Reliability Achieved With Windows® Embedded Standard on SEL Tough Computers

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INTRODUCTION

The SEL tough industrial computers with Windows Embedded Standard 2009 are designed for the types of applications that are needed in utility and industrial environments. SEL tough industrial computers with Windows have been performing reliably all over the world.

Industrial computers need reliable hardware, a reliable operating system (OS), and tools to help the user lock down the monitoring and control applications. Placing the Windows Embedded Standard OS on SEL tough industrial computers allows users to create a custom, reliable appliance (see Figure 1).

Figure 1 Custom, Reliable Appliance

An industrial computer consists of the hardware, OS, and applications. To choose the right industrial computer, consider the reliability and functionality of each of these three layers. The hardware layer consists of the processor, memory, and ports. The OS runs on the hardware, manages the hardware functionality, and manages the application behavior. A typical operating system for an industrial computer today is Windows or Linux®. Applications change the usefulness of the hardware and OS to create the functionality needed for monitoring and control. Applications run on the OS and are the interface to the user.

PROBLEM

Choosing the appropriate OS for an industrial computer can be confusing. Key factors in this decision include application availability, reliability, long-term support, security, and manageability.

SEL SOLUTION

SEL Tough Industrial Computer Hardware

SEL tough industrial computers have a field-proven mean time between failures (MTBF) of over 70 years and come with a ten-year warranty. To achieve the highest reliability, SEL designs, manufactures, and tests computers to protective relay standards such as ANSI/IEEE 1613, ANSI/IEEE C37.90, IEC 60255, and IEC 61850-3. The computer hardware has no moving parts and no fans. With an on-board power supply, custom heat sink, error-correcting code (ECC) memory, CompactFlash® storage, and custom-designed system monitor and enhanced watchdog timer, SEL tough industrial computers achieve the best in reliability.

An OS that is going to be used for industrial applications must also be reliable and capable of executing the applications chosen and designed for monitoring and control. SEL computers can be purchased with typical OS options, including Microsoft® Windows 7, Microsoft Windows Embedded Standard, and Linux. A general purpose OS, such as Windows 7 or Linux, is designed to run many different types of applications simultaneously. An embedded OS is customized for specific applications, and through its reduced attack surface and minimized complexity, it is more reliable and secure than a general purpose OS.

While achieving reliable hardware design, SEL requires the following in a reliable embedded OS for industrial computers:

- Enhanced write filter
- Security
- Remote access
- Long life cycle
- Easily upgradable
- Customizable
- Wide application availability

Windows Embedded Standard OS

Windows Embedded Standard delivers power and familiarity and enhances the reliability of the Windows OS to satisfy the requirements listed above. It includes other features that make it an OS of choice for SEL tough industrial computers.

By making use of the componentized form of Windows, SEL has been able to customize Windows Embedded Standard by including only the components necessary for monitoring and control industrial applications. This reduces the footprint of the OS, and makes it more reliable and secure.

Compared to previous versions of Windows, the reliability of Windows Embedded Standard is enhanced by an upgraded write filter. Embedded device disk volumes often require protection against improper disk write operations. Windows Embedded Standard provides Enhanced Write Filter (EWF) as a solution for this scenario. EWF protects the contents of disk volumes by redirecting write operations to a different storage location, which is called an overlay. This strategy allows write operations to be made without affecting the original contents of a disk volume.

North American Electric Reliability Corporation (NERC) Critical Infrastructure Protection (CIP) has placed security issues as a top priority for power system critical infrastructure systems. Windows Embedded Standard has enhanced the previous Windows OS security features, such as Internet Protocol Security (IPsec) and user authentication tools, with added security technologies such as Network Access Protection (NAP), software restriction policies, and a security configuration manager.

For manageability, users would like to access a computer remotely. Windows Embedded Standard provides the latest version of Remote Desktop Protocol (RDP) 6.1 to help enable Windows Embedded Standard-based clients to connect to remote computers using the latest Windows OS. This includes new security technologies, such as user signatures and group policy settings, Network Level Authentication, server authentication, and terminal server gateway, for a more secure encrypted connection. RDP also makes it easier to connect and control remote applications.

