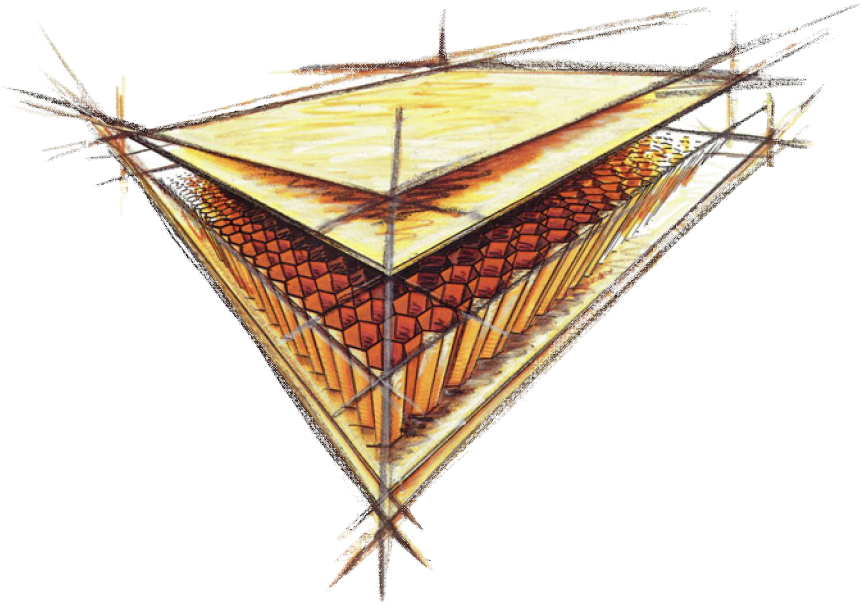
EURO-COMPOSITES®

Technical Presentation

March 2009



The EC Group: We reinforce your ideas

EURO-COMPOSITES® S.A., B.P. 24, Zone Industrielle, L-6401 Echternach, Phone: +352 – 72 94 63-1, Fax: +352 – 72 94 60
www.euro-composites.com

Content

Welcome to the EC Group

Who we are

The EURO-COMPOSITES® Group is a global player in the field of advanced and demanding composites products. We service our customers globally from three locations.

We are worldwide one of the leading producers of complex composites parts.

We deliver to our customers just-in-time and in highest quality:

- Ready-to-assemble parts
- Formed and/or milled composites parts
- Panels
- Laminates
- Honeycomb core materials

In order to support and service our customers best according to their needs we organize our business in three units:

- AVIATION
- SPACE
- INDUSTRIAL

The group

The EURO-COMPOSITES® group consists of:

EURO-COMPOSITES® S.A.
Zone Industrielle
L-6401 Echternach
Luxemburg
Phone: +352-729463-1
Fax: +352-729460

EURO-COMPOSITES® Corporation
13213 Airpark Drive
Elkwood, VA 22718
USA
Phone: +1-540-727-8500
Fax: +1-540-829-6611

EURO-COMPOSITES® GmbH
Dieselstr. 13
D-54634 Bitburg
Deutschland
Phone: +352-729463-1
Fax: +352-729460

Key Data and Financial Information

Key Figures EC Group

Capital & Reserves		€	34.933 Million
	Subscribed Capital:	€	20.160 Million
	Legal and other reserves:	€	14.773 Million
Investment		€	118,00 Million
Rating by banks			BBB to BBB+
Employees			686 (average age 39 years)
Production area	EURO-COMPOSITES® Group		49.5000 m^2
Total area	EURO-COMPOSITES® Group		176.400 m^2
Important Qualifications			Airbus Group Boeing D1-4426 EASA 21 Part G ISO 9001 & SAE AS 9100 NADCAP

Financial data EURO-COMPOSITES® Group 2008

Ratio of Equity	$\frac{\text{Equity}}{\text{Total Assets}} = 42.2\%$
EBITDA	€ 15.5 Million

Turnover EURO-COMPOSITES® Group

2008	€ 87.6 Million

Our Production Sites

Site Echternach, Luxemburg

Current building status

Development plan

- Headquarter
- Main production site
- Finished part production
- CNC centre
- Panel production
- Honeycomb production from Kevlar®, Nomex®, glass- and carbon-fiber

Total area:	93.000 m²
whereof production area:	37.500 m²

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Our Production Sites

Site Echternach, Luxemburg

Center of Excellence Research & Development

- Research & Development Center
- Design and Construction
- Prototyping & Pilot Manufacturing
- Development, test and implementation of new materials, processes and production technologies

Total area:	15.400 m^2
whereof production area:	2.000 m^2

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Our Production Sites

Site Culpeper, USA

Current building status

Development plan

- Production Site
- Finished part production
- CNC-centre
- Panel production
- Honeycomb production from Kevlar® and Nomex® fiber

Total area:	48.000 m²
whereof production area:	7.000 m²

Our Production Sites

Site Bitburg, Germany

Current building status

Development Plan

- Production Site
- Finished part production (RI, RTM and EC-HLM with honeycomb)
- CNC-centre for „Clean Core" aluminum processing
- Aluminum surface treatment
- Honeycomb production from aluminum foil

Total area:	20.000 m^2
whereof production area:	3.000 m^2

Our products

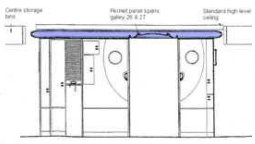
Finished Parts

- Completion of drop-in parts (inserts, reinforcements, extruded profiles, priming, grinding, coating)
- Final assembly of complete units
- Design and manufacturing of tools and molds from metal and reinforced plastic
- Prepreg hand lay-up

Pelmet (1.80 x 3.50 m) ceiling part

Part detail with edge closure, inserts and reinforcement laminate

Drop-in parts after final control

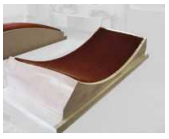


Installation layout Pelmet

Stairhouse shown as part and in its final assembly state (right)

Formed/Machined Parts

- Design and manufacturing of heat-forming equipment
- Manual and machined processing of honeycomb and parts
- Cold and hot forming of honeycomb parts and sandwich structures (two heat forming ovens)

