

BREPLA project

Biobased fibre Reinforced PLAstics

Biogebaseerde vezelversterkte kunststoffen

Outline

COOCK project HBC.2020.2567

AGENTSCHAP
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- COOCK projects
- BREPLA project:
 - Aim
 - Why
 - Methodology
 - Company specific projects
 - How to subscribe?
- Upcoming events
- Questions from public

BREPLA

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- BREPLA: Biobased fiber REinforced PLAstics
- Duration: 01/01/2021 - 31/12/2023 (3 years)
- Funding on national level: Vlaio
- COOCK-type project

- Collective Research & Development and Collective knowledge dissemination/-transfer
Collectief Onderzoek & Ontwikkeling en Collectieve Kennisverspreiding/-transfer
- Valorise results from research projects
- Accelerate introduction of technologies and knowledge
- Research performed by research centres

Part A – Research

Research for group of companies

50% subsidized, can increase to 100%
when meeting requirements for cases

Results are property of research
centre

Dissemination and valorisation are
obligatory

Part B – Company cases

Company specific cases: feasibility
study of results from part A

- Internal trials at the company
- Separate private project

Funding depends on project type

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- Cases are valorisation of the results
- Project for a specific company
 - Funded project
 - Internal project
- BREPLA targets
 - KPI 1: ≥ 22 industry cases after 5 years
 - KPI 2: at ≥ 20 different companies after 5 years

BREPLA project

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- Full title: Biobased fibre REinforced PLAstics
- Collective Research & Development and Collective Knowledge Dissemination (COOCK), supported by Vlaio
- 1 January 2021 – 31 December 2023
- +2 year extra for company specific projects
- Target sector:
 - Flemish companies:
 - Composite manufacturers
 - Textile sector
 - Designers & end consumers related to furniture, consumer goods and automotive

BREPLA project/aim

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- Accelerate the transition to the production and application of bio-based composites.
- Expanding our knowledge of biocomposites and by stimulating and activating the industrial implementation. The cooperation with the companies is the key to a successful transition.
- Focus on 3 sectors with the greatest potential: the furniture industry, the transport sector and the consumer goods sector.

BREPLA project/aim

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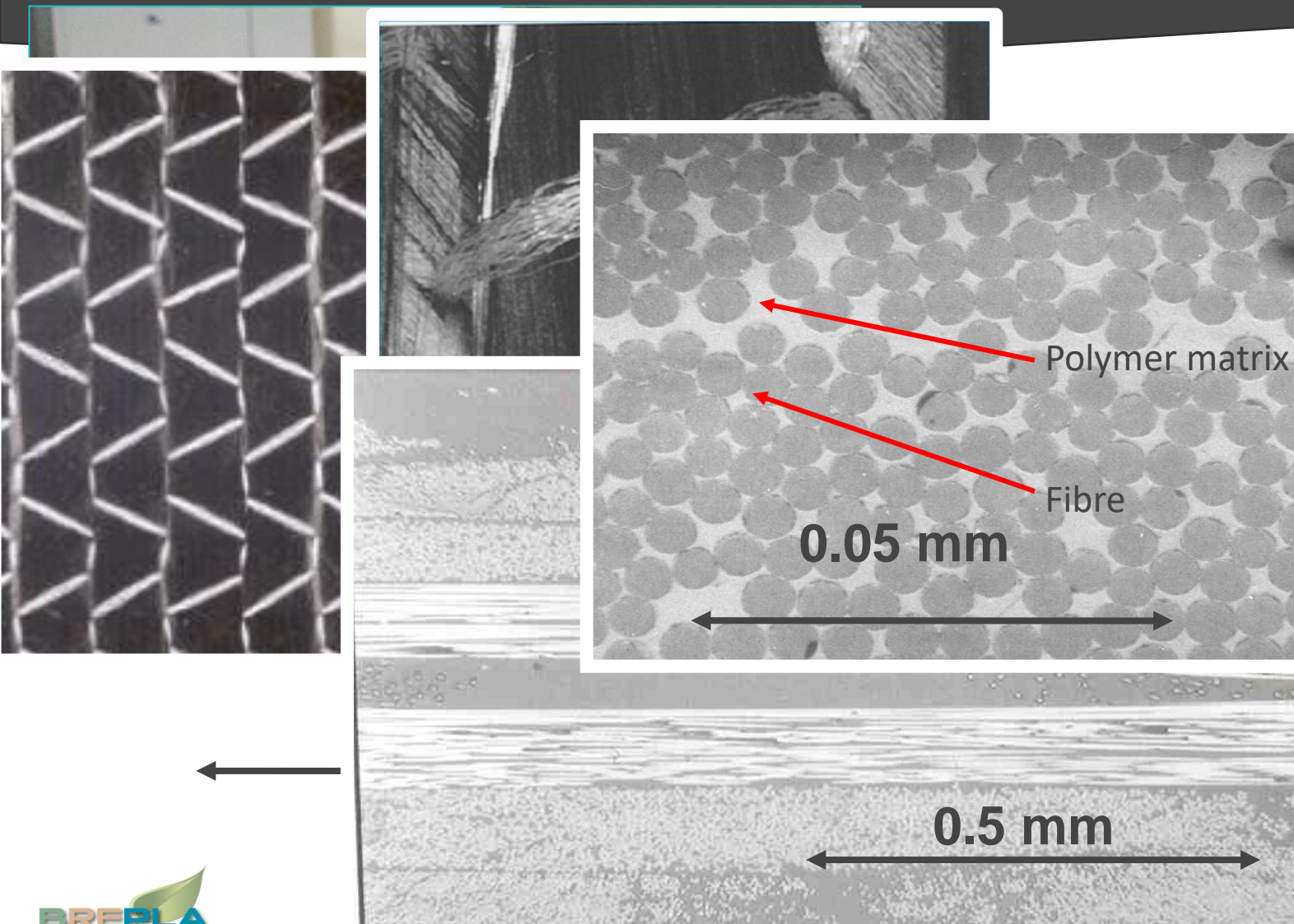
Concrete Goals:

- By means of collective actions and broad, easily accessible awareness raising, we involve the entire value chain in the transition to biocomposites:
- Technological training for frontrunners
- Hands-on workshops for innovation followers
- Composite demonstrators
- A project website, blogs, etc. so that it quickly becomes clear to companies whether and how quickly they can implement the technology.

BREPLA/why?

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Why fibre reinforced plastics (composites)?

- Versatile materials with excellent specific properties
- Lightweight materials reduce fuel consumption
- Complex geometries are possible

BREPLA/why?

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Why Biobased?

- To be less dependent on fossil resources
- To further reduce the carbon footprint
- Strongly encouraged by Europe (Green deal)
- Bio-based composites: composites that are made entirely or largely of biomass



Sustainable flax scooter (Van.Eko)



Structural, flax bridge TU/e



Signpost (NPSP)



Museum bike Flax-carbon

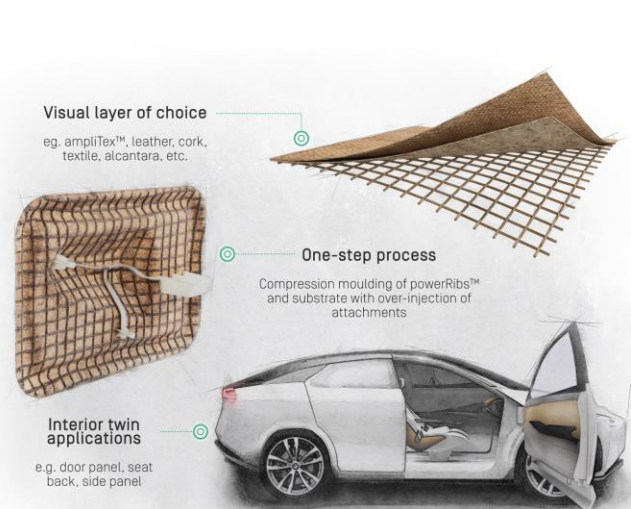
BREPLA/why?

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Why focus on furniture, consumer goods and automotive?

- Mature markets for biobased composites



Bcomp (material supplier)



Flaxco/Sirris



McLAREN IS PIONEERING THE USE OF SUSTAINABLE COMPOSITES IN F1

BREPLA/ how?

