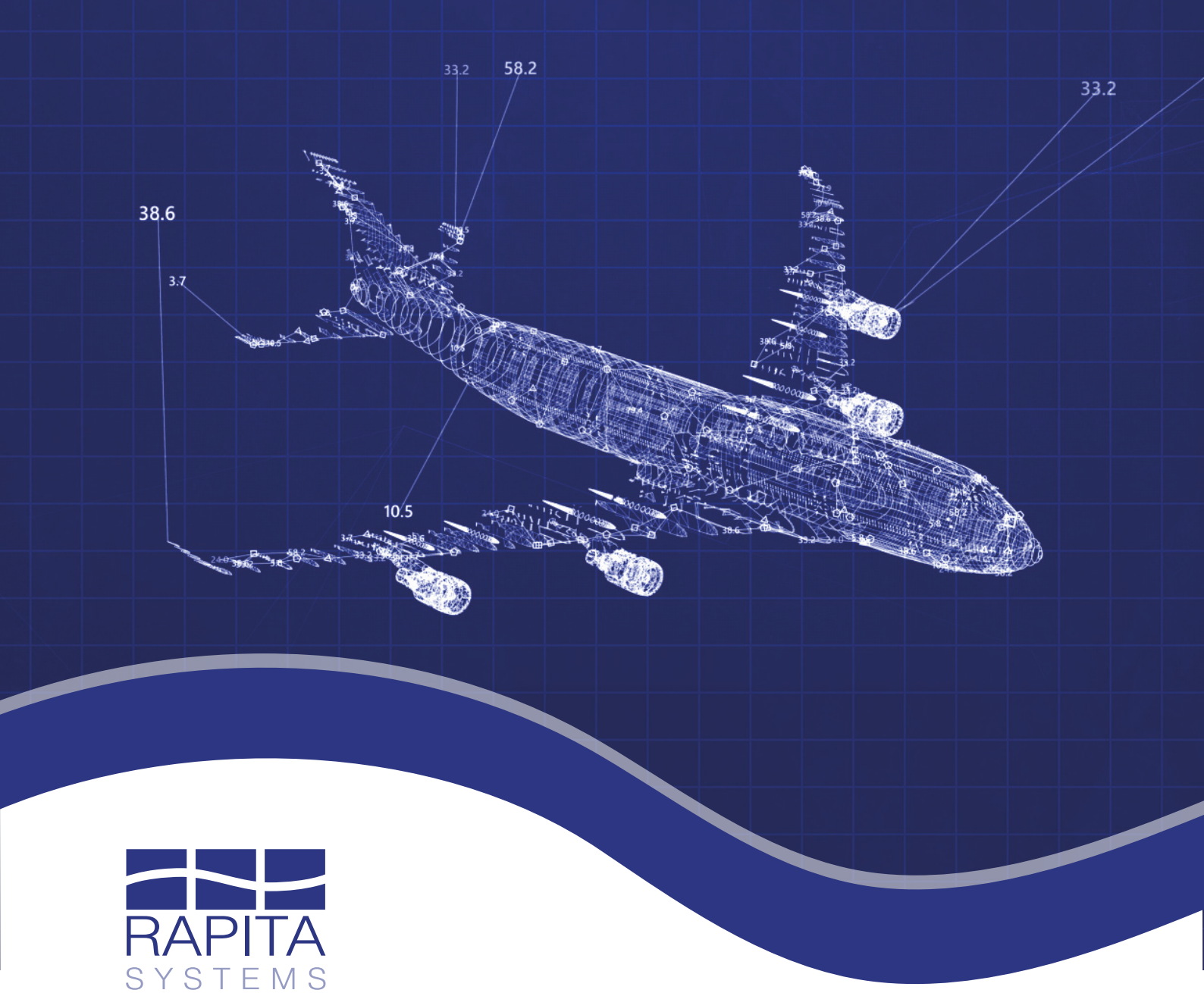


RAPITA SYSTEMS
A DANLAW COMPANY

Safety through quality

PRODUCT BRIEF

Derisk your multicore certification approach with the **MACH**[178] Blueprint

Product brief: **MACH**[178] Blueprint

MACH[178] Blueprint

How can the **MACH**[178] Blueprint help you?

The **MACH**[178] Blueprint provides a research & training platform through which you can understand what is required for multicore certification in accordance with airworthiness guidance including AC 20-193, AMC 20-193, CAST-32A and AA-22-01, and derisk your multicore certification approach.

