

**TITLE: Additive Manufacturing for Injection Molding  
(Phase 2 of OMP412)**

**RELATED ROAD-MAPPING DESIGNATION ID#:** M31

**SUPPORTIVE INDUSTRY:** Daimler Truck, Mitsubishi, Sugino

**PROJECT TYPE:** General Project

**PROBLEM STATEMENT (What Are We Trying to Solve?):** The Phase 1 of this work was able to demonstrate a functional injection mold built on the Gefertec WAAM system. This research effort was led by Dr. Mostafa Saber of OIT. Much emphasis was given to (and accomplished) the confidence on the material mechanical properties so as to withstand the rigors of injection molding cycles. However, by using the WAAM system the build was also subjected to significant time utilization over traditional mold making.

**PROJECT DESCRIPTION:** In significant partnership with Daimler, this project strives to explore alternative AM processes to build a small scale injection mold. The ultimate goal is to decide on an AM process that would be optimally suited to build injection molds. The following are key guidelines for this research effort:

- Select at least 3 AM processes as candidates for building small scale injection molds.
- Recognizing the work envelopes of each of the AM processes, select an inject mold size that can be built by all AM processes. All parts must be the same size.
- Build the Core & Cavities across all AM processes.
  - The build should include all required post-processing for the materials.
- Finish machining of all Core and Cavities. In Phase 1 Ran Bro had supported this effort, and should be re-engaged in Phase 2.
- Conduct complete Mechanical Properties Analysis on all parts (as conducted in Phase 1)
- Select the AM technique that stands out from the analysis as a worthy candidate for building a complete injection mold.
  - Could be more than one AM technique to build the mold.
- Build the complete injection mold and produce parts
  - Includes finish machining (Ran Bro)
  - Post Processing
  - Any final Mechanical Properties analysis as required.
  - Injection Molding (Kaso Plastics)

# OMIC R&D TECHNOLOGY BOARD

## CONCEPTUAL ABSTRACT



**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
- Ran Bro
- Kaso Plastics

### PROJECT DELIVERABLES:

- Final report
- Final presentation
- All built core & cavity components
- Final built molds
- Final injection molded parts

**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.

# OMIC R&D TECHNOLOGY BOARD

## CONCEPTUAL ABSTRACT



**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.

### CONTACTS AT OMIC R&D:

**Urmaze Naterwalla**

Head of R&D

[Urmaze.Naterwalla@oit.edu](mailto:Urmaze.Naterwalla@oit.edu)

**Craig Campbell**

Executive Director

[Craig.Campbell@oit.edu](mailto:Craig.Campbell@oit.edu)

**Jen Kammerman**

Research Administrative Manager

[Jen.Kammerman@oit.edu](mailto:Jen.Kammerman@oit.edu)