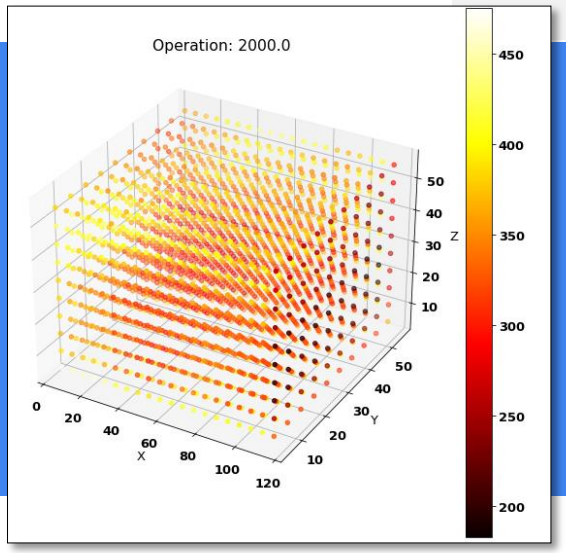
Industry
Aerospace

Applications
Data Modeling,
Operational Efficiency,
Sensing

Solutions
Energy Savings
Cost Reduction
Operational Efficiency

CESMII
THE SMART MANUFACTURING INSTITUTE

PROJECT CASE STUDY
Smart Thermal Processing



PROJECT LEAD

Honeywell

PROJECT TEAM

Virginia Polytechnic Institute and State University, Seco Vacuum Technologies LLC

PROJECT OBJECTIVE

This project will develop Smart Manufacturing technologies for thermal processes essential to US manufacturing with a primary goal of reducing energy consumption and improving processing yields.

MORE ON CESMII.ORG

Smart Thermal Processing Yields a 36% Reduction in Energy Use at Honeywell Brake Plant

BENEFITS TO OUR NATION

Per a Department of Energy (DOE) study, thermal processing accounts for more than 60% of energy usage in US manufacturing. Energy use reductions for thermal processing are difficult to achieve because thermal process equipment is typically a very large and very hot opaque box with complicated multiscale reactions happening for long and uninterrupted periods of time. This problem is common across many industries, offering a significant opportunity to leverage recent advances in smart manufacturing (SM) technologies that will benefit a very large portion of the US manufacturing base.

BENEFITS TO INDUSTRY

This project will accelerate the use of Smart Manufacturing in thermal processes, providing the impetus to kick start development and commercial implementation. The CESMII collaboration will enable cross-process innovations focused on thermal processing functionalities that can be applied to coating, heat treatment, brazing, and deposition processes.

PROJECT DESCRIPTION

TECHNICAL APPROACH

This project is structured into 3 primary segments:

1. Defining a Smart Thermal Processing implementation strategy
2. Implementing initial Smart Manufacturing sensor, monitoring and data analytics algorithms
3. Conducting manufacturing readiness trials in working manufacturing facilities

ACCOMPLISHMENTS

- Each of the SM technologies (Process Load Optimization, Predictive Health, Chemical Reaction Control) are being considered by the Honeywell IP counsel for patent submission and licensing opportunities. The finished applications will also be made available in the CESMII Smart Manufacturing marketplace.
- The Smart Manufacturing technologies designed during the Smart Thermal Processing project for thermal processes exceed the hypothesized energy use reduction in the statement of project objectives for chemical vapor infiltration deposition.

DELIVERABLES

- Identified energy use reduction opportunities of Part Load Optimization (PLO), Sensing, and Predictive Health (PH) technologies
- Implemented Part Load Optimization (PLO), Sensing, and Predictive Health (PH) technologies at Honeywell South Bend carbon brake disc manufacturing plant
- Conducted production trials at Honeywell facilities to validate PLO, Sensing and PH technologies for chemical vapor infiltration brake manufacturing

REUSEABLE OUTCOMES

- Predictive modules for thermal processing
- Part Load Optimization Application
- Chemical Reaction Control Application
- Predictive Health Application
- Predictive models to optimize batch load placement

RESULTS

$6M/yr

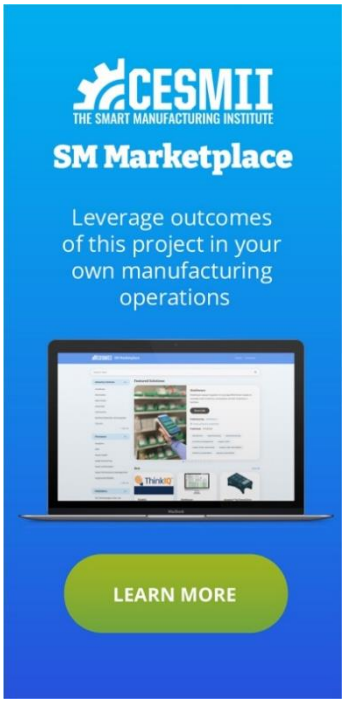
Potential energy savings when implementing Smart Manufacturing technologies on all products manufactured at the Honeywell South Bend plant.

36%↓

Chemical Reaction Control (CRC) Smart Manufacturing technology reduced energy use by 36% during trial runs of this project.

10%↓

Reduction in unplanned downtime for heat treatment equipment at the Honeywell South Bend Plant.



PROJECT DETAIL
Budget Period: BP4
Submission Date: 01/15/2023
Sub-Award (contract) Number:
4550 G YA097
SOPO: 2315

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