



Faculty of Engineering
University of Kragujevac



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10th International Congress Motor Vehicles & Motors 2024

ECOLOGY - VEHICLE AND ROAD SAFETY - EFFICIENCY

Book of abstracts



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and Motors



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ADVANCED WELDING TECHNIQUES: FSW IN AUTOMOTIVE MANUFACTURING

ABSTRACT: The process of joining structural elements of a vehicle plays an important role in the development of new models in the automotive industry. Among the various technologies represented in the automotive industry, the friction stir welding (FSW) technology has been increasingly applied in recent times. FSW provides high-quality welded joints, has high energy efficiency, relatively simple equipment, and the possibility of process automation. It is also the most environmentally friendly technology (no harmful fumes, harmful radiation, light flashes, or protective gas atmospheres), which is of great importance for the modern automotive industry. This automated friction welding process fits well with industries that have high-volume production, such as the automotive industry. Thanks to the application of this welding process, different, new, and more complex products have already been created in the automotive industry. On the other hand, car manufacturers are increasingly working on the design of products made from mixed or hybrid materials, where it is necessary to combine and join completely different metals, such as the joining of steel and aluminum, in order to reduce the weight of their vehicles. With traditional welding methods, joining different metals was not possible. Additionally, the use of industrial robots enables the application of the FSW process for joining materials along complex joint line configurations, as well as joining sheets and plate materials in all welding positions. This paper presents the basic principles of the FSW technological process. Then, all the technological components of this welding process are described. The physical essence of the process itself is based on the interaction of an appropriate tool with the base material. The rotation of the tool through the base material ensures the release of mechanical energy as a result of intense friction and mixing of the welded material. This mechanical energy is converted into heat, which heats the material in the joining zone, thus forming a continuous, high-quality weld. The paper presents examples of the application of FSW in the automotive industry by leading global manufacturers.

KEYWORDS: welding, friction stir welding, welded joint, automotive manufacturing, steel

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