

Volume 43 • Number 4 • Fall 2006



Arriving Daily: M.C. Gill Innovation

Expanding Interest in Travel Global Economy Foster

The M.C. Gill Corporation Group of Companies is a vertically integrated organization capable of supplying advanced composite materials for virtually every aircraft built.

Demand for air travel has increased markedly in the last 10 years. Skyrocketing fuel costs and heightened security have forced the airlines to secure new ways to stay profitable yet competitive. Despite the devastating events of September 11, 2001, the industry has steadily grown. Passenger traffic increased 3.9% from 2004 to 2005 with projected increases of 5.8% in 2006 and 6.5% in 2007.¹ According to the FAA, "Planes will become fuller, as load factor is projected to increase every year. Passenger trip length is also forecast to increase. The growth in passenger trip length reflects the faster growth in the relatively longer international trips and longer domestic trips resulting from increased point-to-point service."² Deregulation in 1978 shifted U.S. air service patterns to the hub and spoke model. As a result, congestion at major hub airports has increased and the obvious advantage of non-stop flights, and therefore, faster travel times, has fueled the debate over patterns of air service. Commercial passengers have increasingly favored a point-to-point service model. The introduction of smaller long-haul aircraft offers significantly improved unit costs, passenger convenience and reduced environmental impact.

Boeing adheres to the "point-to-point" service model and their decision has resulted in the launch of their 787 Dreamliner[™] which M.C. Gill supports with a variety of products.





1 FAA Aerospace Forecast Fiscal Years 2006-2017, pg 33 2 FAA Aerospace Forecast Fiscal Years 2006-2017, pg 30

and Growth of Demand for Air Travel

SEINS

The 787 Dreamliner is a perfect example of how M.C. Gill's innovative product development and corporate synergy coalesce to satisfy a customer's overall needs.

The 787 is a twin aisle super-efficient aircraft with a seating capacity ranging from 210 to 330 people. Advancements in composite technologies make it possible for Boeing to increase the percentage of composites used during assembly by 38%. The 777 *currently* utilizes 50% aluminum and 12% composites. The *new* 787 cuts the aluminum usage to 20% and increases the composite content to 50%. By significantly reducing weight, the 787 delivers higher fuel efficiencies and fewer emissions (20% over similar aircraft).



BOEING 777 Aluminum 50%

Composites 12% Other 38%

BOEING 787

Aluminum 20% Composites 50% Solution 20% Other 30%

Each airliner is struck by lightning an average of 1–2 times per year

LIGHTNING ILLUMINATES THE SKY OVER AIRPORT TERMINAL While increasing the composite content reduces weight, it also renders the aircraft more vulnerable to environmental factors such as lightning. Non-metallic composite structures do not conduct away electrical currents as well as their metallic counterparts. For that reason, lightning strike protection (LSP) has been a legitimate concern since composites first appeared in aircraft design. Alcore's engineering team addressed this concern with a unique solution.



ALCORE STRIKEGRID MATERIAL

Alcore Devises Lightning Strike Protection (LSP) for Composite Structures with Strikegrid[™]

Lightning is considered to be one of the deadliest weather phenomena to commercial aircraft. Each and every time a lightning bolt strikes an unprotected surface, up to 200,000 amps of electricity seeks the path of least resistance. The immediate effects may include welding of metallic flight control surfaces, vaporization of resin from localized composite strike areas and explosion of fuel vapors within fuel tanks. "The aircraft must be protected against catastrophic effects of lightning." U.S. Federal Aviation Regulation —FAR 25.581

Composites have been used on aircraft for over 30 years. Today's commercial and military aircraft are vulnerable to lightning strikes; most commercial aircraft are struck once or twice each year on average. Composite materials do not readily conduct away the extreme electrical discharge generated by a lightning strike, so the current seeks any metal paths that may be available. Certain composite materials such as fiberglass are not conductive at all, while carbon fiber is significantly less conductive than metals. Lightning strike protection (LSP) technology has evolved over the last three decades and now Alcore's Strikegrid material, is available to the aerospace industry.



Alcore's Strikegrid materials are qualified to the Boeing BMS8-339, Rev.B material specification for Type I, Class 2, Grade 013, Form B, Style F for **SG-3**, **2 mil thick** material and Type I, Class 2, Grade 016, Form B, Style F for **SG-4**, **4 mil thick** material. For the first time, these materials are now available in roll form with both SG-3 (2 mil) material in 24" wide rolls and SG-4 (4 mil) material in 36" wide rolls, both 2500 linear feet long (splices allowed per roll will be two or less, with a minimum 50 feet between splice locations). Both of these products are currently being used for lightning strike protection on the Boeing 737, 777 and 787 aircraft.



