

## Horvath Professor of Materials Science and Engineering July 2024

The Alloy Research Central (ARC) team at Michigan Tech is known for thermodynamic and kinetic computational modeling of metallic alloys coupled with machine learning optimization. In addition, Michigan Tech staff and students are able to fabricate these custom alloys in Michigan Tech's pilot-scale facilities. Horvath Professorship funding has been critical to the growth of Professor Sanders' ARC research activities. Over the fiscal year, funding was used to support Professor Sanders' students, staff, students, and travel.

### Specific activities

Professor Sanders' ARC research team has a long relationship with Sunrise Energy, which is working to start a Ni, Co, and Sc mine in Australia. The ARC team currently has two PhD students working to assess the effects of Sc on Al alloys. The Horvath support was critical in covering funding gaps so these students could complete their research on 2000 and 6000 series alloys, which are two of the most common commercial wrought Al alloy systems. These two PhD's are a significant fraction of the 70 PhD/yr that Michigan Tech needs to achieve the new definition of an R1 research university (the other is \$50 million/yr in research expenditures).

The ARC team has been developing a partnership with a major space contractor to design propulsion systems for low-earth orbit vehicles. The contract was signed earlier this year, and the work supports two MS students doing modeling and experimental work. The Horvath fund was used to enable the planning and preparation for this relationship, which is expected to support future Michigan Tech graduate students.

Professor Sanders attended three workshops related to aluminum and material design, including Extrusion Technology (ET'24), the International Conference on Aluminum Alloys (ICAA 19), and the NIST Material Challenges in Developing Sustainable Metal Processing Infrastructure. These smaller workshops are critical to developing future collaborations, and to communicating about Michigan Tech's pilot-scale metal processing equipment and skilled staff. At each meeting, at least one new collaboration was initiated that will support future Michigan Tech students.