FOOD & BEVERAGE
Automation Solutions

Manufacturing &
Productivity Solutions

Increase yield /// Improve quality /// Increase profitability ///

Food for thought

"The number one challenge facing the Food & Beverage and Consumer Packaged Goods industries is productivity."
CIAA

"Restructuring processes, automation of production, energy saving measures are all key activities to improve productivity in the Food & Beverage industries."
EMC

"Increased competition and regulation mean profit margins are squeezed. This means more companies are looking towards automation and control systems to improve efficiency, reduce waste, lower production costs and provide conformance to mandatory regulations."
Frost and Sullivan

A changing world

Perhaps more than any other sectors the Food, Beverage and Consumer Packaged Goods industries face the most intense pressures to meet the demands of changing customer needs, strict Governmental regulation and incredible competition.

Changing market conditions also affect these industries far quicker than many others. For example, the availability of raw materials such as wheat crops, which are impacted by changing weather conditions or the vulnerability of parts supply due to world events. All have an impact on the costs and availability of the goods to be produced.

How do manufacturers cope with these uncontrollable influences? Key factors are "speed of reaction" and increased "flexibility". Having these business levers means the impact can be minimised in times of trouble but maximised in times of growth. Product and ingredient freshness and shelf life make production methods even more critical if product is not to be scrapped as waste. Dealing with these issues requires a data management system that drives a lean manufacturing strategy and delivers visibility, analysis and control of the "end to end" manufacturing process, resulting in increased yield, outstanding quality and increased profitability.

This is not science fiction. This is automation now.

Such a solution delivered to improve capacity, quality and/or delivery is often described as a Manufacturing Execution System (MES), that will provide the shop floor visibility to help you make improvements to your plant, materials handling, labour and operating procedures to improve your business and will deliver the following capabilities and benefits:

