

## Case Study

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## Maximum safety combined with optimised productivity

**With the latest safety technologies, safety can be maximised with assured compliance to the most stringent standards and boost productivity at the same time. Jeremy Shinton of Mitsubishi Electric explains.**

There can be few aspects of machine design that have moved so quickly in recent years as that of safety. With the introduction of new product concepts and harmonised standards which have shifted the safety ethos away from human intervention based on 'zero accidents' to risk assessments based on 'zero risk', engineers have had to work hard to keep up to date.

Meeting today's safety requirements means conforming to the relevant safety regulations and standards which means meeting EN ISO 13849-1, EN 62061, or IEC 61508 according to the integrity requirement, functional requirement and complexity of the system. This has fundamentally changed the approach to safety system design.

In the past, production lines were protected by 'islands' of safety control; typically using their own dedicated safety relays. Whilst safe, this approach suffered from isolation from the main control system and could not deliver sufficient diagnostic information across the whole system to aid fault finding when a safety device was activated, leading to increased and unnecessary downtime.

The advent of the latest stringent safety systems, combined with the cost of the old approach and its impact on productivity, has forced a different view of system design. Does this mean there is no place for something like a simple safety relay? No,

it is really a question of scalability, when only a simple safety stop condition is required on a discrete or standalone application and programming is not required, then a safety relay module is an attractive and cost effective option.

For more complex applications, when there are a greater number of safety inputs and where some logical safety programming is required, a safety controller is the best solution. These offer function block programming, high speed response and support for standardised communications between safety and standard system controllers.

On a larger line or as part of a comprehensive decentralised safety system, a safety PLC is the most appropriate solution. This approach supports distributed control using safety PLCs and remote I/O and incorporates flexible programming and communications over dedicated safety networks.

Today, safety has to extend beyond simply allowing optimal safety control but must be part of a holistic view of production. Many companies can offer a choice of safety devices, or perhaps a safety system of some kind. However, few can provide a complete safety solution that fully integrates with the conventional automation system. Along with a vast portfolio of standard automation solutions, Mitsubishi Electric provides a total safety solution incorporating safety relays,



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safety controllers and safety PLCs, along with safety networks and fieldbuses as part of its fully integrated and scalable iQ architecture. Compliance with the latest safety standards throughout means that users can be confident of meeting the safety regulations required by the application.

In addition, the company offers a range of inverters, servo drives and motion systems, all with comprehensive in-built safety functionality.

This broad range of products and integrated systems allows full visualisation of safety information, allowing optimal safety control while also boosting productivity. The result is not only worker, machine and system safety but industry leading productivity and performance as well.

### Let's look at these key safety technologies in more detail

The Mitsubishi safety relay module (QS90) provides an integrated solution with the standard PLC controllers and is housed either directly on the standard PLC backplane or as an "safety island" on the standard CC Link network. A basic safety function can be performed using conventional safety techniques, eliminating the need for programming and parameter settings. The QS90 offers the additional benefit of sending safety status and diagnostic information directly to the PLC CPU, either over the PLC backplane or via a standard CC Link network connection. Using an HMI or MAPS SCADA rapid safety condition information can be presented to the operator or maintenance team enabling efficient diagnosis of the safety "trip" condition and prompt restarting of the process, thus reducing downtime.

The Mitsubishi safety controller (WS series) is an expandable compact controller suitable for control of small to medium-sized safety systems. Controllers can often be expanded to 100 or more safety I/O points and can provide network interfaces. Certified safety function blocks can enable a safety system to be structured easily and quickly, saving engineering time. Diagnostic information can be displayed on local HMIs or distributed over networks such as Ethernet or CC Link to MAPS SCADA visualisation systems, either directly or via the standard system

controllers.

Where the application involves a complete line, complex or decentralised safety systems, the solution is a safety PLC, performing distributed control using certified controllers that communicate with safety related products and I/O over dedicated safety networks. Such safety PLCs offer flexible programming, generally using ladder and safety function blocks.

Mitsubishi Electric's QS safety PLC, based on the technology of the established iQ automation platform, conforms to international safety standards and maintains compatibility with other Mitsubishi programmable controllers, whilst providing comprehensive safety control solution using TUV certified hardware and function blocks and meets all relevant safety standards.

The QS safety PLC is designed for high-end applications such as automotive production lines where control of multiple safety circuits is required. Communication with connected safety devices is via the dedicated CC-Link Safe bus, enabling safe distributed I/O to be located in the required safety zones.

The QS offers a modern approach to safety by combining a CC-Link Safe distributed I/O network with the flexibility of a modular controller. This offers the capacity to cover an entire production line's safety system, combining the benefits of reduced wiring, rapid diagnostics and easy program modification and maintenance, with the assurance of a full complement of safeguards against system failure and unauthorised access.

Distributed safety I/O can be handled using CC-Link Safe which is compatible with the established CC-Link open device level network and features the ability to mix both safety I/O and standard CC Link I/O on the same bus offering flexibility in system design.

It is, of course, speculation but it seems likely that safety standards will become ever more stringent in the future. Yet, at the same time, global competition will continue to make increasing productivity and reduced costs more and more important. The two do not have to be at odds,



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however. With appropriate safety technologies, built on the same platform as the most advanced standard control architectures and able to integrate seamlessly with them, users can reap the benefits of a win-win situation: the highest levels of safety and the assurance of truly optimised productivity.

### About Mitsubishi Electric

With over 90 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, Mitsubishi Electric Corporation is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, as well as in products for the energy sector, water and waste water, transportation and building equipment.

With around 121.000 employees the company recorded consolidated group sales of 29,5 billion Euro\* in the fiscal year ended March 31, 2013.

Our sales offices, research & development centres and manufacturing plants are located in over 30 countries.

Mitsubishi Electric Europe, Industrial Automation – UK Branch is located in Hatfield, United Kingdom. It is a part of the European Factory Automation Business Group based in Ratingen, Germany which in turn is part of Mitsubishi Electric Europe B.V., a wholly owned subsidiary of Mitsubishi Electric Corporation, Japan.

to manage sales, service and support across its network of local branches and distributors throughout United Kingdom.

\*Exchange rate 120,69 Yen = 1 Euro, Stand 31.3.2013 (Source: Deutsche Bundesbank)

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The role of Industrial Automation – UK Branch is

