Executive Summary

Hundreds of students each year enroll in IME 143 or IME 144, freshmen-level machining classes, and complete an air motor to demonstrate the skills they have acquired on a variety of manufacturing processes. The air motor, however, is useful only as a teaching tool in the classroom; once the students bring them home, the air motor becomes little more than a trophy at best.

With the capabilities of the machining lab, a final project can be developed that can have a benefit to people in need while maintaining educational value. This project details a process plan for a manual water pump. The pump can be donated for use in developing countries where access to clean water is still in desperate need.

The process for manufacturing the water pump had to be deconstructed into specific machining processes and balanced appropriately between the machines available to the classes. The machining lab has a number of different machines that enable students to use 14 different processes. Unlike a production environment, all processes have to be used and balanced to make use of lab time. This often meant using sub-optimal processes and/or procedures.

The critical benchmark for implementing the water pump into the curriculum is cost. Students in IME 143/144 pay lab fees, which cover the cost of materials for the quarter. The fees are $10 for IME 143 and $50 for IME 144. Based on rough estimates from these lab fees, the actual cost of the air motor is between $10 and $20. As designed currently, the water pump has a material cost of about $30. However, this project is larger and more complex. It is recommended that one pump be made for every two students bringing the per student cost to about $15, within the cost range of the air motor.