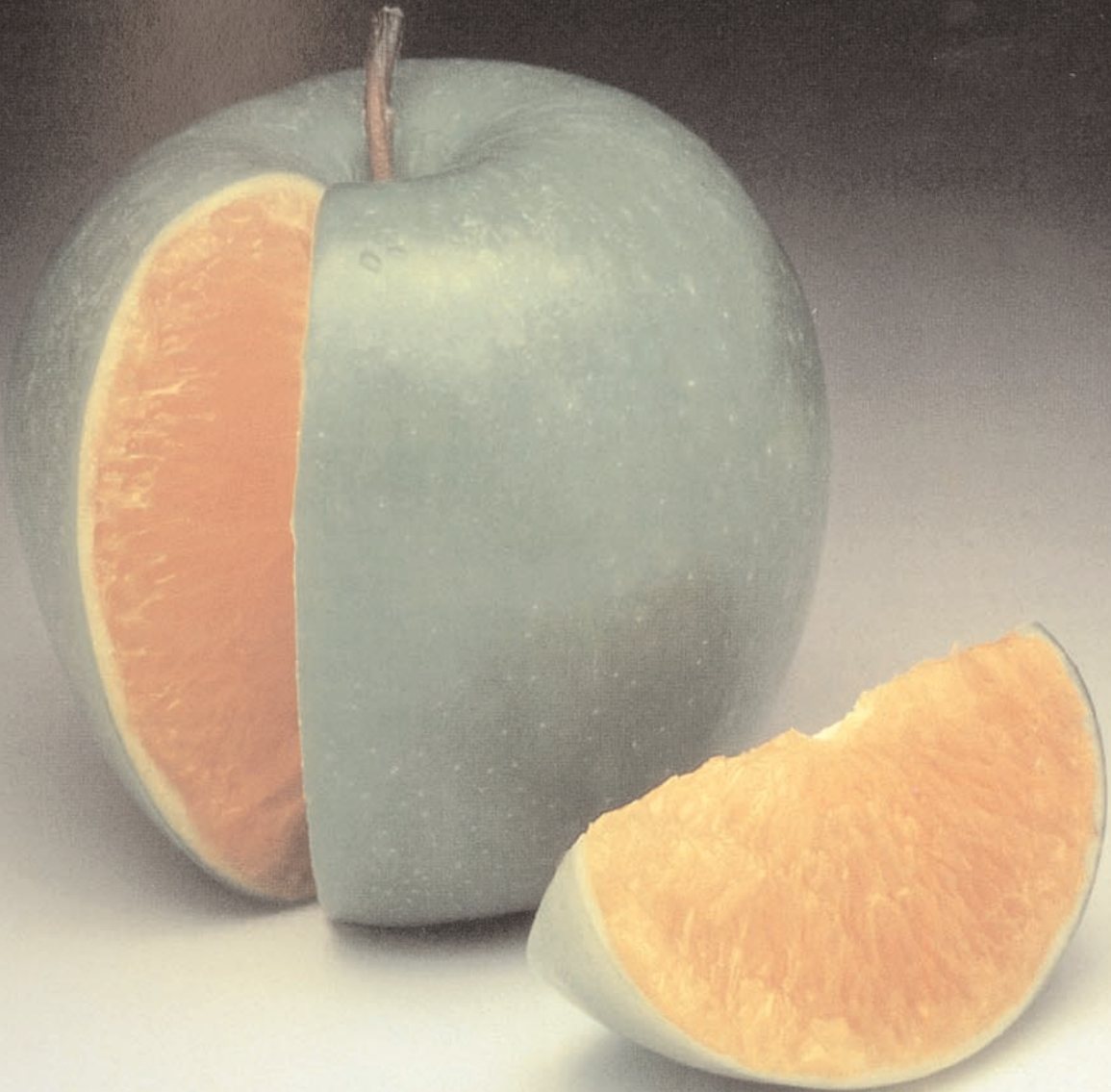


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NUMBER 4



THE M.C. GILL DOORWAY

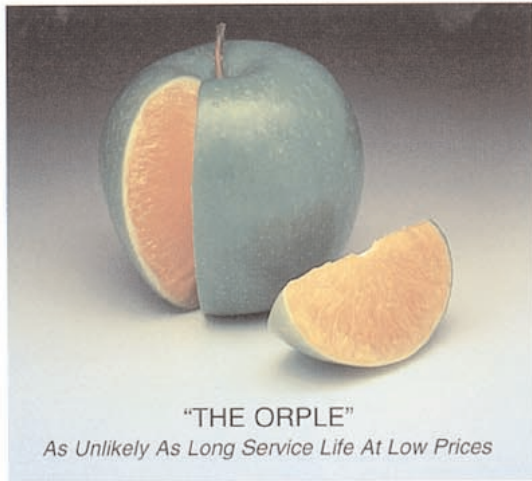
M.C. GILL CORP., 4056 EASY ST., EL MONTE, CA 91731 • PHONE (818) 443-4022 • TELEX 67-7467 • FAX (818) 350-5880



It ain't ever gonna happen.

M.C. GILL SALES TRAIN

CRITERIA FOR SELECTING SANDWICH PANELS...AS



Introduction

We started the second half of our training session with United Aerospace Corporation, our Central and South American sales agency, by reiterating to them what they already knew—we've entered an intensely competitive era in the commercial aviation business, especially with sandwich panels.

We stressed to them that we have competition, some of whom will claim that their panels are "or equals" and at a lower price. That condition is as rare as the Dodo or the Orple. You Can't Have It Both Ways! Top notch quality at bargain basement prices is an oxymoron—it just ain't ever gonna happen! Because things are not always as they seem, be on guard and alert our customers to do the same. Composites is a "bear down" cut-no-corners business!

We believed we needed to educate the UAC arm of our sales force even more. We re-emphasized that there's more to bonding composites than meets the eye—we're the best in the business, and we intend to keep it that way.

High sounding words but what do they mean? We have to back them up because we can't expect the customer to accept them on faith. So we started the afternoon with the following story which emphasizes Mr. M.C. Gill's beliefs about first cost vs. value.

There is no substitute for experience

In following up on a recent quotation we learned we had lost the bid to a competitor on price, but the prospective customer suggested we'd have future opportunities if we were more competitive. M.C.'s response was typical. "Be more competitive—in what way? Are we talking price or value? We make the product [5007A in this case] as inexpensively as we can, consistent with the use intended. We developed it 30 years ago! They [our customer—an independent maintenance facility] should want the best for their customer if they want repeat business. Specify a specialist!"

Things are not always as they seem

Here's Why #1:

"Times are tough in the airline business," we told the UAC group, "but if you anticipate the competition and you know your product line, you can blunt the low price dodge."

The following examples drove home our point. The first is M.C. Gill part number 5040... balsa wood core faced with aluminum. Basic construction. Been around forever. People take it for granted. Anyone can make it, right? Wrong!

The following may sound self-serving, but we pointed out that knock-off artists give products a bad name. In fact, we like good healthy competition (keeps us on our toes) but the fly-by-nighters hurt conscientious manufacturers and we wanted to set the record straight.

