

Establish a Consortium for Environmentally Conscious Advanced Manufacturing for Economical Growth in Kentucky

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Background & Significances:

Advanced Manufacturing Systems (AMS) need to know how to respond to challenges of integrating environmentally conscious technologies, techniques, strategies, training, and objectives (synergetic outcomes) into their daily operations, and, thereby, find opportunities to lower costs, increase profit, and enhance research collaboration & educational activities while managing to limit environmental impact. The AMS managers also increasingly face challenges in complying with changing environmental laws in Kentucky. So, AMS needs a competitive advantages and better bottom lines, and also environmentally responsible design and production methods, standards, research, and training to meet the demand of stakeholders, customers, regulators, employee, and statewide community.

Major Objectives:

The main objective of this proposal is to establish a consortium for environmentally conscious AMS that performs research & development (R&D) in new materials, design & process for wide range of application such as aerospace, transportation, and health in order to stimulate Kentucky's economy. The outcomes of this consortium are methods, standards, and training for AMS which go far beyond traditional methods that cover only regulatory compliance. To stimulate Kentucky's economy by developing integrated approaches centered on innovative methods and trends in design and manufacturing, the consortium will focus on R&D in environmentally friendly processes, design, and applications that results in a series of methods, standards, and sustainable training in the following areas::

1- *Design for Environment Considering Environmentally Benign Manufacturing:*

Stresses the important of instituting environmentally benign AMS practices in several classes of AMS processes including machining, metal casting, metal joining, metal forming, and plastics injection molding. Potentially offensive pollutants and byproducts are identified. Then, Designing for Environment that should meets the requirements.

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(By Dr. N. Joshi)

2- *Manufacturing Systems Evaluation*: Establishing the baseline of where an AMS plant is today and what is needed to improve current systems and processes. (by Dr. K. Jenab)

3- *Prevention of Metalworking, Metal Finishing, and Electroplating*: The current utilization of metal working in AMS operations is harmful to the environment and to the health of workers. This part provides a set of strategies to minimize the life-cycle environmental and health impact of metalworking processes. (by Dr. Q. Xu)

4- *Air Quality in AMS*: Air quality in the work place has been identified as a challenge in AMS that results from fumes, smoke, mist, etc. This part research gaps and emerging air-quality issues that should be considered while AMS managers continue to strive to improve healthy workplaces. (by Dr. K. Jenab)

5- *Environmentally Conscious Electronic Manufacturing, Disassembly for End-of-Life Electromechanical Products*: This part focuses on manufacturing improvement by studying environmental responsibilities within AMS products, process design, electronics manufacturing. Also, the research goes far beyond process and investigates disassembly as the first step of recycle and recovery of end-of-life for AMS products. (by Jorge Ortega-Moody)

6- *AMS Energy Efficiency*: This part focuses in the important of energy conservation in the AMS and the resulting benefits in terms of economics and the environment. Methods will be developed for AMS based on U.S. Department of Energy –funded Industrial assessment Centers (IAC). These methods introduce efficiency measure that are attractive for AMS facilities to implement on account of cost reduction, increased profitability and reduced environmental impacts. (by Dr. W. Grise)

7- *AMS Environmental Compliance Regulations*: Studying how environmental regulation has evolved in the Kentucky State and provides the AMS with a common sense approach to understanding this subject. (by Dr. N. Joshi)

8- *Reusability in AMS Reverse Logistics*: Green manufacturing has gained a lot of interest from both environmental and economic perspectives. The most environmentally conscious strategy in the reverse logistics is reusing old products, which can lead to additional profits for producers. This part proposes reusability evaluation models in reverse logistics that impact on economics and the environment. (by Dr. K. Jenab)

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