Case Study

NEO Tech Collaborates with Aviation Industry OEM to Design a New Operations Automation Device for In-flight Use

Background

Re-thinking the Aviation industry product development process: Collaborative engineering solution with NEO Tech results in functional integration of commercial wireless technology into an innovative IT solution for the aviation industry with an accelerated product development cycle.

An aviation industry OEM and its end customer – a major commercial airline manufacturer – envisioned the value of an innovative new product that would assist in the efficiency of commercial flight crews. This required a product that would use wireless connectivity while safely operating in the aircraft.

In order to deliver a cost-effective and robust solution and accelerate the development process to achieve the end customer's tight schedule, the aviation OEM partnered with NEO Tech. NEO Tech provides full product lifecycle technology solutions, including design through manufacturing services. The NEO Tech engineering solution team also has extensive experience architecting wireless technology into diverse end applications. The collaboration combined NEO Tech wireless and IOT technology domain expertise with the OEM's mission-critical aviation product experience to enable completion of the engineering of the proposed new product.

Project Kick-off

The initial design inputs and project plan were created jointly with the OEM and NEO Tech. This was accomplished through a series of collaborative sessions with the customer starting with a "whiteboard brainstorming session" where the team outlined the framework of the project. The team collaboratively created the system architecture, phase gate planning to meet the allowable timeframe and output documentation for both teams to move forward. The joint engineering teams mapped out the requirements, scheduled the activities and milestones, and assigned actions among the team members.

The collaboration at the very initial stages reduced what likely would have been a longer serial iterative process to define the requirements, and set them up for success against the project's aggressive deadline.

Collaboration in the Product Development Process

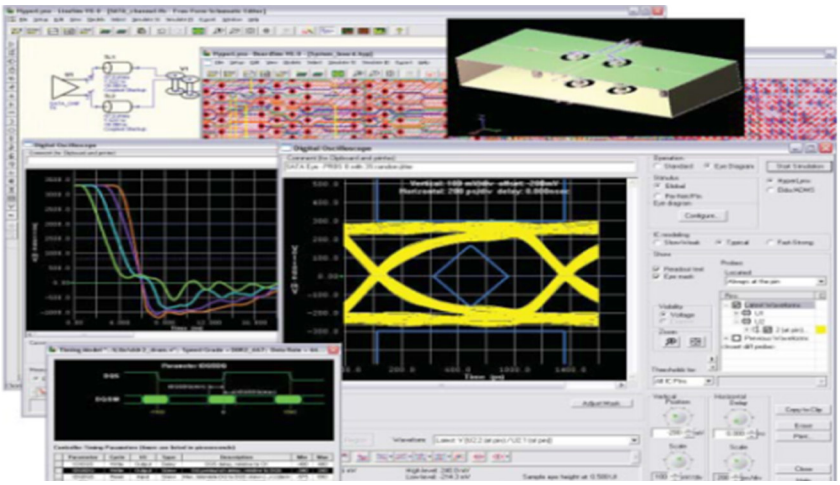
The electrical design had several built-in elements that required the two teams to work together on the system architecture in a collaborative manor to ensure that the interfaces functioned as intended. While NEO Tech focused on the electrical design of the high-level data processing, networking and wireless RF interfaces of the new product, the OEM maintained responsibility for the overall architecture, the design of the power module, the mechanical design, and the final box integration and test.

During the design process, there were several design reviews in which NEO Tech provided design feedback, and recommendations were discussed and approved by the customer. NEO Tech engineers recommended the preliminary BOM and performed materials selection using NEO Tech's supply chain expertise to increase flexibility, optimize cost and reduce future component product life cycle risks.

Printed Circuit Card Design and Prototype

NEO Tech completed the board layout and design, which was a relatively complex fab with 18 layers and a high-density interconnect (HDI) layout. The board included fine pitch, RF and BGA components, RF shields and aviation isolation protection. A leading-edge free scale processor controlled the board with high-speed interfaces including PCIe, SATA, USB, RGMii, Wi-Fi and cellular RF band connections. NEO Tech used its available suite of advanced design tools including Ansys tools such as HFSS for RF and Designer SI for digital interconnect design.