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- Focus on three types of biocomposites: thermoset, thermoplastic and self re-inforced and correlate material properties to end applications
- Build up extra knowledge to close the gaps
- Transfer of knowledge:
 - (online) seminars
 - Workshops
 - Website: <https://www.centexbelpresents.be/en/brepla>
 - Newsletters
 - Etc
- Making demonstrators
- Encouraging companies to perform feasibility studies based on the information from the BREPLA project

BREPLA/why?

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Why Centexbel and Sirris

- Centexbel: strong knowledge of biobased fibres and polymers for composite applications
- Sirris: >10 years experience in composite design & manufacturing

Sharing knowledge from joined projects CORNET Bio-srpc (flax/PLA) and CORNET BIO-SRPC (srPLA)

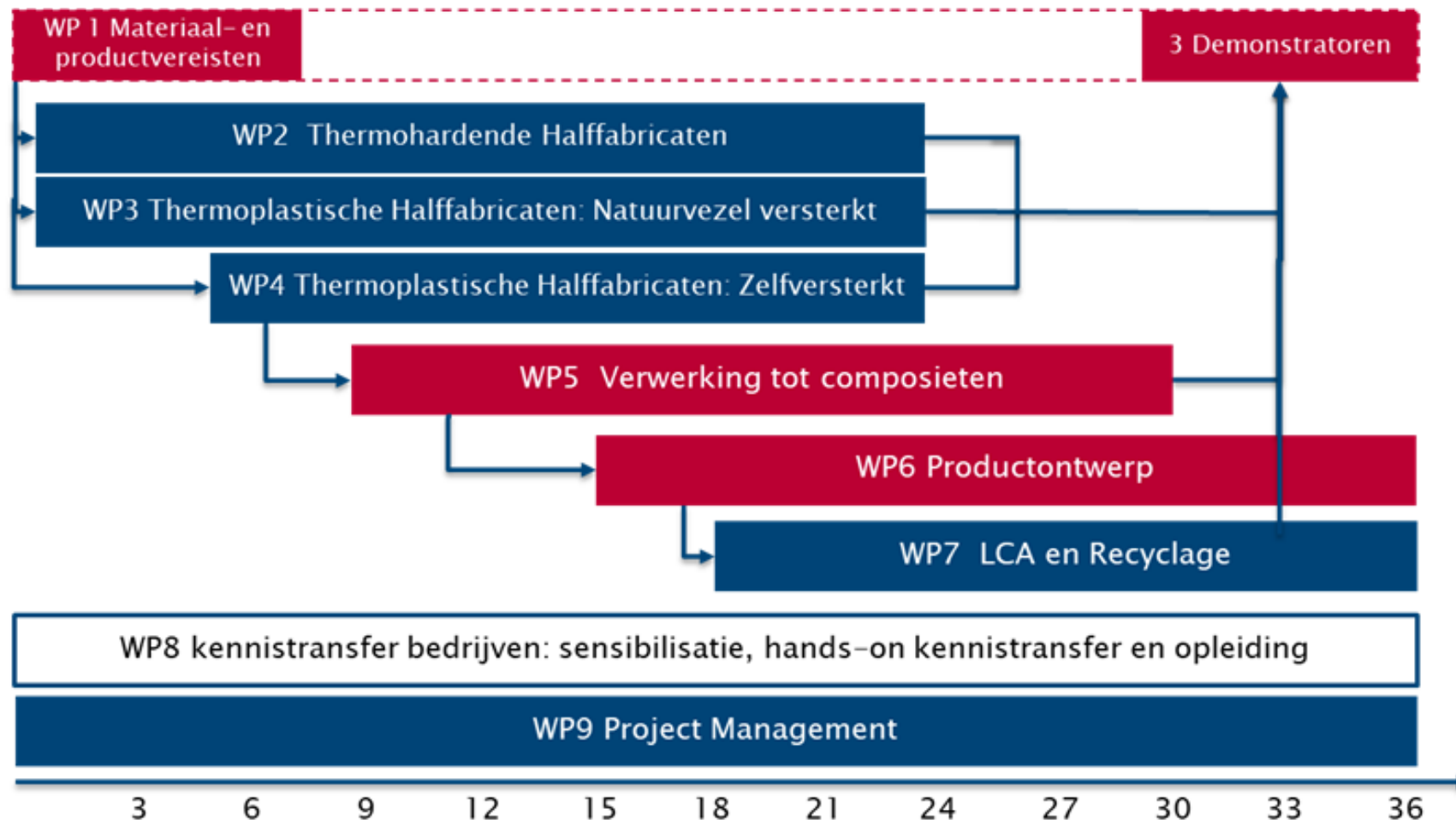
BREPLA/ methodology

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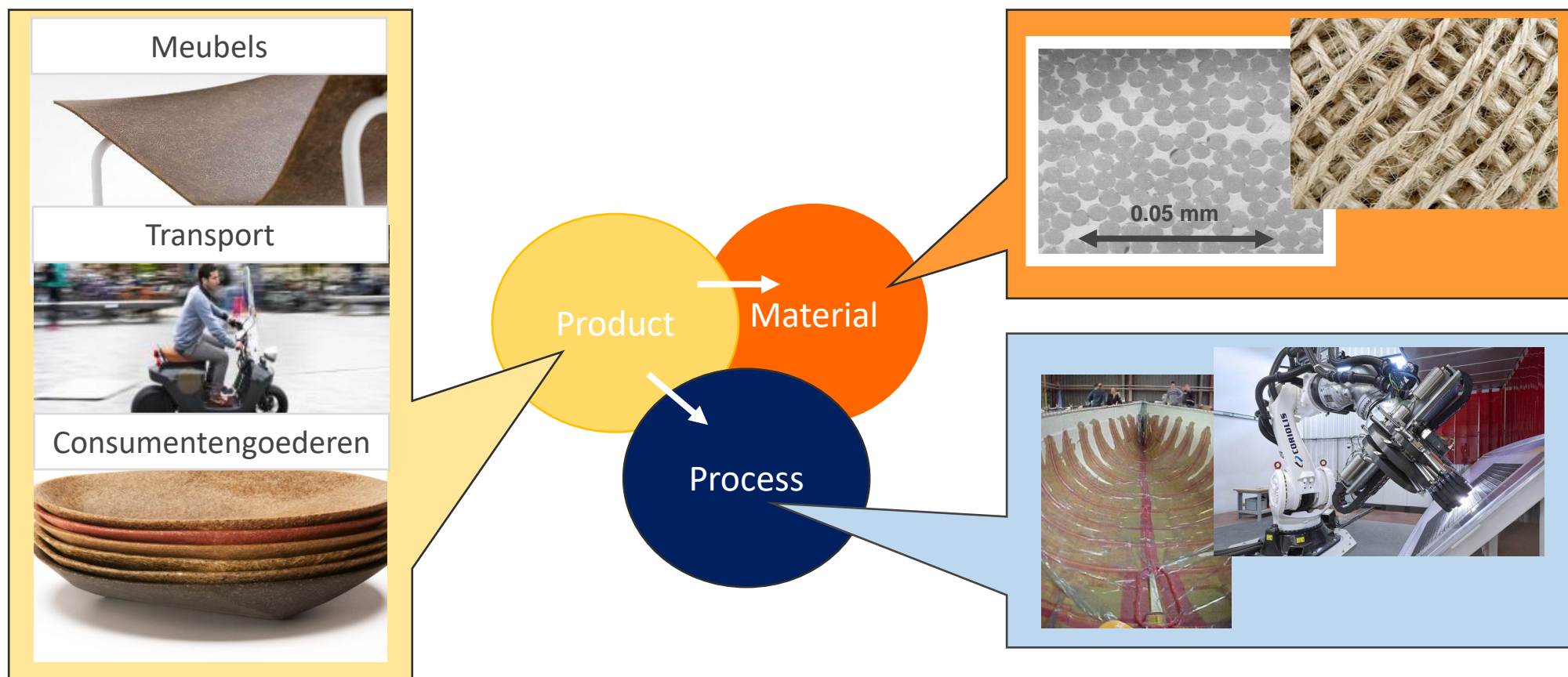


BREPLA/WP1

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- Materiaaleisen bepalen vanuit producteisen:



BREPLA/WP1

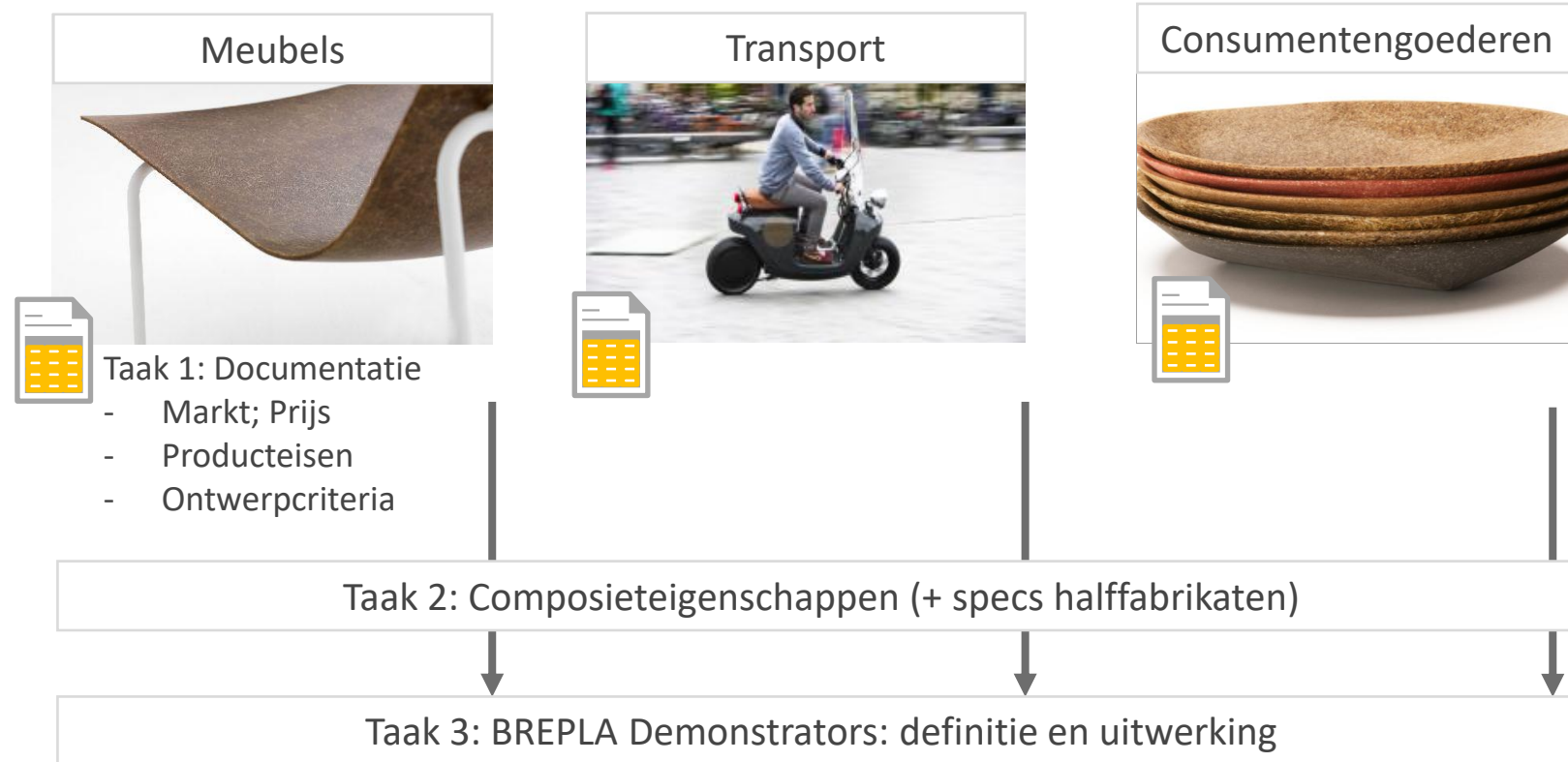
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• Methode:



Brainstorm met gebruikersgroep,
Literatuur



- Knowledge transfer of basic materials for thermoset biocomposites
- Objectives:
 - Collecting info on biomaterials suitable for thermoset composites
 - Optimization viscosity and flame retardant properties of thermoset formulations
 - Collecting info on biobased prepregs and showing some demonstrators

BREPLA/WP2

COOCK project HBC.2020.2567

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- Task 1: fibres and reinforcements
- Suitable fibres for composite applications
- Possible fibre reinforcements: UD, fabrics,...
- Possible fibre treatments to improve FR property, adhesion

BREPLA/WP2

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- Task 2: biobased thermoset matrices
- Biobased alternatives for fossil based thermoset resins
- Determining properties
- Optimizing formulations (viscosity, burning behaviour)

BREPLA/WP2

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- Task 3: biobased prepregs
- Already impregnated fibre reinforcements
- Focus on:
 - Natural fibre + biobased resin
 - Sustainable fibre (e.g. basalt) + biobased resin
 - Making some demo's

- Knowledge transfer of natural fibre reinforced thermoplastic biocomposites
- Objectives:
 - Collecting info on PLA and alternative biobased thermoplastic matrices
 - Optimization of PLA formulations
 - Testing the use of alternative bio-thermoplastics e.g. bioPE, bioPA
 - Describing processes and achievable properties
 - Showing some demonstrators

BREPLA/WP3

COOCK project HBC.2020.2567

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- Task 1: natural fibres as reinforcement
- Suitable fibres for composite applications e.g. flax & hemp
- Possible fibre treatments to improve FR property, adhesion...

- Task 2: thermoplastic biopolymer matrices
- Optimization of PLA formulations to improve impact strength
- Investigation of alternative biopolymers e.g. bioPE, bioPP, bioPA
- Functionalisation of matrix by adding additives e.g. fire retardant, UV-protection

BREPLA/WP3

COOCK project HBC.2020.2567

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- Task 3: processes and intermediate products for fibre reinforced thermoplastic biocomposites
- Extrusion coating
- Impregnation using polymer dispersions
- Fibre intermingling

- Knowledge transfer of self reinforced polymer composites (SRPC)
- Objectives:
 - Making PLA filaments and tapes with high strength and thermal stability
 - Making PLA-matrix formulations with different melt temperatures, impact resistance and functional characteristics
 - Realisation of bicomponent structures e.g. core/shell, tape ABA, islands in the sea
 - Showing some demonstrators

BREPLA/WP4

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- Task 1: fibre reinforcements for bio-based SRPC
- Describing polymer selection and process parameters
- Realization of PLA tapes by optimization of processes

BREPLA/WP4

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- Task 2: matrix formulations for bio-based SRPC
- Using low melting PLA (135-145°C)
- Using PLA grades with higher melting point (150-160°C)
- Functionalization of matrices

BREPLA/WP4

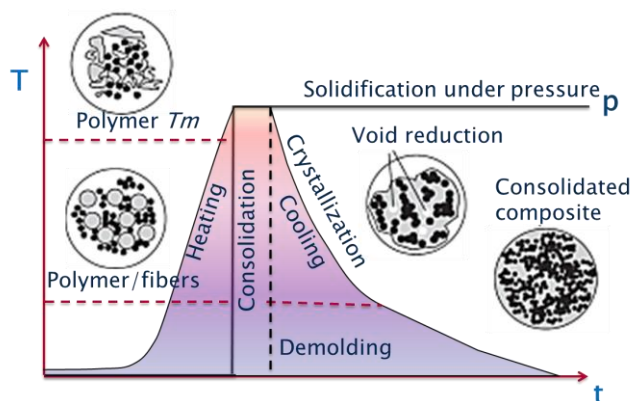
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- Task 3: making of intermediates for bio-SRPC products
- Monocomponent filaments and non-wovens
- Bicomponent filaments, tapes and multifilaments
- Literature review of alternative biopolymers

Verwerking tot composieten:

- Taak 1: 2D structuren voor materiaalkarakterisatie



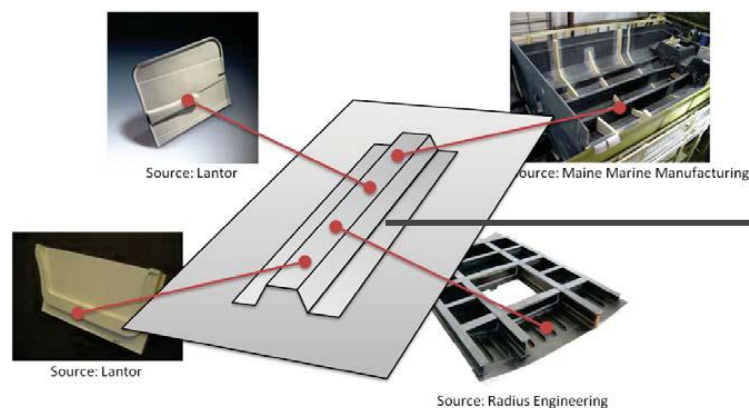
voor



- Taak 2: 3D structuren

Aanbevelingen voor infuseren, persvormen, overmoulden en plooien (incl automatisatiepotentieel)

- Taak 3: proof of concept assemblage: lasprocessen

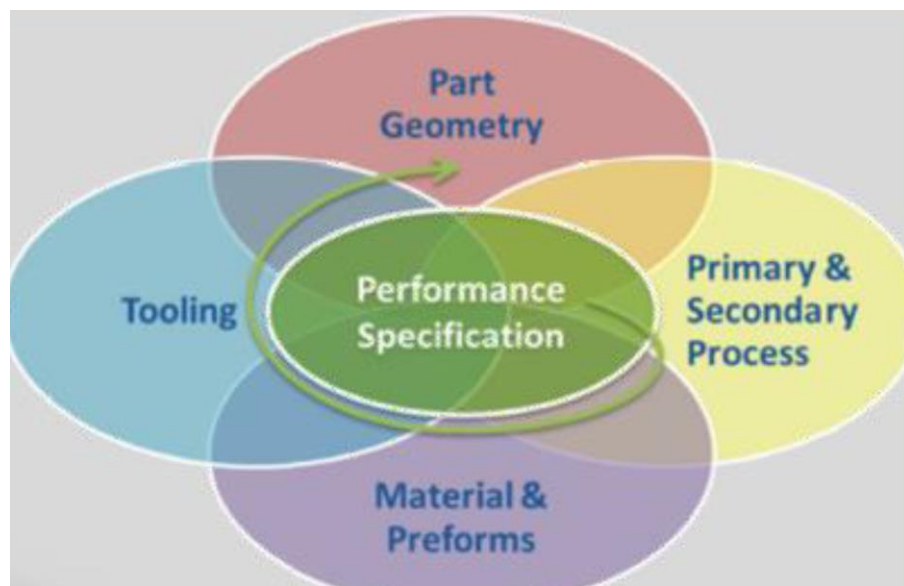


Lassen van 2 composietpanelen: methodiek

- Taak 4: nabewerking, coating en herstelling (in inspiratiesessie)
Uitwerken procesconcepten in brainstormsessies met bedrijven

Productontwerp

Taak 1: Ontwerptools en -methodieken



E.g. ElamX, Ashby

Taak 2: Kostprijsberekeningstools

		VARI	RTM-Light	RTM
Dimensions	A < 2 m ²	12	12	15
	2 m ² < A < 5 m ²	17	13	10
	A > 5 m ²	23	11	6
Performance	high-performance	23	8	39
	structural	23	18	29
	non-structural	23	23	23
Surfaces aesthetics	single	17	17	17
	double	9	18	44
Geometry	shell (evtl. stiffened)	10	10	10
	3D (body)	9	17	34
	undercuts	18	6	6
Thickness tolerances	depth	17	17	17
	medium	13	9	18
Quantity	narrow	25	13	63
	n < 50	33	20	7
	10 < n < 500	27	20	13
	100 < n < 10000	7	27	27
	5000 < n	8	15	38
Total		102	86	102
Percentage		100%	84%	100%

- Environmental impact and possibilities for recycling composites
- Objectives:
 - Demonstrating recycling processes of bio-based thermoset and thermoplastic matrices
 - Investigation of ecological aspects

BREPLA/WP7

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- Task 1: recycling of thermoplastic composites
- Granulation
- Recycling of SRPC
- Recycling of natural fibre reinforced composites

BREPLA/WP7

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- Task 2: recycling of thermoset composites
 - Thermal recycling
 - Grinding
 - Solvolysis/hydrolysis

BREPLA/WP7

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- Task 3: ecological aspects
- Benchmarking for different sectors
- Comparing bio-based materials with selected benchmarks
- LCA: environmental impact caused by use of energy, use of materials and production of waste

BREPLA/WP8

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- Dissemination/knowledge transfer
- Objectives:
 - Dissemination of project results
 - Networking
 - Focussing on company specific projects

BREPLA/WP8

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- Task 1: project website
- <https://www.centexbelpresents.be/en>
- Overview of all Coock projects of Centexbel
- <https://www.centexbelpresents.be/en/brepla>
- Dedicated to BREPLA
- News, events, results,...

BREPLA/WP8

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- Task 2: seminars
- Task 3: conferences and fairs
- Task 4: newsletters
- Task 5: technical trainings
- Task 6: publications in popular scientific journals
- Task 7: interacting with companies

BREPLA/WP9

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- Project management
- Objective:
 - Interaction with UC
 - Follow-up
 - Reporting to VLAIO
 - Follow-up status company specific projects

BREPLA/WP9

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- Task 1: project management
- Task 2: setting up a user committee (2 meetings/year)
- Task3: reporting
- Task4: follow-up company specific projects

Company specific projects

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- Ultimate goal is that companies use the project results and proceed to industrial implementation
- Examples of Company specific projects :
 - Feasibility studies
 - R&D projects (even funded ones e.g. Vlaio projects, H2020 projects)
 - Pilot scale testing
 - ...
- It is important that we are informed (efforts/budget spend) to show VLAIO that the BREPLA projects is succesful and this also helps us to get more funding for the project
- Results of Company specific projects are owned by the company and can be kept confidential.

How to subscribe?

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- To follow up, the registration is free, but mandatory
- Registered companies:
 - Have access to the project results
 - Can give advice
 - Will be invited for the UC meetings (2 per year)
- How: contact Frederik Goethals (frg@centexbel.be) or Linde De Vriese (Linde.Devriese@sirris.be) for the registration form.
- Fill it in and send back. Registration will then be confirmed

Upcoming BREPLA events

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- Save the date:
 - 2 end user brainstorm session 25/02/2021 and 18/03/2021
 - UC 06/2021 (final date to be decided)

Contacts

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- Frederik Goethals: frg@centexbel.be
- Elke Demeyer: edm@VKC.be
- Linde De Vriese: Linde.Devriese@sirris.be

Questions from the audience

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- Questions?
- Acknowledgements:
Project financing



Collective Research & Development and Collective Knowledge Dissemination (COOCK), supported by Vlaio

Project HBC.2020.2567





“Together, we innovate”