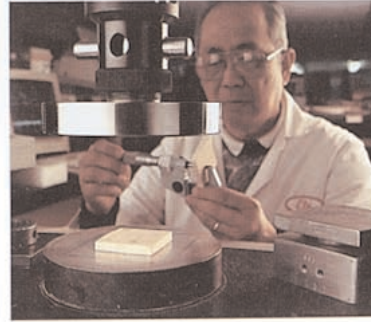
"Here's what we want you, our representatives, to point out to our customers. M.C. Gill pioneered the development and



Aluminum sheets for sandwich panel facings are cleaned in these 54" x 174" tanks into two different solutions.



M.C., at right, with Jacques Kohn, Balteq President, inspecting a block of Balsa wood at the mill in Ecuador.



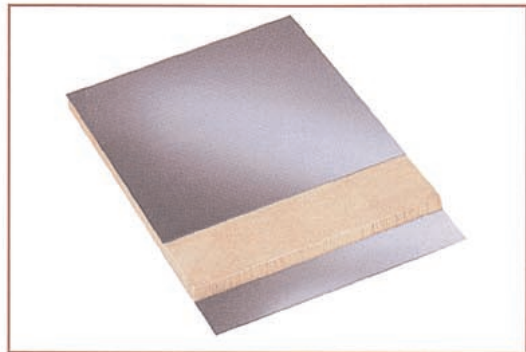
M.C. Gill Quality Assurance technician checking the compressive strength of end grain balsa core.



This sample sheet of end grain balsa shows the number of samples that have been cut out for routine Q.C. density checks.

ING SEMINAR - PART II

PRESENTED TO UNITED AEROSPACE CORPORATION*



use of end grain balsa wood core (the grain of the wood is perpendicular to the panel surface) sandwich panels for aircraft flooring more than thirty years ago, and it's been one of our best selling products ever since.

"So, if your customer is tempted to buy aluminum faced balsa core panels from some Johnny-Come-Lately because it's a little cheaper, point out the following examples of why he should buy from Gill:

- "You can't see the balsa core so you *must* trust your supplier that it has a consistent density and no voids.
- "Does brand X use the correct alloy, hardness and thickness whichever OEM's specification is called out—one which we helped develop in the early sixties?
- "Gill will use whatever grade aluminum facing the customer or spec calls out (*not* whatever we have on hand or whatever's cheapest). A person can't tell the alloy or the thickness merely by looking—that's why trust in a supplier is so important.
- "Gill caustic cleans and acid etches the aluminum skins to ensure they will adhere to the adhesive, so the peel and moisture resistance values will thus be higher. (We could cut one or both of these steps, and some do, to save money but it would be at the expense of product longevity).

- "M.C. Gill has its own written specification for the type of balsa we purchase. And we've found only one supplier in 30 years who can consistently meet our spec. Experience has guided us in preparing a process specification to aid our suppliers regarding the adhesive and its application to the sticks in the laminated balsa block. (Ed. note: Balsa quality control was so important to M.C. that he actually went to the Baltek Corporation mill in Ecuador to observe and learn how the blocks of varying densities were put together. See second picture on the left on page 2).

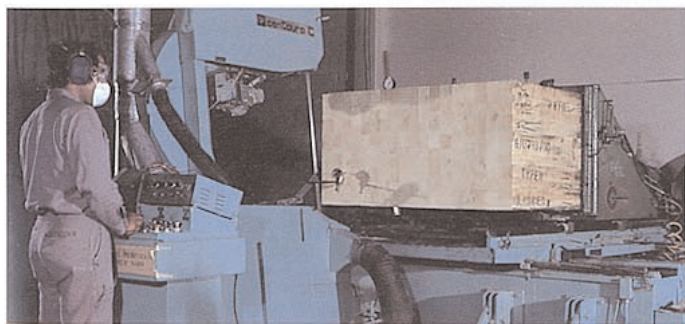
- "Gill inspects *each* shipment of balsa at the receiving dock before it's ever accepted into inventory. We reject some because balsa, a naturally occurring wood, has inconsistencies that must be controlled.

- "Then, Gill's balsa saw operator screens every slice for hardness of the sticks (density), thickness, and those deviations in quality that are peculiar to balsa (and he's been cutting balsa for almost 21 years).

- "Gill uses a more expensive adhesive which is known throughout the industry for its high peel and water resistance values. To economize on adhesive is folly, because it's the critical component which holds everything together; quality and first cost can be (and is) cut here by the Johnny-Come-Latelys at the expense of longevity. We coat both, facings and core.

- "Not only has a quality assurance technician inspected raw materials, but also in-process work *and* the final product—that's why our balsa panels have a 30-year record of outstanding service."

* *In Part I, our Summer 1993 issue of the Doorway, we inadvertently printed the name in the subheading as "United Aircraft Corporation" instead of "United Aerospace Corporation." We regret this error. (Anyone notice it?)*



This specially built saw cuts end grain balsa wood into slices with tolerances of $\pm .005$ ". It ensures that a panel's overall thicknesses will be uniform and a 100% bond line achieved.



Balsa saw operator tests slice for proper hardness. This screening test will indicate if further testing is necessary.

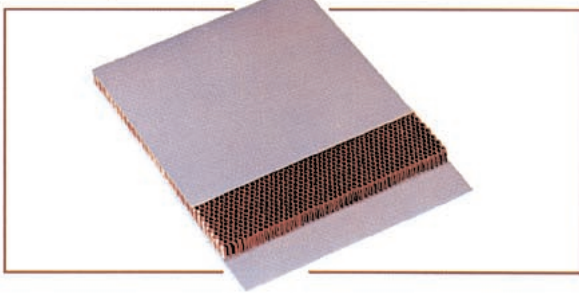


The climbing drum peel test measures force required to separate facing from core; also strength of the adhesive.

We make the Component Parts—and monitor

Things are not always as they seem

Here's Why #2:



We wanted to give the UAC reps an idea of the strict attention to detail we pay to the final product and introduce them to a long time guiding principle at the M.C. Gill Corp. that “trifles make perfection and perfection is no trifle!” M.C. sometimes refers to it as TLC (Tender Loving Care). So, we wanted our second example to concern a product that has a higher degree of difficulty to make than most, and is more than just a “stick-em-together” knock-off.

We asked our Production Manager to pick one that his crew really babies during each step of the manufacturing process. The product he selected is a uni-directional faced/aramid-fiber honeycomb core flooring panel that is used as original equipment and for replacement parts. Once the manufacturing process is complete, the product is very durable and strong, but a great deal of care must be taken with component parts. The following is a condensed version of what he told us.

“Keep in mind that each step is followed for every single panel of this kind we make. These are the selling points you should know and pass on to your customers as reasons to buy from Gill.



“First, the rovings (strands) are run through the uni-directional impregnator to produce the ribbon-like prepreg (coating the strands with a specially formulated resin) for the facings. Special handling is required because the fibers are very fragile before they are coated with the resin, they lose tensile strength with rough handling, and the number of strands per inch is critical.

“The prepreg is then taken to the press, laid up (stacked to the prescribed thickness), and pressed. Point out to your customers that each prepreg has its own

peculiarities. Because we make our own, we know what they are. Knock-off artists who buy prepreg elsewhere cannot be sure just exactly what they're receiving. They have no control over the quality, either on a sheet-to-sheet basis or within each sheet, without firsthand knowledge and control of its prior processing.

“From the press, the facings go to the cutting room where the flashing (excess material around the perimeter of the skin) is trimmed off. At this time the sheets are measured dimensionally and visually inspected for flaws and other discrepancies.

“Weight tolerances are very tight so we weigh each layer before pressing each set of facings (top and bottom pieces) to calculate the pounds per square foot. At the same time we inspect for fiber alignment and splits to ensure uniformity.



