# AEROLEDS
## LIGHTING THE WAY TO FASTER, LOWER-COST AERIAL LED DEVELOPMENT WITH SOLIDWORKS ECOSYSTEM



AeroLEDs leverages integrated SOLIDWORKS mechanical and PCB design solutions to support its rapid growth in the development of landing and navigational LED-based lighting systems. These systems are used on experimental, special-use, and military aircraft such as the lighting system installed on the wing of the Cessna™ aircraft shown here.

**AERO LEDs**
SAFETY OF FLIGHT DESIGNS

AeroLEDs designs and manufactures landing and navigational lighting systems for the aerospace industry and has been installing them on experimental, special-use, and military aircraft for the past decade. The company has introduced revolutionary LED-based lighting products that produce far better results than traditional lighting systems. AeroLEDs products require zero maintenance, can reduce power consumption by 80 percent, extend service life, reduce weight and aerodynamic drag, and provide direct retrofit replacement of legacy lighting systems with no mounting modifications.

The company has grown quickly since 2006, when it introduced its PULSAR line. The PULSAR line is the world's first all LED-based nav/strobe lighting product to meet the U.S. Federal Aviation Administration's Technical Standard Orders C30C and C96a-C2, which govern the positioning of lighting and anti-collision lighting systems. According to President and CEO Nate Calvin, AeroLEDs needed to break the paradigm of the segmented, nonintegrated electrical design process of printed circuit boards (PCBs) and printed circuit assemblies (PCAs), and the mechanical design process, to support rapid growth and reduce the total design cycle.

"Prior to 2016, we used SOLIDWORKS® mechanical design software to develop lighting housings and LED packaging, and another electrical design package for schematic and PCB design," Calvin recalls. "The design process consisted of multiple export/imports between the PCB layout software and SOLIDWORKS to develop the final configuration of a design. While this process functioned fairly well, it was labor-intensive and we never had a 100 percent accurate mechanical representation of all of the associated electrical components on the PCA since it was very time-intensive to add the mechanical models to the assembly. The net result was increased design cycle time, and we often required additional prototype boards to resolve interference issues that were usually less than .010 inches.

"Some of our assemblies are so tightly packed that the pads from the components were becoming an issue," Calvin continues. "I've been a SOLIDWORKS user since 1995, so when we discovered SOLIDWORKS PCB powered by Altium® software, I was immediately intrigued at the potential time savings the package could offer and [how it might allow us to] finally crack the barrier of a fully integrated mechanical/electrical design suite."

AeroLEDs chose the integrated SOLIDWORKS electronic design ecosystem, implementing SOLIDWORKS Premium design, SOLIDWORKS PCB, SOLIDWORKS Simulation Professional analysis, and SOLIDWORKS Flow Simulation computational fluid dynamics (CFD) analysis software solutions. "We chose the SOLIDWORKS solution because we know the SOLIDWORKS mechanical package and value the integration between mechanical and PCB design," Calvin explains. "We also believed that the integrated SOLIDWORKS solutions would save us time and money."

### ACHIEVING "FIRST TIME RIGHT"
Since implementing the integrated SOLIDWORKS electronic design ecosystem, AeroLEDs has cut its development cycles in half. "With SOLIDWORKS and SOLIDWORKS PCB software, we've reduced the PCA/PCB import process from a 15 to 30-minute process that resulted in 'rough models' of 30 percent of the components to a 5-minute import process of 100 percent of the components at 100 percent accuracy. It's a game changer," Calvin says.

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>
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"This transition has accelerated development, while improving quality and increasing collaboration, because we achieve 'first time right' consistently," Calvin continues. "For example, I can take a board from our electrical engineer into SOLIDWORKS, find all of the interference issues, and suggest 10 changes when I send it back to him. He'll then accept 8 of the 10 changes and confer with me about addressing the other two. Perhaps I moved something, and he'll report that 'moving the component violates layout rules, but I can deal with the interference from the mechanical side and modify accordingly.' Since implementing SOLIDWORKS and SOLIDWORKS PCB, we haven't had to produce more than one board revision for clearance issues or modify a mechanical component. We get it right the first time."

## SAVING MONEY IN ADDITION TO TIME

By eliminating production of prototype boards as the means for resolving design issues, AeroLEDs is saving money, which Calvin estimates at $1,000 per circuit board. The company has also realized a 50 percent reduction in scrap and rework costs overall. "Working on the same SOLIDWORKS platform and taking data conversion out of the process has a ripple effect that lowers development costs," Calvin notes. "In addition to checking clearances in SOLIDWORKS, we run motion, structural, airflow, and thermal analyses to validate performance prior to production.

"Another ripple effect is the ability to automatically generate all electronic and mechanical BOM [bill of materials] information, which previously we had to do separately," Calvin adds. "The integrated SOLIDWORKS design environment simply gives us more confidence in our design documentation and provides better design visualization for communicating with production."
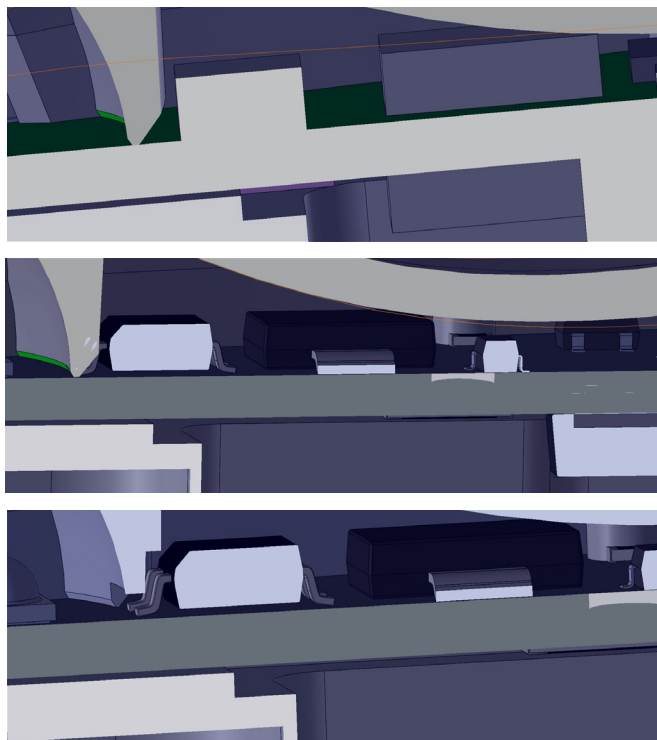
## GROWING PRODUCT DEVELOPMENT THROUGHPUT

The productivity gains that AeroLEDs has realized since adding SOLIDWORKS PCB software to its SOLIDWORKS installation have enabled the company to cost-effectively manage growth as it expands its product offering. "Since implementing SOLIDWORKS PCB software, we operate at a drastically faster pace," Calvin stresses.

"In 12 months' time, we've averaged a new product design and release every two weeks," Calvin says. "We can make greater use of design reuse while speeding up development and improving quality. With the integrated SOLIDWORKS electronic design ecosystem, what you see is what you get!"

Before implementing integrated SOLIDWORKS PCB, AeroLEDs could not detect many interferences (top image) without going to the expense of ordering a prototype board. With SOLIDWORKS PCB software, interferences become obvious in SOLIDWORKS (middle image), where they can easily be resolved (bottom image) without incurring the time and cost of creating a prototype board.

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