



A World of Composite Technologies



HexTow® Carbon Fiber



HexForce® Reinforcements



HiTape® Advanced
Reinforcements



HiMax® Multiaxial
Reinforcements



HexPly® Prepregs



HexFlow® Resins



Polyspeed® Laminates
& Pultruded Profiles



Modipur® Polyurethane



HexBond® Adhesives



HexMC®-i Molding
Composite



HexWeb® Honeycomb Core



HexWeb® Engineered Core



HexTool® Tooling
Material



HexAM® Additive
Manufacturing

HEXCEL 

A Global Leader in Lightweight Advanced Composites Technology

Hexcel has been at the forefront of composites technology for more than 70 years, working as a partner with our customers to create innovative, lightweight, high-performance solutions. We draw strength from our heritage – and continue the pioneering spirit by developing new and improved products to support and anticipate customer requirements.

Hexcel offers an unmatched breadth and depth of products and services to commercial aerospace, space and defense, and industrial markets. We manufacture a full spectrum of advanced material solutions including fiber, specialty reinforcements, prepregs and other fiber-reinforced matrix materials, honeycomb, resins, engineered core and composite structures. As a complete composites solutions provider, we are able to vertically integrate our quality products through all phases of our customers' needs.

Our culture of innovation and customer collaboration as well as our commitment to continuous improvement through Operational Excellence leads us to explore new ideas, to challenge the impossible, and to succeed beyond expectations to support and anticipate customer requirements.

Our products are used by customers to save weight, which reduces fuel consumption and helps to reduce carbon emissions. Some of our products reduce noise pollution while others help to produce clean and renewable energy. The lightweight, adaptable nature of our materials makes products lighter, more aerodynamic, stronger and more durable. Therefore, our overall impact on the global environment is closely linked with our customers and their efforts to make products with a reduced impact on the environment.

At Hexcel, it is our Purpose to propel the future of flight, energy generation, transportation and recreation through excellence in advanced material solutions that create a better world for us all.



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Commercial Aerospace

Hexcel has the greatest number of aerospace qualified products of any composite materials manufacturer worldwide.

We are a major supplier of advanced composites for primary and secondary structures and aircraft interiors. We are a leader in advanced composites for new generation engines.

Hexcel's advanced composite materials bring great benefits to aircraft design. They save weight and reduce fuel consumption, increase payload, extend flight range, enhance toughness and durability, optimize design, reduce part count, decrease maintenance cost and maximize passenger comfort and safety. The improvement in fatigue performance with carbon fiber reinforced prepregs (CFRP) compared to aluminum is also a major benefit.

Aircraft engines have evolved to include so many major composite components that carbon fiber epoxy prepregs account for typically half the volume of the entire nacelle structure. The next step for aero engine designers has been to apply composites technology to more complex structures within the engine itself. Hexcel's sound attenuating treatment for our honeycomb core, called Acousti-Cap®, has been proven to quiet jet engine noise more effectively than any competing system. Our unique capability to weave carbon on a 45-degree bias helps customers reduce scrap. Our toughest carbon fiber prepreg system is used for the front fan blade on the GEnx engine and our HexTow® carbon fiber is used on the LEAP engine fan blades and casing.



Space & Defense

Hexcel is a leader in the Space & Defense market in the manufacture of advanced composites used in commercial helicopters and military aircraft. We are currently qualified to supply materials to a broad range of more than 100 helicopter, military aircraft and space programs.

Hexcel advanced materials advance key defense programs including the F-35 Lightning II, Sikorsky CH-53K King Stallion, V-22 Osprey tilt rotor aircraft, UH-60M Black Hawk, AH-64 Apache, A400M military transport, European Fighter Aircraft (Typhoon), F/A-18E/F Hornet, Rafale fighter jet, and NH90.

From manufacturing precursor to completing flyaway composites parts, Hexcel offers a totally integrated solution. Our fibers meet the grueling demands faced by space and defense aircraft and commercial satellites where our composite systems must perform under extreme conditions and at extreme temperatures that could cause ordinary materials to warp, expand, or contract depending on temperature.

Hexcel composite materials stand up to these harsh conditions and maintain their structural integrity. Our advanced composites are used on solid rocket booster cases, fairings and payload doors for launch vehicles, and buss and solar arrays for military and commercial satellites.

Hexcel is also a leader in producing advanced composites for helicopter blades. Numerous new helicopter programs in development, as well as upgrade or retrofit programs, have an increased reliance on composite materials products such as carbon fiber, prepgs, and honeycomb core to improve blade performance.

We work closely with the producers of carbon/carbon composites and supply our fibers into their systems for this growing segment. HexTow® 85 was uniquely designed to meet many of these specific requirements.



Industrial Markets



Hexcel's Industrial business focuses on three key performance-driven market segments: Energy, Automotive and other specialty areas with focus on Sports & Leisure and Marine. As wind blades have increased in size to power more efficient turbines, and car designers are challenged with driving down CO₂ emissions, lightweighting has become a priority. Hexcel's products are driving weight reduction and promoting greater manufacturing efficiencies in support of these trends.

Energy

Hexcel has supported wind turbine production worldwide for more than 25 years with excellent know-how in composite materials and process enhancing as well as environmentally friendly production processes.

Our extensive range for Energy includes products made of glass, carbon and other fibers to achieve the most suitable solution for our customers. We specialize in the development and manufacture of carbon fiber, non-crimp fabrics, fiber reinforcements, prepregs, laminates including pultruded elements, and polyurethanes.

One of our strengths lies in tailor-made products (technical preforming) to enhance production processes. We have the capability to produce prepregs specially designed for semi-automatic processes.

An emerging market for Hexcel carbon fibers is hydrogen pressure vessels as well as compressed natural gas (CNG) tanks. Hexcel composites also are used for energy storage systems such as flywheels.

Automotive

Hexcel offers automotive engineers a number of cost-effective composite solutions to meet their demanding targets for weight reduction, performance efficiency, design improvements, series production and aesthetic appearance. Hexcel's fiber-reinforcements, non-crimp fabrics, molding compounds and fast curing prepgs are optimized for automotive body and interiors, structural parts, and suspension parts. Our outstanding material solutions and decades of experience are enhanced by dedicated R&T and a Technical Support team that is ready to work in partnership with customers to ensure the best solutions for the designs of today and tomorrow.

