

Cryogenic Pump Prototype

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Fig. 1: Magnetic motor attachments

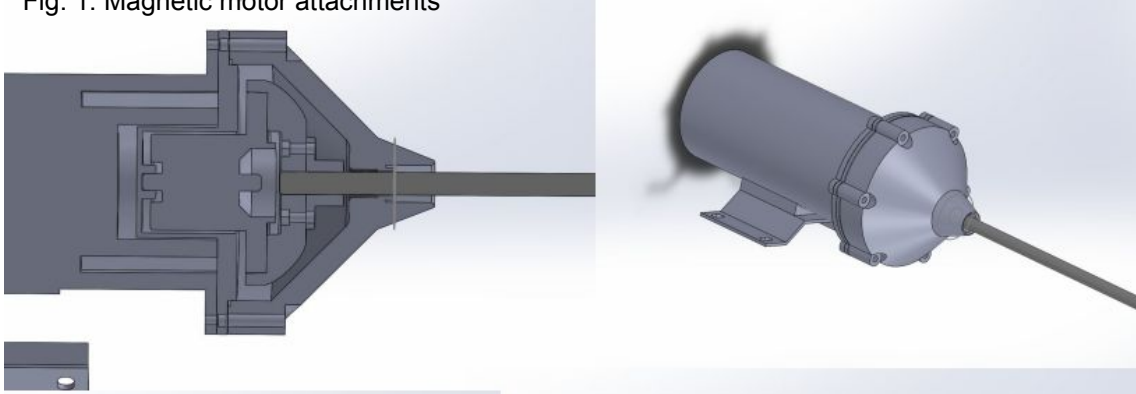


Fig. 2: Final impeller design

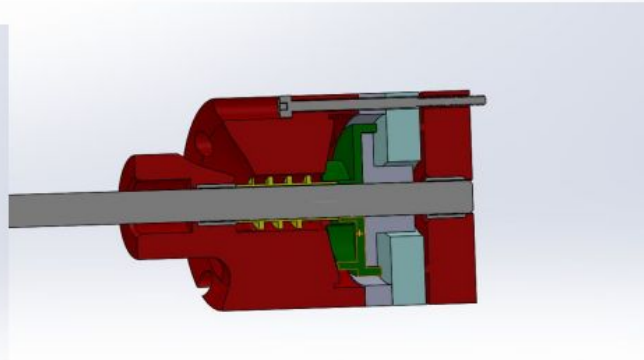


Fig. 3: Fluid collector with inducer and impeller

Objectives: Prototype a new version of a cryogenic pump with a focus on cavitation and vapor phase minimization

Outcome: Successfully designed and fabricated a long-coupled pump that transported liquid nitrogen. I also designed and constructed a testing loop to characterize the performance.

Process: I modeled much of the assembly using CAD software and 3D printed many of the parts for efficient and cost-effective testing. The design separates the magnetic motor from the fluid collector via a metal shaft, preventing the motor from experiencing cryogenic temperatures. Much of my research also focused on novel impeller design to prevent cavitation from occurring at such conditions. The prototype successfully underwent over 100 hours of endurance testing.