

Tailored LFT-D Technology



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Dieffenbacher Compression Technology TAILORED LFT

- n The expression ,Tailored LFT' marks the load-orientated additional reinforcement of LFT parts by endless fibers/fabrics.
- n The aim of producing lighter components for high load and stiffness has made necessary the development of various components and concepts.

Tailored LFT-D Technology Development Of A „Composite-Composite Hybride“Frontend



BMBF Research Projects:

Project partners: Fraunhofer Institut ICT, DOW, WFS, Polymer-Tec, Menzolit Fibron, Leistritz, BMW-Gruppe, Dieffenbacher

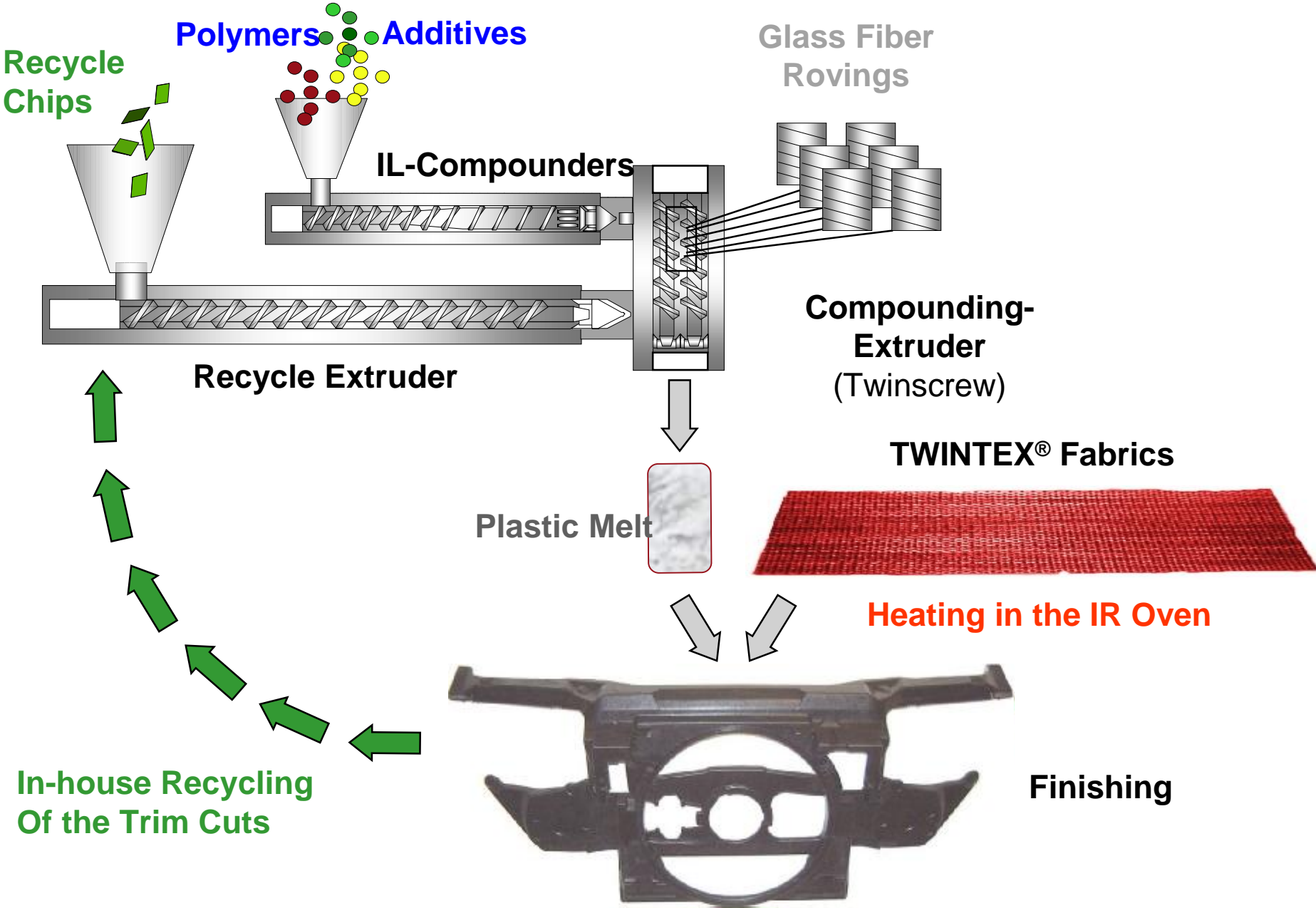
Material/Process:

- n LFT-D/ILC PP GF 30 - 40
- n Local reinforcement in the upper belt:
Twintex PP GF 60 (woven fabric)



Recycle Granules

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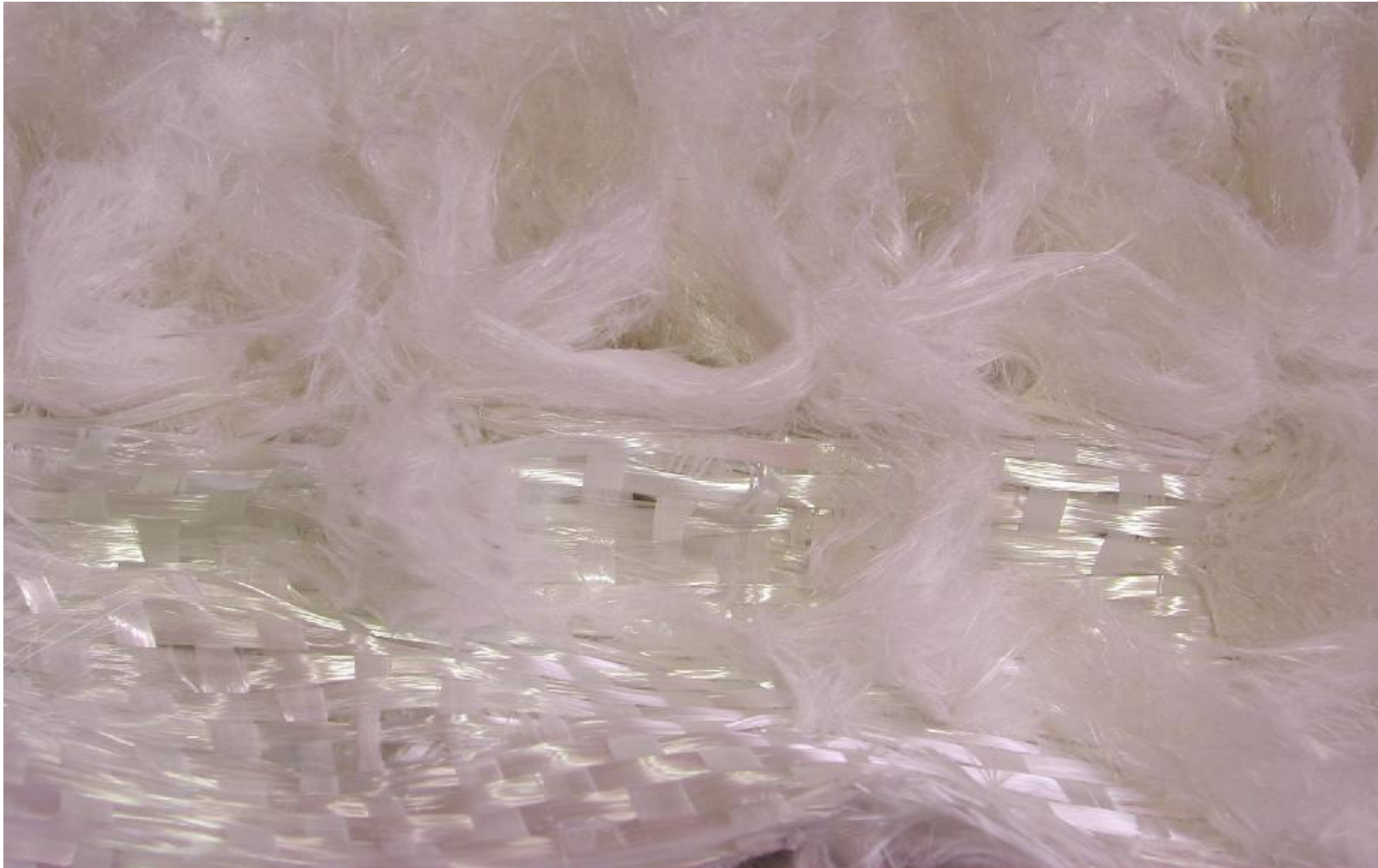
TAILORED LFT Technology

n Challenges:

- n Keeping the endless fiber reinforcement at the placed position
- n Filling of ribs – if possible, penetrating and incorporating the endless fiber reinforcement
- n Fully automatised production unit for large serial applications – short cycle time

Mold filling analysis BMW frontend structure
Top flange cross rib section with fabric – matrix burned off

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n Weight requirements:

Weight of current frontend structure BMW E46 (same functional range):
3,75 kg
(formed and welded sheet metal with attached injection molded fan housing)

Goal: weight reduction 30 weight% à 2.625 Gramm

n Result:

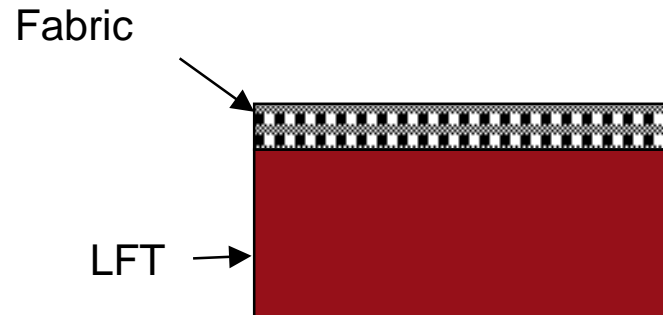
Component with 35 weight-% glassfibers; bushings and metal inlay for catch hook stop

à $2.311 \text{ g} + 140 \text{ g} + 100 \text{ g} = 2.551 \text{ gramm}$

Results

- n Tailored LFT parts PP GF 40/GF60 (0,54 m² projected area, 2 – 3 mm wall thickness) have been produced.
- n Compression force = 13,000 kN.
- n Thickness-controlled plastificate by means of a servo die – tailored plastificate => controlled mold filling
- n Compression cycle 30s at a cooling time of 15s.
- n PAZ double-belt system.
- n Simple gripper system and short handling time by overlaid blank feeding.
- n Endless fiber structure remains complete.
- n Long fiber rip structure for geometric stiffness available, filled throughout the endless fiber reinforcement.

