INCOM

Green Materials for Lightweight Sandwich Cores by Extrusion and Thermoforming

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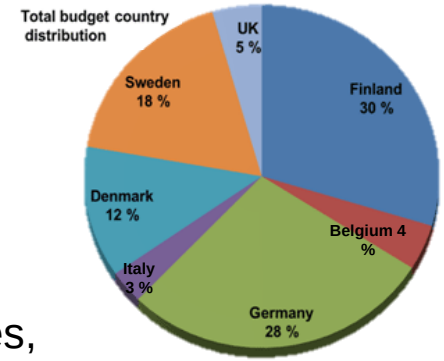
Lisa Wikström VTT et.al.

FP7
European Union Funding for Research & Innovation

Industrial Production Processes for Nanoreinforced Composite Structures

Aim

The aim of the INCOM project is to develop techno-economically viable solutions and production methods for lightweight structures based on advanced sustainable materials for use in sporting goods, vehicles and aeronautical applications.



Who are we:

- Partners from industrial participants and European institutes and universities
- We work within biocomposites, processing and coating technologies
- Whole production chain from bio-based raw materials processing to different fields of applications is included

FoF NMP2013-10-608746

The top-down and bottom-up approaches of the INCOM project

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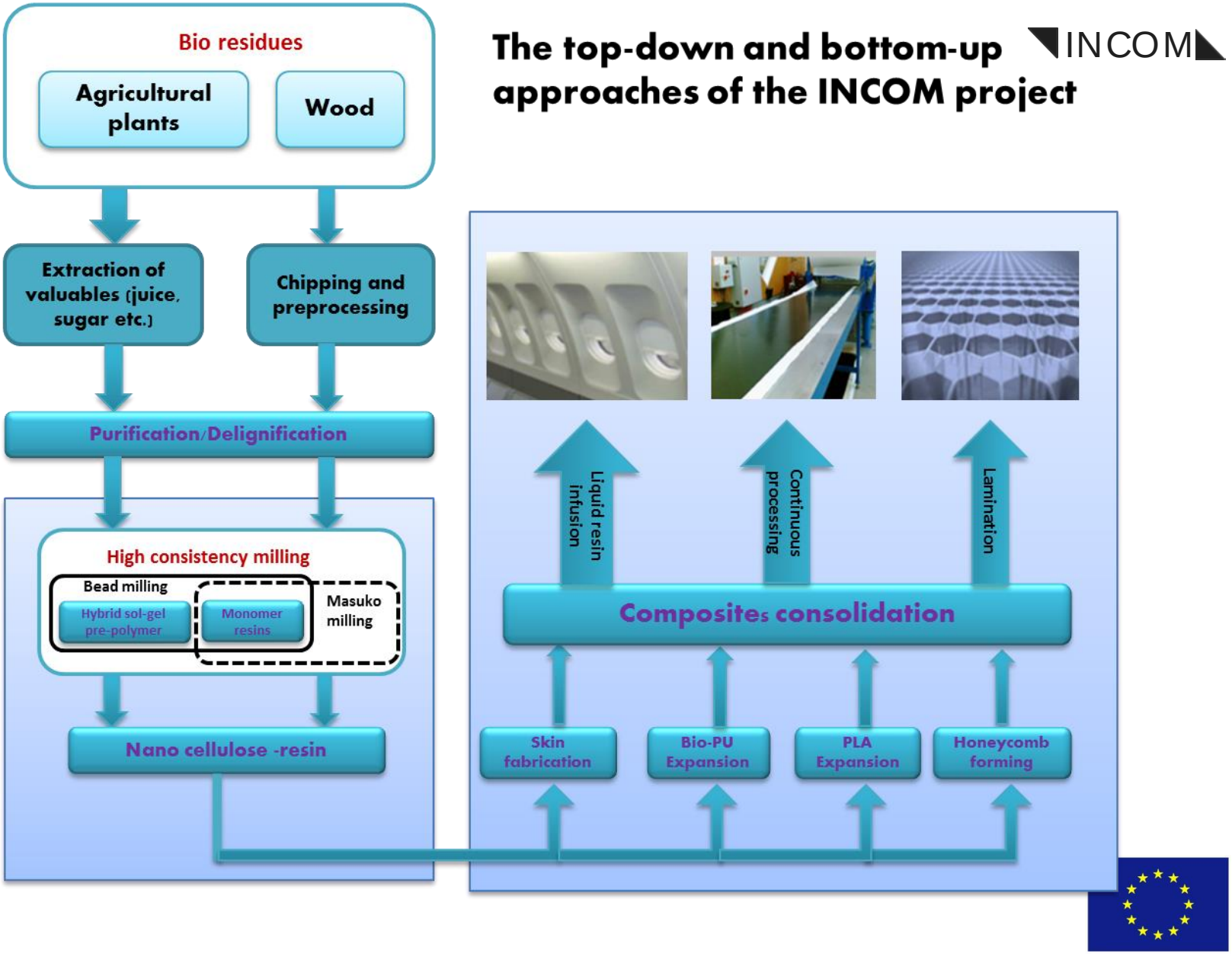

