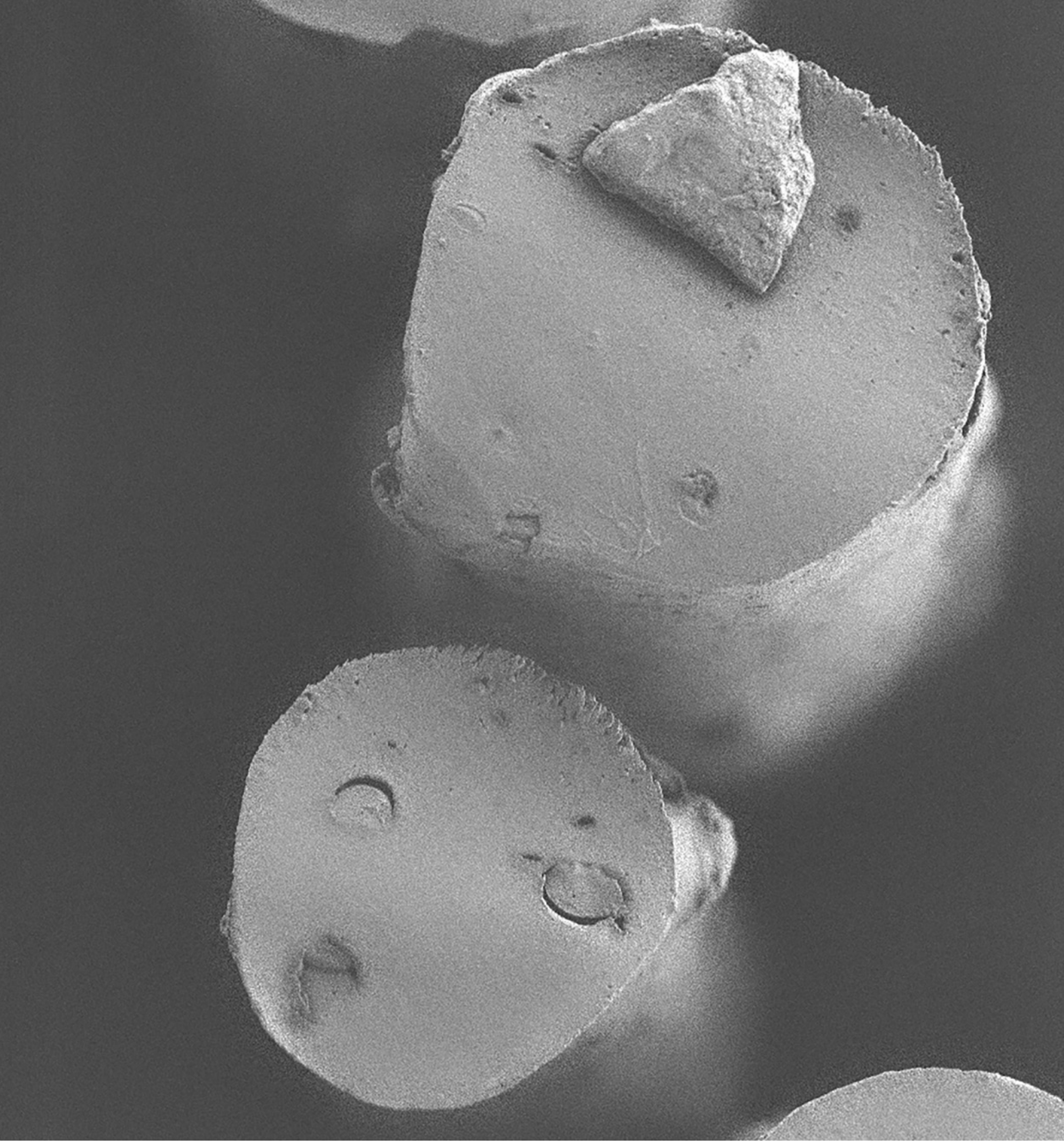


CENTEXBEL

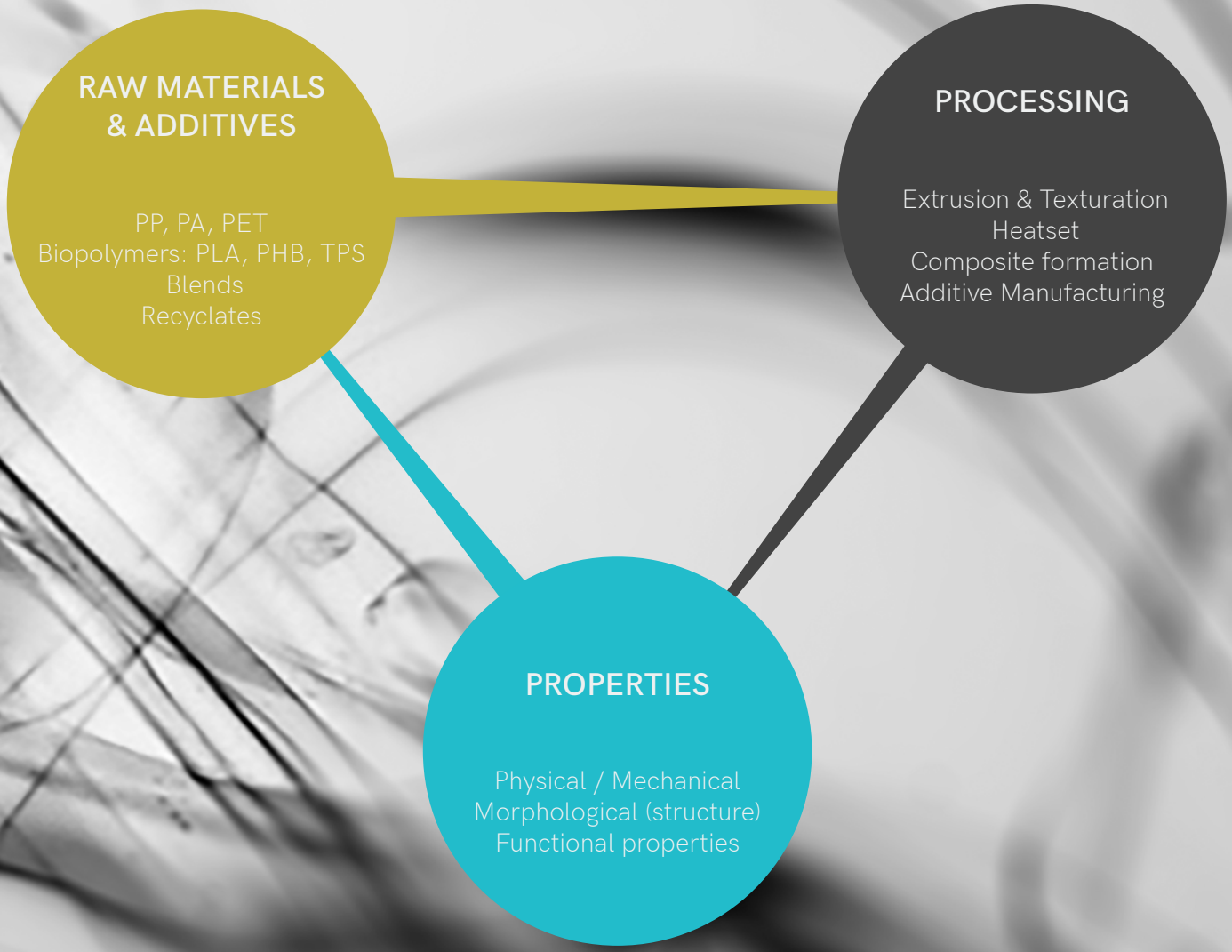
FUNCTIONAL

Thermoplastic Textiles


RESEARCH

Materials for high-end applications

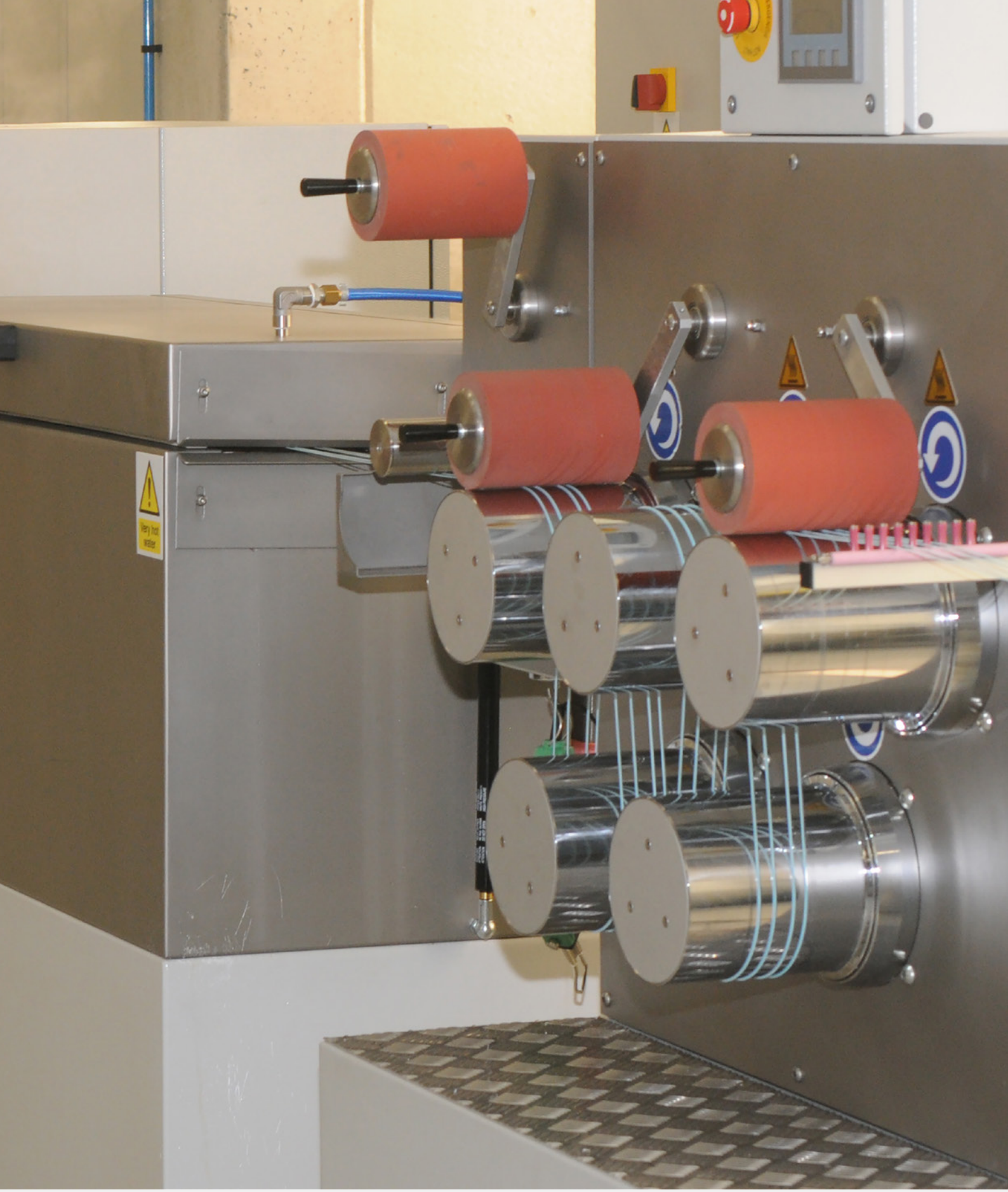
Developments based on a full understanding of the interactions between materials, processing and properties:

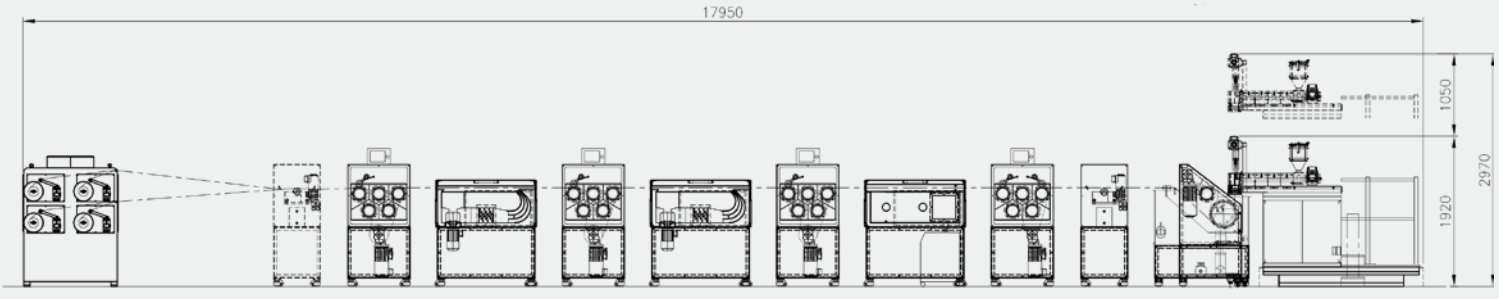


Development of sustainable biopolymers from renewable sources and of recycled polymers complying with the highest technical requirements for high-end applications

Extrusion line

monofilaments, bicomponent yarns and tapes




17950
1050
2970
1920

Functionalised (mono & multi)filaments, and bicomponent yarns and tapes from (bio)polymers

Two extruders allow for a large variety of polymer flow rates for pilot scale productions from 0.250 to ± 5 kg / hour.

The low flow rates are especially important to process experimental products that are only available in very limited quantities.

Extrusion of both thick (several mm) and thin (< 40µm) filaments. In addition to filaments, the extruder is suited to produce filament bundles, films and cut tapes.

