OMIC R&D TECHNOLOGY BOARD
CONCEPTUAL ABSTRACT

TITLE: **Repair of Molds and Tooling with AM**

RELATED ROAD-MAPPING DESIGNATION ID#: **AM63**

SUPPORTIVE INDUSTRY: Daimler Truck, Boeing

PROJECT TYPE: General Project

PROBLEM STATEMENT (What Are We Trying to Solve?): Our industry partners are often challenged by wear of molds, fixturing, and other tooling. This wear could either be predictive from long term usage where surfaces decay over time, and in other cases catastrophic from breakage caused by an unfortunate incident. The research project would explore AM solutions to repair these worn components, and build confidence that the solution provided would yield a reliable performance that is equivalent to the parent part.

PROJECT DESCRIPTION: This project carries with it a very specific focus as outlined below:

- **FOCUS**: The need for this research has stemmed predominantly from our industry partners that work with metal dies and molds. To stay in the scope and scale of a General Project, certain allowances need to be considered. The research would have to collaborate heavily with our industry partners to arrive at key features that would represent a facsimile of wear or breakage scenario. It's possible that the industry has a candidate part that they volunteer for this work. The research is intended to build confidence in an AM capability for repair.

  NOTE: The AM build must demonstrate a repair solution that would surpass those offered by traditional techniques (i.e. Welding, & Machining).

- **MATERIAL**: The material selected needs to be used in die and mold manufacturing, and agreed upon by our industry partners.

- **BUILD:** The research needs to demonstrate the ability to build up material or features that would compensate for material lost, or build a feature that was damaged or broken. The build must be conducted on a base damaged part (or facsimile).

  NOTE: Since this research is intentional about employing AM as the solution to the problem, the repair must demonstrate a significant degree of difficulty in the feature design that benefits from AM capabilities. In other words: it is not acceptable if an

AM technique were used to simply build up on a mass of material, and then finish machine it. A manual or robotic welder can already do that. The feature build or repair must demonstrate a tangible benefit that is unique to AM, OR demonstrate efficiency as compared to traditional means.

- **MACHINING**: If required, any post AM build finish machining would have to be planned for in the scope of this research.

- **POST-PROCESSING**: All required material post-processing must also be completed. This work must be aligned with processes that are deployed on the parent part.

- **ANALYSIS**: The research must also create data to demonstrate confidence in material integrity. This could include, but not limited to, analysis of mechanical properties and chemistry of the build. This analysis should factor in the loading criteria as experienced by the part as it were operational in a production environment.

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:
  http://omic.us/applied-research/additive/
  http://omic.us/applied-research/subtractive/
  http://omic.us/applied-research/materials/
  http://omic.us/applied-research/robotics/
  http://omic.us/applied-research/inspection/

- OMIC Staff or SMEs
  http://omic.us/applied-research/

PROJECT DELIVERABLES:

- Final report
- Final presentation
- Final powders developed

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. . 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.

ADDITIONAL COMMITMENTS TO FACTOR: Researchers may be asked to present their final project at an OMIC R&D biennial Technology Exchange Symposium. This symposium is an in-person event, held at the OMIC R&D campus in Scappoose Oregon. The Symposium is held in the spring, and researchers should factor in their availability when bidding on projects.
Researchers may be invited to participate in OMIC R&D's marketing efforts that showcase the working history of the project.

PROJECT DURATION: It's OMIC R&D's strong preference that duration of a General Project aligns with the academic calendar cycle (July 2025 to June 2026). It is preferred that the project be completed by June 2026. 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 project's useful working duration is typically 9 to 10 months. Researchers are also encouraged to give 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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