Recreation

Hexcel's leading edge technology and advanced structural materials have played a key role in the evolution of sports and recreation equipment, providing lightness, stiffness and strength. From performance bikes to tennis racquets, golf shafts, fishing rods, surfboards, skis or snowboards,

Hexcel is proud to supply the "top of the range" with cutting-edge materials that provide amateurs and professionals with the performance edge.

Marine

Over the past 40 years, Hexcel has developed a wide range of composite materials to meet marine industry requirements, including proven America's Cup Class prepgs and honeycombs for performance boats and non-crimp fabrics for super yachts and high performance military vessels.

Consumer Electronics

Our fibers and specialty sizings that are compatible with polycarbonate resins are used in consumer electronics to produce products such as laptop cases and other electronics. Our fibers meet consumer demand for superior cosmetics in visual parts.





- **Stronger than steel, lighter than aluminum and as stiff as titanium**
- **High strength**
- **High strain**
- **PAN-based fiber**
- **Successive surface treatment to improve bonding**
- **Sizing to improve handleability**

Hexcel has more than 50 years of experience in manufacturing carbon fiber, with manufacturing facilities in the U.S. and Europe. Hexcel manufactures under AS9100 and ISO14001 standards and provides global customer support.

Hexcel is a technology leader in Intermediate Modulus fiber with an in-house polyacrylonitrile (PAN) domestic supply and dedicated R&T facilities for both precursor and carbon fiber development.

HexTow® carbon fiber is the preferred carbon fiber for the world's most advanced aerospace and industrial composite applications.

Carbon fiber is stiffer, stronger, and lighter than other fibers. It is selected for its high strength, lightweight, superior stiffness, electrical conductivity, low thermal expansion, high thermal conductivity and corrosion resistance.

HexTow® carbon fiber is produced in a continuous operation in which Hexcel's proprietary polyacrylonitrile (PAN) precursor undergoes a series of precisely controlled oxidation and carbonization processes. Exposure to extremely high temperatures chemically changes the precursor which yields high strength-to-weight and high stiffness-to-weight properties. Successive surface treatment and sizing stages improve bonding and handleability. The resulting carbon fiber is stronger than steel, lighter than aluminum and as stiff as titanium.

Hexcel offers standard, intermediate and high modulus carbon fibers across commercial aerospace, space and defense, and industrial markets. We offer a wide range of tow sizes used in high-performance composite applications including 3K, 6K, 12K and 24K as well as specialty fibers such as HexTow® 85 carbon fiber which is designed for ablative applications.

Hexcel is the largest supplier of qualified intermediate modulus carbon fiber and has the most qualified positions on aerospace programs in the world.

Continuous Carbon Fiber

Continuous fiber can be combined with all thermoset and thermoplastic resin systems. It is used for weaving, braiding, filament winding applications, unidirectional tapes for ATL and AFP processes and prepeg tow for fiber placement.

Carbon Fiber for Industrial Applications

HexTow® carbon fiber is widely used in a number of leading brand, high performance recreational sports equipment including performance bikes, tennis racquets, fishing rods, skis, snowboards, hockey sticks, baseball bats, and golf shafts to name a few. HexTow® standard and intermediate modulus carbon fiber is selected for winning Formula 1 cars, competition racing boats, high-performance cars, and composite tooling material. Carbon fiber is also opening new possibilities for high strength and performance in the fields of energy generation and high performance pressure vessels.



HexForce® reinforcements

HexForce® woven fabric range is the most complete line of reinforcements for aerospace and industrial markets. They are available in a range of weave styles, fibers, and areal weights – the selection of which depends on several criteria including the required mechanical properties, visual aesthetics, drapeability, and resin impregnation. HexForce® standard reinforcements provide strength and stiffness in the 0 and 90 direction, HexForce® Unidirectional reinforcements provide strength and stiffness in the 0 direction only, and HexForce® Bias Weave reinforcements provide strength and stiffness in the +45 and – 45 directions. Selected HexForce® reinforcements may be certified to a multitude of industry and OEM specifications.

Carbon Fiber Reinforcements

Hexcel manufactures the most complete line of carbon fabrics and specialty reinforcements for the composite industry and offers a complete line of globally certified aerospace products.

Carbon fiber reinforcements, when properly engineered into the appropriate matrix, can achieve one of the strongest and most rigid composite structures available with significant weight savings when compared to metals and other materials.

In addition to the high strength-to-weight ratio, carbon fiber reinforcements are thermally and electrically conductive, have very low CTE and excellent fatigue resistance.

Glass Fiber Reinforcements

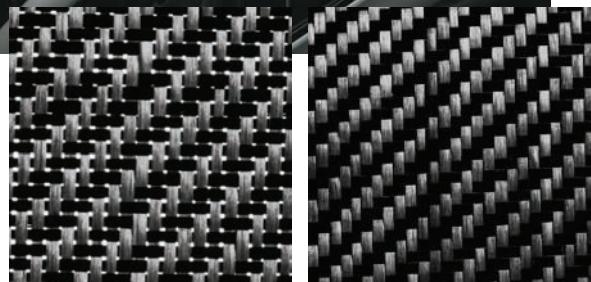
The versatility of glass as a fiber makes it unique industrial textile material. Woven glass fibers offer an excellent combination of properties from high strength to fire resistance at a more affordable cost. Wide ranges of yarn sizes and weave patterns provide huge number of design potential allowing the end user to choose the best combination for material performance, economics and flexibility. Hexcel produces glass fiber reinforcements in a wide variety of areal weights, from 48 to 1300 gsm.

Aramid Fiber Reinforcements

Hexcel manufactures aramid fiber reinforcements in Europe for use in aerospace applications as well as marine, tooling and recreational products where high strength, low weight and impact resistance are essential.



PrimeTex® reinforcements



PrimeTex® is a range of carbon fabrics processed for a smooth, closed weave and uniform cosmetic appearance. The filaments in each tow are spread out, creating a thinner and more closely woven fabric, providing better mechanical properties and less porosity in a composite. PrimeTex® fabrics can also lower the mass in a structure when lighter weight is a key requirement.

