World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:18, No:06, 2024

Basic Characteristics and Prospects of Synchronized Stir Welding

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Abstract : Friction Stir Welding (FSW) has been widely used in the automotive, aerospace, and high-tech industries due to its superior mechanical properties after welding. However, when it becomes a matter to perform a high-quality joint using FSW, it is necessary to secure an advanced tilt angle (usually 1 to 5 degrees) using a dedicated FSW machine and to use a joint structure and a restraining jig that can withstand the tool pressure applied during the jointing process using a highly rigid processing machine. One issue that has become a challenge in this process is 'productivity and versatility'. To solve this problem, we have conducted research and development of multi-functioning machines and robotics with FSW tools, which combine cutting/milling and FSW functions as one in recent years. However, the narrow process window makes it prone to welding defects and lacks repeatability, which makes a limitation for FSW its use in the fields where precisions required. Another reason why FSW machines are not widely used in the world is because of the matter of very high cost of ownership.

Keywords : synchronized, stir, welding, friction, traveling speed, synchronized stir welding, friction stir welding
Conference Title : ICFSWP 2024 : International Conference on Friction Stir Welding and Processing
Conference Location : Riga, Latvia
Conference Dates : June 20-21, 2024