

The Doorway™

M.C. Gill Corporation Group of Companies

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**PRODUCT ADVANCES
THAT RIVAL**

Mother Nature



PRODUCT ADVANCES THAT RIVAL *Mother Nature*



Weight reduction is a subject that captivates millions. A Google search of this topic generates over 56,200,000 hits. For most people the topic is evocative of the human form. For an aerospace engineer, weight reduction takes on a completely different meaning.



F14 FIGHTER JET

Aerospace military engineers were among the first designers to incorporate weight-saving composites into the U.S. F14 and F15 fighters. Early boron-reinforced composites were used for the skins of the empennages¹. Originally restricted to secondary structures, these weight-saving composites soon found their way into primary structures like the wings and fuselage.

Early on, M.C. Gill Corporation realized that specialized reinforcements like carbon fiber and S glass offered weight savings. They supplied cargo liners and floor panels to support weight reduction requirements that offered desirable mechanical properties.

WEIGHT-SAVING EFFORTS EVOLVE

In the 1980s, commercial aircraft manufacturers began to explore ways to improve aircraft performance through several means, including weight reduction. Key to that effort was a substantial increase in the use of advanced composite materials. “The first significant use of composite material in a commercial aircraft was by Airbus in 1983 in the rudder of the A300 and A310, and then in 1985 in the vertical tail fin.”²

The use of composites grew substantially in the next decade. Advanced composites offer a reduction in manufacturing and

maintenance cost while dramatically reducing the weight of an aircraft. Composites accounted for less than 2% of the first F15s. But during the 1990s, fuel costs soared and prompted a growing reliance on composite materials. Airbus and Boeing steadily increased the use of composites per plane to more than 10-15%.

The A320 garnered serious weight reductions by using composites for the entire tail structure, fuselage belly skins, fin/fuselage fairings, fixed leading and trailing-edge bottom access panels and deflectors, trailing-edge flaps, flap-track fairings, spoilers, ailerons, wheel doors, main gear leg fairing doors and nacelles. The broad application of composites resulted in a 28% weight reduction to the A320 airframe.

The Boeing 777 gained a 20% weight reduction by incorporating composite materials in the wing's fixed leading edge, the trailing-edge panels, the flaps

and flaperons, the spoilers, the outboard aileron, floor beams, wing-to-body fairing and the landing gear doors. Using composite materials for the empennage saves approximately 1,500 lbs in weight.³

AEROSPACE INDUSTRY EMBRACES INCREASED USE OF COMPOSITES

As knowledge, material performance and acceptance have grown, the use of composites has increased substantially. Aircraft design has shifted from the so-called "conventional" metallic materials to today's advanced composite products.

The M.C. Gill name is synonymous with innovation because we develop products that exceed expectations.

Gillfloor 4709 is a weight-saving floor panel commonly found on the

M.C. GILL IS COMMITTED TO DEVELOPING PRODUCTS THAT EXCEED CUSTOMER EXPECTATIONS



² IHS White Paper, Composites in Aerospace Applications, Adam Quilter, www.ihs.com

³ *Ibid.*

Boeing 777. This floor panel is made from unidirectional carbon fiber reinforced epoxy facings bonded to aramid honeycomb core. It offers high impact-resistant facings covered with a thin fiberglass layer to prevent galvanic corrosion. It is qualified to Boeing BMS-4-20, type II and III. While it offers substantial weight savings over similar products, even greater reductions were necessary for Boeing's revolutionary 787 Dreamliner. Gillfloor 4809 is that product and provides a 13% to 21% (depending on specification type) weight reduction over Gillfloor 4709.



