GILLFAB 4030 USED IN THE SHELBY SERIES 1

Based on 0.5" Thick Panel with 0.020/0.020" Thick Facings and  
3/16" - 5.7 PCF Nominal Density Aluminum Core  
Typical Average Values

Property	Test Method	Unit	Value
Weight	ASTM C29	lbs/sq ft (kg/sq m)	.81 (.37)
Thickness	ASTM C366	inch (mm)	.502 (12.8)
Sandwich Peel "L" Direction	MIL-STD 401B	in-lb(N-m)/3 in width	56 (6.3)
Sandwich Peel, 30 Day Water Soak	MIL-STD 401B	in-lb(N-m)/3 in width	48 (5.4)
Long Beam Flexural Ultimate Load	MIL-STD 401B	lb (N)	484 (2153)
Facing Stress		ksi (MPa)	42 (290)
Deflection @ 100 lbs load		inch	0.15 (3.81)
Flatwise Compression	Mil-STD 401B	lb/sq in (kPa)	570 (3930)
Flatwise Tensile	Mil-STD 401B	lb/sq in (kPa)	1440 (9928)
Impact Strength	ASTM 3029	in-lb (N-m)	78 (105.9)
Flammability-60 sec. Self-Extinguishing Time	FAR 25.853	second	0
Burn Length		inch (mm)	0.10 (2.5)
Drip Time		second	0
Flammability - 45 sec. Self-Extinguishing Time	FAR 25.853	Second	0
Afterglow		Second	0
Penetration			None

Core Cell	Density PCF	Core Shear Ribbon Dir. PSI	Flatwise Tensile PSI	Type of Failure*	C.D. Peel in.-lb./3
3/8"	3.0	190	740	(core)	30
1/8"	3.1	220	750	(core)	50
3/8"	3.6	250	740	(adhesive)	50
1/4"	4.3	330	940	(core)	64
1/8"	4.5	350	1100	(core)	72
1/4"	6.0	505	990	(core)	61
1/4"	7.9	680	1100	(adhesive)	68
1/8"	8.1	710	1200	(adhesive)	72

\*Type of Failure - Core - core torn apart; Adhesive - bond failed.

# GILLFAB PROTECT

### Some Background

As many of our readers know, the FAA recently ruled that all commercial aircraft in the United States carrying 20 or more passengers must be equipped with fire detection and suppression equipment in cargo compartments—either as original equipment or as a retrofit. The latter must be accomplished by the year 2000.

The purpose of the equipment is to detect potential fire-related conditions and to extinguish them before they endanger the safety of the aircraft, its passengers and crew.

### The Very First

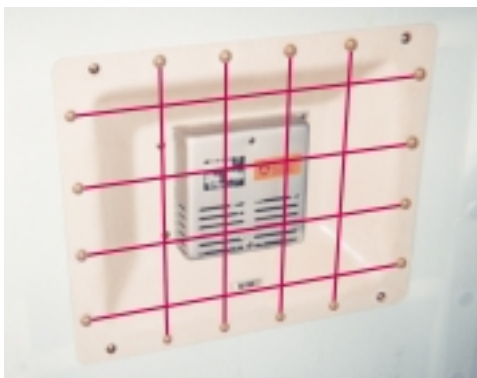
Delta was the first major U.S. airline to begin compliance with FAR 25.857 (for Class C cargo compartments). Early in the planning process, the airline realized that this sensitive equipment would have to have some sort of housing that would protect it from damage resulting in shifting or mishandled cargo and baggage.

Working in concert with Delta's engineers, we assisted in the design phase, then manufactured prototypes, made required changes, passed all applicable FAA tests, began producing the parts last year, and made the first delivery in July 1997. The initial production run is for Delta's 737-200 fleet.

Delta holds the supplemental type certification for the design configurations (three in all) for the 737-200 housings and M.C. Gill has received the Part Manufacturing Authority (PMA) to produce them.



