



A DANLAW COMPANY

*Safety through quality*

## PRODUCT BRIEF

# Data coupling and control coupling solutions for DO-178C

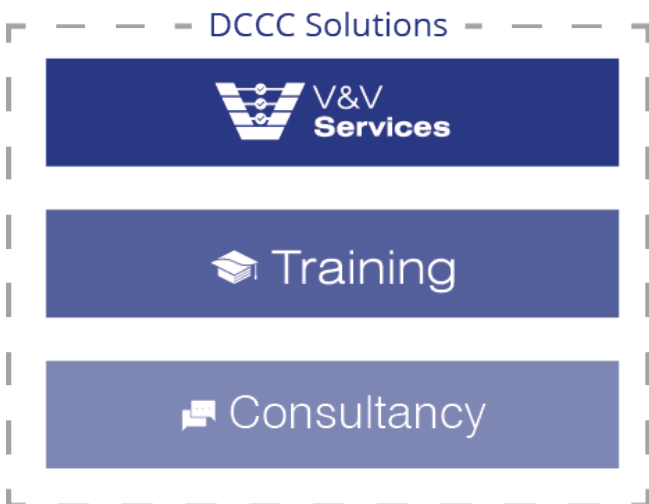
# Product brief: DCCC Solutions

## Introduction

Data Coupling and Control Coupling (DCCC) analysis is required to meet DO-178C objectives, supports the development of quality code, and minimizes project costs and risks.

DCCC is relevant across the DO-178C life cycle, and should be considered as early as possible to maximise efficiency and reduce costs. Your DCCC verification approach must be documented in your DO-178C planning documents before SOL#1, decisions made during software design can have a huge impact on the efficiency of DCCC analysis, and adopting an efficient strategy for DCCC analysis can reduce verification costs.

We provide solutions to support meeting DO-178C's DCCC objective robustly and efficiently throughout the DO-178C life cycle.



## DCCC Solutions

We can help you with the following:

- V&V services to produce DCCC analysis evidence for DO-178C, including traceability evidence, and highlight missing couplings
- Training on DCCC concepts, DO-178C guidance on DCCC, and how to meet DCCC objectives
- Consultancy to help you select an effective DCCC analysis approach based on your project's specific needs

## DCCC V&V Services

We provide V&V services to deliver the DCCC analysis evidence you need for DO-178C for you. Our approach balances tool-based automation and expert services while maintaining the value of DCCC analysis to the broader DO-178C certification objectives. We will carry out all or part of the work necessary to produce the evidence you need.

The tool support we will bring combines static analysis and dynamic analysis:

- Static analysis to check DCCC-related quality attributes in the code and derive coverage goals according to DCCC criteria agreed for the project
- Dynamic analysis to instrument the code and observe coverage goals being met during integration testing

As well as statically derived coverage goals, we can assess design-driven goals, such as assumptions derived from interface requirements and attributes associated with control and data flows.

Our approach is flexible:

- We can work independently or integrate our engineers into your teams
- We can propose DCCC activities and criteria for your project, or work to your criteria
- We can use our (DO-178C-compliant) processes or yours
- If required, we can liaise with your DER

We are experts in providing services for multicore DO-178C projects, as outlined in our **MACH**<sup>178</sup> product brief, and can help you tackle DCCC objectives for applications running on multicore platforms.

## DCCC V&V Services



Efficient DCCC analysis

Automated tool support

## DCCC Training

We provide specialized training courses to leave you with everything needed to understand DCCC and efficiently meet DO-178C's DCCC analysis objective and get the most from DCCC analysis.

Our training includes the following:

- DCCC concepts and DO-178C guidance
  - What are Data Coupling and Control Coupling analyses?
  - How do DCCC analyses relate to other software development and verification activities?
  - What does DO-178C require for Data Coupling and Control Coupling?
  - What challenges are there in meeting the DO-178C DCCC objective?
  - What evidence can be collected to support DCCC analyses?
- General guidance on meeting the DCCC objective
  - What steps do you need to follow?
  - What should you consider throughout the DO-178C life cycle to support DCCC?
  - How do you decide what evidence is applicable for your project?
  - How do you gather the evidence you need?
- Multicore-specific guidance
  - How do DCCC analyses apply to multicore systems?
  - What additional certification requirements are there for DCCC on multicore platforms (CAST-32A / A(M)C 20-193)?
  - What are the main complications with multicore DCCC and how can you address them?

## DCCC Training



DCCC concepts and DO-178C  
guidance

General and multicore-specific  
guidance

## DCCC Consultancy



Help for DCCC planning

Assistance defining analysis  
workflow

Guidance in selecting and  
justifying analysis criteria

## DCCC Consultancy

We provide consultancy to help you plan a robust and cost-effective approach for DCCC analysis.

The consultancy we offer is in various areas including the following:

- Help planning for DCCC and presenting the plans within the DO-178C document set, including design and coding standards and the Software Verification Plan
- Help defining the most effective workflow for meeting the DCCC objective based on project-specific needs, including manual and semi-automated activities, review checklists etc.
- Help selecting and justifying appropriate completeness criteria for DCCC analyses
  - What must you observe in testing to claim to have met the intent of the objective? Why are these criteria sufficient for your project?
  - Which additional analyses, reviews etc. must be performed to support justification that your criteria are sufficient?

Our engineers have extensive experience and can also advise on other aspects of software development and verification, for example, assessing alternative software design strategies for their impact on DCCC.

Based on our expertise in meeting multicore certification requirements, we also offer consultancy in DCCC analyses for multicore platforms, as advised under CAST-32A/ A(M)C 20-193. For more information, see our **MACH**<sup>178</sup> product brief.



## About Rapita

Rapita Systems provides on-target software verification tools and services globally to the embedded aerospace and automotive electronics industries.

Our solutions help to increase software quality, deliver evidence to meet safety and certification objectives and reduce costs.

## Find out more

A range of free high-quality materials are available at:  
[rapitasystems.com/downloads](http://rapitasystems.com/downloads)

## SUPPORTING CUSTOMERS WITH:

### Tools

#### Rapita **Verification Suite:**

Rapi**Test**

Rapi**Cover**

Rapi**Time**

Rapi**Task**

### Engineering Services

#### V&V Services

Integration Services

Qualification

SW/HW Engineering

Compiler Verification

### Multicore verification

#### **MACH**<sup>178</sup>

Multicore Timing Solution

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