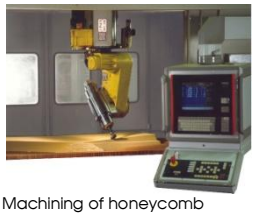


Heat-formed, machined honeycombs on their inspection tool

Heat-forming of Honeycombs

lightweight tooling with honeycomb part

Radome made from formed honeycomb core details



Machining of honeycomb

Core detail formed and machined from two sides

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Design and production of molds and tools

The experience of EC in the design and production of molds and tools for our own production needs is more and more used by our customers too:

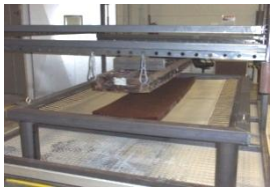
- Tools and fixtures of all kinds
- Molds for honeycomb contouring and forming as well as for design model making
- Molds for sandwich parts and honeycomb stabilization (for RI process, oven and autoclave curing)

Wooden fixture tool

Sandwich part tool for oven curing at 135°C

Metal mold for oven or autoclave curing

Polyurethane (PU) tool as a CNC milling fixture



Steel tool for honeycomb heat formingg

Tool produced with RI for the contouring of formed honeycomb core details

Coated PU tool for model making

RI-mold for parts made with oven or autoclav curing

RTM light mold

New concept for tool production: EC-Tool

Production of tools and molds on the basis of honeycomb sheets and pastes

- Weight, time and cost reduction compared to conventional mold making
- High-tensile mold construction with an excellent surface quality and vacuum tightness

Bonding of honeycomb sheets with paste

Rough milling of contour

Application of paste on the blank mold

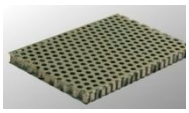
Finished mold after final milling

Our Products

Panels

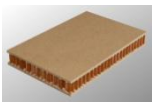
Nomex honeycomb
Carbon skins

Nomex honeycomb
Glass/Phenolic skins



Aluminum honeycomb
perforated aluminum skin

Aluminum honeycomb
Aluminum skin



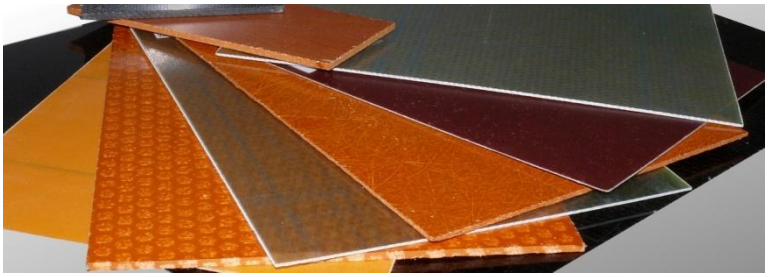
Special fiber honeycomb
MDF sheet

An almost inexhaustible plenitude of combinations of core materials, skin materials and adhesives: EURO-COMPOSITES® designs according to customer requirements the best-suited panel for the application and processing situation.

Possible parameters for the panel design are for example:

- Weight and stiffness specifications
- Fire, smoke and toxicity (FST) requirements
- Behavior in aggressive or corrosive environments
- Temperature resistance

Laminates



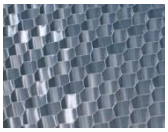
No matter what material: woven or any type of non-woven material: EURO-COMPOSITES® combines for the customer fiber materials and resin and manufactures small and large format laminates with the optimum, cost-effective production technology.

Honeycomb core materials

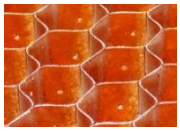
Nomex honeycomb
Kevlar honeycomb

Glass fiber honeycomb

Carbon honeycomb



Aluminum Honeycomb in alloy 3003 and 5052



Perforated Honeycomb from Aramid

EURO-COMPOSITES® manufactures honeycomb core materials from a great variety of raw materials and in a large program of cell sizes and densities.

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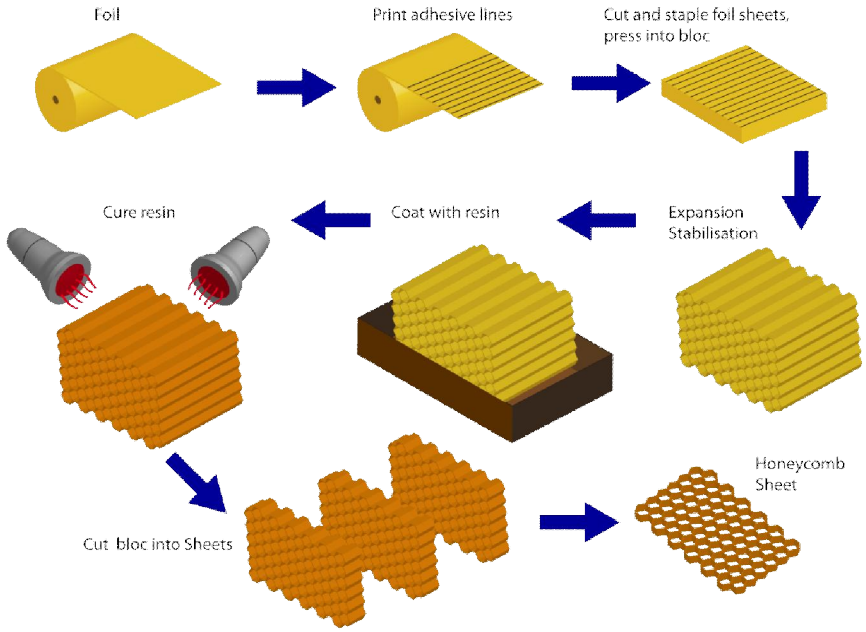
Our production technologies

Honeycomb production and sawing

EURO-COMPOSITES® has four production lines for the aramid honeycomb production and another line for the production of aluminum honeycomb.