Sirris | The collective centre of the Belgian technology industry

The collective centre of the Belgian technology industry

NON-PROFIT ORGANISATION

IP STAYS IN COMPANY

CERTIFICATION
ISO 9001
BQA
BQA_QMS019_C_2017325

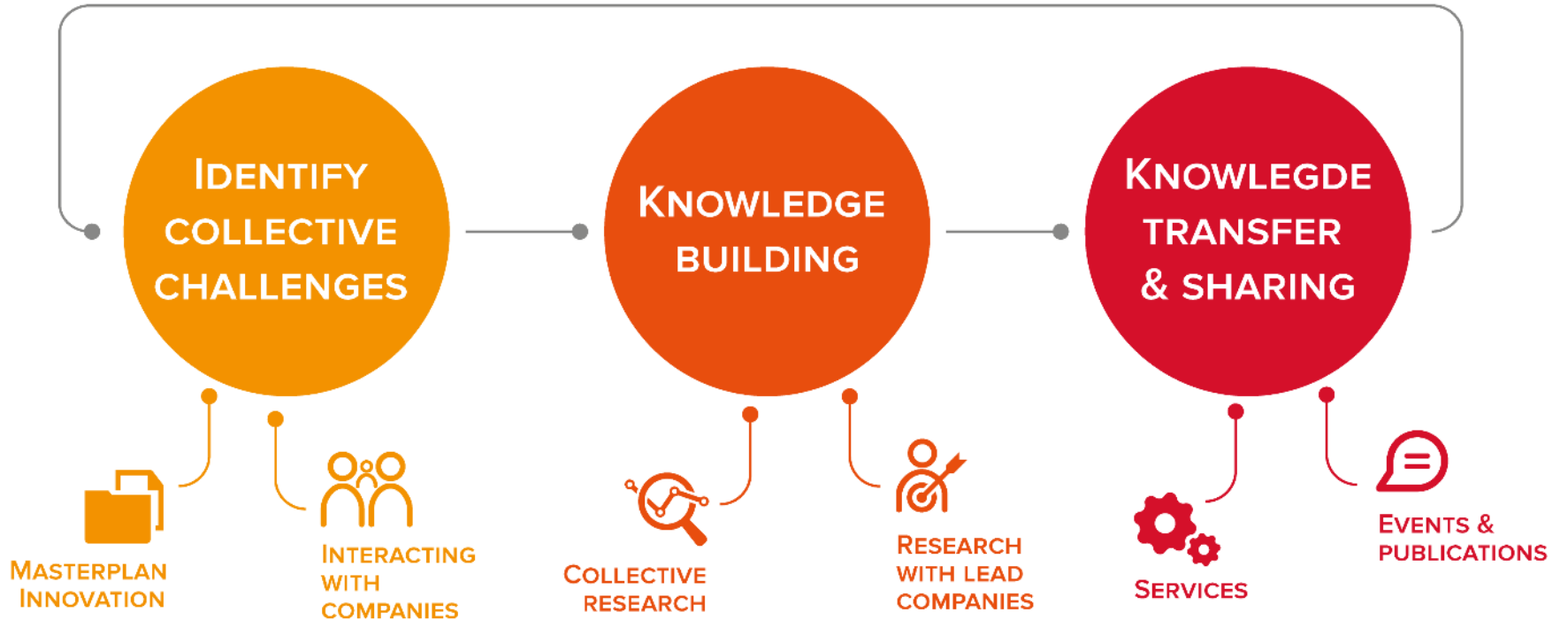
ISO CERTIFIED

70 YEARS OF HANDS-ON EXPERIENCE

1500 SATISFIED CUSTOMERS EACH YEAR

©sirris

The Sirris value chain





COMBINING THE POTENTIAL OF TECHNOLOGY WITH BUSINESS MODEL INNOVATION TO MAKE YOUR BUSINESS FUTUREPROOF



HOW TO MAKE YOUR PRODUCT FUTUREPROOF? MAKE IT MICRO, LIGHT, SMART & CONNECTED!



HOW WILL DIGITAL MANUFACTURING AND INDUSTRY 4.0 IMPACT YOUR FACTORY IN THE FUTURE?



So together, we turn innovation into success



driving industry by technology

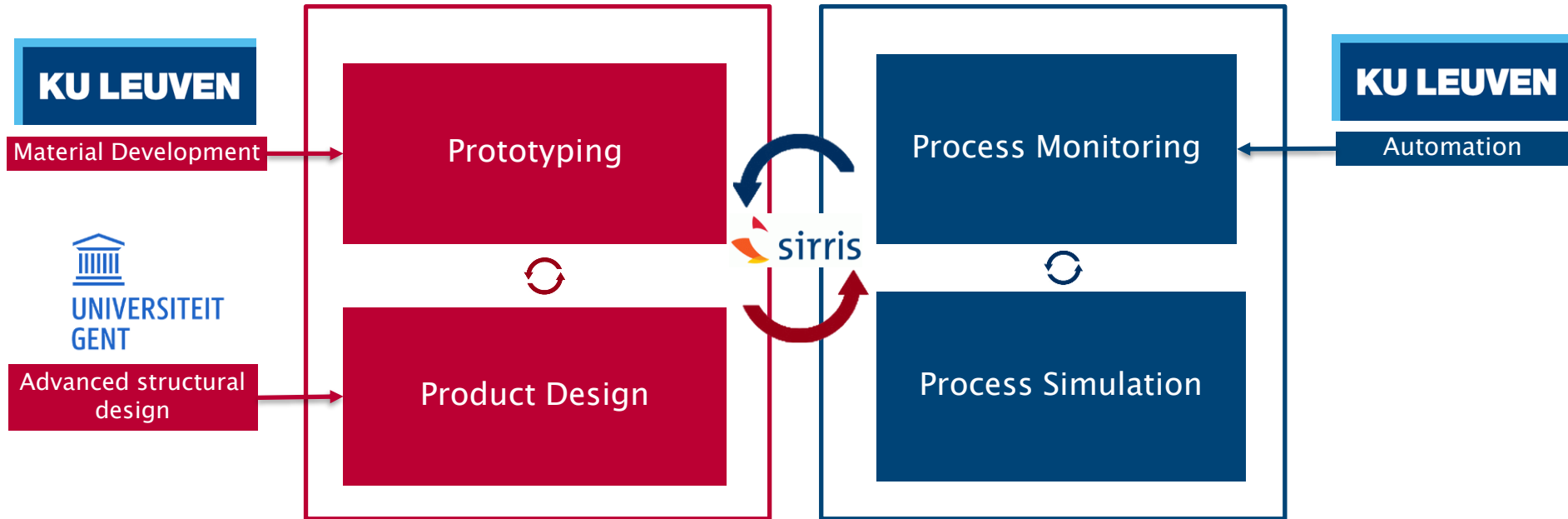
SLC-Lab: a hub for composite innovations

- Engineering, prototyping and testing lab
 - Open initiative by KU Leuven, UGent and Sirris

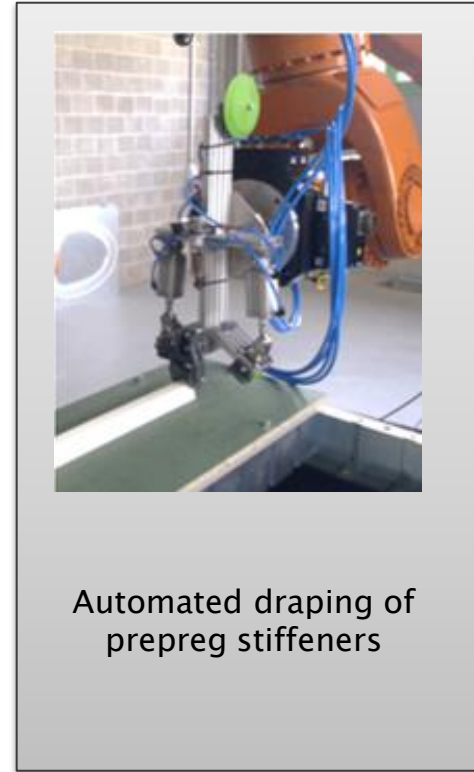


SLC-Lab: focus

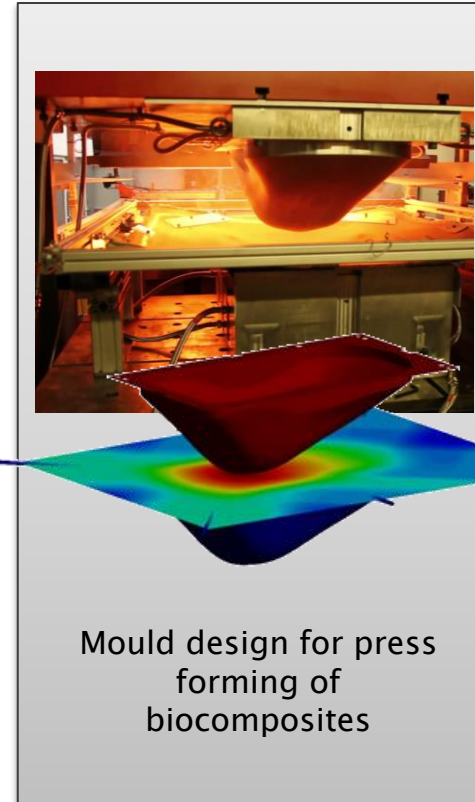
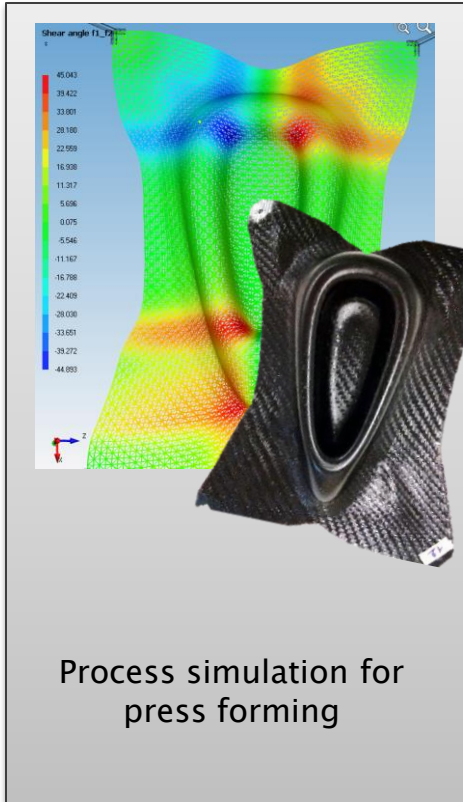
Simultaneous **Product** & **Process** Development