Windows Embedded Standard has a stated product life cycle of ten years for support. With an initial release in 2008, the ten-year support cycle started in 2008.

An OS and applications will require upgrades. The updated Device Update Agent (DUA) makes upgrades easy to perform. The DUA is a lightweight service that performs administrative tasks such as copying files, creating registry keys, and executing processes. DUA runs on the device OS and works by polling a specific remote or local path for a script file. The DUA can run local or remote scripts that modify device settings or update system binaries. Support for Windows Server Update Services, System Center Configuration Manager, and Microsoft Operations Manager helps ensure that Windows Embedded Standard supports enterprise-class manageability of both OS and application-level updates. This helps enterprises to protect, manage, and monitor devices within existing infrastructures.

Also, SEL has developed a special front end, the SEL menu, on Windows Embedded Standard. The SEL menu locks down the computer, OS, and applications, while still allowing flexibility for the administrator to add users, add applications, and implement security models. Using industry standards, such as Extensible Markup Language (XML), the administrator can easily add applications to the menu systems. The security definitions describe which users can access which applications.

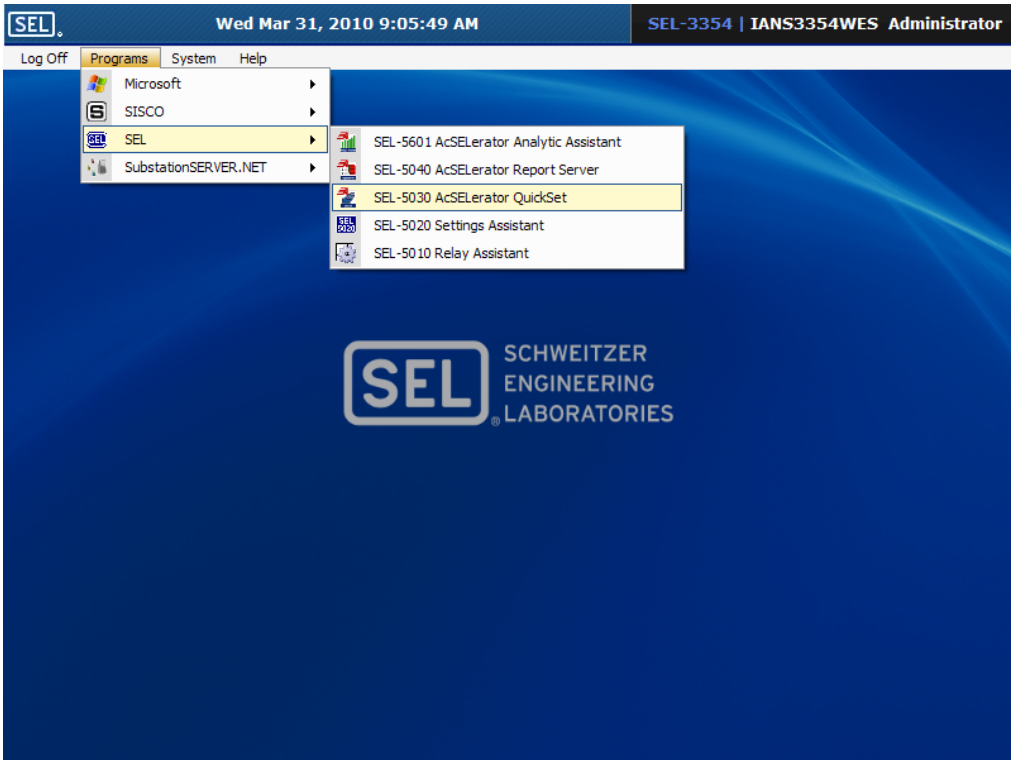

Figure 2 Windows Embedded Standard With SEL Menu

Based on Windows XP Professional and adding other Windows enterprise components, Windows Embedded Standard makes available a rich set of existing Windows applications that a user can choose to load and execute.

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