“If the weight and dimensions are within the specification's tolerances, the facings are ready for bonding to the aramid fiber honeycomb core (which WE manufacture as opposed to buying it from a second party). The core has been sliced to the precise thickness, weighed, and density confirmed.

“The adhesive (which we also manufacture) must be systematically weighed too, again to ensure that panel weight meets the spec. The components are then laid up, layer by layer, and pressed. Finally, the finished panel is weighed to conform to the specification's total weight requirements.

“This,” we stressed to the UAC folks, “is for a finished product that weighs a fraction more than 8 ounces per square foot! We manufacture thousands of these panels every year and, as we said, we repeat the preceding process *for every single one of them!* The process is complicated by the fact that there are different weight requirements for different airframe manufacturers and their customers — identical raw material constructions but different physical and mechanical specifications.”

We anticipated the unspoken question in our agents' collective eyes (“Is it worth it?”) by asking them which product they'd rather buy — the M.C. Gill panel, with more than 30 years of know-how behind it, or the one made by the vendor that buys his prepreg, adhesive or core, or all three from different sources? Their answer was obvious, but we stressed to them that they must get the word to the end user and make it understood why panels made by Gill are superior in quality and long life.

them at every step in the production process

There is no substitute for experience

We make the component parts and we monitor them at every step in the production process. Then we take OUR components and manufacture the end product. Only by doing this can we assume total accountability and traceability for the quality of our products. It costs more but it adds value.

Things are not always as they seem

HISTORY OF SANDWICH PANELS

Just as sales people need to know their products and the competitors' products, it is important to know the history and evolution of the product line.

In the early days of commercial aviation, aluminum sheet facings with riveted aluminum hat section stiffeners were often used for flooring. Drawbacks to this type of flooring included aluminum corrosion and the hat section stiffeners had no memory. They took a permanent set when deformed and rivets pulled out due to fatigue. Therefore, damaged sections had to be cut out and replaced using sheet metal fabrication procedures.

Plywood also saw limited service as flooring core material. It was usually faced with aluminum or stainless steel. Despite its ready availability and low purchase cost, it was heavy, vulnerable to moisture (and resultant weight gain), subject to corrosion if it had aluminum facings, and did not meet modern flammability requirements.

The early jet age saw the 707, and Convair 880 and 990 still using aluminum faced sandwich panels, but with aluminum honeycomb as the core. Improvements in adhesives and rapid development of non-aluminum honeycombs occurred during this period.

Aluminum covered balsa wood, briefly used in the 1940's, was reintroduced by the M.C. Gill Corporation with greatly improved adhesive and with the end grain configuration. Its use as a flooring core material in the early 1960's was facilitated by improvements in adhesive systems. Gill made the first fiberglass reinforced plastic (FRP)/end grain balsa floor panels in 1963 (5007). That product was upgraded in 1970 (5007A) by one step fusing of the laminate into the balsa as opposed to secondary bonding (to our knowledge, no competitor can yet do this); again in 1976 (5007B); yet again in 1979 (5007C); and still again in 1992 (5007P), in which the balsa is treated to produce low smoke emissions and is currently undergoing in-service testing.

With the exception of 5007, all are still being used today—almost 25 years later—attesting to their desirability as flooring material. One reason for the 5007 series longevity and popularity is the care and attention to detail M.C. Gill pays to the balsa wood itself, as mentioned in the paragraphs on our 5040 sandwich panel. FRP/end grain balsa panels can boast of proven service life, corrosion resistance, simple edge sealing

and dent resistance to women's high heels — the original selling feature when it was first introduced more than thirty years ago. Balsa has a first cost from 20 to 60 percent less than honeycomb core flooring and at no sacrifice in quality. As one of our customers once said of 5007C, "We put it in and we forget it!" A structural engineer for a British airline once pointed out to M.C. that come what may, nothing less than 8 pcf flooring core would stand up, be it aluminum or aramid honeycomb, or balsa. We passed this on to our UAC reps.

As specialized jet aircraft were introduced in the mid and late 1950's, flooring likewise became more specialized. The 1960's saw large jets, such as the 747, DC-10, and L-1011, designed for long distance flights, requiring lighter weight materials while maintaining key serviceability characteristics. Short haul jets such as the 737 and DC-9 experienced relatively greater wear and tear, and the emphasis was not so much on light weight as on durability for the wear and tear of short hauls caused by frequent passenger loading and unloading.

More developments in the 80's

By the 1980's, aramid honeycomb was the core material of choice and was used most often with either unidirectional (our 4017 is an example) or woven fiberglass facings. In recent years, design engineers have been continually striving for lighter weight materials throughout aircraft, and flooring is no exception. As a result, aramid honeycomb core and carbon facings, though very expensive compared to other facings, is becoming a more widely used flooring panel construction.

Finally, phenolic resin systems, because of their low smoke emissions are replacing epoxies and polyesters as that characteristic becomes more desirable—in fact, mandated by such governing agencies as the Federal Aviation Administration.

Our continuing research efforts are focused on the always present demand for lighter and lighter weight materials, and low smoke/toxicity resin systems and adhesives—all at no sacrifice of strength and durability. Many different types of composite flooring have been tried but few have been successful. Just as we do not expect that to change, we do expect to continue to lead the industry in those successes that inevitably will occur.

Many uses for sandwich panels

Unlike cargo liner, sandwich panels are used throughout a commercial aircraft. Because they have so many end uses (flooring, bulkheads, overhead compartments, galleys, food and beverage carts, garment modules and lavatory cabinetry and surfaces), mechanical and physical properties may be significantly different. We advised the group to encourage their customers to look for other end uses. We thrive on questions of advantages and problems our panels will solve.

SANDWICH PANEL PROPERTIES

Basically, sandwich panels are used for their flex strength, rigidity and light weight. As is apparent from the amount of detail in Table 1, there are many variables to consider when selecting facing and core materials, and adhesives.

"Likewise," we reemphasized to the UAC reps, "it is important to understand that simply having a hot platen press and using it to bond components purchased elsewhere, does not qualify one as having expertise for OEM and airline quality sandwich panels. In fact, we wonder if some competitors realize the pros and cons of the individual components. And, more to the point, the importance of having the proper combination of components so that the end product matches the individual customer's requirements. Ask if our competitors have ever taken the time and effort to discuss how the various components relate to the customer's specific needs."

Sandwich panels designed to the requirement

Our standard raw stock sandwich panels are made on an end-opening press. They are generally four feet wide by eight, ten, or twelve feet long and almost any thickness. We can make them as wide as 10'4" and as long as 14' without step pressing. Or up to 25' long and 14' wide if they are step pressed on our side-opening press—versatility rarely found at our competitors. And all our presses are new or rebuilt to our specifications. Ill-designed presses are guarantees for failure.

Nomex honeycomb core is available in 1/8", 3/16", and 1/4" (up to 1") cell sizes with densities ranging from 1.8 pcf to 12.0 pcf. Aluminum cell sizes are 1/8", 3/16", 1/4", and 3/8" (up to 1"); densities range from 2.3 pcf to 10.1 pcf depending on cell size. End grain balsa wood averages 6, 7, or 9 pcf density. Foam cores can be ordered by resin type and density from one pcf to twenty pcf or more.

