Student Pitch Challenge

Mérine DELPORTE – IMT Nord Europe
merine.delporte@gmail.com

IMT Nord Europe
École Mines-Télécom
IMT-Université de Lille

RÉPUBLIQUE
FRANÇAISE
Liberté
Égalité
Fraternité

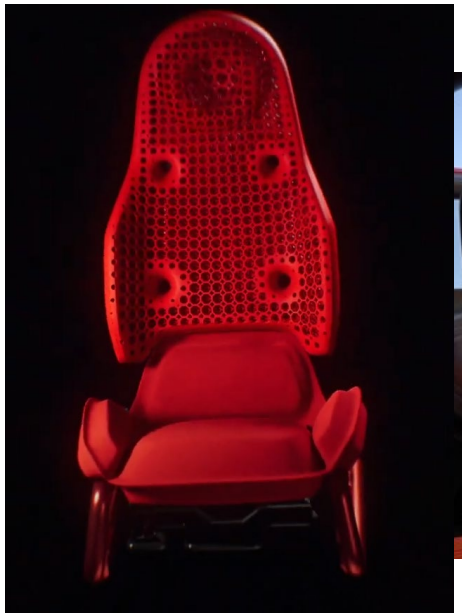
IMT Nord Europe
École Mines-Télécom
IMT-Université de Lille

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

New composition materials of car seat

A tale of automotive seats…

Herman Miller Aeron



Citroën Oli

Renault Captur Concept

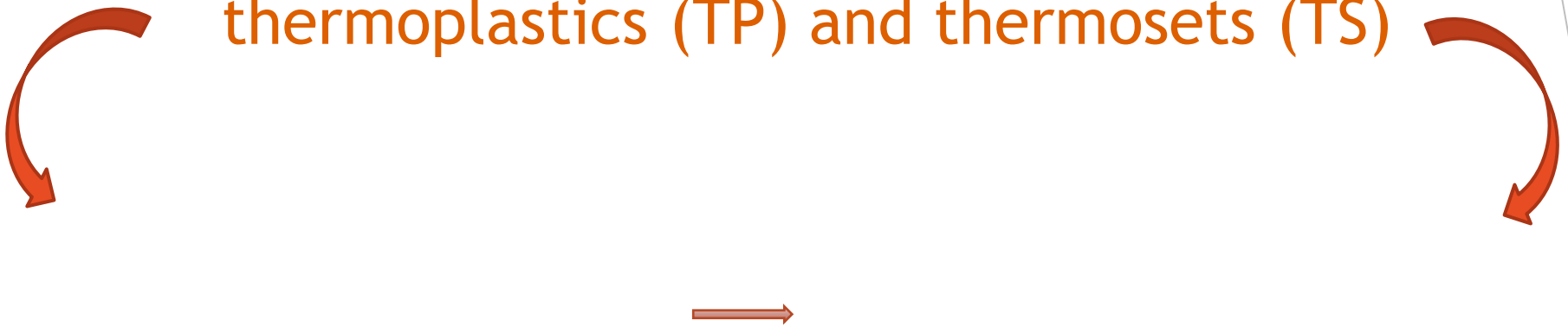
… to be reinvented !

IMT Nord Europe
École Mines-Télécom
IMT-Université de Lille

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

Vitrimers : A breakthrough for the automotive industry

A new family of polymers combining the assets of thermoplastics (TP) and thermosets (TS)



