Implementation of Thermoelectric Generators (TEG) for Recovering Waste Heat from High Energy Pumps

Overview
A high energy pump rejects heat to the surroundings. This source of energy can be captured using thermoelectric technology. The goal of this project is to determine the most effective way to convert heat to electricity using thermoelectric generators (TEG).

Objectives
Flowserve requested research on the most effective way to convert heat into electricity when applied to pumps. The objective of the team is to convert the maximum heat energy into electricity and generate the most power output with the best electrical configuration.

Approach
- The team gathered customer needs and gained an understanding of the problem.
- The team searched for available methods to convert heat to electricity.
- The team completed the thermal analysis for the generators’ components.
- The team did the electrical analysis to find available electrical configurations to generate power output.
- The team selected and purchased materials and products to build the thermoelectric generators and testing rig.
- The team made a CAD model for an overview of the experimental setup and test plan.
- The team manufactured four thermoelectric generators.
- The team performed the testing plan for the project parameters.
- The team plotted the test results to find trends and validate original analysis.

Conclusion
The following parameters allowed for optimal conditions, which allowed us to output two Watts of power with four generators.

- Stainless steel pump material
- High temperature heat source
- Forced Convection cooling
- Matching load resistance
- Combination of parallel and series wiring of TEGs