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# A BIOBASED ELECTRIC SCOOTER BODY; STRONGER, LIGHTER, CHEAPER AND MORE SUSTAINABLE

NPSP BV \_ Mark Lepelaar



## TEAM NPSP



+ BSc / MSc students

## FACILITIES



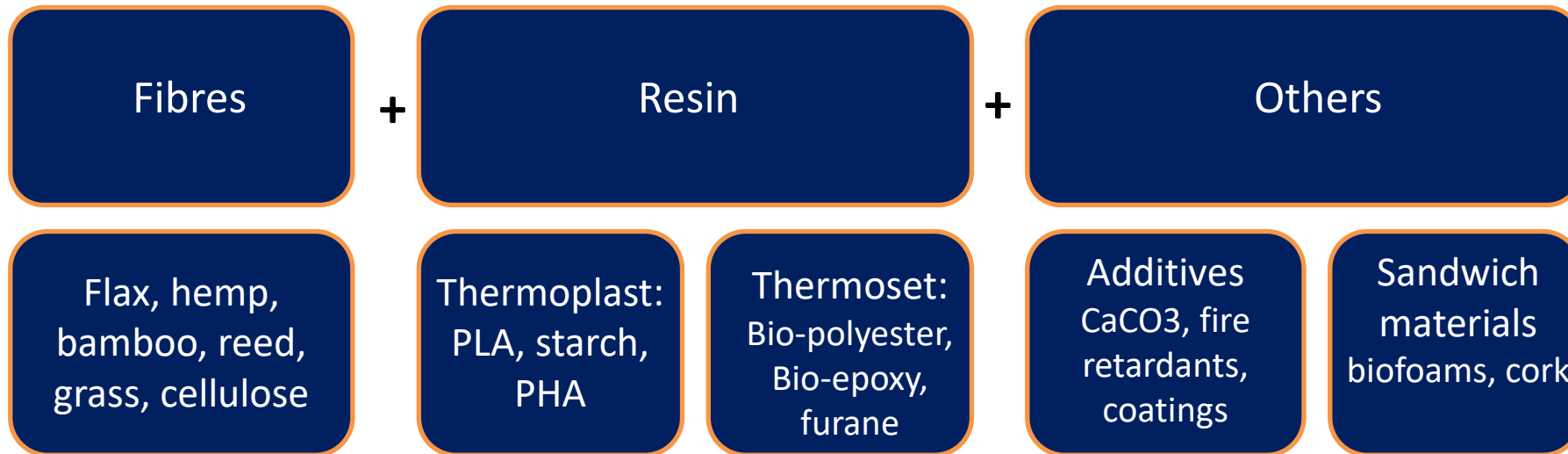
## OUR MISSION

*'It is our mission to make sustainable composites  
common ground.'*



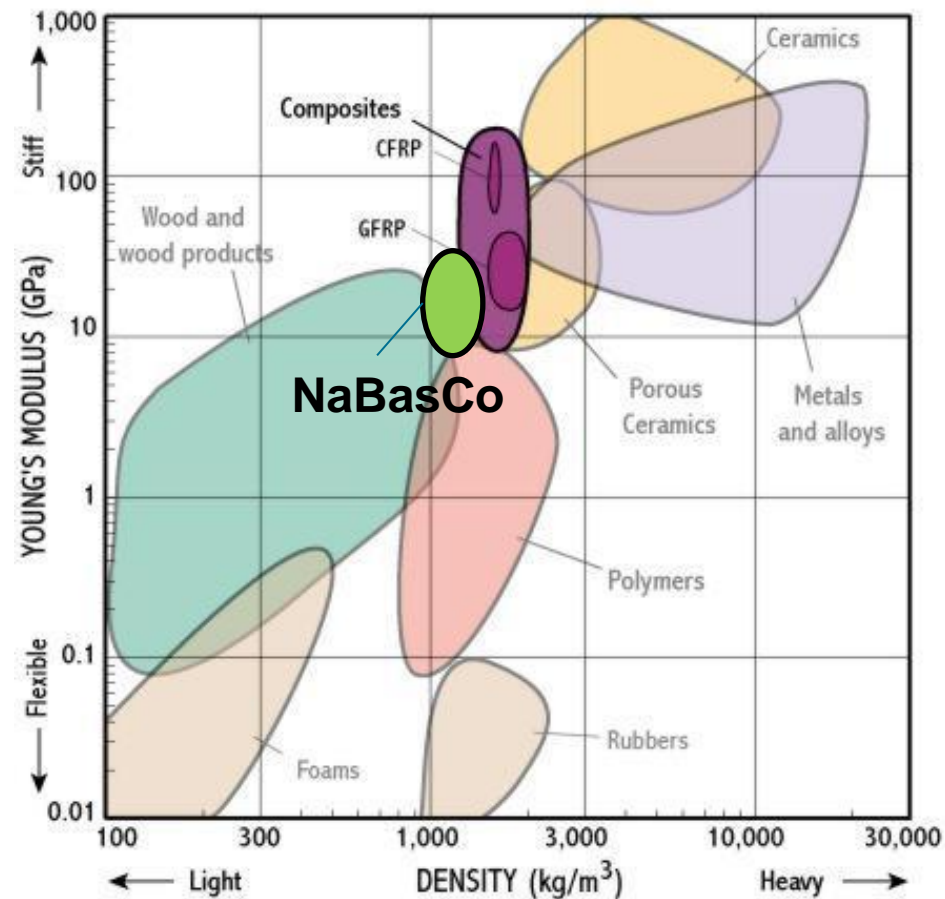
