



## Paul Sanders Michigan Technological University

### STEEL PROFESSOR

As Prof. Sanders' Kent D. Peaslee Junior Faculty Award was ending, he began to develop a vision for introducing students to steel through the use of 3D printing. This technology excites many students from middle school through high school and into college.

Also known as additive manufacturing, 3D printing technology offers the opportunity to engage students while teaching materials and manufacturing concepts. Michigan Tech is ideally positioned to integrate our expertise in three areas to make this vision a reality:

1. Michigan Tech is a leader in developing in low-cost, open-source 3D printing software and hardware. In particular, Michigan Tech has developed a low-cost weld-based metal printer that can be used by students to print steel. Using steel weld wire, this printer can achieve 1 mm resolution.
2. Michigan Tech has the ability to design and manufacture print feedstock with our materials processing capabilities. Alloy compositions can be designed using thermodynamic and kinetic modeling techniques. The alloys can then be cast and thermomechanically processed in our pilot-scale facilities. The last component of the processing regime is wire drawing, which was partially supported by AIST.
3. Michigan Tech's innovative Enterprise Program utilizes student teams to address real-world challenges. In this case, the Advanced Metalworks Enterprise will execute a project on 3D printing of steel starting in the fall of 2018. This project will have an industrial sponsor and the objective will be to develop a value-added geometrical feature on high-volume sheet or bar stock (the substrate). Given the ease of steel welding and the quality of the bond (weld) to the substrate (sheet or bar), this feature will provide a third dimension to the steel product. This additional dimension will add functionality to mass-produced steel and may provide additional markets for steel.