Dual Battery Pack for Ultrasonic Instrument

Overview
General Electric (GE) Inspection Technologies designs and manufactures a variety of non-destructive inspection and testing equipment. The USN-60 and Phasor belong to a family of products that utilize ultrasound technology to detect subsurface flaws in solid objects. Both of these products currently use a custom manufactured lithium battery pack directly mounted to the back of the instrument. Due to lithium’s volatile nature, many battery packs, under new US regulations, are subjected to more scrutinious transportation regulations. This coupled with manufacturing costs, quality issues, and savings realized through the use of off the shelf parts, has motivated GE to seek an alternative and modular battery solution.

Objectives
Our team was tasked to design a battery carrier that will replace GE’s current custom battery pack and accept two standard off the shelf smart Li-ion batteries. The battery pack must fit into the existing soft carry case for the instrument, and meet or exceed MIL STD 810 and the IP45 standard. The final design will be injection molded for high volume production.

Approach
- Met with GE Inspection Technologies to discuss the project.
- Researched battery safety.
- Studied past designs to gain design inspiration.
- Developed iterative designs through continuous discussion and review with GE.
- 3D printed multiple prototypes to refine design features and tolerances
- Test each prototype to ensure conformance and verify specifications.

Outcomes
- The old battery carrier provided 160 Watt-Hours of power.
  The new battery carrier provides 199.2 Wh.
- The new carrier uses the same electrical connections as the old battery, and will fit into the instrument’s protective soft case.
- Hot swap capability with two batteries means no downtime. When one battery is depleted, another can be inserted to continue operation.
- The sealed and durable enclosure protects the batteries from moisture and dust.
- External charging of each battery protects the instrument from misuse and charge faults.
- A more flexible design is a more valuable design. The modular design developed allows GE to market a single or dual battery variant of the carrier at any time in the future.