# The Doorway™

M.C. Gill Corporation Group of Companies

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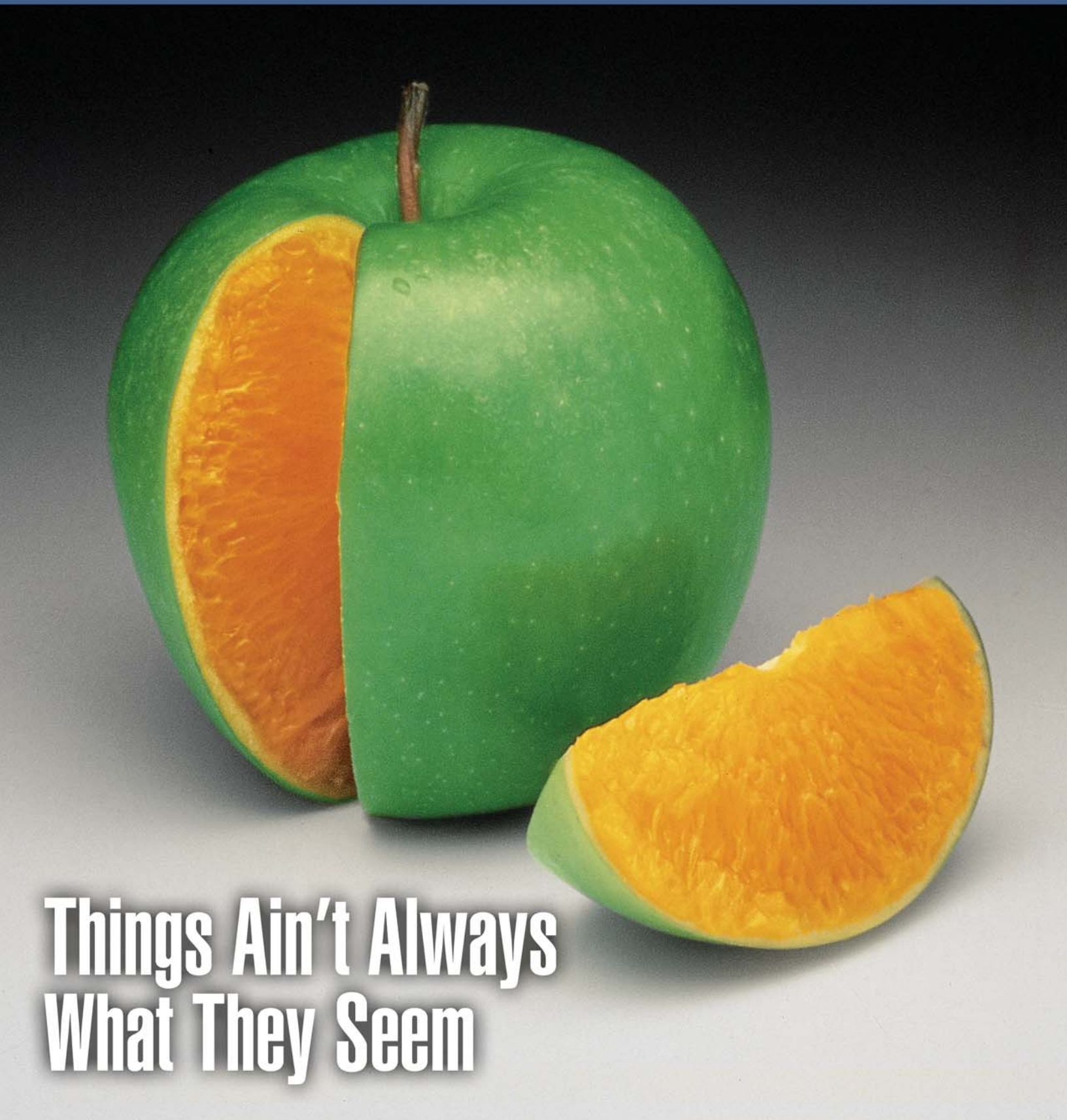


# Things Ain't Always What They Seem

M.C. GILL
PROPRIETARY
DESIGNS
SUPPORT
AIRBUS
AIRCRAFT

# The *Difference*

**Com•pos•ite** *n.* a material which is composed of two or more substances having different physical characteristics and in which each substance retains its identity while contributing to the desirable properties of the whole.

