Public funded project KonFutius

Aachener Zentrum für integrativen Leichtbau

Dr.-Ing. Michael Emonts
Philipp Wigger, M.Sc.

Aachen, 22.06.2021

This project is funded by the European Union and the federal state Northrhine-Westfalia.

EUROPEAN UNION
Investing in our Future
European Regional Development Fund

EFRE.NRW
Investitionen in Wachstum und Beschäftigung

KonFutius

Public funded project – Duration: 01.07.2019 - 30.06.2022

Aachener Zentrum für integrativen Leichtbau | RWTH AACHEN UNIVERSITY

1. Continuous processing of TP-FRP-Laminates

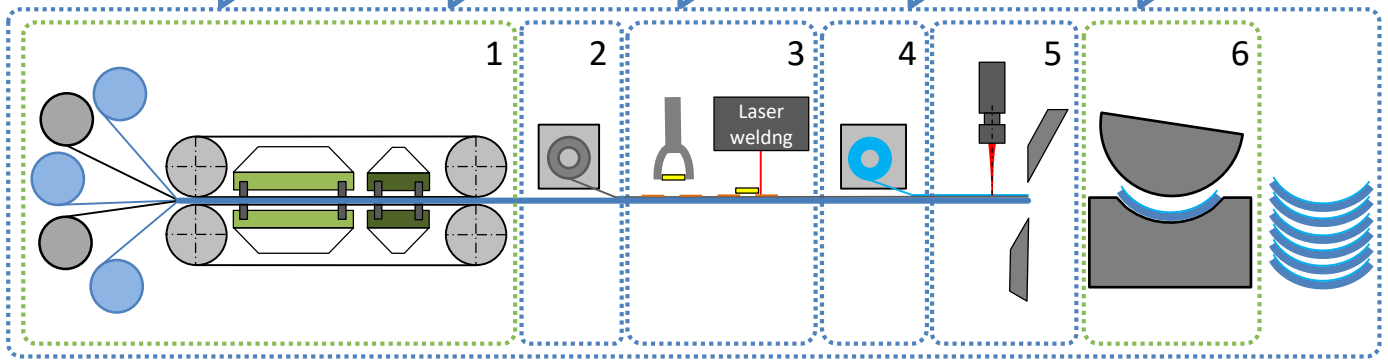
2. Application of functional layers and conductive tracks in the **R2R process**

3. Hybrid Integration of the LEDs

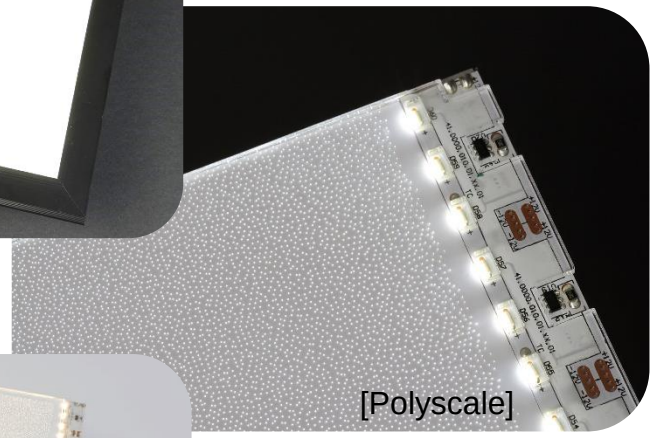
4. Application of functional layers in the **R2R process**

5. Joining the layers and cutting the segments to length

6. Thermo-forming of the curved final contour



Reference part:
Thickness: min. 10 mm



First demonstrator KonFutius:
Thickness: approx. 4 mm

Aachener Zentrum für integrativen Leichtbau | RWTH AACHEN UNIVERSITY | Fraunhofer IPT

polyscale | LEISTER | Fraunhofer ILT

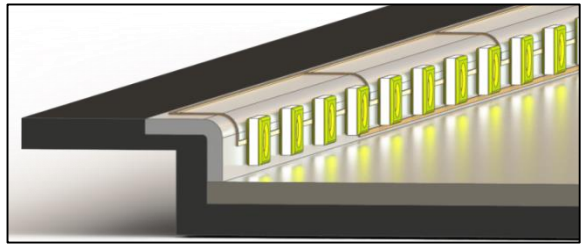
This project is funded by the European Union and the federal state Northrhine-Westfalia.