# BIOCOMPOSITES; NATURAL FIBRE REINFORCED BIOPOLYMERS

- Fibres give strength, the resin protects and keeps in shape
- Light, Low maintenance, Double curved forming, Function Integration





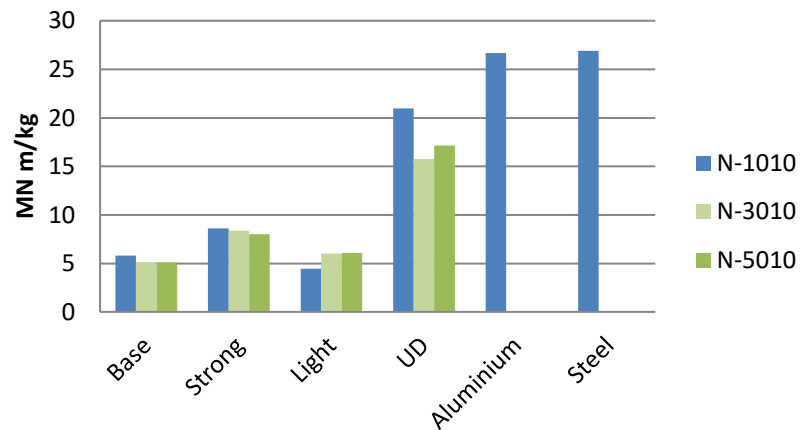
## COOPERATION WITH UNIVERSITIES



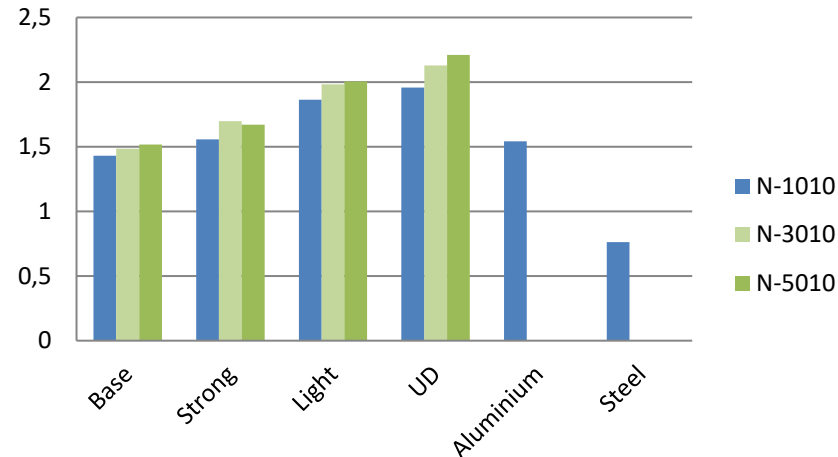
University of Cambridge,  
Department of engineering

