Overview
Ultrasonic dental scalers, like Dentsply’s Cavitron, have no automatic method of measuring wear on scaler tips. The current method is a visual inspection that lacks accuracy, requires exceptional eye sight, and relies on physical length. The team looked at measuring tip wear by comparing the energy output of a new tip to a worn tip. The team measured the amplitude of ultrasonic noise produced by the tip to determine three levels of wear: good, worn, and worn out.

Objective
The overall objective of the project is to provide a device to automatically measure wear of Cavitron inserts and notify the user when an insert should be replaced.

Approach
- Began with research into the Cavitron and dental industry
- Researched patents related to automatic wear detection methods in industrial machines
- Outlined the needs of the customer
- Brainstormed concepts
- Created three alpha prototypes focusing on a physical and energy method
- Developed beta models: displacement gage and acoustic energy
- Took ultrasonic acoustic energy to final prototype
- Found correlations between amplitude of sound wave and tip wear

Outcomes
- The team developed valuable skills in project management, teamwork, and problem solving
- Dentsply received a multitude of new approaches to the problem of automatic wear detection
- The team produced two possible patentable ideas for Dentsply to continue to develop
  - Acoustic Energy Microphone
  - Displacement Gauge