The solution supports different roles in the avionics supply chain, including those of Integrated Modular Avionics (IMA) Certification Applicants, System Integrators, Platform Providers and Application Suppliers.

Benefits and use cases

- Understand how to meet AC 20-193 and AMC 20-193 compliance objectives from planning to submitting compliance results using the **MACH**[178] workflow
- Develop in-house expertise to support AC 20-193 and AMC 20-193 compliance
- Derisk your multicore DO-178C projects

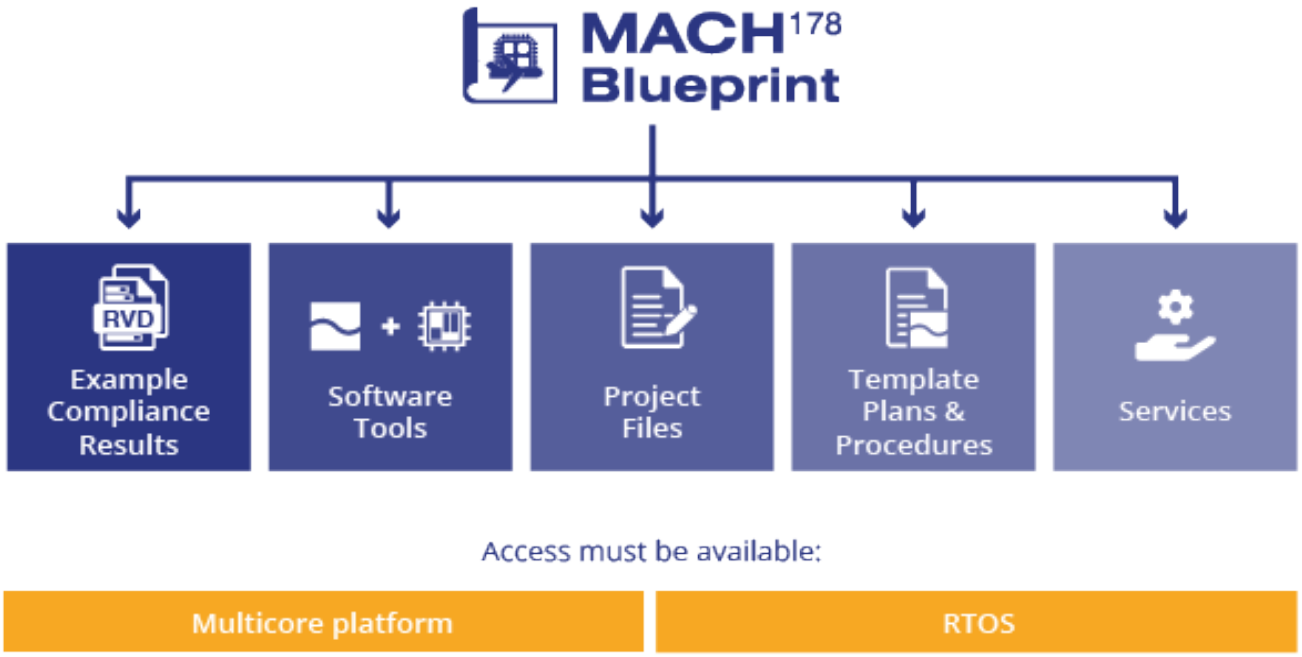
How does it work?

The **MACH**[178] Blueprint is based on Rapita Systems' **MACH**[178] approach for AC 20-193 / AMC 20-193 compliance, which is being used to support the certification of multicore DO-178C software up to and including DAL A by avionics software developers globally. For more information on **MACH**[178], see the **MACH**[178] Product brief.

The **MACH**[178] Blueprint demonstrates how you can address key AC 20-193 / AMC 20-193 objectives using the **MACH**[178] workflow. It includes results from running the workflow on the Blueprint platform, software tools and project files to support running the workflow on the Blueprint platform, and template plans and procedures that support using the workflow.

This is delivered along with support and training to help you understand and repeat the **MACH**[178] workflow.

To repeat the **MACH**[178] workflow using the Blueprint materials, you will need to arrange access to the corresponding multicore platform and RTOS, which are not included in the **MACH**[178] Blueprint.



What's included?

The **MACH**178 Blueprint includes the following components.

Example Planning Documents

The **MACH**178 Blueprint includes example A(M)C 20-193 planning documents that have been instantiated for the Blueprint platform. This includes the following documents:

- Plan for Multicore Aspects of Certification
- Multicore Software Verification Plan

These documents are instantiated versions of the template planning documents available in **MACH**178 Foundations.