Fabrication, too

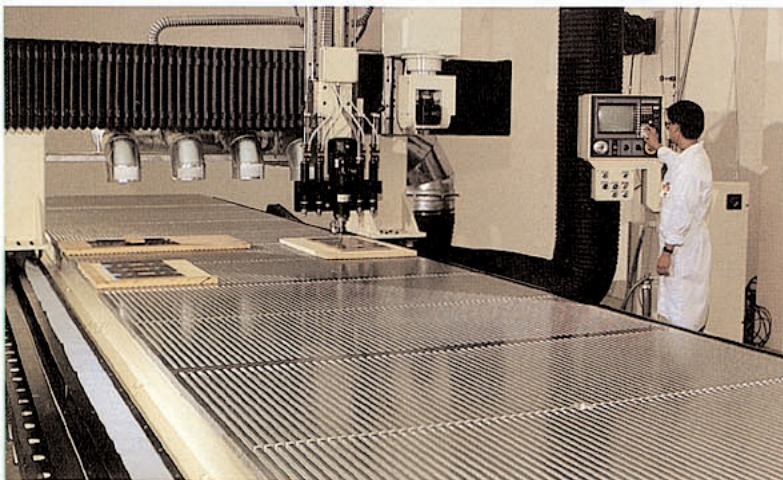
M.C. Gill now has the capability to fabricate raw stock panels with our five-axis CNC (Computer Numerically Controlled) profiler with which we can cut, drill and rout to virtually any configuration.

We recently were awarded a contract from a major airframe manufacturer for finished flooring panels including cutting to shape, routing and filling the edges, drilling holes and placing inserts, and in some cases priming the finished part. With self-adjusting moveable inserts, the part we ship is ready to drop into the aircraft at the appropriate point on the assembly line.

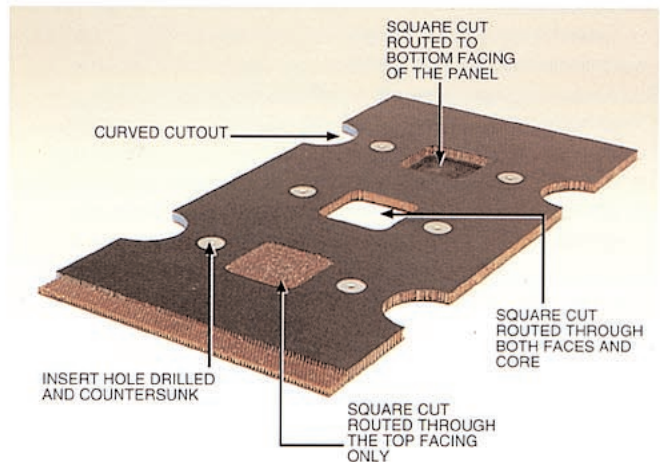
Properties Vs. Use

As was the case with cargo liners, design engineers for flooring of that day determined the desirable properties, those with which they were familiar. But some of their values, based on safety and service considerations, had little or no relation to in-service use.

M.C. Gill has long believed the only true measure of a product's performance is the in-service test. We encourage such testing of our products, and will label and date them for ease of traceability and accountability. How else can one truly judge the worth of the product unless he observes it in actual use day after day, flight after flight. At least one major aircraft tragedy was the result of floor failure—that's why we insist on laboratory tests, and then in-service testing, before we market a new product. In fact, our sales personnel would be pleased to pick up or arrange for shipment to our plant failed panels or cargo liner for study and future improvement. We will gladly share the results of our analysis.



Technician at Monitoring Console alongside the 6' x 30' bed of our CNC Profiler.



Flooring Panel with Aramid Honeycomb Core and Carbon Faces showing some of the configuration options afforded by the CNC profiler.

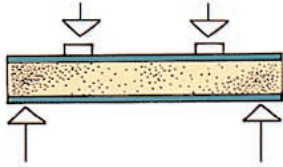
TABLE 1 - SANDWICH PANEL COMPONENTS

Pluses and Minuses

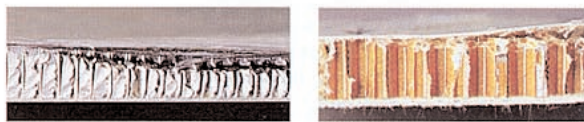
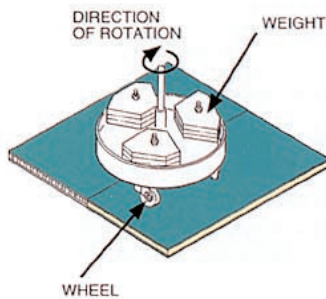
FACINGS		
<p>Aluminum Alloys High rigidity-to-weight Good stiffness Good core shear Non burning and smoking Low corrosion when treated Dents easily High heat contribution and conduction</p> <p>Steels Low carbon: Low cost Very stiff Heavy Prone to corrosion</p> <p>Stainless: High strength and rigidity Difficult to bond</p> <p>Titanium Strong and light Difficult to bond High cost</p>	<p>Plywood/Pressed Hardboard Low cost Non structural Heavy Burns easily Smoke is toxic Absorbs moisture</p> <p>Fiber Reinforced Plastics All are: Corrosion resistant Most Are: Radar transparent Low specific gravity Unidirectional: High impact resistance High specific strengths in specific directions Good abrasion resistance</p> <p>Woven: Easy to cut and trim Resists delamination Good bi-directional</p>	<p>Fiber Reinforced Plastics (continued)</p> <p>E-Glass: High mechanical properties Good chemical, heat and moisture resistance Moderate price</p> <p>S-2 Glass: Very high tensile strength Very good puncture Higher cost than E-Glass</p> <p>Carbon: Very light weight Very good stiffness Excellent fatigue strength and wear resistant Low density and thermal expansion Poor impact strength Galvanic corrosion with aluminum unless latter is properly insulated High cost</p>
CORES		
<p>Rigid Foams Phenolic: Low smoke and toxic emissions Low heat release values Good compression strength Good shear strength Wide density range</p> <p>Polymethacrylamide: Good mechanical properties Water absorbent Burns easily High cost Difficult to bond</p> <p>Poly Vinyl Chloride (PVC): (half PVC/half urethane) Temperature stability Low brittleness Fair fire resistance</p> <p>Polystyrene: Fair mechanical values Low cost High flammability and smoke emission Low temperature resistance</p>	<p>Rigid Foams (continued) Soluble in many solvents which makes it difficult to bond with rubber based adhesives</p> <p>Polyurethane: Solvent and chemical resistant Best thermal insulation Relatively fire retardant High smoke emission Fairly friable</p> <p>End Grain Balsa Wood High endurance in heavy abuse areas High compressive strength Good core shear strength Resistant to point loading High fatigue strength Good thermal insulation Low cost Limited density choices</p> <p>Honeycomb Aramid fiber (Nomex): High fatigue and impact resistance Radar transparent High strength-to-weight ratio</p>	<p>Honeycomb (continued) Corrosion resistant Low smoke and toxic emissions Absorbs moisture High cost Open cells collect liquids</p> <p>Aluminum: Good temperature, corrosion, and moisture resistance if properly treated High strength-to-weight ratio Excellent rigidity No toxic and smoke emissions Lower cost than Nomex Poor burn through resistance Low corrosion and water resistance if not properly treated Open cells collect liquids</p> <p>Crushed (Nomex or aluminum): Can be roll formed Can be substituted for solid sheet aluminum, thickness for thickness, with 1/3 weight savings and no sacrifice in most mechanical properties Higher cost than solid aluminum</p>
ADHESIVES		
<p>Epoxy Modified: Many formulations available for different end uses Relatively low cost</p> <p>High temperature: Produces durable bonds to 350°F Moderately expensive</p>	<p>Vinyl Phenolic Excellent peel Difficult to process Applications limited by environmental laws</p> <p>Urethane Low cost Used with continuous surface material Low water resistance</p>	<p>Contact Elastomeric (rubber base) Satisfactory for non-structural applications Should be applied to facings <i>and</i> core Should be evaluated for cold flow Application limited by environmental laws Inexpensive</p>

THE MOST IMPORTANT PROPERTIES

Based on our almost 50 years of experience, we believe the following



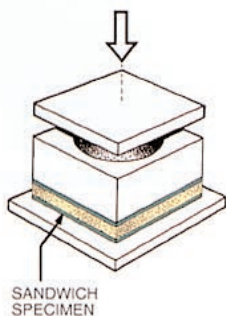
Long Beam Flex tests the facings (which should fail before the core). It is the standard test for determining the load bearing capability of a sandwich panel. It tells you how much weight the panel will support and how much deflection you will experience.