PrimeTex® gives a clear visual benefit to the finished product, enhances the mechanical properties in a laminate and allows high K tow fibers to be used, for the lowest areal weight. The PrimeTex® range is available with HR, IM and HM fiber, from 3K up to 24K.



HiMax® multiaxial reinforcements

HiMax® multiaxial fabrics also known as non-crimp fabrics are layers of unidirectional fiber that are assembled and stitched together. They provide strength and stiffness in multiple directions depending on the controlled orientation of the fibers. The range includes Biaxial, Triaxial, and Quadraxial. These reinforcements provide composites with stiffness and strength and are key products for many industrial markets.

The non-crimp concept allows in-plane mechanical properties to be enhanced, such as tension and flexion. In a complex lay-up, there is less material waste, and the lay-up time is reduced by using thicker materials. High tow-count fibers can be used.

HiMax® reinforcements offer several advantages over traditional fabric forms:

- The reinforcing fibers can be placed in different axis to optimize the performance of the finished laminate.
- The avoidance of resin-rich areas means it is easy to achieve a higher weight fraction (wf).
- Non-crimped fibers give higher tensile and flexural properties in the finished laminate.
- There is reduced print-through which is especially important on boat hulls and automotive applications.
- Fabrics are easier to cut and handle as the stitching holds the material together.
- Heavier combinations are possible, meaning higher deposition rates.
- The straight uncrimped fibers allow good resin penetration and flow which is ideal for infusion and light-RTM, while the stitching aids resin migration through the layers (Z-direction) which is perfect for maximizing infusion rates.



HiTape® reinforcements

HiTape® innovative high-performance dry unidirectional reinforcements are designed to meet the requirements of Aircraft primary structures made by cost-effective out-of-autoclave (OOA) technologies such as vacuum infusion or injection.

HiTape® allows dry preforms to be manufactured in a fully automated lay-up, similar to the AFP and ATL processes widely used for UD prepregs. The tight width tolerance of HiTape® reinforcements give total control of the automated dry preform process – making them a waste-free operation, even for complex structures, as the materials are placed exactly where required.

Using OOA vacuum infusion technology, Aircraft structures made with HiTape® reinforcements demonstrate fiber volume content and mechanical properties that are very similar to parts made with the latest generation primary structure prepregs. HiTape® reinforcements give particularly high Compression After Impact

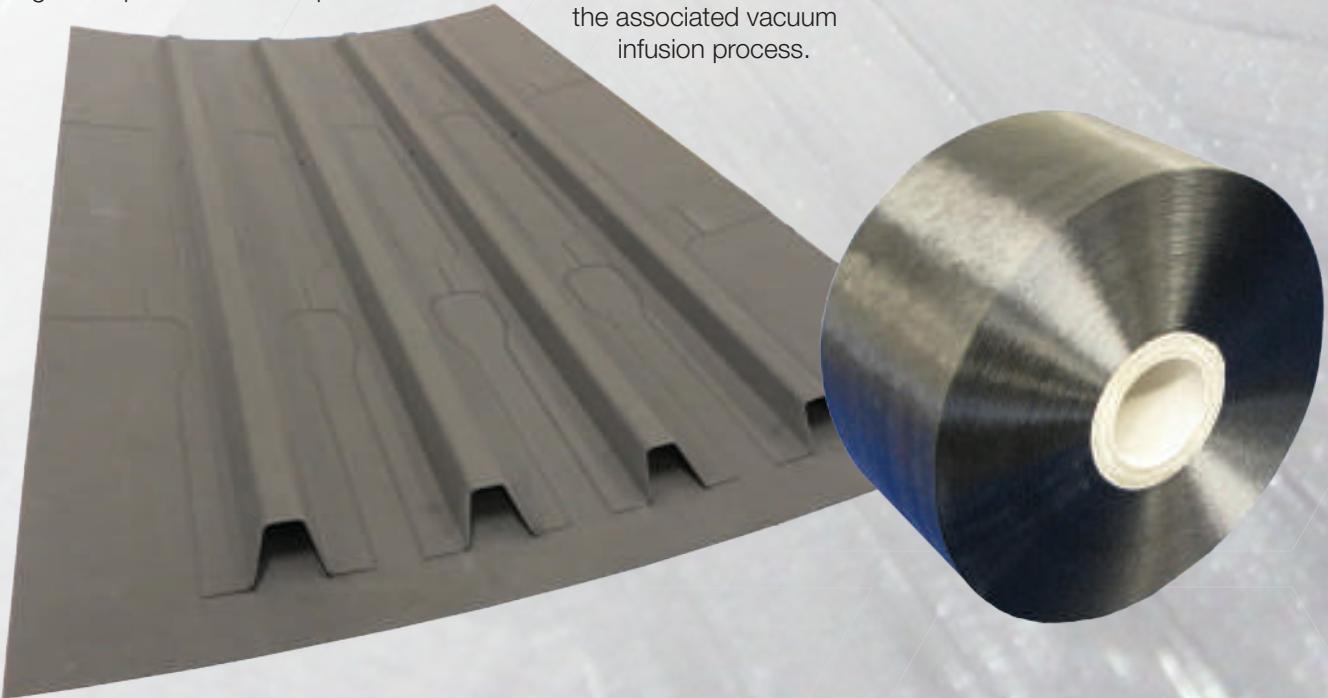


(CAI) performance, which is a real breakthrough in infusion technologies with unidirectional carbon reinforcements.

Based on HexTow® carbon fibers, Hexcel supplies HiTape® reinforcements with HexFlow® infusion epoxy resins for optimum mechanical performances and infusion/injection processing.

