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| Session ID: PP2-12 | Paper ID: 203 | 09:30-16:00 / Oct. 23, 2019 |
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# The Microstructure and Wear Resistance of the Cu-Al Alloy Used in the Wire Arc Additive Manufacturing Process

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**Abstract:** In the paper, the results of the investigations of Cu-Al alloy are presented. The additive manufacturing technology has a capability for manufacturing the products with better mechanical properties than observed in the products manufactured by means of conventional technologies. The WAAM process, due to subjecting the material to alternate heating and cooling processes of high rates allows to manufacture products of microstructure free from the casting defects and large microsegregations which can affect the properties of final products. The WAAM technology gives the opportunity to build large parts from the different type of metal materials and 3DMP® process (developed by Gefertec GmbH), which belongs to the group of the WAAM techniques, was applied to obtain the samples intended for investigations from the Cu-Al alloy. The results presented were obtained during the implementation of the project which is aimed at development of new Cu-based alloys intended to be used as feedstock materials for building elements for the marine industry. Besides the corrosion resistance in the sea water, the new Cu-based alloys, development of which is the subject of the project, should reveal also the high wear resistance. In the paper, the results of tribological tests of the samples printed out by means of 3DMP® process and samples in the 'as casted' state as well as microstructure investigations results are shown.

**Keywords:** WAAM, Cu-Al alloys, wear resistance, additive manufacturing, microstructure

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# Automated Surface Finish of a Mirror-Like Stainless Mould Steel Using Ultrasonic Ball Polishing Process

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**Abstract:** The objective of this research is to develop an ultrasonic vibration assisted spherical polishing process on a three-axis and five-axis CNC machining center, respectively, in order to improve the surface roughness of a STAVAX plastic mold stainless steel and to reduce the volumetric wear of the polishing ball. The optimal plane surface ball burnishing and vibration assisted spherical polishing parameters have been determined by conducting the Taguchi's L9 and L18 matrix experiments, ANOVA analysis, and the verification experiments, respectively. The determined optimal burnishing parameters were as follows: the burnishing force