
TITLE: OMIC-M24 Smart Cutting Tool

RELATED ROAD-MAPPING DESIGNATION ID#: M24

SUPPORTIVE INDUSTRY: ATI, Mitsubishi, Kennametal

PROJECT TYPE: General Project - Machining

PROBLEM STATEMENT (What Are We Trying to Solve?): In the machining industry there are certain inconsistencies in the material a company is delivered. This causes cutting tools to wear out prematurely or be pulled from production before their end of life. Both scenarios are negatives from a producibility and cost standpoint by either impacting the quality of the part or recycling tools that can still be in production. A best-case scenario is using 80% of a cutting tool's useable life without sacrificing part quality.

PROJECT DESCRIPTION: An understanding of the performance domains of these "smart tools" can be arrived at by way of the following data compilation:

- Determining a method of creating predictability in cutting tools via sensors
- Locating material that has inconsistencies in material properties between deliveries
- The research should compile data on: Tool life, tool wear, surface finish, chip formation, and repeatability. This data should be benchmarked against industry standard cutting tools without any predictability aspects to them
- All results from comparison are used to create a business case for a smart tool

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.

- Mills - Doosan DVF5000, Okuma M560V, Axile G6
- Lathes – WFL M50, Doosan TT2500SY, Doosan SMX2600ST
- Grinder – ANCA TX7 Linear
- Lecia Microscopes

PROJECT DELIVERABLES:

- Formal report, raw data collection template, and related presentation
- Method for predicting cutting tool wear
- Process for testing smart tool against traditional tool
- Business case for using smart tool over current industry standard

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CONCEPTUAL ABSTRACT



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.

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