- Two printer lines for Nomex®, Kevlar® and one for aluminum
- Simultaneous lay-up of 6 blocs with automatic machines plus resources for hand lay-up in case of production peaks
- One 5-opening-bloc-press, two 3-opening-bloc-presses
- Five dip tanks
- Four stabilization ovens
- Nine curing ovens
- Fifteen aramid honeycomb saws and two aluminum honeycomb saws



Production process for aramid honeycomb

Our production technologies

CNC milling center

Capable to machine metal, plastics, wood, foams, honeycomb, laminates and parts made of GRP, CRP, and ARP

Machine	Working axis	Machinable dimensions
CNC 1	Five	2500 x 1200 x 600 mm
CNC 2	Five	2500 x 5000 x 600 mm
CNC 3	Five	1100 x 1000 x 400 mm
CNC 4	Three	2200 x 4200 x 300 mm
CNC 5	Five	2500 x 1200 x 400 mm
CNC 6	Five	2500 x 1200 x 400 mm
CNC 7	Five	2100 x 5300 x 950 mm
CNC 8	Five	3200 x 11500 x 500 mm
CNC 9	Five	3000 x 15000 x 1000 mm
CNC 10	Five	4050 x 2050 x 1000 mm
CNC 11	Five	7100 x 1440 x 860 mm
CNC 12	Five	1840 x 4100 x 800 mm
CNC 13	Five	1840 x 5200 x 800 mm
CNC 14	Five	2020 x 4100 x 860 mm
CNC 15	Five	7000 x 1440 x 820 mm
CNC 16	Five	3360 x 1340 x 300 mm
CNC 17	Five	4800 x 8000 x 2000 mm
CNC 18	Five	6500 x 2600 x 1300 mm
CNC 19	Five	5500 x 2600 x 1300 mm

CNC 16 is an ultrasonic cutting machine
CNC 17 is dedicated to milling monolithic carbon parts

Milling of a part

Modern, powerful CNC Milling centers

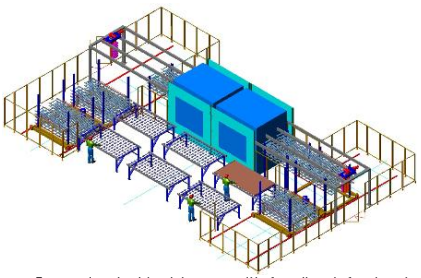
Our production technologies

Panel Production

On our modern presses we manufacture panels and part with all established core materials and skins of prepreg, aluminum or laminates (HPL and CPL).

Press	Openings	Maximum panel dimensions
Press 1	4	2400 x 2950 mm
Press 2	3	1300 x 3000 mm
Press 3	3	1360 x 3150 mm
Press 4	2	2100 x 4000 mm
Press 5	1	2500 x 12000 mm
Press 6	1	3000 x 15000 mm
Press 7	1	1300 x 2700 mm
Press 8	1	1335 x 3000 mm
Press 9	1	1300 x 2500 mm
Press 10	1	1100 x 2500 mm
Press 11	2 x 5	1650 x 3200 mm
Press 12	1	1350 X 3600 mm
Press 13	1	1350 X 3600 mm
Press 14	1	1350 X 3600 mm

Press for large formats



5 opening hot/cold press with feeding infrastructure

Our production technologies

Automatic Potting machine

- Machine concept by EURO-COMPOSITES®
- Fully automatic NC-controlled potting machine
- Laser-positioning system
- Maximum part dimensions: 2000 x 4000 mm
- Fast and efficient potting of honeycomb parts with complex shapes
- Nesting software to optimize material usage

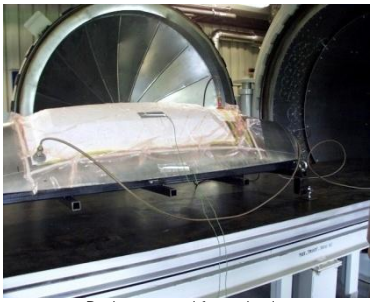
Coating line

- Maximum part dimensions: 3100 x 5200 mm
- Air temperature for drying continuously adjustable up to 120°C
- Able to process all coating systems for high-pressure airbrushing.

Autoclave

- Maximum dimension for parts: 2000 x 6000 mm
- Curing temperature 180°C (Standard), up to a maximum of 250°C
- 6 bar pressure
- 24 point vacuum measuring system

View of the EURO-COMPOSITES® autoclave



Part prepared for autoclave process

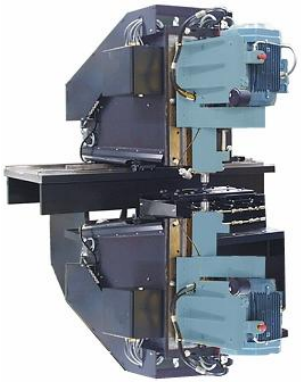
Friction Stir Welding

Friction Stir Welding (FSW) joins two parts with a specially shaped, rotating tool.

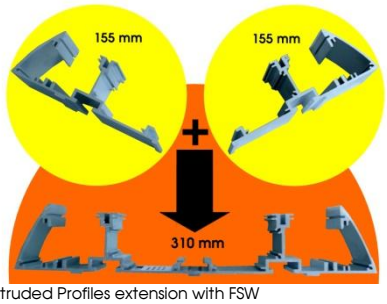
Due to rotation and pressure of the tool frictional heat is produced and the parts soften plastically in the area of the rotating tool without reaching the melting point.

The pin of the tool immerses into the malleable material of the parts and produces by its rotation and shape a homogenous blend along the joining line. The shoulder of the tool forms and smoothes the welding line with only a marginal ridge.

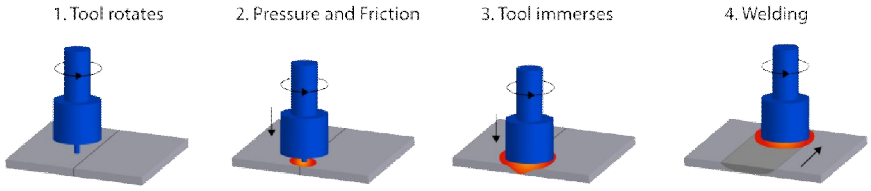
After cooling there is a solid phase joint of the two parts. The process does not need filler wire, welding flux or gas shielding and produces a sealed weld without porosity and without inclusions.