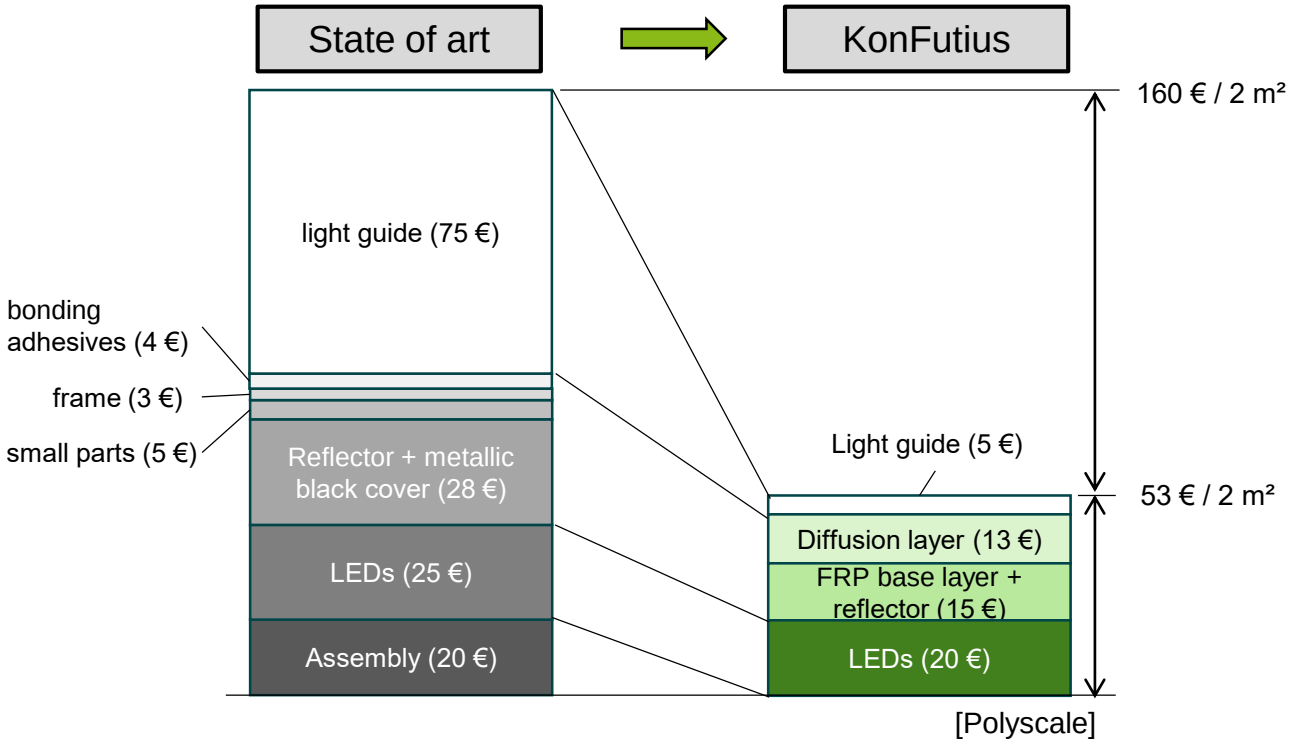
EUROPEAN UNION
Investing in our Future
European Regional Development Fund

