Aircraft Test Bench Architecture Evolution

Example with the A400M

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CREATIVE ELECTRONIC SYSTEMS

Eurofighter Test Rig Requirements

- Large multi-site / multi-nation specifications
- Common global architecture for large testers to small portable testers
- Very high connectivity required with aircraft simulators
- One unique CPU type
- One common architecture for avionic bus interfaces

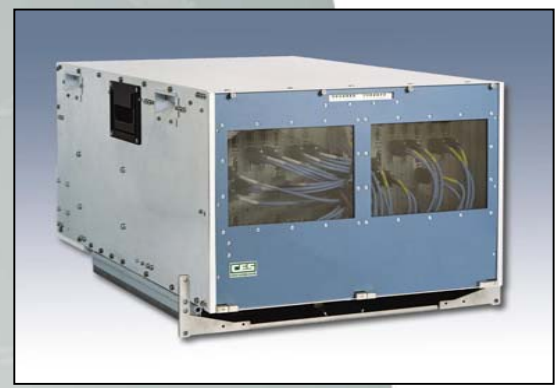
Eurofighter Test Rig Solution

- Simple, fast and secure adaptability to a variety of applications
- PowerPC family, PCI local bus, VME global bus
- Tightly coupled FPGA – PowerPC architecture for avionic buses

CREATIVE ELECTRONIC SYSTEMS

Airbus A380 Test System Requirements

- Common equipment between ground test, flight test and serial aircraft test
- Three environments with different problems:
  - Ground: emulation, simulation and validation
  - Flight: full-speed recording and real-time analysis
  - Serial aircraft: same as flight, plus additional size and environmental requirements



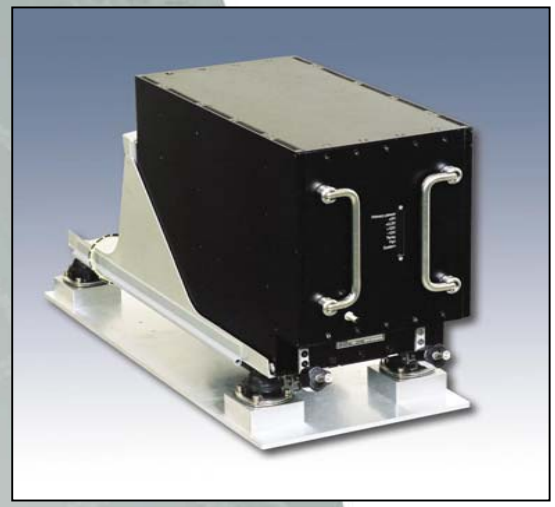
Airbus A380 Test System Solution

- One general purpose CPU architecture
- Introduction of a multipurpose test element for the new AFDX® bus

Merging the 2 Approaches for the A400M

- Portability check of the Eurofighter AIDASS® test solution to the A380 IENA ground test and flight test rigs without impact on the existing equipment
- Same solutions reused with new steps:
  - Mix of military avionic buses (MIL-STD 1553B) with commercial avionic buses (AFDX®, ARINC 429, CANbus)
  - Open platform specification to adapt multiple user requirements

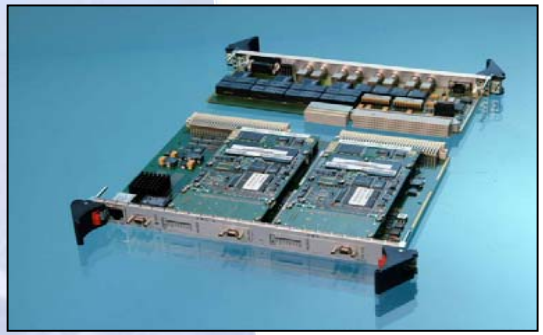
The Future

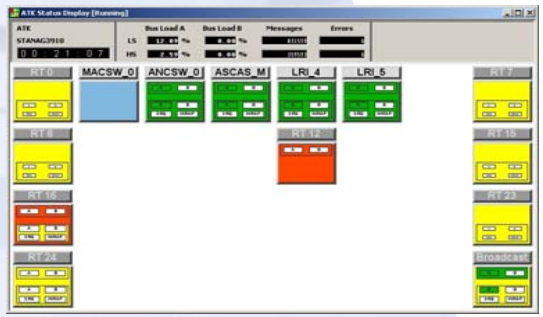


- Benefit from the experience with the MRTT and different drone programs
- Close the gap between mission computers and test computers
- Operating system independent BSPs
- Software upward compatibility:
  - VxWorks® -> SCA compliant -> VxWorks® AE 653
  - Integrity® -> SCA compliant
- Hardware upward compatibility:
  - Commercial
  - Ruggedized (air cooled / conduction cooled)
  - Ruggedized Military (air cooled / conduction cooled)