Double-head welding unit



Extruded Profiles extension with FSW



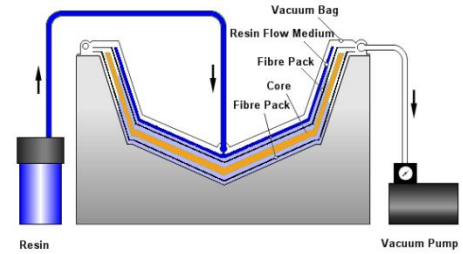
Work flow of the FSW process

EURO-COMPOSITES® uses a **very modern double-head welding unit** which is especially suited for the joining of extruded profiles:

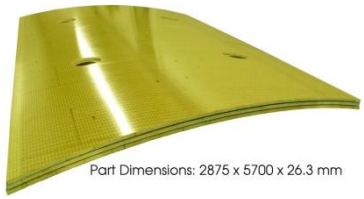
- Maximum dimension for parts: 3000 x 18000 mm
- Maximum dimension for single extruded profile: 500 x 3300 mm resp. 500 x 6000 mm with repositioning
- Maximum distance between upper and lower welding tool: 420 mm
- Maximum welding line thickness (full material, both heads welding simultaneously):
  - 10 mm (in AA5xxx and AA2xxx),
  - 18 mm (in AA6xxx)

Our production technologies

Resin Infusion (RI)



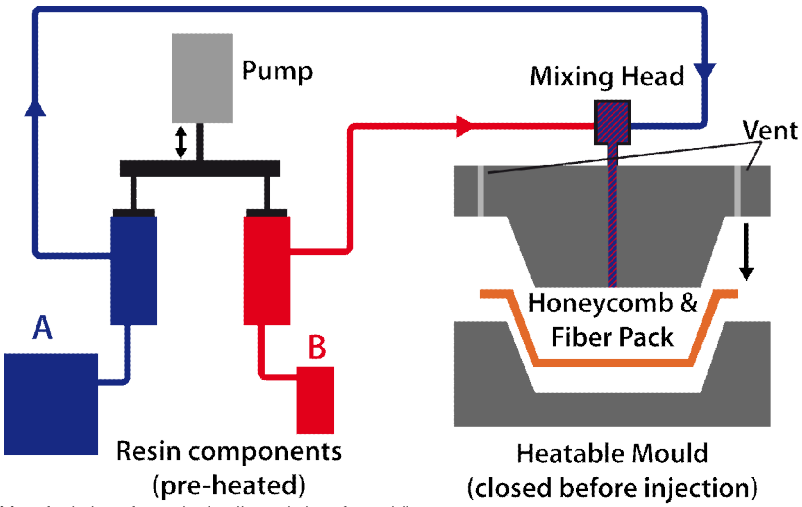
Part production with resin Infusion



Sample part produced with resin infusion technology

Useful technology for flat parts and laminates up to relatively complex shaped parts with one visible surface. EURO-COMPOSITES® uses various vacuum techniques with mold and vacuum foil as counter-mold. These processes are best suited for small to medium size series.

Resin Transfer Molding (RTM)



Manufacturing of a part using the resin transfer molding process

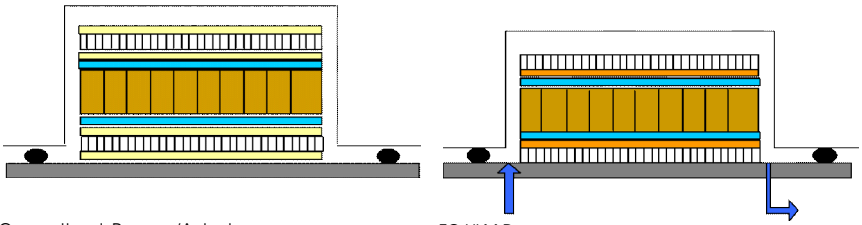
For larger series or double-sided decorative surfaces the Resin Transfer-Molding (RTM) process is well suited. Massive closed mold and counter-mold system are used as the resin is introduced under pressure into the mold system.

EURO-COMPOSITES® Honeycomb liquid molding (EC-HLM)

Advanced parts with a honeycomb core have been manufactured (especially in the aviation industry) so far by using the prepreg-autoclave process.

EURO-COMPOSITES® has developed a new process technology that allows the use of honeycomb and dry woven or non-woven fiber packs together with a RI or RTM process.

Structural part with honeycomb core and carbon skins



Conventional: Prepreg/Autoclave

EC-HLM Process

A process comparison for the production of a structural part with similar product properties results in the following advantages for the EC resin infusion process:

- Reduced material cost (dry fabric and pure resin instead of prepregs; less adhesive layers)
- Reduced weight since less adhesive films by 10-15%
- Lower process cost, time reduction by 30%
- Reduced outgoing inspection cost because of improved water tightness (does not need to be controlled anymore)
- Improved operation features (minimized porosity), therefore less water condensation problems into the honeycomb

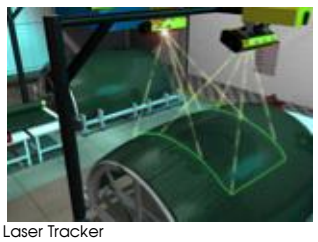
Laboratory Service

Instruments

- Universal testing machine (2.5 kN, 50 kN and 100 kN)
- Climate chambers
- Salt spray chamber
- Differential scanning calorimeter (DSC)
- Titro-processing
- Smoke density measurement
- Burning chamber, flammability testing
- Food cart roller test machine
- Coordinate measurement machines (CMM)
- NDT: woodpecker, tap hammer, ultra-sonic
- NDT: X-ray unit (6000 x 2500 x 1200mm)
- Laser projection

Universal testing machine

Test of compression strength



Laser Tracker

Coordinate measurement machine

Tap hammer

Design & Engineering / Center of Excellence

Activities

Our Center of Excellence is home to the Design and & Engineering and the Research & Development department. Both departments offer their services not only internally but can also work independently for our customers.

- Capacity:

Engineering:	56000 h/year
Research & Development	14500 h /year
Prototyping & Pilot manufacturing	37500 h/year

Our Customers are supported with the design of the best technical and commercial composites solution (application-oriented development in close cooperation with the customer) under consideration of the following aspects:

- Product properties (mechanical, thermal, acoustical, FST conforming)
- Manufacturing technology (Vacuum bag, press technology, autoclave process, resin infusion, resin transfer molding)
- Definition of tooling concept (Wood, plastics, metal)
- Definition of measuring and test equipment and procedures
- Higher degrees of functional integration
- Stress analysis/FEM (in part together with external partners)
- Transfer of the product requirement of customers and the results of EC's own developments into technical part definitions as a basis for quotations and in a later stage also for the technical documentation/ production procedures.

