

# Composite Trends

from HEXCEL

## Summary

JEC and Sampe

1-2



New Cost Optimised Axle Module

2



Hexweb® CRF aluminium Honeycomb

3



HexTool® Innovative Tooling Material

3



Contacts

4



Hexcel at JEC (Paris) and SAMPE (Long Beach, CA)

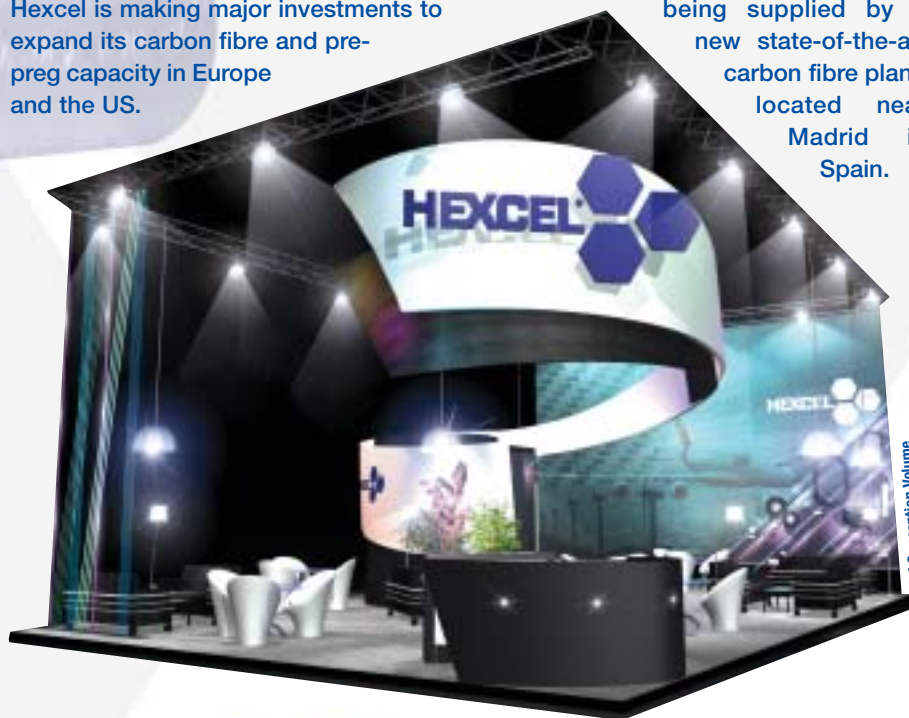
**Hexcel's stand at JEC this year (Stand No. F57) will reflect the company's recent announcements regarding their investment in additional carbon fibre manufacturing capacity. A predominantly black colour scheme has been selected (for obvious reasons) and a central feature on the stand will be the carbon spiral radiating out from the centre of the stand.**

Displays on the Hexcel stand will highlight the company's vertical integration, from the fibre itself, to carbon fibre reinforcements, prepregs and new FRM technologies such as Hexcel's HexMC moulding concept.

**Investing to meet customer needs for carbon fibre**  
To meet growing customer demands, Hexcel is making major investments to expand its carbon fibre and pre-preg capacity in Europe and the US.

Global expansion plans to increase the current levels of Hexcel's carbon fibre and prepreg production capacity are underway, with new facilities being built as well as expansion at existing sites.

A \$100 million global project will increase Hexcel's carbon fibre capacity by about 50%, with half of this being supplied by a new state-of-the-art carbon fibre plant, located near Madrid in Spain.



Stand Number: 529



Stand Number: F 57



Jmf Conception Volume

The new facility will also have the space to add two further lines to meet future demand.

In the USA, Hexcel is expanding carbon fibre production at two sites: Decatur, Alabama and Salt Lake City, Utah. In Decatur, expanded facilities will provide the Polyacrylonitrile (PAN) precursor materials for carbon fibre production, increasing capacity by approximately 40% over current levels. This development underlines Hexcel's ongoing commitment to the aerospace industry and will create around 25 new jobs at the site. In Salt Lake City, a new carbon fibre production line is being added to the facility, increasing manufacturing capacity by two and a half million pounds of carbon fibre.

Dave Berges, Hexcel Chairman, President and CEO said: "The large increase in carbon fibre composites usage in commercial and military aircraft is driving us to expand our manufacturing capacity to support growing customer demand. Hexcel is already the world's largest producer of intermediate modulus carbon fibre, a type of fibre that is being increasingly specified in new aerospace programs. We are pleased to establish European manufacturing of carbon fibre to complement our existing and expanded capacity in the US.