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COST EFFICIENCY

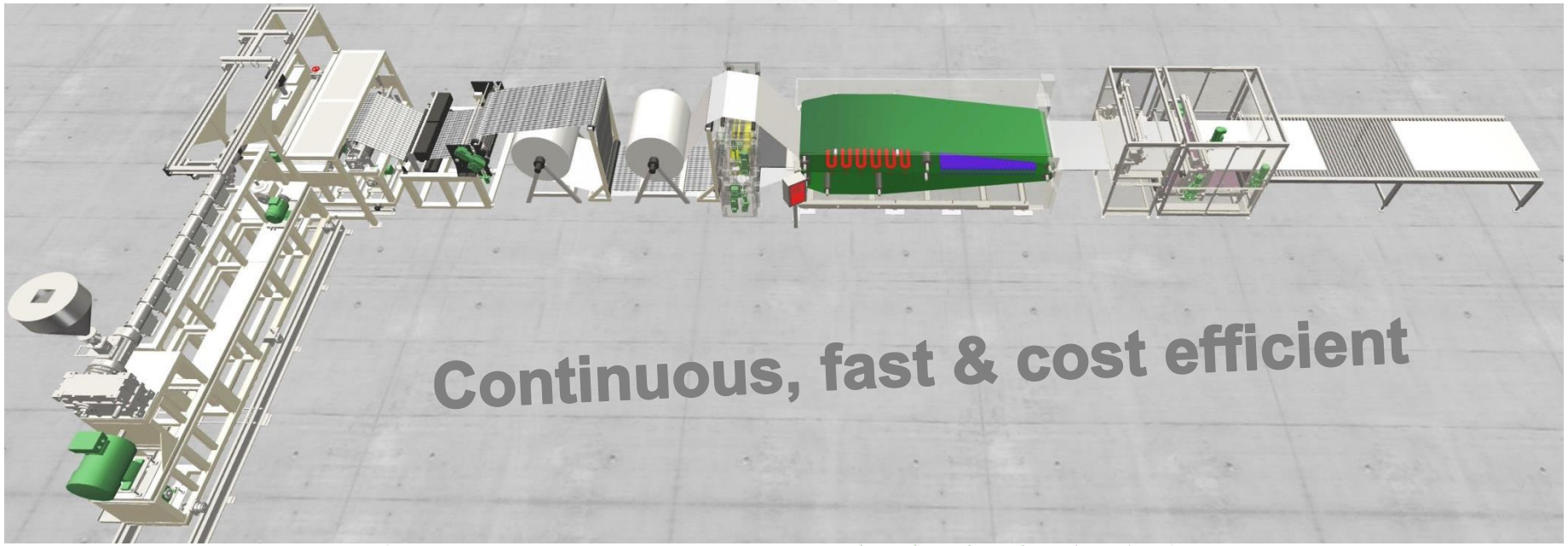
LIGHT WEIGHT PRODUCT IS COST EFFICIENT:

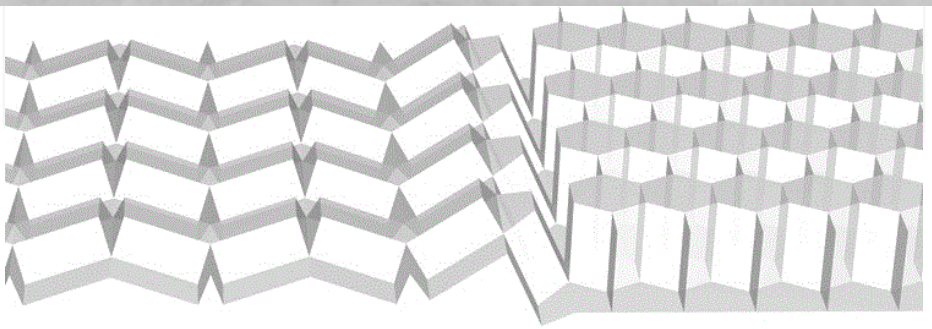
- ✓ LESS RAW MATERIALS
- ✓ LESS ENERGY FOR LOGISTICS
- ✓ LESS RESOURCES FOR DISPOSAL
- ✓ OPTIMISED PERFORMANCE

DIFFERENTIATION

- Bioeconomy relies on effective usage of **bio-based and recyclable materials**.
- **Lighter weight** decreases ecological foot print in every phase of products life cycle.
- Replacing fossil based materials and recycling is the future.
- Packaging, construction and vehicle material producers seek for new materials.

EconCore's Technology for Production of **Honeycomb Sandwich Panels**

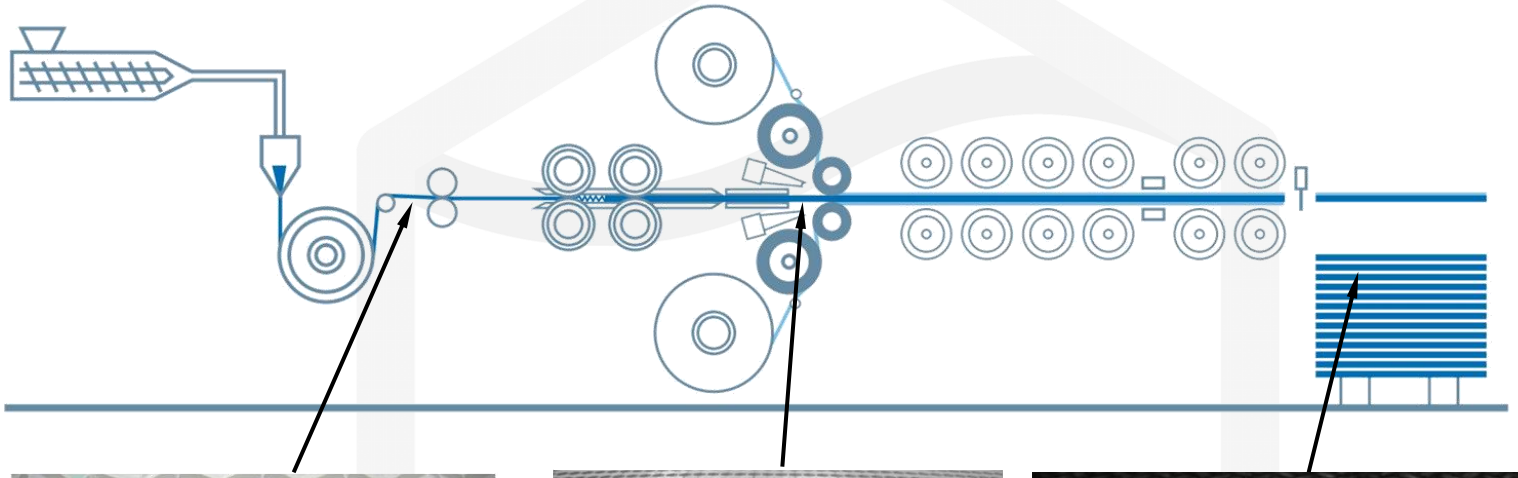


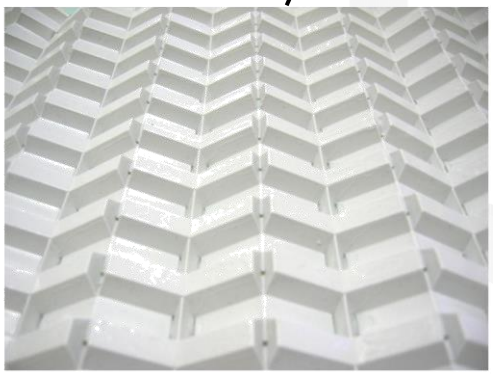


ThermHex production process

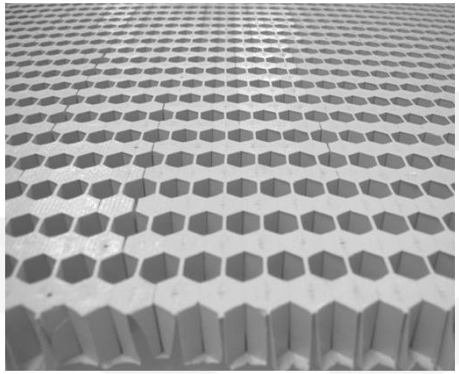
EconCore‘s Honeycomb Panel Production Line

