

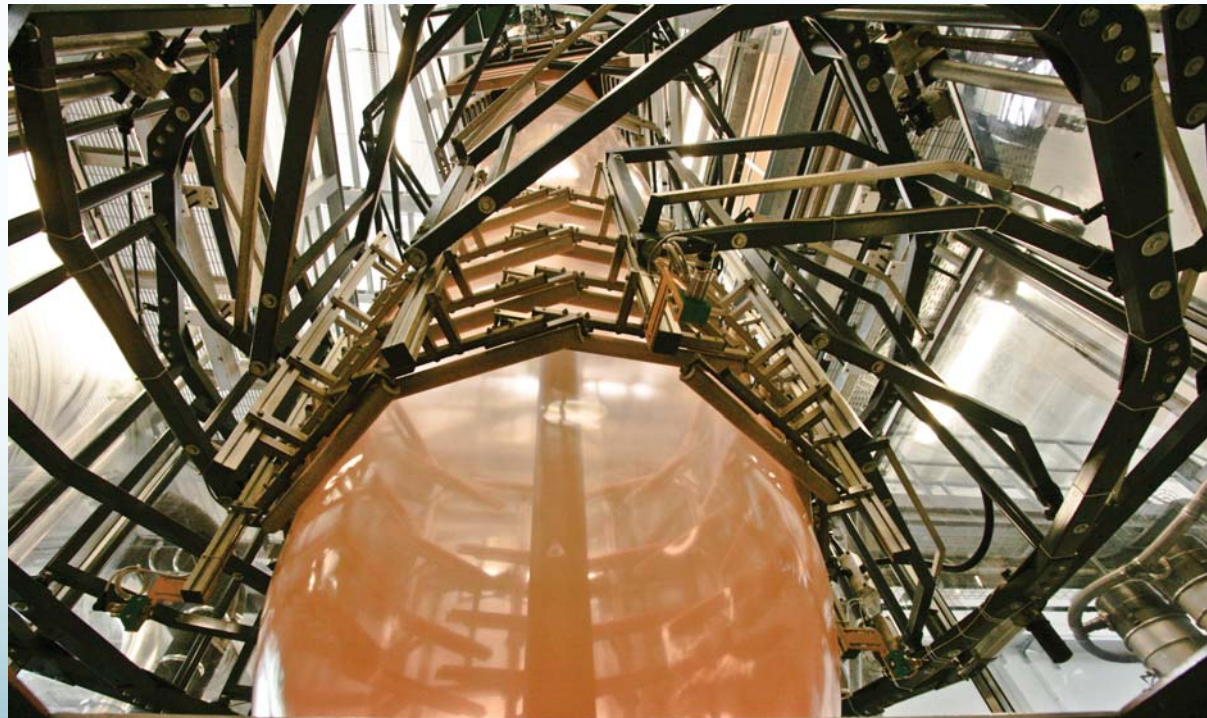
Thermoplastic Composites Laminates

POLYBRI™

A high throughput productive line for Lightweight
Engineered Environmentally Friendly Fabric Composites
is now running in Italy

Where ? At 2Gamma !

- In Mondovì, Corso Inghilterra 15, at **2Gamma Srl** plant
 - Specialist to develop, produce and sell technical films at 7-9 microlayers, from 15 to 150 micron total
 - Polyamide, Evoh, Metallocene, PP,.....
 - antiadhesive,
 - protective,
 - thermoadhesive,
 - antistatic,
 - for lamination,
 - microporous,
 - coupled
 -



key factors for our composites making

- **The highest productive flexibility**
 - Single/multiple layers
 - Functional/aesthetical layers addition
 - Composite continuous panels
- **The widest range of usable resins and fabrics**
 - Reactive thermoplastic (proprietary formulations)
 - Pure thermoplastic (PA6, PBT, PP,)
 - Carbon, Glass, Basalt, Aramide, Natural fibers
- **A technology to serve our customers**

Tailored products

- The Structura technology is based on a proprietary impregnation method
- Given that :
 - We impregnate either fabrics and mat upon Customer Project/Article needs
 - We impregnate with the chosen resin according to the Customer needs
- Most of our developments are made under NDA contracts

Think Global


- **Our customers are global**
 - We must be global
- **The market moves fast**
 - We must be as fast in understanding and support their moves and needs

Global presence

- **Structura** and **Swiss-CMT** built up a strict partnership to develop the technology and impregnation resins.
- **Structura** and **Swiss-CMT** actively support the customer project developments at partners like Persico
- We are developing a Strategic alliance with a Asian composite laminates maker.
- We are actively looking at a third plant located in North America to complete the service globalization.