EFRE.NRW
Investitionen in Wachstum und Beschäftigung

Project Approach

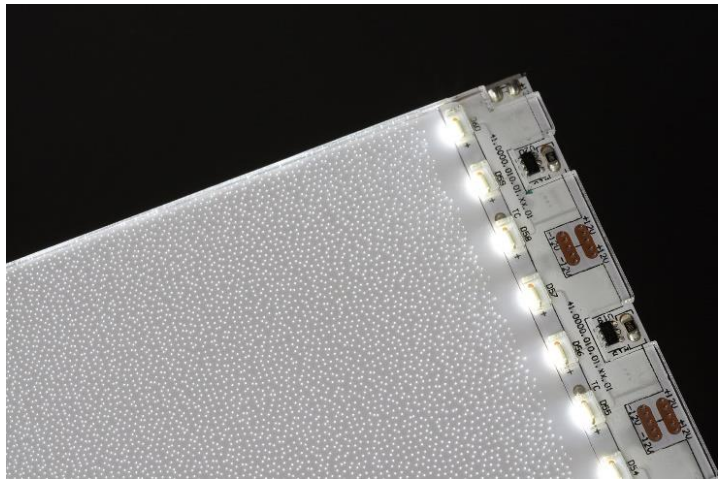
- Cost reduction of 60% by continuous fabrication
- Weight reduction by use of FRP instead of steel or aluminum
- Compact system architecture through integrative manufacturing process
- Geometrical flexibility for usage in architecture and transport
- Fully automated production process for economic use in high-wage countries