There are many important considerations to designing high performance composites, especially when you consider the diversity of fiber reinforcements, resin matrices, adhesives and core materials. While varied materials are fundamental to design flexibility and optimization, it is important to recognize that each material has unique attributes and although they may be similar in appearance, the differences can be profound. One of the most common misconceptions we encounter with operators and maintenance providers is the idea that if two different product designations are qualified to the same specification, the products will be indistinguishable in characteristics and performance. While this fallacy is not unique to our Airbus-qualified products, it is more notable, when you consider that no two manufacturers have qualified the same cargo liner, floor panel or repair patch constructions.

In 1988, M.C. Gill Corporation became the first Airbus-qualified floor panel manufacturer in North America. Since that time, we have introduced a portfolio of cabin and cargo floor panels, cargo linings and repair patches for use in all Airbus families of aircraft. Although our proprietary designs have been developed to meet the mechanical and physical characteristics established by Airbus, history has taught us that no performance specification can cover every aspect of quality that goes into a product or assure in-service durability. Consequently, our product designs often go beyond the minimum specification requirements to ensure maximum durability. While we welcome the opportunity to qualify superior designs, it is important for Airbus operators to recognize that not all composites are created equal. This is where M.C. Gill Corporation's design experience makes the *difference*.


## The Unrivaled Durability of Gillfab™ 4422 and Gillfab™ 1367A Cargo Lining

Throughout its history, M.C. Gill Corporation has introduced numerous proprietary cargo liners, many becoming a benchmark for industry standards. Often, the best explanation for a successful product design can be traced to the original design objectives. For Gillfab 4422 and Gillfab 1367A, both qualified to Airbus Technical Specification 2550 M1M 0008 00, our design efforts began with the most valuable resource available – our customers. Through their feedback, the following design objectives were established:

- Introduce an improved alternative to OEM and competitor products;
- Achieve superior impact resistance properties to withstand the most severe in-service conditions;
- Incorporate materials having a proven history of in-service durability;
- Accomplish the desired product improvements while optimizing durability, weight and cost.


Gillfab 4422 consists of woven glass reinforced phenolic facings bonded to Nomex® honeycomb core. The facing design, Gillfab 1367A, incorporates woven S-glass with an M.C. Gill proprietary resin system to yield one of the highest impact resistances of any phenolic cargo liner. During qualification testing, the impact resistance of Gillfab 4422 was so high in comparison to the minimum specification requirements, our Research & Development department had to request Airbus' permission to increase the weight of the test impacter to enable us to measure the ultimate impact strength of our material. Using this more stringent test condition, the lowest impact value recorded was still more than 20 times higher than the minimum Airbus requirement. When tested side-by-side with competing products at a 9.3mm (0.366˝) thickness, the impact resistance of Gillfab 4422 was more than eight times greater than the next highest value.

While this may seem excessive to some, our philosophy has always been to design products best suited for the intended end-use, rather than relying on specification requirements that might not fully reflect all in-service conditions. As the world's most experienced manufacturer of cargo liner, our customers have come to expect superior durability from our Gilliner™ and Gillfab™ cargo liners and we remain steadfast in our commitment to deliver it. This is what we refer to as the M.C. Gill *difference*.

## Gillfab 4223 Bulk Cargo Flooring – BCC2 Impact Strength Without an Aluminum Top Sheet

Bulk cargo flooring is one of the most challenging applications for a high performance composite panel, particularly when you take into account the repetitive impacting, loading and abrading, characteristic of a bulk cargo environment. These stresses, combined with environmental conditions like moisture and humidity can test the limits of any material. An optimum panel design must not only yield the necessary mechanical and physical properties, it should also incorporate materials that will ensure the highest durability and wear resistance throughout the service life of the product.

Given the multiplicity of qualified "aftermarket" constructions and original equipment designs, it is not surprising that bulk cargo floor panels are an area of confusion for some Airbus operators. Until recently, there were two types of bulk cargo panels used by Airbus in production – BCC1 and BCC2. The BCC1 is considered the basic bulk cargo floor panel. For airlines requiring a more durable panel, Airbus offered an optional BCC2 panel. Both BCC1 and BCC2 panels are covered by an aluminum top sheet [0.5mm (0.020″) and 0.8mm (0.031″) respectively].

