Reliable and Automated Connection of Printed Electronics to the Aviation Electrical System

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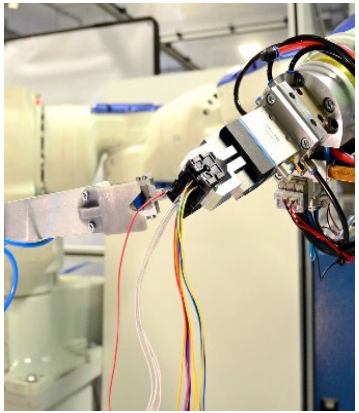
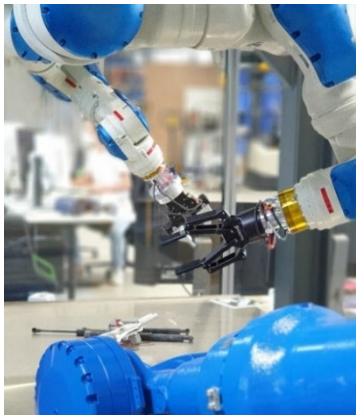
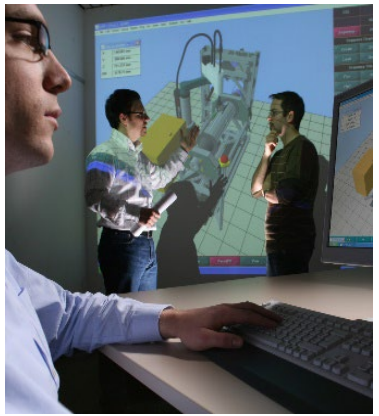
Agenda

- Introduction
- Completed Projects
- Identified Challenges
- Ongoing Projects
- Q & A

Institute for Factory Automation and Production Systems (FAPS)

Electronics Production	Electro-mechanical Engineering	Data and Power Networks	Home Automation
			

Institute for Factory Automation and Production Systems (FAPS)

Medical Technology	Robotics	Automation Technology	Engineering Systems
			

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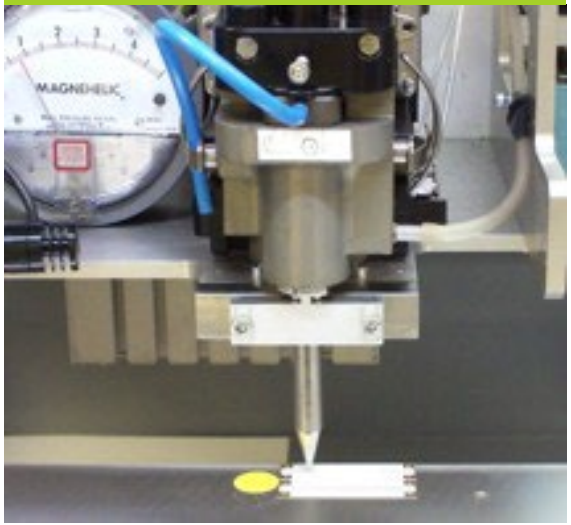
Project MiniHelix

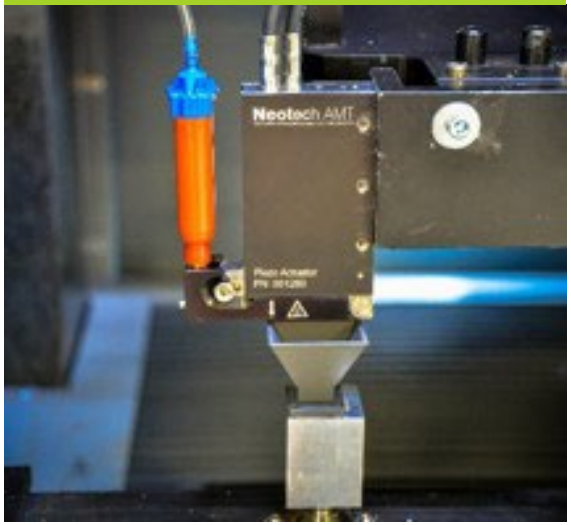
- Simulation of the antenna properties with CST Microwave Studio
- Evaluation of the applicability of various MID technologies for producing HF-compatible structures