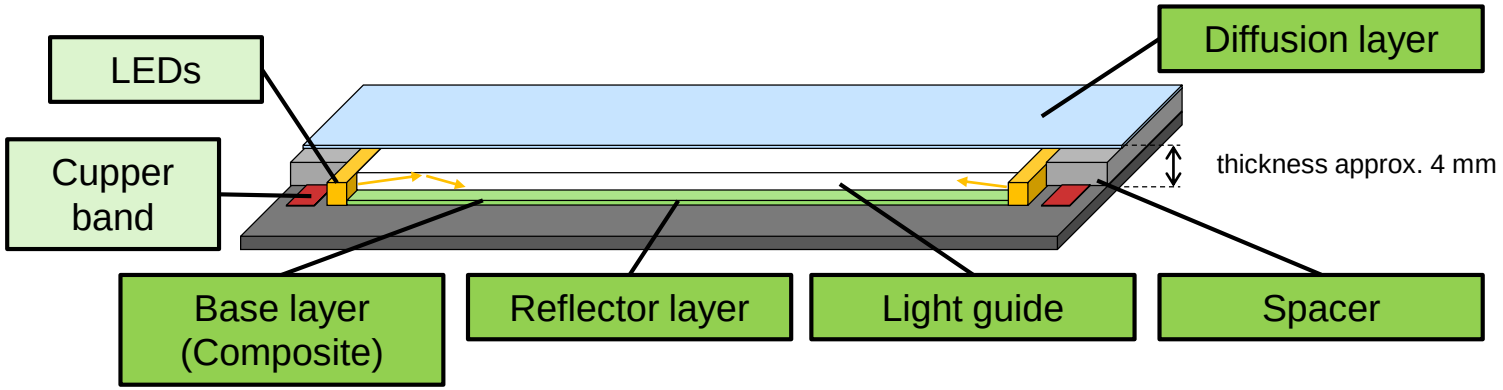


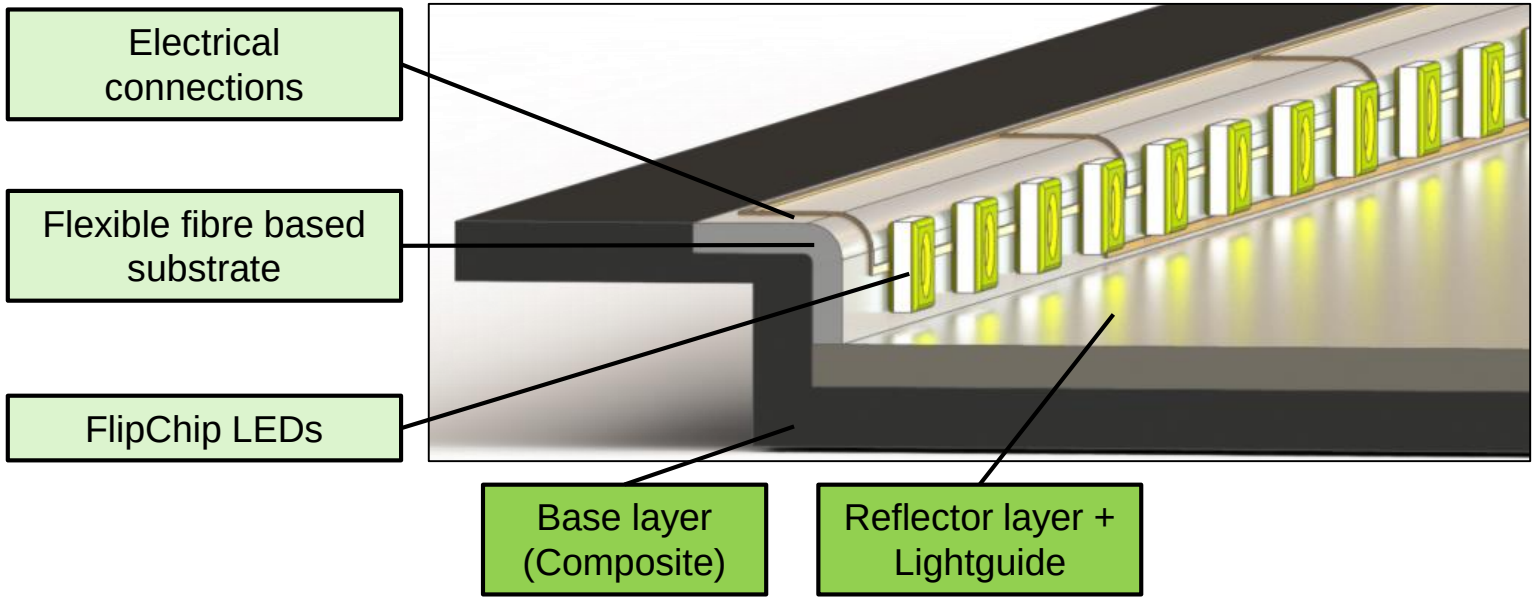


KonFutius

Demonstrator Part





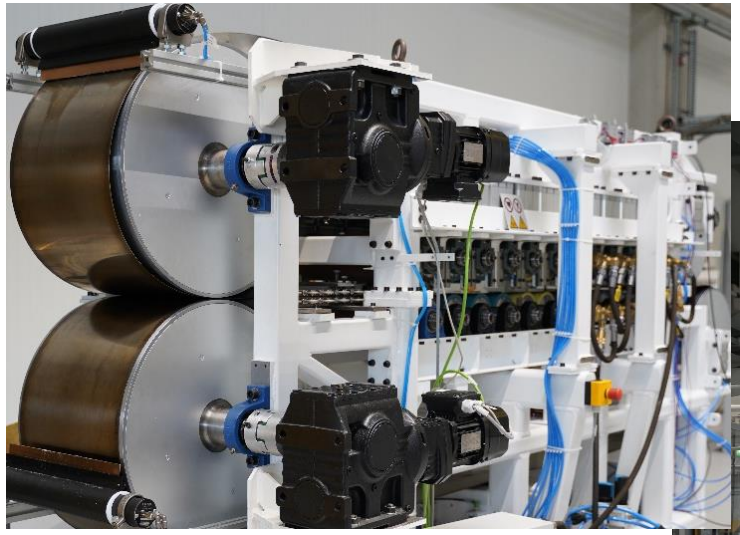


KonFutius Process Chain

Used Machinery

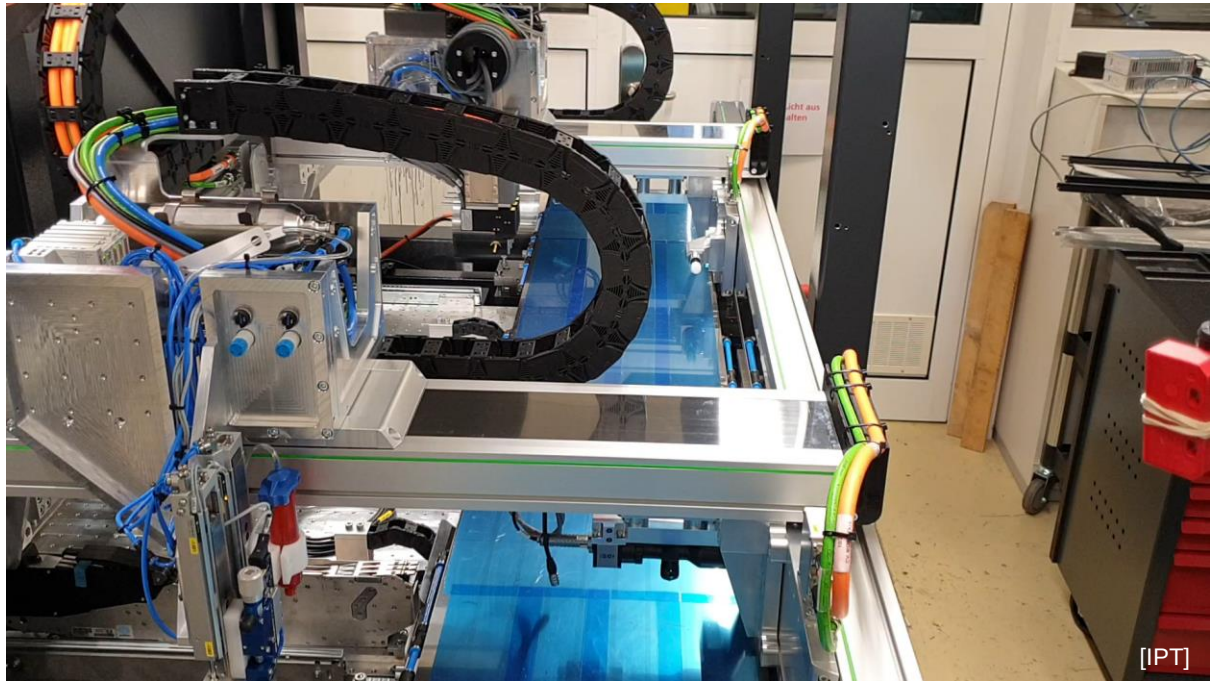
Double Belt Press and Static Press at the AZL

- Manufacturing of FRP carrier structure in the Double Belt Press
- Forming of the LED-Panel in the Static Press