Gillfab 4223, qualified to Airbus Technical Specification 5360 M1M 0005 00 Type BCC2, consists of woven glass reinforced phenolic facings bonded to Nomex honeycomb core. Unlike the original equipment panels, Gillfab 4223 does not feature an aluminum top sheet. This is because the M.C. Gill design yields an impact resistance equal to or greater than the BCC2 requirements. Although aluminum overlay can serve as a relatively low-cost method of reinforcement, our Gillfab 4223 design exploits the strength-to-weight ratio of glass-reinforced facings to achieve superior durability and in-service performance. With many operators experiencing corrosion, peeling, and delamination of the aluminum overlay, our proprietary, non-metallic design has become the preferred replacement material with Airbus operators and maintenance facilities around the world.

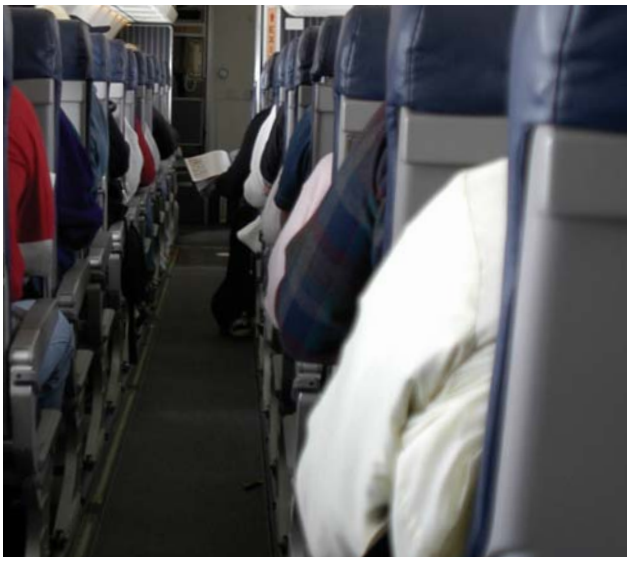
*Note: Airbus has recently introduced a BCC3 bulk cargo panel for production which eliminates the aluminum top sheet.*

## Gillfab 4505 and 4605 – Demonstrated Durability in Cabin Flooring

When Airbus launched the A330/A340 series aircraft, they also released a new series of floor panel specifications aimed at harmonizing floor panel designs and increasing panel strengths to support advancing designs. In general, these specification changes resulted in stronger, more durable flooring. For passenger areas, the specification change introduced two types of floor panels, PC1 and PC3, to differentiate between high- and low-traffic areas. It also expanded the scope of qualification testing to include, for the first time, food roller cart testing.

There are many test methods used to evaluate floor panel designs. For main aisle and galley panels, we consider the food roller cart to be one of the most practical and representative tests. This test is designed to measure the fatigue resistance of the floor panel core by closely simulating the in-service conditions created by the use of food carts. The results of this test provide a meaningful approximation of how flooring will hold up in service.

Gillfab 4505 and 4605, qualified to Airbus Technical Specification 5360 M1M 0008 00 Types PC3 and PC1 respectively, feature unidirectional carbon-reinforced phenolic facings with Nomex honeycomb core. During qualification testing, Gillfab 4505 was subjected to 120,000 cycles with 125.7 pounds per wheel and an additional 35,000 cycles at an increased weight of 165.3 pounds per wheel with no reported failures. Although not required by the Airbus specification, but to further test the durability of our design, M.C. Gill Corporation subjected this panel to an additional 120,000 cycles at an increased weight of 250 pounds per wheel with no reported damage.



## Gillpatch™ Cargo Liner Repair Patches – Versatility by Design

Since first introduced over four decades ago, Gillpatch designs have continued to evolve to meet increasingly stringent flammability requirements and to maintain compatibility with contemporary cargo liner designs. While repair patches may seem relatively simple from a design perspective, there are important factors which must be considered. For Airbus operators, these extend beyond flammability compliance to include issues such as durability, the extent and location of damage, and ease of installation.