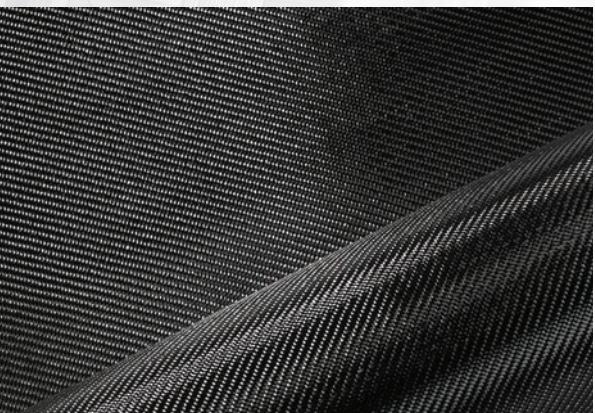
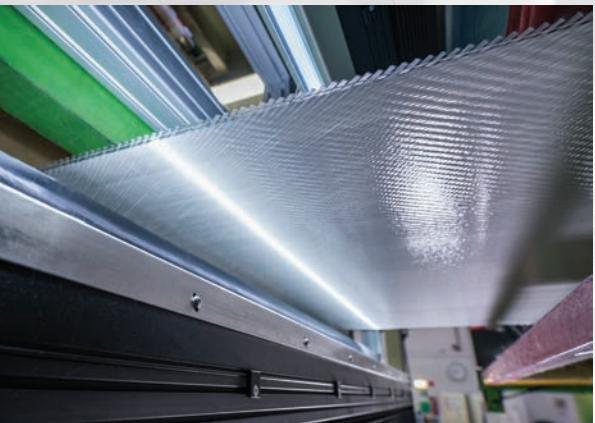
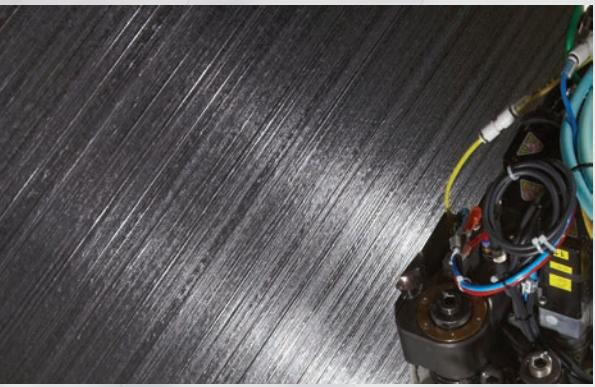
Customer evaluations have demonstrated that significant cost-savings are achievable with HiTape® reinforcements and the associated vacuum infusion process.

The materials allow the part design to be optimized, including function integration. The automated dry preform process is simplified, without any splicing of materials or polythene film to remove. There is no need to apply pressure to consolidate the preform and remove air as this occurs later when vacuum is applied. Very high preform lay-up outputs are achieved and another cost-saving benefit is that no refrigerator storage is required due to the dry nature of the reinforcements.





HexPly® prepegs



Hexcel prepegs provide a tougher, lighter and stiffer alternative to conventional materials. They are specially formulated resin matrix systems that are reinforced with man-made fibers such as carbon, glass and aramid. Prepeg is the ultimate composite material. The thermoset resin cures at elevated temperatures, undergoing a chemical reaction that transforms the prepeg into a solid structural material that is highly durable, temperature resistant, exceptionally stiff and extremely lightweight.

HexPly® Prepegs for Aerospace

Hexcel pioneered the development of composite materials to meet the requirements of early aircraft manufacturers. Ground-breaking projects included the construction of a full scale wing spar in flax fiber reinforced phenol formaldehyde resin for a Bristol "Blenheim" bomber. Weight-saving was a major driver in the exploration and development of these new materials, alongside the need for higher mechanical properties and greater design flexibility.

The aerospace industry is the greatest consumer of Hexcel prepegs, for civil aircraft, military jets, helicopters, aero-engines or space satellite and launchers. Hexcel's range of resin formulations for aerospace prepegs includes a wide range of epoxies for highly loaded parts and supreme toughness; BMI systems for high temperature performance; phenolics for fire, smoke and toxicity performance in aircraft

interiors; and cyanate esters for space structures and satellite applications. HexPly® prepegs are available with HexForce® woven and multiaxial reinforcements, as slit tape for ATL and AFP applications, or as unidirectional tapes in various forms. HexPly® out-of-autoclave (OOA) prepegs are used for their flexibility and efficiency in part manufacturing.

HexPly® Prepegs for Industrial

Hexcel provides a range of HexPly® prepegs for industrial applications, using specially formulated epoxy, phenolic and BMI resin matrix systems. HexPly® prepegs are reinforced with woven, multiaxial and unidirectional (UD) carbon and glass fibers.

HexPly® prepegs are used in a wide range of industrial markets where they are tailored to meet specific performance requirements including: low-temperature cure; good fatigue performance; fire, smoke and toxicity performance; and great visual finish combined with high temperature resistance.

The HexPly® Industrial product range continues to evolve, with surface films, systems with very short cure cycles and higher temperature performance resins being introduced. All industrial markets can benefit from Hexcel's high-performance, lightweight composite materials, from traditional markets such as sports equipment to new applications such as industrial machinery and alternative energy.



HexFlow® infusion resins

Hexcel pioneered the development of resin formulations for composites and is the premier worldwide supplier of preprints, RTM and RFI systems.

Resin Transfer Molding (RTM) and Vacuum Infusion are composite manufacturing methods that are particularly suitable for low-to-medium volume production rates, allowing high-quality components to be created without using autoclaves. Large complex shapes can be achieved with good surface quality and a reduced part count.

HexFlow® RTM6 is the aerospace industry standard for resin transfer molding, manufactured in Europe and the U.S. and qualified by all major OEMs and Tier 1s. This mono-component resin system has 20 years proven service and is favored for its high glass

transition temperatures and flexibility in injection and cure cycle parameters.

In response to customer demand, Hexcel developed a bi-component format of RTM6 called HexFlow® RTM6-2. With the same chemical composition as RTM6, RTM6-2 provides the same high mechanical properties as the original resin and is easy to transport by air or sea. At customer facilities, this system can be stored at +5°C for 12 months (instead of -18°C for 9 months for HexFlow® RTM6). Our HexFlow® RTM230 resin delivers improved toughening performance.

HexFlow® resins are fully compatible with the extensive range of HexForce® reinforcement fabrics. Our technical support engineers are on hand to assist with the optimum resin and reinforcement selection.



Polyspeed® laminates & pultruded profiles



Laminates

Polyspeed® laminates are fiber-reinforced epoxy resin impregnated materials that are supplied in a cured state. Hexcel manufactures a wide range of pressed laminates made with unidirectional or multidirectional carbon, glass and aramid reinforcements as well as hybrid laminates which combine glass, carbon and aramid fibers to meet specific customer mechanical properties requirements. Being pre-cured, laminates are chemically stable and have established mechanical properties, making them ready-to-use for compounding with foam or adhesives.