Design Assurance Guidance for Airborne Electronic Hardware, the DAL-X standards, and compliance with environmental requirements outlined in DO-160, Environmental Conditions and Test Procedures for Airborne Equipment.



High Speed Simulation Tools

NEO Tech completed 3D mechanical solid modeling of the board to ensure precision alignment of the PCBA in the box assembly as the available space was restricted. This enabled the successful fit at the box level on the first prototype iteration, reducing likelihood of re-spins. NEO Tech also integrated manufacturing and supply chain know how into the new board by applying its DFM and DFX design rules. These are followed on every design project that NEO Tech completes.

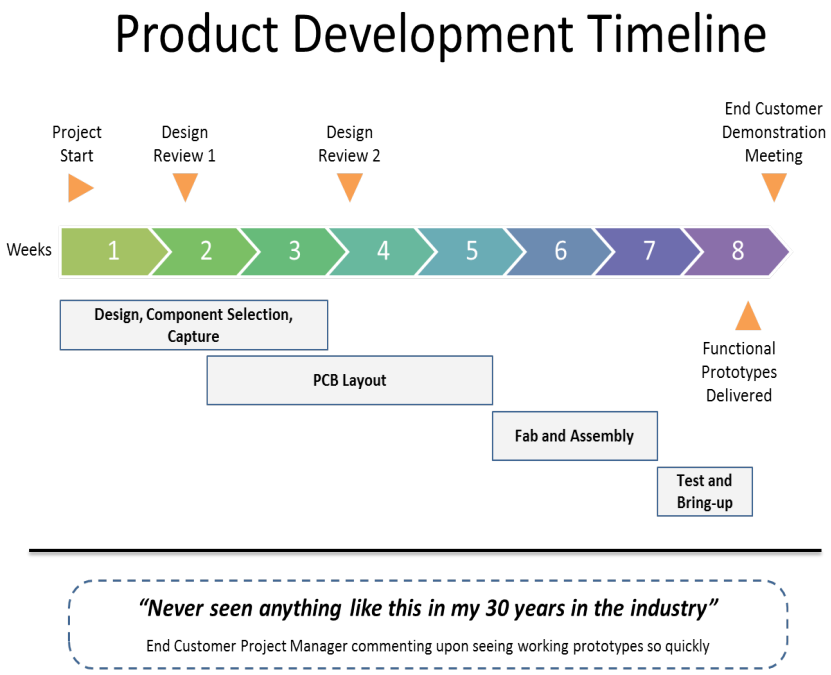
The NEO Tech engineering team followed FAA and other federal regulations during the design process. These regulations include DO-254,

NEO Tech was responsible for prototypes. They procured materials, pcb fabs and performed quick turn prototype manufacturing on its dedicated proto line to prepare samples that could be used for functional evaluation. Working with the OEM, the engineering team created and implemented circuit functional validation tests to enable the end customer's further higher level system validation and software development.

Accelerated Schedule to Meet Aggressive Deadlines

The OEM customer had a two-month deadline to present a working prototype to its airline customer. By keeping the lines of communication open and working steadily and intelligently together, the joint development team was able to meet the deadline, delivering functional samples that enabled the OEM to demonstrate the functional system at their end customer meeting.

NEO Tech worked with the OEM to deliver functional prototypes barely eight weeks after the project kickoff. The end customer was astonished and commented during the demonstration meeting, “Never have I seen anything like this in my 30 years in the industry.”



Lessons Learned

The collaborative design process between NEO Tech and the OEM resulted in achieving a functional design in a much shorter timeframe than several industry veterans thought possible. The successful outcome demonstrates an improved method to deliver updated design technology and shorter product development lifecycles for the aviation industry used to much more extended timeframes to introduce new technology.