



Networks built on a
Common Industrial Protocol

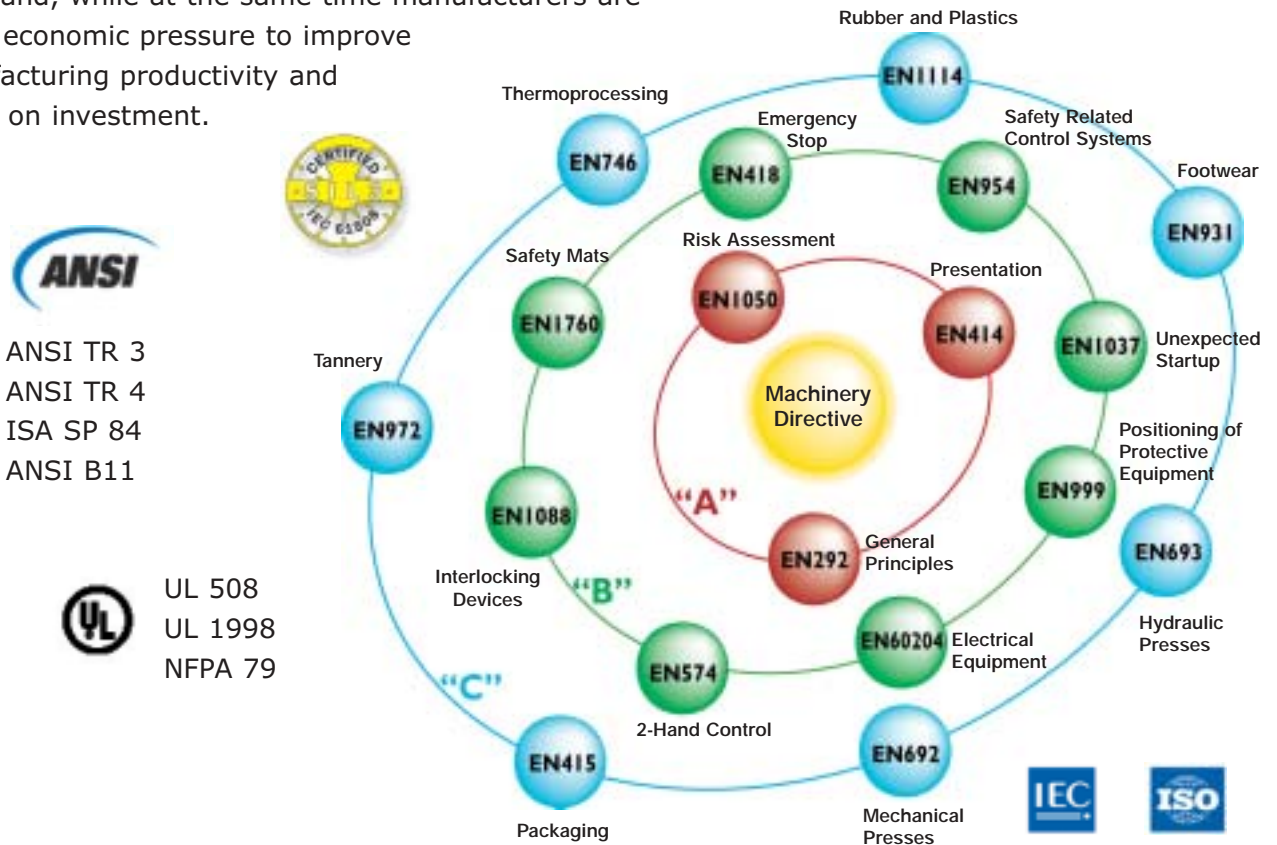
Optimised Control...



...Protected Investment!

Safety requirements continue to grow

Safety is a key issue in manufacturing automation today. Manufacturers are under growing social and legislative pressure to do everything possible to protect workers from physical injury. The number of standards relating to industrial safety continues to expand, while at the same time manufacturers are under economic pressure to improve manufacturing productivity and return on investment.



