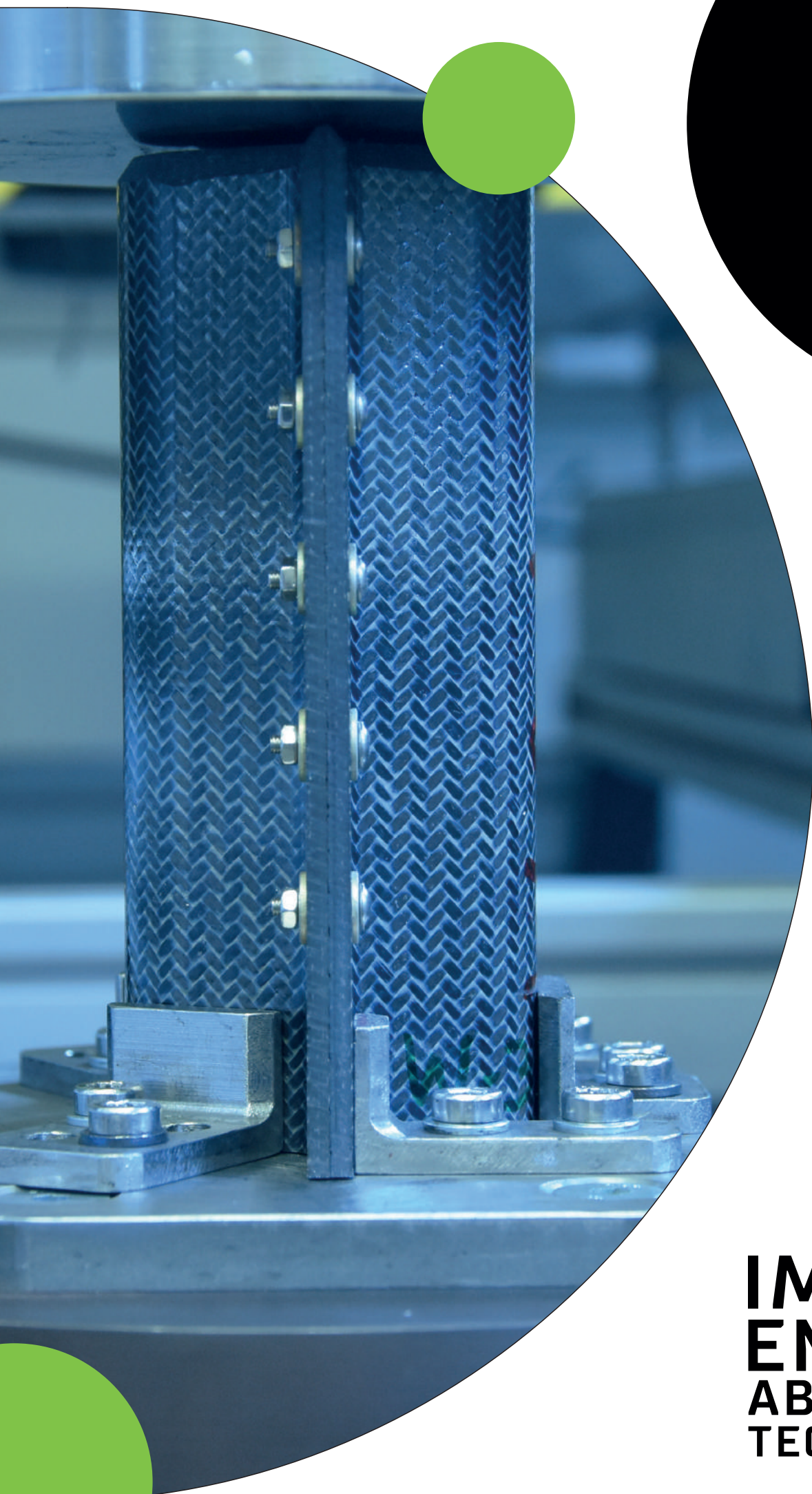




Łukasiewicz  
Institute  
of Aviation



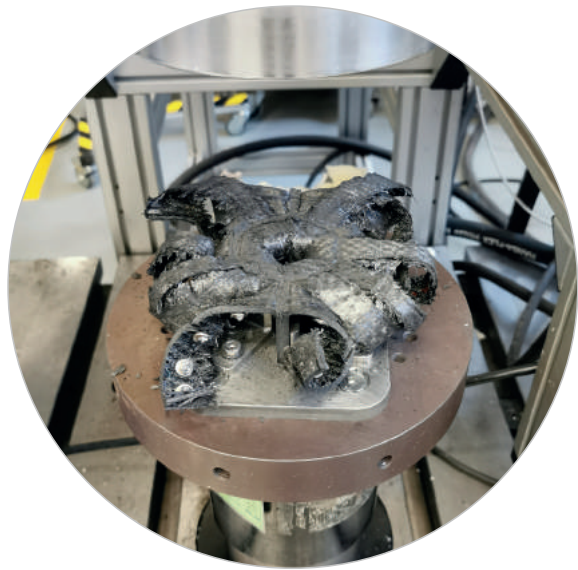
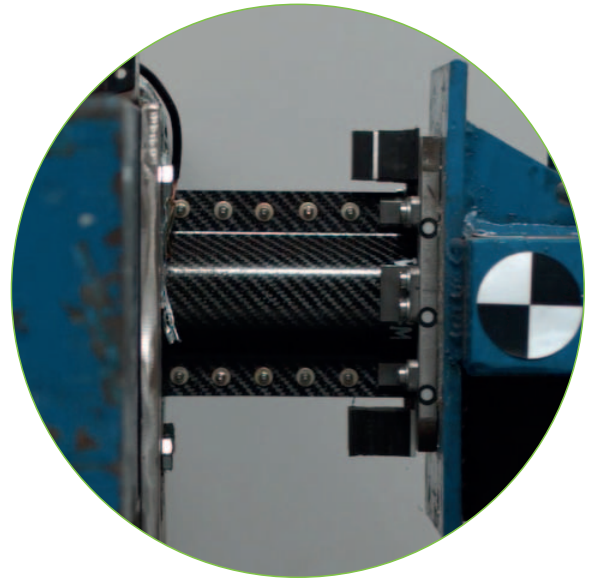
Thermoplastic composites

**IMPACT  
ENERGY  
ABSORBING  
TECHNOLOGY**

Łukasiewicz – Institute of Aviation has developed an innovative technology for the use of thermoformed composite materials, resulting in the ability to produce impact energy-absorbing components. Composite energy absorbers may find applications in various industries, primarily aviation and automotive.

## KEY FEATURES

- Weight Reduction: carbon fiber reinforced composites can be up to 70% lighter than steel and up to 40% lighter than aluminum with the same strength.
- Stable energy absorption characteristic without large peaks.
- Fast production rate: thermoplastic composites offer fast production rate with utilization of hydraulic press.
- Design based on numerical analyses validated by tests.
- Wide range of available materials: technology was developed for glass and carbon fiber composites with wide range of polymer matrices: PA6, PC, PPS, PEI, PEEK.

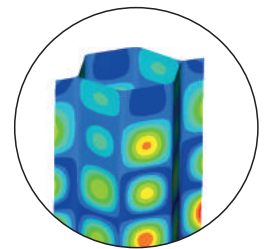
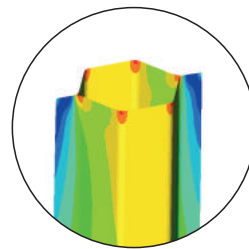


- Tailored design: composites allow for optimized crash box designs, customizing energy absorption capabilities for different applications.
- Corrosion resistance: thermoplastic composites don't corrode and offers high chemical resistance, providing durability in harsh environments.
- Integration and manufacturing efficiency: thermoplastic composites integrate well into existing production processes and offer joining flexibility [bolting, adhesive or welding].