Example Compliance Results

The **MACH**178 Blueprint includes results generated from running the **MACH**178 workflow to identify and characterize the impact of two interference channels on the Blueprint platform.

This includes results and completed checklists for the following activities:

- Hardware Resource Identification
- Interference Channel Identification
- Critical Configuration Settings Identification
- Hardware Event Monitor Identification
- Hardware Event Monitor Validation
- Interference Channel Characterization
- Timing Requirements Analysis
- Software Characterization

These documents are instantiated versions of template documents available in **MACH**178 Foundations.

Software Tools

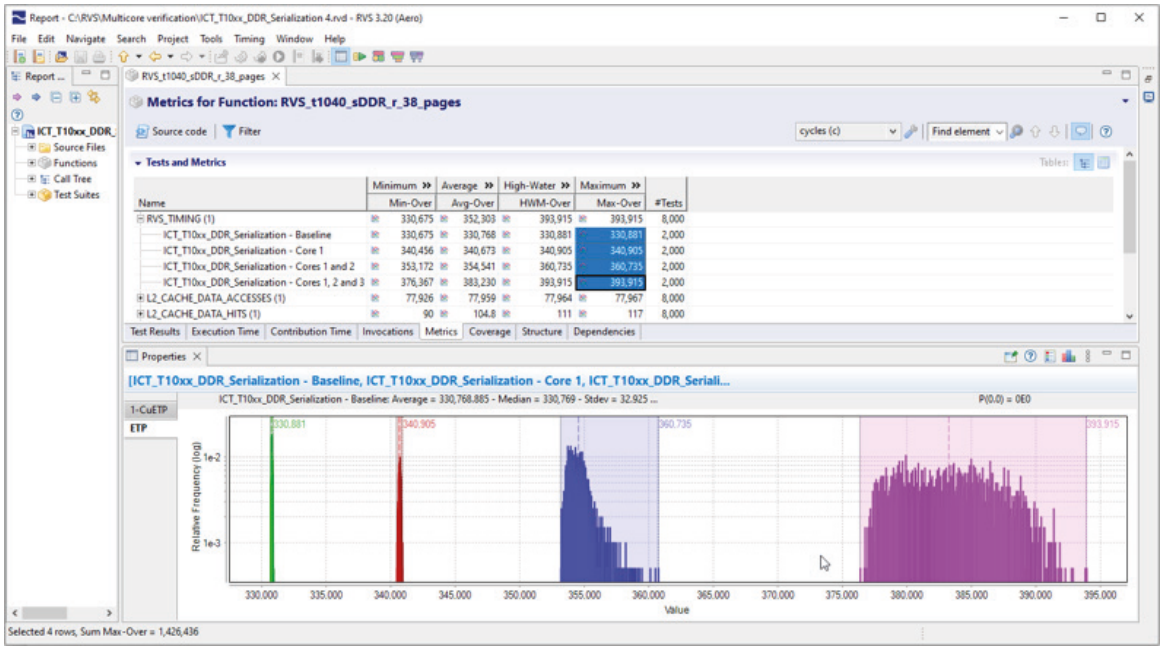
The **MACH**178 Blueprint includes software tools that you can use to repeat the **MACH**178 workflow on the Blueprint platform in-house; this includes:

- The R**VS** toolsuite to automate instrumentation to collect performance metrics including software execution time and Hardware Event Monitors, to run multicore tests, and to report on and export results
- Rapi**Daemons** to support the characterization of interference effects on the Blueprint platform

Project Files

The **MACH**178 Blueprint includes project files that you need to run the Blueprint software, execute Rapi**Daemons**, and run multicore timing tests on the platform. This includes:

- Blueprint application software build files
- Timing tests for the Blueprint application
- R**VS** project files to support running timing tests on the Blueprint application and collecting results



Training

To support your use of the **MACH**[178] Blueprint, we provide 5 hours introductory training and a free seat on our popular multicore DO-178C (A(M)C 20-193) training courses, which operate in Europe and the USA.

Additional training is available through **MACH**[178] Services.

Support

We provide support for your use of the **MACH**[178] Blueprint, including setup and use of the Blueprint platform and use of the software tools.