- Process improvement and visualisation

- Quality management

- Integration into business applications

- Reporting and analysis, track and trace

- Regulatory compliance

- Energy saving and optimisation

- Manufacturing intelligence

Understand, control, manage

Poor informati
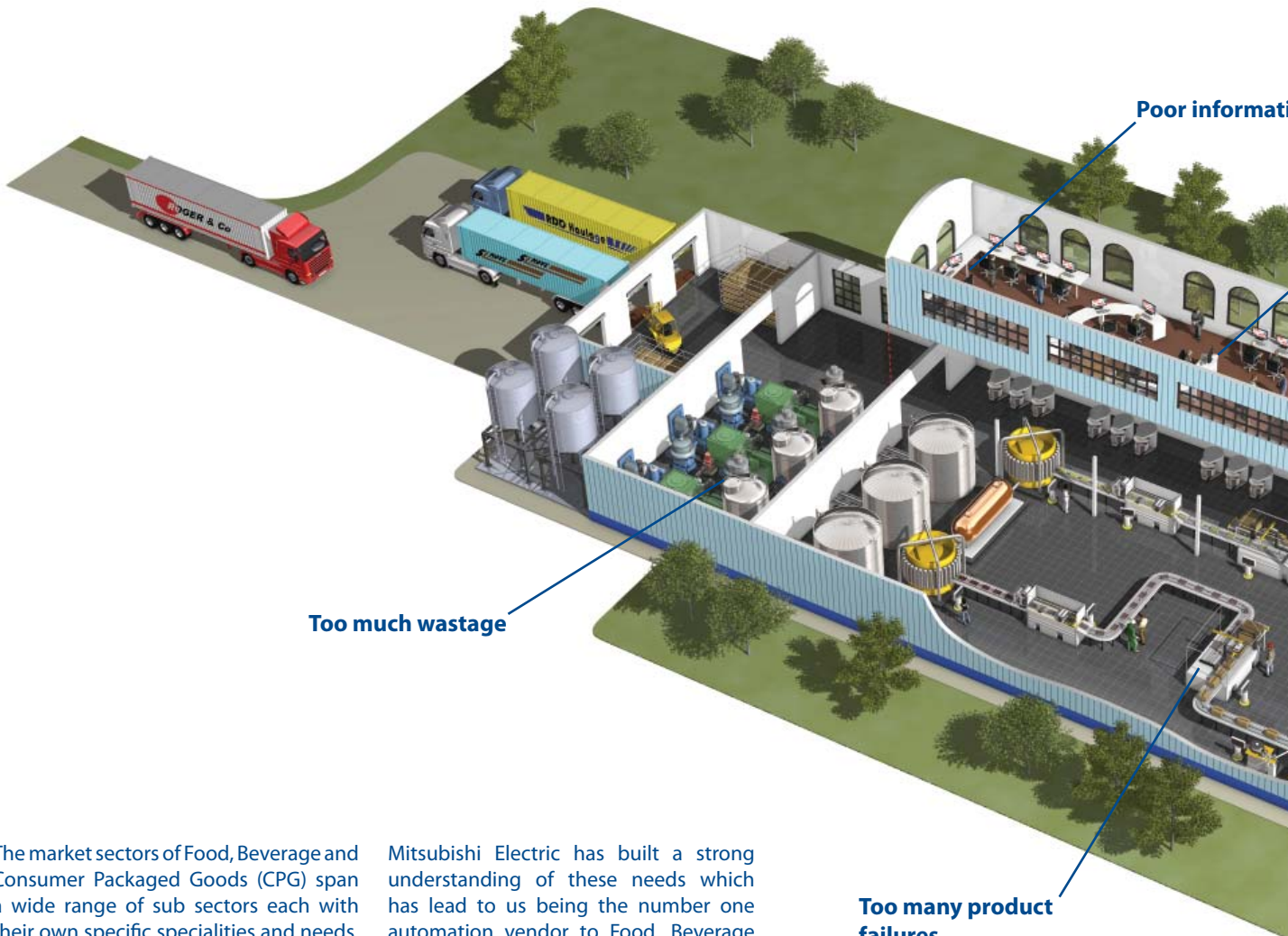
Too much wastage

Too many product failures

The market sectors of Food, Beverage and Consumer Packaged Goods (CPG) span a wide range of sub sectors each with their own specific specialities and needs. The European Unions NACE definitions include 9 separate sub sectors for Food and Beverage alone: These cover Meat products, Oils and fats, Animal feeds, Fish products, Dairy products, Various food products, Processed fruit and vegetables, Flour and starch products and beverages.

Although each subsector will clearly have its own specific demands, all have common business drivers such as:

Responding to market demand through having agile Product Lifecycle Management (PLM) methodologies, Regulatory compliance, Waste reduction, Downtime reduction, Freshness and shelf life, Product tolerance, Driving down inventory and commodity costs, Genealogy – ensuring batch traceability through the supply chain and Security.

Mitsubishi Electric has built a strong understanding of these needs which has lead to us being the number one automation vendor to Food, Beverage and CPG businesses throughout Asia. Our reputation for quality, reliability and innovation supports our customers in one of the most intensely competitive regions in the world market.

From Batch control to "food safe" Robots, from energy management to reporting direct into your ERP systems such as SAP, Oracle or DB2, you can be sure Mitsubishi Electric has the solutions and flexibility to be your automation partner.

ion flow

Need to be more profitable

Throughput slow

Can't meet shipping deadlines

Too much stock

The Mitsubishi architecture and openness offers Food and Beverage companies the unique capability to not only provide traditional control and visualisation functionality but the ability to integrate all aspects of their operations. By adopting a more holistic approach to Operations Management significant savings and operational efficiencies can be realised. In an industry that produces such a precious commodity, Mitsubishi Electric is uniquely placed to ensure superior quality of supply covering all aspects of the control and management of these demanding facilities.

ERP and MES
Direct connection for your data from the shop floor to your business systems.

Batch with a difference
Batch control directly from your lineside PAC – without the vulnerabilities of a PC.

Energy under control
Use energy management control solutions throughout your plant.

Pick and place as often as you want
Robot solutions help you to solve your materials handling issues with the minimum of fuss.