An integrated solution for safety-critical and standard control

DeviceNet Safety™, the safety extension to DeviceNet™, provides the simplest means possible of implementing a safety network and integrating it into a wider enterprise network topology. The safety extension allows safety devices to coexist with standard control devices on the same network: safety sensors can operate alongside variable speed drives, safety controllers with standard PLCs and proximity switches. No matter what combination of devices is used, the integrity of the safety control loop cannot be affected by any of the standard control devices.



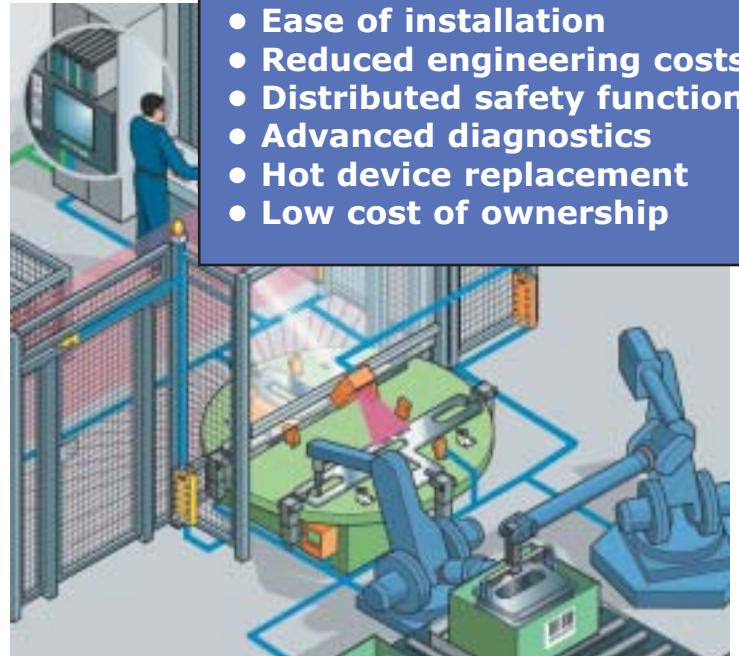


One of the key strengths of the DeviceNet Safety solution is that, unlike other safety networks, it has the ability to connect safety devices and standard devices on the same network or wire, either with or without the need for a Safety PLC.

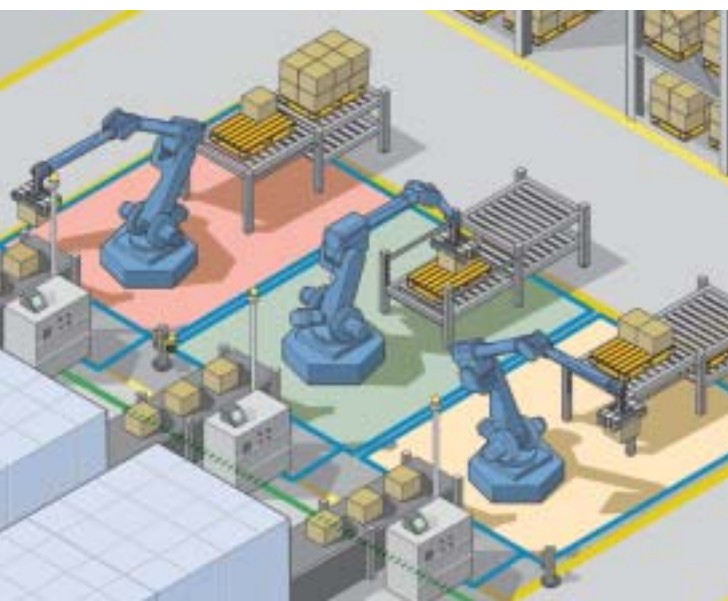
With DeviceNet Safety, you can automate the safety aspect of your plant using the same network that is used for the standard control, and reap the benefits of reduced engineering and installation costs, improved diagnostics, and increased architectural flexibility, thereby protecting your investment.

For fast safety loops, DeviceNet Safety enables local or peer-to-peer communication between sensors, actuators and intelligent devices delivering a shorter safety response time.

Because DeviceNet Safety is built on 'Common Industrial Protocol' (CIP™) technology with its seamless bridging and routing capabilities, a Safety Controller on one DeviceNet segment can connect to sensors on another DeviceNet segment via an EtherNet/IP backbone. 'End to end' safety allows this loop to be closed with standard, commercial switch and bridge technology.



