THE UNIVERSITY OF ARIZONA

SIE Seminar

A Supply Chain Model for Additive Manufacturing: A Medical Case Component

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2:00-3:00 PM

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This presentation presents an exciting new topic for industrial/manufacturing engineering – using Additive Manufacturing (AM), or 3D Printing as it is commonly known in the press, to produce unique one-of-a-kind parts. Although AM has held the promise of making functional metal components directly from a CAD model in 1-2 days with very little human interactions, deficiencies associated with AM makes this vision difficult to achieve. For instance, parts coming from a metal AM process are typically the texture of a casting, meaning that they require finishing operations of some sort. This cast like surface also affects the mechanical properties of the component often leaving these parts with less than desired fatigue properties.

Engineering a product that uses AM as a foundational process component will require major changes for the way a product is engineered. The rules that have been used to design a product no longer hold as “truths” because the cost of geometric complexity is no longer a major cost driver. The basic method for engineering a unique medical product will be discussed. Perhaps more importantly, the ***Supply Chain*** for parts produced using AM is still ill-defined.

This presentation will provide a number of *component models* for the elements that will make-up the ***AM Supply Chain.*** With these elements as building blocks, an architecture for the ***AM Supply Chain*** will be proposed, and a simulation model for a medical product (a uniquely customized hip stem) will be described. A simulation model for the ***AM Supply Chain*** will be described with a focus on the resources needed in the supply chain. The simulation model will be used to estimate where the resources might be located as well as to define the number of these resources that will be required and the cost associated with producing a product using this method. The model shows that this methodology will provide an economically viable pathway for the next generation of medical devices to be made.

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