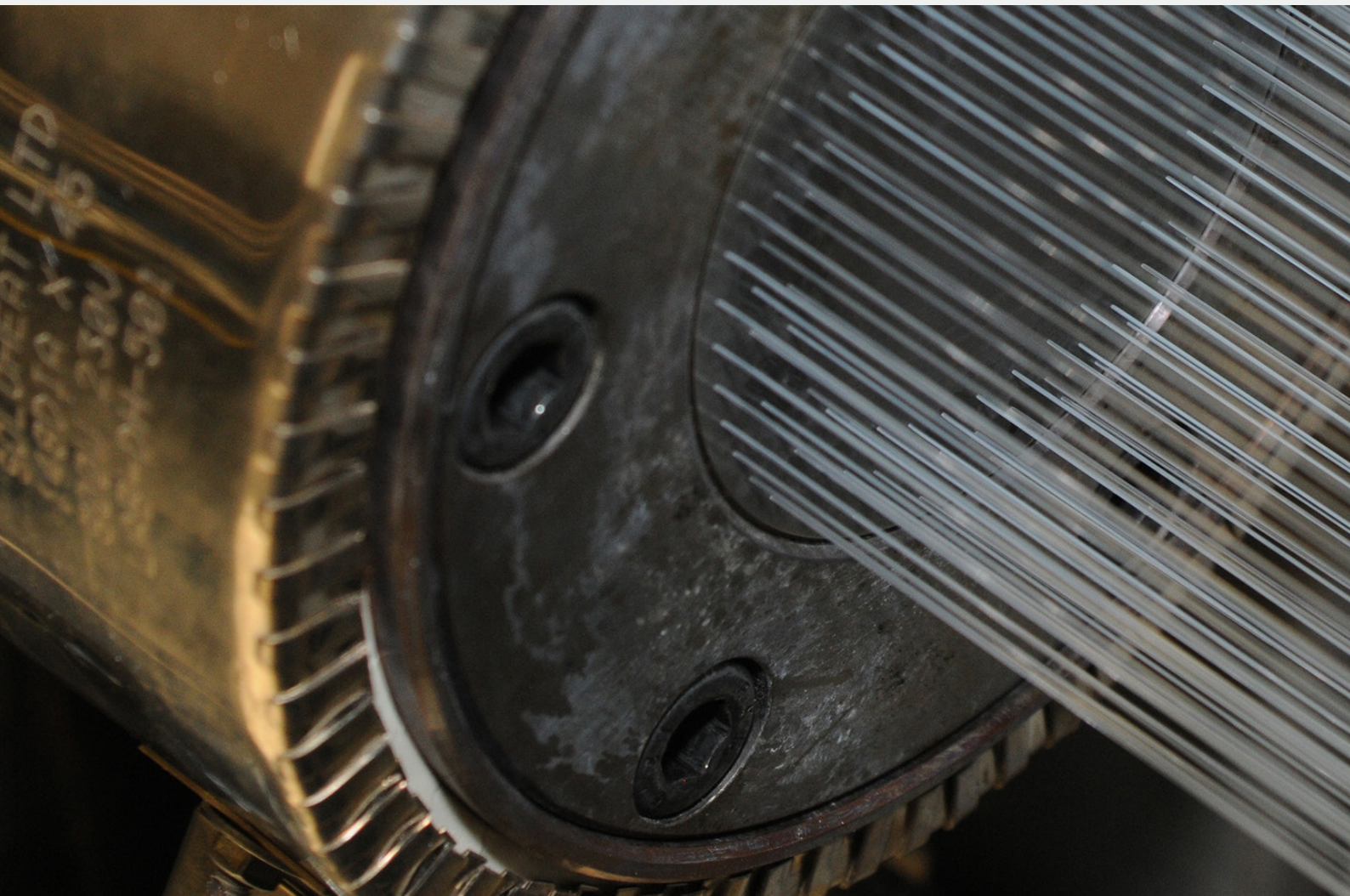
Cooling systems:

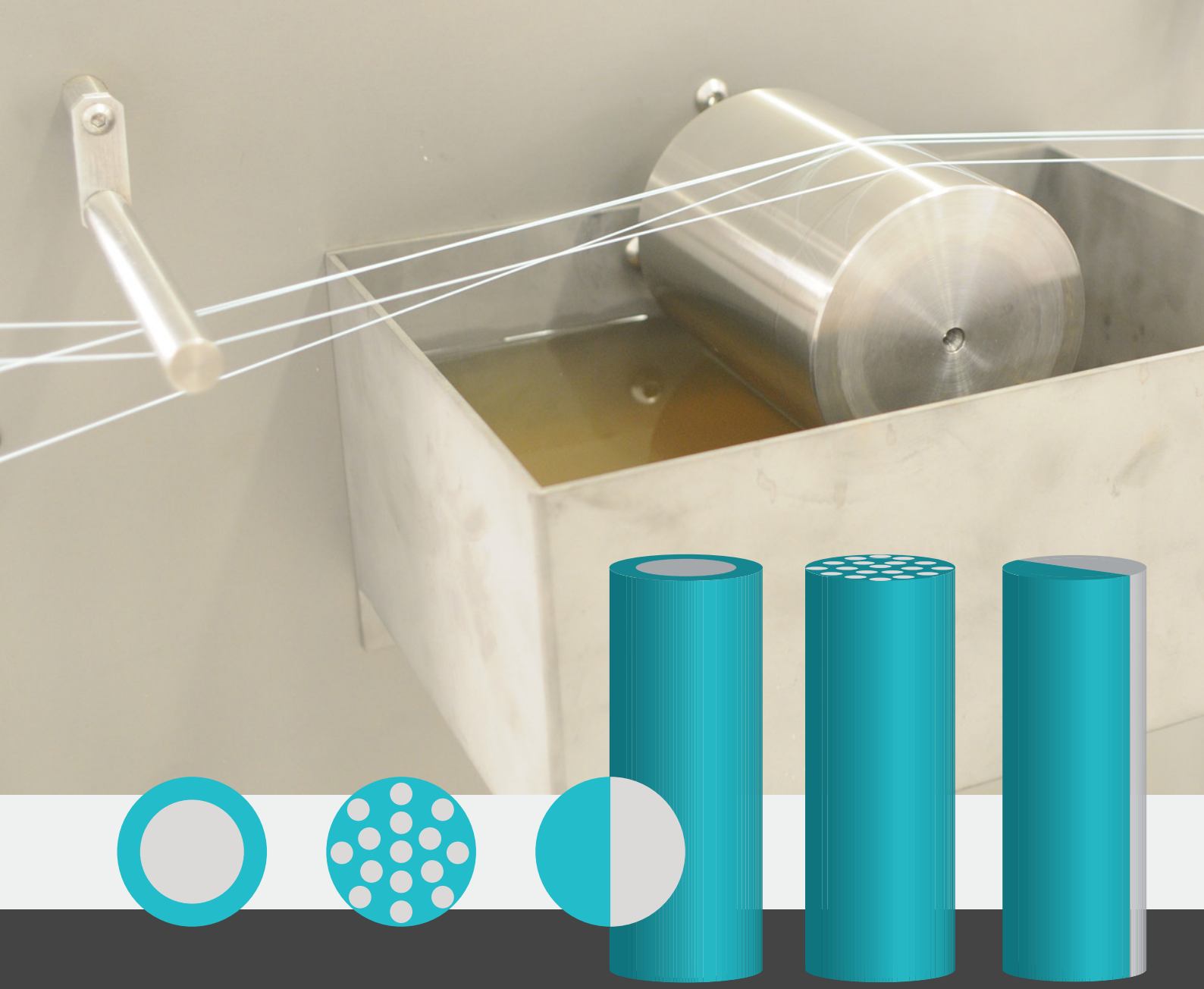
- standard cooling water bath with temperature range from 15 to 70°C
- cooling drum with the same temperature range or air cooling or a combination of both methods

The filaments are drawn by means of four roller sets, each with an adjustable temperature; intermediate ovens allow the process to take place in several steps to optimize both strength and stability.

Thermal treatment in hot-air or steam ovens; possibility of a 3-step drawing process to maximize the mechanical properties and thermal stability of the yarns.

Winding station with 4 positions for monofilament (bundles) or to a winding device for films.