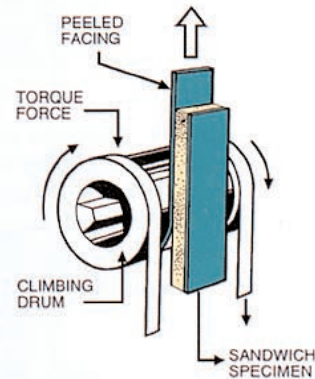
EXAMPLES OF CORE FAILURE IN AN ALUMINUM HONEYCOMB CORE PANEL (LEFT) AND A NOMEX HONEYCOMB CORE PANEL (RIGHT).

Roller Cart test determines the fatigue resistance of the core in an aircraft flooring panel. The test is a meaningful approximation of how flooring will stand up in-service in the aisles of commercial passenger aircraft. It simulates the wear and tear created by food and beverage carts in the aiseways and galleys of these aircraft.

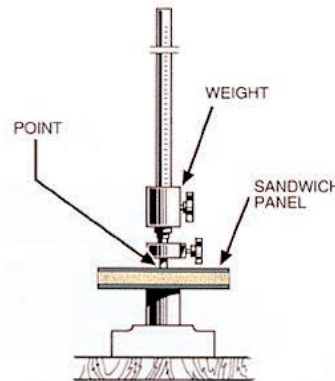
Core Shear tests the core (which should fail first). It reduces the span on a flex test to 15-30 times the panel thickness to see where the core will fail before the facings. Tells you, using a different test method for another component of the panel, essentially the same thing long beam flex does.



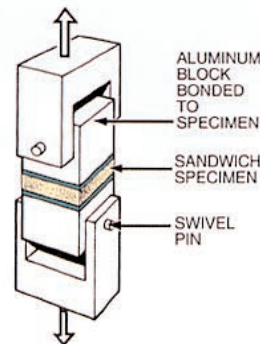
Flatwise Compressive measures the strength of the core in resisting compressive loads, such as women's spiked heels where loads might reach 4,100 psi.



Climbing Drum Peel measures the torque to peel the facing from the core. You don't want the facings pulling away from the core because it reduces the strength of the panel. However, experience has taught us that panels with quite low peel will serve quite well as flooring if the edges are not exposed to peel forces. For example, some of our 5007A panels with low peel values have lasted 20,000 hours in the aisles of jet aircraft. Delaminated flooring is spongy and tends to upset passengers.



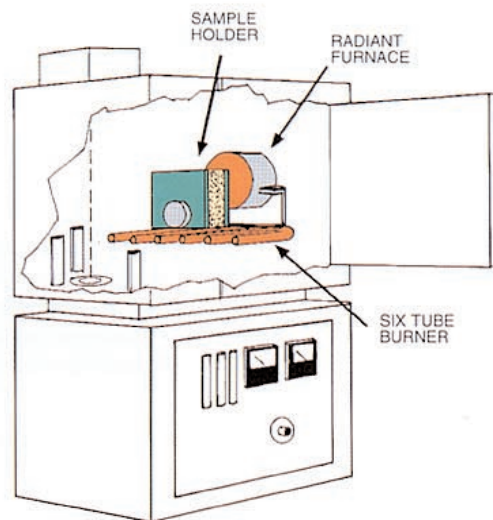
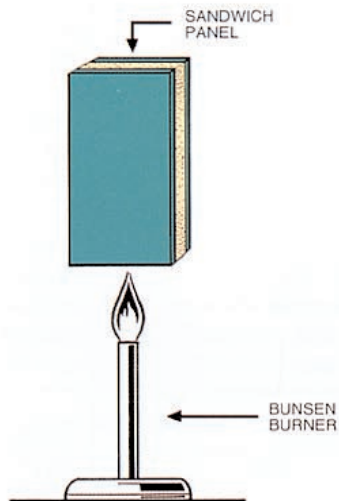
Impact measures the panel's resistance to damage from impact or puncture i.e., weights such as mechanics' tools dropping on an unprotected panel, as well as women's stiletto heels.



Flatwise Tensile measures the strength of the adhesive—a good indication of structural strength of core and adhesive, two very important contributors to the overall strength of the panel.

TY TESTS OF SANDWICH PANELS

Following property tests we perform in our labs are most important



Smoke, Toxic Emissions and Heat Release. Of all a sandwich panel's properties, low smoke and toxic emissions, and low heat release are arguably the most important from a safety standpoint. One result of the tragic aircraft crashes that occurred during the 1980's and early 1990's is increasing concern on the part of the FAA, airframe manufacturers, airlines, and the M.C. Gill Corporation related to passenger hazards caused by post crash conditions, namely fire, smoke and heat.

New standards were established by the FAA in 1988 for heat release rates of certain aircraft components. Heat release values for samples tested are reported in terms of kilowatts of heat per square meter for the peak heat release in terms of kilowatt-minutes per square meter for a two minute integrated heat release. In 1990, the FAA assigned maximum values of 65 and 65 for peak and total heat release (reduced from the original 100/100 in 1986).

The measurement gains perspective when one considers that a one-square foot piece of red oak flooring approximately one-half inch thick will yield readings of 130/130 under identical test conditions—twice the maximum values currently allowed by the FAA.

NIST (NBS) Smoke Chamber measures the smoke emitting properties of materials when exposed to heat and flame under flaming and non-flaming conditions. In other words, if there is a fire, how much smoke will come from the panel and how difficult will it be to see inside the aircraft.

We wanted to impress on our UAC seminar attendees that although flooring panels are not required to pass the heat release tests at this point in time, the M.C. Gill Corp. has developed, in response to customer requests, a number of panels that will pass these tests. To manufacture panels that enable airlines and airframe manufacturers to comply with these new standards, we developed new products and "reintroduced" existing ones that utilize phenolic resin systems in their construction. Our goal is not so much to decrease prices as it is to increase value and service life.

In the morning session we explained that phenolic resins are inherently non-burning and exhibit very low smoke emissions and toxicity in a fire compared to almost any other organic polymer. Most M.C. Gill sandwich panels are well within the FAA's regulations and likely would pass any near future standards that agency might adopt.