Application Module at the Fraunhofer IPT

- Application of printed electronics
- Integration of Laser cutting and an Laser welding technology



KonFutius Process Chain

Foil impregnation on the double belt press

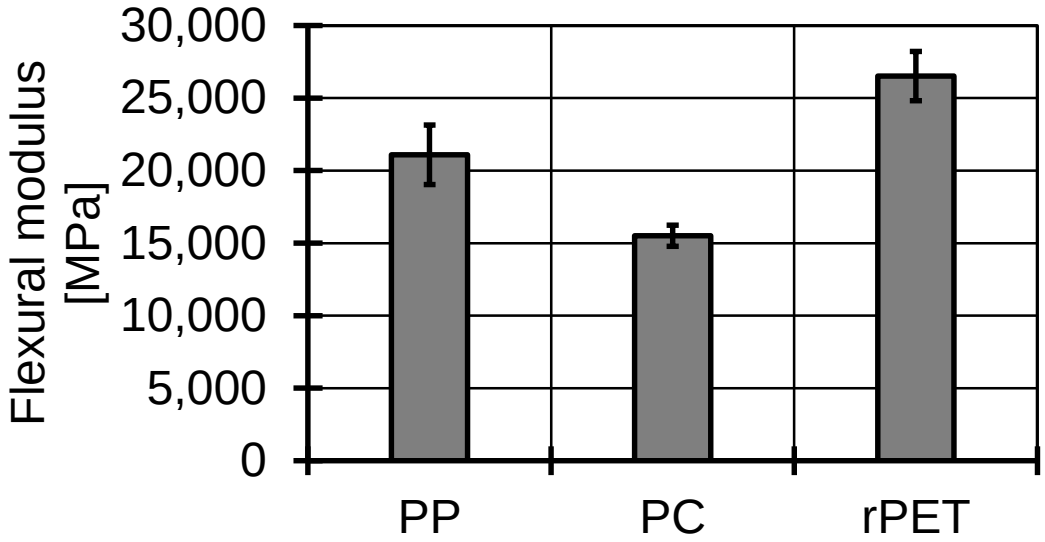
- DOE was carried out to define the optimal process window for each material
- Part Quality was evaluated by 3 point bending tests and microscopy images