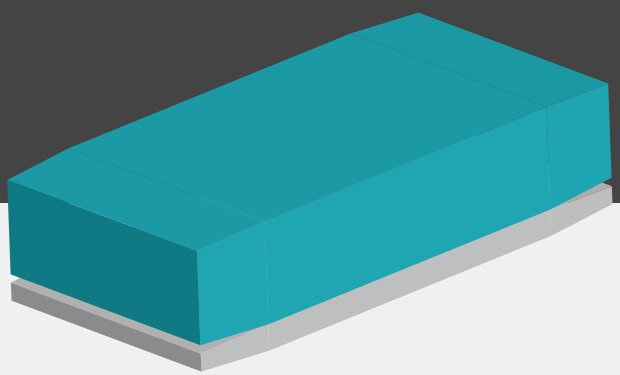




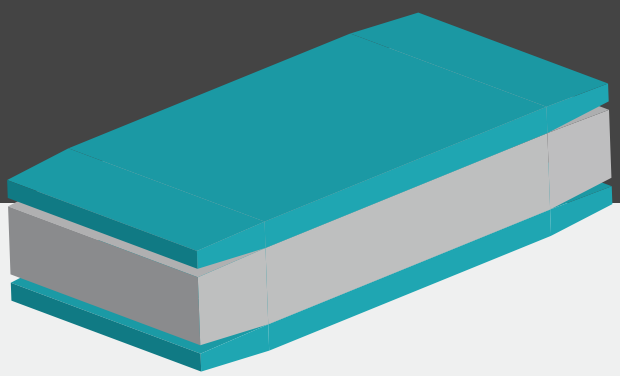
core-shell, islands-in-the-sea, and side-by-side

The extrusion line is also suited to produce bicomponent fibres, made from two different polymer grades that are present over the entire length of the filament according to a determined pattern. By extruding both polyemers to one filament, their different properties will be combined.

The final properties and applications depend on the properties of the different polymer grades and on the shape of the cross-section.