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BOEING 747 LCF PREPARES FOR TAKEOFF

Boeing Facilitates Launch with Unexpected Approach

Boeing's Everett, Washington, facility is currently home to the 747, 767 and 777. The site receives materials from over one thousand suppliers worldwide with parts arriving every day. The Everett, Washington, site is also home to the 787 Dreamliner. Leading-edge design, quality materials and state-ofthe-art processes are all critical to a successful program. Boeing's engineers stepped outside the box when they developed a unique assembly process for the 787 Dreamliner. Instead of following the customary assembly process, Boeing determined they could cut costs and speed delivery time by working with large pre-assemblies and the 747 LCF (large cargo freighter) was the means to that end. Boeing's newsletter, The "Boeing Frontiers" reports, "The LCF will have one basic mission when it enters service in early 2007: efficiently ferry large composite 787 sections, including major fuselage Wichita, Kan.; and Nagoya, Japan, to Boeing's final

3 www.boeing.com/news/frontiers/archive/2005/june/ ts sf05.html, pg 2

747 LCF

N7478C



Castle Industries Dado Panels for the 747-LCF Surpass Boeing Expectations

The 747-LCF is unlike any other freighter. The 747-400 is easily one of the most recognizable aircraft in service today. Boeing challenged a group of engineers and international design partners to modify this aircraft so it would accommodate large sections of the new 787 Dreamliner. The redesigned 747-400 LCF boasts an enlarged fuselage and extended vertical fin. Boeing determined that they could save 20–40% in cost and reduce delivery time by moving the 787 pre-assemblies by air. At the core of the new design is the hinging of the aft fuselage section nicknamed "the swing zone." The entire tail section of the redesign swings out to allow loading of whole sections of the 787.

Castle Industries, known for machined and formed metal parts and assemblies, adds their expertise to the 787 effort with their dado panel assemblies. Dado panels are positioned throughout the aircraft and they are a critical element in *all* aircraft. The dado panels ensure equal pressure is maintained in both the cargo and main cabin areas. Should one area or the other experience a failure and decompression results, the dado panels react to equalize so the aircraft is able to land safely.

Boeing selected Castle Industries to manufacture new dado panel assemblies for the LCF. In addition to the very aggressive schedule, design changes had to be made to accommodate tooling problems and other technical issues. Curt Laufmann of Boeing 787 Global Partners states, "The 747-400 LCF enables integration of the 787 components in a way never before possible. The 747-400 LCF is absolutely critical to meeting the unprecedented customer demands for the 787 Dreamliner." Castle Industries met the challenges by modifying the designs and manufacturing the 32 different dado panel designs. The redesign and delivery of assemblies for the first three airplanes were completed in less than 90 days, far exceeding Boeing's expectations.

Castle Industries President, Eldon Swanson, credits their success to the technical experience and expertise of the engineering and manufacturing staff. "Our employees knew what was expected and accomplished their tasks on or ahead of schedule."



CASTLE INDUSTRIES DADO PANELS FOR THE BOEING 747 LCF

DADO PANELS

Vertical Integration Sets M.C. Gill Apart

Another example of how M.C. Gill's vertical integration benefits its customers can be found nearly 6,000 miles away in France, at Alcore Brigantine.



BOEING 787 TRANSLATING SLEEVE



Alcore Brigantine has an extensive background and proven track record in the manufacture of core details for engine nacelles. They are working with FACC, a major composite component and system supplier located in Austria, to provide aluminum honeycomb details for the production of the Boeing 787 translating sleeve. FACC is the system supplier for these major assemblies that form part of the nacelle assemblies supplied by Goodrich for the Boeing 787 program. The program includes details for two nacelle designs: one for the Rolls-Royce Trent 1000 and one for the GE GEnx[™] engine.

Alcore's Maryland facility produces the aluminum honeycomb to Goodrich's exact specification using Alcore's proprietary PAA (phosphoric acid anodizing) technology. All subsequent processing is carried out at the Alcore Brigantine facility in Anglet, France. In all, there are approximately 40 different parts in the outer duct and outer cowl.

This program relies heavily on Alcore Brigantine's engineering resources. Not surprisingly, the team has met the aggressive time schedule in completing the tooling and CNC (computer numerical control) data.



ALCORE WAREHOUSE

Gillcore[™] HK Kevlar[®] Honeycomb Optimizes Weight Savings for 787 Floor Panels

Weight savings are critical to the success of the aerospace industry today. M.C. Gill's R&D group recognized this and developed an exciting new product that delivers significant weight savings over other core materials. Gillcore HK Kevlar Honeycomb is a material that is ideal for aerospace applications. This new material has a unique combination of properties that result in flexibility, strength and reduced weight.