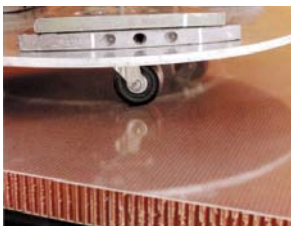
Within the respective Airbus Maintenance Manuals there are a variety of approved repair techniques. While many of these methods are generically referred to as "speedpatches," there are distinct differences in product designs. The M.C. Gill portfolio of approved repair methods includes Gillpatch III, Gillpatch IIIR and Gillpatch 1367P013. Collectively, these patches provide Airbus operators versatility in their cargo liner repairs.

**Gillpatch III**, qualified to AIMS 08-07-001 and ABS5665, is designed for durability as well as flammability compliance. Unlike most "speed-patches," Gillpatch III has an impact resistance equal to or greater than a 0.070˝ (1.8 mm) thick cargo liner, making it a true repair method.

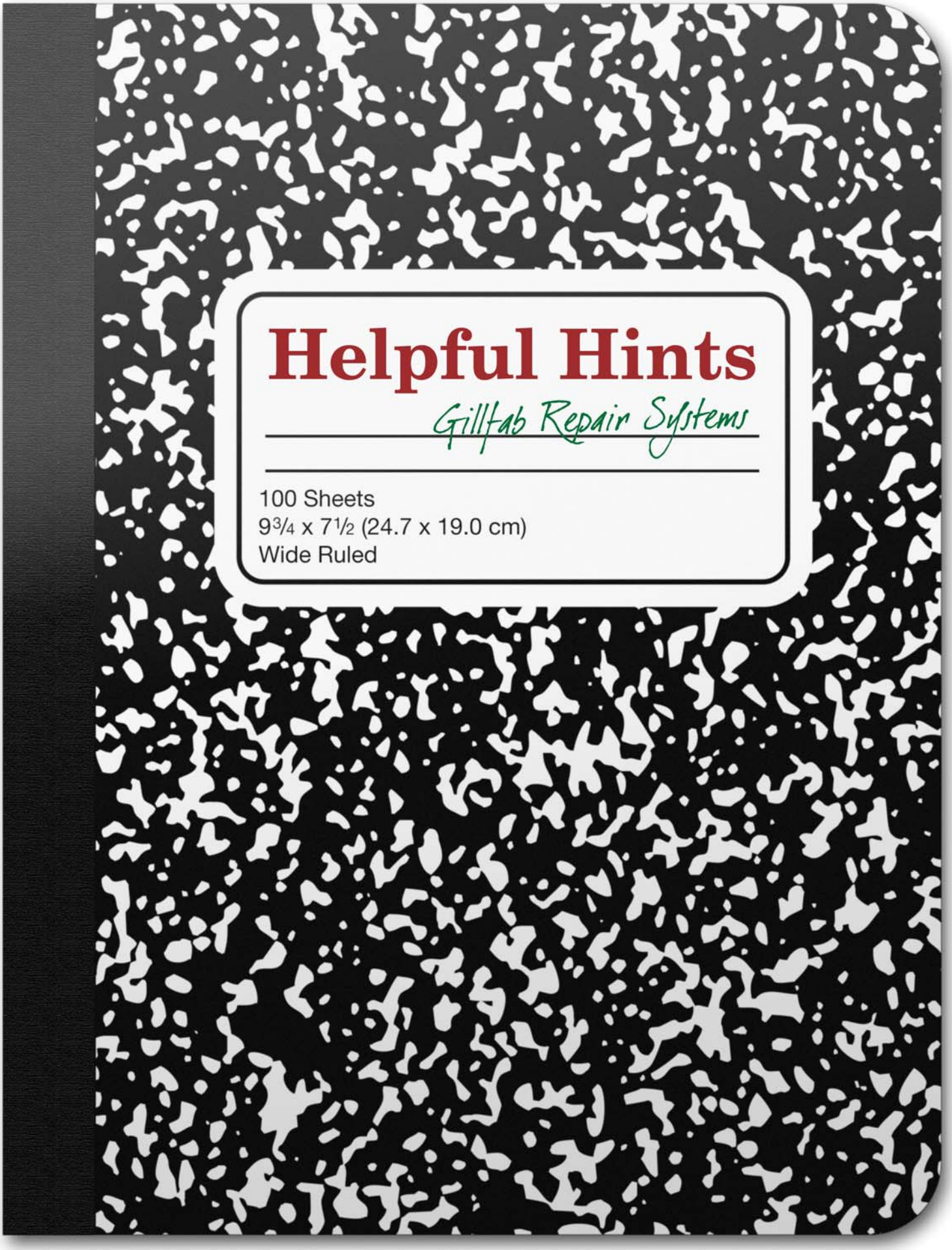
**Gillpatch III WR**, qualified AIMS 08-07-001 and ABS5665, is designed to address the severe flammability conditions inherent to repairs in the ceiling position. By incorporating rivets into our Gillpatch III design, operators can achieve repairs without the necessity of removing the damaged panel.