Laminates are used in layer constructions and absorb physical impacts in the final products such as skis, snowboards, floor panels and many other industrial applications.

Pultruded Profiles

Pultrusion is a continuous process for the manufacture of composite profiles. Hexcel's Vert-Le-Petit site pioneered pultruded profiles manufactured with unidirectional and orientated fiber, mainly with carbon fibers, and offers a wide variety of pultruded sections.

Polyspeed® pultruded profiles are made from either carbon fiber (standard, intermediate and high modulus), glass, quartz, basalt or other fibers as specified. The profile matrix is a Hexcel formulation based on epoxy and polyurethane thermoset resins allowing applications in the most severe environments up to 100°C as standard, and up to 200°C in certain specifications.

Hexcel pultruded profiles are used in many industrial applications including sporting goods, robotics, medical, building, telescope monopods and tripods.





HexMC®-i molding materials



HexMC®-i molding materials for industrial applications

HexMC®-i is a high performance molding material, suitable for the production of complex shaped parts and specifically designed for compression molding. With long carbon fibers (50mm) and a low resin content, HexMC®-i provides better mechanical properties than any other short or long fiber molding compound.

The HexMC®-i epoxy system provides short cure cycles, from two minutes at 150°C/ 302°F depending on part thickness. Complex shapes can be achieved and inserts can be integrated in the molding process. This product is particularly beneficial for sporting goods, automotive and marine applications, as well as a wide range of industrial components.

HexMC®-i molding materials enable composite parts to be manufactured for:

- Applications where complex 3-D shapes limit the use of typical fiber reinforced matrices/reinforced laminated composites
- Use for applications where previously metal was the only solution
- Parts with abrupt change of cross-sectional thickness
- Applications where co-curing of elements is desired, such as metal inserts or mixing with other materials and more
- Use with automated production process similar to SMC molding
- Production of parts with zero material waste



Modipur® polyurethanes

Modipur® polyurethane systems enable complex shapes to be achieved at low cure temperatures and in rapid production cycles.

Hexcel supplies a wide range of formulated two-component systems that are used for sports,

automotive and other industrial applications. The Modipur® range includes semi-flexible and integral foams with closed or open cell structures. The products are used as core materials, as insulation and/or for their adhesive properties, in sports and industrial applications.

HexBond® adhesives

Hexcel formulates and manufactures a comprehensive range of structural film adhesives, foaming adhesive films, paste adhesives, liquid shims and primers for aerospace and industrial markets.

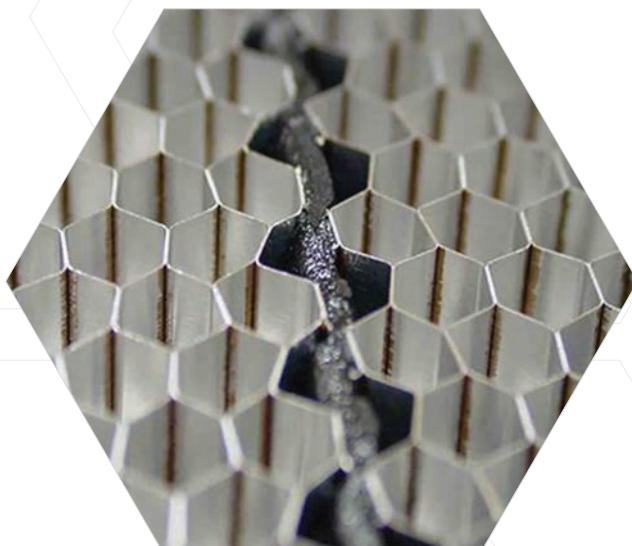
HexBond® Film Adhesives

Epoxy and bismaleimide (BMI) adhesives are supplied in film form on a roll and require heat and pressure to cure. These high performance structural adhesives are ideal for metal-to-metal and composite bonding and for the manufacture of honeycomb sandwich structures.



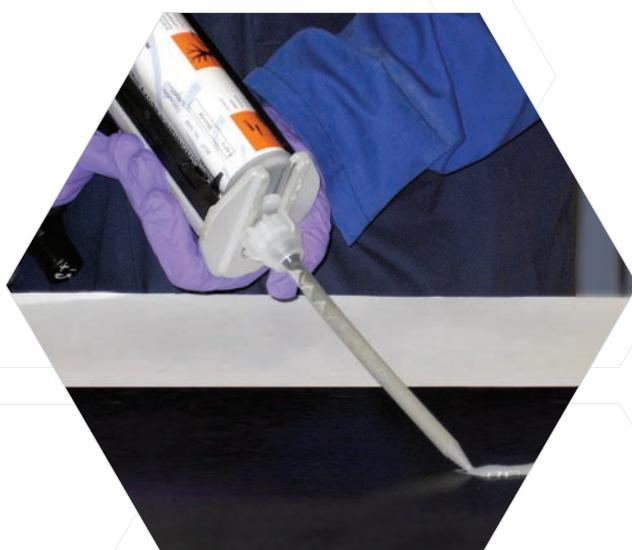
HexBond® Foaming Adhesive Films

When cured at an elevated temperature, these films expand, making them ideal for gap filling, honeycomb core edge bonding and core splicing. HexBond® foaming adhesive films are supplied in sheet form and are designed to be used in conjunction with HexBond® film adhesives.



HexBond® Primers

Each HexBond® primer has been formulated to ensure the maximum possible performance is achieved from the corresponding HexBond® film adhesive. HexBond® primers protect pretreated metal surfaces prior to bonding and ensure maximum bond durability. All HexBond® primers are free of chromium compounds.



HexBond® Shimming Adhesives

These are two-part epoxy adhesives which can be cured either at room temperature or elevated temperatures to achieve higher levels of mechanical performance.

HexBond® Paste Adhesives

We offer a range of one and two component epoxy and BMI adhesives which can be used for bonding, potting, and filling composite and metallic structures. These products are supplied in a variety of different package forms including cartridges and small containers.

Whether using a film or a paste adhesive, Hexcel has a wide range of products to offer for almost all composite and honeycomb bonding requirements.



