RAPITA
SYSTEMS
A DANLAW COMPANY

Safety through quality

PRODUCT BRIEF

Supporting your A(M)C 20-193 compliance with
MACH¹⁷⁸ Services

Product brief: **MACH**¹⁷⁸ Services

MACH¹⁷⁸
Services

How can **MACH**¹⁷⁸ Services help you?

MACH¹⁷⁸ Services provide support for achieving multicore DO-178C (A(M)C 20-193) compliance objectives using the **MACH**¹⁷⁸ workflow (see *What is the MACH178 workflow?*).

This includes services to support your use of **MACH**¹⁷⁸ automation tools, to apply the **MACH**¹⁷⁸ workflow to your multicore program to produce A(M)C 20-193 compliance evidence, and training and consultancy to support your compliance journey.

Benefits and use cases

- Support your use of the **MACH**¹⁷⁸ workflow for A(M)C 20-193 compliance

- Reduce time to market for your multicore DO-178C projects
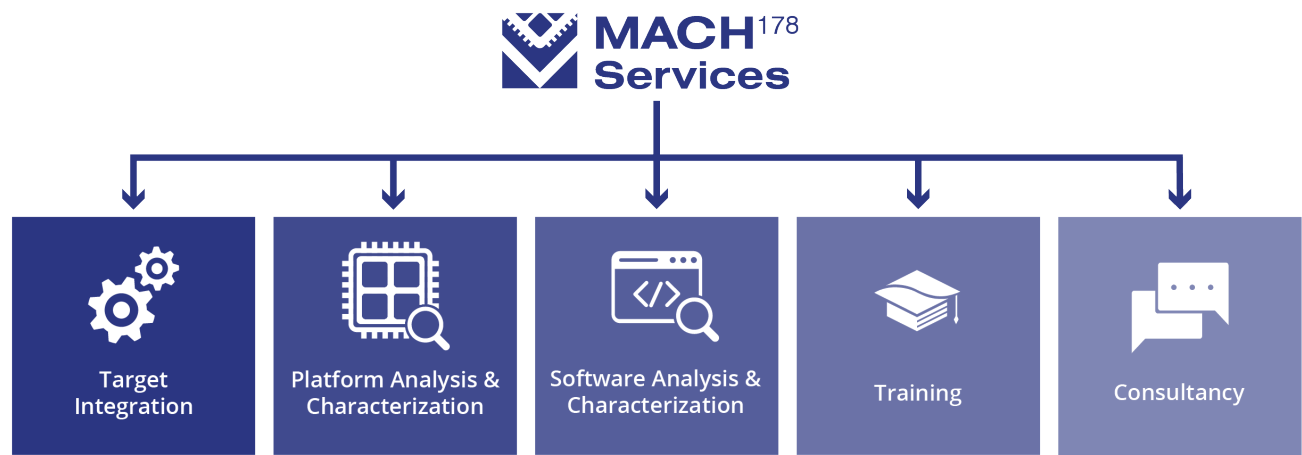
- Derisk your multicore DO-178C projects

Services

The following services support the use of the **MACH**¹⁷⁸ workflow for multicore DO-178C (A(M)C 20-193) compliance.

Target Integration

The **MACH**¹⁷⁸ workflow makes A(M)C 20-193 compliance efficient through the use of automation support, including R**VS** tools and Rapi**Daemons** (see *MACH¹⁷⁸ Tools*).

To integrate R**VS** tools to be used within a multicore environment, we provide a Target Integration Service. This is described in our *Target Integration Service Product brief*.

Rapi**Daemons** must be ported for the multicore platform they are used for. This is also done through our Target Integration Service.

MACH¹⁷⁸
Services

| Target Integration | Platform Analysis & Characterization | Software Analysis & Characterization | Training | Consultancy |

Platform Analysis & Characterization

The Platform Analysis & Characterization service produces deliverables that provide A(M)C 20-193 compliance evidence relating to verification activities including the following on a specific multicore platform:

- Identifying hardware resources
- Identifying and characterizing interference channels
- Identifying critical configuration settings
- Identifying and validating hardware event monitors

These deliverables provide evidence needed to support the following A(M)C 20-193 objectives:

- MCP_Resource_Usage_1
- MCP_Resource_Usage_3
- MCP_Resource_Usage_4

Platform Analysis & Characterization services are performed using the **MACH**^{178} workflow (see *What is the MACH^{178} workflow?*).

