



AFFORDABLE. SAFE. FLEXIBLE.

REAL-TIME OPERATING SYSTEM SOLUTION
SUPPORTING MULTICORE MICROPROCESSORS
WITH ROBUST PARTITIONING BASED ON
ARINC 653 AND CERTIFIABLE TO THE HIGHEST
INDUSTRY STANDARDS

M-RTOS

UNRIVALED & FLEXIBLE COMMERCIAL TERMS

STRETCH YOUR R&D DOLLARS WITH SIGNIFICANT RTOS COST SAVINGS

Decrease your RTOS cost of ownership by 50% to 70%. No high front-loaded payments as the M-RTOS is offered with a fixed annual subscription over an agreed period (maximum 7 years). Pricing structure is based on micro-processor rather than an end-use product. Simplified licensing with no run-time license limitations. This radical approach offers opportunities to leverage savings across multiple end-use products and product portfolios.

AFFORDABLE PRICING ADAPTED TO YOUR MARKET REALITY

Pay only for what you need. Flexible M-RTOS pricing based on Design Assurance Level (DAL). Our certification packages are tailored for the necessary DAL. Further discounts available for enterprise licensing with sub-licensing flexibility. Other payment options are negotiable including coupling the M-RTOS sale with other MANNARINO services. Commercial terms flexible to adapt to the way you want to conduct your business.

“...MANNARINO's M-RTOS offering is also right on the mark with an affordable and high quality ARINC 653 RTOS...”

— MARK LILLIS,
VICE PRESIDENT OF ENGINEERING,
SYSTEM, ELECTRONICS & CONTROLS,
TRIUMPH GROUP
WEST HARTFORD, CT



The M-RTOS is a certifiable (RTCA DO-178C / EUROCAE ED-12C), affordable, safe and flexible hard-deterministic real-time operating system compliant to ARINC 653. The product can be tailored for your specific microprocessor and guarantees robust spatial and temporal partitioning of the individual software applications. The M-RTOS product configurability offers the user the greatest flexibility to adapt the M-RTOS to the needs of the application software and platform hardware.

CUSTOMIZATION WITH MODULAR & SCALABLE ARCHITECTURE

ARCHITECTURE ADAPTABLE TO VARIOUS HARDWARE PLATFORMS

The M-RTOS kernel is adapted for your specific processor architecture. The M-RTOS includes ARINC 653 compliant APIs and allows application developers to build ARINC 653 compliant applications in a robust partitioned environment. M-RTOS proprietary APIs allows platform developers to integrate M-RTOS on a given hardware platform by developing a board support package and the platform services in a dedicated system partition.

DESIGNED FOR UTMOST CUSTOMIZATION AND CONFIGURABILITY

For maximum flexibility and re-use of artifacts, the M-RTOS is based on an independent build & load architecture. It means that separate binaries are created for the kernel & software partition executable files as well as the individual software partition configuration binary files.

DESIGNED FOR PERFORMANCE

BUILT TO OUTPERFORM THE COMPETITION

Two decades of developing safety-critical systems made us acutely aware of the friction points of using COTS RTOS products. With M-RTOS, we leveraged all this expertise to create a modern and streamlined real-time operating system that outperforms the market leaders on all key performance benchmarks.

BY AEROSPACE ENGINEERS FOR AEROSPACE APPLICATIONS

The M-RTOS leverages over 20 years of MANNARINO's experience working with customers utilizing existing COTS RTOS products & developing custom operating systems for various applications. Incorporates lessons-learned like providing visibility of hard to reproduce application errors, and the ability to design a deterministic solution with greater optimization and responsiveness.

NATIVE ARINC 653 COMPLIANT RTOS

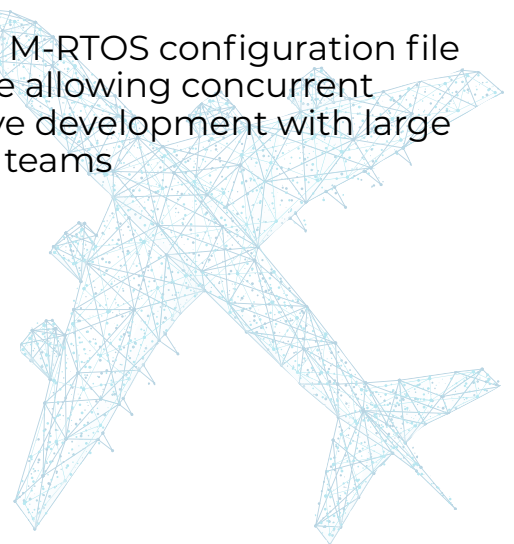
"Blank sheet" designed specifically to meet ARINC 653. No compromises to support legacy code from previous releases or old architectures. No adaptation layer between a proprietary API and an ARINC 653 API. Achieve the best performance / value combination

on the target platform by building from the ground up with scalability and modularity in mind. For interfaces not covered by ARINC 653, rely on open standards (FACE, etc.) to improve portability.

