

OMIC R&D TECHNOLOGY BOARD

CONCEPTUAL ABSTRACT



TITLE: OMIC-AM29 Printed Machining Tools

RELATED ROAD-MAPPING DESIGNATION ID#: AM29

SUPPORTIVE INDUSTRY: Walter, OSG, Caron, CG Tech, Mitsubishi,

PROJECT TYPE: General Project – Additive Manufacturing

PROBLEM STATEMENT (What Are We Trying to Solve?): Use of additive manufacturing technologies has shown the ability to design for reduced weight of products using internal structures impossible to create through traditional methods. Machining tools offer an attractive option to implement this strategy to create tools that require less power to rotate, possibly reduce vibrations, and create enhanced cooling channels. Reducing power and vibrations leads to higher material removal rates and better surface finish of machined parts.

PROJECT DESCRIPTION: The project looks to design and create metal cutting tool using additive manufacturing and test its ability to remove material. Some considerations to acknowledge in the project include:

- Research and come to decision on type of tool body to create (Heavy roughing, facemill, large diameter drill, etc.), material, insert type (if necessary) and additive technology to use
- Design internal structure for directional strength to handle necessary cutting forces and reduce vibrations
- Test the tool and benchmark against a comparable tool noting; operating parameters, HP/Torque, vibrations, surface finish and tool life

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.

- GEFERTEC Arc 605
- ExOne 25Pro
- OKUMA M560V 3 Axis Mill w/ Caron Engineering software
- DOOSAN SMX-2600 ST Mill-Turn w/ Caron Engineering software
- Anca TX7 Linear tool grinder
- OMIC Lab: Microscopy, imaging, cutter inspection and balancing equipment.
- OMIC Staff: Kyle McGann, Cody Apple, Urmaze Naterwalla

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PROJECT DELIVERABLES:

- Formal Report, raw data collection tables, and related presentation
- Digital and physical model of created tool
- Worn inserts
- Chip samples
- All images/video files compiled

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 discussions 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.

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