5

Improving efficiency

Seamlessly link assets to business information systems

Mitsubishi Electric will improve your manufacturing and production efficiency by utilising our innovative non PC based data logging and data collection solutions to seamlessly link assets to business information systems. Taking an holistic approach using our MX4Business data management solution means we can provide a cost effective system for tracking and reporting asset level production data such as Overall Equipment Effectiveness (OEE) and Key Performance Indicators (KPIs). This provides concise and easy to use real time and historic reports for all personnel from plant level to the boardroom. This approach is essential for implementing Six Sigma projects, TPM/TQM processes and Lean Manufacturing techniques and will deliver significant efficiency improvements immediately, with typical payback times of 6-9 months.

Efficiency reducers

The UK's DEFRA (The Department for Environment, Food and Rural Affairs) reports that the food industry generates 10-20% waste by weight, equating to between 3% and 8% of business turnover which is more than some businesses profit margins. It recommends the adoption of a continuous improvement methods and "Lean Manufacturing" as a method of reducing waste and process improvement. Examples include reducing energy losses, resolving Process/Machinery, Workflow issues and reducing wastage.

The seven wastes (Ohno, 1988)

- Over production
- Waiting (by operators and machines)
- Transportation of materials
- Unnecessary or overcomplicated processes
- Excess stock or materials
- Excess movement by operators
- Defective products

Industry has long recognised the seven deadly sins that relate to low productivity, poor quality, increased costs and wasted resources - but, maximising productivity and efficiency is still a problem many manufacturers face today.

Proven efficiency and productivity gains have been practically demonstrated with recent applications where real customer challenges have been overcome. Take for example a depositing process where the accuracy of the volume of product was held within 0.1g tolerance. Utilising the latest servo technology, it not only had a positive impact on "give away", it also reduced clean down times by incorporating an anti drip mechanism, where the servo system prevented excess product needing to be cleaned from ancillary areas of the process. The overall result was faster throughput, reduced downtime and reduced product waste.

This is just one example of the positive impact Mitsubishi Electric automation has had on many Food and Beverage processes and applications.

Process efficiency

The chart here clearly shows the scope for improvements in process and plant efficiency to meet your goals. These include OEE (Overall Equipment Effectiveness), S88 Batch Control, track and trace solutions and improving the accuracy of plant scheduling.

Improve your production efficiency

Other 6%
Meeting 1%
Machine downtime 4%
Machine startup 2%
Shortage of parts 10%
Setup time 22%
Improvement Opportunity
Speed loss 2%
Operating time 52%
Partially Optimised Production
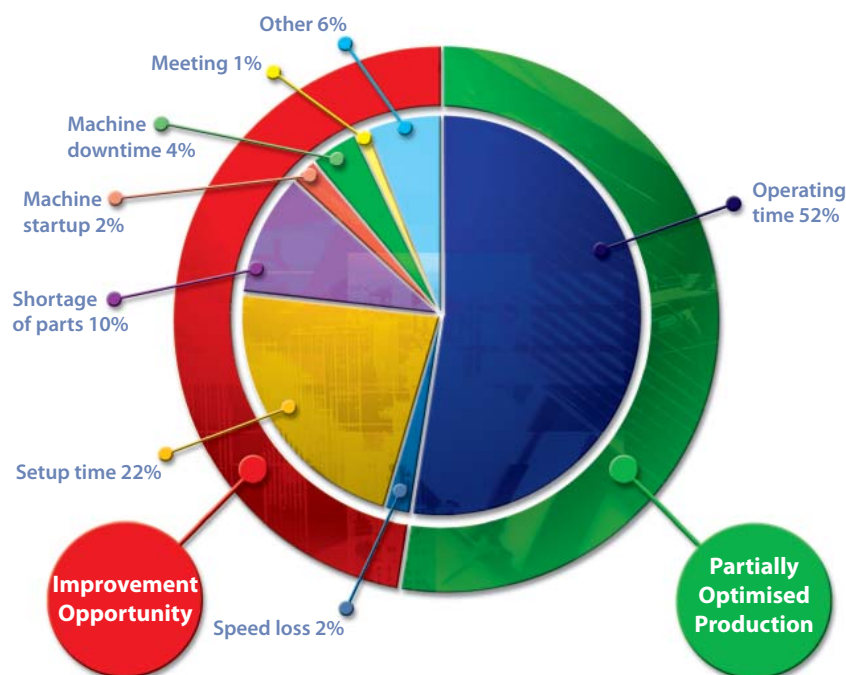
Sustainability

Energy management and control is a vital ingredient to reduce waste

Energy management is the key

Sustainable manufacturing is a topic that has received a lot of focus, especially in the Food and Beverage sectors. It has mainly centred around material resources or commodities, such as coffee beans, wheat etc.

