



NEWS RELEASE

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Contact: John Wranovics
M: 925.640.6402
jwranovics@curtisswright.com

Curtiss-Wright, Green Hills Software and Richland Technologies Demonstrate Deterministic Safety-Certifiable COTS Multicore System

Demo highlights advantages of time partitioned/unified operating system approach for certified applications, using multicore INTEGRITY-178 tuMP™ RTOS and RTGL OpenGL SC libraries running on OpenVPX™ single board computer

EMBEDDED WORLD 2017, NUREMBERG EXHIBITION CENTRE, GERMANY (Hall 4A, Booth 620C) – **March 14, 2017** – -- [Curtiss-Wright's Defense Solutions division](#) today announced that it is collaborating with Green Hills Software and Richland Technologies to demonstrate the industry's first COTS-based multicore solutions for critical and high-assurance systems. The live demonstration, presented in the Green Hills booth (Hall 4A, Booth 620C) during Embedded World 2017, will show the Green Hills field-proven INTEGRITY-178 tuMP™ safety- and security-critical multicore real-time operating system (RTOS) running safety critical graphics applications using Richland Technologies RTGL OpenGL SC graphics libraries on Curtiss-Wright's [NXP-based VPX3-133 single board computer \(SBC\)](#) and the [VPX3-716 graphics display module](#). This solution enables system designers to very carefully control which application is running on which SBC core and when. For certified and non-certified environments this capability uniquely provides users with the utmost deterministic control over their processor's set of cores at any instant in time. This combination of INTEGRITY-178 tuMP and RTGL running on Curtiss-Wright COTS hardware enables customers to utilize the full power of their multicore processor in a deterministic certified environment.

"The tight integration of the RTGL OpenGL SC graphics libraries with the INTEGRITY INTEGRITY-178 tuMP RTOS enables users of Curtiss-Wright SBCs based on NXP processors to utilize all available compute power from all of the module's available QorIQ cores, including virtual cores, all based on deterministic, user-defined core and scheduling assignments," said Lynn Bamford, Senior Vice President and General Manager, Defense Solutions division.

Because this unified multicore OS enables users to place applications on a specific core, or user-defined groups of cores, at specific instants of time, INTEGRITY-178 tuMP running on Curtiss-Wright OpenVPX modules eliminates the risk of interference from shared resources. Alternative approaches, that combine a hypervisor with multiple AMP operating systems, don't

enable users to control application scheduling across all of the processor's cores unlike a unified multicore operating system. This is because each of the AMP operating systems is running independently with no centralized point of scheduling to prevent collisions resulting from resource sharing. These conflicts can require the processor to throttle down to a single core, reducing performance and degrading reliability. In comparison, the Curtiss-Wright/Green Hills demonstration uses time partitioning and a single unified RTOS operating system running across all cores. For stringent safety certifiable applications this enables worst-case time execution to be accurately calculated and proven.

[Green Hills](#) is the only RTOS supplier to have successfully completed all of the RTCA/DO-178B Level A certification requirements for its multicore RTOS, including guidance in the CAST-32A Position Paper. Curtiss-Wright, by combining Green Hills Software's industry-leading software certification expertise with its own RTCA/DO-254 hardware development and verification process, is now able to deliver one of the industry's first DO-254 certifiable COTS multicore SBCs that support the RTCA/DO-178B Level A-compliant INTEGRITY-178 tuMP multicore RTOS.

Designed using an RTCA/DO-254 design process from the beginning of the development cycle, Curtiss-Wright's safety-certifiable multicore processor SBCs provide system designers with a complete COTS hardware/software solution for their avionics systems. To speed and ease the safety certification process, an RTCA/DO-254 data artifact package for each SBC and a certifiable board support package (BSP) with RTCA/DO-178 artifacts for the multicore RTOS, will be available. Curtiss-Wright and Green Hills also plan to announce support for INTEGRITY-178 tuMP RTOS on the DO-254 safety certifiable VPX3-152 SBC in Q2 2017, as well as the DO-254 safety certifiable Intel Xeon based VPX3-1220 SBC in Q3 2017.

The demo also features [Richland Technologies](#) portfolio of DO-178C certifiable OpenGL SC graphics libraries running under INTEGRITY-178 tuMP on Curtiss-Wright's COTS hardware. The versatility of display systems design based on this approach is demonstrated by rendering complex 3D scenes using the RTGL hardware accelerated OpenGL SC libraries for the AMD™ e8860-based Curtiss-Wright VPX3-716 graphics module, while simultaneously using the RTGL SoftPipe rasterizer library on a separate core cluster to render the highest Design Assurance Level graphics without the need for the GPU. Finally, the RTGL Hybrid Renderer provides a flexible mechanism to deterministically merge multiple graphics pipelines. Richland's RTGL OpenGL SC libraries offer the flexibility to support a wide range of SBC and graphics hardware architectures. Curtiss-Wright will be supporting RTCA/DO-254 safety certifiable graphics on similar e8860 based VPX3-717 and VPX3-719 graphics modules.

About the VPX3-133 Single Board Computer

Curtiss-Wright's VPX3-133 is a rugged 3U OpenVPX™ SBC featuring NXP's quad-core QorIQ™ T2080 Power Architecture® processor. The VPX3-133 combines the performance and the advanced I/O capabilities of the QorIQ™ quad-core AltiVec™-equipped 64-bit processor with an extensive set of I/O that provides an extremely powerful processing solution for SWaP-constrained environments. It delivers a high level of computing functionality in the small 3U standard form factor with low power (37Watts) while providing industry leading I/O flexibility.

About the VPX-716, VPX3-717 and VPX3-718 Graphics Modules

Curtiss-Wright's VPX3-716 is a rugged 3U OpenVPX graphics module featuring AMD's high-performance e8860 embedded graphics processing engine with support for up to four independent displays. The [VPX3-717](#) module offers up to six independent displays, and the [VPX3-719](#) adds dual channel video capture, supporting a wide range of video interfaces including analog, DVI, and HD-SDI serial digital video. The VPX3-717 and VPX3-719 modules are DO-254 safety certifiable with a full set of available artifacts, and support a wide range of OpenGL software drivers which are also DO-178 safety certifiable.

For more information about Curtiss-Wright's Defense Solutions division, please visit www.curtisswrightds.com.

About Curtiss-Wright Corporation

Curtiss-Wright Corporation is a global innovative company that delivers highly engineered, critical function products and services to the commercial, industrial, defense and energy markets. Building on the heritage of Glenn Curtiss and the Wright brothers, Curtiss-Wright has a long tradition of providing reliable solutions through trusted customer relationships. The company employs approximately 8,000 people worldwide. For more information, visit www.curtisswright.com.

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