The product exhibits exceptional sheer strength and modulus, superior durability, fatigue and hot/wet properties.

This high-performance honeycomb is ideal for aircraft interiors, flooring and secondary structures.

In addition, the Gillcore HK Kevlar Honeycomb demonstrates excellent thermal and moisture dimensional stability. Most significant is the 20–30% weight savings over other core materials.

The benefits inherent in M.C. Gill's innovative products and processes support their stringent development criteria:

- Meet or exceed mechanical property requirements of existing OEM design specifications.
- Achieve maximum possible weight reductions.
- Attain desired product improvements while maintaining competitive pricing.

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The M.C. Gill Corporation Group of Companies is proud of our participation in the Boeing 787 program. This program allows us to showcase our cutting-edge product development skill-set, dedication to the aerospace industry and commitment to our customers.

Alcore Brigantine

Successfully Completes Quality System Audit by ASD-EASE/QUALIFAS Associations



THE TEAM OF MANAGEMENT OF PROCESSES (From left to right) Stéphane Bats, Serge Veloso, Pascal Cazeres, Philippe Laurent, Laurent Desclaux, Stéphane Priault, Isabelle Troisvallets, Laurent Demaret, Frédéric Caramanos,





THE M.C. GILL GROUP OF COMPANIES



JULY 19, 2006

Anglet, France – Alcore Brigantine successfully completed the main audit of its Quality System. During 2006, Alcore Brigantine implemented the new standard EN 9100 (based on standard ISO 9001 – 2000 release, with additional requirements specific for Aerospace Industry products). This audit represents a comprehensive new set of standards.

ASD-EASE (AeroSpace and Defense Industries Association of Europe – European Aerospace Supplier Evaluation) and QUALIFAS (Quality of the Suppliers for the French Aerospace Industries) oversee the European Aerospace Industry's business practices. These two organizations perform, record, and manage the periodic Quality Systems audits of their members and their suppliers.

The audit recognizes Alcore Brigantine's role as a leader in the field of aluminum honeycomb core processing in Europe. Alcore Brigantine will seek NADCAP accreditation next.



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



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THE DOORWAY IS PRINTED ON 10% POST-CONSUMER RECYCLED PAPER AND SHOULD BE RECYCLED



Why We Love Children!

On the first day of school, a firstgrader handed his teacher a note from his mother. The note read, "The opinions expressed by this child are not necessarily those of his parents."

A little boy got lost at the YMCA and found himself in the women's locker room. When he was spotted, the room burst into shrieks, with ladies grabbing towels and running for cover. The little boy watched in amazement and then asked, "What's the matter, haven't you ever seen a little boy before?"

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While taking a routine vandalism report at an elementary school, I was interrupted by a little girl about 6 years old. Looking up and down at my uniform, she asked, "Are you a cop?" "Yes," I answered and continued writing the report. "My mother said if I ever needed help I should ask the police. Is that right?" "Yes, that's right," I told her. "Well, then," she said as she extended her foot toward me, "would you please tie my shoe?"

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It was the end of the day when I parked my police van in front of the station. As I gathered my equipment, my K-9 partner, Jake, was barking, and I saw a little boy staring in at me. "Is that a dog you got back there?" he asked. "It sure is," I replied. Puzzled, the boy looked at me and then towards the back of the van. Finally he said, "What'd he do?"

* * *

While working for an organization that delivers lunches to elderly shut-ins, I used to take my 4-year-old daughter on my afternoon rounds. She was unfailingly intrigued by the various appliances of old age, particularly the canes, walkers and wheelchairs. One day I found her staring at a pair of false teeth soaking in a glass. As I braced myself for the inevitable barrage of questions, she merely turned and whispered, "The tooth fairy will never believe this!"



If the average man never trimmed his beard, it would grow to nearly 30 feet long in his lifetime.

A lump of pure gold the size of a matchbox can be flattened into a sheet the size of a tennis court.

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Golfers use an estimated \$800 million worth of golf balls annually.

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In 1970, 127 runners ran the NY Marathon. In 1998, 32,000 did.

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Ants don't sleep.

C

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When ants find food, they lay down a chemical trail, called a pheromone, so that other ants can find their way from the nest to the food source.

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The percentage of Africa that is wilderness: 28% (now get this...)

The percentage of North America that is wilderness: 38%

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Q. What is the only food that doesn't spoil? A. Honey

$\star \star \star$

Q. If you were to spell out numbers, how far would you have to go until you would find the letter "A"? A. One thousand

* * *

111,111,111 x 111,111,111 = 12,345,678,987,654,321

It is impossible to lick your elbow.

WWW.MCGILLCORP.COM

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Every day, more money is printed for Monopoly than the U.S. Treasury.