Software Analysis & Characterization

We support Software Analysis and Software Characterization activities in the **MACH**^{178} workflow (see *What is the MACH^{178} workflow?*) through Consultancy services. This includes advising on strategies for multicore worst-case execution time analysis and multicore data coupling and control coupling analysis to meet A(M)C 290-193's MCP_Software_1 and MCP_Software_2 objectives.

Training

We provide training to support the following:

- Your understanding of multicore DO-178C (A(M)C 20-193) compliance in general, including required activities and certification considerations. We provide public training events in Europe and the USA regularly, and can provide private training where required.
- Your understanding and application of the **MACH**^{178} workflow (see *What is the MACH178 workflow?*), including your use of **MACH**^{178} automation support tools (see *MACH^{178} Tools*).

Consultancy

We provide consultancy services on DO-178C, AC 20-193 and A(M)C 20-193 compliance, including gap analysis consultancy, certification liaison support and consultancy to satisfy AC 20-193 and AMC 20-193 objectives.

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 timing behavior are identified

5. Software Characterization – where software timing behavior is measured when subjected to multicore interference

6. Certification – where compliance results are collated, automation tools are qualified, and results are submitted to a certification authority

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

MACH¹⁷⁸ Tools

Multicore DO-178C projects require additional testing, making it more crucial than ever that tools and automation are 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 and resource usage data 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/ED-215 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. Rapi**Task** does not require qualification based on its role in the **MACH**[178] workflow.
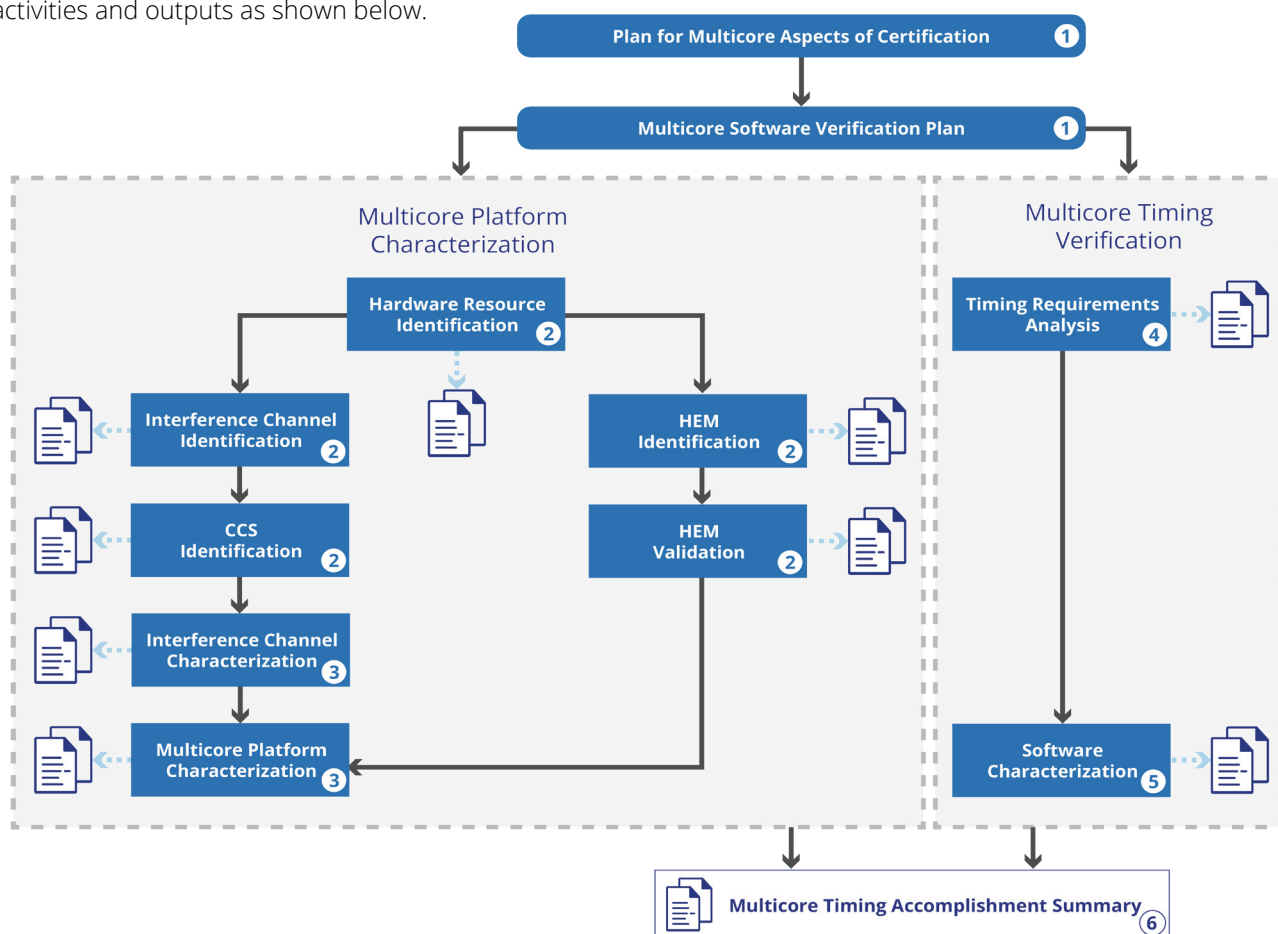
How can **MACH**[178] help you?