"With this expansion, we should be very well positioned to support the growth in our European customers' product requirements such as the full range of Airbus commercial airliners, business jets from Dassault, engine nacelles from Aircelle, helicopters from Eurocopter and other military aircraft from EADS".

### Prepreg expansion

In terms of prepreg production, over \$20 million is being invested in new technology in the UK, Spain, Germany and France, again to meet the growing demands of the aerospace industry.

In Duxford, work is already underway to expand the site's formulated resin capacity and in Parla, Spain, a new prepreg line is being added. Both developments will be fully operational by March 2006.

In addition, new prepreg capacity will be installed in Stade, Germany and Nantes, France where Hexcel will set up prepreg production facilities close to Airbus locations. The extensive capacity expansion plan is designed to meet the growing demand for prepreg for current and future aerospace programs.

The new facilities in Stade and Nantes will not only increase capacity but also enable Hexcel to exceed customer expectations for delivery and responsiveness, as well as enhance product quality and make the overall supply chain more efficient and reliable. In both locations, Airbus will be the primary customer for the new lines which are expected to be operational by December 2006.

Dave Berges added: "I am delighted that we are expanding Hexcel's prepreg capacity in Europe, setting up new facilities in close proximity to the major Airbus composite manufacturing sites. This will reinforce our partnership and enable us to meet the growing requirements for prepreg for current and future aircraft programs".



**Dave Berges**  
Hexcel Chairman  
President and CEO

## New Cost Optimised Axle Module for Composite Leaf Springs - from Magna Steyr

There are many advantages in building leaf springs from composites. Weight savings of 50-70% are achievable compared with steel alternatives. These weight savings have knock-on benefits of reducing fuel consumption and increasing the loading capacity. Composites also provide improved energy absorption, providing the required balance of high tensile strength and low modulus.

When prepregs are used to manufacture leaf springs the formulation ratios and resin content are accurately controlled. This provides good quality control and component reproducibility, along with minimal material waste. Formulated epoxy systems exhibit good toughness and fatigue properties – and the resin chemistry can be optimised for specific properties. Prepregs also offer the potential for automated processing. Cost is minimised by using single tows, but heavy aerial weight material can still be made in a single process. New technologies have been developed that allow the full impregnation of heavy reinforcements.

**Magna Steyr**, based in Oberwaltersdorf, Austria, is a leader in automotive development, from module and component to complete vehicle production. **Magna Steyr Graz** has developed an innovative Cost Optimised Axle Module in which coil springs, stabiliser bar and stabiliser link rods are replaced by a single transversal leaf spring manufactured in HexPly® glass prepreg.

**HexPly® M10** is an industrial prepreg system from Hexcel used extensively for leaf spring applications. **HexPly® M10** is favoured due to its particular suitability for the impregnation of heavy reinforcements and the manufacture of thick laminates. It provides excellent flexural fatigue properties at room temperature. It is also particularly suitable for large volume production, with up to 2,500 leaf springs being produced per week from a single press. The system has a flexible cure cycle from 30 minutes at 140°C to 10 minutes at 160° C.



**HexPly® M10** has been used for many years for the manufacture of composite leaf springs and during the 15 years "in service" knowledge gathered, there has been no failure nor requirement for part replacement.



## A new Hexcel technology for Excellent Finish HexPly® XF101

Hexcel has developed a new material to significantly reduce post processing for large composite components. Typically manufacturers have to work on a cured composite surface before application of decorative or protective surface coatings. This process can involve many cycles of filling and sanding to establish an acceptable base surface. Hexcel's new technology massively reduces the need for this time consuming and expensive work.

Hexcel was able to apply its growing expertise in surface finishing materials to this problem. **HexPly® XF 101** is the first product in this exciting new range of materials and retains all the usual benefits of a preimpregnated material, while offering the added advantage of reducing the need for complicated surface preparation. A further benefit of **HexPly® XF 101** is that it has been formulated to give enhanced drapeability. This allows easier application to contoured surfa-

ces when used with heavyweight reinforcements.

In large component trials, with vacuum curing, this material had successfully eliminated up to 95% of surface defects. This equates directly to productivity gains through savings of hours of preparation time for each component. With **HexPly® XF101**, Hexcel continues to deliver materials that meet the challenges facing large component manufacturers.

