

Advantages of Systems Integration and new Technologies for Systems Testability Improvement during Aircraft Manufacturing Phase

Author(s): G. Soriano-Rull, A. Corrales-Dominguez

Affiliation: Airbus Military

Introduction:

Achieving manufacturing objectives on time, on cost and on quality has traditionally implied being more than efficient and optimising manufacturing processes in no matter which industrial domain or market. Today's world requires even more than that, and manufacturing processes must be considered and designed during product definition, being *collaborative engineering* the basis for the *design for manufacturing* or *design for testing* concepts.

In the field of large and medium aircraft (A/C) manufacturing, systems testing activities are present in more than half of the complete production lead-time, which means that efforts for reducing testing times need to be made from the very beginning of the aircraft design. Current systems design, architectures and technologies allow the introduction of specific onboard functions for systems testability during A/C manufacturing phase, which leads to reduction of testing time and improvement of overall testability activities.

A400M Design for Testing:

In the frame of the A400M program, special attention was given to testing requirements during systems design phase. Considering the A/C systems architecture, available technologies and their capabilities and the testing needs during A/C manufacturing phase in the Final Assembly Line (FAL), specific functions were integrated into A/C systems in order to:

- improve aircraft systems testability on ground,
- reduce ground tests time, cost and non-quality issues,
- extend the previous CATS[®] test system capabilities,
- increase integration level between CATS[®] test system and A/C systems.

The A400M systems architecture is based in an AFDX network connecting A/C systems. This network contributes to a high level of integration between systems and eases the definition of

communications between A/C systems, but also between A/C systems and non-onboard systems like CATS[®].

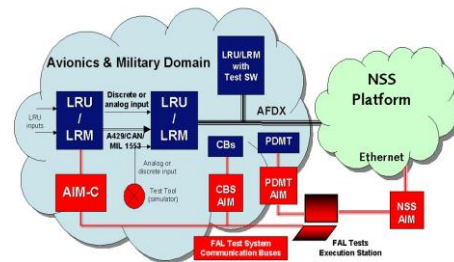


Figure 1. CATS[®] test system connection to A/C.

Among the specific functions for testability developed in the A400M systems, two of them must be highlighted:

1. NSS Platform gateway function for CATS[®] connection and communication with A/C systems.
2. Specific embedded test software and communication protocol in aircraft computers.

These two functionalities onboard the A/C allow the execution in a complete automatic way of some systems tests at FAL making use of the CATS[®] system, and following industrial procedures according to the Design Office test requirements.

Conclusions and future in testability:

High level of onboard systems integration and high communication capabilities allow, if correctly and in-time defined, more efficient manufacturing processes in terms of testing, with important non-recurrent and recurrent costs and time saving.

The future should lead to standardisation of aircraft systems capabilities and functions for ground testing at FAL, leading to more and simpler integration between A/C systems and ground testing tools with easy connection capabilities and standard protocols utilisation.

* CATS[®] stands for Computer Aided Test System and is the Airbus Military test system used in Airbus Military's Final Assembly Lines for performing on ground systems tests.

** NSS stands for Network Server System and is the system where onboard maintenance applications run in the A400M.