However, there is one other very important resource that is silently eroding the manufacturers bottom line: Energy.

Manage it, reduce it or pay for it!

Sadly, many manufacturers often end up paying the penalty of extra energy usage, as they simply do not know what can be done to reduce and manage their current energy consumption.

The use of inverter technology is well known, but even the inverters of today are far more efficient than those of even just 10 years ago often saving up to 50% of wasted energy on motors.

Peak performance

However, by taking a holistic approach to reviewing the energy usage and consumption, even greater savings can be made.

For example, regardless of the country, peak energy costs will affect the tariff levels used. The method of calculation may differ, but any efforts to reduce the peak energy consumption will then reduce the tariff rate and any possible penalty payments.

In this case, knowing what the peak level was and when it occurred can be used to make a predictive model allowing loads to be managed and shed before the peak is reached.

Recycle

It is well known that plastics and other waste materials can be recycled, but not everyone knows that energy can also be recovered.

In a simple hoist application using an inverter is good, but using a regenerative inverter can make your hoist turn in to a generator when carried loads are lowered.

Imagine all the waste heat and energy disappearing into the environment from a hot forming or oven process. However, with heat pump technologies the "waste" hot air can be easily turned in to useful hot water for use as process water or even showers for the line workers. Also, using an air to air system and during the winter, warehouses and office blocks could be heated from the waste production heat.

As much or as little as you want

Mitsubishi Electric is in an enviable position to be able to offer its customers a wide range of energy efficient solutions, from air conditioning, heat pumps and high speed hand dryers, to drives and control solutions, as well as direct reporting and interfacing with existing ERP systems. Even the roof of a production site could be turned into a power generator with Mitsubishi Electric's photovoltaic panels!

Mitsubishi Electric's innovative 'total energy management system' can bring together all the parts needed to create a modular energy management solution. From a feasibility study stage to a final proposal, predefined solutions are available to speed up the system implementation and, of course, lower costs.

Our capability

With our partners we have installed total energy systems in Europe saving many megawatts of power annually and reducing power peaks by an average of 688kW.

The value of these savings, though, varies country by country and also increases over time as the tariff rates increase.

MEASURE → UNDERSTAND → MANAGE
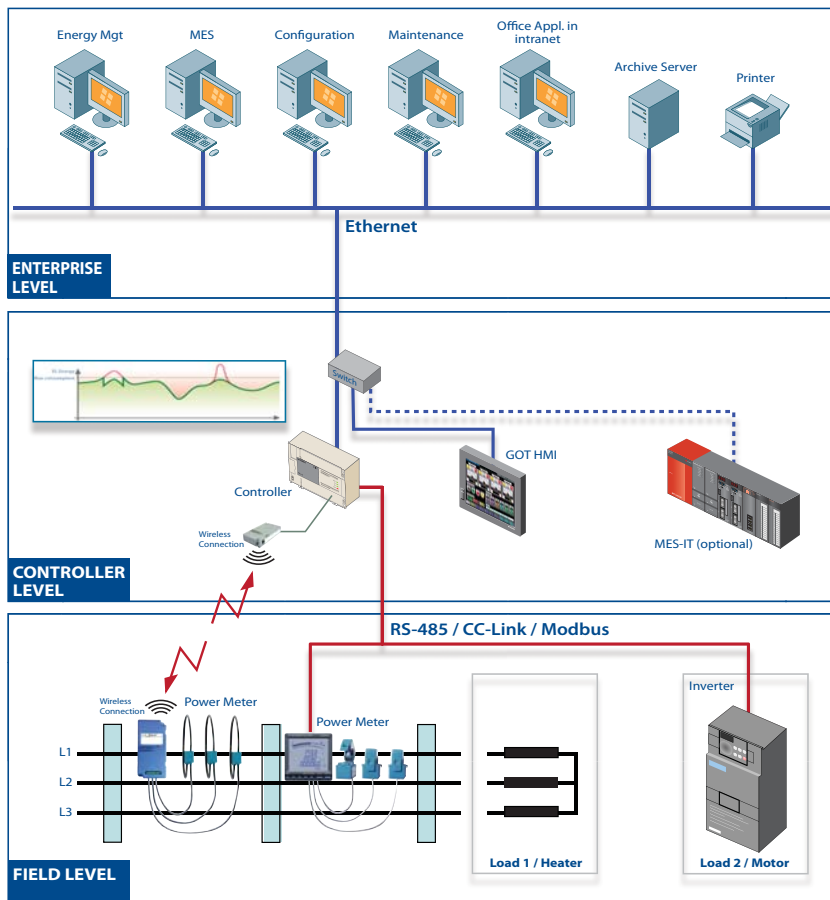
Energy management concept