Closed mould thermoset composites – cases

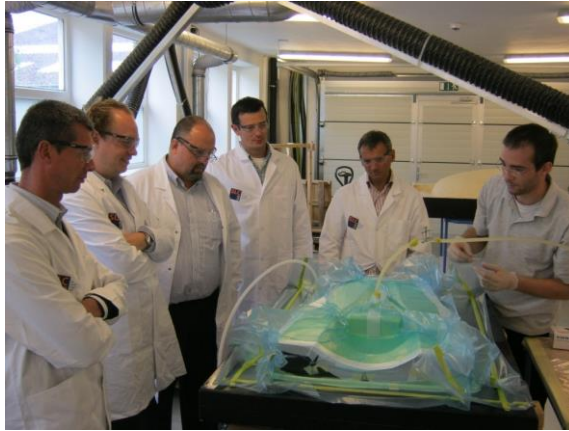


Thermoplastic composites – cases



Trainings and seminars

- Hands-on training
- Theory and practice



Example for hands-on workshop “Crash course in composite materials”

Some references for individual trainings: Allnex, Altreonic, Basaltex, Bekaert, Lastek, Lootens Line, Sapim, Snauwaert, Zweko Optics



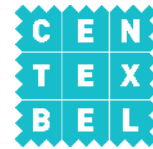
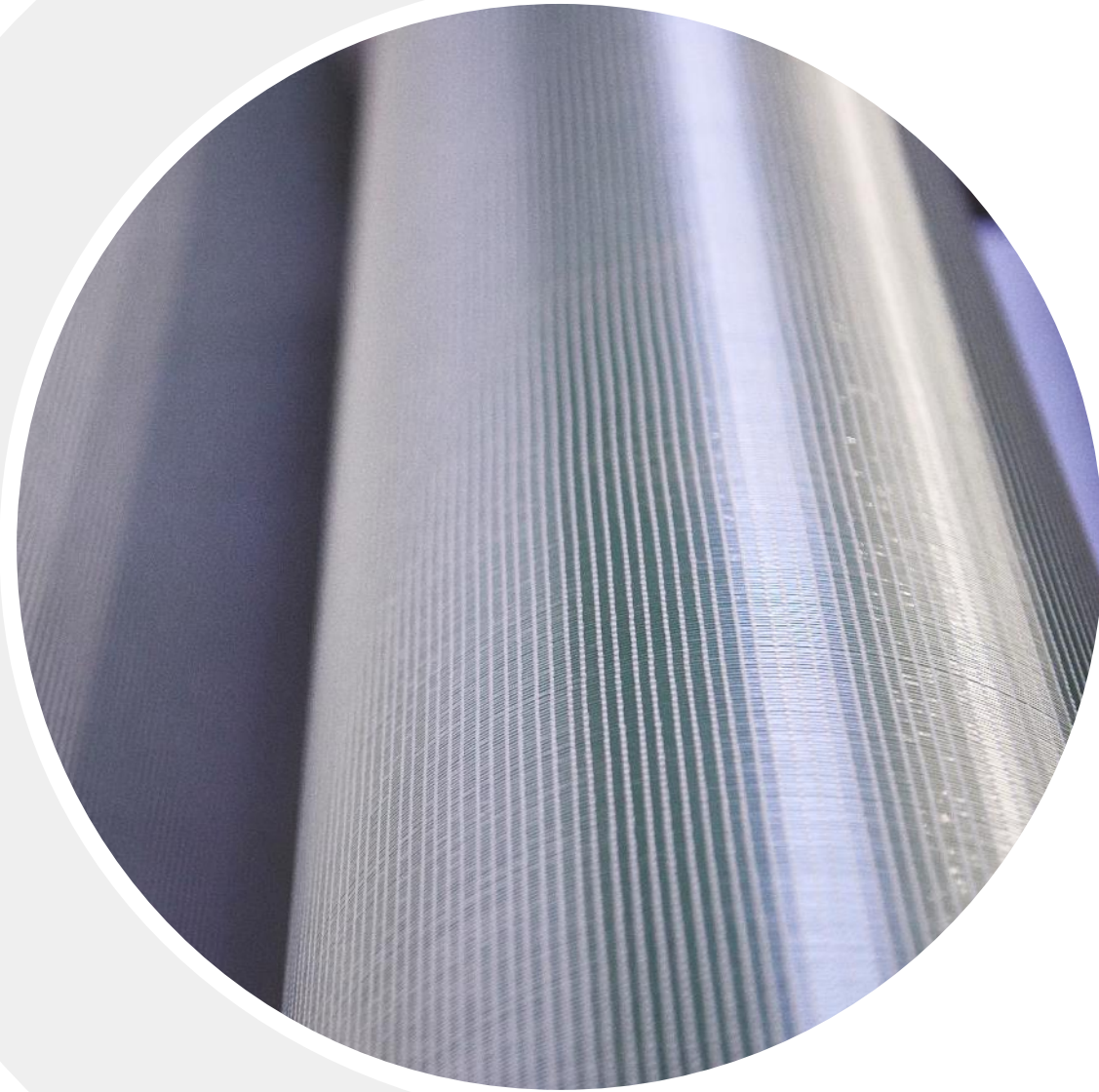
Linde De Vriese, Team Lead SLC-Lab



Linde.devriese@sirris.be



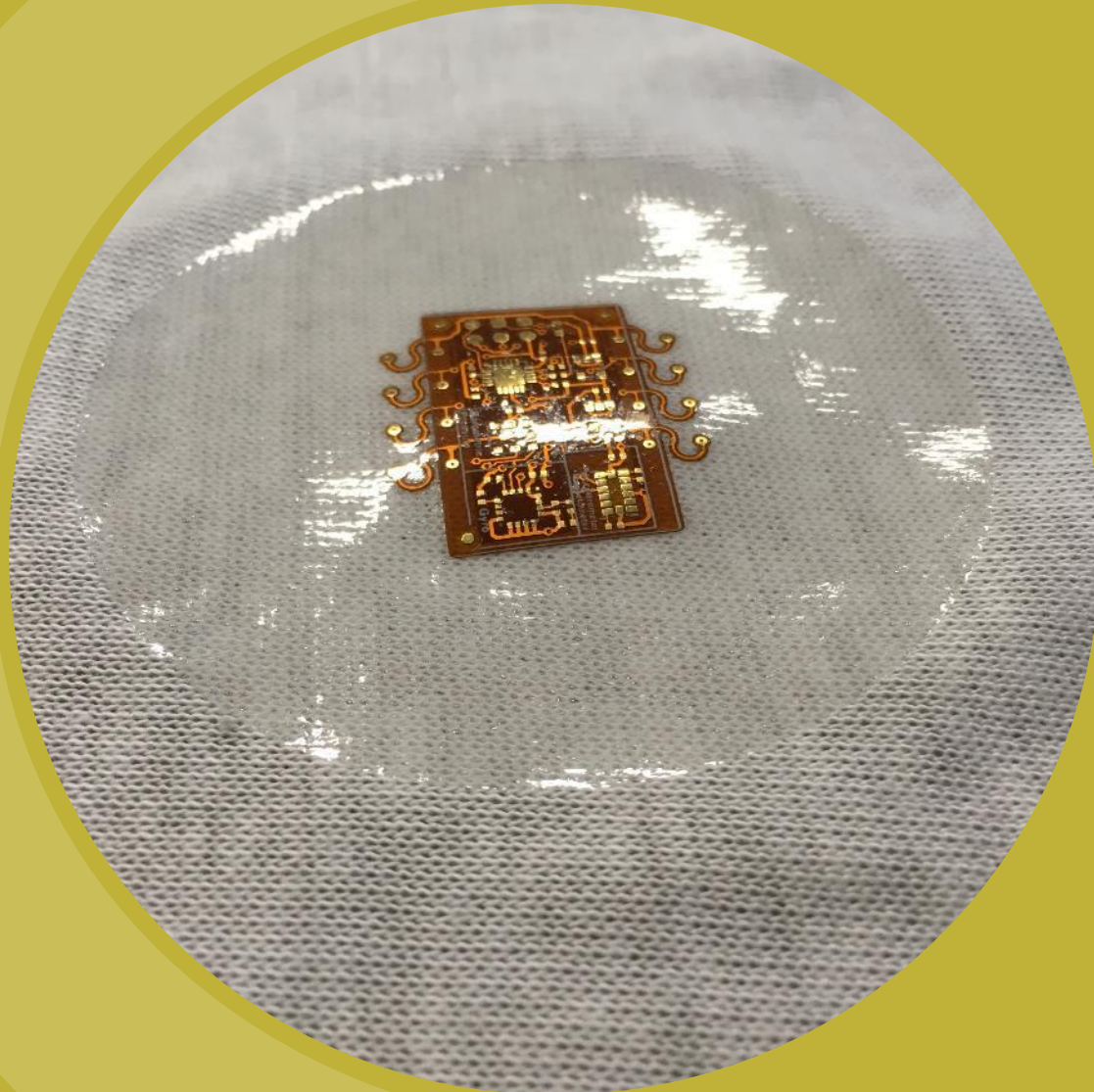
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CENTEXBEL VKC