QUALIFICATIONS OF SANDWICH PANELS BY AIRCRAFT TYPE

As any good sales force would, UAC personnel wanted to know which of our products are qualified to what aircraft. We prepared Table 2 on the next page as a kind of quick reference guide but we were quick to remind them that these qualifications are not cast in concrete. Rather, we are continually developing

new products in response to airframe manufacturers' requests. In fact, we hope to have some announcements in the next few months that will substantially broaden our base of qualified products. We were not in a position to elaborate but we could see UAC's collective eyes light up at the prospect.

TABLE 2 — SANDWICH PANELS QUALIFIED FOR MAJOR AIRCRAFT

AIRFRAME MFG. & AIRCRAFT MODEL	FLOORING APPLICATION	SPECIFICATION	M.C. GILL PART NUMBER
Airbus Industrie A300 and A310	Passenger Passenger	TL53/5000/79 TL53/5000/79	4105 Ty 1 4105 Ty 2
A320 and A321	Passenger Containerized cargo Bulk cargo	5360M1B000100 5360M1B000100 5360M1B00100	4205 4322 4323
British Aerospace 146-200/300, ATP, and 1000	Passenger (under seat) Passenger (aisle) Cargo compartments	BAeR 3231 BAeR 3231 BAeR 3232	4109 Gr L 4109 Gr M 4004A
Jetstream 31/41	Passenger (under seat) Passenger (aisle)	MAT 006 MAT 003	4004B 4017A
Embraer EMB-110, 120, and 123	Passenger (aisle) Passenger (under seat) Galley or bulkhead Galley or bulkhead Galley or bulkhead Galley or bulkhead Galley or bulkhead	GPS 4009 MEP-15-020 MEP-15-017 GPS 5040 GPS 4122-A GPS 4030 GPS 4017-II	4009 5417 4117 5040 4122A 4030 4017 Ty 2
McDonnell Douglas DC-9, 50 Series	Passenger (aisle & under seat)	DWG BZZ 7002	4017T
MD-80 series/ MD-90 series	Passenger (aisle) Passenger (under seat) Passenger (aisle)	DWG BZZ 7002 DWG S3932194 DWG 7954400 Ty 1	4017T 4106 4109 Ty 1 or 4509 Ty 1
	Passenger (under seat)	DWG 7954400 Ty 2	4109 Ty 2 or 4509 Ty 2
	Passenger (outboard) Cargo compartment Cargo compartment	DWG 7954400 Ty 3 DWG S00096 DWG S00486	4309 5242 5042C
DC-10 series	Passenger (galleys) Passenger (under seat) Passenger (aisle & under seat) Cargo compartment	DWG S3933941 DWG S3933942 DWG BZZ 7002 DWG 3932195	4022C 4022C 4017 Ty 1 and Ty2 5042B
MD-11	Passenger (aisle)	DWG 7954400 Ty 1	4109 Ty 1 or 4509 Ty 1
	Passenger (under seat)	DWG 7954400 Ty 2	4109 Ty 2 or 4509 Ty 2
	Passenger (outboard) Cargo compartment Cargo compartment Cargo (low traffic)	DWG 7954400 Ty 3 DWG S3932193 DWG S3932195 DWG S4929905	4309 5042B 5042B 5042B
	(Note: Specification call out depends on skin thickness for above three products— check with our customer service representative if you are unsure)		
	Cargo compartment	DWG 7954401	4004
Lockheed	Passenger (aisle & under seat)	LAC-C-28-1386	4017L

SOME ADDED NOTES ABOUT CARGO LINER

Finally, we digressed a bit to cargo liner—1066 to be exact.

“Did you know that M.C. Gill’s proprietary 1066 is the grand daddy of *all* high impact (puncture) polyester cargo liners?”, we asked the UAC group. “It is probably the one product that our competitors attempt an ‘equal to’ the most, because most cargo liners look pretty much the same. But 1066 was introduced in 1962, and was the result of M.C.’s extensive work on a light weight, high puncture resistant cargo liner for commercial jets. His break-through had included ‘a feeling’ he had about the addition of a certain ingredient to the resin.

“As things turned out, the addition of that ingredient was a major enhancement of 1066’s performance. But only a pioneer with M.C.’s experience would have had the innovative foresight to change and improve a formulation that was good enough to *one that excelled*. Proving that excellence was easy. M.C. service tested and followed closely the in-service life with a major airline.

“The problem was that when airline customers demanded 1066 and the airframe manufacturers tested it in their laboratories it wouldn’t pass their specifications. But 1066 service tested so well that, with M.C.’s assistance, the airline wrote a specification around it and adopted it on a preferred product basis. When the original liner needed replacing, 1066 was the material of choice. In time, a major airframe

manufacturer also wrote a spec for it and it was used as original equipment for many years.

“M.C. continued to improve it (the cloth is specially woven to our specification) and it is still the finest polyester cargo liner available. We feel so strongly about the durability of 1066 that we stamp the date of manufacture on it (as we do on all our proprietary products) so the customer can observe for himself how long it lasts before it has to be replaced.

“Most of the improvements were planned, but not all. Once, an R&D employee was anxious to get home one evening and in his haste neglected to add a minor ingredient to the resin formulation. M.C. inspected the finished material the next day and somehow it didn’t look right. It wasn’t, but rather than reject it out of hand he tested it and found that the missing ingredient was in fact a deterrent to puncture resistance, and that property actually was improved greatly without it.

“One improvement we *meant* to make resulted in Gilliner 1366. We developed it for a major airframe manufacturer and

we were first on the market with it. Specifications were written but then our attained puncture values were lowered so that a second source could be qualified. That source then took advantage of this reduction to produce a lower priced knock-off which met the spec, but reduced ‘in-service’ life and this is not good for the cargo liner industry.

Things are not always as they seem



MUSINGS FROM THE HORSE’S MOUTH

“Isn’t it reasonable to assume a company noted for its award winning quality and 48+ years in the specialized composite business would be making a product with an expected life of ten to twenty percent longer than the newcomers in the field? I recall a major airline’s maintenance mechanic who estimated it takes approximately eight man-hours (>\$280) to change out an unrepairable cargo liner panel and twelve man-hours to change a failed floor panel (>\$420). If that’s true, why

wouldn’t that expense coupled with the downtime of the aircraft, the 10 to 20 percent contemplated savings not realized on the cost of the material, not to mention overhead and aggravation, would dictate taking no chances... and therefore purchasing from a long-time proven source. Why in the world would one do otherwise?” The composites industry is not a mature one. There is a lot of learning going on and there is absolutely no substitute for experience.

M.C. GILL

“Many of the things we do are above and beyond the minimums accepted by some... but not by Gill.”

“Our basic philosophy is that we will not cut quality to cut price. If we can improve a product or a manufacturing process and if that results in lower costs, we’ll pass the savings on to our customers. But we won’t cut corners just to cut price. We devote our efforts to improving, not cheapening our products. There is more to composites than meets the eye.

“Point out to your prospective customer,” we told UAC, “that you represent a company whose full time job is making cargo liner and sandwich panels for commercial aircraft—not some part-time operator who doesn’t have enough to do, with an idle press or two, and with some contacts from whom he can buy a few raw materials to throw in those presses, and voila!, produce a panel of, at best, dubiously consistent quality with possible multiple rejections and missed or late deliveries.” (The M.C. Gill on-time delivery rate exceeds 90 percent. Even so, for years company policy has been that we won’t lose an order because of delivery!)

