

MSc Assignment

Metal-Polymer Joining by Infrared Heating

Metal-polymer joints are important due to their ability to combine the strength of metals with the flexibility and design freedom of polymers. They enable lightweight design, material compatibility, and design flexibility, making them valuable in industries such as automotive, aerospace, and electronics. Traditional methods have limitations in terms of bonding strength and reliability. Infrared heating offers a potential solution, but its adaptation for metal-polymer joining is still relatively unexplored. Therefore, there is a knowledge gap that needs to be addressed to utilize the full potential of infrared heating in this context.

**Approach:**

Joining metal and polymer materials is a challenging task due to the significant differences in their physical and chemical properties. The use of infrared radiation allows for localized and controlled heating, with potentials to enable the formation of strong and reliable joints between thermoplastics and other materials. However, there is still a need to optimize the process parameters and understand the underlying mechanisms to achieve enhanced bonding performance.



Within this assignment you will design and build a infrared joining setup for joining thermoplastic composites.

Research group

The *Surface Technology and Tribology* (STT) group will organize the research with a focus on surfaces and interfaces in an engineering context, as well as degradation mechanisms occurring at these surfaces and interfaces. This assignment will be conducted in connection to a PhD research project and in collaborative manner.

Tasks:

- Literature survey
- Design and building a setup including heating, alignment and press parts
- Bonding metals to thermoplastic composites
- Benchmarking the bond performance
- Analyzing and discussing the obtained results.
- Writing a scientific report

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