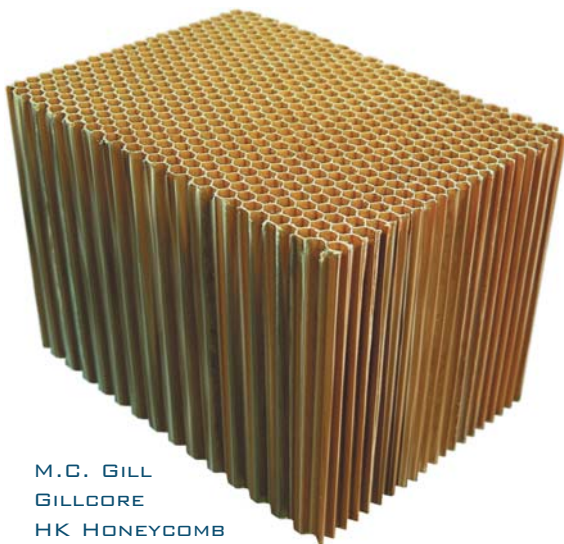
Gillfloor 4809 is a light-weight floor panel made from unidirectional carbon fiber-reinforced epoxy facings bonded to Kevlar® aramid honeycomb core. It offers high impact-resistant facings covered with a thin fiberglass layer to prevent galvanic corrosion. It is a light-weight, high-strength panel with a high strength-to-weight ratio and is qualified to Boeing BMS-4-20, type VI, VII, VIII and IX. Boeing's 787 Dreamliner incorporates

Gillfloor 4809 and typifies the weight-saving benefits that composites offer. The 787 attributes up to 50% of the structural airframe weight to composite materials. It will burn 20% less fuel than existing jets of a similar size. This translates into fuel savings, a reduction in airport landing fees, lower maintenance costs, increased passenger satisfaction and improved airline profits.



THE AIRBUS A380

Composites are ideal in a variety of aircraft applications. They include interior flooring, sidewalls, ceilings, galleys and lavatories. Exterior applications include trailing and leading edges, flaps, ailerons, access panels and doors. To support weight reduction requirements, Gillcore HK Honeycomb incorporates Kevlar® N636 paper in the honeycomb core. It offers a 25% weight savings over Nomex® Honeycomb for high strength-to-weight and rigidity-to-weight ratios. It conforms to rigid smoke toxicity and flammability standards as well as high wet strength and corrosion resistance. Gillcore HK offers superior



weight savings and is found in the 787 Dreamliner assemblies and the Airbus A380 interior structures.

Composites are a fundamental ingredient to the design of the massive Airbus A380. The A380 is the largest passenger airline in the world. This aircraft can accommodate up to 853 passengers, and

“Boeing’s 787 Dreamliner incorporates Gillfloor 4809 and typifies the weight-saving benefits that composites offer.”

composites make up 25% of the airframe by weight. The success of this aircraft design hinges on weight reductions, and Gillfab 5509 is a cockpit floor panel that supports that goal. Gillfab 5509 is a low-smoke aircraft sandwich panel with facings made from phenolic resin reinforced with cross-plyed unidirectional carbon and Kevlar® honeycomb core. The facings include a thin fiberglass layer to protect against galvanic corrosion. It is light-weight and features good flame, smoke and toxicity properties.

M.C. Gill consistently exceeds customer expectations. When Boeing engineers began development of the Dreamliner 787, weight reduction was an essential prerequisite to design, so M.C. Gill engineers developed a super weight-saving cargo liner. The result is Gillfab 1367G.

M.C. Gill’s R&D Department routinely evaluates new resins, hardeners, additives and reinforcements. Gillfab 1367G is a light-weight, high-impact; low smoke, flammability and toxicity fiberglass-reinforced phenolic laminate. It displays high mechanical strength, puncture and corrosion resistance with



BOEING 787 DREAMLINER

a white Tedlar overlay on the face side for reflectivity. It is qualified to Boeing BMS 8-223, Cl. 5, Gr. B and meets FAR Pt. 25, appendix F parts I & III (burn through). This laminate uses lower aerial weight fabrics that reduce the weight and thickness of the liner while maintaining the properties of thicker, heavier products. This combination of attributes qualifies Gillfab 1367G as the cargo liner for the 787 Dreamliner.