“Moreover, we are the only manufacturer that can offer a complete line of cargo liners AND flooring panels for every major airframe manufacturer in the world. We make virtually all our products’ components. We’ve developed many of the products whose construction is now standard on all commercial airlines, and we’ve been in business for more than 48 years under the same ownership and management. There is no substitute for experience so why in the world would one buy elsewhere? It’s up to you to point this out.

“Our living depends on laminates and sandwich panels. That’s why we have to put everything we’ve got into what we make. That’s the reason we hate to hear we didn’t receive an order because of first cost.

“Convince your customers to put their faith in a manufacturer who gives it the extra that makes the difference; whose livelihood has depended on making sandwich panels and cargo liner on a full time basis for forty-eight years. One who is as vertically integrated as is feasible—makes its own facings, makes its own core, makes its own adhesive. And who can give you

complete traceability and accountability for every step in the manufacturing process. And who meets the quality requirements of ISO 9001!”

“Preach the gospel of John Ruskin,” we told them. “Impress on your customers that, ‘It is unwise to pay too much, but it is worse to pay too little...’” In M.C.’s words, “First cost is not least cost.”

“Be sure that you have exposed the conscientious buyer and the hard working engineer to all the fine points he or she should know, because very often OEM specifications are intended to represent some kind of control, but will not assure success in end uses. The specification has not yet been written that some less-than-scrupulous laminator cannot find his way around to make and sell a lower cost product. Tell them there is no substitute for experience and we’ve got it! Point out to those buyers that aircraft flooring is no different than any other aircraft component, i.e., it should be the real thing, not a “knock-off” and should possess the following characteristics.”

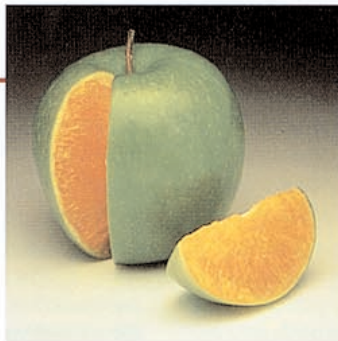
Here is what we have to sell...

Light Weight: High specific strength, good corrosion resistance, thermal and electrical insulation, minimal weight gain from insert installation and edge sealing when exposed to moisture and high humidity.

Safety: Fire resistant per FAR 25.853; low toxic gas and smoke emission when burned.

Durability: Resistant to corrosion and repetitive loading (fatigue) including flexural stresses from normal passenger/crew movement, point loads from stiletto-type high heels, and high psi loads from service cart wheels; not weakened by fabricating for inserts; compatible with adjacent materials, e.g., galvanic corrosion; puncture resistant.

Economy: Easy and quick fabrication, including simple installation of inserts, cutting with standard tools, sealing edges; high yield from raw stock panels (raw stock dimensions compatible with finished sizes); and resistant to edge damage when cutting.



*Just remember,
“Things are not always as
they seem.”*

Conclusion:

The presentation of the above data concluded the M.C. Gill Product Training Seminar for United Aerospace Corporation. Judging from the “dazed” looks in the room we had provided our guests with a substantial amount of information to digest. They’re the cream of the crop, however, and we are sure they will assimilate it and pass it on to our customers.

We’re even more confident that the next time a customer or potential customer asks, “Why should I buy from M.C. Gill?”, our UAC representatives will be ready with the answers...perhaps beginning with, “Why in the world wouldn’t you buy from Gill, the grand daddy of all composite laminators. Let me tell you all the reasons that it is such a bargain.”



LEARNING TO DESIGN FROM THE ATOM UP.

*M.C. Gill announces appointment of
Dr. Steven Nutt to Composite Materials
Program at USC.*

"I believe reinforced plastics should be given the same emphasis as steel, aluminum, concrete, wood and other structured materials. Reinforced plastics are used in all forms of manufactured goods, with an ever-increasing technical sophistication. College students should at least be acquainted with the basic principles of this important material. Hopefully, in the near future they will be recognized as specialists on the same level as, say, metallurgists."

It will come as no surprise to many of our readers that this quotation comes from M.C. Gill, Chairman of the company bearing his name. The quote was taken from remarks made sixteen years ago when M.C. pledged \$250,000 to the University of Southern California's School of Engineering for an academic chair for the study of polymeric materials.

In expanding on his reasons for sponsoring the gift, M.C. stated, "I believe far greater importance should be given to reinforced plastics as structural materials. For the most part, universities have been slow in recognizing the need to provide background to students concerning plastics as related to polymeric materials. USC aspires to have the best polymer program in this area, and our endowment is meant to help improve their program. We anticipate that as more students become acquainted with, see and appreciate the technology and challenges of the plastics industry, more will enter it as a career. And they will come better prepared."

The initial endowment, followed by several additional gifts a few years apart, was used to establish a permanent professional chair in the Department of Chemical Engineering. It was christened the "M.C. Gill Chair in Composite Materials," devoted to the study of polymeric materials.

Those endowments also played a major role in providing the impetus for the growth of the University's Composite Materials Program. Long time readers of the Doorway know that from time to time we report on the Program's progress. With that in mind, the M.C. Gill Corp. is pleased to announce the appointment of Dr. Steven Nutt as a new senior member of the Composite Materials Program.

Although much of Dr. Nutt's work to date has dealt with inorganic composites including ceramics and metals, he intends to expand that scope to include organic composites. The M.C. Gill endowment will allow him to continue his own research as well as expand on the opportunities offered in industrial composites.

Typical of the types of projects Dr. Nutt might pursue are the development of high-temperature ceramic composites for turbine engine applications, aluminum-based composited for automotive and aerospace applications, and design methodologies for predicting the response of composite structures to different kinds of loading.

An integral part of Dr. Nutt's orientation will be to become acquainted with industry leaders

throughout Southern California. "I want to meet with the region's entrepreneurs to better understand what they need and expect from composite materials. Ultimately, the objective would be to take that information and design materials from the atom up," he explained.

Dr. Nutt received his B.A., M.S., and Ph.D. from the University of Virginia, in 1977, 1978, and 1982 respectively. He is married to Dr. Jane Emerson who is on the faculty at the University of California, Irvine Medical School. The couple have four children and live in Irvine.

M.C. has always promoted the reinforced plastics industry. Likewise, he has believed that the field has received a decided lack of attention in university curricula throughout the academic community. His endowment and other gifts to USC, and the appointment of Dr. Nutt will, he hopes, go a long way to correct that oversight. His generosity has been intended to generate interest and respect for composites, USC, and in the process, the M.C. Gill Corporation.



*M.C. and Dr. Nutt examining a block of
Gillfoam—a phenolic based foam
developed by the M.C. Gill Corporation.*



From left, John Fogelberg, Boeing Senior Buyer; Stephen Gill, President and CEO and Larry Russell, OEM Sales Director, both of M.C. Gill Corp.; and B.D. Applegate, Director of Customer, Manufacturing and Engineering—Boeing Materiel Division.

Thank

A closing paragraph in the Fall 1992 issue of the Doorway that chronicled M.C. Gill Corporation's receipt of one of Boeing's Small Business Supplier of the Year awards read:

"In accepting the award, both Stephen and M.C. Gill thanked the Boeing Company for the award and pledged continued efforts to meet the airframe manufacturer's requirements for outstanding performance. After confirming that Boeing's award is an annual event, Stephen offered to make Mr. Fogelberg's hotel reservations for next year."

Stephen missed the mark—but not by much.