Project MiniHelix

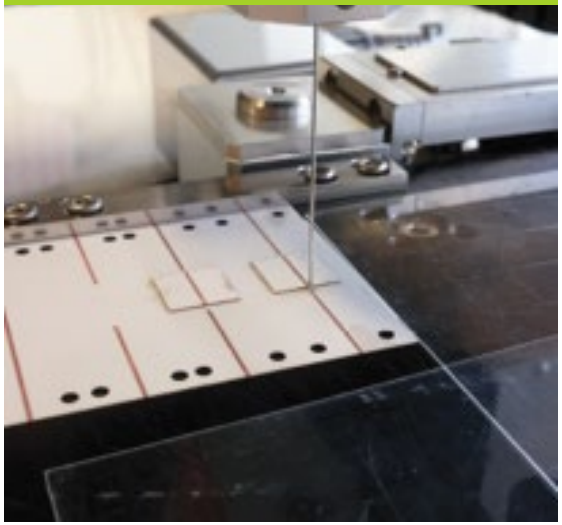
Aerosol jet



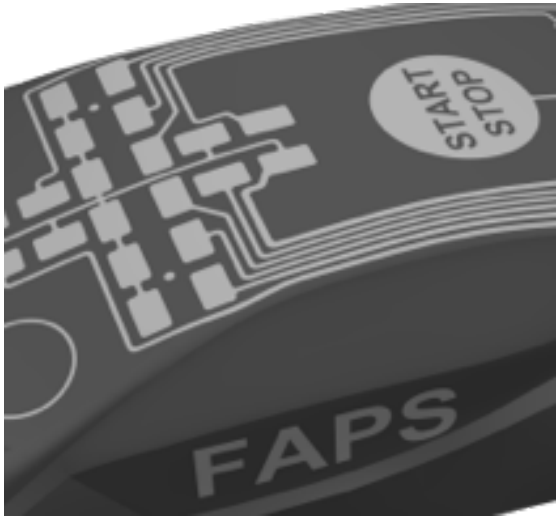
Piezo jet



Dispensing



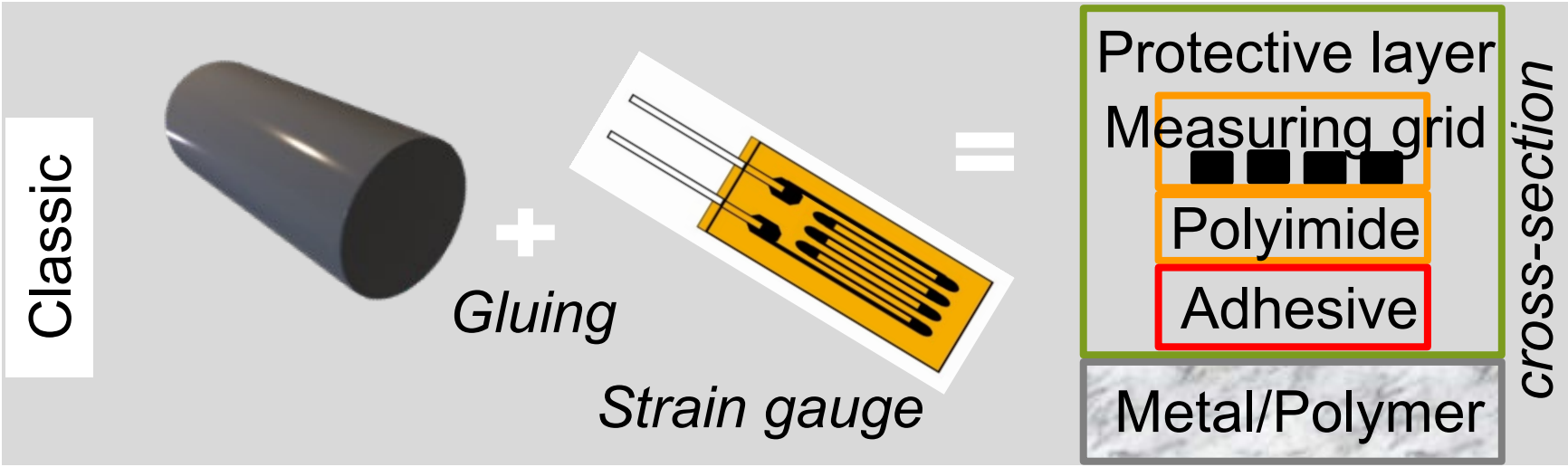
Project MiniHelix

Nano jet	LDS	Helix antenna (AJ)
		

Project PrESens

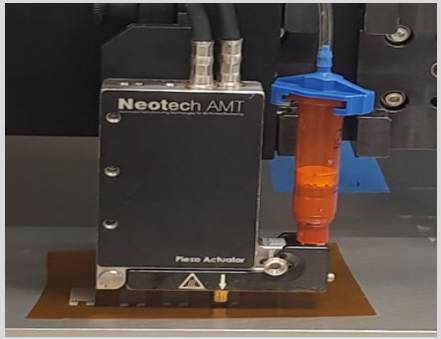
- Demonstration of the direct integration of strain gauges and temperature sensors on mechatronic test specimens
- Saving sensor assembly steps
- Suitability of various printing processes for sensor production (piezo jet, aerosol jet)
- Achievable tolerances and reliability

