

# Electrical properties of Friction Riveted joints on printed circuit boards

Helmholtz-Zentrum Hereon, Institute of Materials Mechanics, Solid State Materials Processing



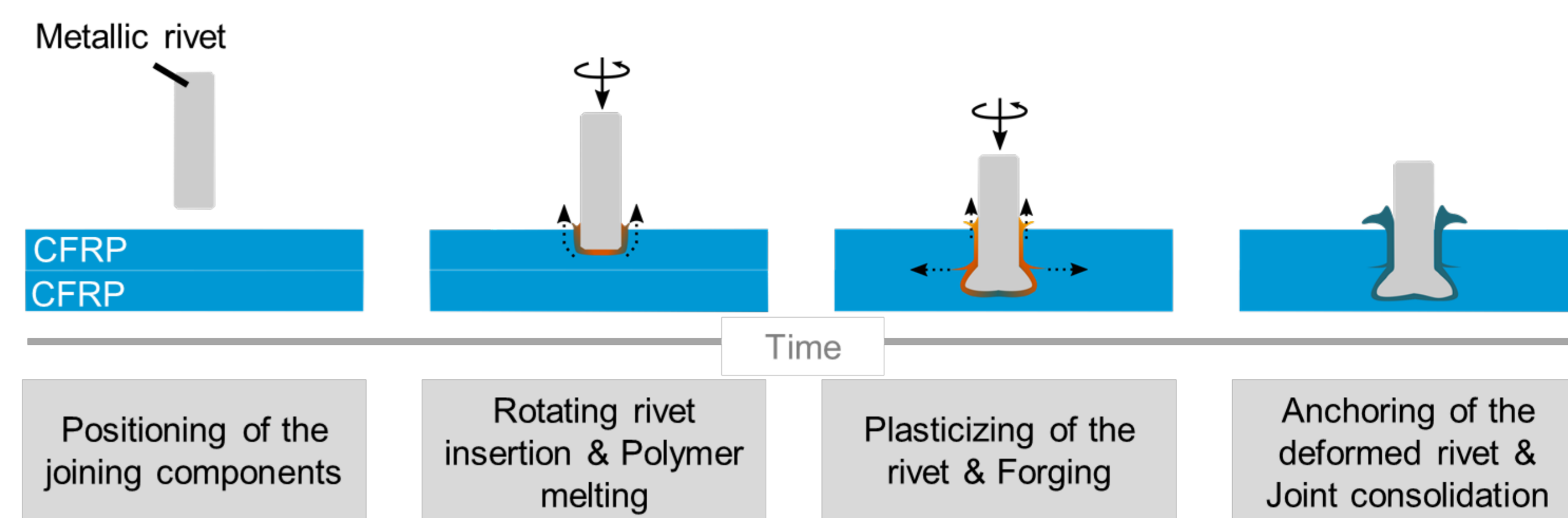
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## Introduction