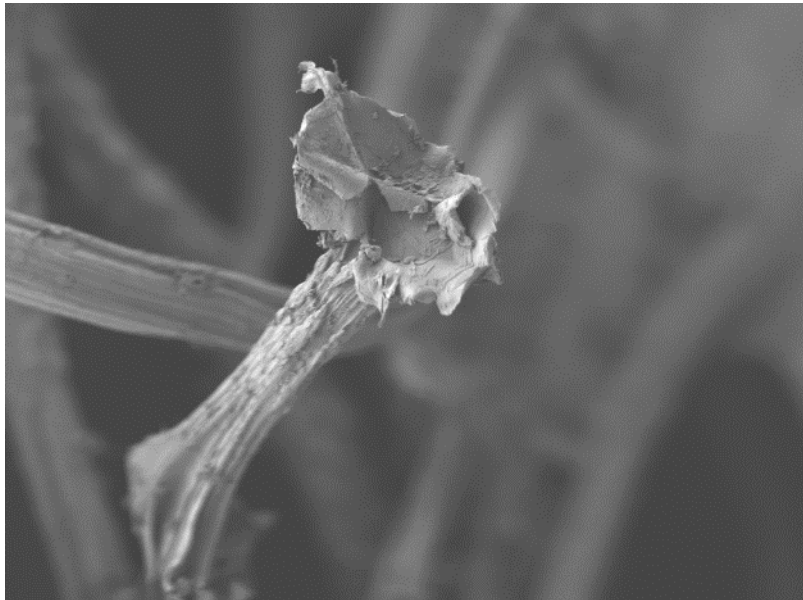
AT THE SERVICE OF
THE TEXTILE & PLASTIC CONVERTING INDUSTRY

COLLECTIVE RESEARCH CENTRE



CENTEXBEL

MEMBERSHIP ORGANISATION



UNITING

Belgian textile companies
Associated (international) member
companies and organisations



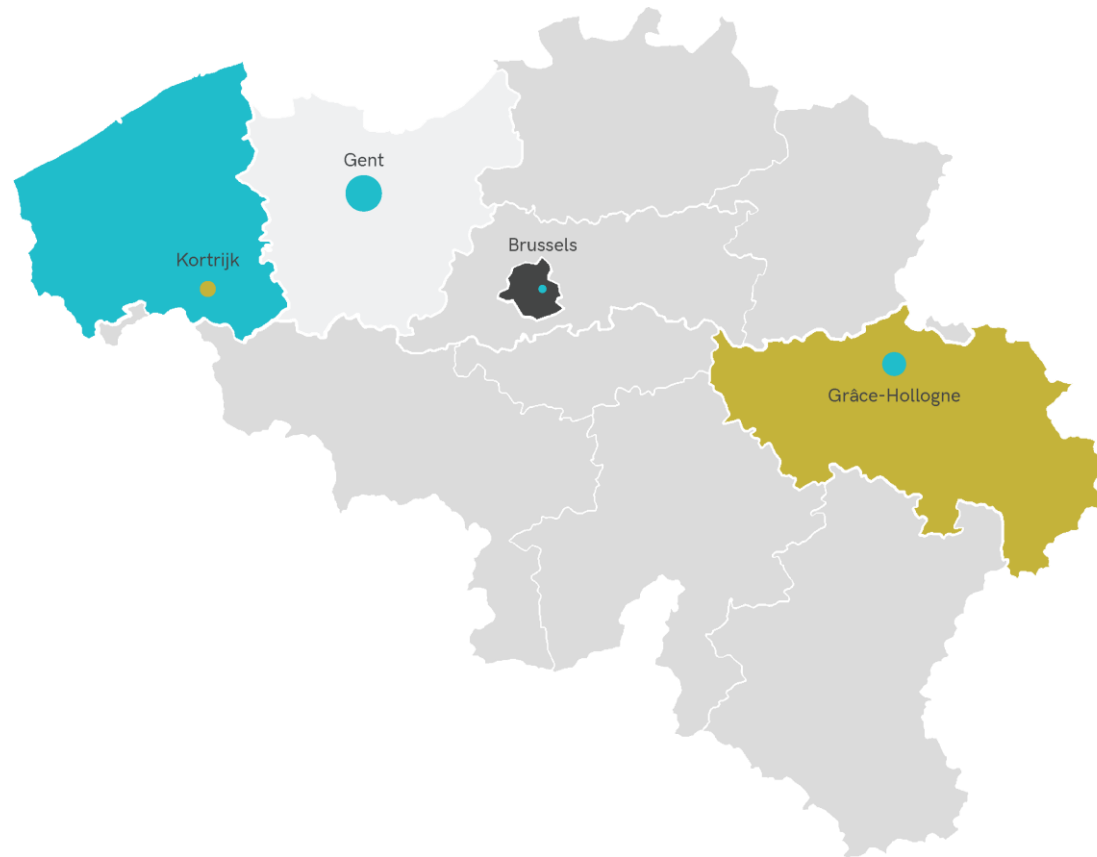
GOVERNED BY THE INDUSTRY

CENTEXBEL - VKC

- 180 enthusiastic and highly educated men and women
- committed to an innovating and sustainable industry