Project PrESens

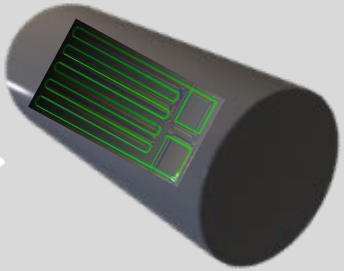


Project PrESens

PrESens



Digital printing



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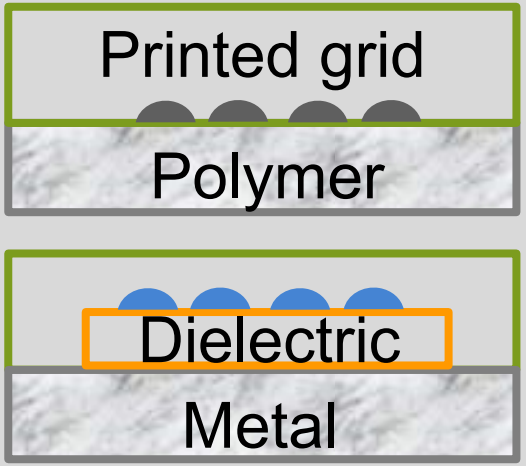
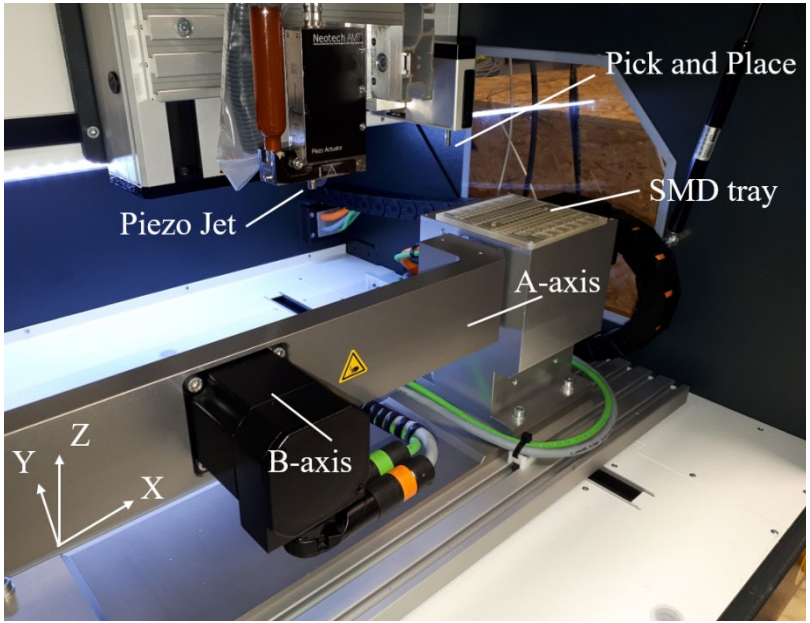
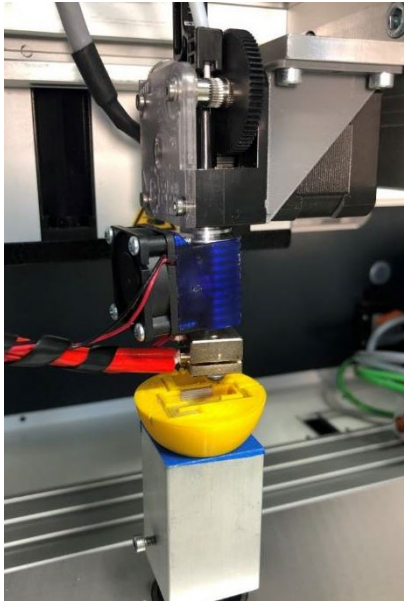


Process combination

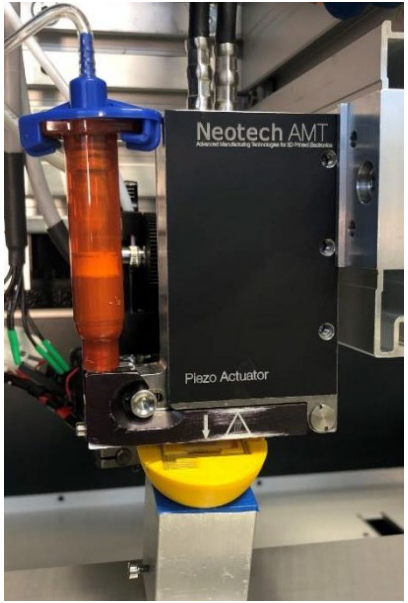
- Manufacturing individualized mechatronic integrated products by combining processes like FDM, Piezo-Jet, Pick and Place and NIR curing