Blueprint platform

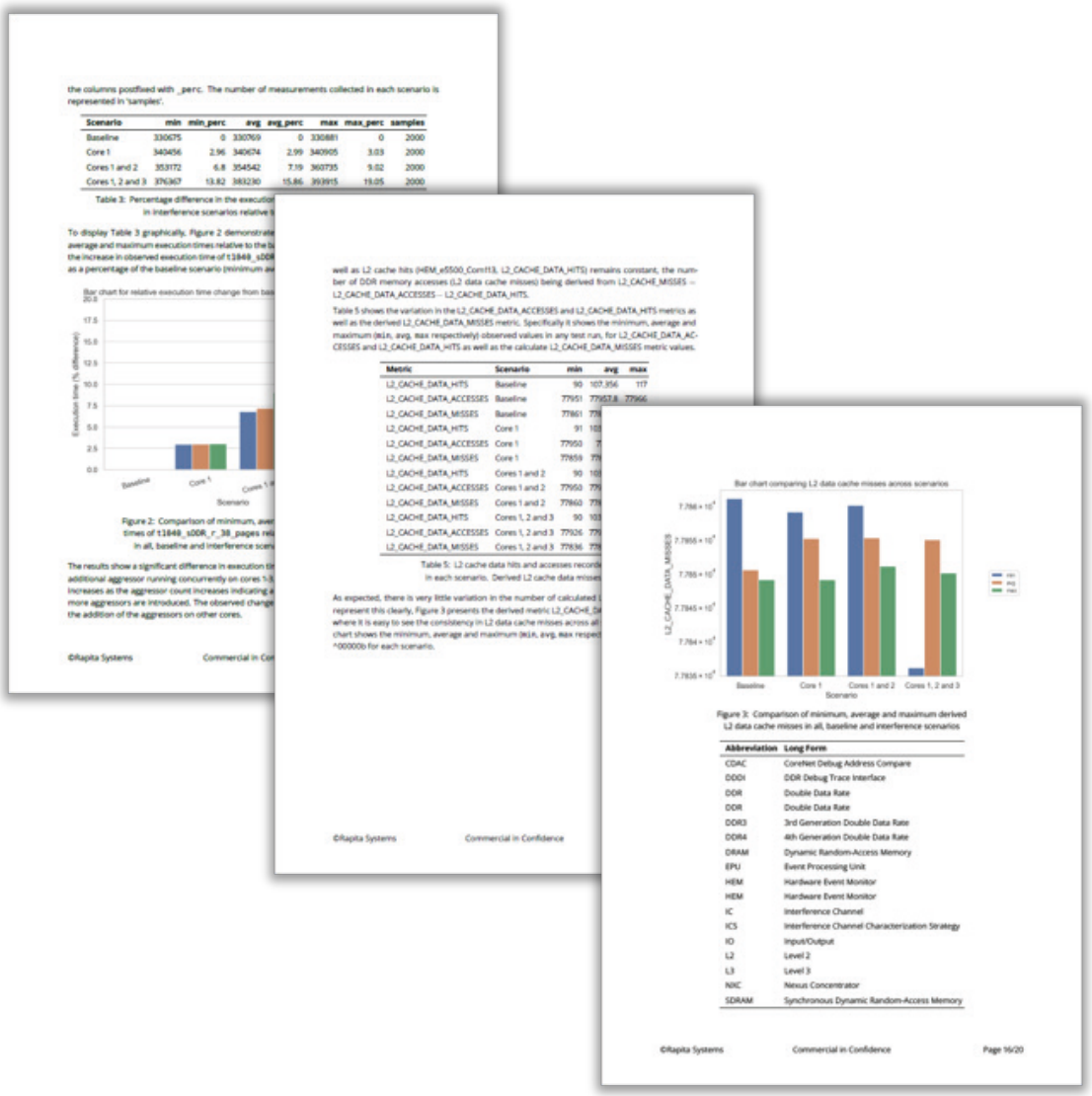
The **MACH**[178] Blueprint platform is a canny edge detection application running on an NXP® T1040RB processor with a DDC-I Deos operating system.

To support your use of the **MACH**[178] Blueprint, access to the Blueprint platform must be available, including the T1040RB processor and the Deos RTOS. We may be able to help you gain access to these components. Contact us to learn how we can help.

Interference channels

Understanding interference channels and characterizing the effects of interference is a key part of addressing AC 20-193 and AMC 20-193 objectives.

Artifacts delivered in **MACH**[178] Blueprint products focus on two interference channels on the Blueprint platform.



What is the **MACH**[178] workflow?

The **MACH**[178] workflow is a compliance workflow designed to support DO-178C (A(M)C 20-193) compliance activities. It has been developed to provide an optimized path to planning for understanding, mitigating and quantifying multicore interference, and producing A(M)C 20-193 compliance evidence.