- **Automated in-line production of honeycomb sandwich panels**





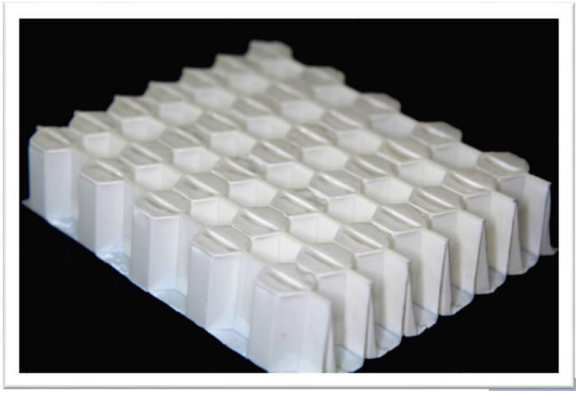
vacuumformed pattern



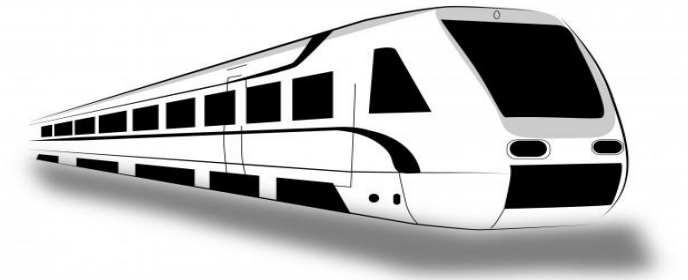
folded honeycomb

honeycomb sandwich panel

FST thermoplastic honeycomb development



(FR / FST qualified) PC material based honeycomb core



- Fire resistance performance competitive to conventional and expensive NOMEX honeycombs
- Target applications include aircraft interiors and parts

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economic core technologies

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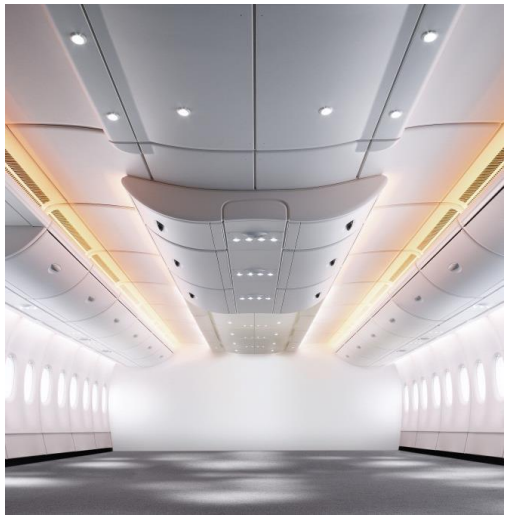
FST thermoplastic honeycomb development

Development work initiated with DIEHL AIRCABIN,
leading supplier of aircraft interior components.
Aircraft applications requirements are similar but tougher that the railway applications requirements



DIEHL Aircabin

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FST thermoplastic honeycomb development - key requirements of sandwich cores for cabin interiors

Density

Target value:
29 - 48 kg/m³

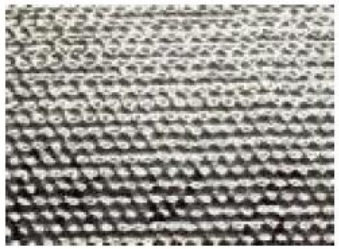
FST

Flammability
Heat Release
Smoke density
Toxicity

Mechanical properties

Compression strength
Shear strenght
Shear modulus

Surface quality



Few surface defects

Drapability

Satisfactory drapability
for the manufacture
of complex geometries

Thermal resistance

Permanent: -20°C to 55°C
Temporary: -40° to 70°C

Media resistance

Resistance to high humidity
and Skydrol

Costs

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DIEHL
Aircabin

courtesy of Diehl Aircabin

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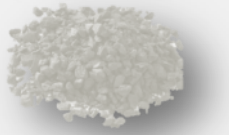
Fibre reinforced thermoplastic honeycomb development

Development work leading towards biobased and/or biodegradable light weight high performance sandwich structures.