**Gillpatch 1367P013**, qualified to AIMS 08-07-002 and ABS 5666, is designed to repair sandwich linings where damage is limited to the top face sheet. For 'light duty' repairs, Gillpatch 1367P offers a weight and cost savings as compared to Gillpatch III.

## There is a *Difference*



As a leading pioneer in the field of high performance composites since 1945, M.C. Gill Corporation has a longstanding history of supporting the aviation industry with optimum product designs. Fundamental to this success is our expertise in composites materials, our knowledge of in-service conditions, and our commitment to designing products having superior physical, mechanical and performance characteristics. When it comes to high performance composites, there is no substitute for experience.


Helpful Hints
Gillfab Repair Systems
100 Sheets
9¾ x 7½ (24.7 x 19.0 cm)
Wide Ruled

As a qualified supplier of floor panels, cargo liner and cargo repair patches for all Airbus families of aircraft, we are accustomed to working with our customers to provide them the necessary product support. Because many of these inquiries have evolved into "frequently asked questions", we thought our readers could benefit from this shared information.

The following comments are not intended as a substitute for the Airbus documentation, in particular the aircraft SRM and AMM and also SIL 25-097 covering the local manufacture of Cargo Lining Panels. Reference is also made to the M.C. Gill IRM (Installation and Repair Manual for Floor Panels) and AIM (Airline Instruction Manual for Cargo Lining Panels), both of which are needed to produce replacement panels using M.C. Gill semi-finished materials.

## 1) Damage to Sidewall And Ceiling Panels

Patch repairs can be performed in accordance with the techniques given in the Airbus AMM. What Airbus refers to generically as "Speed-patches" includes Gillpatch III and Gillpatch 1367P013 self-adhesive patches, both of which are qualified by Airbus (ABS 5666 for Gillpatch 1367P013 and ABS 5665 for Gillpatch III). The approved repair methods allow repair of panels in-situ for damage through one skin and for damage through both skins; the flowchart and detailed instructions in the AMM must be followed. Repair of ceiling panels using Gillpatch III with rivets is also permitted, and M.C. Gill instructions are available for this type of repair. Gillpatch 1367P013 is thinner and lighter, but Gillpatch III is more robust. Both are available in a range of pre-cut sizes and as sheet material.

**Available products**: Gillpatch III, Gillpatch III WR (with rivets), Gillpatch 1367P013.

Boxes of 10 patches 5″x5″, 8″x8″, 12″x12″ or a mix and sheets at 48″x144″.

Superficial damage to the Tedlar covering on cargo sidewall and ceiling panels can be repaired using the supplier's recommended repair methods (Ref: http://www.dupont.com/tedlar/techdata/pdf/e95904-1.pdf).

## 2) Protection of Sidewalls And Ceilings

Some areas, particularly around entrances and opposite to doors, regularly sustain damage. Some operators prefer to use reinforcement to prevent this type of damage from occurring or to limit it. Operators have been known to use a variety of materials to add protection. M.C. Gill is seeking approval for its patch materials to be used on undamaged panels as an alternative option to Airbus approved materials (Ref. SIL 25-097).

**Available products**: Gillpatch III, Gillpatch 1367P013 in sheets at 48″x144″

## 3) Damage to Rapid Decompression Panels

Repair can be accomplished using Gillfab 3072 h-profiles where composite frames are damaged. Latches can be recovered, but new fire barrier seals will need to be installed.