Vitrimers

- Malleability
- Recyclability
- Shaping

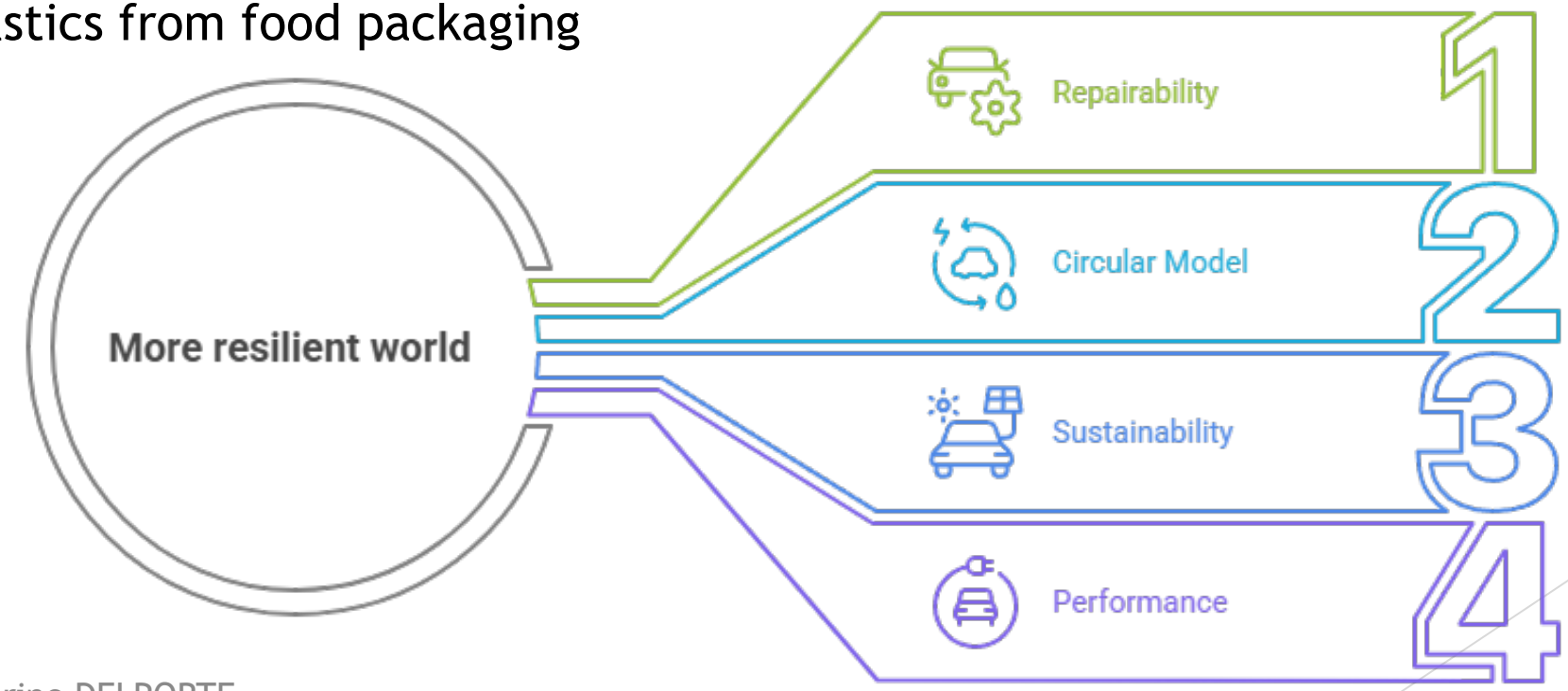
- TP-like processability with TS-like performance
- Self-healing
- Easy integration into existing manufacturing lines

- Mechanical strength
- High thermal performance

Towards new sustainable circular composite materials

Other feedstocks to be considered as reinforcement or additives:

- Rubber from used tyres
- Basalt fibres
- Plastics from food packaging



Student Pitch Challenge

Jean AGOPIAN- CESI

CESI
ÉCOLE D'INGÉNIEURS

CESI
ÉCOLE D'INGÉNIEURS

The Nervous System of Mobility, Reinvented

In-Mold Wiring (IMW) doesn't just make vehicles lighter. It transforms their DNA for a more sustainable and intelligent era.

of our planet's direct CO_2 emissions come from the transportation sector.