Mitsubishi's expertise, therefore, can encompass a wide range of energy management capabilities such as:

- CRC Reporting / compliance

- Energy survey / consultancy

- Enhanced Capital Allowance certified products & solutions

- Power quality solutions

- Display Energy Certification

- Photo Voltaic solutions

- Ground source & air source heating solutions

- Heating & cooling solutions

A new way of thinking

To optimise energy usage, there must be complete transparency throughout the enterprise from shop floor to top floor. Mitsubishi Electric offers this capability through its Energy Control Pack (ECP), which collects live data from all points of energy consumption for analysis by multiple levels of management systems. Thus, speeds can automatically be trimmed, loads matched and temperatures controlled in real time to achieve significant energy savings.

Batch implementation

Improved quality and traceability

C Batch delivers Batch control in a PC-less environment

Implementation

To meet the challenges of a consumer driven business, such as a Food & Beverage manufacturer, it is essential to develop and implement new recipes easily as part of the Product Lifecycle Management (PLM) methodology. This enables changes to existing recipes to be made quickly, without creating the demand for complex and time consuming programming.

Traditionally, implementing effective batch control systems has meant a PC-based installation coupled within the real-time control loop, but many manufacturers prefer the greater simplicity, security and inherent reliability of a Programmable Logic Controller (PLC) based system, eliminating the need for PCs on the plant floor.

Industry standards

The C Batch controller from Mitsubishi Electric conforms to the S88.01 standard. This global standard defines a common language and process models for the design and specification of batch processing systems. It enables the cost and complexity associated with dedicated, custom software traditionally needed to implement batch control systems to be eliminated.

It also provides the flexibility to make frequent changes to recipe parameters, without the need for manually reconfiguring process lines or costly redesigning batch control software.

Mitsubishi's C Batch provides a standards driven path to significant productivity improvements, allowing the same equipment to be used to make multiple products, or to perform any number of different operations, with simple recipe development and deployment.

Software modules

The C Batch software puts the recipe execution engine, phase logic interface, phase logic and basic control on the PLC. Recipe creation and editing is provided through the associated PC software module and the operator interface is provided by the Batch View software running on Mitsubishi Graphic Operator Terminals (GOTs).

Why use S88 Batch control

C batch provides all the features you would expect from traditional PC-based batch control software.

Utilising the S88 modular approach makes it easier to change one or all recipes and controls, resulting in a reduced time to market for new products.

Productivity can be increased by the simultaneous execution of several recipes, with automatic allocation of units.

The S88 model delivers improved throughput and production is more flexible, with reduced cycle times and faster changeovers, resulting in reduced waste and rework and increased yield.

The PC-less environment reduces the risk of standard operating system viruses and provides a ruggedised, secure environment.

Traceability is a mandatory requirement of any process and the S88 track and trace model produces error free consistency and quality throughout the process.

The high availability embedded database technology on the PLC controller delivers improved speed and security.

The structured S88 environment offers easy validation and reuse of validated modules to save time and cost.

Process developments are easier to implement scaling of recipe parameters and, scaling of production batches offers improved flexibility, without complex batch changes.