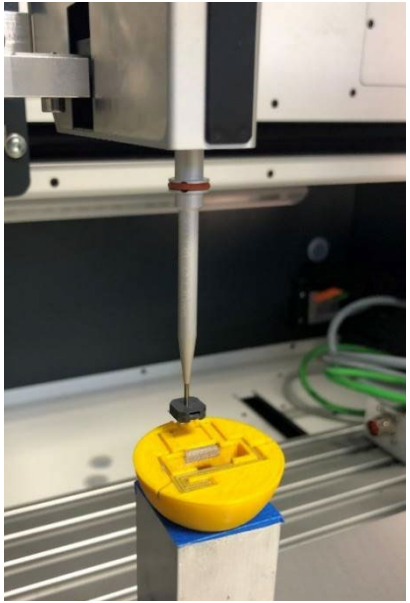
Process combination



FDM printing

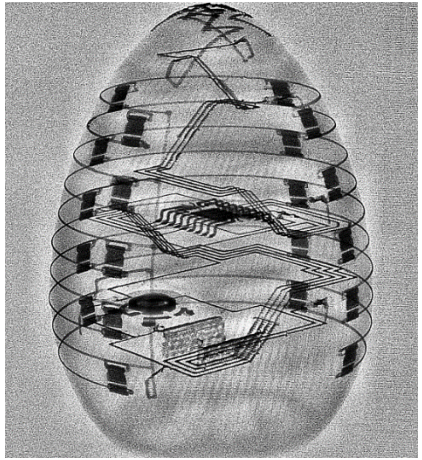


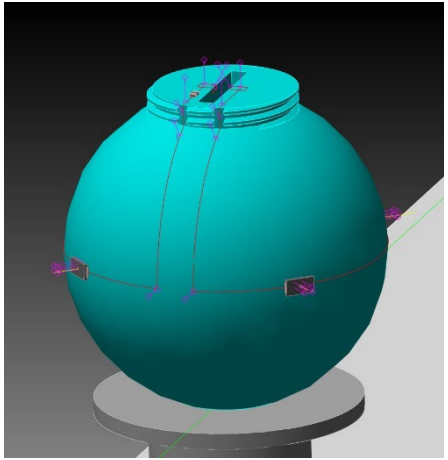
Piezo jet printing



SMD assembly

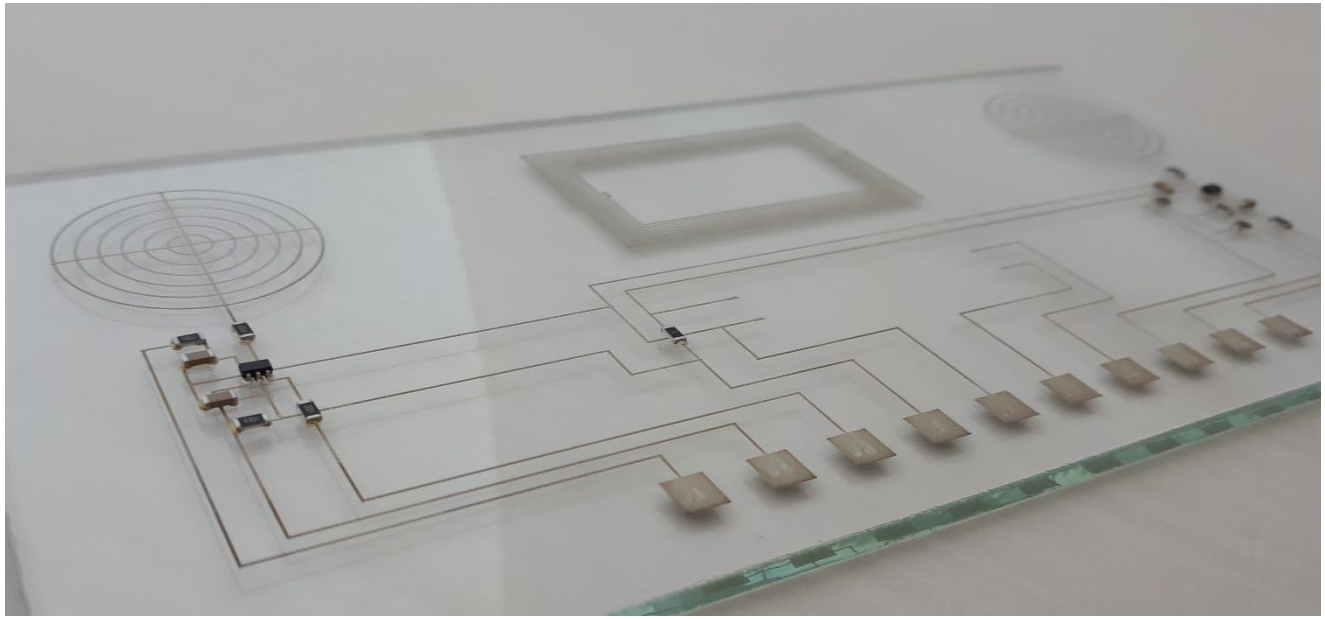
Process combination





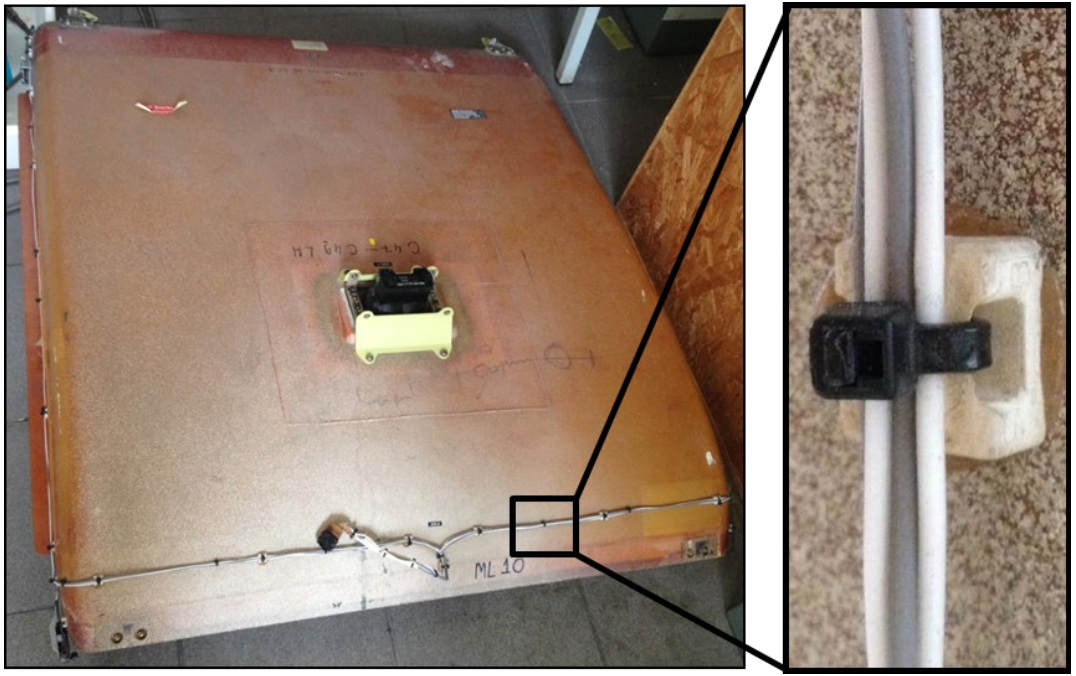
M. Ankenbrand, Y. Eiche and J. Franke, "Programming and Evaluation of a Multi-Axis/Multi-Process Manufacturing System for Mechatronic Integrated Devices," *2019 International Conference on Electronics Packaging (ICEP)*, Niigata, Japan, 2019, pp. 273-278

