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AB2023

**7th International Conference
on Adhesive Bonding 2023**

13-14 July, 2023

Faculty of Engineering - University of Porto
Porto, Portugal

- FUNDAMENTAL ASPECTS OF ADHESION
- **THE SCIENCE AND TECHNOLOGY OF SURFACES**
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Development of bonding technology for aluminium alloys with various mechanical, chemical and laser beam surface treatment processes

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Environmental awareness and sustainability are the key objectives of various industries. In the automotive industry, lightweight construction and the development of environmentally friendly concepts play a prominent role. Environmentally friendly operation requires reducing the weight of vehicles, which results in lower emissions and energy consumption. There are several ways to reduce the weight of vehicles, such as the use of aluminium and its various alloys or mixed material combinations. A good bonding technology to achieve weight reduction is adhesive bonding. Another major advantage of adhesives in the automotive industry is their good sealing and vibration absorbing properties. The preparation of the surfaces to be bonded is necessary for the proper quality of the bonding technology [1-3].

In our research, we have carried out several mechanical, chemical and laser beam surface treatments on aluminium sheet to improve the adhesion of the surfaces. The effects of the surface treatments applied were investigated by wetting measurement, roughness measurement and microscopic examination. Bonded joints made of surface treated aluminium sheets were tested against tensile and shear stress and the type of failure of the joints was evaluated. All types of surface treatments have been successfully used to increase the adhesion properties of aluminium sheet on a wetting contact angle basis. Based on our tests, the best surface treatment technology for increasing the adhesion of aluminium sheets was found the laser beam surface treatment. The aluminium sheets, which had been surface treated by different processes, were also examined by scanning electron microscopy to reveal the different surface structures. Microscopic examination of the glued samples showed how the adhesive penetrates into the surface structures.

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