

# COAX HELICOPTERS LTD.

## COMMERCIALIZING COAXIAL ROTOR HELICOPTER TECHNOLOGY WITH SOLIDWORKS SOLUTIONS



Coax Helicopters leverages SOLIDWORKS Premium design and SOLIDWORKS Composer technical communication software to commercialize coaxial rotor helicopter technology—previously used only by the military—for use in manned and unmanned applications.



### **Challenge:**

Advance and refine coaxial rotor helicopter technology development for use in manned and unmanned commercial applications.

### **Solution:**

Implement SOLIDWORKS Premium design and analysis and SOLIDWORKS Composer technical communication software solutions.

### **Benefits:**

- Developed functional prototype in 18 months
- Cut years of development time
- Saved hundreds of thousands of dollars in prototyping costs
- Improved helicopter safety and stability

CoaX Helicopters Ltd. is an Australian company that is commercializing the use of coaxial rotor helicopter technology for use in manned and unmanned applications. Coaxial rotor helicopters have previously been used only by the military—the U.S. Navy flew the Gyrodyne QH-50 unmanned coaxial rotor helicopter as part of its Anti-Submarine Warfare platform for 30 years. CoaX Helicopters now holds the development rights to the technology and has quickly produced functional prototypes for commercial applications, revolutionizing the helicopter industry by providing safer, more economical, and more powerful machines that are capable of lifting heavier loads.

Unlike conventional helicopters, which use a single rotor atop the craft and a second smaller tail rotor to control the fuselage torque induced by the main rotor, coaxial rotor helicopters utilize two identical large rotors that are mounted one above the other on concentric shafts. While the rotors have the same axis of rotation, they turn in opposite directions. This contra-rotation reduces each other's induced torque, which is why coaxial rotor helicopters are much more stable than conventional helicopters, making them safer and more efficient.

When CoaX Helicopters acquired the Gyrodyne technology—including the original 2D design drawings—they needed a development platform to document the design, and then refine and optimize it for use in commercial products, according to Managing Director Peter Batten. "First, we needed to translate 2D design data into usable 3D geometry for continued development," Batten explains. "Others have tried to adapt this technology, but those attempts were largely based on trial-and-error engineering, which was extremely expensive. Our approach differs in that we are completing most of the development in a 3D design system, which is faster and less costly."

After evaluating 3D design packages, CoaX Helicopters chose SOLIDWORKS® Premium design and analysis software for development, and SOLIDWORKS Composer™ technical communication software to prepare designs for production. CoaX Helicopters chose SOLIDWORKS Premium software because it's easy to use; supports fast, frequent design changes; and provides integrated design simulation capabilities.

"SOLIDWORKS gives us the ability to document and prove what we are doing," Batten stresses. "We can push designs out of SOLIDWORKS in a modularized manner very simply, accurately, and cost-effectively."

### **ACCELERATING HELICOPTER DEVELOPMENT**

Using SOLIDWORKS Premium design software, CoaX Helicopters has accelerated development, designing, manufacturing, and testing its first functional prototype in a year and a half. "The coaxial rotor helicopter is well-thought-through technology, and our challenge was to quickly redesign prior versions using modern materials and technologies to bring it back to life," Batten notes. "With SOLIDWORKS, we were up and running in a year, and building and flying a prototype in just 18 months. Since then we have used the knowledge gained and our SOLIDWORKS capability to progress to a larger, more capable prototype."

"Complete development of a manned experimental aircraft in that short a time frame is a significant achievement," Batten adds. "SOLIDWORKS saved our team of five engineers years in development time. Frankly, we couldn't do what we're doing with the body, and utilize the number of available parts this quickly, without SOLIDWORKS."



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— Peter Batten , Managing Director

### **CONTROLLING PROTOTYPING AND MANUFACTURING COSTS**

CoaX Helicopters also took advantage of the integrated finite element analysis (FEA) tools in SOLIDWORKS Premium to validate safety and performance, saving hundreds of thousands of dollars in prototyping and manufacturing costs in the process. "Our underlying philosophy for commercializing coaxial rotor helicopter development is that we have to do it safely," Batten points out. "While we know that the design works, we need to be able to validate performance and safety without building and testing numerous prototypes."

"With SOLIDWORKS Premium software, we can quickly conduct design analyses regarding safety, durability, and performance," Batten continues. "For example, we used SOLIDWORKS Simulation to validate the strength of our fuel-tank supports and study torsional stresses, as well as dampen vibration in critical areas."

## DEMONSTRATING TECHNOLOGY, PREPARING FOR MANUFACTURING

In addition to relying on SOLIDWORKS Premium design and analysis solutions for development, CoaX Helicopters leverages SOLIDWORKS Composer technical communication software to demonstrate the technology to prospective customers and investors, as well as prepare its manned and unmanned helicopter designs for manufacturing and assembly. "We use SOLIDWORKS Composer software not only to develop imagery that looks like a finished product, and animations of how the technology works, but also to portray and prepare what we're going to build," Batten explains.

"SOLIDWORKS Composer software allows us to show the assembly and disassembly of an entire aircraft, providing manufacturing and assembly instructions that are non-language specific," Batten says. "This capability will enable us to move quickly during production because we can take advantage of regional manufacturing and assembly facilities irrespective of the spoken language."

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Using SOLIDWORKS Premium design and analysis software, CoaX Helicopters accelerated development and demonstrated a manned functional prototype in just 18 months, while simultaneously creating designs for unmanned applications, such as fire suppression.

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