VectorCAST for DO-178C and ED-12C

What is RTCA DO-178C; EUROCAE ED-12C

DO-178C and ED-12C are equivalent standard definition documents (edited in issue B and C) with the title “Software Considerations in Airborne Systems and Equipment Certification” issued from RTCA (for U.S.) and EUROCAE (for European Community) that are the most common means of compliance for civil avionic systems. Both DO-178C and ED-12C outline guidelines used by organizations developing airborne equipment and certification authorities, such as FAA, EASA, and Transport Canada.

One of the key requirements in the software verification process of DO-178C and ED-12C is achieving structural code coverage in conjunction with the testing of the high-level and low-level software requirements. These documents classify software into five levels of criticality based on whether atypical software behavior could cause or contribute to the failure of a system function. The table below shows the relationship between the failure condition category and the structural coverage objective as defined the standards.

<table>
<thead>
<tr>
<th>Level</th>
<th>Failure Definition</th>
<th>Associate Structural Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Software resulting in a catastrophic failure condition for the system</td>
<td>Modified Condition / Decision Coverage, Decision Coverage and Statement Coverage</td>
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<tr>
<td>B</td>
<td>Software resulting in hazardous or severe-major failure condition for the system</td>
<td>Decision Coverage and Statement Coverage</td>
</tr>
<tr>
<td>C</td>
<td>Software resulting in a major failure condition for the system</td>
<td>Statement Coverage</td>
</tr>
<tr>
<td>D</td>
<td>Software resulting in a minor failure condition for the system</td>
<td>None Required</td>
</tr>
</tbody>
</table>

Software Criticality Level and Structural Coverage Requirements

What is VectorCAST for DO-178C and ED-12C

The VectorCAST family of tools supports the creation and management of test cases to prove that the low-level software requirements have been tested. Additionally, the VectorCAST tools support the capture and reporting of structural code coverage data at all levels prescribed by DO-178C and ED-12C including Level A.

Highlights

- Supports all levels of code coverage required by DO-178C; ED-12C
- Automatic generation and compilation of complete test stubs and driver programs
- Automatic regression testing
- Compliant test report generation
- Test execution on host, simulator, and embedded target system

VectorCAST Tool Qualification Deliverable Process

DO-178C and ED-12C specifies that qualification of a software tool is necessary when processes prescribed by the document, are eliminated, reduced, or automated by the use of a tool, without its output being manually verified. Because VectorCAST automates the process of validating low-level requirements and the process of recording and reporting on structural code coverage, it must be qualified when used as part of a DO-178C and ED-12C certification. Vector Software has developed an off-the-shelf qualification package that has been used on more than forty DO-178C and ED-12C certification projects.

VectorCAST for DO-178C and ED-12C Qualification Kit

Includes:

- Tool Operational Requirements (TOR)
  - The VectorCAST functionality in verifiable requirements
  - Project operational environment (compiler, platform, target, etc.)
  - Configuration management process
  - Method for attaining verification that VectorCAST has been satisfactorily tested against specified requirements

- Tool Qualification Document (TQD)
  - Tool qualification test data and results
  - Test scripts for re-execution

VectorCAST Tool Qualification Deliverables

Supports all levels of code coverage required by DO-178C; ED-12C
Automatic generation and compilation of complete test stubs and driver programs
Automatic regression testing
Compliant test report generation
Test execution on host, simulator, and embedded target system
Fact Sheet VectorCAST for DO-178C and ED-12C

Programs using VectorCAST:
- F-35 Joint Strike Fighter
- F-22 Raptor
- CV-22 Osprey
- C-5 Galaxy
- C-130 Hercules
- CH-47 Chinook
- Airbus A400
- MHP Maritime Helicopter
- Boeing 777
- Boeing 747
- HAWK
- Airbus A380
- F/D 728
- Agusta A109
- CMHD
- M346
- SmartDeck
- GEnx EMV
- Pegasus
- Airbus A340
- Eurocopter NH-90, Tiger
- Eurofighter
- ATLANTE UAV
- Barracuda UAV
- HERTI UAV
- Watch Keeper UAV
- SAAB Gripen

More information: www.vector.com

Aggregate Coverage Report DO-178B/C and ED-12B/C

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