

# OMIC R&D TECHNOLOGY BOARD

## CONCEPTUAL ABSTRACT



**TITLE: OMIC-A14 Alternate to Carbide P2 of OMP423**

**RELATED ROAD-MAPPING DESIGNATION ID#:** A14

**SUPPORTIVE INDUSTRY:** ATI, SANDVIK, MITSUBISHI, SUMITOMO, SECO, OSG, BOEING.

**PROJECT TYPE:** General Project (PHASE 2 of OMP423)

**PROBLEM STATEMENT (What Are We Trying to Solve?):** Modern day machining is predominantly conducted with 'Carbide' tools. This tool material classically is comprised of Tungsten Carbide (WC) and other alloying elements, embedded in a matrix of Cobalt (Co). These materials are getting more expensive, and harder to come by as raw materials. This project can explore capabilities of alternative materials as a potential replacement for conventional carbide cutting tools.

### **PROJECT DESCRIPTION:**

Mechanical properties and microstructure of the prototypes are tested to evaluate the feasibility of the designed materials for cutting tools applications. The research team offers candidates of new advanced alloys or composites with tailored mechanical properties and carbide-free microstructure. This research may take the approach as follows to assess the capabilities of these materials for carbide-free cutting tools.

1. A computational simulation to find an optimum alloy composition. This includes primary and secondary phase predictions in the microstructure at various temperatures.
2. Synthesis of designed alloys or composites including possible post treatment to enhance the mechanical and chemical stability of processed materials. The synthesis method(s) should have been already proven to be sustaining and cost-effective.
3. Mechanical testing and microstructure investigations to evaluate the feasibility of the designed alloys for cutting tools applications.

**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 machining capabilities at OMIC R&D can be reviewed at the following link: <https://www.omic.us/explore/facility>
- OMIC Staff: Cody Apple, Taylor Schaming.

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### PROJECT DELIVERABLES:

- Developed new tools
- 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:

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