AIMS² Research Project in Digital Design and Topology Optimization of Harley Davidson Engine CAM Support for Metal Additive Manufacturing

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| Faculty: | Dr. Bingbing Li |
| Research Duration: | 2020-21 (September 15, 2020 – May 31, 2021) |

Goals and Objectives of the Project, Expectations and Outcomes

• Describe briefly what students can expect to learn by participating in this project.

The Cam Support Plate is critical to the success of this engine design. A failed cam support plate results in catastrophic engine failure. The Cam Support Plate supports one side of the flywheel, allowing the pinion shaft to turn the oil pump, a chain drive, and the camshaft. The Cam Support Plate directs the flow of oil from the oil pump throughout the engine. Working in conjunction with the oil pump, it is considered to be the heart of the engine. This project details the process of reverse engineering a Cam Support Plate used in the Harley Davidson Milwaukee 8 Engine. During this project, we have reverse engineered the Cam Support Plate by attempting a variety of processes including: white light and laser scanning, physical measuring, virtual recreation, redesign its oil channels, investigate surface finish and reduce the weight of the Cam support plate by using software tools such as SolidWorks, Autodesk Inventor, and Solidthinking Inspire. The focus of this project is to redesign the internal oil channels by removing the edges and making a curvy channel in order to make the oil flow smoother, look into the surface finish, change the topology, and eventually reduce the weight of the plate.

In particular, since most projects will be 100 % virtual please be sure to include the following information:

• Resources required to complete the project and how they will be made available to students.

CAD design and topology optimization will be conducted on the computer remotely.

• Weekly Meeting schedule

Students are expected to devote to the project 3-5 hours per week remotely.

• Plans to monitor student progress

Students will have to attend the LSAM research group weekly Zoom meeting to report their progress.

• Deliverables

New design of CAM support with optimized internal fluid channel

- FYI we are anticipating hosting our symposium (virtual) in March 2021.
- All students will be expected to deliver an oral presentation in accordance with guidelines. This will be on Zoom and open to an invited audience including faculty, students, industry and community members.
- If a face to face symposium becomes possible students will also be required to complete a poster.