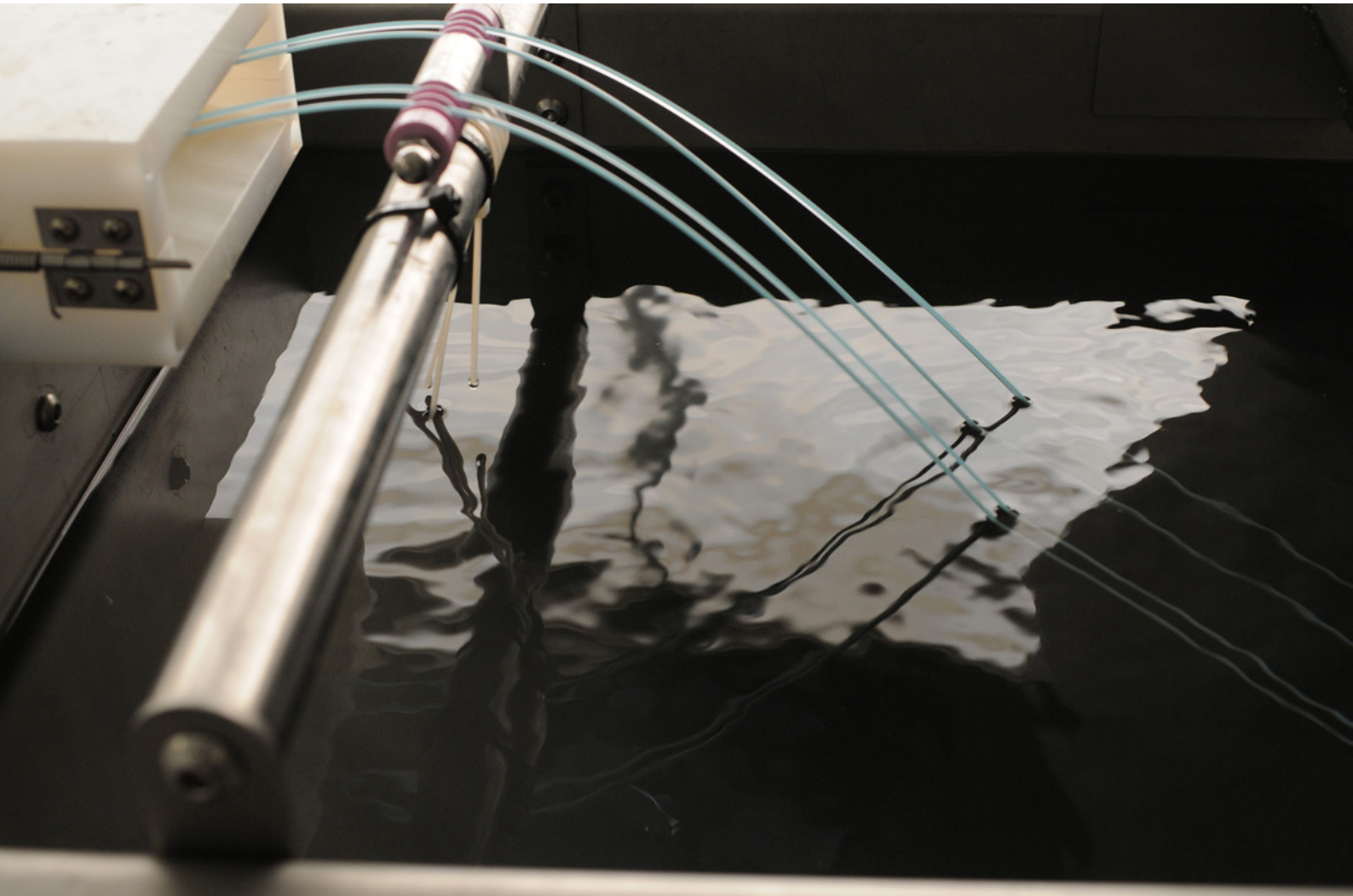


A-B

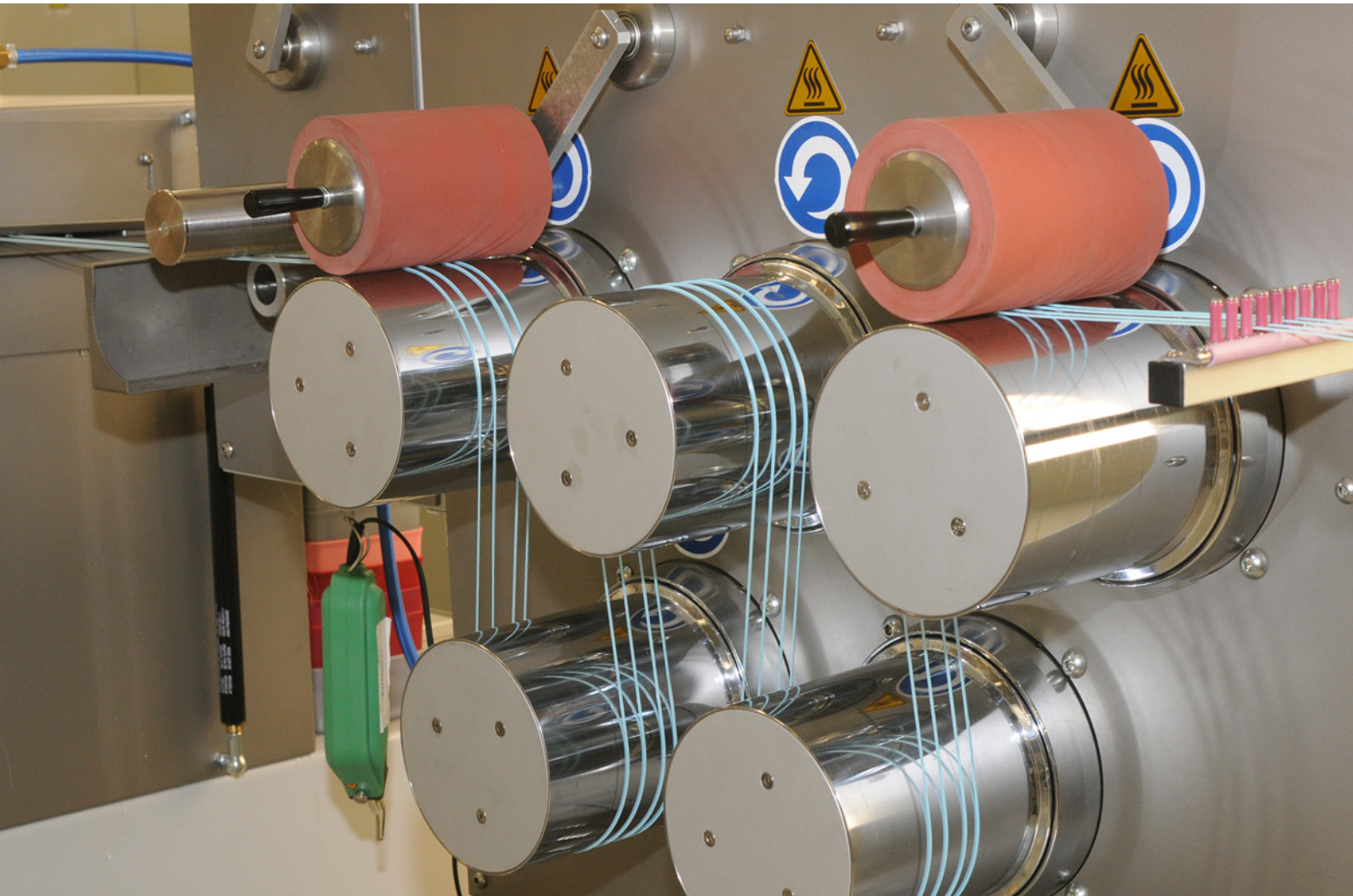


A-B-A

The line is equiped with spinnerets to co-extrude films with an A, A-B and A-B-A-structure upto 50 mm.




3/8 O.D. X .062 WALL



A cost and time effective platform for the industry

The extrusion platform is ideal to optimise extrusion processes, to produce prototype yarns and filaments and to evaluate the spinnability of new polymer grades and recyclates as well as the processability and properties of new masterbatches.

Rapid and flexible production of samples for prototyping and testing purposes, requiring but low material quantities !

material characterisation	extrusion	protoyping/sample testing
THERMAL ANALYSIS	MONOFILAMENTS	YARN TESTING twist, denisity, strenght, elongation, evenness, (SEM) microscopic assessment
RHEOLOGY	MULTIFIAMENTS BCF, CF & POY YARNS	PROCESSABILITY knitting and weaving nonwoven web formation composite formation 3D printing
ADDITIVES	(BICOMPONENT) YARNS & TAPES	ADDED FUNCTIONALITIES anitmicrobial properties, burning behaviour, thermal insulation, wicking properties and conductivity