Additional activities are:

- Process development / process improvement and implementation of new/improved processes into production
- Training of employees on new processes and equipment
- Customer-independent development and research, partially in cooperation with Universities and research institutes
- Own development workshop for
    - Prototyping
    - Pilot manufacturing
    - Development support
    - Design and production of new tools

Equipment in our Center of Excellence

Production Equipment

Equipment	Description
CNC machine for monolithic carbon processing	X-axis: 8000 mm, 50 m/min Y-axis: 4800 mm, 50 m/min Z-axis: 2000 mm, 30 m/min
Drying Oven	Inner dimensions: 1700 x 1000 x 2750 mm Max. temperature: 250°C
Freezer	Inner dimensions: 3000 x 3000 x 2400 mm Up to -20°C at a max. ambient temperature of 38°C
Panel sliding table saw	Carriage length: 3000mm
Panel press	Press surface: 2750 x 1350 mm Max. Opening: 400 mm Force: 102 N/md
HT-Press up to 400°C	Press surface: 1300 x 1400 mm Max. Opening: 400 mm Force: 800 N/md
Horizontal Bloc Saw	Max. bloc width: 1300 mm Sheet thickness: 3 to 950 mm

Equipment for honeycomb development

Equipment	Description
Dip Tanks	234 ltr, 875 ltr
Curing Oven	Inner dimensions: 1750 x 1750 x 2300 mm Max. temperature: 380°C
Resin store container	
Resin formulation station	

Chemical Laboratory

Equipment	Description
Laboratory facility including chemical fume hoods and exhaust	
Viscometer for resin (Brookfield cps)	
Precision scale	Max. 2 kg (0.01 g)
Ultrasonic bath	
6-point recorder	
Mixing equipment for resins	Capacity 5 kg, with two 2 mixers (low and high viscosity)
DMA	

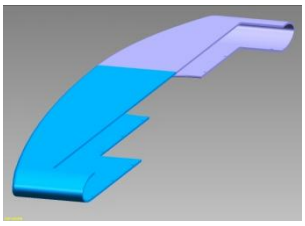
Test equipment

Universal test machine	

CAD/CAM

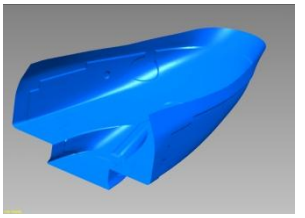
CAD-Software:

- Unigraphics NX2 and NX4
- CATIA V5 R17 (Modules CPM, CPE, MD2)
- AutoCAD 2008



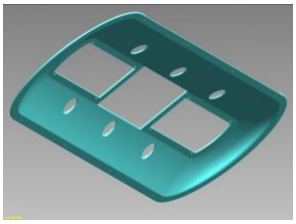
CAM-Software

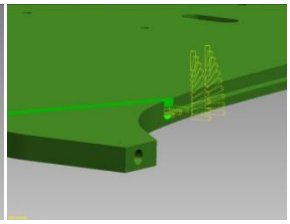
- Unigraphics NX4
- 3- and 5-axis programming
- UNISIM simulation software

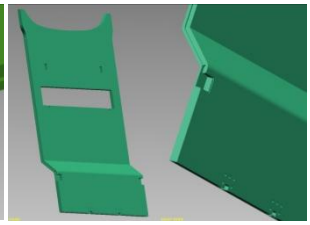


Data Exchange via:

- Unigraphics or Catia, Native Formats
- STEP, Parasolid, IGES, for the 3D-area
- DXF, PDF, CGM for drawings and the 2D-area







Aluminum honeycomb core: New surface treatment

Development Goal:

New Surface treatment of aluminum foil for alloys 3003 and 5052 (other alloys can be included upon demand).

Target of the new surface treatment:

- Corrosion resistance which is similar to PAA – treated core
- Cr-free surface treatment

The development and the later production are done in our site in Bitburg Germany that is fully operational now with printer line, surface treatment unit and bloc press.

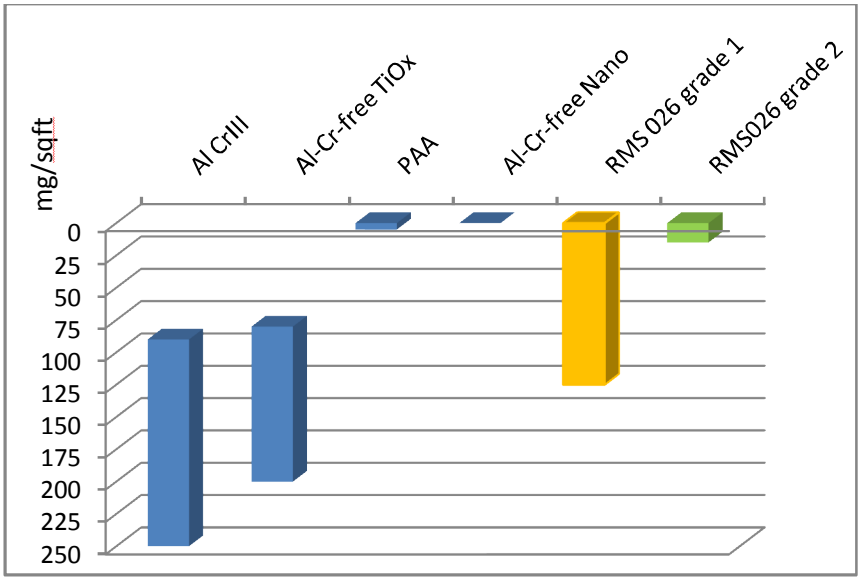
Current Status:

Successful manufacture and test of small scale prototypes:

- 4.8mm (3/16"): Cell size OK
- 6.4mm (1/4"): Cell size OK
- 9.6mm (3/8"): Cell size not checked yet, from experience we are confident, that all larger sizes will be not problematic
- 3.2mm (1/8") - Cell size N-OK, due to increased expansion forces, optimization of node bond strength under development

Test of corrosions resistance:

(According to MIL-C-7438G : 720h in salt spray, measurement of weight loss (mg/ft^2) and comparison with requirements of RMS 026:



Aluminum honeycomb core: New surface treatment (Continued)

Time schedule:

Mid May 2008: Supply of special coating roll
Small scale production run at production site Bitburg

End of Mai 2008: Supply of counter roll

With our new honeycomb types we do go along with the new airplane generations of our customers.