LABS & OFFICES



TURKEY: Istanbul / Bursa

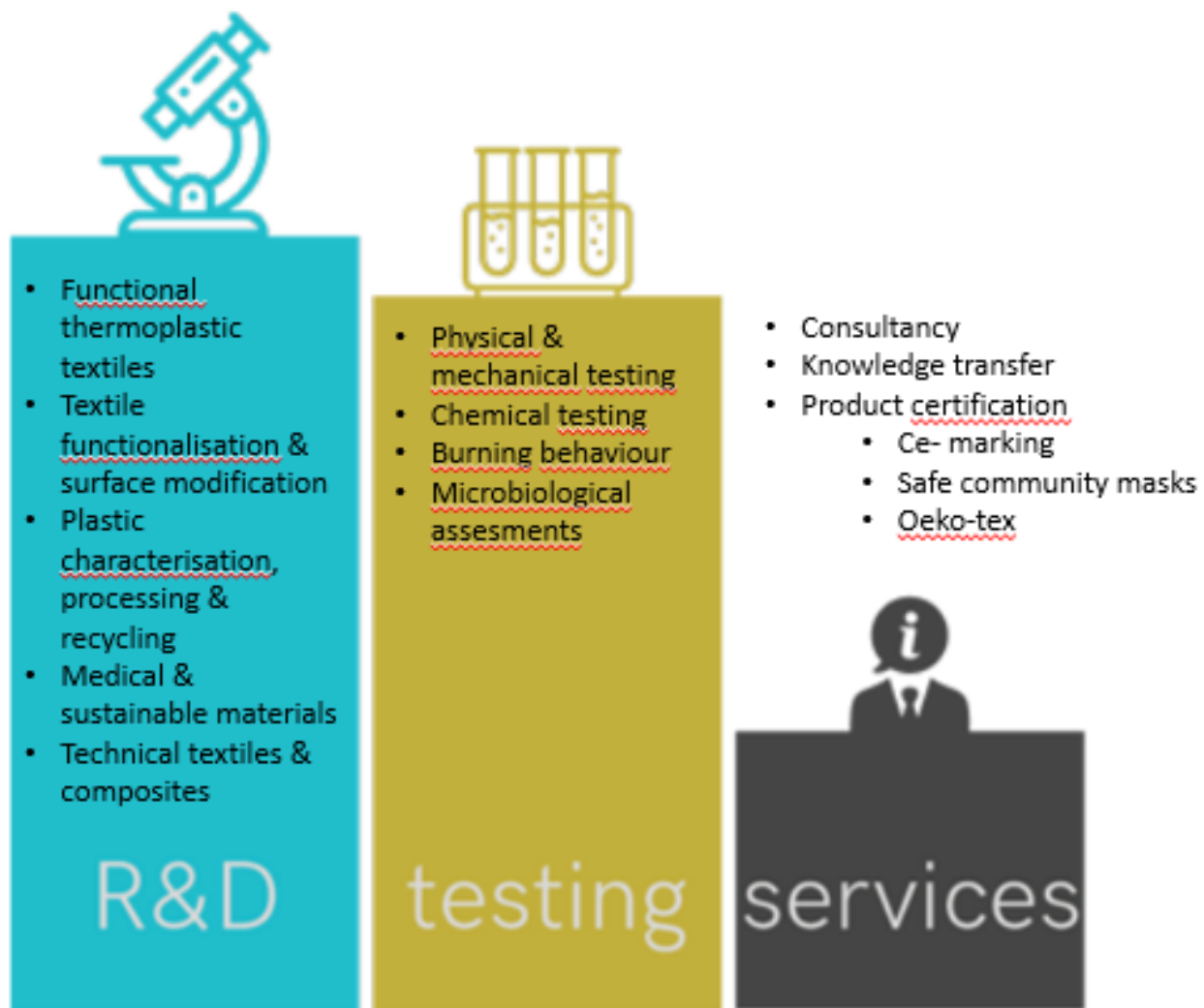


INDIA: Coimbatore

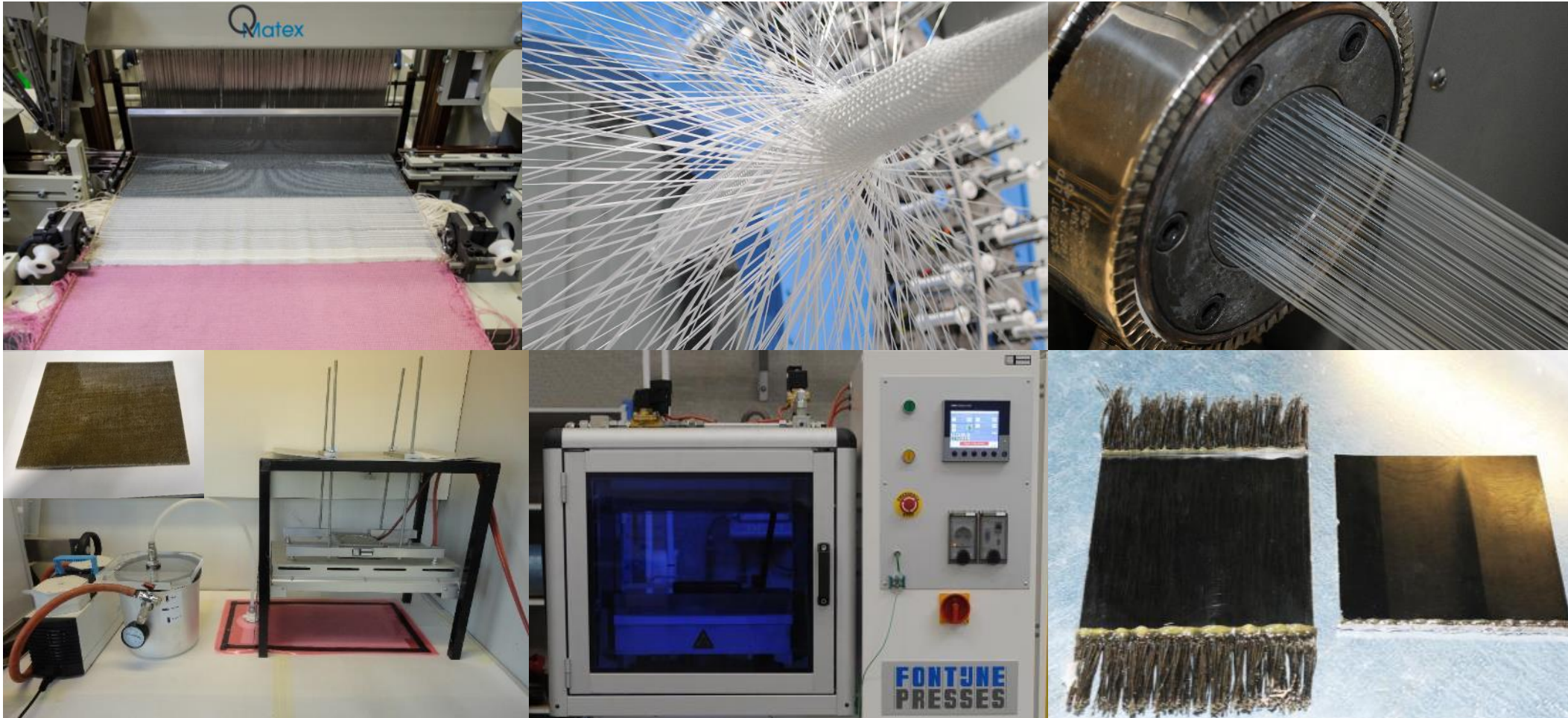


CHINA: Guangdong

PRODUCTS & ACTIVITIES



Composite manufacturing equipment



Composite testing equipment

- Composition: SEM, FTIR
- Physical : tensile, bending, impact, DMA, interlaminar shear
- Thermal: DSC, DMA
- Burning behaviour: LOI, UL94, ISO 11925-2

Composite experience

Relevant projects:

- Mat4rail (H2020): composites for railway applications
- Fenecom (Cornet): fast curing technologies for composites
- Suscomtrab (Cornet): sustainable & flame retardant composites
- Biocompal (Interreg): biobased thermoset composites
- Bio4self (H2020): biobased self-reinforced composite



Composite experience

- Relevant papers:
 - Book chapter in Biobased Products and Industries: Chapter 10 - Bio-based textile coatings and composites; D. Smet, F. Goethals, B. Demedts, W. Uyttendaele, M. Vanneste (2020)
 - Wolter, N.; Beber, V.C.; Sandinge, A.; Blomqvist, P.; Goethals, F.; Van Hove, M.; Jubete, E.; Mayer, B.; Koschek, K. Carbon, Glass and Basalt Fiber Reinforced Polybenzoxazine: The Effects of Fiber Reinforcement on Mechanical, Fire, Smoke and Toxicity Properties. *Polymers* **2020**, *12*, 2379. <https://doi.org/10.3390/polym12102379>
 - Frederik G, Pol Paelinck, Myriam V, Ralf Lungwitz (2020) Fast and Energy Efficient Curing of Composites –Fenecom Project: Page 6 of 6 A Short Review. *SOJ Mater Sci Eng* 7(1): 1-6.

BREPLA team

- Frederik Goethals: researcher textile functionalisation and surface modification. Contact: frg@centexbel.be
 - Main tasks in BREPLA: coordination, biobased thermoset resins, dissemination activities
- Elke Demeyer: researcher functional thermoplastic textiles. Contact: edm@vkc.be
 - Main tasks in BREPLA: biobased thermoplastic resins, self reinforced composites, dissemination activities



MORE ?



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