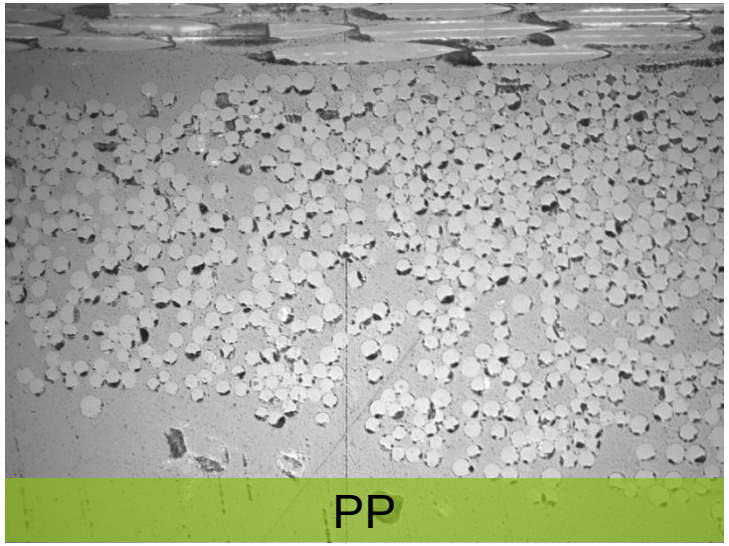
- Fixed parameters:
  - 7-layer arrangement (4x polymer, 3x glass)
  - Foil width 330mm
  - Woven width 350mm
  - Production speed 300mm/min
- Varied parameters:
  - Pressure profile – low, middle, high
  - Temperature profile – low, middle, high
- Results:
  - The glass fibre woven can be impregnated with PP, PC and PET
  - The highest quality can be achieved with high temperature and high pressure

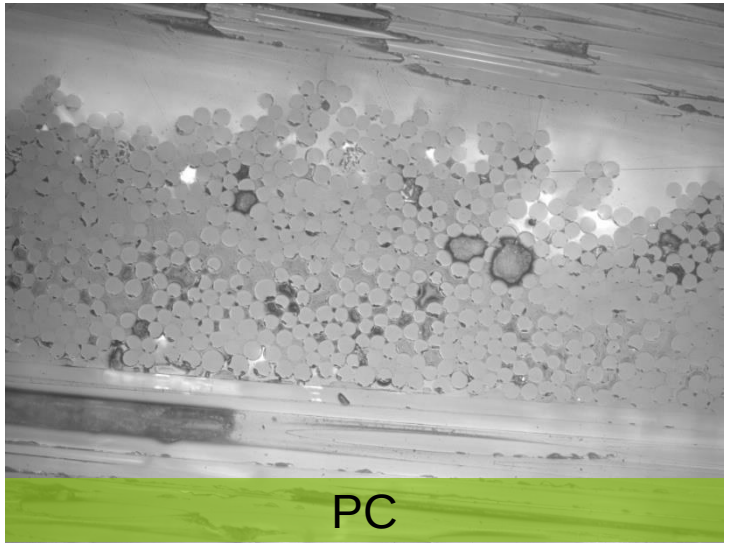
KonFutius Process Chain

Foil impregnation on the double belt press

- Measured flexural moduli are in the area of commercially available glass fiber reinforced composites
- Still working on improving the impregnation quality especially for polycarbonate
- Microscopy:
  - Images show good macro impregnation for PP and PET
  - Still some room of improvement for the micro impregnation