4.5 km
of copper cables

40 kg
of additional weight

12 hours
of manual assembly

Lightweight
Virtually weightless

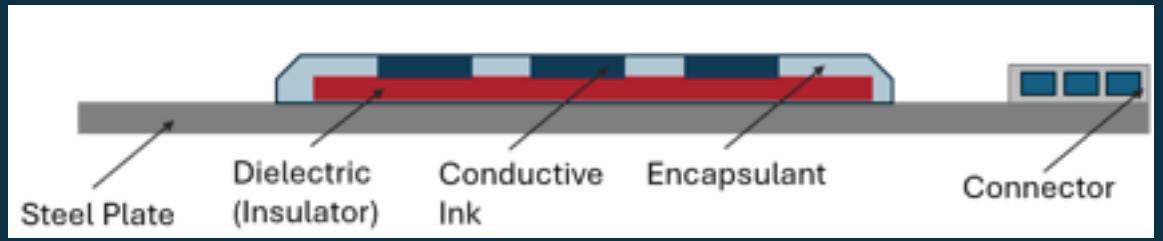
Integrated
Fused with the structure

Automated
Designed for automation

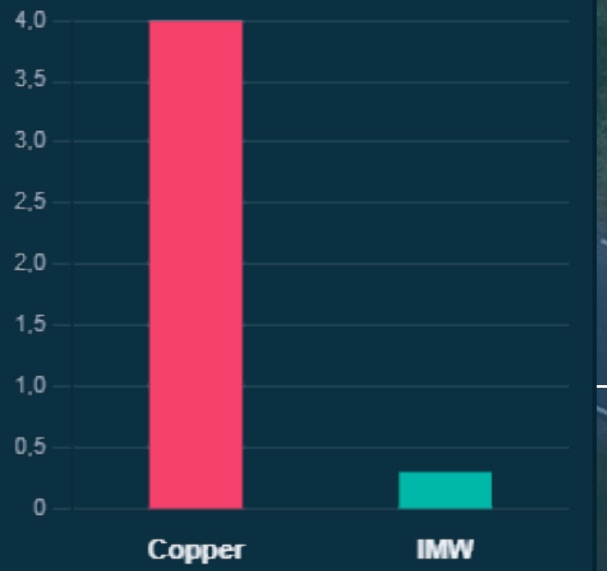
Copper Cables vs. In-Mold Wiring

What is In-Mold Wiring (IMW)?

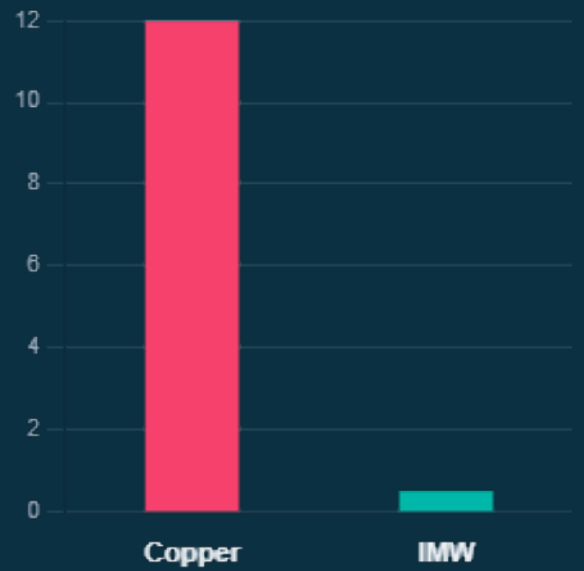
IMW is a multi-layer structure where conductive circuits are printed and encapsulated directly onto a base material, like a steel plate.



Production Emissions (CO_2)



Assembly Time (Hours)



Weight (for 60m)

0.5 kg > **25 g**

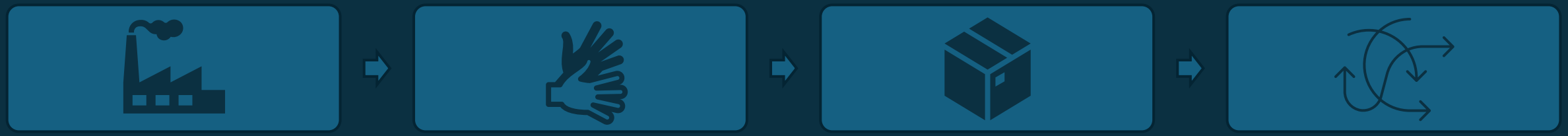
Copper IMW

Lifecycle Comparison

Criteria	Copper Cables	In-Mold Wiring
Durability	Long-lasting but corrodes	Durable if encapsulated
Recyclability	Highly Recyclable (up to 80%)	Challenging (Mixed Materials)