The aerospace industry is actively working towards greater efficiencies by reducing aircraft weight, increasing fuel efficiency and extending aircraft life.

AIRLINE COMMITS TO WEIGHT REDUCTION PROGRAMS

While most airlines are implementing programs that reduce operating costs, certain airlines have established strategic initiatives whose goal is to significantly reduce fuel consumption, specifically through weight reduction.

One prominent U.S. carrier is ecstatic with the results of their cargo liner retrofit program (300 total aircraft). Shifting to Gillfab 1367B will be worth savings of more than one million dollars annually. Gillfab 1367B is a light-weight, high impact-resistant, low smoke and toxicity cargo liner constructed with fiberglass reinforced phenolic resin. Expansion of this program to similar models is expected to save another 117 pounds/aircraft.

This carrier is also working closely with M.C. Gill on the 757 cargo compartment liner program. Incorporating Gillfab 1367B will save 268 pounds/aircraft for annual fuel savings of \$1.18 million (across 124 aircraft).



COMPOSITES ARE THE FUTURE AND THE FUTURE IS NOW

Today, public pressure to be more fuel efficient, reduce emissions and replace older jets (constructed of predominantly aluminum components) with composite-rich aircraft is stoking the composites market. More than ever, manufacturers are feeling the sting of rising oil prices and the corresponding negative impact on their profits.

Rising oil prices, meanwhile, are cutting into airline profits, pushing carriers to demand better performance and longer range from the new planes they buy. According to the Air Transport Association, aircraft fuel efficiency has increased by an average of 2.5% a year since 2003, saving the industry about two billion dollars a year.

“Alaska Airlines removed five magazines per aircraft saving \$10,000 a year in fuel.”

It is clear that change is essential and the aerospace industry is committed to meeting this challenge head on. Evidence of this paradigm shift surfaced at a recent Air Transport Association of America, (ATA) meeting. Vice President and Chief Economist, John Heimlich, reported on U.S. airlines operating in an era of high jet fuel prices⁴. His findings cited 22 ATA member airlines who have adopted a number of creative ways to limit their exposure in a volatile market.

⁴ U.S. Airlines Operating in an Era of High Jet Fuel Prices, ATA, Jan 2007



Air Traffic Control (ATC) has also adopted a number of new procedures and practices to reduce drag and support the reduction in fuel consumption at airports across the U.S. The FAA estimates savings can reach into tens of millions of dollars on an annual basis.

Obviously, industry officials are keenly aware of the need to streamline practices as well as aircraft design. Advanced composites have proven themselves a viable means to support weight reduction initiatives. M.C. Gill cargo liners, floor panels and raw materials are a natural fit for these airlines as we partner towards a lighter, more efficient future for our industry.



The following were some of the unique ways the airlines are reducing fuel consumption.

- Removal of obsolete ovens, excess potable water and unnecessary galley equipment.



- Removal of in-flight phones on the MD-80 and B737-400s cut 200 lbs/ aircraft, translating into 3,400 gallons of fuel savings/year.

- Alaska Airlines removed five magazines per aircraft, saving \$10,000 a year in fuel.



- Alaska Airlines now counts children for a more accurate weight estimate to reduce on-board fuel and catering supplies.

- Two airlines have shifted to a paperless cockpit.



- JetBlue removed six seats in their A320s and saves 904 pounds per aircraft.

- American and Delta use super tugs for ground movement rather than taxiing.



- Airlines are replacing older beverage carts with lighter models.

- Southwest gained a 3% fuel savings by installing winglets on their 737-700.

