syncroness™
AN ALTEN GROUP COMPANY

A COMPLETE PRODUCT DEVELOPMENT PARTNER

- Brainstorming and Concept Generation
- Feasibility Studies and System Architecture
- Detailed Product Design
- Prototyping
- Design for Manufacturing (DFM)
- Verification Testing
- Manufacturing Assembly and Test Equipment
- Sustaining Engineering

INNOVATION AT A GLANCE

Client

- A Global Leader in Data-Driven Automated Drones

Project

- Redesign of Drone Airframe, System Architecture and Subsystems

Objectives

- Improve system architecture and subsystem modularity to streamline manufacturing operations.
- Redesign current drone for easier assembly, less maintenance and greater reliability.

Approach

- Conducted a trade study and several workshops on-site to capture feedback about flight failures and pain points during assembly.

Results

- Created interface control documents within the system architecture to improve drone assembly, design and reliability.
- Modified the payload interface subassemblies, which reduced the mass of those assemblies by 23 percent.
- Managed redesigns of the fuselage for the next gen drone including the parachute canister, new arms, GPS antenna and propulsion system to achieve modularity.
- Optimized airframe design in preparation to meet FAA Type Certification for Beyond Visual Line of Sight (BVLOS) drone operation.

Capturing Aerial Data for Industry

Commercial Unmanned Aerial Vehicles (UAVs) are expected to reach a $6.3 billion market by 2026, with growing markets worldwide, according to a report by Fortune Business Insights[1]. The customer provides on-demand drone services for industrial facilities all over the world. The drones follow a preordained path from their docking stations and can be managed with light manpower. They perform inspection, mapping and security services for mines, sea ports and oil refineries.

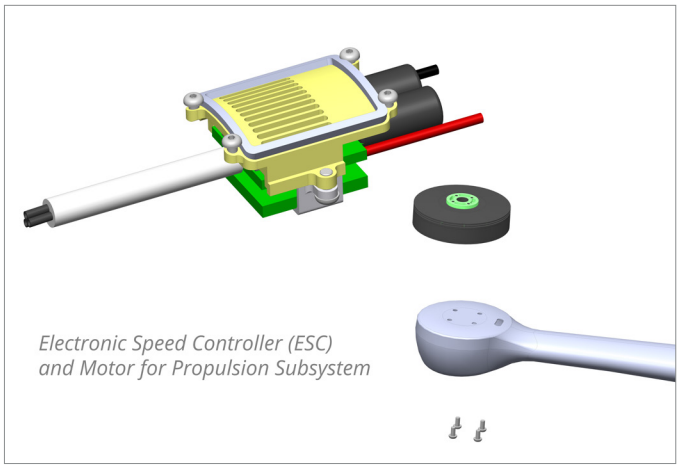
Conducting Risk Analysis

The customer experienced a high number of failures during drone flights, but couldn't pinpoint the root cause. A team of Syncroness engineers helped the customer prioritize essential design elements while the product was on the market.

"They respected us for our engineering design. We brought a level of rigor to the project that set a high standard and they leaned on Syncroness to accomplish these challenging engineering tasks," said Syncroness Senior Mechanical Engineer Paul Brayford.

Transforming the System Architecture and Subsystems

The customer provides their clients with an automated docking station, a UAV, and the software to operate it. As a first step, the Syncroness team conducted an engineering design review of the existing product and subsystems, and identified subsystem redesign efforts that could run in parallel. They created interface control documents to improve assembly instructions, component design, integration and handling, and error proofing. Then the team delivered a CAD package and recommended redesigns of several subsystems to increase reliability. They utilized the composite analysis capabilities within Femap with NX Nastran



Electronic Speed Controller (ESC) and Motor for Propulsion Subsystem

to conduct Structural Finite Element Analysis on the UAV components and assemblies.

The team also improved the design of the electromechanical interface assembly by redesigning the battery connectors to a machined aluminum equivalent. Together with updating the payload interface module, the team decreased the overall weight of the drone without increasing part manufacturing cost.

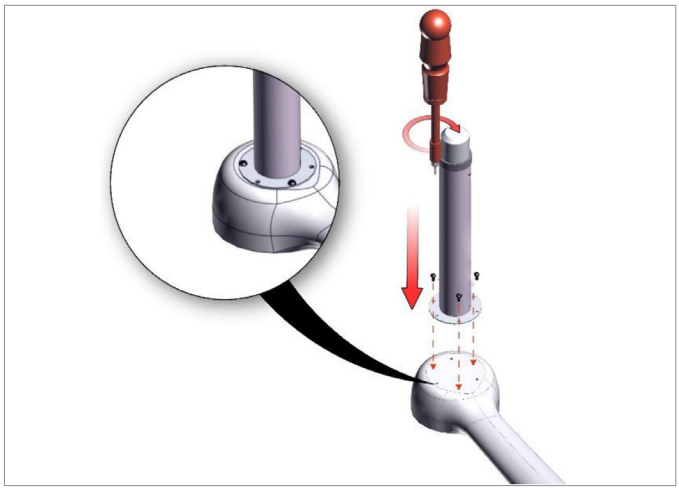
Commanding the Commercial Drone Market

Finally, the Syncroness team evaluated the customer's next gen drone. They redesigned the airframe into a multi-piece structure capable of withstanding normal crash scenarios, and improving reparability for any significant incidents. Previously the drone consisted of a single carbon fiber monocoque fuselage. If any aspect of it was damaged, the entire drone needed to be rebuilt or scrapped.

The team redesigned the mounting components on the propulsion mount and landing gear, which enabled the customer to maintain or replace parts individually. If a part on the propulsion system failed, the customer only had to replace a low-cost leg instead of a high-cost fuselage–significantly decreasing the operating costs over the full life of the UAV.

The Syncroness team worked with external vendors to package a significantly larger parachute that could be deployed more rapidly to lower the fuselage to the ground in a controlled manner. They integrated a new GPS antenna architecture into the fuselage to provide improved reception and positional accuracy.

Syncroness engineers documented the modular drone redesign in preparation for FAA Type Certification for Beyond Visual Line of Sight (BVLOS) drone operation. These designs make it possible for the customer to stay competitive in providing commercial drone services on an international scale.



Leg Assembly in the Landing Gear Subsystem

About Syncroness

For more than two decades, Syncroness has provided inspired solutions to highly complex business and technical problems. We have a strong portfolio of clients in the medical device, aerospace, and industrial equipment industries. By providing a full complement of engineering services aligned to the entire product lifecycle, Syncroness enables companies to accelerate product development and drive more predictability and productivity into their businesses. Working with Syncroness, companies gain the critical insights necessary to develop products that make a difference and create a better world.

Sources:

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