

## DAGSI Research Topic Template

1. **Research Title:** Manufacturing Process Monitoring & Control
2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:**

Mechanical Engineering, Electrical Engineering, Manufacturing Engineering, Industrial Engineering, Materials Science & Engineering (MS or PhD level).

4. **Objectives:** The overall goals of the project are to identify and better understand the key challenges associated with implementing process monitoring & control concepts in aerospace manufacturing processes. The project will demonstrate closed-loop control of a scalable process, including identifying opportunities for optimal data management and analysis.

5. **Description:**

While chemical engineers have built process models based on unit operations for decades, and electrical engineers have similarly applied accurate models to the design of intricate circuits, complex manufacturing processes have proven much less amenable to model-based descriptions. Rapidly increasing computational power combined with the proliferation of low-cost data, however, are beginning to transform manufacturing. A new Industrial Internet of Things provides an opportunity for pervasive in-situ process monitoring with closed loop control, which could significantly increase agility for manufacturing sectors such as aerospace, which are typically driven by high-value, low-volume products.

This project will combine in-situ process monitoring, materials/process models, and process control algorithms to demonstrate closed-loop control for at least one aspect of a manufacturing process. Ideal processes would provide the opportunity for rapid characterization and feedback needed for real-time control, and they would also focus on manufacturing processes with significant aerospace impact. Although the investigation may focus on a lab-scale process, it should be representative of processes used at a manufacturing scale. Finally, the project should investigate and demonstrate approaches for managing and analyzing the significant data associated with closed loop process control.

6. **Research Classification/Restrictions:** This research is unrestricted, and the results will be in the public domain.
7. **Eligible Research Institutions:** Universities & AFIT