HexWeb® honeycomb

- Exceptional stiffness and strength with little added weight for the aerospace and industrial markets
- Available in a variety of cell sizes and densities
- Made from fiberglass, aluminum and aramid mechanical papers

Honeycomb is a lightweight core material for structural stiffening applications. This versatile material is widely used in the construction of aircraft components such as floors, interior paneling, secondary structures and helicopter rotor blade aerofoils. Other applications include railway carriage doors and ceiling panels, marine bulkheads and furniture. Honeycomb is also the ideal material for energy absorption (bumpers/fenders, lift shaft bases), for RF shielding and fluid and light directionalization.

Hexcel was the first company in the U.S. to manufacture expanded

honeycomb on a commercial scale. Today more than 700 varieties are produced in a wide range of materials and cell configurations.

In addition to the aerospace market, Hexcel honeycomb is used in sandwich constructions for a wide range of industrial applications – from boat hulls and train interiors, to sports equipment and car chassis and body panels. HexWeb® aluminum honeycomb is also used for its excellent energy absorption characteristics, for example in automotive crash test barriers.

HexWeb® Acousti-Cap® sound attenuating honeycomb

HexWeb® Acousti-Cap® enables aircraft engine designers to achieve superior acoustical performance, including dramatic noise reduction during take off and landing, without a structural weight penalty. This marks an improvement in current technology, which requires trade-offs between weight and noise reduction. Acousti-Cap® consists of a non-metallic permeable cap material embedded into an honeycomb core to create an acoustic septum.

Hexcel's customers specify the flow resistance characteristics they want in the product, as well as overall core thickness, numbers of caps in a cell, and insertion depth. The result is a product tuned to their acoustic requirements.

An aluminum version of Acousti-Cap® is also available that provides comparable broadband noise reducing performance, with added cost-savings benefits.

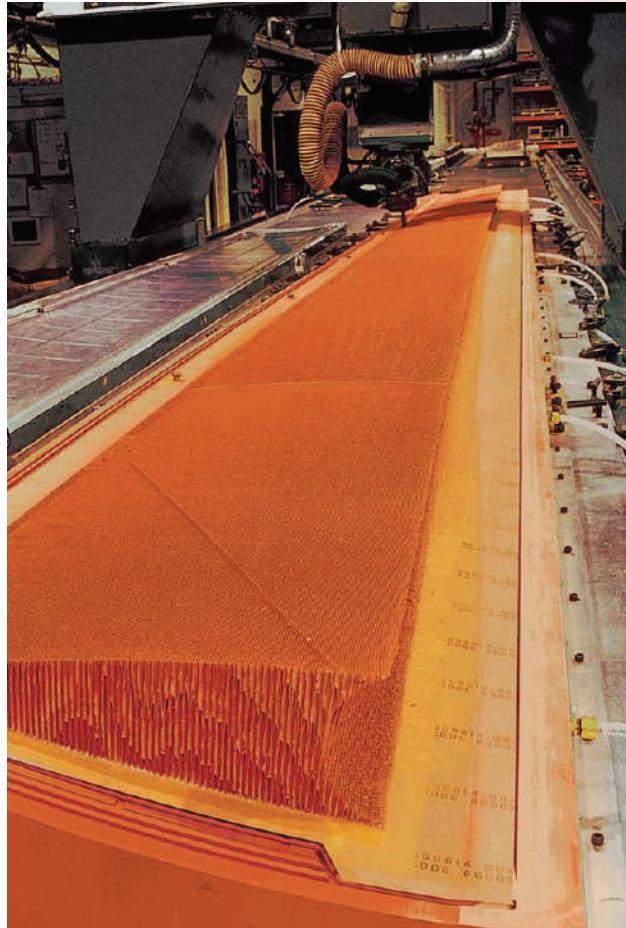




HexWeb® engineered core

- High quality components
- Precise dimensional tolerances
- Fewer manufacturing stages and processes
- Dedicated technical support from HexWeb® engineered core experts

HexWeb® engineered core starts with standard blocks and slices of honeycomb, also known as core. This lightweight material adds stiffness and strength when used as a material in sandwich structures. The core can be formed, shaped, machined and bonded using advanced, computer-aided design and manufacturing techniques to achieve a core that meets specialized customer requirements. The expertise of our manufacturing and engineering staff, combined with extensive research and unique core processing technologies, results in profiled precise complex shapes. These core shapes are then used as semi-finished components in composite parts and structures that can add value to your product in a variety of ways.

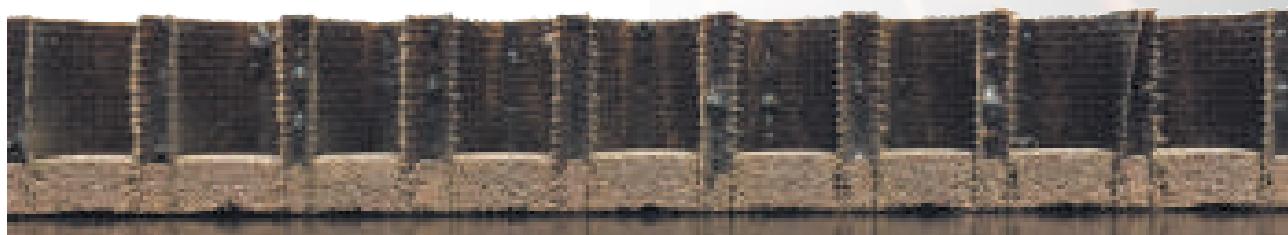


HexShield™ heat resistant material

HexShield™ heat resistant material is a new technology that provides high temperature resistance in aircraft engine nacelle applications and is made to be able to withstand a fire event. The technology builds on Hexcel's long history of heat resistant honeycomb products with the 260°C/500°F HexWeb® HHS-327 honeycomb. It combines the benefits of honeycomb as a structural material with the additional benefits of formability with thermal resistance performance. This

new technology can be combined with various facing materials to meet customer requirements.

Hexcel has created and completed testing on two different compositions of HexShield™ 450 which performs well to a 450°F operating condition and HexShield™ 600 which performs well to a 600°F operating condition.





