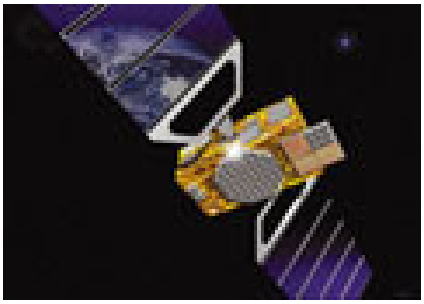
**AdaTEST 95**
**Provides**
**Test Assurance**

# Case Study: AdaCore Technologies



An impression of a Galileo Satellite

*AdaCore Technologies are leading suppliers in the field of Ada software products, particularly well known for the GNAT compiler and the GPS development environment. AdaCore also specialise in customised client-driven software development.*

The European Space Agency (ESA) required a new high integrity software development kit for the production of mission and safety critical systems, for their onboard satellites. This environment would be used by primary space contractors such as Astrium and Alcatel, and many subcontractors to these companies. It was to the Paris office of AdaCore that ESA turned to provide this kit.

Ada is often regarded as the natural computer language to use for standard safety critical software, but for the highest safety levels to be reached, further refinements of the Ada language have been developed. One such refinement is the Ravenscar profile, which came into being after a conference held in 1998 in Ravenscar, England. This defined a subset of Ada which would permit the real-time features of Ada to be used in a demonstrably safe way. ESA wanted to use the new software development kit to support this Ravenscar profile.

## *TEST CRITICALITY*

The most critical feature of the new kit was the run-time environment, which is located on the target and controls every aspect of the application as it runs. To satisfy ESA's stringent quality needs this had to be tested thoroughly by AdaCore. The software would only be accepted if evidence of testing, including coverage analysis, could be provided. To meet the 100% Statement coverage analysis requirement, **AdaCore turned to IPL's AdaTEST 95 testing tool.**

However, technical difficulties needed to be addressed before AdaTEST 95 could be deployed in this environment. AdaCore's Senior Software Engineer, Jose Ruiz, comments "AdaTEST 95 needed dynamic memory to store raw coverage data, which is then analysed at the end of the test. However, the Ravenscar profile specifies that dynamic memory allocation is not allowed, and so other solutions needed to be developed".

## *IPL FINDS A SOLUTION*

IPL agreed to look for solutions to this problem, and in August 2004 the development environment was assembled at IPL's Bath office. In charge of the project was IPL engineer Richard Miskin. "I had a few ideas that I thought would work." says Miskin, "though it took a further 2 months to solve all the technical problems and complete the necessary validations". IPL delivered a new version of AdaTEST 95 to Adacore in October 2004, customised for the Ravenscar profile.

Jose Ruiz resumes the story. “We had a validation suite ready to run, so we rebuilt the run-time using code instrumented by AdaTEST 95. By mid-November the facility was running smoothly and we had developed, with IPL, the optimal solution. The results were very interesting,”

Jose continued. “Coverage showed us two things: firstly that about 8% of our code was not being reached by the original validation suite. This was a small surprise because we had thought our validation tests were fairly complete. The other more surprising fact that AdaTEST 95 showed us was that certain areas of our code were not reachable! This was in spite of the fact that the code had been through visual inspection, and certainly looked good. However, the coverage evidence was conclusive; those parts of the software had to be redesigned and rewritten to ensure that the intended functionality was correctly implemented.”

### *HAPPY CONCLUSION*

It took approximately four months to run the tests with coverage, supplement the original tests, and refactor the code so that it was all reachable. The return on investment from AdaTEST 95 was immediately apparent. Ruiz says, “**We found AdaTEST 95 to be extremely powerful in what it could do, and exceptionally clear in the way it presented the data**. There was never too much or too little information; it always showed just what we wanted to know and no more.” With the help of some home-made utilities processing the results data, AdaCore were able to deliver their product to ESA in March this year, with all supporting evidence as requested.

Ruiz reflects on his experiences with AdaTEST and IPL over the last year. “The first point I would make about IPL is that it is a good company to deal with. You get an honest, accurate response to every query, and you get it quickly. In most cases the turnaround on problem reports was under 24 hours, in many cases better than this. IPL were extremely obliging, and went beyond what they were asked in order to give us what we needed.”

*IPL wishes to thank AdaCore Technologies for their participation in this case study. We wish them well in future projects.*

### Galileo Information

A white paper: IPL Testing Tools and the Galileo Software Standard, is available on the IPL website.

### *FURTHER INFORMATION*

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