Aluminum honeycomb core: Usage of thin foils

Development Goal:

Using thin, untreated aluminum foils with the new aluminum surface treatment process

Current Status:

Manufacture of small scale prototype tests (planned):

- 4.8mm (1/4") -cell size, density 50kg/m3 (3.12pcf)
- Other cell sizes might be possible upon request.

Time schedule:

June/July 2008: Small scale test planned, as soon as the new printer for aluminum foil and the new surface treatment are in operation

Sandwich panels with Magnesium Skins

Development Goal:

Develop sandwich constructions

- with extensive weight reduction compared to aluminum
- with good corrosion inhibiting properties (measured by salt spray)

Development is done in cooperation with industrial partners for:

- the manufacture of Mg-skins
- the development of corrosion inhibiting primers
- application of surface treatments

Current Status:

Development of corrosion inhibiting surface treatment

Time schedule:

Next trial by July 2008 and evaluation by August 2008

Glass fiber honeycomb core (ECG)

Development goal:

Market driven, customers ask for reliable source of this core type

Current Status:

- Cell size: 4.8mm (3/16"), Density Range: 88 to 192 kg/m^3 (5.5 to 12 pcf)
  - Production process stable
  - Various qualifications completed
  - Used already in aircraft parts
  - Additional qualifications pending
- Cell size: 9.6mm (3/8"), Density Range: 72 to 96 kg/m^3 (4.5 to 6 pcf)
  - Production process stable
  - Other densities may be possible upon request
  - Qualifications pending
- Cell size: 4.8mm (3/16"), Density Range: 48 to 80 kg/m^3 (4.5 to 6 pcf)
  - Production process stable
  - Product availability depends on availability of glass fiber fabrics
  - Qualifications pending

Other cell size/density combinations can be developed upon request

Time Schedule:

Complete qualifications together with customers as soon as possible.

Further Development Goals:

Target is to produce honeycomb cores with

- increased mechanical strength
- reduced weight
- smaller cell configuration (e.g. 3.2mm (1/8") cell size)

Current Status:

Project is in an early stage. Product design approach is to use

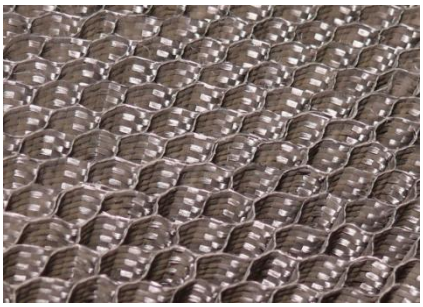
- biaxial glass fabric +/-45° instead of 0°/90°
- very lightweight glass fabric types (< 50gsm)
- resin systems like PI and PES as an alternative to phenolic resin

Market availability of raw materials is checked and a new production process is under development.

Time Schedule

First small scale tests by end 2008

Carbon Fiber honeycomb
Kevlar fiber honeycomb



Development Goal (Carbon & Kevlar Honeycomb):

- increased mechanical strength of honeycomb core or of final sandwich construction
- modified physical properties (i.e. electrical conductivity)

Current Status:

- Manufacture of smaller sized honeycomb cores possible, on request with cell size 4.8mm (3/16")
- Standard resin system is phenolic resin other resin systems as like as Polyimide on request
- Bloc size (especially for resin systems other than phenol) (W)480mm*(L)380mm*(T)355mm - (W)19"*(L)15"*(T)14")

Time Schedule:
Ready to go on small scale series production

Development Goal (Kevlar honeycomb):
Optimization of high -density honeycomb core: Test with new printing roll and modified cell configuration

Status:
Under evaluation

Time Schedule:
First results by end 2008

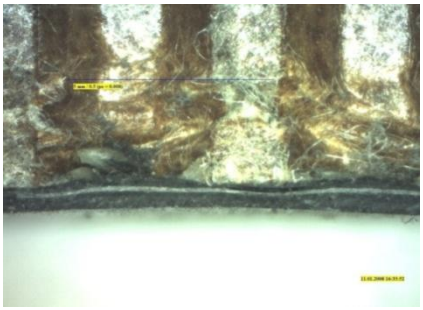
Development Goal (Kevlar honeycomb):
Reduction of Fuzziness by improved cutting quality and optimization in production to increase productivity.

- width and thickness of blades
- improvement of blowing table

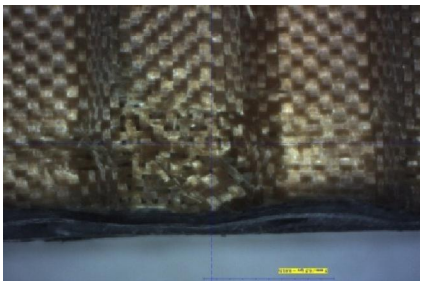
Status :
Planned to be carried out

Time Schedule:
First results by end 2008

Sandwich panels with high impact strength



Kevlar® Core after Crush



Glass fiber core after Crush

Development Goal:

Increased impact strength of sandwich constructions by modifying the honeycomb core.

1. Improved Resin systems

Status:

- Objective not reached: Using PU-based; Epoxy-based and phenolic resin derivatives from various industrial partners
- Under evaluation: Using additives of various suppliers to change the properties of the resin
- Objective not reached: use of high-temperature resin systems like Polyimide
- Under evaluation: use high temperature thermoplastic resin systems as PES

Time Schedule:

Under evaluation this year, first results by next year.

2. Reinforcements

Status:

- Use of glass fiber fabric in configuration 0/90°
  Test Result: impact strength on ECG 4.8-40/48 worse compared to paper honeycomb core ECK 3.2-40/48.
  Fabric structure completely broken after crush

- Use of Biaxial glass fabric ± 45°
  Status: Feasibility tests for manufacture of ECG-4.8 (3/16) cell size density 40/48 kg/m3n (2.5-3pcf) under preparation
- Use of very lightweight glass fiber fabric (<50gsm) for manufacture of honeycomb core with smaller cell size (if possible 3.2mm / 1/8") and lower weight
  Status: under evaluation
- Kevlar fabric in 0/90 and biaxial +/-45
  Status: Honeycomb core with cell size 4.8mm, (3/16") under evaluation

Time Schedule:

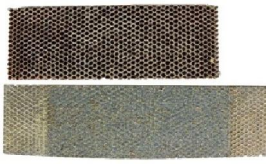
Under evaluation this year, first results by 2009.

