OMIC R&D TECHNOLOGY BOARD

CONCEPTUAL ABSTRACT

TITLE: OMIC-AM24 Additive Materials Glossary P2 of OMP422

RELATED ROAD-MAPPING DESIGNATION ID#: AM24

SUPPORTIVE INDUSTRY: BOEING, DAIMLER, OREGON TOOL, SECO.

PROJECT TYPE: **General Project (Phase 2 of OMP422).**

PROBLEM STATEMENT (What Are We Trying to Solve?): The phase 2 of this project proposes to further improve our understanding of leveraging additive manufacturing (AM) technologies by:

1) Keeping the AM database up to date
2) Developing an AM technologies guide
3) Investigating material properties of select AM printers
4) Investigating the effect of annealing 3D printed parts

PROJECT DESCRIPTION:

1. The developed AM tool is a database of AM machines and their capabilities. This tool does not have all available printers, and only has a sampling of machines across the wide range of AM technologies. Additionally, this tool has an 'Add product request' feature. Continuously improving the tool by A) updating the database with requested machines, website searching, and requests to manufacturers, and B) providing release updates to the Access tool as necessary.

2. In addition to the access database, develop a document or webpage that will help novice users understand the different AM technologies and their capabilities as highlighted by the available machines. Provide a brief overview of the technologies and how they work and an easy to navigate summary of the database. For example, demonstrate the range of part size, materials, and accuracy that can be made using each technology using specialized queries within the database. Detail general cost ranges and post process requirements should be provided in this document.

3. In addition to database maintenance and upgrades, propose to collect material information on select AM machines currently at OMIC facilities (Gefertec Arc 605, Markforged X7). This includes tensile and ultimate strength in all directions, Young's modulus, elongation and fracture characteristics. Additionally, the project should characterize accuracy and surface roughness for the Markforged machine. This will enable OMIC to confidently predict the properties of parts that are made on their machines. This will also serve as a baseline to compare against materials in objective 4.

4. The project should investigate methodologies to improve material properties of parts manufactured on these devices. Preliminary research in labs indicate that annealing Onyx parts made on the Markforged 3D printers can improve mechanical properties, thereby increasing strength by greater than 60%, and improving the consistency of the parts. The project should further investigate this by performing tensile test, flexural test, fracture analysis, and other material tests on parts post-processed with a variety of annealing temperatures and cooldown rates.

Identify Related OMIC R&D Resources: Proposing researchers should use their best judgement 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.

- Identify OMIC machines: The spectrum of capabilities at OMIC R&D can be reviewed at the following link: https://www.omic.us/explore/facility
- OMIC Staff: Kyle McGann.

PROJECT DELIVERABLES:

- Enhance electronic tool for decision making on additive method selection
- Related training material for electronic tool utility
- Plan for long term continuous maintenance & updates
- Final report
- Final presentation

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 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 2022 to June 2023). It is preferred that the project be completed by June 2023. 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.

CONTACTS AT OMIC R&D:

Urmaze Naterwalla
Head of R&D
Urmaze.Naterwalla@oit.edu

Craig Campbell
Executive Director
Craig.Campbell@oit.edu

Jen Kammerman
Executive Assistant
Jen.Kammerman@oit.edu