



# EVOLVE CONTROL AUTOMATION MANAGEMENT CAPABILITIES FOR INDUSTRY 4.0 BENEFITS

Workload Consolidation Extends System Functions to Gain Cost Savings and Data Analytics and Meet High Safety and Security Standards

## INDUSTRIAL CHALLENGES

- Significantly reduce the cost and complexity of control automation systems, factory system management, maintenance, safety, and security at the factory edge
- Monitor and measure processes for immediate actions

## WIND RIVER SOLUTIONS

- **Wind River Helix Virtualization Platform:** A real-time, embedded, Type 1 hypervisor that can manage unmodified guest operating systems running in virtual machines, consolidating workloads for factory control automation
- **VxWorks:** The world's leading RTOS, enabling deterministic applications scaling from very small compute packages
- **Wind River Linux:** Industry-leading open source operating system for connecting, securing, and running IIoT systems, networks, and devices
- **Wind River Simics:** Allows developers to simulate anything, chip to system, and get the access, automation, and collaboration tools required for Agile development practices
- **Wind River development tools:** Powerful tools to save developers time and increase quality

## THE CHALLENGE

As global manufacturers face increasing competition, optimizing the efficiency, productivity, and quality levels within their processes or discreet manufacturing facilities is becoming a matter of business survival. Existing factory infrastructure is aged and inefficient, often using multiple separate systems based on software platforms as old as the buildings they operate in.

How can a manufacturing company significantly reduce the cost and complexity of system management, maintenance, safety, and security? Additionally, how can factory personnel monitor and measure processes as they occur, obtain real-time data analytics, and take action immediately when intervention is required?

## THE APPROACH

The weight of these challenges is driving industrial companies to bring greater intelligence to the factory floor and field locations. With recent Industry 4.0 software innovations, industries are able to bring more intelligent edge-based industrial control solutions to manufacturers globally.

Wind River® Helix™ Virtualization Platform can take multiple separate control automation systems on a machine and consolidate the workloads on a single compute platform. This workload consolidation solution will allow a manufacturer to increase control management capabilities, analyze data for timely actions, and conduct predictive maintenance. The platform also provides high levels of safety and security to the manufacturing equipment to safeguard system and factory personnel.

## Wind River Helix Virtualization Platform

Helix Platform is a real-time, embedded, Type 1 hypervisor that runs on Arm® or x86 multi-core processors. It can manage unmodified guest operating systems running in virtual machines (VMs) in machines and devices targeting a broad range of market segments, including aerospace, industrial, medical, transportation, and more. Helix Platform's hypervisor can manage independent VMs running VxWorks®, Wind River Linux, and other unmodified guest operating systems such as Windows and Android. With these capabilities, system developers can consolidate and reliably

run multiple applications—such as control management, data analytics, safety-critical and non-safety-critical applications, and legacy applications—all on a single system. Additionally, the hypervisor can securely partition a VM running a safety-critical application to ensure that there is no interference or conflict from any other application or function running in another VM. This virtualization platform can be the foundation for an industrial workload consolidation solution at the factory edge. Helix Platform includes VxWorks, Wind River Linux, and Wind River Simics®.

## VxWorks

VxWorks is a real-time operating system used in more than 2 billion devices in aerospace, industrial, medical, transportation, and other markets. Its small footprint enables deterministic applications scaling from very small compute packages to complex manufacturing systems and avionics systems. It works across the majority of Arm and x86 processor architectures. When used within a VM managed by Helix Platform, it can run safety-critical applications, essential applications that require real-time or deterministic functions to operate an important system.

## Wind River Linux

Wind River Linux is the embedded operating system of choice for IIoT software developers who want a combination of open source flexibility, commercial grade reliability, and support to help minimize the total cost of ownership. Wind River Linux delivers vital components for the productization and commercialization of any IoT device. Within a Helix Platform workload consolidation solution, a Wind River Linux VM can be established to run Linux applications, such as communications.

## Wind River Simics

Simics simulates systems—from the smallest to the most complex—so a product developer can adopt new development techniques that are simply not possible with physical hardware. By moving from physical hardware to a virtual lab, embedded software teams can transform crucial aspects of their processes to create innovative products.

## Wind River Development Tools

To create a workload consolidation solution for your specific manufacturing components and needs, Wind River provides powerful and time-saving development tools. The Wind River Workbench suite of development tools allows the developer to

configure the operating system, analyze and tune the software, and debug an entire system. Wind River Diab Compiler helps boost application performance; reduce memory footprint; and produce high-quality, standards-compliant object code for embedded systems.

## THE RESULT

Using the Helix Platform hypervisor together with VxWorks, Wind River Linux, and Wind River development tools, a workload consolidation solution for control automation for a factory machine can be developed for a wide variety of industrial manufacturing machines. Rather than several separate control automation compute platforms operating on a machine, each control compute system can be consolidated into separate virtual machines on a single multi-core compute platform. A typical configuration is shown below:

Components of the solution in Figure 1 are:

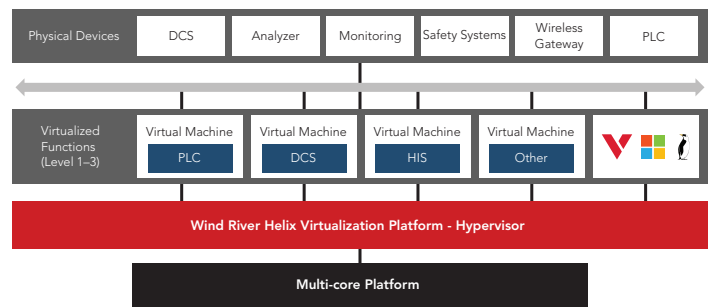


Figure 1. Control automation on a factory machine

- Multi-core system (ARM, x86)
- Helix Platform
- VxWorks real-time operating system
- Wind River Linux operating system
  - VMs running VxWorks and guest OSes
  - Machine 1: PLC control management system
  - Machine 2: DCS control management system
  - Machine 3: HMI, possibly running on guest Windows OS
  - Machine 4: Wind River Linux OS running safety, communications, analytics, or legacy applications
  - Machines 5 and 6: Optional add-ons

To learn more about VxWorks, virtualization, or Helix Platform, visit [www.windriver.com](http://www.windriver.com), or contact [salesinquiry@windriver.com](mailto:salesinquiry@windriver.com).