# VERY LIGHTWEIGHT PRODUCTS; BEATING ALUMINIUM AND STEEL

**Specific Stiffness NPSP  
Composites ( $E/\rho$ )**



**Sp. Plate Stiffness NPSP  
Composites ( $E^{1/3}/\rho$ )**



- Stiff and Light

- Stiff and light shells/  
plates

## A WIDE RANGE OF BIOCOMPOSITE MATERIALS

### **N-3010**

- Natural fiber with polyester

### **N-5010**

- Natural fiber with partially bio-based resin

### **N-8010**

- Natural fiber, calcite and partially bio-based polyester

### **N-9010**

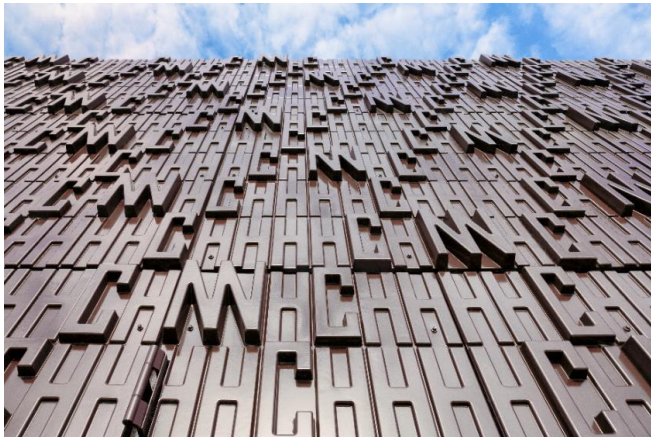
- Natural fiber / textile wastestreams with bio-based PLA

### **N-10010**

- Natural fiber with a 100% bio-based resin



## MANY BIOCOMPOSITE PRODUCTS - N5010





## BIOCOMPOSITE PRODUCTS - N8010

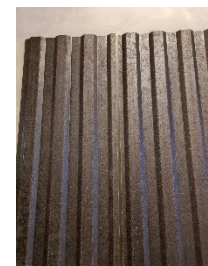
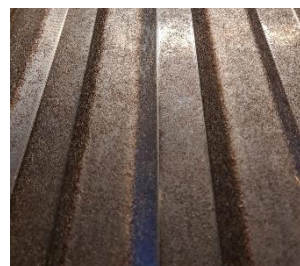
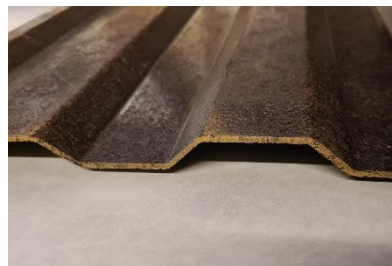
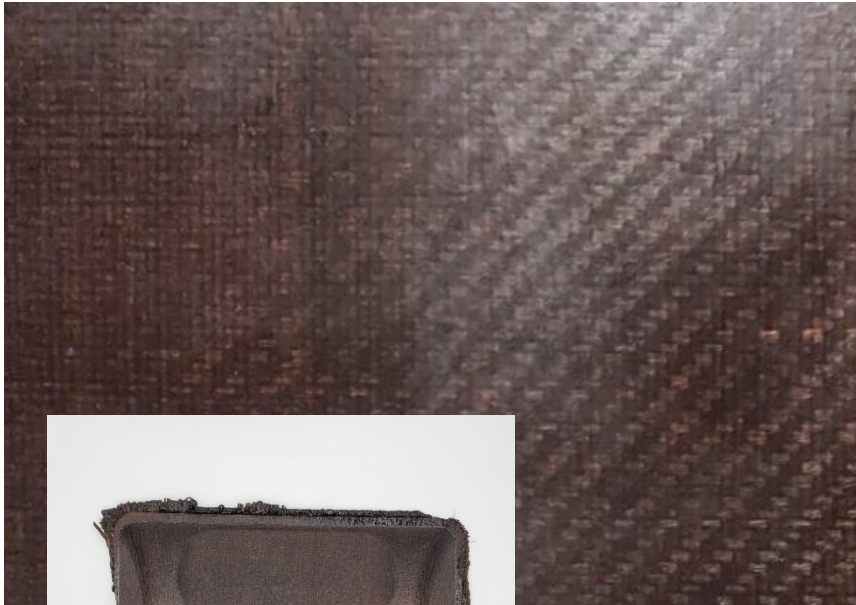