The workflow includes the following stages:

1. Planning – where planning documents for the compliance process are developed
2. Platform Analysis – where platform resources and interference channels are identified
3. Platform Characterization – where the impact of interference on each interference channel is quantified
4. Software Analysis – where requirements on software performance are identified
5. Software Characterization – where the performance of software in interference scenarios is verified
6. Certification – where compliance results are collated, automation tools are qualified, and results are presented to a certification authority

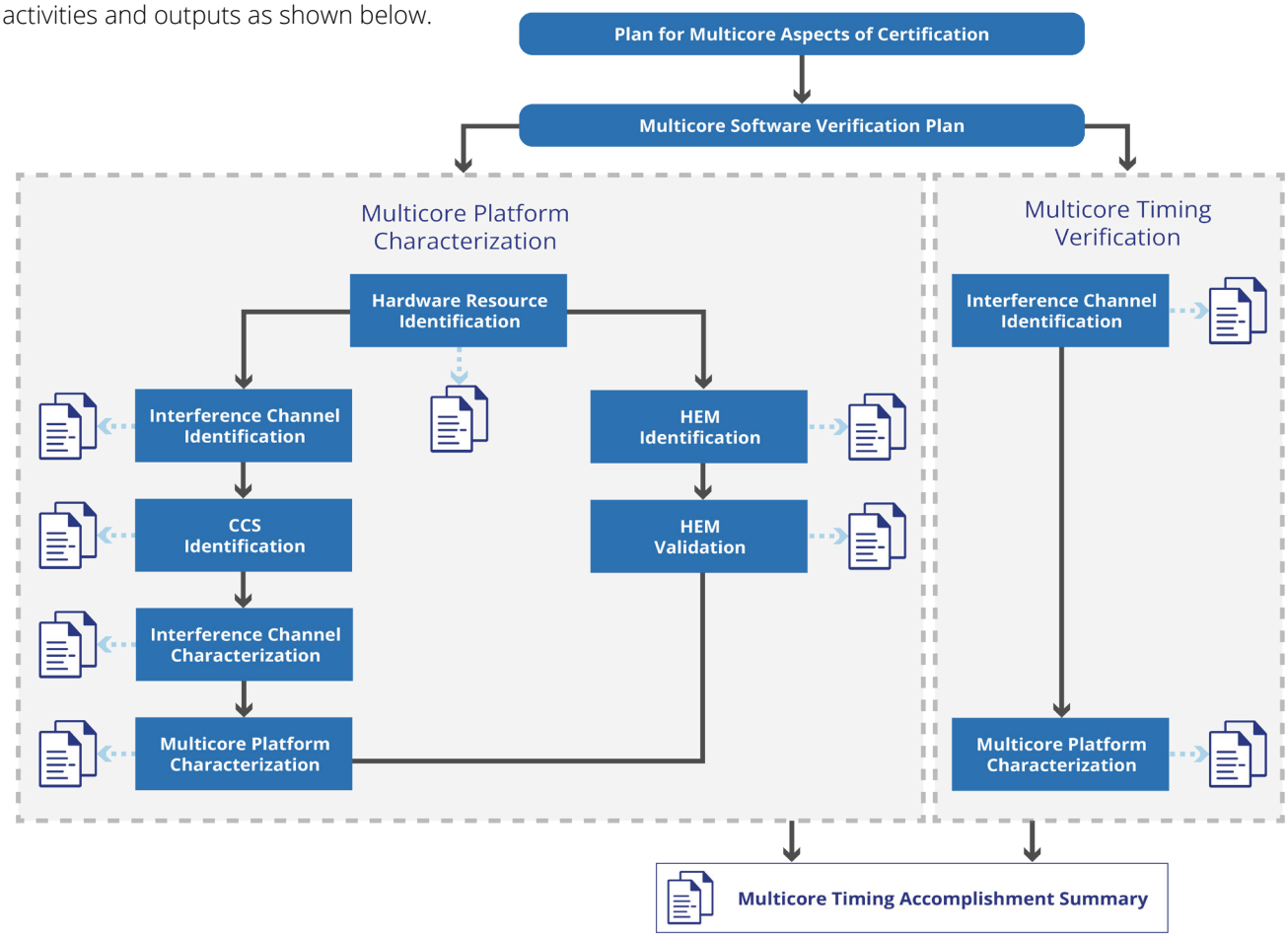
These stages map to DO-178C (A(M)C 20-193) plans, activities and outputs as shown below.