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 / ED-215

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 such as eVTOL or military & defense avionics certification, e.g. 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 the multicore DO-178C objectives in 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 certification evidence.

We help develop supplier frameworks and processes that can be used as acceptance criteria for activities to meet A(M)C 20-193 objectives 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 meets the objectives of A(M)C 20-193. This evidence can later be used by Application Suppliers, System Integrators and Certification Applicants to support multicore DO-178C compliance.

Support for Application Suppliers

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

More **MACH**[178] solutions

As well as **MACH**[178] Services, **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/ED-215 qualification kits and services (see *MACH[178] Tools*).

- **MACH**[178] Blueprint – an off-the-shelf example multicore project and related materials that you can use to learn how to achieve A(M)C 20-193 compliance using the **MACH**[178] workflow. For more information on the **MACH**[178] Blueprint, see the *MACH[178] Blueprint Product brief*.
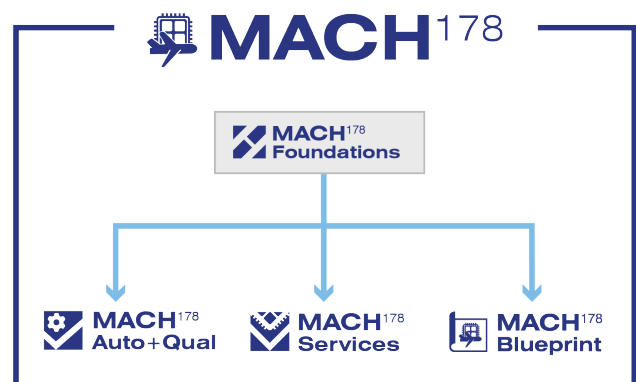
About Rapita

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

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	

Contact

Rapita Systems Ltd.
Atlas House
York, YO10 3JB
UK

+44 (0)1904 413945

Rapita Systems, Inc.
41131 Vincenti Ct.
Novi, Mi, 48375
USA

+1 248-957-9801

Rapita Systems S.L.
Parc UPC, Edificio K2M
c/ Jordi Girona, 1-3
Barcelona 08034
Spain

+34 93 351 02 05

rapitasystems.com

linkedin.com/company/rapita-systems

info@rapitasystems.com