Basic Building Blocks for Test Systems

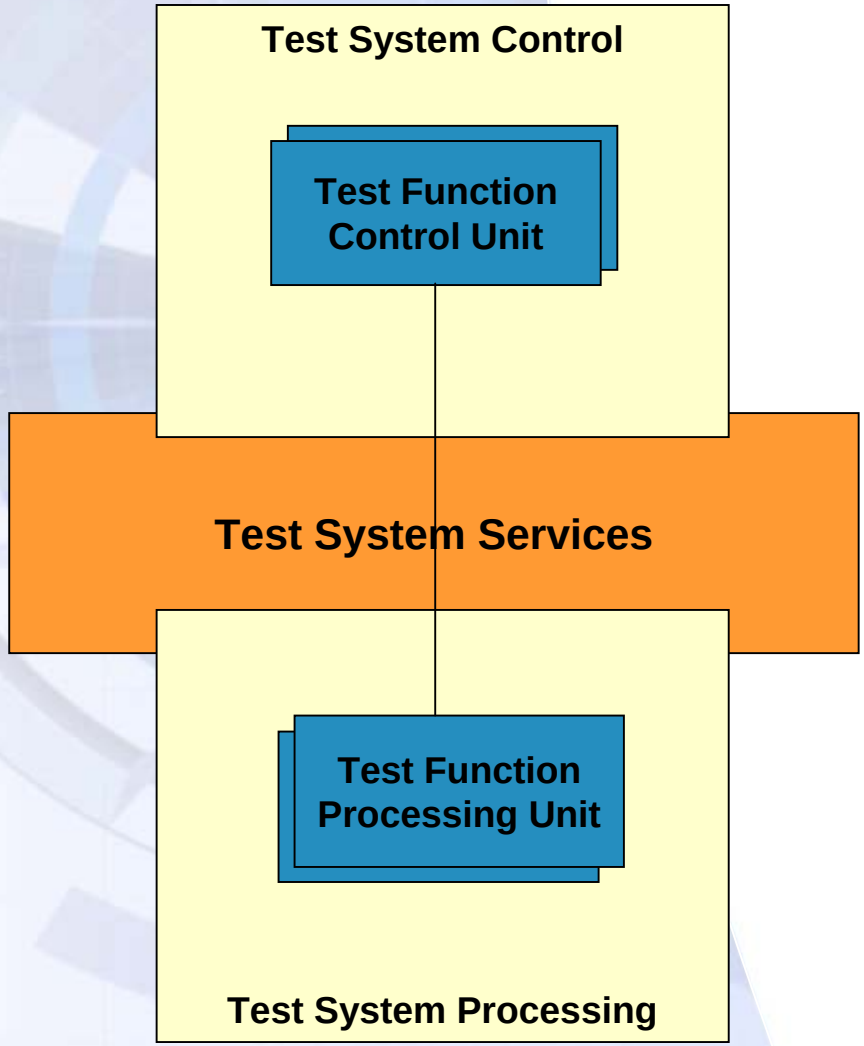
- Board-Level Elements
  - CPU Boards / PMCs / FPGAs
  - Rear IO Signal Conditioning
- System-Level Elements
  - PCs
  - VME Chassis
  - Real-Time Processors
  - Interface Boards
- Software Elements
  - PC-Based Graphical User Interface
  - System Services
  - Real-Time Processes





Virtual Rig Configurations

- PC-Based Test Function Control
  - Configuration (data, hardware, patching)
  - Graphical User Interface
  - Test Script & Test Procedures
  - Offline Data Analysis
- PC-Based Test System Services
  - Loading Services
  - Communication Services
  - Interface Control Services
- PC-Based Real-Time Processing
  - Wave Form Generators
  - Simulations
  - Recording & Replay
  - Simulated Bus Systems and Data



Target Rig Configurations

- PC-Based GUI
  - Configuration (data, hardware, patching)
  - Graphical User Interface
  - Test Script & Test Procedures
  - Offline Data Analysis
- Distributed System Services
  - Loading Services
  - Communication Services
  - Interface Control Services
- VME-Based Real-Time Processes
  - Wave Form Generators
  - Simulations
  - Recording & Replay
  - Signal Interface Boards

Conclusions

- Reduction of hardware and software building blocks
- Use of hardware and software elements from software testing to flight test
- Reduction of test system development cost by reusability of hardware and software elements
- Less effort for obsolescence treatment for project lifetimes over 15 years
- Effective development of test procedures with same GUI
- Customers save development cost by reusing test procedures for all system integration levels