

SECTOR Aerospace & Defence  
STANDARD DO-178B

# Case Study



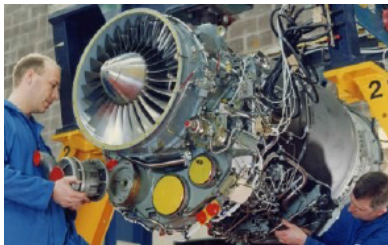

Optimized Systems & Solutions  
(Formerly Data Systems & Solutions,  
formerly Rolls Royce and Associates)

## CLASSIFICATION

Cantata has been successfully qualified many times to DO-178B (levels A and B) avionics projects

For information on tool qualification, please visit:

[www.qa-systems.com/cantata](http://www.qa-systems.com/cantata)



The Adour Engine- Used in the Jaguar Aircraft

## ABOUT THE COMPANY

At OSyS, our vision is to be a world-class provider of asset optimization solutions.

In response to our customers' ever-changing needs and challenges, we develop and deliver quality products and services.

<http://www.o-sys.com/>

## Background

This project involved supplying a test system for the Rolls-Royce Adour Mk 106 gas turbine engine, which powers the Jaguar strike aircraft. The project was known as DECATS (Digital Engine Control Amplifier Test Set). It took the form of a rugged PC, linked via an RS-422 port to the engine controller.

## DO-178B Requirements

The software for DECATS was produced entirely in C++ by OSyS, and presented certain challenges in its verification. The system was assigned a Safety Integrity Level of C, according to the DO-178B standard. This equates to a 'Major Failure Condition' if the system goes wrong. The standard requires that the software should be unit tested and evidence should be provided of coverage at statement and branch levels. In fact, in the interests of efficiency, the DECATS software architecture was partitioned into 'Safety-Related', 'Other Application Modules', and MFC classes (mainly relating to the user interface). A decision was made to fully unit-test all safety-related modules, and to selectively unit test the other code modules depending on their complexity. This was judged by reference to recognised complexity metrics, and how algorithmically detailed the modules were.

## Cantata in Practice

Mike Ferguson, an OSyS engineer, was assigned the task of selecting a suitable tool for the verification activities. According to him, *"Previous good experience with AdaTEST and Cantata, made Cantata an obvious tool to evaluate."* Evaluation and training were carried out and Cantata was selected for the project. Two specific features of the tool proved very popular with the engineers. Simon Prior particularly praised its ability to get inside the classes being tested using the 'Friends' technique so that internal ("white box") data could be both set and checked. The feature was 'Wrapping', and it allowed a class to be tested independently of all other class interfaces. Prior asserted that, *"without this, difficult external conditions not directly influenced by our code, such as memory allocation errors, may have been difficult to simulate."*

In terms of testing strategy, the OSyS engineers were very happy to endorse the general principle of testing C++ classes by hierarchical integration. They also supported the Harrold principle which requires re-testing of base functionality when testing in the context of a derived class. In addition to unit testing, Cantata also proved useful during system testing, by measuring code coverage. This was carried out on the entire system and helped identify 'gaps' in the system test sets.

Prior praised the usability of the tool, in addition to the service OSyS was provided with throughout the project. *"The technical support team were 100% effective in terms of speed, accuracy and general helpfulness."*

All case study text has been approved by the relevant customer.

QA Systems acquired the Cantata business taking over all development, support and sales from IPL in March 2012. Cantata is the extension of the Cantata++ tool.