Materials & processes

Cellulose fibres



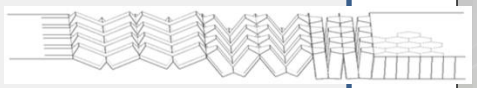
Thermoplastic Polymer PLA or PP

Melt compounding + Additives

Granulates

Film extrusion

Vacuum forming

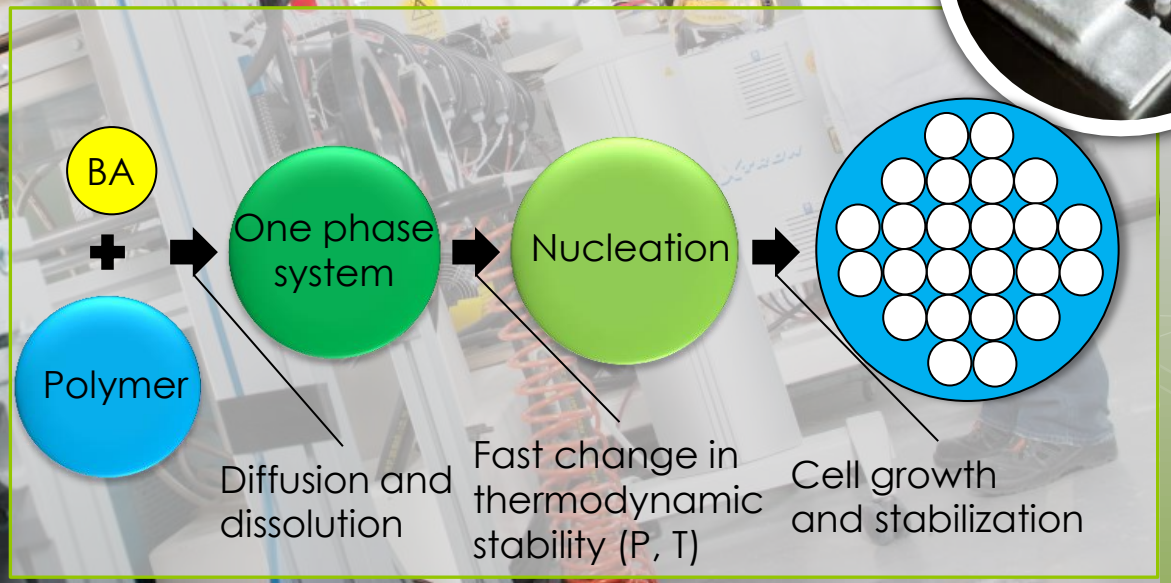


Biobased honeycomb structure with improved stiffness

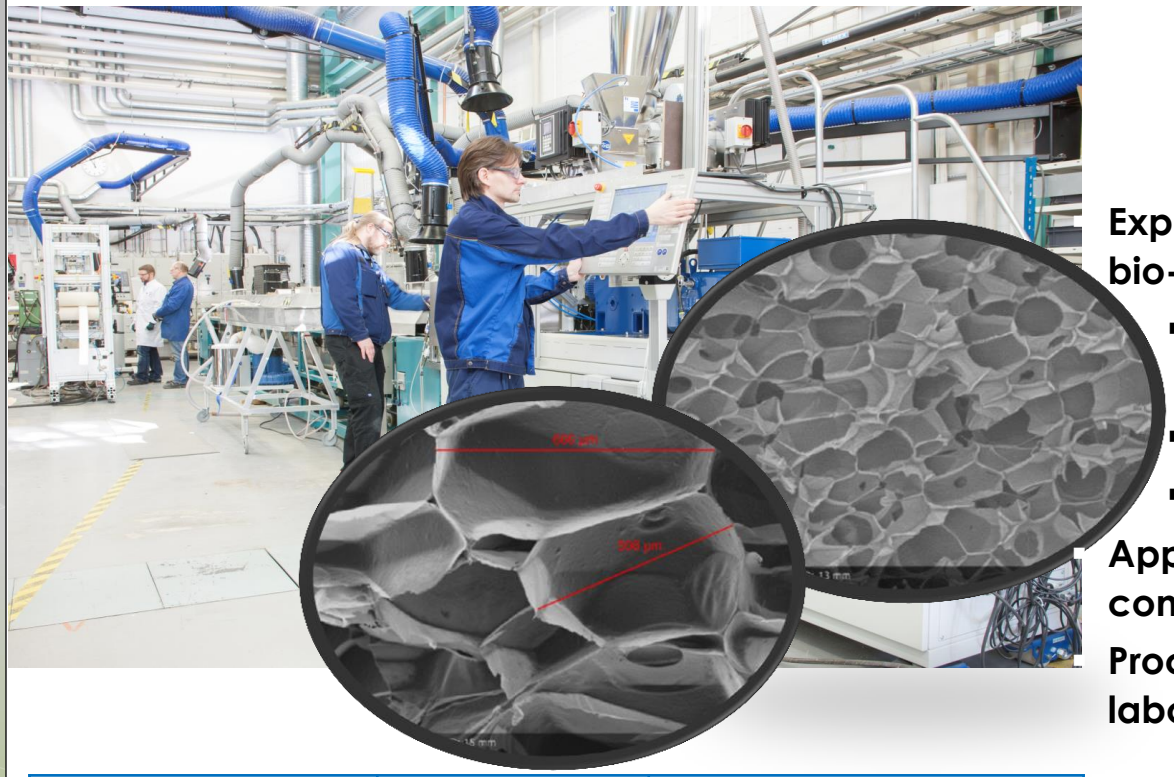
Technical University of Denmark

econcore economic core technologies

Extruded thermoplastic foam development



Extruded thermoplastic foam development



Blowing agent	CO_2	Iso-butane – CO_2 mixture
Throughput	7 kg/h	17 kg/h
Density	60 kg/m^3	46 kg/m^3
Average cell size	500 µm	100-200µm
Compression stress	0.19 MPa	0.12 MPa

Expanded and extrusion foamed bio-based thermoplastics

- **Sustainability by replacing oil-based components**
- **Light-weight, high insulation**
- **100% bio-based**

Applications in packaging, construction, and transport

Process and development from laboratory to pilot scale

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Light weight high strength sporting goods

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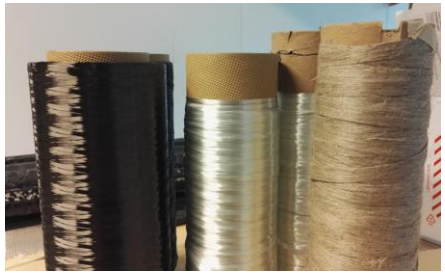