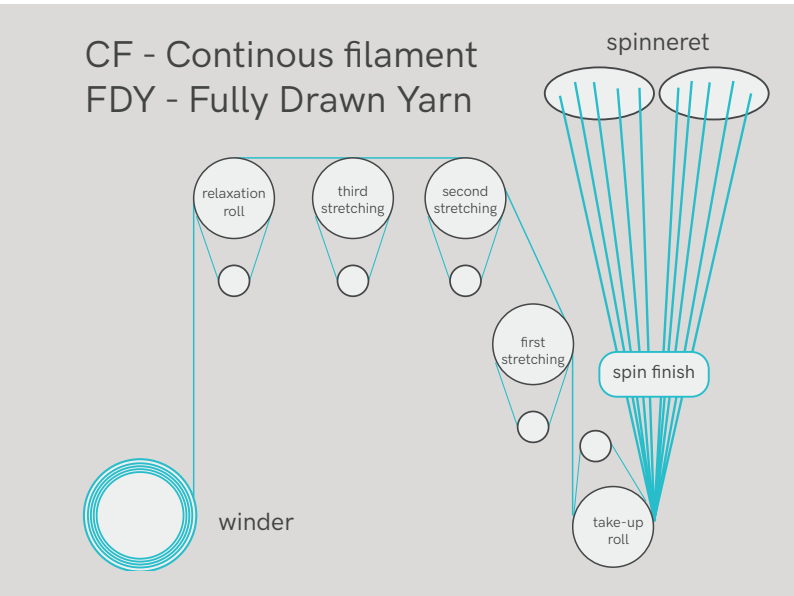
Because the extrusion platform is fully integrated in the entire Centexbel-VKC's organisation, all material samples and prototypes can be submitted to relevant testing during each processing step. The results are then discussed with our researchers and technological experts for subsequent improvement, valorisation and industrial upgrading.

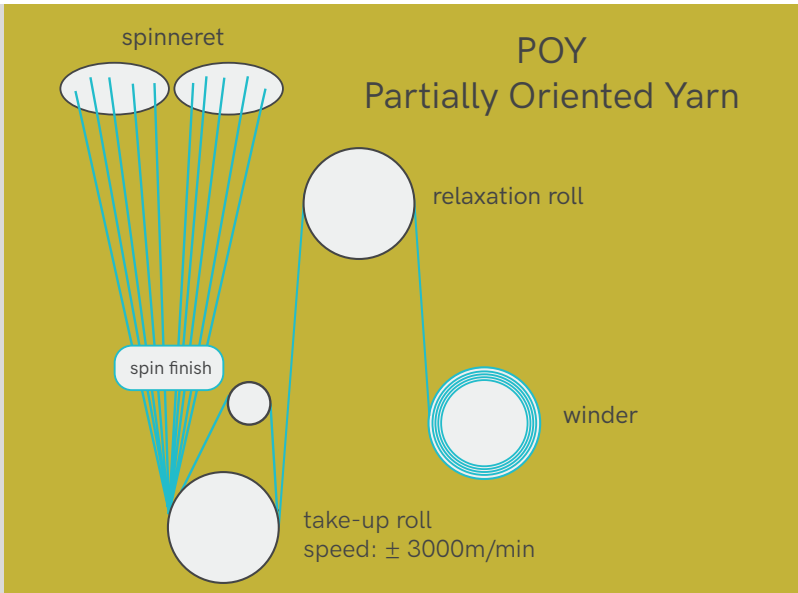
Spinmaster

Unically configurated multifilament pilot line designed to extrude BCF carpet yarns as well as flat CF and POY yarns

Technical specifications:

- High temperature processing: up to 400 °C
- Speed: up to 3500 m/min
- 3-step yarn drawing
- Production output: 1 – 20 kg/h



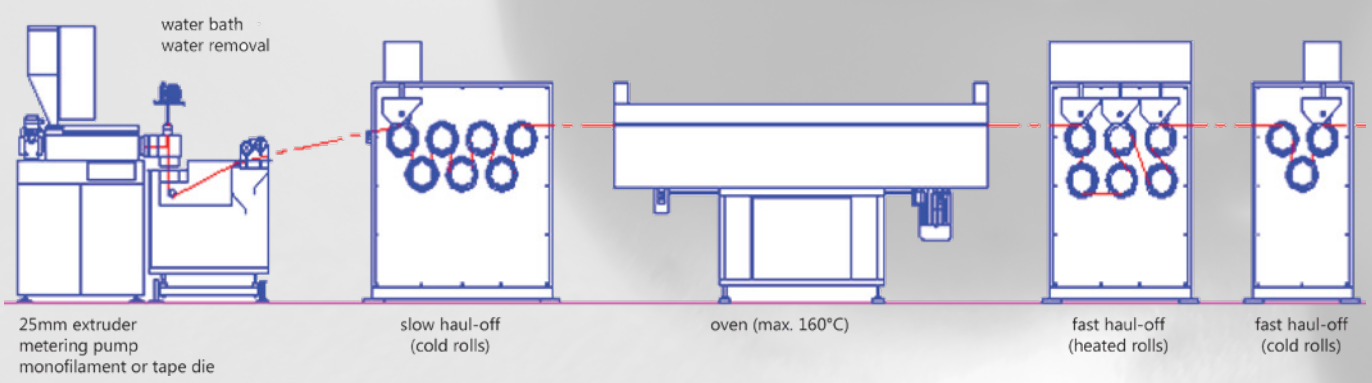


Tape and monofilament line

The semi-indutrial tape and monofilament line is used for prototypes with low amounts of material (0.6 to 5 kg/h) and can be equiped with different types of spinheads (from 1 (round/tape) to 300 spinholes. The height of the water bath can be adjusted).