Swiss-CMT

more than a shareholder



we support you in the realization of
innovative, sustainable and clever **composites solutions**
from the first idea till production.

make advantage of our excellent network from
material suppliers to machine manufacturer

the Proprietary Resin key concept

- A unique property method to lower the resin's viscosity, down up to impregnation by capillarity
- Consequently :
 - The best fabric impregnation happens in a continuous laminating line with minimum pressure
 - PrePreg version (reactive over 90°C and stable at RT)
 - Fully polymerized version (thermoformable after heating)
 - VOC and solvent free
 - FR formulations under development

the Proprietary Resin key concept

- **Reactive ?**
 - Yes, available as **RT stable Prepreg** for a Out of Autoclave process to a **thermoplastic like** final product
 - The reactivity can be finalized by us in a fully impregnated thermoformable laminate and in intermediate B Stages
 - In both cases the very low resin viscosity, enters the fabric intimacy by capillarity and polymerizes locally
 - A unique solution to large, primary structural, parts molding, in a repeatable, high throughput, productive sequence
 - Run through cataphoresys
 - Brands :
 - **POLYBRI™ 2...** serie is the PrePreg
 - **POLYBRI™ 31..** and **32..** series are the Polymerized

Termoplastic Resins

- PA6
- PP
- PBT
- PK
 - PC, under development
 - All VOC and solvent free

Thermoplastic resins

- Structura, can either **impregnate** or **couple**, thermoformable laminates by most of the thermoplastic resins available on the market
 - **Impregnation** happens by melting down and pressing the thermoplastic resin into a fabric
 - **Coupling** of a thermoplastic film over a fabric happens by temperature and pressure
 - Brand:
 - **POLYBRI 35..** is the PA6
 - **POLYBRI 36..** is the PP
 - **POLYBRI 37..** is the PBT

Fabrics

- **Glass fibres**
 - any
- **Carbon fibres**
 - any
- **Basalt fibres**
 - any
- **Aramidic fibres**
 - Any
- **Natural fibres**
 - selected

Lamination line



The Structura outputs

- Coiled continuous thermoplastic laminates
 - **Abt 1 Mil m²/y capacity (max 1,7m wide)**
- Coiled continuous Pre-reacted laminates
 - **Abt 1 Mil m²/y capacity (max 1,7 m wide)**
- Coiled continuous reacted laminates
 - **Abt 0,5 Mil m²/y capacity (max 1,7 m wide)**
- operative from August 2014
- Doubling capacity possible in 6 months time

TDS

some examples

Reactive Resin	Xt (Mpa)	E modul (Gpa)	layup description	Xt (Mpa)	E modul (Gpa)	PA6 resin
POLYBRI™ 3192 60042	300	19,8	4x600gr GF Twill			
POLYBRI™ 3192 40061	261	18,8	6x400gr GF Plain Weave			
POLYBRI™ 3192 43050	540	41	5x430gr GF UD			POLYBRI™ 3512 43050
POLYBRI™ 3192 22101	256	14	10x220gr GF Plain Weave			
POLYBRI™ 3192 43020			2x430gr GF UD			
POLYBRI™ 3192 60049			4x600gr GF mat			POLYBRI™ 3512 60049
			9x280gr GF Twill			POLYBRI™ 3512 28092
			4x400gr GF Twill			POLYBRI™ 3512 40042

