



Bluefin Robotics

Bluefin Robotics is seeing a sea change in E-CAD M-CAD design integration with Altium Designer.



“Altium Designer has created an environment where the mechanical and electrical engineering teams can meet to model, visualize, and discuss the electro-mechanical designs early on in the design phase. Altium Designer is not only critical to the design process, but also to the success of the design.”

Richard Wilson

Electrical Engineer Manager,
Bluefin Robotics

The Need

The ocean floor is one of the last frontiers. With depths reaching up to eleven kilometers, it's not surprising that much of it remains unmapped and unexplored. However, interest grows for the mystical deep. Government, academic and commercial organizations require detailed mapping and scientific data from these regions. From hydrate mapping to whale watching and even locating dangerous war mines in seaports, the need for a reliable and multipurpose survey tool is growing.

Meeting this demand is Bluefin Robotics. Since branching off from the Massachusetts Institute of Technology (MIT) in 1997, Bluefin has built a reputation for its Autonomous Underwater Vehicle (AUV). AUVs are completely automatic vehicles that navigate the sea-bed to collect data and images. Using advanced sonar, manometers and sensors, AUVs capture important information in areas unsuitable for human exploration.

The Challenge

The push for smaller and more complex electronics to be created in shorter time periods has created a greater need for electrical and mechanical integration. This trend was particularly relevant to Bluefin. The tight design requirements of its AUVs presented challenges when co-ordinating electrical and mechanical designs. The sequential process of electrical to mechanical design was proving to be clumsy and fraught with design flow inefficiencies. The departments were not working collaboratively, and were constantly finding discrepancies between designs. Engineers were forced to rely on cardboard models. These were time consuming to build and rarely detailed all the mechanical specifications of the project. In effect, engineers from both sides could never fully visualize their work and requirements.

An AUV is a very tight design. The vehicles must perform in extreme conditions and often experience pressures of up to 6000lb per square inch at depths of 4000 meters. Not only do AUV engineers design their vehicle to survive these pressures, they must also make the vehicle neutrally

buoyant, which reduces propulsion energy requirements and increases vehicle efficiency. In practice this means that for every cubic inch of air added to the vehicle, an equivalent amount of weight has to be added and if left un-restrained, it can lead to a large and unwieldy vehicle. When it comes to AUV design, PCB design is no exception to this volume and weight conundrum.

The Solution

Bluefin decided to upgrade to Altium Designer. By taking advantage of the IGES format and advanced STEP files import-export function, Bluefin could integrate 3D mechanical software data into the Altium Designer platform. This opens up a whole new level of interdependency, as accurate 3D design data flows freely between the two domains. The result is MCAD and ECAD co-design. This is an extremely efficient as mechanical engineers can now work collaboratively with their electronic peers. Engineers can now transcend the traditional sequential design process because co-design means projects can occur parallel to each other, allowing the quick generation of extremely accurate designs.

The Results

By eliminating design flow inefficiencies, Bluefin increased its productivity dramatically. In a process that used to take days of painstaking work, Bluefin now completes the same task in just half a day. Discrepancies between designs are also non-existent. Projects now come back from the manufacturer correct first time, every time. And without having the hassle of design inconsistencies, Bluefin improved its designs. For example, the Bluefin-12 and Bluefin-9 AUVs has been fitted with a doubled-sided, eight layer actuator controller used to manage its one kilowatt thruster and dual DC brushless motor. With Altium Designer, engineers could easily collaborate on the design and find the delicate balance between performance, buoyancy and reliability. The result: the Bluefin-12 AUV can travel up to 76 miles underwater and carry a sonar that maps each side to a range of 30 meters.



Product Information

Bluefin Robotics makes a series of AUVs, gliders and batteries for use in deep sea exploration and geotechnical mapping. Most AUVs are tubular in shape and are categorized based on diameter. The vehicles are completely autonomous, navigating and collecting data without operator intervention. Once in the sea, an AUV will journey to the bottom of the ocean and use a range of advanced sonar equipment and sensors to gather images and data. Originally seen as a tool for scientists or as a novel project for budding engineers, the AUV is now gaining ground in commercial and government sectors. Recognized for being extremely reliable, AUVs are responsible for expensive ocean floor surveys for offshore oil companies as well as dangerous battle fleet experiments for the military.

Customer Information

Bluefin started in 1989 in the MIT Autonomous Underwater Vehicle Laboratory, well recognized as one of the first to pioneer the AUV. In 1997, Bluefin branched off and has since built its own reputation for highly reliable AUVs for use in scientific, military and commercial applications.

For more information, visit www.bluefinrobotics.com



Altium's technology
implemented in the
deep sea exploration
industry

About Altium

Altium is a global developer and supplier of electronic product development software for the Microsoft Windows environment. Founded in 1985, Altium released the world's first Microsoft Windows-based printed circuit board design tool in 1991, and continues to provide advanced, easy-to-use and affordable design systems to electronics engineers, designers and developers worldwide.

Altium Designer is a single, unified application that provides all the technologies and capabilities necessary for complete electronic product development. Altium Designer integrates board- and FPGA-level system design, embedded software development and PCB layout, editing and manufacturing.

For more information, visit www.altium.com