## Chromium free corrosion protection coating for European manufactured honeycombs

Hexcel (UK) is now producing a commercial grade aluminium core (ACG/3003) using a Chromium free foil treatment, designated **HexWeb® CRF**. Since early 2005, all ACG/3003 honeycomb produced in Europe has used the new foil treatment.

The new **HexWeb® CRF** product has been shown to offer the same level of mechanical and corrosion resistance properties. A product data sheet is available from your local Hexcel sales office.

### Benefits of HexWeb® CRF:

- Chromate free corrosion protection coating
- Good strength and stiffness to weight ratio
- High fatigue resistance
- Good vibration damping characteristics
- Non-combustible
- Can be machined to complex profiles
- Exhibits uniform crushing characteristics

- Compatible with a wide range of skin materials, providing a good bonding surface for Redux® adhesives.

- 4. Proposed reduction in US occupational exposure limit



The move to **HexWeb® CRF** demonstrates Hexcel commitment to the environment and not only allows Hexcel to eliminate chrome from the manufacturing process but means that our customers can overcome the increasing restrictions being imposed by the use of chrome coated materials in a range of industries.

One such customer is AFL Honeycomb Structures, who have been involved in the field of energy absorption since the early 80's and pioneered the concept of honeycomb core applied to vehicle safety testing. AFL is using **HexWeb® CRF** to manufacture a full range of aluminium

honeycomb deformable crash test barriers, a sample of which will be displayed on Hexcel's stand at the JEC show.



Environmental legislation is limiting the use of any products containing chromium and at some stage in the coming years the chrome-coated products are expected to be withdrawn. Four such examples of this impending legislation are:

1. RoHS Directive
2. End-of-life vehicles Directive
3. REACH Regulations

## HexTOOL™ Innovative Tooling Material

Hexcel is launching **HexTOOL™**, a new patent pending composite tooling material that enables machineable composite moulds to be produced for the first time. This new concept for composite moulds is competitive against conventional composite tools and metal moulds, especially those made from INVAR.

**HexTOOL™** uses Hexcel's established HexMC® technology for high performance cost-effective composite mould tools. The launch product is a material made of high strength carbon fibre and **HexPly® M61** BMI resin. Compared to epoxy resins, this provides superior resistance to degradation (micro-cracking) when submitted to thermo-cycling. It is also a very tough system providing adequate resin flow for tooling applications.

### Tool Manufacture

The tool comprises at least one layer of **HexTOOL™**, cured in an autoclave. The lay-up is done with minimum labour and time (i.e. no debulking) and on a master mould that does not have to be dimensionally accurate. The "as cured" tool is then machined to final desired shape.

This approach is possible thanks to the use of **HexMC®**, a quasi isotropic material made of carbon prepreg bundles randomly orientated. The removal of cured material on the tool surface does not change the quasi isotropic characteristics of the whole laminate, unlike with composite moulds made of prepreg fabrics.

Thus the dimensional integrity of the mould is maintained.

Compared to traditional composite moulds, with **HexTOOL™** you can:

- make complex shapes
- produce within tight tolerances (+/- 0.125 mm)
- easily repair the mould
- readily change surface dimensions eg to address engineering changes

Production of **HexTOOL™** moulds is not labour intensive and requires less skill. An accurate master mould is not essential.

- Compared to metallic moulds and more specifically to INVAR, which is the one alloy with coefficient of thermal expansion (CTE) compatible with carbon/epoxy structures, **HexTOOL™** mould offers:

- lighter weight for easier handling thus minimising infrastructure investment
- faster heat-up and cool-down rates leading to energy and time savings
- easier repair, easier machining
- ability to change mould dimensions (includes possibility to add extra thickness to the mould at a later stage)

- And of course, as for the other competitive solutions, **HexTOOL™** moulds offer:
  - CTE compatible with carbon/epoxy moulding
  - Vacuum integrity (also after machining)
  - Life of several hundreds of thermo-cycles
  - Tool cost is no more expensive than current solutions.