Extrusion and drawing conditions

- slow haul-off (1 to 75m/min); 7 cold rolls
- heated oven (max. 200°C)
- flexible fast haul-off (10 to 200m/min) - nip roll per pair of rolls;
- individually heated rolls (allows annealing)
- speed setting per roll pair (allows stretching/relaxation)
- extra fast haul-off (3 cold rolls): stabilisation/relaxation before winding



LPU™ Underwater Pelletizing System

Pellet Rates up to 100 kg/h

EFFICIENT - FLEXIBLE - WEAR RESISTANT - ECOLOGIC

DUST FREE - CLOSED LOOP SYSTEM

Small lab pelletizing system for lab-scale developments and small-scale pellet production, including an underwater pelletizer, a tempered water system, and pellet dryer.

The pelletizer is connected to the twin-screw coumpounder and operates in a closed loop. The perfectly round pellets are transported by the process water of the cutting chambre to the centrifugal dryer. Because the entire process is taking place without any contact with the ambient air, there is no gas and dust emissions and no risk of contaminating the product.

The process water remains within the closed loop of tempered water system where it is reused for subsequent production runs.

CIRCULARITY
IN & WITH NEW MATERIALS

Deze infrastructuur werd gefinancïeerd binnen het project Circularity in & with New Materials. Door het gebruik van recyclaten te optimaliseren wil het project de waardeketen van materialen transformeren en komen tot een gesloten kringloop.

Met de steun van:

Europese Unie
AGENTSCHAP INNOVEREN & ONDERNEMEN
EFRO EUROPEES FONDS VOOR REGIONALE ONTWIKKELING
west-vlaanderen de gedreven provincie
KU LEUVEN
TUAwest
UNIVERSITEIT GENT
howest
CATALISTI
CENTEXBEL
vives
FABRIEK VOOR DE TOEKOMST NIEUWE MATERIALEN
POM

Composite LabPress

The Centexbel-VKC composite press is perfectly suited to treat both woven and non-woven fabrics as well as unidirectional textiles. Furthermore, the polymer plates can be pressed in view of rotational rheology.

Unidirectional composites are generally best suited for research. The mechanical properties of these composites can be readily interpreted and it is also possible to work directly on yarn level, without having to produce a fabric first. Centexbel-VKC is able to process the polymer in both fibre as film form.

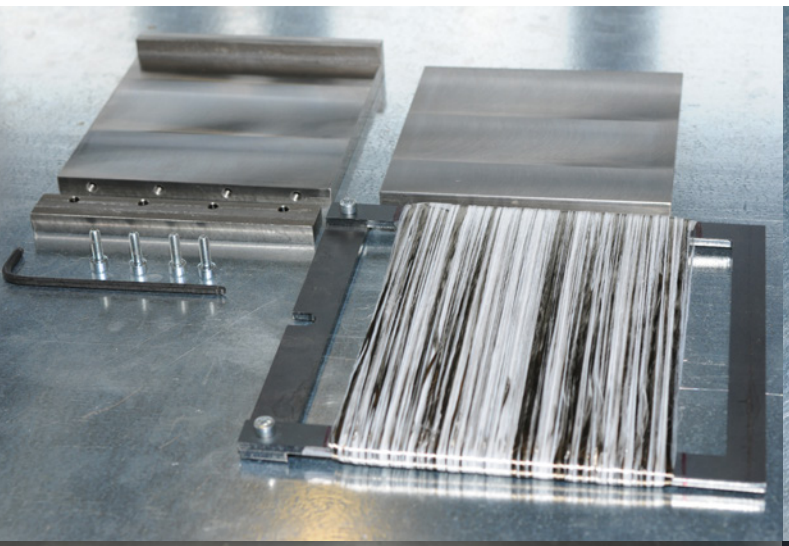
Unidirectional composites

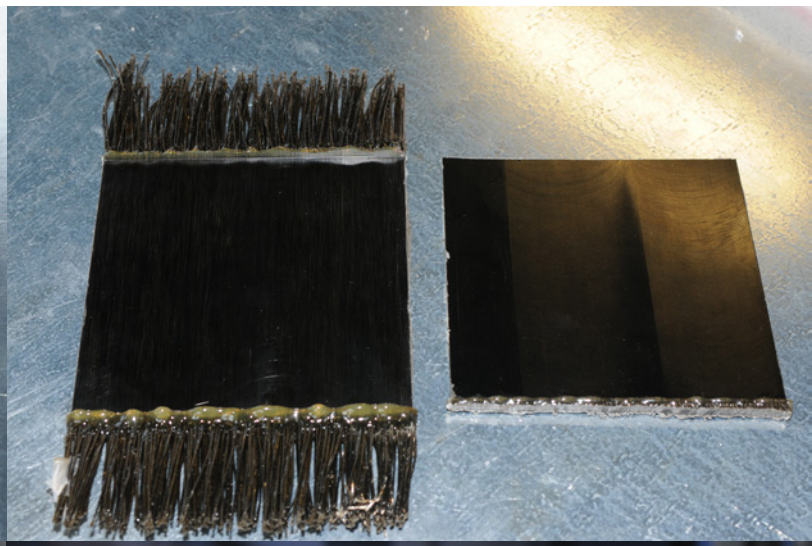
The operation procedure to produce a UD-plate (or unidirectional composite plate) includes the following steps:

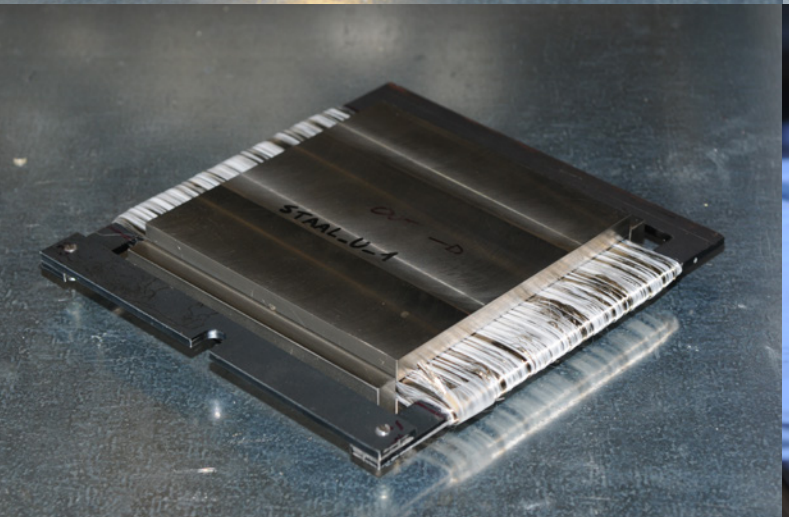
- A number of layers consisting of reinforcing and matrix yarns are winded around a frame. The number of layers needed to obtain a certain thickness can be easily computed.
- The pre-form is then placed in a specially developed mould that can be opened for easy demoulding
- The fibres are cut loose from the frame. This needs to be executed very carefully to prevent fibre disorientation
- The mould is placed into the press where it is submitted to a preset press cycle. The press cycle is characterised by a set pressing pressure, temperature and duration.