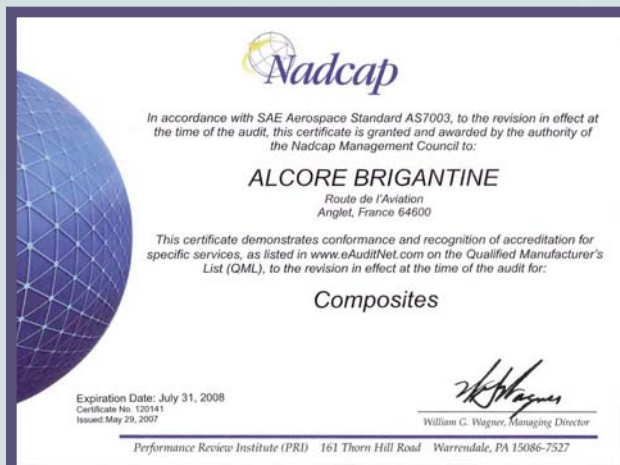




Alcore Brigantine Successfully Passes NADCAP Accreditation



In July, 2007, Alcore Brigantine, Anglet, France, successfully passed their NADCAP accreditation. In accordance with SAE Aerospace Standard AS7003 the NADCAP Management Council has granted Alcore Brigantine 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.



Alcore Brigantine participated in a three-day audit of their business practices with support from Alcore in Edgewood, Maryland. 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



M.C. GILL CORPORATION

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



mission is to provide international, unbiased, independent manufacturing process and product assessments and certification services to add value, reduce costs, and facilitate relationships between primes and suppliers.

NADCAP accreditation confirms constant improvement and a high level of expertise for the quality and process management in aerospace parts manufacturing. NADCAP accreditation is a mandatory contract requirement by Fischer Advanced Composite Corporation (FACC) for the aluminum honeycomb core details for the B787 translating sleeves.

Lead participants in the audit were Laurent Descaux, Quality Manager, and Karine Forsans, Quality Engineer. Alcore Brigantine is part of the M.C. Gill Corporation Group of Companies. Congratulations, Alcore Brigantine!



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.



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



**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

www.mcgillcorp.com

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THE FUNNY SIDE

Little Johnny's kindergarten class was on a field trip to their local police station where they saw pictures tacked to a bulletin board, of the 10 most wanted criminals. One of the youngsters pointed to a picture and asked if it really was the photo of a wanted person.

"Yes," said the policeman. "The detectives want very badly to capture him." Little Johnny asked, "Why didn't you keep him when you took his picture?"

The new employee stood before the paper shredder looking confused.

"Need some help?" a secretary, walking by, asked.

"Yes," he replied, "how does this thing work?"

"Simple," she said, taking the fat report from his hand and feeding it into the shredder. "Thanks, but where do the copies come out?"

While proudly showing off his new apartment to friends, a college student led the way into the den.

"What is the big brass gong and hammer for?" one of his friends asked.

"That is the talking clock," the man replied.

"How's it work?"

"Watch," the man said and proceeded to give the gong an ear-shattering pound with the hammer. Suddenly, someone screamed from the other side of the wall. "Knock it off, you idiot! It's two o'clock in the morning!"



Trivia

Oxymorons:

A combination of contradictory or incongruous words.

- | | |
|-----------------------|-------------------------|
| Act naturally | Legally drunk |
| Civil war | Minor catastrophe |
| Clearly misunderstood | Near miss |
| Definite maybe | Passive aggressive |
| Diet ice cream | Same difference |
| Exact estimate | Small crowd |
| Freezer burn | Temporary tax increase |
| Genuine imitation | Twelve-ounce pound cake |
| Great depression | Working vacation |
| Jumbo shrimp | |

Anagrams:

A word or phrase made by transposing the letters of another word or phrase.

- | | | |
|-------------------|---|--------------------|
| "The Morse Code" | = | Here Come Dots |
| "Slot Machines" | = | Cash Lost in 'em |
| "Snooze Alarms" | = | Alas! No More Zs |
| "A Decimal Point" | = | I'm a Dot in Place |
| "Eleven Plus Two" | = | Twelve Plus One |

