

26th National Symposium on Cryogenics and Superconductivity

Contribution ID : 55

Effect of cryogenic cooling on the cutting temperature, surface roughness and chip thickness in turning Aluminium 5083 alloy

Friday 24 Feb 2017 at 15:45 (00h15')

Content :

The machining industries are interested in high material removal rates and product quality by using greater cutting velocity and feed rates in order to achieve better productivity. In the conventional process, the cutting fluid, when applied in the cutting zone, fails to enter the chip tool interface and hence fails to reduce the cutting temperature. The usage of conventional coolants is not so effective and moreover, it imposes major environmental problems due to the chemical breakdown of the cutting fluid in high temperature and it contaminates water and soil during huge disposal. The quality of dimensional accuracy of the product is also greatly affected. Cryogenic machining is an alternative method in which the machining operation is done using cryogenic coolant as the cutting fluid.

Aluminium 5083 alloy is taken as the test specimen, which has high industrial relevance. Liquid Nitrogen is selected as the cryogenic cutting fluid and a commercial emulsion fluid is selected for wet machining. A comparative study of turning operation is done using normal wet coolant and cryogenic coolant as the cutting fluids and the process parameters like cutting temperature, surface roughness and chip thickness are used to draw the results and conclusions of the research work.

Summary :

The cryogenic liquid nitrogen is used as the cutting fluid for turning aluminium 5083 alloy for better product quality compared to the conventional wet turning operation.

Primary authors : Mr. JAIS, Jibi (PG Scholar)

Co-authors : Dr. ROY, K E Reby (Assistant Professor)

Presenter : Mr. JAIS, Jibi (PG Scholar)

Session classification : Technical Session 12

Track classification : Societal & Other Applications of Cryogenics & Superconductivity

Type : Contributory Talk