Building Tomorrow: The Smart Factory and the Connected Vehicle

Traditional Factory: A Complex Chain



IMW Factory: A Streamlined Flow

The Future of Mobility: The Vehicle as a Smart Surface

- Autonomous Driving
- Smart Interiors
- Seamless Integration

Student Pitch Challenge

Julien Cardon-Belloy Baptiste Fournier Romain Augé
- IMT Nord Europe

IMT Nord Europe
École Mines-Télécom
IMT-Université de Lille

RÉPUBLIQUE
FRANÇAISE
Liberté
Égalité
Fraternité

IMT Nord Europe
École Mines-Télécom
IMT-Université de Lille

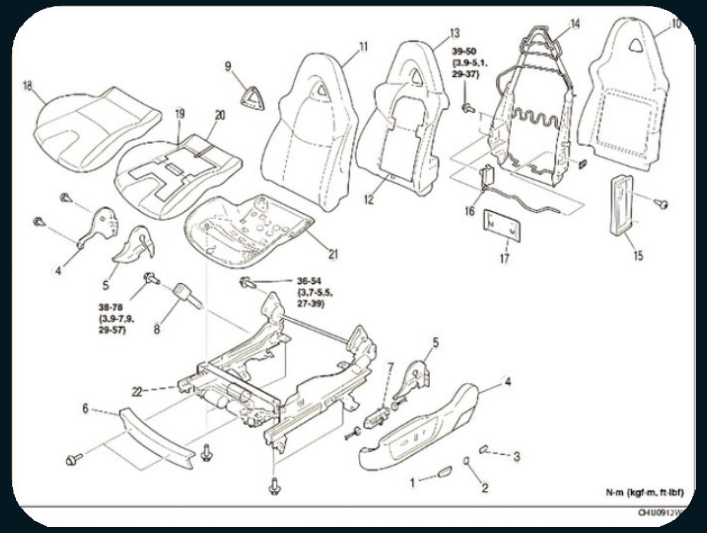
RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

Optimising Ergonomic Seats & Armrests by 3D Printing Expandable Polymers

Julien Cardon-Belloy
Baptiste Fournier
Romain Augé

Current issues with traditional seats :

- Difficult to recycle due to heterogeneous materials
- Use of glue and assembly increases industrial waste
- Manufacturing involves multiple steps → energy and material loss



Objective of the project :

Rethink seat and armrest design for better ergonomics, sustainability, and industrial efficiency

IMT Nord Europe
École Mines-Télécom
IMT-Université de Lille

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

Our proposal: 3D printed expandable thermoplastics

Materials selected :

Expandable PLA

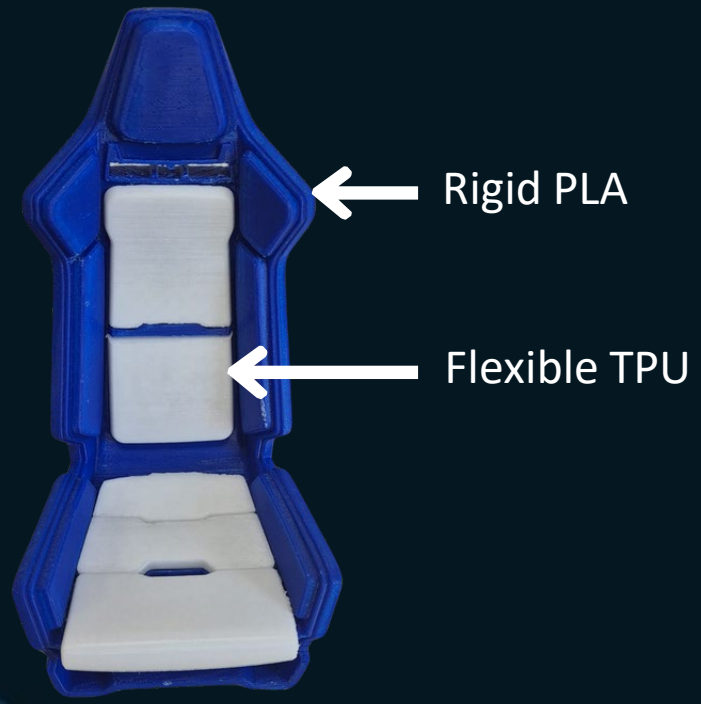
- Lightweight
- Biodegradable
- Ideal for rigid structures