Process combination

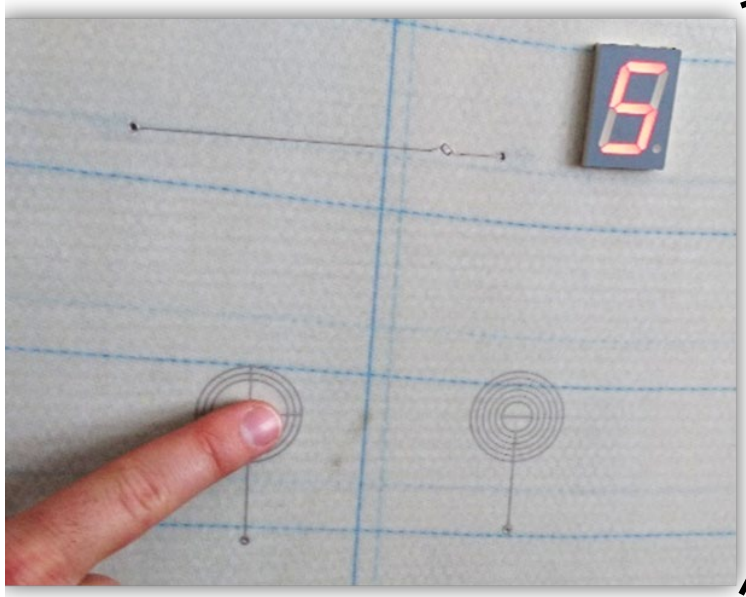


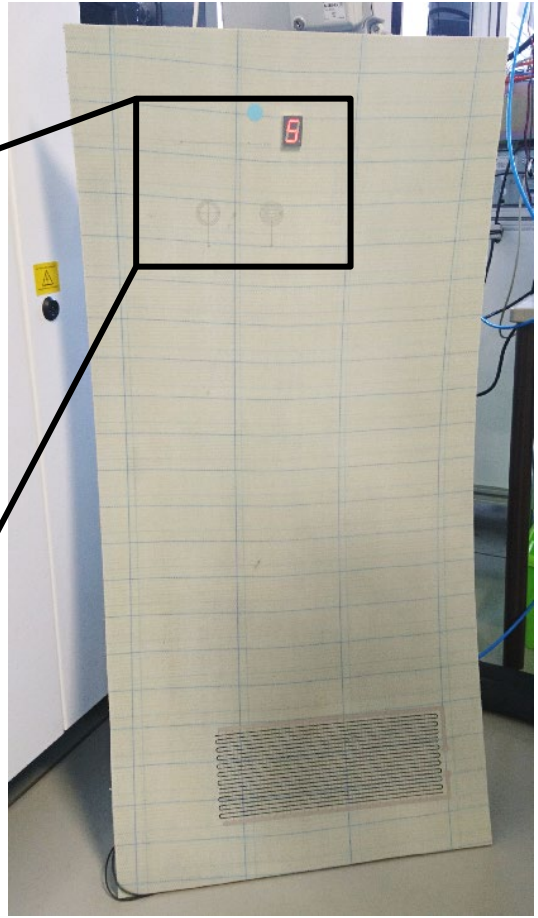
Process combination

Aviation research



Aviation research





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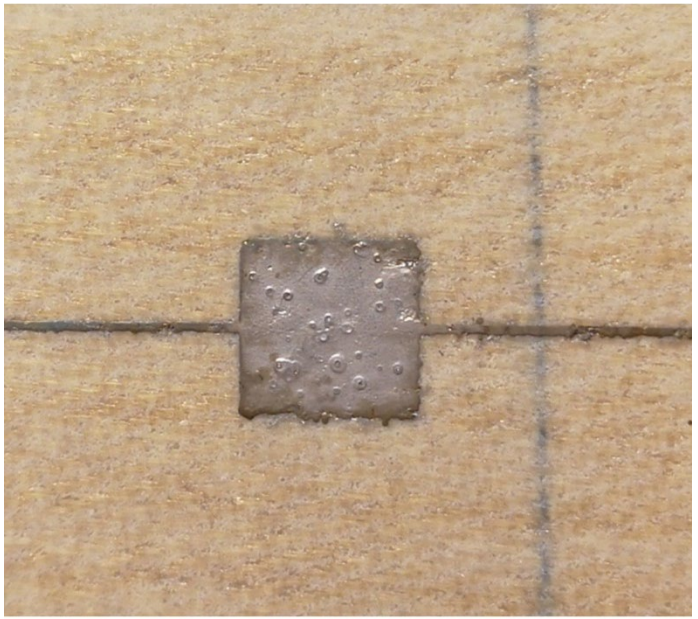