- Recyclability: thermoplastic composites can be recycled into other products by remelting.

The technology was developed in the project: "Design of energy absorber of frontal impact for passenger vehicle (CRASH-BOX)" founded by Łukasiewicz Research Center and realized by consortium: Institute of Aviation and Automotive Industry Institute.

## POSSIBLE USE

- **Aircraft Seats (helicopters, GA planes, UAV etc)**  
This is particularly important for enhancing passenger protection during crash landing or impacts
- **Aircraft floors and landing gears**  
The cockpit flooring and landing gear can be reinforced with composite absorbers incorporated into light energy-absorbing beams that increase ability to dissipate impact energy.



- **Automotive front and back crash boxes**  
Customization allows for tailoring crash boxes to meet specific requirements, with simulations and live testing ensuring optimal performance in vehicles.



The Łukasiewicz Research Network – Institute of Aviation offers a wide range of specialized research, engineering services and products. We provide comprehensive solutions, ranging from dedicated analyzes, simulations, engineering design, through the selection, testing and certification of materials and structures, to rapid prototyping and additive manufacturing.

al. Krakowska 110/114, 02-256 Warsaw, Poland  
e-mail: [info@ilot.lukasiewicz.gov.pl](mailto:info@ilot.lukasiewicz.gov.pl) / [www.ilot.lukasiewicz.gov.pl](http://www.ilot.lukasiewicz.gov.pl)