EC-HLM
Honeycomb Liquid Molding
Process comparison

Development Goal:
Process comparison between resin infusion with honeycomb and autoclave with prepreg

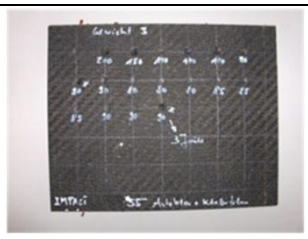
EC-HLM Resin infusion with honeycomb	Autoclave with prepreg and adhesive film
Sample design: • ECA 4.8-96 (Nomex), 12 mm • 2 layers carbon fabric G986 (twill 2/2) • infused with RTM6 resin	Sample design: • ECA 4.8-96 (Nomex), 12 mm • 2 layers carbon prepreg M21 (twill 2/2) • Hysol EA 9695 adhesive film

Climbing Drum Peel Test (22°C, 75%RH)	
Ø 270 N **core failure**	Ø 288 N **core failure**



Flatwise Tensile Strength Test (22°C, 75%RH)	
Ø 4.09 MPa **core failure**	Ø 3,93 MPa **core failure**

Impact Test according AITM 1-0057	
Passed 3.3 Joule Failed: 3.5 Joule	Passed: 3.0 Joule Failed: 3.3 Joule



EURO-COMPOSITES® S.A., B.P. 24, Zone Industrielle, L-6401 Echternach, Phone: +352 – 72 94 63-1, Fax: +352 – 72 94 60
www.euro-composites.com

Lightweight Tooling with honeycomb and epoxy paste

Development goal:
A lightweight, cost-effective alternative to the currently internally used cut and glued epoxy plates

Process steps:

1. Cutting honeycomb + gluing with paste + milling (rough)


2. Application of surface paste + CNC milling (fine)


Status:
Possible tooling applications with this process:

- <u>for 60°C epoxy-paste:</u>
  - o tools for CNC-honeycomb milling
  - o tools for honeycomb cutting
  - o pattern for the production of GFK or CFK laminate tools
  - o large tools

- <u>for 200°C epoxy-paste:</u>
  - o tools for composite part production under oven curing up to 180°C
  - o tools for composite part production under autoclave curing up to 180°C
  - o tools for honeycomb part stabilization with adhesive film (oven or autoclave)

Lightweight Tooling with honeycomb and epoxy paste
(continued)

Advantages:

- Cost reduction with new process is more than 35% against current tooling production with cut and glued polyurethane (PU) plates
- 50 % weight reduction against current tooling with cut and glued PU plates
- Better surfaces quality and vacuum tightness compared to glued PU plates
- With honeycomb, high stable and high temperature resistant tooling (> 180°C) is possible
- Combination of high temperature resistant epoxy paste (200°C) and honeycomb allows a direct tool production over CNC milling. (-> cost reduction)
- Processing for small and large high-quality tooling possible

Selected Qualifications

General Qualifications

Quality Systems		ISO 9001 – 2000 NADCAP COMPOSITES AS 9100 Qualifas/AECMA EASE EASA 21 G

Qualifications by customers

AUSTRIA	FACC	FMS 1030 FMS 3210
BRAZIL	Embraer	MEP 15-010 MEP 15-030
FRANCE	Adder Aircraft Interiors	PGQ 34-1608
	Aérospatiale	ASN-B 75310/75320
	Aérofonctions s.a.s.	DQ 16
	Aircelle	BLGG 502001/BLGG 502101 HDSM 1045/1044
	Breguet Aviation	27161/NSN-B 75310
	Dassault	AMD.BA 1.4.2.3.4
	EADS Astrium	DSN 0798 01 AA
GERMANY	Airbus	AIMS 11-01-001 AIMS 11-01-004 AIMS 11-01-005 AIMS 11-01-007 AIMS 11-01-008
	Britax Sell	WO 303-001/WO 306-001
	Dasell	DCIN 100
	Dornier	DOL 70/DOL 71
	EADS	IPS 11-01-001-01 IPS 11-01-004-02
	Luft & Raumfahrt	LN29967 LN29968
INDONESIA	IPTN	NMS 8-124
ISRAEL	Israel Aircraft Industries	M.S. 08.0020
ITALY	Agusta	199-24-103
	Alenia	N4901
NETHERLANDS	Fokker	THS.472/THS.473
	Driessen Aerospace Systems	SMS 015
SPAIN	Aries	ACMS233
	C.A.S.A.	I+D+P-176
SWEDEN	Saab Scania	STD 124224/226/228
SWITZERLAND	Bucher Leichtbau AG	div. LAM Spec.
	Jet-Aviation Basel AG	curved Panels
UNITED	AIM Group	BAER 1007
KINGDOM	BAe Airbus	ABR 3-0070/0069/0066
	BAE Systems	MM-0032
	Ericsson	10549MPP247
	Marconi Avionics	06CL0061/319/T308
	Shorts	SMS35
	Westland Helicopters	WHPS 297

Qualifications by customers (continued)

USA/CANADA	AAR Composites	ATRMS 301
	AIM	AIM-M-1013
	Bell Helicopters Textron	299-947-103
	Boeing	BMS 8-124
		BAC 5317
		D210-12012
	Bombardier Canadair	BACM 539-001
	Bombardier de Havilland	D H M S - P1.26
	Britax Heathtecna	EPS No 1009
	Cessna Aircraft Company	CMNP083
	Composites solutions	CSCMS220
	General Electric	A50TF 86
	Goodrich	RMS 065
	Gulfstream	GMS 4011
	Kaman Aerospace Corp.	KPS 384
		KPS 922
	Lockheed	LCM 28-1041
		STM 28-105
	Lockheed-Martin	LMA-MD017
	Mc Donnell Douglas	DMS 1974
	Nordam Group	NTR-MS 3031
	Northrop Grumman	ACS-MRS-5301
	Raytheon Aircraft Corp.	BS 23732
	Rockwell	TB 0130-035
	SAE	AMS 3715
		AMS 3711/3714
		AMS-C-81986
	Sikorsky Aircraft	SS 9223
	TTF Aerospace	TMS13