Hotel reservations were not required for Mr. Fogelberg (Boeing Senior Buyer) but, rather, for Stephen Gill (M.C. Gill President and CEO) and Larry Russell (Director OEM Sales). On November 1, 1993, they were in Seattle, WA, for the Chairman's Small Business Supplier of the Year award ceremony. For only the second time in the history of the Boeing Chairman's award, the same company had been selected two years in a row.

After opening remarks by John Fogelberg and self introductions by those assembled, John Bowe, Manager of Small Business Programs, gave a brief history of the Boeing award. In Bowe's words, "About 1978, we decided to honor small businesses, in addition to those recognized by the U.S. Small Business Administration. And so, we present a small number (of small businesses) with the Chairman's Award to recognize their outstanding contribution."

"The unique thing about Gill is that on only one other occasion in almost 20 years has a company been nominated two times in a row. That speaks highly for the service M.C. Gill has been providing the Boeing Commercial Airplane Group. John (Fogelberg) has been a very good champion of yours, gentlemen. You

have fused his thinking with yours that, 'by gosh, we'd better do something.' It's my pleasure to welcome you here. What else can I say — congratulations."

Mr. Bowe then turned the dais over to B.D. Applegate, Boeing's Director of Customer, Manufacturing and Engineering for the Materiel Division, whose remarks included the following. "Last year John came down to your facility in El Monte to present the award to Gill." Looking at Stephen Gill, he continued, "Your father put some responses in your company magazine and I would like to take just a few minutes to quote some excerpts from that article."

"Before I do that though, I would like to tell you that here at Boeing we have lots of initiatives, lots of directions we're going, and lots of goals. In 1994, we have four major goals for everyone at Boeing. Everyone in the company will be targeted on unit cost, customer satisfaction, cycle time, and defects. If you will listen to the comments your father made, I think you are going to pick out those same elements in your company. These are his (M.C.'s) comments."

"To me, attitude is everything. I hope that we are perceived by our customers as being attentive, anxious to help and concerned about satisfying their needs. I hope that we ask questions about end uses and suggest other products better suited to their needs and be willing to break our backs to help a customer in trouble. We are dedicated to the industry with constant effort to lead and keep pace with a fast moving technology. At the very outset in 1945, we shunned making products we were not proud to have our name on."

Here, Mr. Applegate interjected, "This is very important—I can guarantee you that every one of our planes has the Boeing name on it." He then continued to quote from M.C.'s remarks, "We gravitated to the difficult and demanding and took pride in developing proprietary products to better suit

You, Boeing... Again!

the needs of our customers. I know that we are perceived as a quality outfit. The fact that John Fogelberg wanted to speak with as many of our employees as he could was proof he regards us as a team where everyone is important."

Applegate continued, "I think that his comments capture the essence of a quality corporation and it's something we at Boeing are certainly striving for. I want to congratulate you folks for not only having earned it last year but this year also, so it's something that you should be very proud of."

"John tells me that you folks have never missed a schedule and there are no quality discrepancies — zero. To me that is really outstanding. Generally, when you see a company that has a good performance in one area they'll have good performance in other areas — it's the stamp or trademark of a good company. To have your pricing in place through 1997 is excellent. That means you know where you are and where you are going. It's a real tribute, Steve. I guess with all of that, I just want to add my congratulations and maybe next year we'll see a threepeat," Applegate continued.

In his acceptance, Stephen Gill noted that, "We are very honored to be given this award, especially two years in a row. As my father said, 'We try very hard to do whatever we can to please the customer.' We realize that it is the customer who is paying our way and if we don't keep the customer happy, we're in trouble. We will continue to strive to do our level best. That's all we can do. But if we do, that threepeat isn't out of the question. Thank you."

In our cover story we tried to convey the M.C. Gill philosophy of doing business. In this one, we hope we've shown how that philosophy pays off.

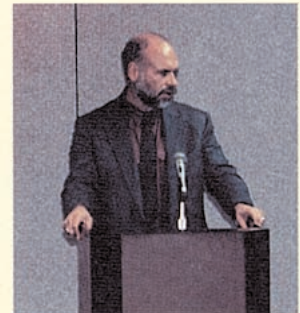
Threepeat, here we come!



John Fogelberg offers some opening remarks.



John Bove explains the history and background of the Boeing Award.



Kent Stepaniuk, CEO, Pegasus Northwest, fabricator of Gill cargo liners for Boeing.



B.D. Applegate making the formal award presentation.



Stephen Gill accepting the Boeing Small Business Supplier Award.

ATTENTION: McDONNELL DOUGLAS OPERATORS

McDonnell Douglas has qualified M.C. Gill's Gillfab 1367A cargo liner to DMS 2419 for use on MD-80 and MD-90 aircraft. In an AOL dated February 17, 1994, Douglas has approved using the lighter weight 1367A interchangeably with DMS 2226 material (Gillfab 1167), and substituting it for DMS 1946 material (Gillfab 1100 and 1100G). We hope to have more details in our next issue of the M.C. Gill Doorway. In the meantime, if you have any questions or want additional information, please contact our Customer Service Department at 818-443-4022 or Fax us at 818-350-5880.

THE FUNNY SIDE

A young father came home from work and found his wife crying. "I've had an awful day," she sobbed. Baby cut his first tooth and took his first step..." "But that's great!" exclaimed the proud father. "...Then Baby fell down, cut his lip on the tooth and said his first word."

★★★★★

A boy was watching his preacher father prepare a Sunday sermon. "How do you know what to say?" he asked. "God tells me" replied the father.

"Then why do you keep crossing things out?" said the lad.

★★★★★

Second hand books: twice-sold tales.

★★★★★

An air traveler stopped at a machine and bought \$10,000 worth of life insurance before her next flight. Next she stepped on a scale that gave her weight and told her fortune. She almost fainted when she read, "Your recent investment will pay off handsomely."

★★★★★

"Why do people take an instant dislike to me?" asked the efficiency expert.

"It saves time," came the reply.

★★★★★

If Mother Nature doesn't make mistakes, why do cakes, pies, candy, and ice cream taste better than peas, carrots, lettuce and beets?

★★★★★

An arrogant young woman wired home from her new job: "Made supervisor; feather in my cap." A few weeks later, she wired again: "Made manager. Another feather in my cap." A few more weeks went by and she sent another telegram: "Fired; send money for a plane ticket to fly home." "No ticket necessary," her parents wired back. "Use feathers."

Trivia

One-fourth of the total U.S. land area is inhabited by two or fewer persons per square mile.

★★★★★

There are 25 moles on the average adult's body.

★★★★★

There are 200,000 donkeys and 692 elephants in the United States.

★★★★★

Cassius Clay/ Muhammad Ali has appeared 29 times on the cover of Sports Illustrated — more than any other athlete. Lew Alcindor/Kareem Abdul-Jabbar ranks second with 24 and Jack Nicklaus is third with 23.

★★★★★

Henry Ford's first automobile had no reverse gear.

★★★★★

The expressions "first-string" and "second-string" originated when archery was a major sport.

★★★★★

The chances are one in four that a pharmaceutical is derived from a plant.

★★★★★

Five percent of the students at Dunkin' Donuts University do not pass the six-week training course.

★★★★★

1,700,000 base sliding injuries occur each year in softball.

★★★★★

An average of 400,000,000 rounds of golf are played in America each year.

★★★★★

Seventeen percent of all ties sold in 1992 were purchased for Father's day.

★★★★★

Since 1981, eight deaths have resulted from vending machines falling on persons who shook them.