MACH[178] Tools

Multicore DO-178C projects require additional testing, making it more crucial than ever that efficient automation is used wherever possible. The following tools from Rapita Systems directly support the **MACH**[178] workflow:

- Rapi**Daemons**, which support the targeted generation of interference on specific hardware resources, allowing the observation of interference effects
- Rapi**Test**, which supports the authoring and execution of multicore timing tests on a multicore platform
- Rapi**Time**, which supports the observation and analysis of execution time data and values from Hardware Event Monitors on the target hardware during tests
- Rapi**Task**, which supports visualization and analysis of task sequencing and scheduling behavior on a multicore platform

DO-330 qualification kits and a Qualified Target Integration Service are available for Rapi**Daemons**, Rapi**Test** and Rapi**Time** to support the use of these tools in DO-178C projects.



How can **MACH**[178] help you?

The **MACH**[178] Blueprint is part of the **MACH**[178] solution. **MACH**[178] is a package of products and services designed to support the certification of multicore DO-178C software according to relevant airworthiness guidelines:

- DO-178C / ED-12C
- AC 20-193 / AMC 20-193/ CAST-32A (superseded)
- DO-330

As these guidelines represent the "gold standard" for certification of critical embedded software, **MACH**[178] can also be used to support airworthiness certification in other contexts e.g. eVTOL, or Military & Defense avionics certification to standards such as MIL-HDBK-516C (AA-22-01).

Support for System Integrators and Certification Applicants

MACH[178] allows System Integrators to perform verification activities demonstrating that a multicore Platform along with its integrated Applications is compliant with A(M)C 20-193. When combined with the incremental assurance evidence provided by Platform Providers and Application Suppliers, this forms a complete set of A(M)C 20-193 certification evidence.

We help develop supplier frameworks and processes that can be used as acceptance criteria for A(M)C 20-193 compliance activities performed by Platform Providers and Application Suppliers on the project.

Support for Platform Providers

MACH[178] allows Platform Providers to produce evidence demonstrating that their Platform is compliant with A(M)C 20-193. This evidence can later be used by Application Suppliers, System Integrators and Certification Applicants to support A(M)C 20-193 compliance.

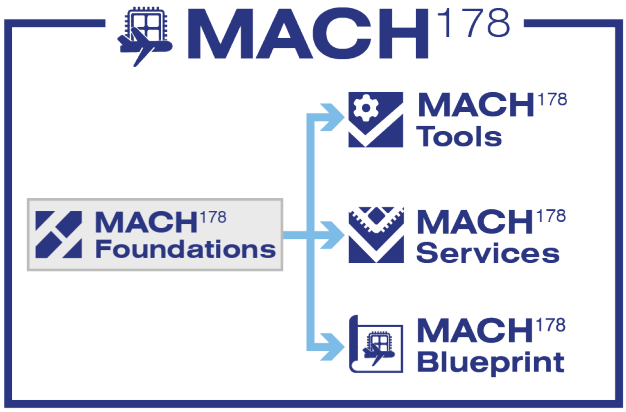
Support for Application Suppliers

MACH[178] allows Application Suppliers to produce evidence demonstrating that their Application, running on the target Platform, is compliant with A(M)C 20-193. This evidence can later be used by System Integrators and Certification Applicants to support A(M)C 20-193 compliance.

More **MACH**[178] solutions

As well as the **MACH**[178] Blueprint, **MACH**[178] includes other solutions to support your A(M)C 20-193 compliance journey:

- **MACH**[178] Foundations – a document repository including template planning documents, procedures and checklists to apply the **MACH**[178] workflow for multicore DO-178C (A(M)C 20-193) compliance. For more information on **MACH**[178] Foundations, see the *MACH*[178] *Foundations Product brief*.
- **MACH**[178] Tools – software tools to support applying the **MACH**[178] workflow on a multicore project, with DO-330 qualification kits and services (see *MACH*[178] *Tools*).
- **MACH**[178] Services – services to support applying the **MACH**[178] workflow to your multicore project. For more information on **MACH**[178] services, see the *MACH*[178] *Services product brief*.



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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

SUPPORTING CUSTOMERS WITH:

Tools	Engineering Services	Multicore verification
Rapita **Verification Suite**:	V&V Services	**MACH**[178]
Rapi**Test**	Integration Services	Multicore Timing Solution
Rapi**Cover**	Qualification	
Rapi**Time**	SW/HW Engineering	
Rapi**Task**	Compiler Verification	

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