# 6000 SERIES COMPOSITE S DELTA'S FIRE DETECTORS



*A flush ceiling-mounted smoke detector encased in the fiberglass reinforced housing. The red wires are installed last and serve as added protection for the detector.*



*Ceiling-mounted smoke detection unit (right) and a central electronic unit (the black box on the left) shown prior to installation of the wire grid. If smoke is detected, one of the detection units transmits a signal to the central electronic unit which in turn sends the signal on the cockpit, thus alerting crew members.*

## **Manufacturing Process**

As stated previously, all three housing types are located in the cargo compartment and there is a total of eleven pieces — nine detection units and two central electronic units. They are constructed of multi-ply of

fiberglass reinforced modified epoxy resin. The number of plies is dependent on the size of the housing and its location in the cargo compartment. Once the lay-up is complete and the part has been pressed, one of M.C. Gill Corp.'s five axis CNC machines trims it to the final dimensions and drills the required number of holes before it is inspected, marked, and shipped.

As is the case with all cargo compartment related products, the finished parts pass all applicable FAA fire-related FARs—including 60 second and 45° burn tests, and burn through.

## **Gill Capability For All Aircraft**

Although the housings' three designs are unique to Delta's 737-200 aircraft, M.C. Gill has the capability to manufacture similar parts for any aircraft. In fact, the company is currently manufacturing housings for the Hollingsead Company who has a contract with Northwest to manufacture and install fire detection and suppression systems in that airline's fleet.

"This company was founded on its ability to find opportunities to assist our customers. In this instance, Delta came to us, explained what they needed and asked if we could help them," said Stephen Gill. "We welcomed their inquiry, not only because Delta is a long time and valued customer, but it afforded us another opportunity for a new application of our products. It allows us to continue to contribute to the safety of commercial passenger aircraft. We've risen to that occasion for many many years and will continue to do so."



*Epoxy prepregged glass cloth tailored to the male half of the matched die mold.*



*Preformed prepreg in the press prior to closing the mold.*



*Press operator performs routine wall thickness check with a micrometer.*

# THE FUNNY SIDE

Have you ever seen falling rocks in a falling rock zone?

★★★★★

If we all became what we wanted to be when we grew up, would we be living in a world full of cowboys, ballerinas, and firemen?

★★★★★

If at first you don't succeed, find out if the loser gets anything.

★★★★★

Adam and Eve had the ideal marriage. He never compared her cooking to his mother's and she never talked about all the men she could have married.

★★★★★

It IS as bad as you think, and they ARE out to get you.

★★★★★

We've had bosses who took an IQ test and the results were negative.

★★★★★

Where there's a will, I want to be in it.

★★★★★

It's lonely at the top, but you eat better.

★★★★★

Warning: Dates in your calendar are closer than they appear.

★★★★★

We're born naked, wet, and hungry. Then things get worse.

★★★★★

Make it idiot proof and along comes a better idiot.

★★★★★

He who laughs last thinks slowest.

# Trivia

Almost two-thirds of all Americans choose to live in the state where they were born.

★★★★★

The average mail carrier walks 5.2 miles per delivery day.

★★★★★

Most people put their left sock on first.

★★★★★

The difference between a pig and a hog is weight. The former weighs less than 180 pounds; the latter, more.

★★★★★

One out of 33 Americans never eat candy.

★★★★★

One-third of the U.S. population over 14 cannot swim.

★★★★★

The olive tree is mentioned 37 times in the Bible.

★★★★★

Only three percent of inventors make a profit from their inventions.

★★★★★

63 percent of Americans want to hear the bad news first.

★★★★★

The decibel level of a snore can be almost as loud as a pneumatic drill.

★★★★★

Bugs Bunny was originally named Happy Bunny.

★★★★★

The four most popular names for pet female cats are Misty, Muffin, Fluffy, and Samantha.

★★★★★

Mark Twain took out a patent for suspenders.

★★★★★

Yo-Yos were first used by the Greeks in 450 B.C.