## BIOCOMPOSITE PRODUCTS – N9010





## BIOCOMPOSITE PRODUCTS – N10010



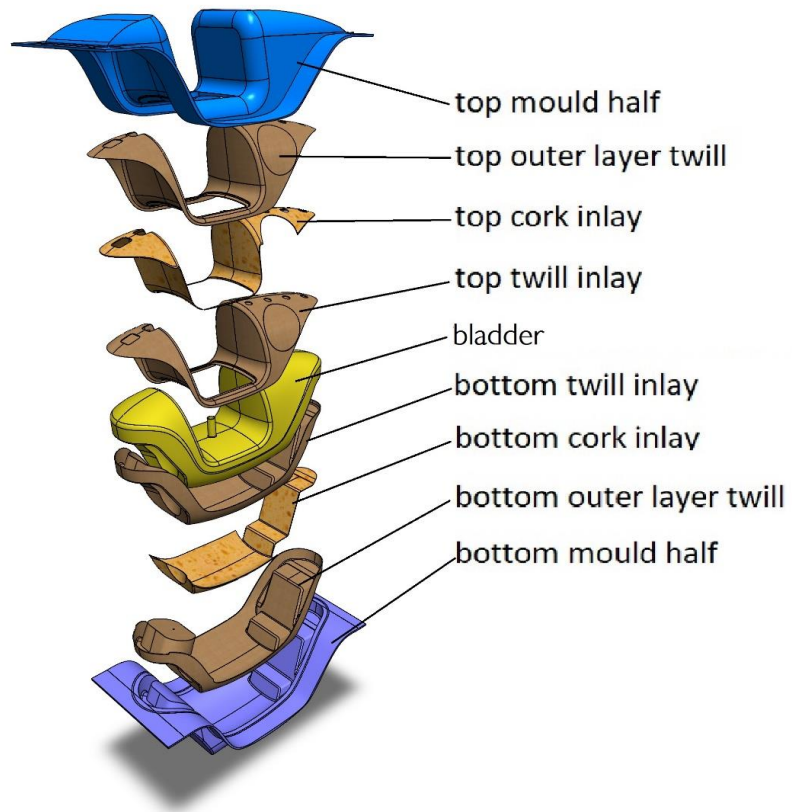
## ELECTRIC SCOOTER –N5010



Vaneko electric scooter  
Hemp/flax monocoque body

1 part instead of metal frame and plastic covers  
Stiff structure  
Optimal design  
Large battery pack

## ELECTRIC SCOOTER –N5010



Targets and results;

Lower weight

-> 13 kg (-56%)

Higher biobased content

-> 65% (was 30%)

Lower costs by saving on labor time

-> -50% (price -40%)



## ELECTRIC SCOOTER –N5010






## ELECTRIC SCOOTER –N5010

- Complete value chain of biocomposites -raw resources, composite materials, products, EOL-
- Knowledge on material properties, life span, production techniques
- Higher stiffness, stronger -> lighter
- Cheaper
- Higher biobased content
- Next step; further uptake by the market, also in other products



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