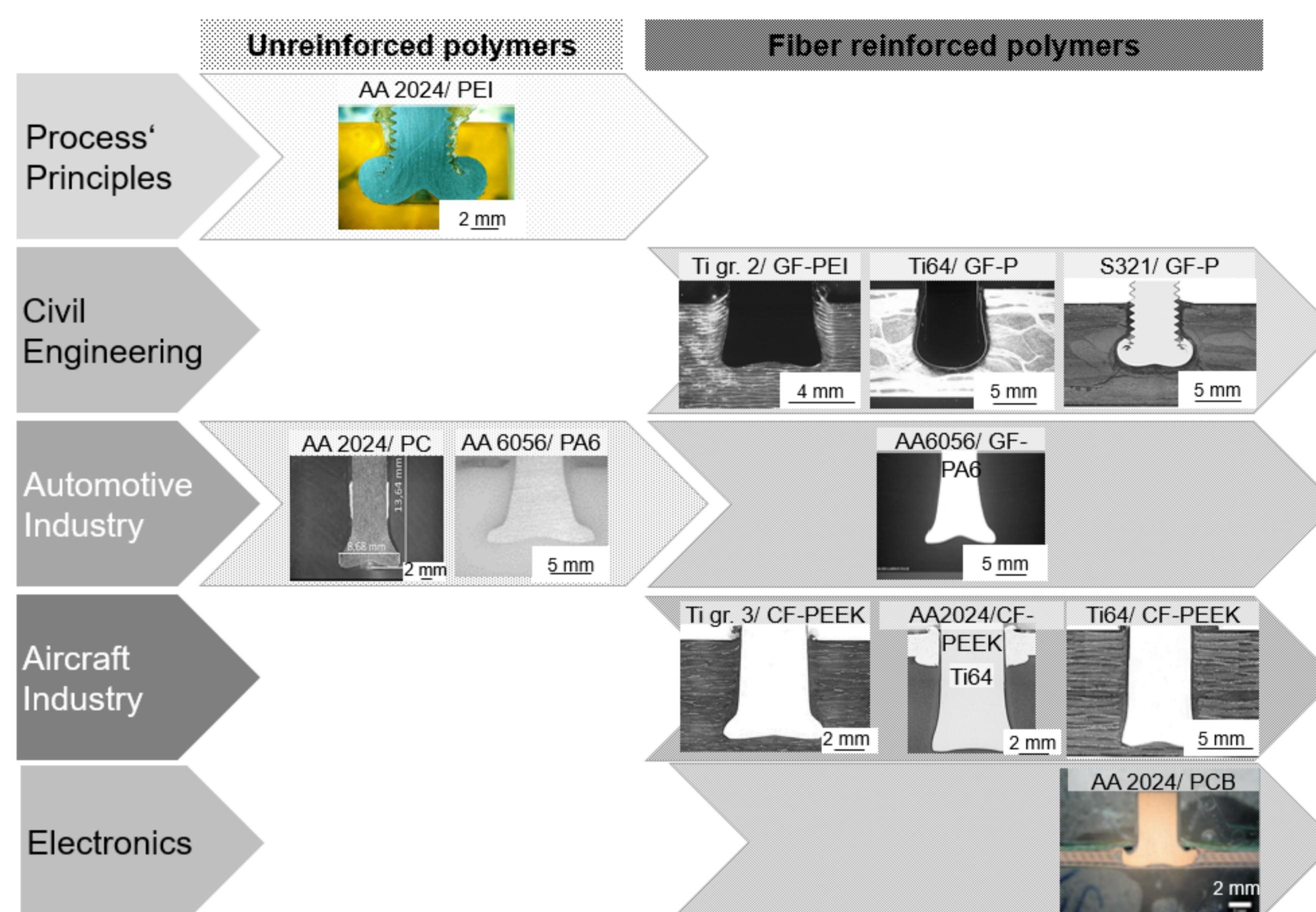
The Friction Riveting (FricRiveting) process was developed and patented at the Helmholtz-Zentrum Hereon and has been successfully investigated for a wide range of polymers/composites and metals for aircraft, automotive and civil engineering applications. Preliminary studies showed already the potential of applying Friction Riveting to both thermosetting and thermoplastic polymeric composites. The electronics industry, could benefit from this friction-based technique to overcome the limitations of current joining techniques (such as soldering and traditional fastening, i.e. surface preparation, thickness limitations, accessibility, etc.) for composites used in printed circuit boards (PCBs).

The scope of this work is to investigate the Friction Riveting process for PCB materials, with the main focus on the electrical properties of joined assemblies. Further activities will include down-scaling and scale effects, microstructural characterization and process-related changes in physical-chemical properties as well as basic rheological aspects. Process optimization through design of experiments (surface design, artificial neural networks, etc.) for application-relevant joint properties.

The work is integrated in the FricBoard technology transfer project in cooperation with Panasonic Industrial Devices Europe GmbH, Lüneburg. The place of employment is at the Helmholtz-Zentrum Hereon.



Schematic of the Friction Riveting process. Example of a standard metallic-insert joint on two overlapping composite plates.



Material combinations and applications investigated for Friction Riveting.

## Tasks

- Literature research (printed circuit boards, electrical properties of polymeric composites, tribology of polymers, fundamentals of polymer rheology, welding and joining of composites)
- Performing joining experiments and trials, respectively process optimization via design of experiments
- Joint characterization: microstructural analysis, temperature development, assessment of physical-chemical properties, determination of mechanical properties and fracture behaviour
- Presentation of the results and documentation of the experimental work (in English or in German).

## Contact

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