

Cantata++ and AdaTEST 95

The production of **high-integrity** (also known as mission or safety-critical) software relies significantly on the amount and quality of testing that is performed in the software development process. The quality of that testing in turn depends on the quality of the testing tools used by the development engineers. Some current industry-specific standards, notably the **RTCA DO-178B standard for Civil Avionics** (“Software Considerations for Airborne Systems and Equipment Certification”), contain a requirement that the software verification tools used should be demonstrably fit for purpose. This means that the development team who wishes to use a given testing product must audit that tool and be willing to provide evidence of its suitability.

The DO-178B standard, for example, contains a statement that the developers must take steps to demonstrate that the tool complies with its Operational Requirements under normal conditions (12.2 Tool Qualification).



It is also routine for engineering companies to want to satisfy themselves that the tools they are buying are suitable and meet their own company-specific quality standards. In many such cases it is the ISO 9001 standard which forms the template for their own software quality standard.

This document sets out the basic case for accepting the IPL test tools by these criteria and describes the further practical measures offered by IPL for would-be developers to conduct their tool-specific audits.

What You Should Look For?

Taking the DO-178B statement of the need to *demonstrate that the tool complies with its Operational Requirements under normal conditions* (12.2 Tool Qualification) as a starting point, the main things that an auditor needs to look for are:

- An Operational Requirement in the form of a tool specification. This may either be a single document, or a set of linked requirements. In IPL’s process such documents are called System Requirements Specifications (SRS). It is normal to do an audit of a specific version of a specific tool used in a specific development environment.
- A description of a set of tests which combine to demonstrate that all requirements on the specification are satisfied. In IPL’s process such documents are called System Acceptance Test and Trace Specifications (SATTS) and System Acceptance Test Procedure Specifications (SATPS). IPL tools are fully tested on a variety of host-native platforms. To validate the tool on a target platform a specialised subset of the SATTS/SATPS is used – called the target validation test suite.
- Evidence that the tests have been run and that all passed as expected. In the IPL process these steps are all monitored and witnessed by an independent QA representative. If testing on target is involved then results of the software validation tests run on the target will need to be available.
- A further confidence-boosting check may be evidence of a formalised and documented development process linking Operational Requirements with the running of the SATs. This process should include evidence of validated high-level and low-level design, application of coding standards, unit and integration testing, and proper version/configuration management.

Question

Why is it not possible for IPL to provide a simple ‘certificate’ that its products satisfy the requirements for DO-178B software verification tool?

Answer

Because it is the users’ responsibility to satisfy themselves, and in turn satisfy their own certification body, on this matter. A given tool can only be certified in the context of a project-specific development environment and associated development standard. IPL can provide access to the evidence needed for this certification to occur but cannot itself carry out the certification (IPL can provide a Certificate of Conformance that a given tool meets IPL’s own software development standards, but this is not the same as the above).

Developed under the control of IPL’s Quality Management System which is certified to ISO 9001:2000 (TickIT)



Certificate Number FM 01589



The General Case for the Suitability of IPL Tools for use on DO-178B (and Similar Standard) Projects.

- IPL has been in business since 1979, specialising in the production of bespoke software systems for clients in the aerospace, telecommunications, medical, transport and defence industry sectors. IPL has had a Software Code of Practice (SCOP) since 1987, and its Quality Management System (QMS) was successfully audited for the ISO 9000-3 standard in 1992. IPL has maintained its ISO 9000 quality rating to this day. The current standard is called BS EN ISO 9001:2000 (TickIT). IPL's certificate is FM01589.
- IPL's software testing tools have been developed under Project-Specific Procedures which are conformant to the SCOP/QMS. The tools' development records have been the subject of repeated internal and external ISO 9001 QA audits since they were first released in 1992.
- The current tools Cantata++ and AdaTEST 95, and the predecessor products Cantata and AdaTEST, have been audited many times since 1992, both against the DO-178B and other company-specific criteria. A list is provided in Table 1.

The IPL Tool Certification Package

For customers who wish to audit the tools in a way which will satisfy them and their external auditors if necessary IPL offers a package which comprises the following:

- One-day spent with IPL staff, which can be held either at IPL offices in Bath, UK, or via webinar. The IPL participants will typically be the Product Development Manager, the IPL QA manager, and a Technical Support Engineer. The aim is to conduct the auditors through the IPL Software Code of Practice and QMS, then show how these procedures have been followed and recorded under appropriate QA control.
- Opportunity to receive copies of any relevant documents which are seen during the course of the day. These takeaway items may be subject to signing a Non-Disclosure Agreement.
- Opportunity after the audit day to continue discussion of any issues raised, in the expectation that all questions will be satisfactorily answered.
- The Tool Certification Package is an IPL list price item so for a quotation, please discuss with your supplier. You should allow four weeks between placing an order and IPL being in a position to host the audit.

The normal end step of the tool audit process is that the auditor writes a report stating what was found, and concluding with a remark as to the tool's suitability for the intended purpose. It is customary but optional for the auditor to provide IPL with a copy of this report, which will be treated in a commercially confidential way.

IPL Tool	Customer	Project	Date
AdaTEST	BAE Systems	Boeing 777 PFC	Feb 1995
AdaTEST	Rolls-Royce Aero	BR710 FADEC	Aug 1995
AdaTEST	Ultra Electronics	Civil avionics	May 1996
Cantata	NLR/Thales Av.	EuroCopter FCDM	May 1998
Cantata	BAE Systems	Civil HUD	Dec 1998
Cantata	ATE	Mil avionics	Dec 1999
AdaTEST	Meggitt Avionics	Civil avionics	Jan 2000
AdaTEST	BAE Systems	Mil avionics	Apr 2000
AdaTEST	Park Air Systems	Civil avionics	Feb 2001
Cantata	BAE Systems	Civil avionics	Dec 2002
AdaTEST 95	Smiths Aerospace	Boeing 777 avionics	Apr 2003
Cantata	Nord-Mikro	Civil avionics	Apr 2003 and Mar 2005
Cantata and Cantata++	ESW Wedel	Civil avionics	June 2005
Cantata++	TTTech	Civil avionics	January 2007

Table 1. IPL tools audits

Quote

"AdaTEST 95... is documented, controlled and verified to a level beyond that required by DO178B."

IPL

IPL Software Products Group
Eveleigh House, Grove Street,
Bath BA1 5LR, UK

Tel: +44 (0) 1225 475000
Fax: +44 (0) 1225 444400

Email: tools@ipl.com

www.ipl.com/tools

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