OPTIMIZED INTEGRATED DEVELOPMENT ENVIRONMENT THAT SIMPLIFIES DEVELOPMENT TEAMWORK

All encompassing innovative Eclipse-based tools allowing use of open source utilities and facilitates developer training. Designed for exceptional user experience. The M-RTOS Workbench tool suite provides a development environment to master the complexity of ARINC 653 configuration tasks and minimize the developer's efforts with:

- Centralized XML configuration files edited using an intuitive GUI
- Configuration file validation at build time resulting in earlier detection of anomalies
- Role-based M-RTOS configuration file architecture allowing concurrent collaborative development with large distributed teams



CERTIFICATION PEACE OF MIND

THE ONLY COTS RTOS SUPPLIER WITH CERTIFICATION DELEGATION

Since 2016, MANNARINO has been authorized as a Design Approval Organization (DAO) for Airborne Software (RTCA DO-178C / EUROCAE ED-12C) and Airborne Electronic Hardware (AEH) (RTCA DO-254 / EUROCAE ED-80) by the National Aircraft Certification Branch of Transport Canada Civil Aviation (TCCA). MANNARINO is the first service-based company in Canada to obtain DAO accreditation from TCCA.

M-RTOS DEVELOPMENT GUIDED BY THE MANNARINO DAO

M-RTOS is developed with aerospace certification at the forefront. The MANNARINO DAO certification expertise is an integral participant guiding the M-RTOS development activities to assure certification readiness at the onset. All the M-RTOS life cycle data has been reviewed by our TCCA delegate, meets all RTCA/DO-178 DAL A objectives, and is ready to be submitted to your aerospace certification authority. We will guarantee support for your first certification and subsequent validations to other jurisdictions.

“...M-RTOS: a new generation of RTOS innovation and technological leadership for cutting-edge aerospace applications.

— ALAIN AUBERTIN,
PRESIDENT & CEO, CRIAQ

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UNPARALLELED CUSTOMER SUPPORT & SERVICE

OVER 20-YEARS OF PROVEN TRACK RECORD OF SUCCESSFUL CUSTOMER SERVICE

MANNARINO has a long successful history of providing software and system engineering services in various market segments.

MANNARINO corporate roots have been firmly ingrained in the services industry for over 20 years providing safety-critical systems, software and airborne electronic hardware engineering services to the Military/Aerospace market.

SAFETY REQUIRES EXPERTISE AND TALENT EVEN WITH CERTIFIED TOOLS

MANNARINO brings its RTOS technical know-how, small and nimble organization, innovative problem-solving skills, and unprecedented customer-focused approach to develop an RTOS product that will meet the market needs and specific customer requests.

“...MANNARINO brings the full package of certifiable products and unprecedented service we were looking for...”

— HOWARD LOEWEN,
PRESIDENT, MICROPILOT

SERVICE MANAGEMENT DESIGNED TO REDUCE YOUR EFFORT

Our focus is on building relationships first. From our flexible product offering to our innovative engineering team, our team will analyze your needs right down to the smallest details with attentiveness you won't find anywhere else.

GUARANTEED AS LONG AS YOUR PRODUCT IS IN SERVICE

Includes notifications for available product updates or functional issues. Functional/Safety software changes covered by warranty.

As the product integration starts with the customer, we will ensure receptive and responsive customer service including direct communication with the MANNARINO software development team and integration on-site at the customer.

We guarantee our customers fast and efficient product development and integration by putting the customer at the center of our vision. This is our commitment to provide a customer-centric approach to technological excellence.

M-RTOS SOFTWARE SPECIFICATIONS

DESIGN REQUIREMENTS

- Certifiable DO-178C Level D to A
- ARINC 653 Compliant APEX Interface
- Robust Partition Isolation Environment (supports multiple levels of safety criticality)
- Independent Build and Load of the Module, Partitions, and their respective Configuration Files
- Available on Major Processor Architectures (ARM and PowerPC) and Effortlessly Portable to Other Architectures
- Minimal Hardware Requirements (available on resource limited micro-controllers)
- FACE Aligned Transport Layer (exceeding ARINC 653 requirements)
- C Standard Library (Compliant to FACE™ Technical Standard, Edition 3.0 Safety Base and Security Profiles)
- Support for application development in C and C++ languages

FLEXIBILITY

- Extensible ARINC 653 Health Management Service (easily adapted to platform requirements)
- Safe, Flexible and Unique I/O Model (efficiently port to any hardware with optimal performance)
- Extendible Kernel Design (adjustable to customer needs)

CONFIGURATION

- Offline Configuration Validation (by Qualified MANNARINO Configurator tool)
- Configuration Data Carefully Distributed Across Partitions and Module Configuration Binaries (to guarantee true independent development)

CERTIFICATION

- Certifiable to Highest Industry Standards (RTCA DO-178C / EUROCAE ED-12C)
- Life Cycle Artifacts Supporting up to Design Assurance Level A
- Unique Safety Net Feature (to guarantee M-RTOS kernel still operates in a safe domain following BSP development)
- Comprehensive Qualification Data Kit (designed to minimize effort during integration and certification activities)

PERFORMANCE

- Native ARINC-653 RTOS
- Built to Outperform the Competition

M-RTOS INSTALLATION AND SUPPORT

- Installation Support includes:
 - IDE Installation
 - License Manager Installation
 - Tool Training and Walk-through
 - Rebuild of a Sample Project
 - On-site Installation Support, as required
- Modern Web-based Documentation (covering all aspects of ARINC 653 and M-RTOS)
- Centralized Error Logging Mechanism (for easy troubleshooting)
- Same Day Customer Support Guarantee
- MANNARINO DAO Support for Initial Certification and Subsequent Validations to Other Jurisdictions



ABOUT MANNARINO

With over 20 years of experience and an industry-recognized expertise in safety-critical systems and software engineering, MANNARINO exemplifies quality and consistency at its best!



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