

OMIC R&D TECHNOLOGY BOARD

CONCEPTUAL ABSTRACT



TITLE: Integrating sensors into additive manufacturing processes.

RELATED ROAD-MAPPING DESIGNATION ID#: AM1

SUPPORTIVE INDUSTRY: SANDVIK, BLOUNT, MITSUBISHI, DAIMLER, BOEING, SILVER EAGLE

PROJECT TYPE: General Project - Additive manufacturing

PROBLEM STATEMENT (What Are We Trying to Solve?): 3d printed parts in certain applications are subjected to high forces and stresses. In these applications the location of sensors to record internal part condition is difficult if not impossible to achieve. The research of integrating sensors within 3d printed parts has a high value for these applications. The types of sensors to be studied can record temperature or force.

PROJECT DESCRIPTION: Steps to complete research on integrated sensors in 3d printed parts are the following:

- Define scope of project with input from supportive industry contacts on what parts and part geometries would benefit from integrated sensors during testing and use.
- Determine what 3d printer(s) industry members are currently using. Decide what type of sensor (temperature, force, other) would be suitable for these OMIC member companies.
- Determine method of applying sensors to parts. Will they be 3d printed or physically attached during the print. Determine functionality and design of 3d printed sensors.
- Experimental data collected from 3d prints of parts with imbedded sensors. Determine method to calibrate and validate that these sensors are recording accurate data.

Identify Related OMIC R&D Resources:

- Gefertec 3d printer and CAM software
- CATIA
- Sensor output gauge to record signal.
- Sensors/strain gauges currently used to test parts.
- MTS load frame or other mechanical testing apparatus.

PROJECT DELIVERABLES:

- Training on metal 3d printer
- Study of methods that would be useful for 3d printed sensors.
- Study of methods that would be useful for hand application of sensors during 3d prints.
- Selection of key OMIC members that can supply inputs and models of parts that need sensors, where they would be located, and what data they are intended to collect.

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- 3d prints of parts with both 3d printed sensors and hand applied sensors.
 - Testing/calibration of sensors imbedded within part.
 - Feasibility study of which member companies can use which technology depending on the type of 3d printers they have.
 - Final report, presentation summarizing results.