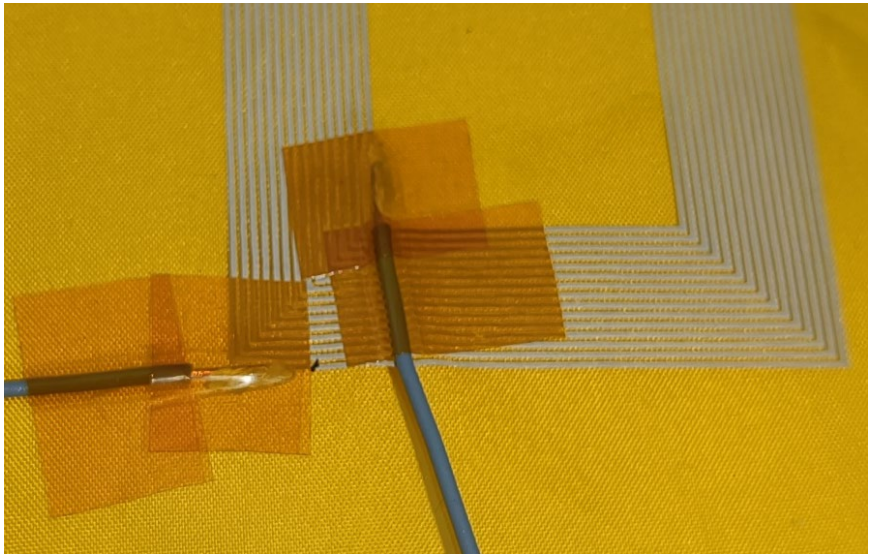
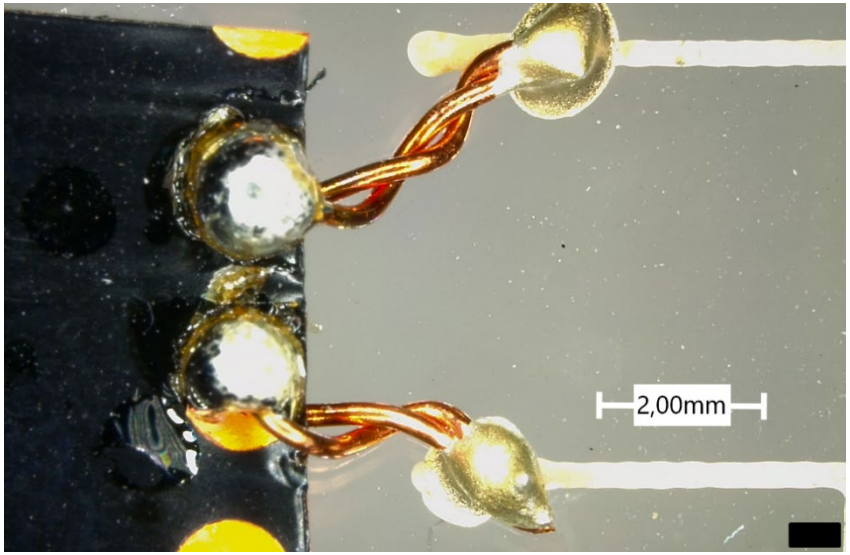
Challenge - Conductivity and Reliability

- Ag: 61 MS/m,
  silver pastes: ~ 2 – 7 MS/m
- The more flexible, the less conductive