Press Thermoforming by preforming

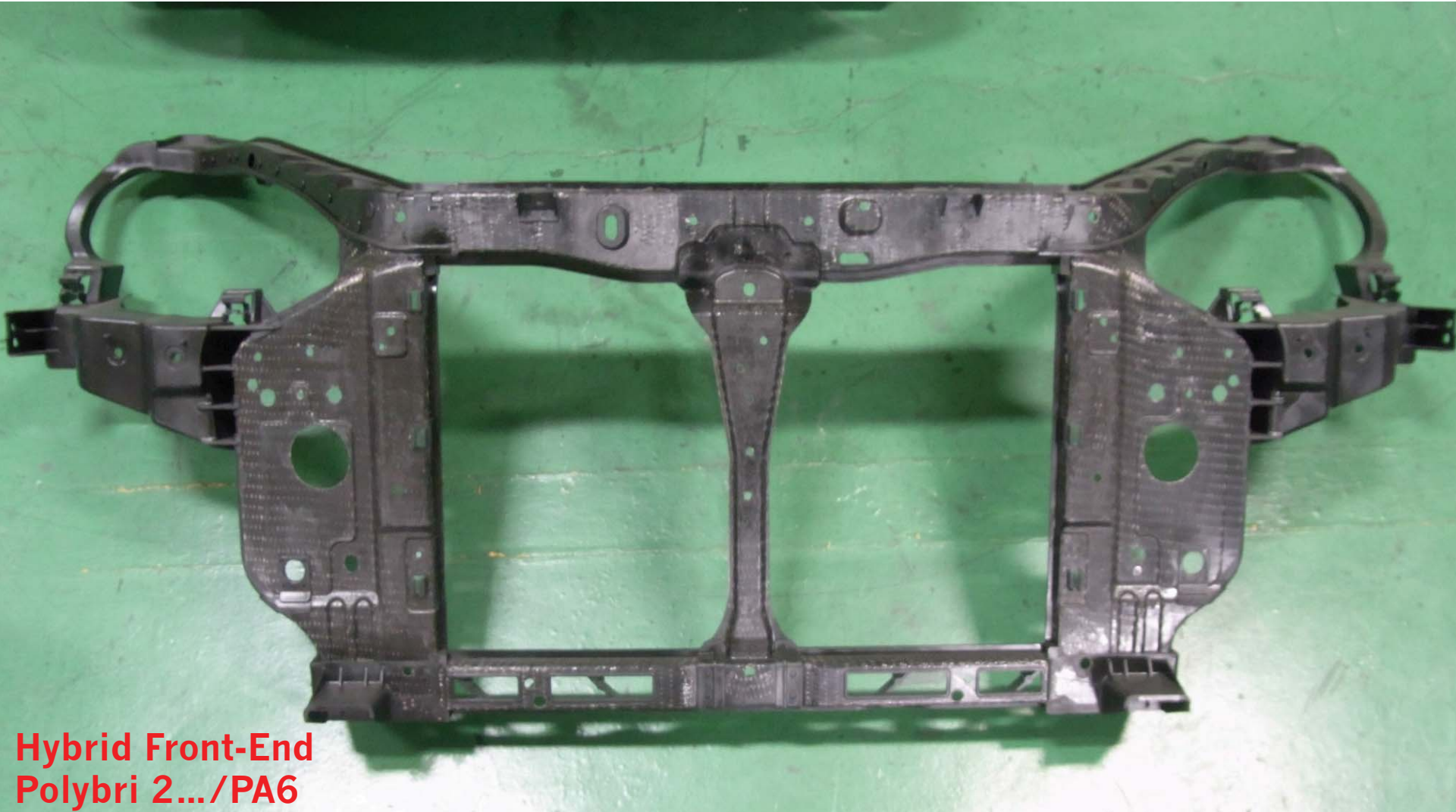


Press Thermoforming

**Coupling of the aesthetical
surface layer made
meanwhile molding**



Press Thermoforming/Overinjection



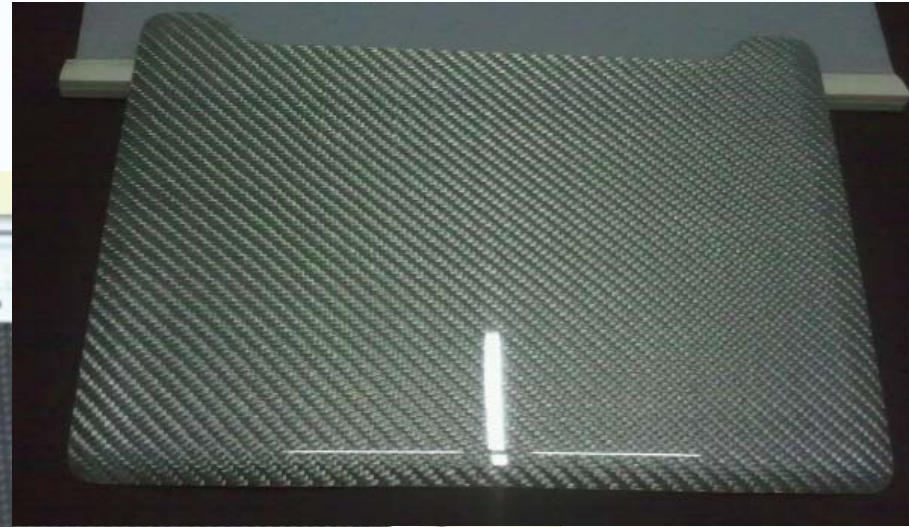
Hybrid Front-End
Polybri 2.../PA6

Press Thermoforming/ Overinjection

- Front hybrid seat
 - Polybry 3....-PA6



Press Thermoforming/overinjection + clear coat