HexTool® tooling material

HexTool® composite tooling material combines tolerance accuracy with extreme lightness. HexTool® is Hexcel's new patented composite tooling material that, for the first time, enables the tolerance accuracy achieved with metals to be combined with the extreme lightness of carbon fiber composites. HexTool® molds are easy to repair and are simple to modify. This new concept for lightweight, efficient large-scale tools is cost-effective compared with conventional composite tools and metal molds, especially those made from Invar®.

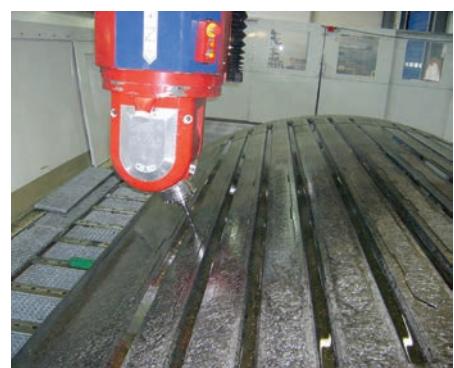


Since the launch of HexTool®, several leading tooling engineers have used the material, confirming the benefits of the technology. They have noted that dimensional stability is maintained at tolerances very close to those achieved with metal tooling and that vacuum integrity is assured, even in heavily machined areas. Long tool life, ease of use, and the machinability of cured structures are some of the primary reasons HexTool® is chosen for the tooling for parts on next-generation aircraft worldwide.



HexTool® tooling compound comprises randomly layered strips of unidirectional prepreg that have been consolidated into continuous rolled goods. It can be used for multi-ply quasi-isotropic hand lay-up and subsequently CNC milled to close tolerance.

HexTool® means that accurate and expensive master molds are no longer necessary since dimensional tolerances are machined into the tools surface, lower cost master material can be used in place of costly machined metal tools.



Engineered Products

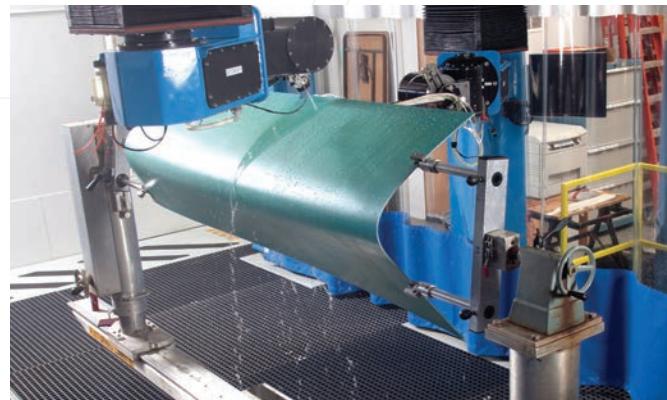
In addition to being a major supplier of composite materials to the aerospace industry, Hexcel also manufactures and markets lightweight, high-strength composite structures and assemblies for commercial and military aircraft, helicopters and business jets.

We have more than 70 years of documented performance in aerospace and defense contracts, working for Airbus, Boeing, Bombardier, Mitsubishi Heavy Industries, Sikorsky, Kawasaki Heavy Industries and Lockheed Martin.

Finished composite parts are lighter than metal, resist rust and corrosion, are able to be made into complex shapes. They also have the ability to have tailored ply shapes and material types to increase toughness and strength to support a longer lifespan.

Hexcel engineered products include wing-to-body fairing assemblies, wing trailing edge assemblies, tail section components, radomes, dorsal and flap-track fairing assemblies, cockpit sidewall and ceiling panels and doorliners, leading edges, access doors and rotor blade components.

Our engineered product facilities have 382,000 sq. ft of manufacturing space; a 33,000 sq. ft clean room; 7 autoclaves (up to 50' in length); a range of ovens, water-jet cutters, CNC routers and spray booths; and a wide range of testing equipment, state of the art NDT capability and extensive engineering and tooling programs. Hexcel is well equipped to manage multiple programs.





HexAM® additive manufacturing

3D printed HexPEKK® flight-ready parts

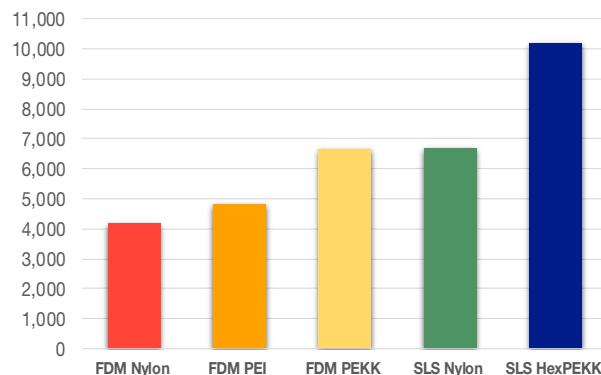
Benefits of HexPEKK® Parts

- No tooling required
- Dimensional repeatability
- Lower cost
- Lower weight
- Superior laminate quality
- Low outgassing
- Allows for more complex / organic geometries

The HexAM® process combines a high-performance PEKK thermoplastic with selective laser sintering (SLS) technology to produce fully functional HexPEKK® end-use components. HexPEKK® parts offer significant weight, cost and time-to-market reduction compared to incumbent metal or composite technologies while still providing repeatable and validated engineering material properties.

The HexAM® additive manufacturing platform is ideal for high-performance aerospace applications. Hexcel's proprietary PEKK thermoplastic, processed with SLS technology, yields HexPEKK® hardware with robust, repeatable material characteristics. HexPEKK® parts are chemically resistant and low outgassing, have a wide temperature performance range, and are already used by customers for crewed space, satellite, military aviation, and defense applications. Combining the flexibility of select laser sintering technology with an engineering-grade material 50% lighter than aluminum, Hexcel's HexAM® additive manufacturing platform is a perfect solution for customer needs.

Z Tensile Strength (KSI)



HexAM® process makes it simple to remove non-critical sections without additional processing to make parts lighter.



Complex organic geometries are possible with HexAM® process without the need for forging or welding.



HexAM® process is ideal for complex ducts and shapes that would typically require multiple metal parts and welds, with HexAM® manufacturing, parts come out of a printer flight-ready with no need for additional processing.



