ARTESYN™
EMBEDDED TECHNOLOGIES

CONTROL SAFE™

ControlSafe™ Platform

SIL4 COTS Fail-Safe System for Train Control and Rail Signaling

DELIVERING FAIL-SAFE SYSTEMS FOR CRITICAL RAIL SAFETY APPLICATIONS

Leveraging over 30 years of expertise in developing highly reliable and available embedded computer systems, Artesyn Embedded Technologies is a premier supplier of commercial off-the-shelf (COTS) fail-safe computer systems to rail system integrators and rail application providers.

- Highly integrated COTS solution designed to be certified to SIL4 safety standards
- Designed to deliver system availability as high as six nines (99.9999%)
- Modular and scalable for deployment in many rail applications
- Innovative data lock-step architecture allows seamless technology upgrades
- Hardware-based voting mechanism maximizes application software transparency
- 15 years planned product life and 25 years of extended support and service
- Backed up by a global service organization
- Rugged design compliant with EN 50155
- Growing product portfolio to enable future rolling stock and trackside deployment

RAIL TRANSPORTATION IS TOP PRIORITY FOR INVESTMENT

By helping to significantly cut carbon emissions and by reducing human dependence on automobiles and fossil fuels, rail transportation is widely viewed as one of the most sustainable means of transporting passengers and goods.

Virtually all countries are focused on finding more efficient and sustainable ways to move people. Developed economies are upgrading their existing mass transit infrastructures while emerging ones are building new systems.

So, as the fundamental growth drivers for rail continue to remain positive and the requirement for rail systems is high, it is clear that investing in railway transportation will remain a top priority for governments worldwide in the coming decades.

MEETING THE HIGHEST INDUSTRY SAFETY STANDARDS

The enormous capital expenditure on rail infrastructure is not only for building larger railway networks, but also for meeting the more stringent requirements on highly safe and reliable operations.

More countries are embracing Safety Integrity Level 4 (SIL4) standards to ensure their railroad operations meet the highest safety standards. According to the Union of the European Rail Industries (UNIFE) World Rail Market Study, Train Control and Rail Signaling play an increasingly important role in the overall rail infrastructure and the market will reach $16-18 billion per year between 2014-2017.

PROTECTING RAIL INFRASTRUCTURE

Artesyn Embedded Technologies has over 30 years of experience in developing highly reliable and available embedded computer systems. We are a premier supplier of commercial off-the-shelf (COTS) fail-safe computer systems to rail system integrators and rail application providers.

With all safety-related software designed to be certified to EN50128 SIL4 and all reliability, availability, maintainability and safety (RAMS) processes to EN50126, and hardware to EN50129 SIL4, Artesyn's ControlSafe™ Platform (CSP) can be deployed in safety application environments to protect investment in rail infrastructure.

ACCELERATING TIME-TO-MARKET FOR SIL4 CERTIFICATION

Based on open standards, Artesyn's ControlSafe™ Platform (CSP) is a cost-effective solution that enables all rail application developers and system integrators to substantially accelerate time-to-market without being deterred by the potentially high costs and risks associated with the stringent SIL4 system development and certification process.

Artesyn is committed to building long-term partnerships with our customers, based on proven and reliable systems with consistent performance. The ControlSafe Platform further strengthens this commitment by providing rail industry customers with an unmatched, highly reliable platform with 15 years of planned product life and 25 years of extended support and service.

BEST-IN-CLASS AVAILABILITY

Artesyn's ControlSafe Platform is designed to deliver best-in-class system availability as high as 99.9999%, which means that system downtime is limited to less than a few seconds per year.

Artesyn has successfully completed extensive modeling and analysis by its team of highly qualified staff throughout the development and testing stages. As a result, Artesyn's ControlSafe Platform meets all the functional safety, reliability and availability requirements mandated by rail standards and specifications.

DELIVERING A FAIL-SAFE COMPUTING SYSTEM

Adhering to Artesyn's future-proof development philosophy, the ControlSafe Platform is modular, scalable and designed to seamlessly accommodate additional I/O interfaces as well as upgraded processors that will be required throughout the product life cycle.

The ControlSafe Platform consists of two redundant ControlSafe Computers (CSCs), each of which delivers fail-safe operations. They are linked by a Safety Relay Box (SRB) that monitors the health of the two CSCs, designates one of the as 'active' and the other as 'standby', and controls fail-over operation between the two CSCs to deliver a fail-safe computing system. The 'active' CSC controls the I/O via a customer application, while the 'standby' CSC runs the same application but has no ability to drive any output.

At the core of each CSC are two identical CPU boards that run in data lock-step mode and implement a two-out-of-two (2oo2) voting mechanism. The field proven VxWorks 653 operating system from Wind River provides safe partitions for customer applications.

Any discrepancy between these two CPUs causes the active CSC to declare itself unhealthy and signal its state to the SRB, which in turn causes the standby CSC to become active. The unhealthy CSC is taken out of operation and, once it has been repaired, can be brought back into service.

This health-and-safety architecture is designed so that there is no possibility of an incorrect output being driven to external equipment.

CONTROL SAFE™

ALLOWING CUSTOMERS TO FOCUS DEVELOPMENT ON SYSTEM DIFFERENTIATION

Artesyn provides a platform that is high performance, easy to use, scalable and upgradeable. Application processing is carried out on a modern Freescale QorIQ™ processor, delivering high performance, energy-efficient processing and supporting the extended life required by rail equipment.

The ControlSafe Platform's data lock-step architecture, which supports high performance modern processors, makes it possible to upgrade processors over time while retaining the same I/O.

Having implemented the 2oo2 voting facilities in hardware allows application developers to migrate existing application software with minimal modifications. An extensive set of well documented application programming interfaces (APIs) that provide access to system parameters and management facilities make it easy for application developers and system integrators to monitor and control the system.

The Artesyn ControlSafe Platform includes I/O modules that provide interface to a range of communication protocols such as CAN, Ethernet, Ethernet Ring, UART, and MVB. All I/O modules have a common architecture based on the same Freescale CPU core and the same Wind River VxWorks 653 operating system, thus simplifying the software development environment. All I/O modules are accessed over Ethernet allowing a seamless distributed architecture where additional expansion can be contained in a remote chassis. All modules support remote on-line software and firmware upgrade without risk of rendering a system inoperable.

THE ARTESYN EXPERIENCE

Artesyn has over 30 years of experience serving a range of fail-safe and fault-tolerant industries, including the world's telecommunications networks, where we have deployed hundreds of thousands of products.

With that long experience comes a deep understanding of our customers' requirements for on-time, consistent and high quality product coupled with excellent customer support. We deliver on all counts from our own world-class factory and seasoned support experts.

Artesyn strives to speed our customers' time to revenue and make your development process as efficient as possible. Products features are supported globally with local system architects and FAEs to keep you on schedule.

We're a very flexible and agile organization. We recognize that you may need your system to have your own unique branding. No problem. We're used to that. We have services that allow you to define the look and feel that's consistent with your company's branding and aesthetic standards.

Our flexibility isn't just limited to look and feel. Integration services, unique support requirements, longevity of supply, drop shipments and many more services are designed to make it easy to do business with us and quick for you to get to market and deploy smoothly.

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