Characteristics of the Centexbel-VKC LabPress:

- Max temperature: 300°C
- $\Delta T/\Delta t$ = max 10°C/min
- Pressure: 30-600 kN (2 – 300 bar)





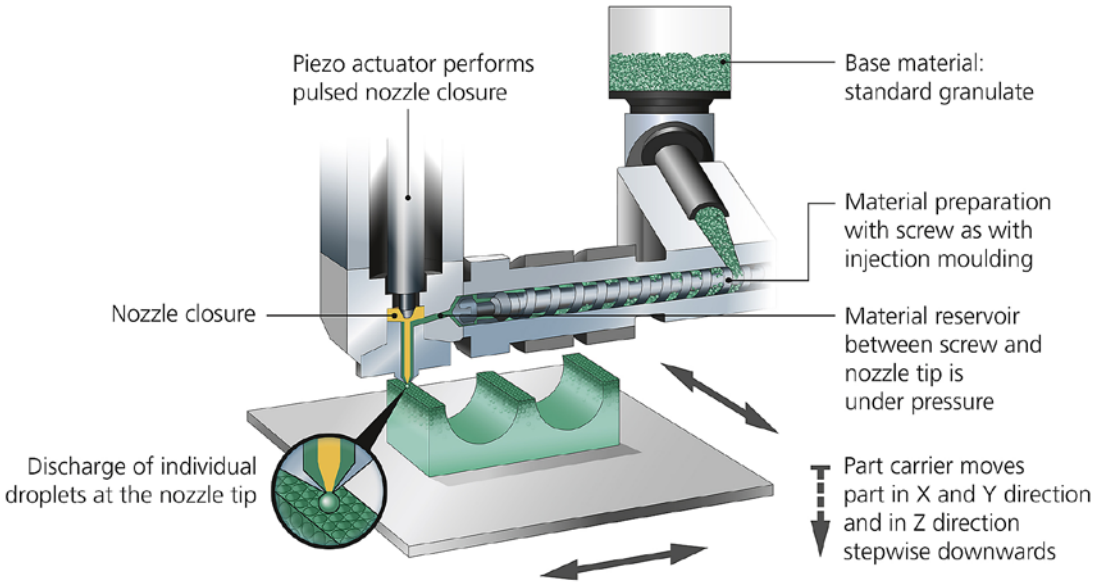


Additive manufacturing

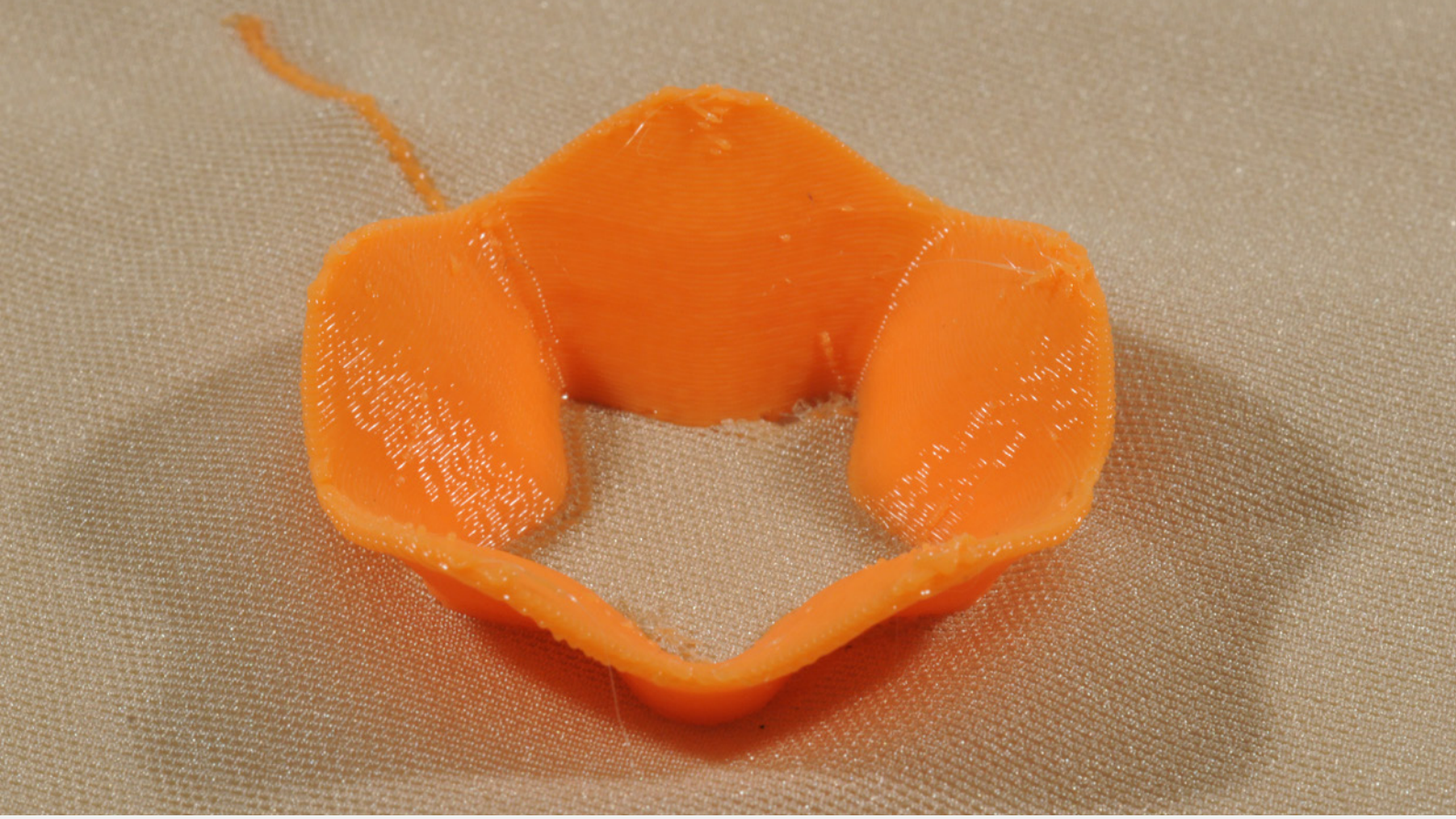
3D-printing with polymers offers several benefits: free design, weight reduction, improved performances, corrosion resistance. Thermoplastic polymers can be molten again and formed into new products and are therefore easier to be recycled than thermoset polymers.

The Centexbel platform is equiped with a **fused deposition modelling (FDM)** printer (Ultimaker) and the **Arburg Plastic Freeformer.**