Expandable TPU

- Wear-resistant
- Flexible
- Adapts to shapes and uses

Process selected : FDM Additive manufacturing

Mechanical metamaterials (hyper-light lattice or porous structure, tailored gradient of rigidity) combining stiffness, lightness, customization, local production, no waste



Key innovation :

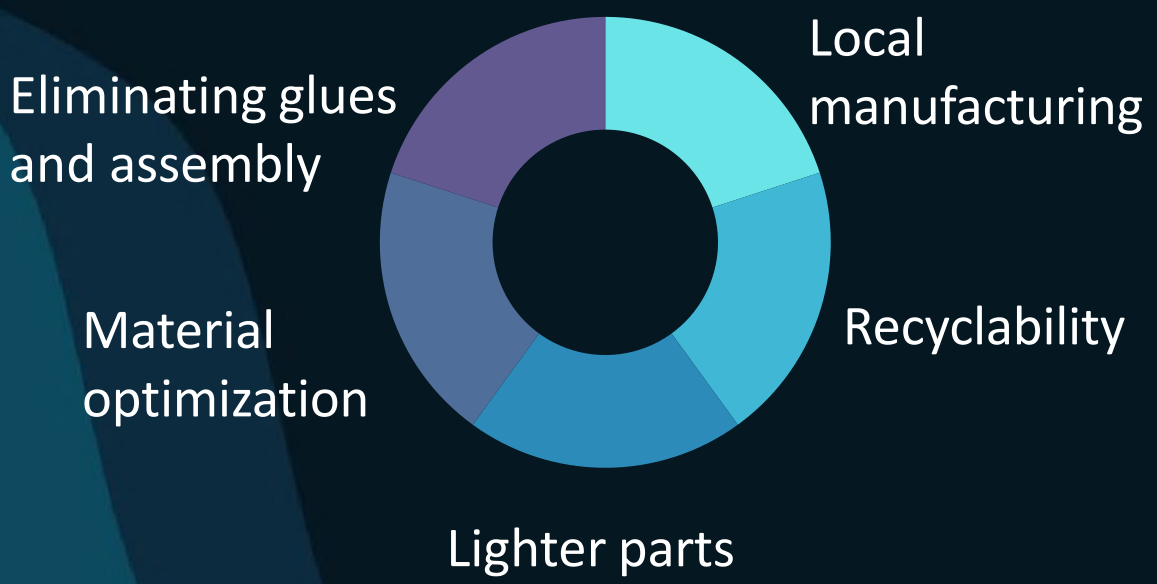
1 . FDM 3D printing + control of temperature, flow rate, speed

2 . Enables Shore hardness modulation in a single print

3. Produces both rigid and soft zones without glue, foam, or separate parts

Advantages & Future Work

Ecological and Economic Benefits



▶ Future developments

- ▶ Industrial validation (durability, temperature resistance, comfort)
- ▶ Material development (precise Shore control, bio-based options)
- ▶ Closed-loop recycling
- ▶ Smart integration (sensors, ventilation channels)
- ▶ Business development : IP , spin-off

3D printing expandable polymers offers a sustainable, ergonomic, and scalable solution for vehicle interiors.