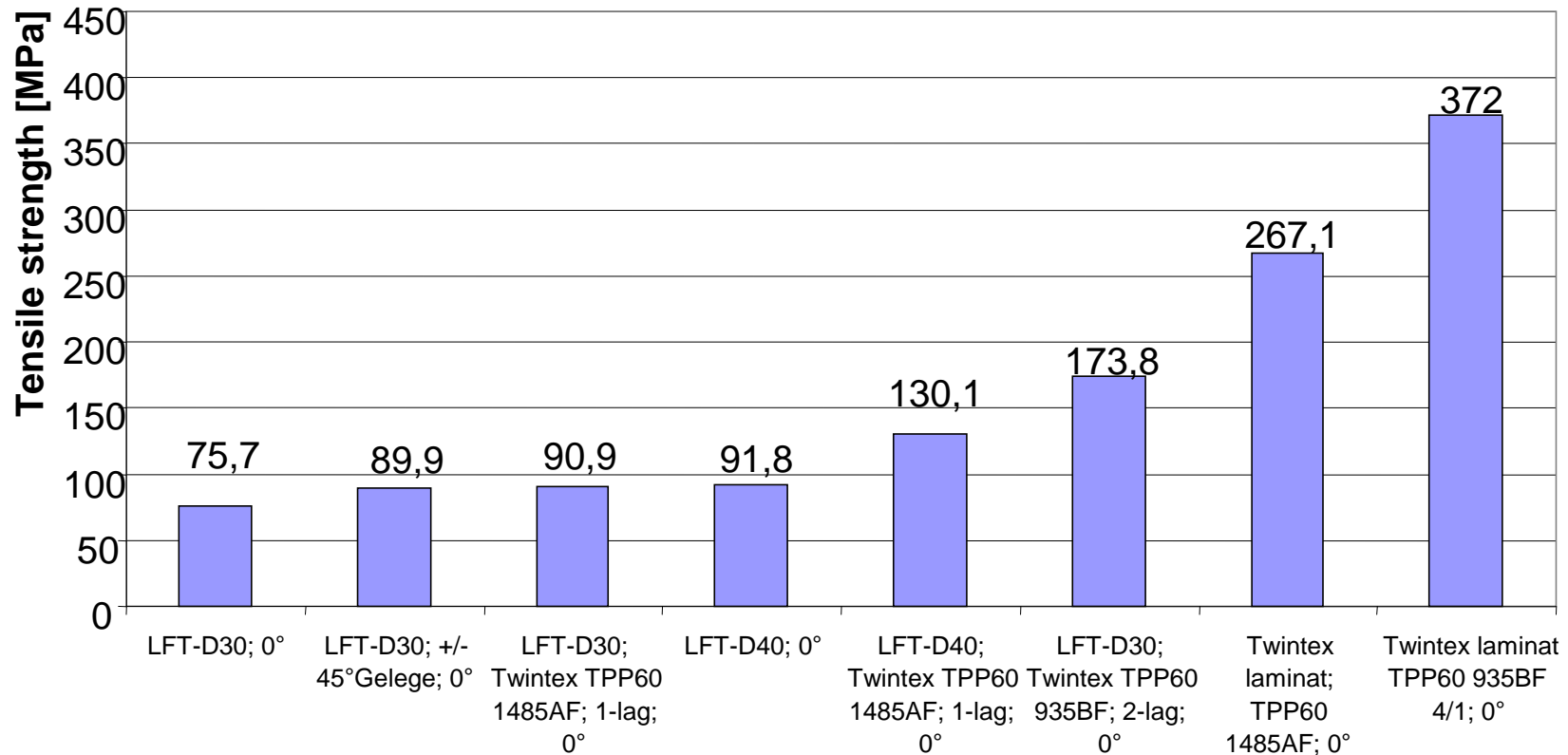
Introduction of mechanical properties of Tailored LFT



- n Important parameters are :
 - n Fiber orientation of each layer (fabric and LFT)
 - n Volume ratio of fabric and LFT (thickness of each layer)
 - n Properties of each layer
 - n Process parameters (processing window)

Fabric reinforced LFT samples

- n The variation of fabrics and LFT's offers a material tailored for each application



Dieffenbacher „Engineering Area“

Equipment consisting of features that are close to real production and different ways of treatment:

- n 1 hydraulic High Speed Press 15.000 kN with an active parallel levelling system
- n 1 LFT-D Plant
- n 1 LFT-G Extruder for granules
- n Conveyor and dosing plants for various plastics granules and recycles
- n adjustable die for tailored plastificates

Research and Development

- n Development of new economical treatments especially suitable for the processing of long fiber-reinforced thermoplastics and -sets
- n Support for the construction parts designer by the Dieffenbacher Competence Team
- n Matching and preserial production



New Developments Of The Plant Technique

n Adequate provision of material by a servo die

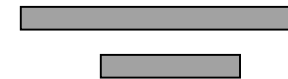
n Plastificate with adjustable thickness profile



n Reception of several plastificate positions by the double-belt system

n various prepositionings of the plastificate relative to the tracks

track 1
track 2



n Preheating station for local reinforcing material

n heating unit for twintex (woven fabric) close to the PAZ double-belt system

n Manipulation of plastificates

n gripper with special gripping modules

n Special mold technique

n needle modules within the mould

Closing Words

The In-line Compounding-Compression Process is an established technology for long fiber reinforced components that offers a high development potential for future applications.