Press Thermoforming/overinjection + clear coat



In Mold Lamination

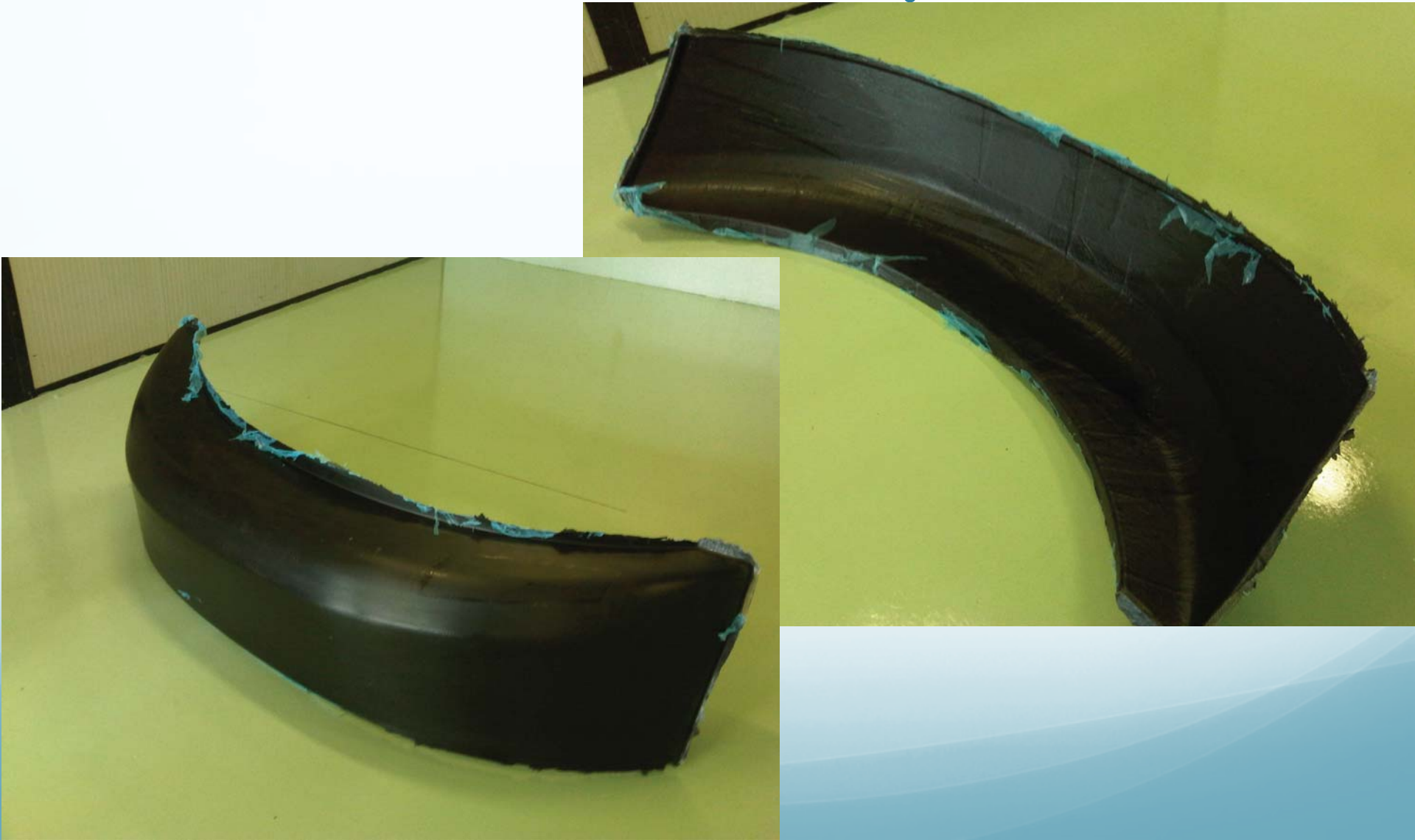
Prepreg cuts



In Mold Lamination part extraction



In Mold Lamination the finished part



In Mold Laminating large bodies



Integrally-Heated Ceramic
Composite Tooling



[Production time for 12.6 Metre Blade is
6 hours

Trunk Floor panels mold /finishing



Thank you !

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