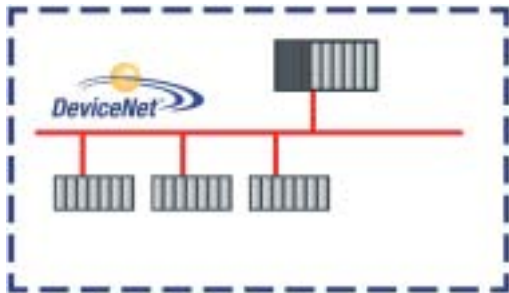
- **Ease of installation**
- **Reduced engineering costs**
- **Distributed safety functions**
- **Advanced diagnostics**
- **Hot device replacement**
- **Low cost of ownership**



Segmentation of the network architecture into multiple DeviceNet Safety segments allows time-critical safety loops to be optimised – scalable integration of multiple network segments results in shorter loop closure times and therefore tighter safety exclusion zones!

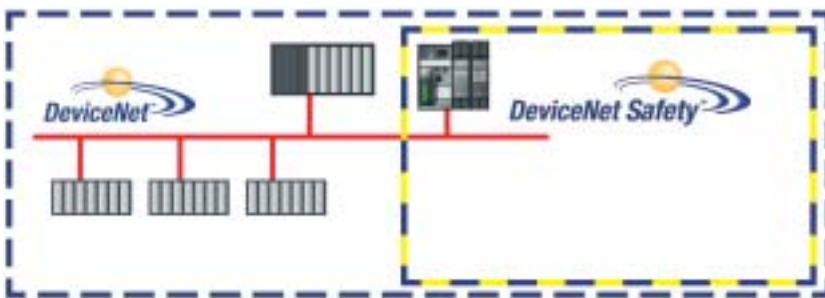


A safety network architecture that evolves



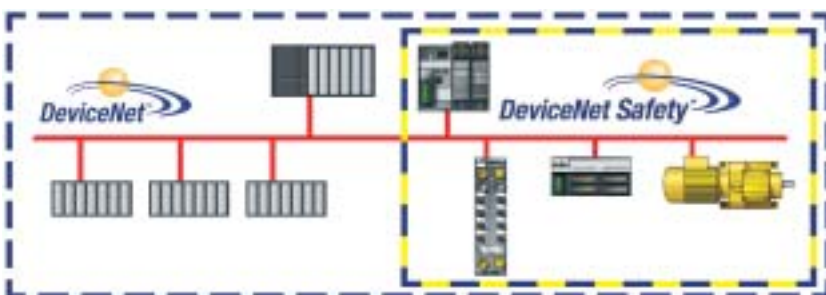
An existing PLC control system with standard DeviceNet I/O devices from multiple vendors.

Add DeviceNet Safety to an existing DeviceNet network



By the simple addition of a DeviceNet Safety – Safety Controller, with its integral I/O, to the existing DeviceNet Network on the same wire, a safety application is added that will meet Safety Integrity Level (SIL) 3 according to IEC 61508 standard.

Add the functionality you need as you need it



The system can continue to evolve, as needs demand, with the addition of multi-vendor DeviceNet Safety products, such as IP20 or IP67 Safety I/O blocks, or directly connected devices with DeviceNet Safety integrated into the node, for example Safe Drive systems.