Benefits

- Batch processes examples include mixing / blending / masking / pasteurisation / baking / forming

- Improved Formula management

- KPI (Key Performance Indicator) data collection and reporting

- Production Performance Rating (PPR)

- Enhanced Production management

- Improved accuracy of Plant Scheduling

- Standards management and compliance reporting

Improved process control

Typical S88 system with PC based Batch Engine

C Batch S88 system with Batch Engine on PAC Controller
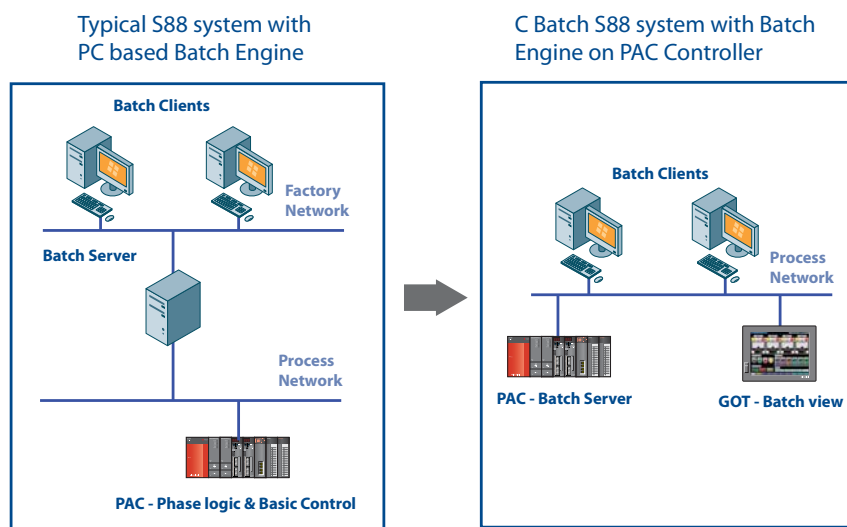
Typical production line architecture with intelligent automation

Business MES integration
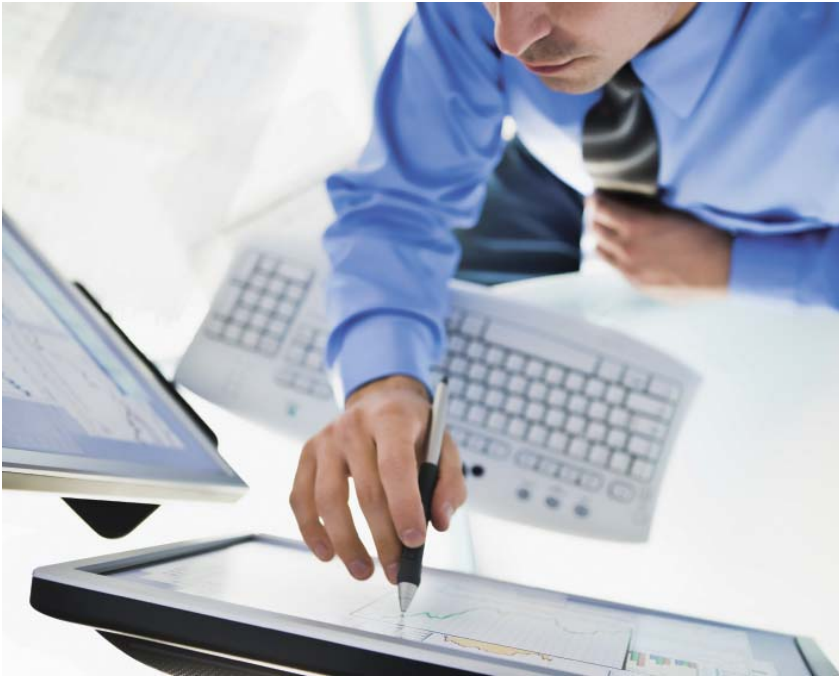
A wide variety of distributed assets can all be integrated into a single system

Non-PC based systems provide maximum reliability

Mitsubishi Electric has developed technologies which challenge the traditional automation architecture and can offer a robust environment, whilst delivering the operational requirements needed.

Mitsubishi's "C Controller" range of automation solutions offer direct connection from the plant/asset to enterprise systems such as SAP, Oracle, DB2 etc within a ruggedised industrial form.

These systems are non PC based and are therefore not susceptible to the same operating system legacy issues that are found in a traditional PC based system.