▲ Machining the cured tool

◀ Mould Lay-up

# Agents and Distributors in Europe, Middle East and Africa



### Agents

**Kevra OY Finland**  
Tel : ++ 358 9 612 68 20  
juha.kokko@kevra.fi  
www.kevra.fi

**Myko Engineering Israël**  
Tel : +97209 7481262  
zeev-lavi@barak-online.net  
www.myko.co.il

**APCOL Portugal**  
Tel : +(351) 219 410 010  
ecrespo@apcol.com

**AMT South Africa**  
Tel : +27 (011) 392 42 32  
gebi.bargehr@amtcomposites.co.za  
www.amtcomposites.co.za

**Hi Tech Composites Sweden**  
Tel : +46 13 212220  
hitechcomposites.ab@telia.com  
www.hitechcomposites.info

**ASES Aviation Turkey**  
Tel : +90 (216) 574 7000  
ases@asesaviation.com  
www.asesaviation.com

### Distributors

**Ironbark Composites Australia**  
Tel: +61 352 648 505  
click@ironbarkcomposites.com.au

**Joh Klinglhuber & Söhne Austria**  
Tel: + 43 1 597 47 12  
office@jks.at

**Kevra OY Finland**  
Tel : ++ 358 9 612 68 20  
juha.kokko@kevra.fi  
www.kevra.fi

**Composites Distribution France**  
Tel : +33 (0)2 28 01 70 20  
marc.janeau@composites-distribution.com  
www.composites-distribution.com

**SF Composites France**  
Tel: +33(0)4 67 99 85 50  
sfcomposites@sf-composites.com  
www.sf-composites.com

**Esterhammer Germany**  
Tel: +49 7152 58724  
info@esterhammer.de  
www.esterhammer.de

**Lange & Ritter Germany**  
Tel: +49 7156 2006 0  
www.lange-ritter.de

**Wela Germany**  
Tel : +49 (4152) 8824 0  
info@wela-handelsgesellschaft.de  
www.wela-handelsgesellschaft.de

**A. Andreou and Co Greece**  
Tel : +30210 4828452  
andreou@aanandrou.gr  
www.androu.gr

**Myko Engineering Israël**  
Tel : +97209 7481262  
zeev-lavi@barak-online.net  
www.myko.co.il

**Imatec Italy**  
Tel : +39 (0) 2 39002168  
commerciale@imatec.it  
www.imatec.it

**Mates Italiana Italy**  
Tel: +39 0 292 1603 57  
info@mates.it  
www.mates.it

**Romar Voss Nederland**  
Tel: +31 475 491 019  
info@vosschemie.nl  
www.romar-voss.nl

**High Modulus New Zealand**  
Tel: +64 9 415 6262  
info@highmodulus.co.nz  
www.high-modulus.com

**Milar SP. Z.O.O. Poland**  
Tel: +4822 755 85 21  
milar@milar.pl  
www.milar.pl

**Apatech Russia/CIS**  
Tel : +7 (95) 2070265  
zhilenko@apatech.ru  
www.apatech.ru

**Skolil Komposit Czech Republic & Slovakia**  
Tel : + 420 220 873 550/1  
www.skolil.cz

**Polivia Nova Czech Republic**  
Tel: +420 577 141 171  
Skrabankova@polyvianova.cz

**Axson Iberica Spain**  
Tel: +34-93-225 1620  
axson@axson.es  
www.axson.fr

**Caldic Spain**  
Tel: + 34 90 221 0314  
afont@caldicspain.com  
www.caldic.com

**AMT South Africa**  
Tel : +27 (011) 392 42 32  
gebi.bargehr@amtcomposites.co.za  
www.amtcomposites.co.za

**Hi Tech Composites Sweden**  
Tel : +46 13 212220  
hitechcomposites.ab@telia.com  
www.hitech.servehttp.com

**Derya Marine Servis Turkey**  
Tel : +90 (2524) 125 225  
deryamarine@superonline.com



**AIM Composites United Kingdom**  
Tel : +44 1223 441000  
materials@aimcomposites.com  
www.aimcomposites.com

**Amber Composites United Kingdom**  
Tel : +44 1773 530899  
sales@ambercomposites.co.uk  
www.ambercomposites.co.uk

**Composite Materials United Kingdom**  
Tel: +44 1606 738 811  
JonPMiller@aol.com

**SilMid United Kingdom**  
Tel : +44 (845) 130 1110  
garym@silmid.co.uk  
www.silmid.com

**Wessex Resins United Kingdom**  
Tel: +44 1794 521111  
linda@wessex-resins.com  
www.wessex-resins.com

For more details on products and markets covered, please contact your Hexcel Representative

### Key

Core Prepregs Adhesives Fabrics

\*All information is believed to be accurate but given without liability. Users should make their own assessment of the suitability of any product for the purposes required. All sales are made subject to our standard terms of sale which include limitations on liability and other important items.

Contact : [communications@hexcel.com](mailto:communications@hexcel.com)  
[www.hexcel.com](http://www.hexcel.com)

