Tyco Security Products

Bullet IP Surveillance Camera Housing Redesign

Overview
Tyco Security Products has tasked the international design team with a security camera housing redesign. Tyco desired two unique designs, one from Penn State University and one from Shanghai Jiao Tung University. Both designs were required to be tamper-resistant while ensuring compliance to the IP66 standard for waterproofing and dustproofing in addition to the IK10 standard for kinetic energy impacts. The major improvement of the redesign was flush end-caps locked in with security screws, which prevent the camera from being taken apart quickly.

Objectives
The team was to analyse the current design and make subsequent improvements in terms of tamper-resistance, while strictly adhering to the IP66 standards and IK10 standard met in the previous design. The team was also required to conduct thermal analyses to ensure the camera’s internal PCB board remained within its strict operating temperature.

Approach
- Establish communication with SJTU teammates
- Determine customer requirements by researching the security camera marketplace
- Conduct patent research to prevent patent infringement
- Brainstorm initial design concepts and request feedback from sponsor
- Create SolidWorks models of initial concept
- Conduct a Tyco site visit (SJTU) and have Tyco provide the team insight regarding future work
- Create pre-alpha prototype using 3D printers
- Conduct a prototype analysis to make improvements to the design
- Decide on final design and order materials corresponding to machine
- Machine final prototype using The Learning Factory facility
- Test the prototype with regards to the IP66 and IK10 standards
- Analyse tests and determine if standards were met

Outcomes
- The design meets both IP66 and IK10 requirements
- The design is tamper-resistant
- The design meets internal operating temperature requirements according to FEA analysis
- Tyco set a maximum manufacturing cost of $80.00, the team’s design costs under $50.00 to manufacture
- The team was awarded first place in the category “Best Project”