A methods to disperse cellulose nanofibres or fibrillate cellulose fibres in resin were developed. The resin with fibres enabled
The products present the top end in terms of strength and weight. Strength and weight can be achieved with "normal" resins, but hit impact resistance increase is in focus when using resins with cellulose nano fibres.

Fibrillation and dispersion of cellulose in a pre-polymer medium.



Filament winding

CSI Composite Solutions & Innovations Oy

Fibre reinfroced sporting goods

Technical University of Denmark DTU VTT VMA VMA-GETZMANN GMBH Verfahrensrtechnik

FoF NMP2013-10-608746

VTT

LULEÅ UNIVERSITY OF TECHNOLOGY

Technical University of Denmark

DTU

INCOM

Fraunhofer ISC

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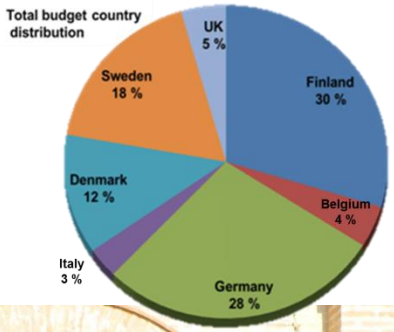
DIEHL
Aircabin

CSI Composite Solutions & Innovations Oy



milliDyne
Surface Technology

Axon

2B

VMA-GETZMANN GMBH
Verfahrensrtechnik

bergius
MIXING TECHNOLOGIES

SurA Chemicals

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