New designs have been incorporated in the Single Aisle family based on the design in use on Long Range aircraft for some years. This involves making step edges reinforced with edge filler for replacement decompression and wall/ceiling panels, a technique included in the M.C. Gill AIM.

Airbus has introduced a modification of a metal profile to protect composite h-profiles in the original design (Ref. SIL 25-097).

**Available products**: Gillfab 3072A, B, C and D; lengths of 70″

## 4) Bumper Panels

These are panels that protrude from partitions in the cargo area and are positioned to protect the partition decompression panels from damage and to stop cargo from blocking the operation of the decompression panels. The bumper panels often become damaged due to their location. There are no repair schemes in the AMM, but it is known that some operators use Gillfab 4422-508 panel to repair these panels. They are non-structural, so carry no significant load. M.C. Gill is seeking approval for a standard cargo lining panel to be used for repair of these panels.

**Available product**: Gillfab 4422-508001AA-4, in sheets 48″x144″

## 5) Floor Panels

### A) Appearance of Floor Panel Materials

All replacement floor panels look different from each other and also different from the OEM floor panels. This is because replacement floor panel materials (semi-finished materials) are qualified by their performance. We have chosen a different construction to the OEM supplier for manufacturing reasons as well as cost and performance reasons. This is particularly noticeable in the Bulk Cargo area floor panels.

**Available product**: Gillfab 4223-496009IC-9, in sheets 60″x144″

### B) Inserts and Hard-Points

One effect of these different constructions is that replacement floor panels will need to have inserts installed. The OEM panels use hard-points within the panel construction, and this is not possible for a composite workshop to duplicate. All Operators and MROs must carry out a qualification test to validate their process for insert installations. This is at no cost to the Operator/MRO.

**Available product**: M C Gill Airbus Insert Test Kit

Correct installation of the qualified inserts is essential to obtain the necessary bond strength between insert and panel. Sufficient core must be routed from the insert hole, enough potting adhesive must be applied to the insert barrel and, on the TF20 insert, a correct reaction of the insert top flange must be achieved.

**Available products**: TF073/074 Torlon 2-piece inserts (Gillfab 4223, 4522)

TF 110/111 Aluminium 1-piece inserts (Gillfab 4223, 4522)

TF20/21 Aluminium 2-piece inserts (Gillfab 4223, 4123)

T303 (parts A&B) Aluminium 2-piece inserts (Gillfab 4505/4605/4405/ 4522)

### C) Bulk Cargo Floor Panels

Damage to OEM and aftermarket panels occurs through heavy use. Operators and MROs sometimes use a protective layer of Gillfab laminate such as Gillfab 1367A or Gilliner 1066 or a sacrificial layer of sheet aluminium as a means of extending the useful life of the floor panels in this area.

### D) Insulation Foam

The thick foam bonded to the underside of cargo floor panels is not included in the M.C. Gill IRM as it is part of the floor panel installation. When making a replacement floor panel, the foam can either be reinstalled or replaced with new foam (see Airbus Consumable Materials list for approved supplier of ABS 5088). The method of attachment is provided in the SRM.

## 6) Floor Panel Repairs

The most common method of dealing with damaged floor panels is to manufacture a new one (see SRM). However, time or material availability may sometimes lead to repair as the appropriate option. In this case, M.C. Gill has developed a number of repairs that can be used in conjunction with the allowable repairable damage limits (see SRM) to provide a fast turn-around repair for Operators. These repairs include fast-curing fillers and pre-cured patches. The repair materials will be included in the M.C. Gill IRM at the forthcoming revision and will be available in repair kits.