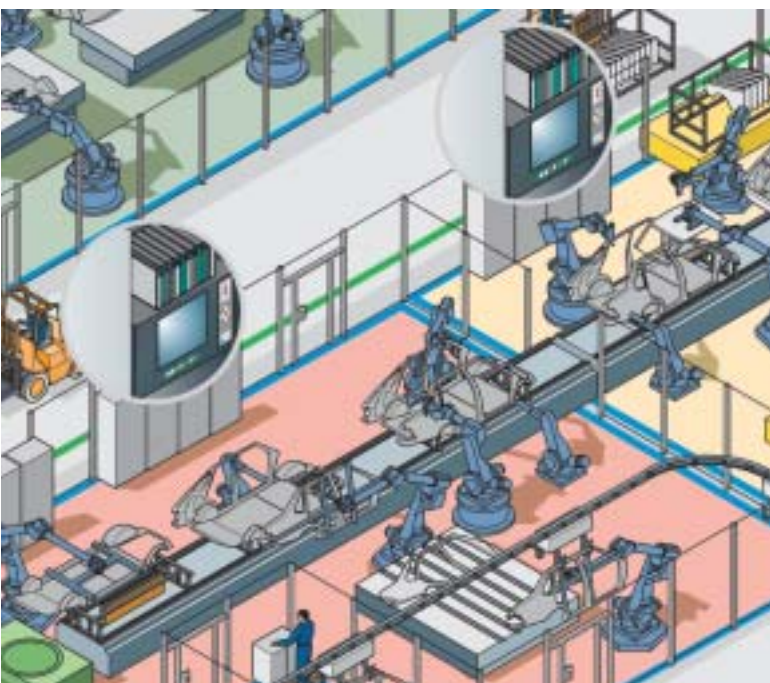


Bridging and routing

As an extension of standard CIP, CIP Safety, the protocol used on DeviceNet Safety, automatically inherits the bridging and routing capabilities enjoyed today by users of EtherNet/IP, and DeviceNet. A single DeviceNet Safety network will be able to contain as many as 64 devices, but as CIP Safety supports a seamless, multi-link architecture, the maximum device count will be virtually unlimited. Multiple DeviceNet Safety segments can be interconnected using a high-speed EtherNet/IP backbone, with all the nodes communicating as seamlessly as if they are on the same segment.

Multi-controller network

Like standard DeviceNet, DeviceNet Safety enables users to place multiple controllers on the same DeviceNet Safety network, each supervising multiple I/O or intelligent devices. This functionality allows users to easily break up their application based on the unique performance requirements and appropriate mix of safety and standard control. The integration of standard and safety controllers on a common network also enables the easy synchronization of safety monitoring and plant production systems, enabling better overall productivity.



Advanced diagnostics

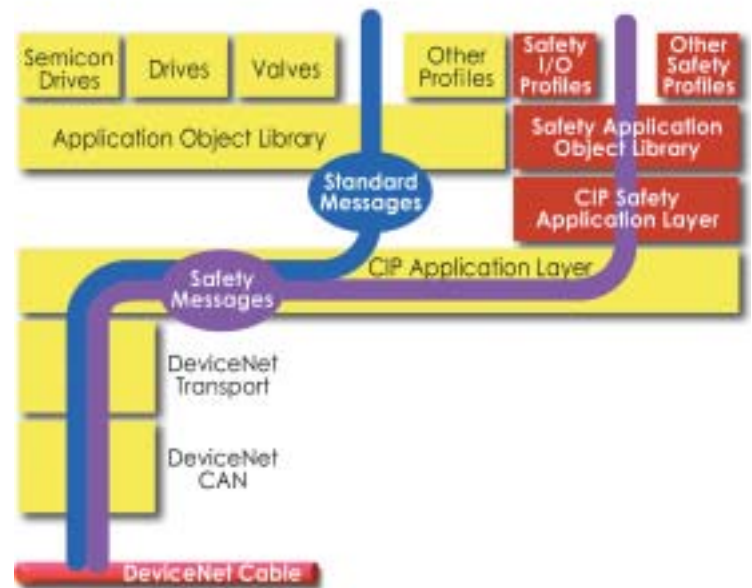
DeviceNet Safety will allow the application to test the robustness of the full system, rather than just individual nodes. Advanced diagnostics can even check the external load to verify that voltage is applied to the actuator, and input or output modules have the capability to detect open or short-circuit wires and loss of power.



Standard and Safety working together:

CIP Safety, the protocol used on DeviceNet Safety, ensures that standard devices do not interfere with the function of the safety devices and vice versa.

With other safety protocols, manufacturers are forced to run a separate network just for safety controls. This adds unnecessary complexity to a system and often precludes systems including both standard and safety devices from responding uniquely to each type of fault.