Challenge - Contacting





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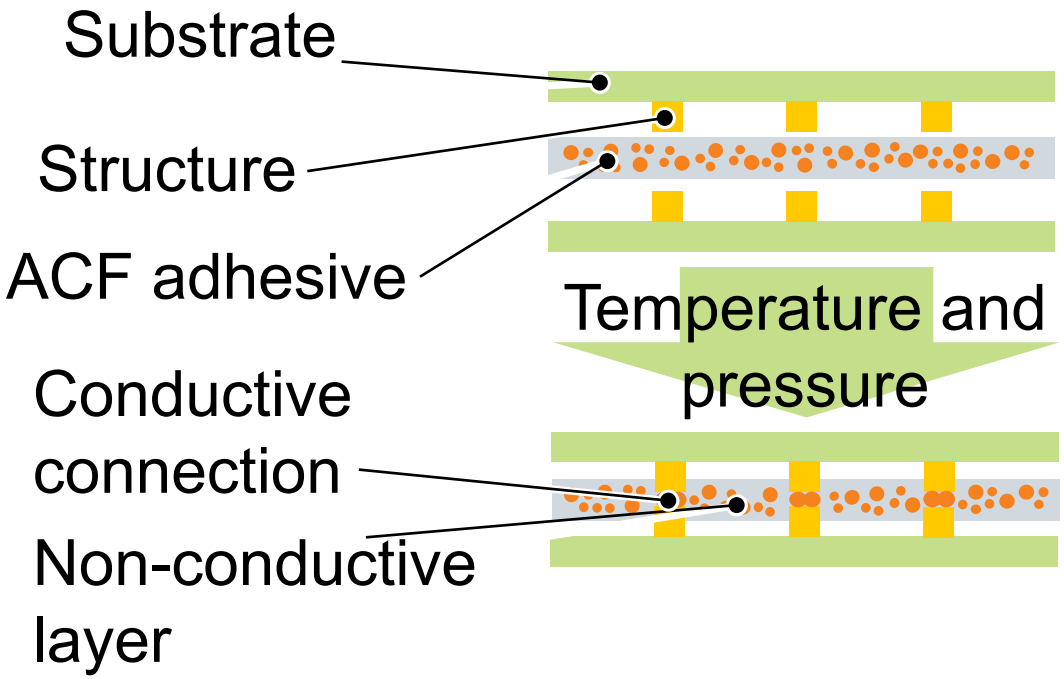
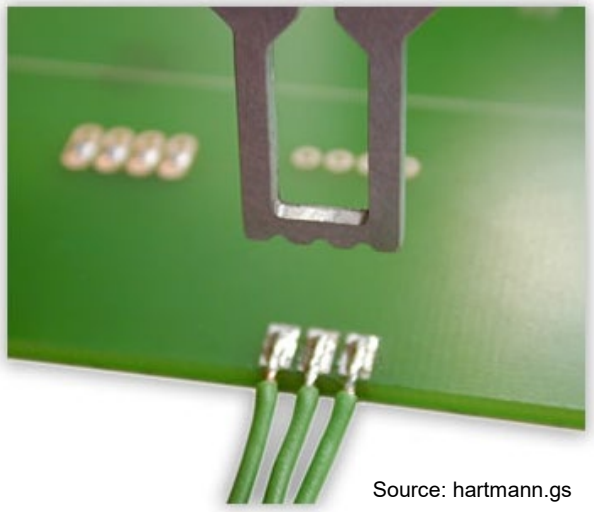
Project PrInterfaces

- Motivation: Challenges of contacting PE
- Goal: Find reliable contacting methods
- Solution: Systematic examination of contacting methods
- ACF Heat seal bonding, Low-temperature soldering, Crimping, Press-fitting

Project PrInterfaces





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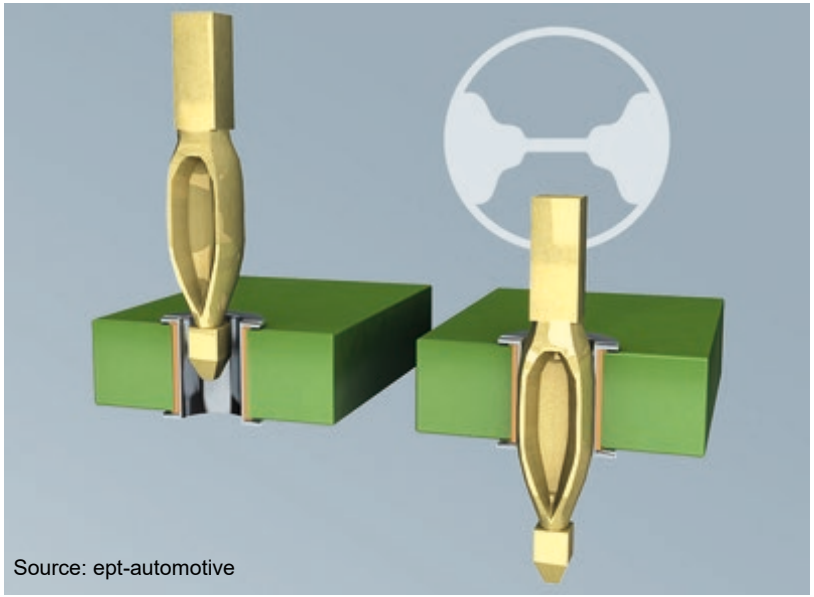
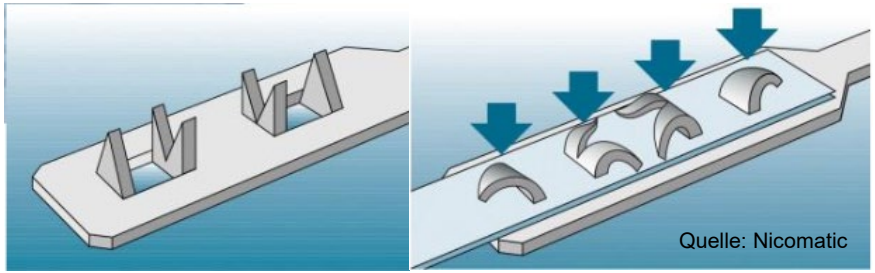
Project PrInterfaces

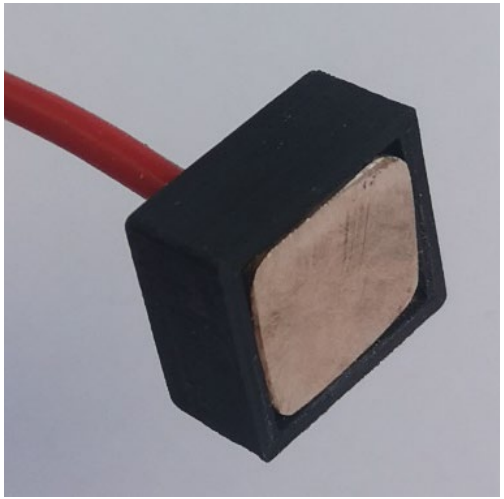




Project AngElo

- Motivation: Reducing the amount of wiring on the plane
- Goal: Development of a reliable connection to the PE
- Solution: Integration of a standard aviation connector

