CASCADE
ENGINEERING

DEPENDABLE ENGINEERING,
CERTIFIED SOLUTIONS

CASE STUDY
06

Client: QINETIQ

DESIGN AND MANUFACTURING SUPPORT

QinetiQ GmbH is a German aerospace company with a rich heritage of delivering product and design services for their clients. When they needed an end to end solution to integrate an airborne radar on a Pilatus PC-12 platform, they turned to Cascade Engineering for help.

We undertook the entire structural modification for the project, from the requirements, through to the delivery of a flight ready modification kit.

REQUIREMENT

The customer had a requirement to install an externally mounted advanced sensor. The requirement placed on Cascade was to provide an efficient design solution, ready for manufacture and installation. Subsequently, the customer requested that we find an appropriate manufacturer such that we provided an end to end service from initial concept to delivery of manufactured components.

CONCEPT

A number of concepts were developed and considered.

Using our internal review process, in conjunction with the customer, accounting for their changing internal systems configuration, these were down-selected.

The final solution was considered to be the most efficient in terms of meeting the requirements, yet using the minimum number of components, that could be manufactured with resources known to be commonly available.

The customer accepted the chosen concept, presented at the Preliminary Design Review, with little or no comment.

DESIGN

From the agreed design, a drawing data set was prepared to industry standards and sample drawings were provided to the selected manufacturer for comment.

A number of detail changes were made to allow the components to fit more readily into the manufacturer's production flow. With the end customer's agreement and after a Critical Design Review with the customer, fully approved drawings and associated CAD data were released to manufacture.

MANUFACTURING

Cascade managed the manufacturing of components, the assessment and product verification of the manufacturing process. This was done by contacting a number of suppliers within the UK and across Europe to establish and confirm capabilities and provision timescales. We used an initial component list to obtain ROM costs, then a final list of the components, quantities and timeframe requirements to finalise quotes.

Cascade proposed a single manufacturer who was capable of manufacturing all the components. The customer then contracted this manufacturer directly, with Cascade handling day-to-day liaison.

Prior to manufacture, Cascade visited the supplier site to review the drawing data set with the supplier, to ensure the design made best use of the manufacturer's capabilities.

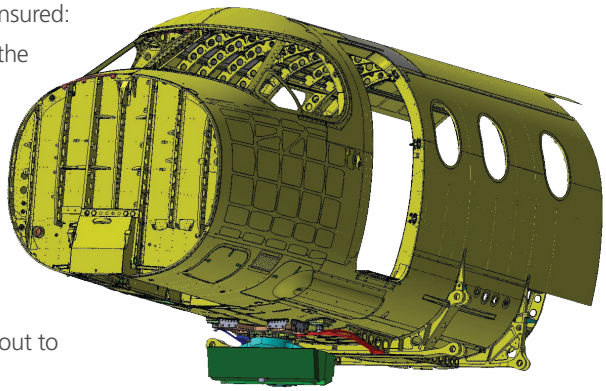
Minor changes were made to components, so as to optimise them to achieve minimum cost. In Cascade's experience, the best people to advise how to keep manufacturing costs down are the manufacturers themselves. They can often suggest minor modifications, that allow production difficulties and bottlenecks to be overcome, so that savings can be made without compromising the quality of the finished product. This liaison continued throughout the manufacturing process.

Inevitably there were queries from the manufacturer about certain details in relation to the drawing data set. These were answered promptly to maintain the delivery schedule.

VERIFICATION

A First Article Verification was carried out at the manufacturer's site. This FAV ensured:

- The manufacturer understood the drawing data, the inspected items correctly met the design intent and there were no adverse issues.
- All queries raised about any drawings during production had been incorporated, ensuring future component manufacture would be carried out to the latest standard.



EXPERTISE DELIVERED

Working alongside the QinetiQ GmbH team, we were able to meet the declared deadlines. After FAV, the manufacturer was confident the set of components would meet the customer requirements and once ready, were shipped directly to the customer's facility in Europe.

CASCADE ENGINEERING HALLMARKS

- Seamless end to end support.
- Working closely with manufacturers to ensure the designs are produced correctly.
- Analysis of metallic semi-monocoque aluminium structure under current CS-23 requirements.
- Analysis of complete structural elements, such as the Rear Fuselage, Vertical Tail and Elevator.
- Analysis of mechanical systems, such as the Elevator Control System.
- Large data manipulation for results taken from Finite Element models, to allow multiple load cases and structures to be analysed in an efficient, logical and repeatable manner.
- Development of design, optimisation and certification analysis and compilation of reports, presentations and certification stress reports.
- Act as delegated signatories and compliance verification engineers (CVE) to ensure Stress justification satisfying FAR or EASA regulations.
- Ability to assess all types of structural analysis method and determine suitability or even develop methods to suit the circumstances, all in collaboration with the OEM.
- Ability to apply this efficiently when revisiting stress calculations performed by others, for new variants of an aircraft.

COMPREHENSIVE EXPERIENCE

- Demonstration of Cascade Engineering's bespoke service for one-off modifications to components that are critical to the overall structure of the aircraft.
- Providing a focal point structural compliance verification engineer (CVE).
- Dealing with manufacturers to ensure smooth delivery of components by liaising from an early stage, conducting design visual examination and approval of parts.
- Providing end to end support to the customer and manufacturer.
- Integrated working has resulted in the Cascade team becoming approvers for QinetiQ GmbH internal projects.

CASCADE APPROACH

- Start with concept solutions – brainstorming, getting something on the blank sheet.
- Move to concept development – moving initial ideas into viable schemes for selection.
- Assess manufacturing capabilities, production rate issues, installation and assembly limitations.
- Preliminary & Critical Design Review preparation, presentation to OEM, managing actions to progress beyond review.
- Decide on clear route forward.

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