DeviceNet Safety: Building on the benefits of standard DeviceNet

DeviceNet Safety offers all the features and benefits of standard DeviceNet, plus the added CIP Safety protocol. DeviceNet has many attributes that make it ideal for safety systems. These include:

- Robust media, which has been tested in high noise and other challenging environments
- Automatic checking for duplicate node addresses
- Ability to remove and replace devices under power
- Built-in retries at the data-link layer
- PFH (Probability of Dangerous Failure per Hour) of $\leq 10^{-9}$ (i.e. approximately one dangerous failure every 1150 years)
- Error counters for each connection to the network
- Priorities established by configuration
- Connection-based messaging so both producer and consumer can identify data failure

Finally, DeviceNet Safety requires no changes to the standard DeviceNet media and topology when used in safety implementations. That means current DeviceNet users can continue to use existing wiring to implement a safety system by just adding DeviceNet Safety devices to the existing network.

This will allow OEMs to design standalone machines each with their own separate subnet, ensuring that safety loops on one machine can be accessed but not negatively impacted by other machines.

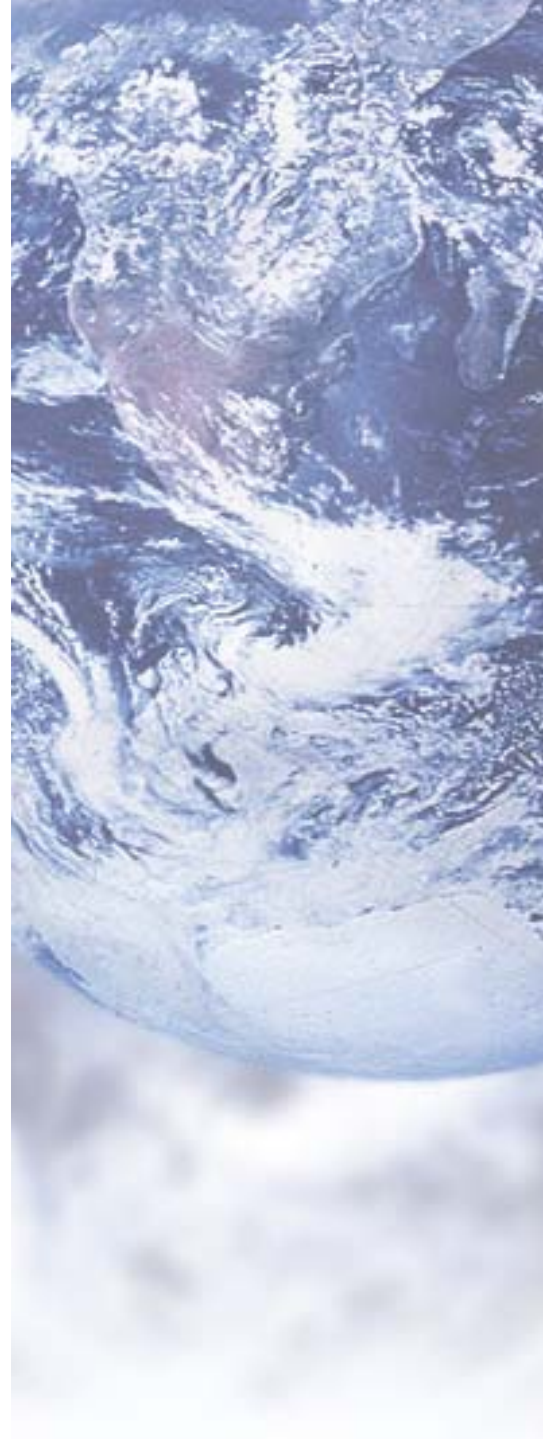
An end user, meanwhile, also benefits because multiple machines can be interlocked using an EtherNet/IP backbone without risking the performance integrity of any individual machine.

Combined, these features set DeviceNet Safety apart from the competition.



About ODVA

ODVA is an international association comprised of members from the world's leading automation companies. Collectively, ODVA and its members support network technologies based on the Common Industrial Protocol (CIP™). These currently include DeviceNet™, EtherNet/IP™ along with major extensions to CIP – CIP Safety™, CIP Sync™ and CIP Motion™. ODVA manages the development of these open technologies, and assists manufacturers and users of CIP technologies through tools, training and promotional activities. In addition, ODVA offers conformance testing to help ensure that products built to its specifications operate in multi-vendor systems. ODVA also is active in other standards development organisations and industry consortia to drive the growth of open communication standards. For more information, visit the ODVA web site at: www.odva.org



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