Structural articles making by press thermoforming of a composite Skintec PBT

A very high throughput productivity generic case

By Gianluigi Creonti – october 2010

Skintec PBT

What is it

- The newest generation thermoplastic composite laminate
- Made by
  - Glass fibre, fabric, up to 70% weight
  - Carbon fibre, fabric, up to 65% weight
  - Basalt fibre, fabric, up to 75% weight
    - And an IP thermoplastic PBT based resin “in situ polymerized”

Skintec PBT

How is it supplied

- Up to 3 m wide continuous laminates
  - Any composition
  - Homogeneous thickness
  - Homogeneous lay up
- Preforms already lay up
  - Any composition
  - Any variable thickness
  - Any variable lay up

STRUCTURA PBT

handling and storage

- Chemically stable
  - Very long pot life
  - No VOCs
  - No solvents
  - Recyclable
- No H&S risk category
- **A clean and easy raw material for an user friendly part making technology**

unicity advantages

- Very fast processing
  - Press thermoforming at Persico
- No original warpage under heat
  - The “in situ polimerized” resin has no first process memory
- Stable up to abt 200°C
  - Fast softening at higher temperatures
  - Fast cristallistion over 200°C
- Stable at very low temperatures
- Not measurable shrinkage

Skintec PBT

the challenge

- To make the composites capable of an automotive level of throughput
  - At low investments on an already known base technology
  - At a competitive cost compared to the existing steel parts
  - **To get, at least, 50% weight saving**

Skintec PBT

the case study

- Just a shaped form taken out of a large article mould
- To show
  - how easy Skintec shapes
  - The indicative cost approach
  - The aesthetical finishing
  - The overall considerations

STRUCTURA

- Skintec PBT
- The line
- at **Persico**

ModenaFiere

- Skintec PBT the part

- Skintec PBT

The part

- Skintec PBT the mould

Trial main data

- Skintec PBT 1212 , 0,6mm thickness
  - Glass fabric, balanced
- Skintec PBT 1385, 1,3mm thickness
  - Glass fabric, balanced
- Heating cicle RT up to 250°C
- Mould temperature 80°C
- Moulding closure max 15 sec
- Mass cristallisation max 30 sec

Out of the tunnel

- The hot laminate gets out of the heating tunnel

Surface finishing

- Any cover layer can be directly applied

….Some numbers….

- Skintec PBT = abt. 9€/Kg
- The part weight (steel) = 1300gr.
- The part weight (Skintec) = 700 gr.
  - At equal isotropic design
  - At 2,5 times thickness
  - At abt. equal mechanicals
    - By a proper layup design, the weight can lower down to abt. 400 gr.

…Some more numbers…

- A complete line = **1450 K€**
  - 3 stages IR oven
  - 800 t press
  - 2 pieces/min process rate
    - = 950 to 1000 pieces/day
- A complete mould single print, blades, hard surface, etc. = **150K€**
- Total investment = 1600K€
  - 5y depreciation
  - 220000 pieces/y
    - Investment cost/part = **1,45€**

…Part costs…

- Isotropic solution
  - Raw material = 9*07= 6,3€/part
  - Labour = 60/120= 0,5€/part
  - Investment = 1,45€/part
    - **8,25€ total**
- Anisotropic solution
  - Raw material = 9*0,40= 3,6€/part
  - Labour = 60/120= 0,5€/part
  - Investment = 1,45€/part
    - **5,55€/total**

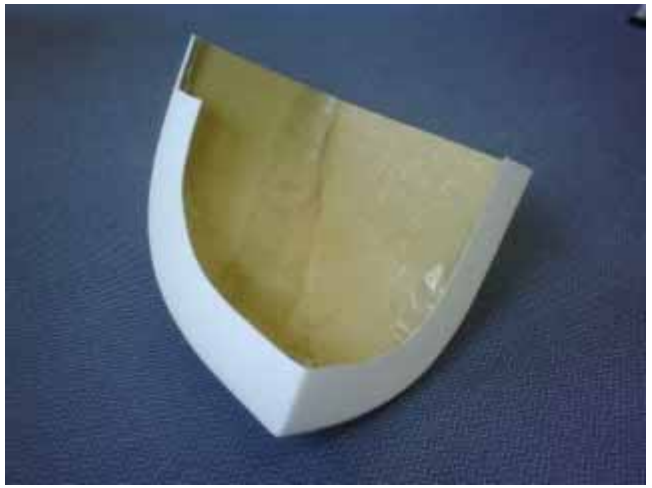
…additional…

- Surface finishing :
  - Fabrics any
  - PU leather **Soteco**
  - Flocked tapes **Dimontonate floccati**
  - Water painting **Inver**
  - On line painting
  - ……

…..than a new challenge

- **To use Skintec thermoforming at lower investments and lower throughput**
  - 1000 to 10000 pieces/y
  - Abt 500000€ investment
- Surface finished by IMC in the same process

.....Just a small example



To do what ?

- Hollow articles like Aeolic blades
- Structural shaped parts of large and small size, automotive and not automotive, lighter than RTM and cheaper than RIM
- Any Lay up
- Glass, Carbon or Basalt fibres

Wrap up

- Structura dedicate their technology to make a given part
  - Joint developments
  - Supply of pre industrial samples
    - Supply of finished parts for small series
  - Supply of tailored technology
  - Supply of tailored raw materials
  - Technical support after sales
  - Under NDA conditions

- Thank you for your attention

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