

Wichita State University
Department of Industrial, Systems, and Manufacturing Engineering
ISME Colloquium Presentation

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Title: The Flow Stress of AM IN 625 under Conditions of High Strain and Strain Rate
Date: Friday - September 14, 2018
Time: 1:00 pm - 2:00 pm
Location: Clinton Hall, 214

Abstract

Additively manufactured (AM) nickel superalloy (In 625) with known processing history and quasi-static properties has been investigated under extreme strains up to about 100% and strain rate up to about $10^4/s$ by machining. A model for the calculation of the component of force that is due to indentation by the tool cutting edge was utilized to correct the measured shear force and material flow stress. The results are compared to flow stress measurements produced by Kolsky compression testing under strains of about 25% and strain rate of about $10^3/s$. The highly instrumented setups utilized for the machining testing made possible an accurate description of the strain and strain rate at the primary shear zone (PSZ), and the temperature at the tool rake face that prevailed throughout the machining. The strain and strain rate were determined by digital image correlation. The temperature was determined by through-the-tool thermography. Differences observable during the cutting and dynamic compression of additive and wrought In 625 are outlined.

Speaker Biography



Homar Lopez-Hawa is currently a PhD student majoring in industrial engineering at the Industrial, Systems and Manufacturing Engineering Department of Wichita State University. Since he joined Wichita State University, in January 2017, he has worked as a graduate research assistant in the Advanced Manufacturing Processes Laboratory. His current interest include analysis of the mechanical behavior of additive materials, specific to metals, under extreme conditions; as well as industrial automation and electronics. He holds a BS in Electronics Engineering, Suma Cum Laude, from the PUCMM, which he received in 2016. He has presented his work in conferences and University presentations, such as GRASP and the WSU Engineering Open House.