Northrop Grumman Italia Teams With Mentor Graphics To Achieve DO-254 Compliance

A DO-254 Success Story

DO-254 GROWING IN ADOPTION

RTCA/DO-254 “Design Assurance Guidance for Airborne Electronic Hardware” is a standard that is currently being enforced by the Federal Aviation Administration (FAA), European Aviation Safety Agency (EASA), and other worldwide aviation certification agencies. DO-254 is quickly becoming a best practice requirement even beyond aviation, in many contracts where the FPGA or ASIC components are part of a safety- or mission-critical system.

ACHIEVING CERTIFICATION FOR THE DO254 STANDARD

Compliance Mandated...

When Northrop Grumman Italia’s (NGI) customer mandated DO-254 for the complex hardware of the future versions of their navigation systems, they instigated a program to bring their proven development process into alignment with DO-254 category level A. Although they were able to put systems in place to achieve traceability of requirements through design, verification and validation, they felt that it would be prudent to get a second opinion from industry experts.

So they turned to Mentor Graphics. Through Mentor’s involvement in the DO-254 community and partnerships with certification experts, Northrop Grumman Italia quickly got the advice they needed to be confident that their process met DO-254 compliance. However, they felt that their verification process could be improved further, so they engaged with Mentor’s verification consulting team for their first pass through the process.

Verification Challenges

In previous projects, NGI had verified their complex hardware using VHDL test benches and then completed system validation in the lab. However, NGI’s Mission Assurance department recommended improvement of the verification process via an RCCA (Root Cause Corrective Action). The NGI team knew they not only needed to have a DO-254 compliant process, but also one that thoroughly verified their designs as early as possible to avoid cost and schedule problems in future programs.

Advanced Verification Methods

Verification experts from Mentor’s Consulting Division were brought on site to analyze the situation and to recommend the best fit verification methodology. The process was improved through the use of SystemVerilog covergroups and assertions coupled with an integrated test plan that could be traced against requirements using Mentor’s Questa verification platform and its ReqTracer requirements traceability tool.

A Requirements-Driven Flow

DO-254 mandates a requirements-driven flow. Requirements specify a design’s intent and therefore requirements must be linked to all design and verification activities. The Mentor Graphics ReqTracer tool was chosen to automate traceability to meet the stringent requirements of DO-254. NGI are very enthusiastic about the power of the integrated Questa/ReqTracer solution, and will use this approach on future programs.
Northrop Grumman Italia Drives To DO-254 Compliance Success With Mentor Consulting

Partnering Early Brings Unexpected Benefits

Mark Peryer, Verification Practice Manager, was team lead on this engagement. Mark is based in Newbury, UK.

A CASE STUDY

Partnering from the Start
Northrop Grumman Italia (NGI) recently engaged Mentor Graphics Consulting in a project requiring both DO-254 compliance and verification methodology improvements. The objective of the engagement was to enable NGI to demonstrate a DO-254 compliant verification process for the complex hardware in the navigation products that they supply to a number of military/aerospace manufacturers.

Knowledge Transfer
Starting in April 2009, Mentor Consulting worked with NGI to verify three FPGAs using a DO-254 compliant verification process. The structured program started with knowledge transfer on advanced verification techniques using one of the FPGAs as a working example; to deliver verification consulting to verify the most complex FPGA and to support NGI as they verified the third FPGA themselves. The project had to be complete by the end of May 2009 to be ready for an audit by the customer.

Advanced Verification Success
The engagement was completed on schedule to the complete satisfaction of NGI staff and management. All three devices were verified with 100% code and functional coverage and complete traceability of requirements through a verification procedure to simulation results. The NGI staff members were shown how to develop test benches using SystemVerilog coverage groups and assertions. The simulation coverage data was merged with a test plan, which gave proof of requirement verification so that the verification results could be linked back to the design requirements.

Unexpected Side-Effects
The traceability of design requirements through to proof of coverage via a simulation database was key to achieving DO-254 compliance. However, the side effect of using the methodology was the verification took less time to implement, that more bugs were found early, and issues were easier to debug.

The NGI team will be using the process implemented by Mentor Consulting for future projects not only because it meets DO-254, but because of its productivity.

KNOWLEDGE TRANSFER

Mentor Consulting’s Verification Practice offers solution-driven consultants who will dramatically reduce your verification process times while improving quality.

Unlike other EDA consulting services or third party consultants, Mentor Consulting’s highly experienced Verification Services team use a structured Knowledge Transfer process. This process is geared to enabling clients to learn ‘on the job’ so that they can fully understand and adopt the methodology and tools which are a best fit solution to their needs.

For more information, go to www.mentor.com/consulting www.mentor.com/go/do-254