

Technology Project Abstract:

TMP 3a – Integration of ICME with Legacy and Novel TMP Processing for Assured Properties in Large Titanium Structures



Lead Industry Partner: GE Aviation
Technology Pillar: Thermo-mechanical Processing

Lead Research Partner: The Ohio State University

Project Summary

This project focuses on reducing costs and development time for designing and testing titanium components by developing and validating integrated computational materials engineering (ICME) modeling.

Technology Gap / Need

- More affordable, lighter weight, and improved performance is demanded by military systems and commercial products, and new design and manufacturing processes using titanium alloys can help meet those demands.
- Widespread manufacturing use of titanium alloys is typically hindered by high material costs and long development times required because there are limited analytical simulation tools to replace “trial and error” design and testing approaches.

Project Summary

This project focuses on the development of advanced analytical models that can more accurately predict material properties, structural performance, and fatigue properties of titanium components.

Proposed Technology

This project will focus on solid-state joining and powder metallurgy processes (e.g., net-shape hot isostatic pressing (HIP)) of similar and dissimilar materials for the production of machining and forging preforms.

Project Benefits

The project will lower the costs and increase the performance of titanium alloy-based components, which are significant benefits to many defense and commercial companies. The computationally-based tools may reduce by 50% both the time and cost for materials development and component design.

These tools will also permit the manufacture of components with enhanced local properties, and in some cases, lower weight. This is especially important for components in aerospace and transportation applications.

Workforce and Educational Impact

The members of the proposed project will participate in an educational program designed specifically to qualify engineers in the use of the computational models from this project. This workforce development program will focus both on the computational models and the necessary materials characterization that often will be needed to exercise the models.

Period of Performance

Start Date: September 2015
End Date: March 2018

Funding

Total Project Value: \$6.4M

Participants

Industry Partners

Boeing
GE Aviation
Scientific Forming Technologies Corporation

Research Partners

EWI
Purdue
Southwest Research Institute
The Ohio State University
University of Michigan
University of North Texas