**M.C. GILL CORPORATION**
4056 Easy Street, El Monte, California 91731
phone: 626 443-4022 fax: 626 350-5880 email: info@mcgillcorp.com

**Alcore, Inc.**
Lakeside Business Park,
1502 Quarry Drive
Edgewood, Maryland
21040 USA
phone: 410 676-7100
fax: 410 676-7050
email: sales@alcore.com

Alcore Overnight™
Expedited Delivery
email: overnight@alcore.com

*Alcore does not sell sandwich panels. Contact M.C. Gill for these products.*

**Castle Industries, Inc. of California**
601 South Dupont Avenue
Ontario, CA 91761-1502 USA
phone: 909 390-0899
fax: 909 390-0898
email: info@castleindustries.net

**Alcore Brigantine, Inc.**
Route de l'Aviation
7, allée Etchecopar
64600 Anglet France
phone/téléphone:
+33 (0) 5 59 41 25 25
fax/télécopie:
+33 (0) 5 59 41 25 00
email: sales@alcorebrigantine.fr

**M.C. Gill Corporation Europe Ltd.**
23 Enterprise Road,
Balloo Industrial Estate South
Bangor Co-Down
BT19 7TA, N. Ireland
phone: +44 (0) 2891 470073
fax: +44 (0) 2891 478247
email: sales@insoleq.co.uk



# Alcore, Inc. Granted Accreditation by NADCAP Management Council

In accordance with SAE Aerospace Standard AS7003 the Nadcap Management Council has granted Alcore, Inc. accreditation for specific services listed in the Scope of Accreditation AS7118 for Composites. These services include core processes such as Core Machining, Core Splice Bonding, Core Stabilization, Core Potting and Core Septum Bonding.

Nadcap is a worldwide cooperative program of industry prime contractors that governs precise standards used to measure the competency, capability and consistency of suppliers and associated products within the aerospace and automotive industries. Its mission is to provide international, unbiased, independent manufacturing process


In accordance with SAE Aerospace Standard AS7003, to the revision in effect at the time of the audit, this certificate is granted by the authority of the Nadcap Management Council to:

Alcore Inc
1502 Quarry Drive
Edgewood, Maryland 21040

They have demonstrated conformance and are awarded accreditation for specific services, listed in the Scope of Accreditation to the revision in effect at the time of the audit for

AS7118 for Composites

Expiration Date: April 30, 2007

and product assessments and certification services to add value, reduce costs, and facilitate relationships between primes and suppliers.

"This certification is a testament to our commitment to be a leader in the field of honeycomb core processing," said Alcore COO, Dave Cross. "This is another step in assuring we meet international standards for our customers worldwide."

Alcore manufactures a variety of metallic honeycomb cores for aerospace and other applications. The company also offers extensive special processing capabilities on metallic and non-metallic cores, from simple operations like chamfering to complex projects including roll-forming, 5-axis machining and splicing of different densities into core blankets.

# THE FUNNY SIDE

The schoolteacher was taking her first golfing lesson.

“Is the word spelt p-u-t or p-u-t-t?” she asked the instructor.

“P-u-t-t is correct,” he replied.

“Put means to place a thing where you want it. Putt means merely a vain attempt to do the same thing.”

★ ★ ★

Egotistical Harry was always reminding people that he played semi-pro baseball.

“I was the James Bond type of player,” he told his friends. “I had all sorts of tricks to confuse the opposition.”

“Batted .007,” his wife added.

Smith goes to see his supervisor in the front office. “Boss,” he says, “we’re doing some heavy housecleaning at home tomorrow, and my wife needs me to help with the attic and the garage, moving and hauling stuff.”

“We’re short-handed, Smith” the boss replies. “I can’t give you the day off.”

“Thanks, boss,” says Smith “I knew I could count on you!”

★ ★ ★

Martin had just received his brand-new drivers license. The family troops out to the driveway, and climbs in the car, where he is going to take them for a ride for the first time. Dad immediately heads for the back seat, directly behind the newly minted driver.

“I’ll bet you’re back there to get a change of scenery after all those months of sitting in the front passenger seat teaching me how to drive,” says the beaming boy to his father.

“Nope,” comes dad’s reply, “I’m gonna sit here and kick the back of your seat as you drive, just like you’ve been doing to me all these years.”

# Trivia

## Superstitions

More than 80 percent of high-rises lack a 13th floor.

★ ★ ★

Many airports skip the 13th gate.

★ ★ ★

Airplanes have no 13th aisle.

★ ★ ★

Italians omit the number 13 from their national lottery.

★ ★ ★

Hospitals and hotels regularly have no room number 13.

On streets in Florence, Italy, the house between number 12 and 14 is addressed as 12 and a half.

★ ★ ★

Many cities do not have a 13th Street or a 13th Avenue.