Continuing Innovation

Hexcel's success is built on our strength in innovation and operational excellence. Innovation is evidenced in our breakthrough products and our more than 1,350 patents and pending applications worldwide. At Hexcel, aiming for what seems an unrealistic goal, or challenging some long-held paradigm are springboards to discovery and thinking "outside the box." We partner with customers to develop solutions that revolutionize their designs, and our technical support engineers ensure the practical application of these transforming technologies.

Research & Technology

Hexcel employs more than 250 people who work in research and technology. Many of our manufacturing sites have research and technology centers where scientists and engineers work on projects specific to the location. In addition, we have primary R&T centers in the U.S. and Europe.

U.S.

- Dublin, CA - *Matrix Technologies*
- Casa Grande, AZ - *Core Technologies*
- Decatur, AL - *PAN and Carbon Fiber Technologies*

Europe

- Duxford, Cambridgeshire, U.K. - *Resin Systems and Adhesives Technologies*
- Leicester, U.K. - *Non-crimp and Multiaxial Fabrics*
- Les Avenières, France - *Reinforcements Technologies*





ARC Technologies



ARC Technologies, a Hexcel company, is the leading supplier of microwave and RF absorbing materials for commercial and defense applications.

The company has a wide range of capabilities for producing RF / EMI and microwave absorbing materials and specializes in combining functional fillers – including dielectric, magnetic and conductive properties – with a proprietary blend of polymer resins to generate various matrix materials including structural composites and thermoplastics.

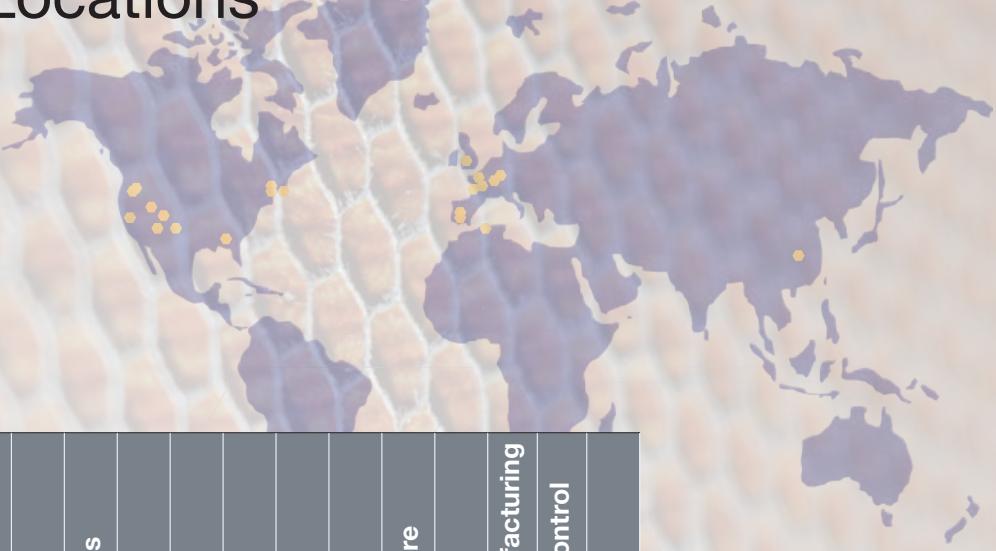
ARC Technologies has developed an unrivaled range of capabilities to solve microwave and RF interference, radar absorbing, and EMI control problems.

ARC Technologies was founded in 1989 and acquired by Hexcel in 2019. It has more than 200,000 square feet of research, design, manufacturing, and office space in Amesbury, Massachusetts. With a loyal customer base in aerospace, defense, and commercial markets, it is the leading supplier of microwave and RF interference, radar absorbing, and EMI control materials.

Whether customers face problems at 10 MHz or 110 GHz, near-field or far-field, narrowband or broadband, the ARC Technologies team has a standard or custom solution ideal for any application.



Hexcel Global Locations



Location	Country	PAN	Carbon Fiber	Reinforcements	Matrix	Adhesives	Laminates	Pultrusion	Honeycomb	Engineered Core	Final Parts	Additive Manufacturing	Interference Control	R&T
Amesbury, MA	U.S.													
Burlington, WA	U.S.													
Casablanca	Morocco													
Casa Grande, AZ	U.S.													
Dagneux	France													
Decatur, AL	U.S.													
Duxford	U.K.													
Dublin, CA	U.S.													
Hartford, CT	U.S.													
Illescas	Spain													
Kent, WA	U.S.													
Leicester	U.K.													
Les Avenières	France													
Neumarkt	Austria													
Parla	Spain													
Pottsville, PA	U.S.													
Roussillon	France													
Salt Lake City, UT	U.S.													
Seguin, TX	U.S.													
Stade	Germany													
Tianjin	China													
Vert-le-Petit	France													
Welkenraedt	Belgium													

For a complete listing of our locations and contacts, please visit www.hexcel.com/About/Global-Locations

Hexcel Product Family



**HexTow®
Carbon Fiber**



**HexFlow®
Resins**



**HexMC®-i Molding
Composite**



**HexForce®
Reinforcements**



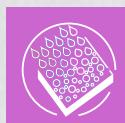
**Polyspeed®
Laminates &
Pultruded Profiles**



**HexWeb®
Honeycomb Core**



**HiTape®
Advanced
Reinforcements**



**Modipur®
Polyurethane**



**HexWeb®
Engineered Core**



**HexPly®
Prepregs**



**HexBond®
Adhesives**



**HexTool®
Tooling Material**



**HiMax®
Multiaxial
Reinforcements**



**HexAM®
Additive
Manufacturing**

For more information

Hexcel is a leading worldwide supplier of lightweight composite materials to aerospace and industrial markets. Our comprehensive range includes:

- HexTow® carbon fibers
- HexForce® reinforcements
- HiMax® multiaxial reinforcements
- HexPly® prepgres
- HexMC®-i molding compounds
- HexFlow® RTM resins
- HexBond® adhesives
- HexTool® tooling materials
- HexWeb® honeycomb
- Acousti-Cap® sound attenuating honeycomb
- Engineered core
- Engineered products
- Polyspeed® laminates & pultruded profiles
- HexAM® additive manufacturing

For U.S. quotes, orders and product information call toll-free 1-800-688-7734. For other worldwide sales office telephone numbers and a full address list, please go to:

<http://www.hexcel.com/contact>

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