

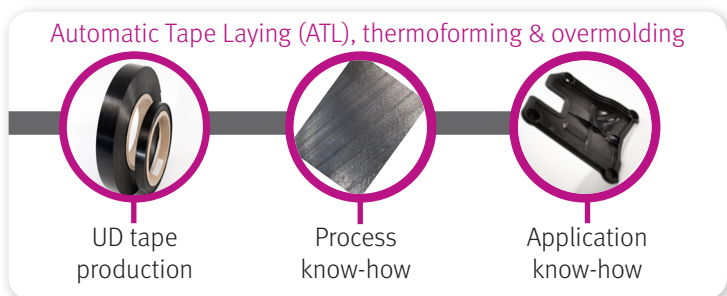
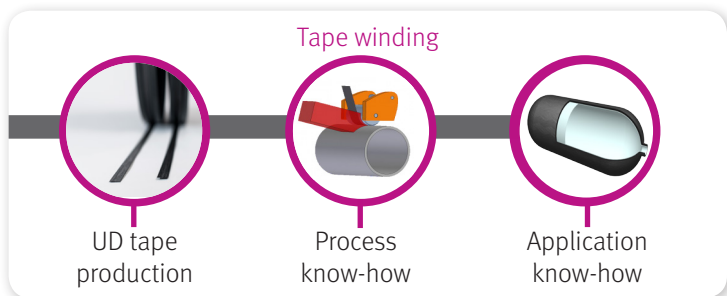


DSM's automotive weight loss factory

Extreme light weighting of automobiles is the most efficient technology for reducing emissions and enhancing mileage. The DSM Weight Loss Factory utilizes unidirectional, continuous fiber-reinforced, thermoplastic tapes as the fundamental building block of such light weight composite materials.

Our strategy extends well beyond just manufacturing the composite tapes. We also develop and specify processes such as Automatic Tape Placement (ATP), tape winding and tape-insert over-molding, and the necessary computer aided engineering (CAE) for part design and manufacturing process specifications. DSM is active in the industry in specifying and standardizing composite material testing and quality specifications.

UD tape processes



UD tape manufacturing process

1. Tape winding of parts with rotational symmetry (cylinders, tubes, box-beams etc.).
2. Automatic Tape Laying (ATL) (panels, sheets, etc.)
 - ATL panels are thermoformed to net shape
 - ATL panels are over-molded with structural features (ribs, etc.).
3. Hybrid metal-composite construction (composite patches glued to metal).

Technology and support

Design and CAE

- FEM analyses (static & high-strain)
- Thermoforming and over-molding simulation
- UD tape winding and simulation
- Mold flow analyses (injection-molding)

In-house macro & micro structural analysis of UD tapes

- Material-modeling and micro-mechanics
- Micro CT scans (void content, fiber-filament orientation, fiber-matrix adhesion, etc.)
- SEM micrography
- Tensile, flexural and impact testing.

Bonding

- Composite to plastic
- Composite to metal (with and without adhesives).

Potential applications

DSM's polyamide-based UD tapes with endless carbon or glass fiber reinforcements are viable, lightweight alternatives to metals in several applications. UD tapes, tape-based 2D fabrics and crossplies are used in structural and semi-structural applications, as well as in the selective reinforcement of injection molded parts .



Demonstration vehicle door panel

A demonstration vehicle door panel made by JLR from carbon fiber-reinforced PA410, as well as fabric sheets woven from the same UD tape (EU-sponsored ENLIGHT project). The UD tape products were thermo-formed and glued to make the panel, which is 60% lighter than state-of-the-art, steel-based designs, while still fulfilling safety requirements. The full composite door consists of structural panels and a tape-wound side impact beam over an extruded, permanent mandrel.



Demonstration MaxFiberSteel wheel

Maxion Wheels and DSM successfully manufactured and tested (Rim Rolling Fatigue) thin-walled hybrid, steel-composite automotive wheel-rim reinforced with UD tape (tape-winding) made from glass fiber-reinforced PA410. The hybrid wheel-rim is 2Kg lighter and 30% more fatigue-resistant than state-of-the-art, steel design, whilst inert to road salts and battery acids.



Demonstration central floor

A vehicle central-floor module from carbon fiber-reinforced PA410 made by FCA (EU-sponsored ENLIGHT project). The UD tapes based ply-books were thermo-formed to the final shape. The composite part is 18% lighter than state-of-the-art, steel-based designs, while still fulfilling safety requirements. The composite strength and dimensional stability are not affected by the E-coating process, a requirement of BIW parts.

DSM UD tape portfolio

Products	Recommended CF	Recommended GF
Akulon® PA6	≤ 55 wt%	≤ 60 wt%
Akulon® PA66		
EcoPaXX® PA410		
ForTii® Ace PPA		

UD Tape specifications	Typical values
Thickness	0,20 - 0,30 mm (typical for CF) 0,25 - 0,30 mm (typical for GF)
Width	Up to 800 mm
Length	Any length possible (< 1000 m)
Slitting	≥ 6 mm

If you would like to know how UD tape can help you meet the extreme demands of today's automotive applications in terms of performance, cost and sustainability contact us to today.

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DSM – Bright Science. Brighter Living.™

Royal DSM is a global science-based company active in health, nutrition and materials. By connecting its unique competences in life sciences and materials sciences DSM is driving economic prosperity, environmental progress and social advances to create sustainable value for all stakeholders simultaneously. DSM delivers innovative solutions that nourish, protect and improve performance in global markets such as food and dietary supplements, personal care, feed, medical devices, automotive, paints, electrical and electronics, life protection, alternative energy and bio-based materials. DSM and its associated companies deliver annual net sales of about €10 billion with approximately 25,000 employees. The company is listed on Euronext Amsterdam. More information can be found at www.dsm.com.