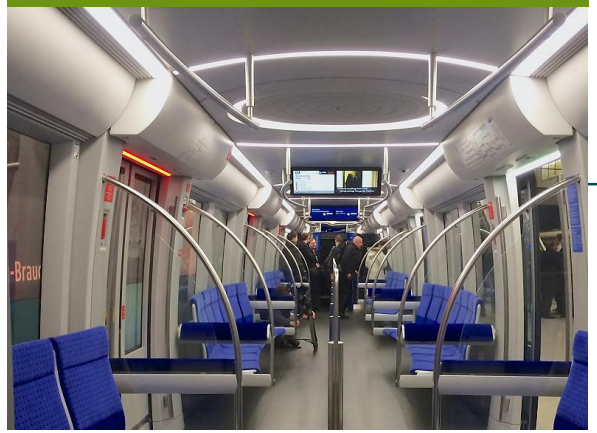
Outlook

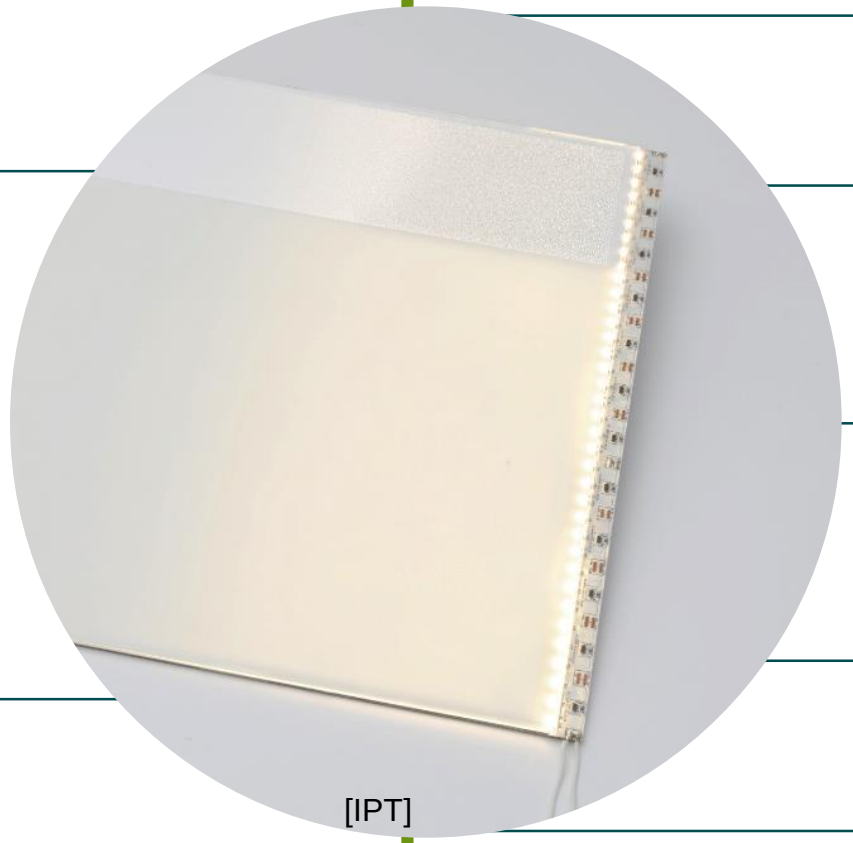
KonFuitus Demonstrator and Follow-up Project

Currently running Project KonFutius

2D-LED-Panel

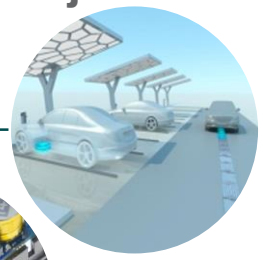
Curved-LED-Panel





[IPT]

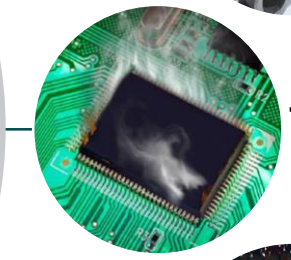
Potentials for a Follow-Up Project



Induction

[ILT]

Integrated Sensors



Thermal Management

Complex Geometry

Transparency

Contact

Public funded Project KonFutius

Dr.-Ing. Michael Emonts
Managing Partner
michael.emonts@azl.rwth-aachen.de
Phone: +49 241 8024 500
Mobile: +49 172 720 7681

Philipp Wigger
Research Assistant
philipp.wigger@azl.rwth-aachen.de
Phone: +49 241 8024519

AZL der RWTH Aachen
Campus Boulevard 30
Building Part 1A, 3rd Floor
52074 Aachen, Germany