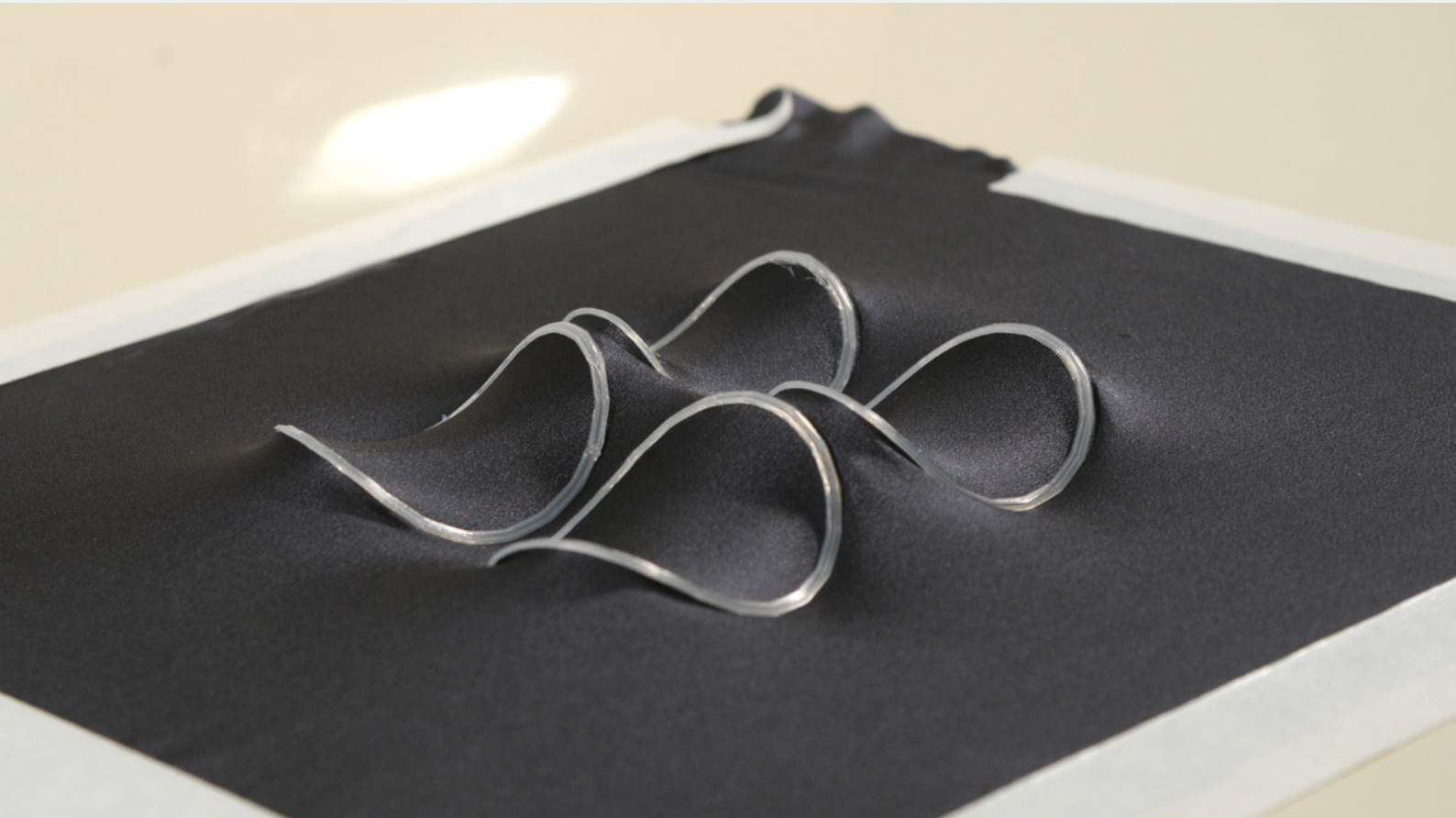
- The FDM technique inolves the use of a **polymer filament**, which is fed through a heated nozzle and extruded layer by layer onto a build platform.
- The Arburg Plastic Freeformer starts from **polymer pellets**, allowing for a far larger variety of polymer grades to be processed, including soft and flexible materials.



Fused Deposition Modelling (FDM) - ULTIMAKER S5



Centexbel develops biobased polymers and polymers from recycled materials for direct 3D (top) and 4D (bottom) printing on textile and plastic substrates



Acknowledgements

We would like to thank the following instances for enabling us to set up this unique platform for product and process development:

EFRO
EUROPEES FONDS
VOOR REGIONALE
ONTWIKKELING

AGENTSCHAP
INNOVEREN &
ONDERNEMEN

Vlaanderen
is ondernemen

FABRIEK VOOR
DE TOEKOMST
NIEUWE MATERIALEN

POWERED BY
POM
maakt werk van West-Vlaanderen

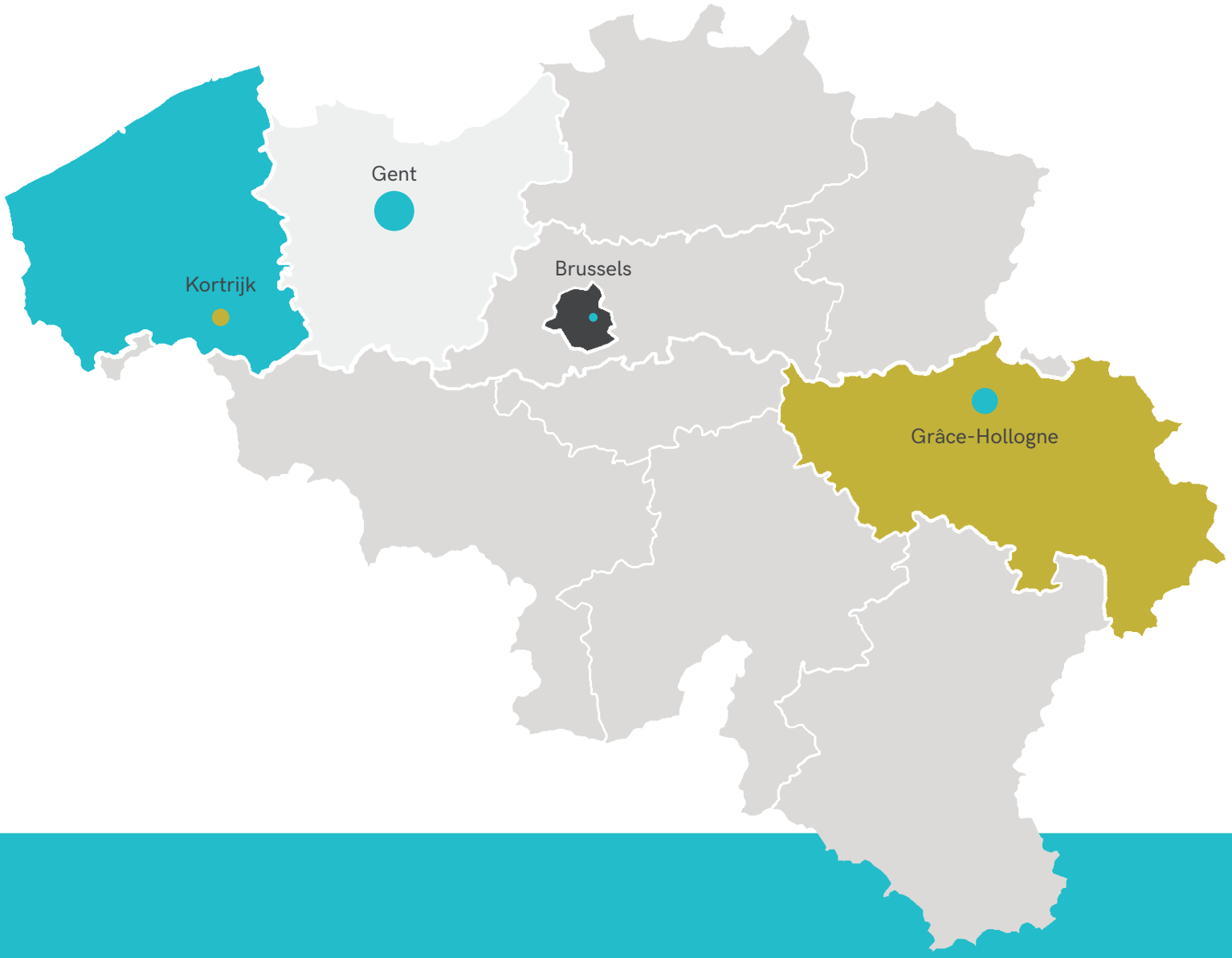
met de steun van
west-vlaanderen
de gedreven provincie

CREATE

CONNECT

INSPIRE

SOLVE



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