Tailored LFT-D Technology
The expression ‘Tailored LFT’ marks the load-orientated additional reinforcement of LFT parts by endless fibers/fabrics.

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

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

BMBF Research Projects:
Project partners: Fraunhofer Institut ICT, DOW, WFS, Polymer-Tec, Menzolit Fibron, Leistritz, BMW-Gruppe, Dieffenbacher
Recycle Granules

Polymers
Additives

Recycle Extruder

IL-Compounders

Glass Fiber Rovings

Compounding-Extruder
(Twinscrew)

Recycle Chips

Recycle Chips

In-house Recycling Of the Trim Cuts

Plastic Melt

In-house Recycling Of the Trim Cuts

Heating in the IR Oven

TWINTEX® Fabrics

Finishing
TAILORED LFT Technology

Challenges:

- Keeping the endless fiber reinforcement at the placed position
- Filling of ribs – if possible, penetrating and incorporating the endless fiber reinforcement
- Fully automised 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
**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% \(\rightarrow\) **2.625 Gramm**

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

\[\rightarrow 2.311 \text{ g} + 140 \text{ g} + 100 \text{ g} = 2.551 \text{ gramm}\]
Results

- Tailored LFT parts PP GF 40/GF60 (0.54 m² projected area, 2 – 3 mm wall thickness) have been produced.

- Compression force = 13,000 kN.
- Thickness-controlled plastificate by means of a servo die – tailored plastificate => controlled mold filling

- Compression cycle 30s at a cooling time of 15s.
- PAZ double-belt system.
- Simple gripper system and short handling time by overlayed blank feeding.

- Endless fiber structure remains complete.
- Long fiber rip structure for geometric stiffness available, filled throughout the endless fiber reinforcement.
Introduction of mechanical properties of Tailored LFT

Important parameters are:
- Fiber orientation of each layer (fabric and LFT)
- Volume ratio of fabric and LFT (thickness of each layer)
- Properties of each layer
- Process parameters (processing window)
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:
- 1 hydraulic High Speed Press 15,000 kN with an active parallel levelling system
- 1 LFT-D Plant
- 1 LFT-G Extruder for granules
- Conveyor and dosing plants for various plastics granules and recycles
- Adjustable die for tailored plastificates

Research and Development
- Development of new economical treatments especially suitable for the processing of long fiber-reinforced thermoplastics and -sets
- Support for the construction parts designer by the Dieffenbacher Competence Team
- 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
The In-line Compounding-Compression Process is an established technology for long fiber reinforced components that offers a high development potential for future applications.