

OMIC R&D TECHNOLOGY BOARD

CONCEPTUAL ABSTRACT



TITLE: Integrating Fiber Optic Sensors in 3D Printing (Phase 2 of AM1)

RELATED ROAD-MAPPING DESIGNATION ID#: AM34

SUPPORTIVE INDUSTRY: Boeing, Oregon Tool

PROJECT TYPE: General Project

PROBLEM STATEMENT (What Are We Trying to Solve?): Optic fiber sensors are advanced in the high stability and large detection scale in temperature and strain measurement. In AM1 project, the OSU team has tested the feasibility of embedding optical fiber sensors into the metal structures produced by LPBF process. The new capability enabled measuring the distributed temperature and/or strain within a metallic part with a high spatial resolution of 1mm. However, due to the high-temperature nature of the laser spot, the control parameters of the printing process need to be carefully selected to avoid melting the fiber sensor.

PROJECT DESCRIPTION: This project will leverage the existing test results to optimize the control parameters of LPBF or LDED for integrating the optic fiber sensors during printing. Sample parts can be printed at the end of the project period to demonstrate the new capability. An investigation of alternate 3D printed materials that can be cost effectively for carbon fiber molds.

Identify Related OMIC R&D Resources: Proposing researchers should use their best judgment in deciding on the optimal resources for the research. To further aid in this decision, the OMIC staff has taken the initiative to best identify on-site resources (machines, equipment, and staff) that may relate to the scope of this research. Please recognize that researchers are not limited to these resources.

- Machines and equipment at OMIC can be reviewed at:
<https://www.omic.us/explore/facility>
- OMIC Staff or SMEs

PROJECT DELIVERABLES:

- Final Report
- Final Presentation
- Build apparatus

SPECIAL NOTE: It should be recognized that this Conceptual Abstract is written based on comments collected during OMIC R&D Road-mapping workshop and based on industries need for applied research. However, researchers as SMEs, are encouraged to lend specific technical

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feedback to further refine the Project Description and or Project Outcomes. The proposing researcher may do so either directly to OMIC R&D, or in the submitting proposal.

UTILIZATION OF OMIC RESOURCES: Researchers are encouraged to utilize the capital and personnel resources available on the OMIC R&D campus in their proposals. Use of OMIC time and machines should be included in the Proposal funding request. If use of OMIC resources are not identified in a proposal and are requested during, the project sponsor will be responsible for requesting a costed project amendment from the Tech Board.

PROJECT UPDATE EXPECTATIONS: Researchers are required to have monthly update discussion with OMIC R&D to provide a summary update on project status. This is done by way of a user-friendly format known as the OMIC 6-Block update. Typically, these meetings are scheduled on the first Wednesday and Thursday of each month. Secondly, depending on the scope of the project, OMIC R&D's industry Tech Board representatives are often interested in periodic project updates, and even in project participation. Researchers are required to communicate with supportive industry and facilitate communications as required.

PROJECT DURATION: It is OMIC R&D's strong preference that duration of a General Project aligns with the academic calendar cycle (July 2023 to June 2024). It is preferred that the project be completed by June 2024. Researchers are encouraged to factor in variables such as contracting, student hiring (if needed), procurement, holidays, and travel. It has been OMIC R&D's experience that a projects useful working duration is typically 9 to 10 months. Researchers are also encouraged to lend feedback, and to adjust the scope of work to best fit this preferred timeframe. Additionally, it is reasonable to even recommend phasing breakdowns to the project. In some unique circumstances, if the project is to take significantly longer than the duration of the academic year, this reasoning should be explicitly explained in the proposal.

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