Project AngElo - Preliminary tests



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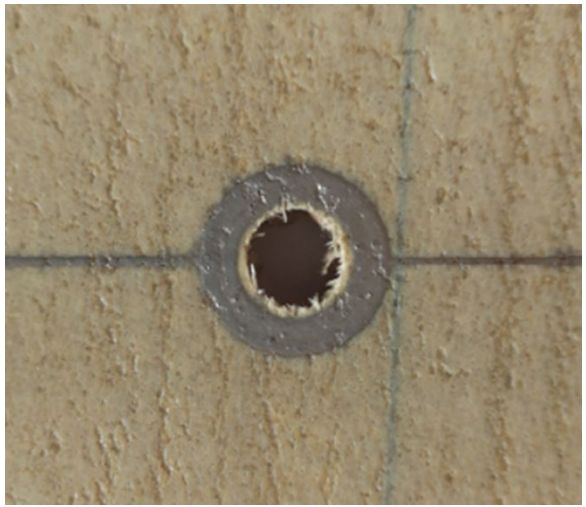

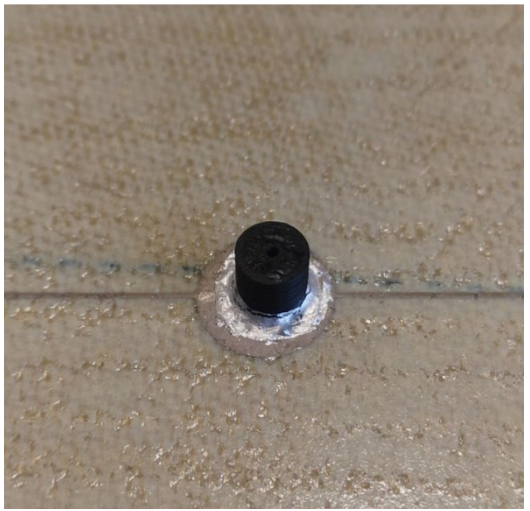

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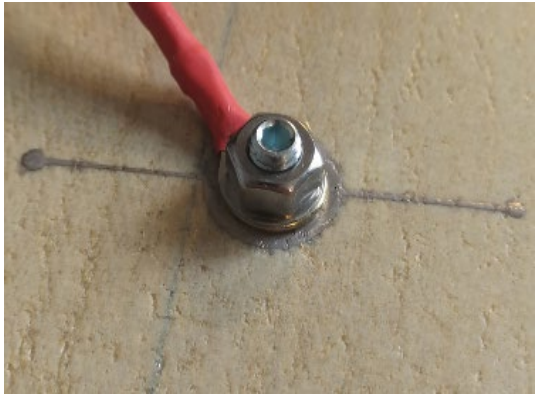
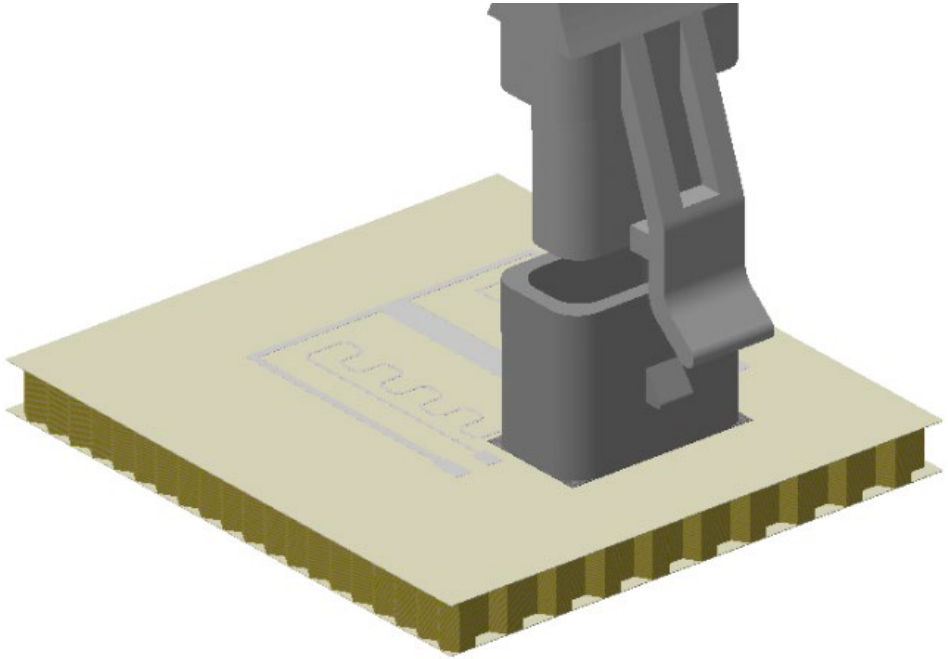


Project AngElo - Concept



THANK YOU!

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