Employees and qualification level

EURO-COMPOSITES® S.A.
EURO-COMPOSITES® GmbH

Employees by Department

Sales		22
Administration		25
Procurement		8
Technical Controlling/Production Planning		17
Technical Department		58
Research & Development	8	
Design & Engineering	39	
Process & Industrial Engineering	6	
Prototyping & Pilot manufacturing	5	
Production		365
Workshops, Goods Receiving, Shipping Dept.		76
Quality Department		23
Quality Assurance	5	
Quality Control	18	
Apprentices		13
TOTAL		**607**

Employees by Qualification level

PhD Level	5
Graduate Engineer	45
Business Administration (University degree)	6
State-certified Technician	27
Master Craftsman	37
Skilled Craftsman, Commercial Employee	474
Apprentices	13
TOTAL	**607**

Employees and qualification level

EURO-COMPOSITES® Corporation

Employees by Department

Sales		8
Administration		6
Procurement		2
Technical Controlling/Production Planning		3
Technical Department		5
Production		41
Workshops, Goods Receiving, Shipping Dept.		8
Quality Department		6
Quality Assurance	1	
Quality Control	5	
TOTAL		**79**

Employees by Qualification level

Graduate Engineer	7
Business Administration (University degree)	2
Technician	7
Master Craftsman	17
Skilled Craftsman, Commercial Employee	46
TOTAL	**79**

Your contacts at EURO-COMPOSITES®

EURO-COMPOSITES® S.A.

Phone: +352 72 94 63-1
Fax: +352 72 94 60
Fax (Board of Directors only!): +352 72 94 63-235

Postal address: EURO-COMPOSITES® S.A.
B.P.24
Zone Industrielle
L-6401 Echternach
G.D. Luxembourg

Board of Directors

Rolf Mathias **ALTER**, Chairman and CEO
Dr.-Ing. Patrick **FRÈRES**
Werner **HUWER**
Dipl.-Ing. Falko **LÖHR**
Dipl.-Kfm. Horst **WILLKOMM**

Please contact via: Management Secretaries Office

Martina **WINKEL**
Phone: +352 72 94 63-217
Fax: +352 72 94 63-9217
E-Mail: winkel@euro-composites.com

Stephanie **LECLERC**
Phone: +352 72 94 63-220
Fax: +352 72 94 63-9220
E-Mail: leclerc@euro-composites.com

Sales Aviation

Guy **SPEICHER**, Executive Vice President, Head of Department
Phone: +352 72 94 63-204
Fax: +352 72 94 63-9204
E-Mail: speicher@euro-composites.com

Carlo **SCHAFFNER**, Senior Manager Sales Honeycomb
Phone: +352 72 94 63-215
Fax: +352 72 94 63-9215
E-Mail schaffner@euro-composites.com

Dipl.-Ing. Achim **SCHIRMER**, Sen. Manager Sales Panels & Composite Parts
Phone: +352 72 94 63-232
Fax: +352 72 94 63-9232
E-Mail: schirmer@euro-composites.com

Your contacts at EURO-COMPOSITES®

Sales Space

Dr.-Ing. Heike **POIGNAND**, Vice President
Phone: +352 72 94 63-334
Fax: +352 72 94 63-9334
E-Mail: poignand@euro-composites.com

Sales Industrial

Dipl.-Ing. (FH) Carsten **JUNG**, Senior Manager Sales Head of Department
Phone: +352 72 94 63-321
Fax: +352 72 94 63-9321
E-Mail: jung@euro-composites.com

Sales New Products

Dr. rer. nat. Jürgen **WALTER**, Vice President
Phone: +352 72 94 63-449
Fax: +352 72 94 63-94491
E-Mail: walter@euro-composites.com

Procurement

Andreas **RUMP**, Senior Manager Procurement
Phone: +352 72 94 63-201
Fax: +352 72 94 63-9201
E-Mail: rump@euro-composites.com

Center of Excellence

Design & Engineering

Dipl.-Ing. Manfred **HAHN**, VP, Manager CoE Head of Department
Phone: +352 72 94 63-336
Fax: +352 72 94 63-9336
E-Mail: hahn@euro-composites.com

Research & Development

Dipl.-Ing. Dipl.-Chem. Willy **WINTGENS** Head of Department
Phone: +352 72 94 63-211
Fax: +352 72 94 63-9211
E-Mail: wintgens@euro-composites.com

Dipl.-Ing. Dipl.-Chem. Oliver **BOTTLER**
Phone: +352 72 94 63-259
Fax: +352 72 94 63-9259
E-Mail: bottler@euro-composites.com

Your contacts

EURO-COMPOSITES® Corp.

Phone: +1 540 727 85 00
Fax (Administration): +1 540 727 85 35
Fax (Sales only) : +1 540 829 66 11

Postal address: EURO-COMPOSITES® Corporation
13213 Airpark Drive
Elkwood, VA 22718
USA

Board of Directors

Rolf Mathias **ALTER**, Chairman and CEO
Sylke **HEIL**, Executive VP and CFO
Matthew **FLYER**, Executive VP, Sales & Engineering
Alwin **HEIL**, VP, Quality Assurance & Procurement

Please contact via: Management Secretaries Office

Barbara **WEBSTER**
Phone: +1 (540) 727 8513
Fax: +1 (540) 727 8535
E-Mail: barbara.webster@euro-composites.com

Sales

Matthew **FLYER**, Exec. Vice President Sales & Engineering
Phone: +1 (540) 727 8526
Fax: +1 (540) 829 6611
E-Mail: matthew.flyer@euro-composites.com

Procurement

Alwin **HEIL**, Vice President
Phone: +1 (540) 727 8533
Fax: +1 (540) 727 8535
E-Mail: alwin.heil@euro-composites.com

Raw Materials

Mary-Ann **ALTER**, Manager Procurement
Phone: +1 (540) 727 0593
Fax: +1 (540) 727 8535
E-Mail: mary-ann.alter@euro-composites.com