Rzeszow University of Technology
Faculty of Mechanical Engineering and Aeronautics

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ABSTRACT OF DOCTOR'S THESIS

Title: *Analysis of the influence of refill friction stir spot welding tool geometry for joining aluminum alloys sheets used in the aerospace industry*

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Abstract: The doctoral dissertation presents issues related to the Refill Friction Stir Spot Welding technology for joining sheets made of aluminum alloys used in the aerospace industry. Studies on the impact of the geometry modification of the front surface of the inner tool sleeve on the properties of welds and the effect of plasticization and mixing of joined materials are presented. The researches have shown that a properly selected geometry allows for higher load capacity and fatigue life of welds when joining clad sheets of 2024 aluminum alloy with an anode layer, compared to welds made with a tool without geometry modification. The usefulness of this joining method in the production of aircraft structures as an alternative to resistance welding was analyzed. As part of the verification of the usability of the RFSSW technology, an element of the pilots window frame structure of M28-05 aircraft was made, using the developed tool design, with replacing resistance welding and using anodized parts.