In addition, Mitsubishi has developed intelligent solutions to provide data and alarm logging to be carried out locally at the PLC. This technology has created the possibility of removing the gateway PC from the topology altogether.

If data and alarm logging is processed directly at the PLC, then visualisation and control needs to be met by intelligent HMIs. Using a non-PC based technology such as GOTs means increased system availability and reduced system maintenance. In addition, dedicated maintenance benefits such as direct PLC program monitoring, plus strong diagnostic functions and remote management over a VNC connection, achieves maximum uptime.

However, if SCADA PC nodes are required, then keeping the critical data/alarm logging in the local PLC means that the SCADA node can be the control and visualisation element of the system, whilst protecting this vital information in a more robust PLC environment.

Mitigation techniques can then be deployed to minimise the risk with respect to the PC based SCADA or visualisation system.

By using the Mitsubishi C Controller technology the link between plant/asset and the enterprise systems can be achieved directly from the PLC level and therefore minimise the risk.

Data flow in manufacturing or process control systems

Key benefits

- Simple connection of the Shop-Floor to the complex IT-World

- Direct and consistent communication to all standard data bases

- No programming, just parameterising

- Transparency - real time during production

- No data loss during network failure

- Open connection to 3rd-party devices

- Start-up time reduced

- Direct connection to SAP using SAP BAPI, SAP Web Service or PCO

- Indirect connection to SAP or other enterprise systems using Websphere

Security built in

In a world where information and data security is becoming increasingly important, the MES IT module allows user access to be tailored to Individual information needs. IT teams can access automation process data without fear of inadvertently affecting operational processes, while still allowing engineering staff to carry out normal functions with no risk to the IT infrastructure.
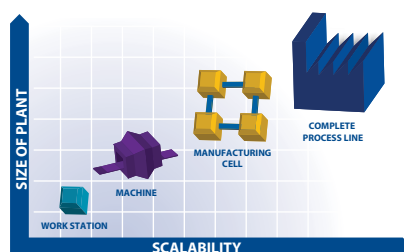
Scalable solutions

Improving productivity with e-F@ctory

Meeting the needs of high speed production lines

e-F@ctory is Mitsubishi Electric's solution to improve the performance of any manufacturing enterprise, achieving reduced total cost of ownership, maximised productivity, and seamless integration.

Born out of the expertise Mitsubishi Electric has developed as a global manufacturing enterprise, we are now sharing this expertise with our customers.

This enables Mitsubishi to provide solutions to meet your every need for improving productivity. For full details visit our special e-F@ctory alliance website: www.e-factory-alliance.com

Some of the many e-F@ctory solutions we can offer the Food Industry include:

Machine vision

Machine vision systems hold the key to reliable, consistent, automated inspection in the most demanding manufacturing tasks, even on the highest speed production lines. And when tightly integrated with higher level enterprise controllers, machine vision systems provide the means to capture and record the complex production information that is essential for effective traceability.

Machine vision adds a new layer of intelligence to production systems that helps companies to improve their manufacturing performance. Modern cameras integrated with automation systems can quickly eliminate product defects, verify assembly, and track and capture information at every stage of the process.

The result is fewer production errors, lower costs, and increased customer satisfaction, with the assurance of full traceability should a problem arise anywhere in the supply chain.

Life-cycle engineering software

Mitsubishi Electric and e-F@ctory partner Adroit Technologies have addressed the shortcomings of traditional PLC-SCADA integration tools with Mitsubishi Adroit Process Suite (MAPS).

(MAPS) is a life-cycle software tool that offers value along the entire value chain. It addresses the shortcomings of most PLC SCADA integration tools in that it offers value to the engineering and integration phases. It also extends the integrity of the 'as delivered' solution and offers customers the ability to handle the normal extensions and maintenance of any automation solution.

This single integrated package takes users through all the phases of process design, engineering design, control system design, installation, commissioning, acceptance testing and ongoing maintenance; helping to maintain consistency and integrity within an automation system, improving quality and reducing costs.

For full details visit our special e-F@ctory alliance website: **www.e-factory-alliance.com**

A world of automation solutions

Robots

Motion control and servos

Variable speed drives

LV circuit protection

Laser machines

HMIs

CNC controllers

EDM machines

Micro PLCs

Modular PLCs
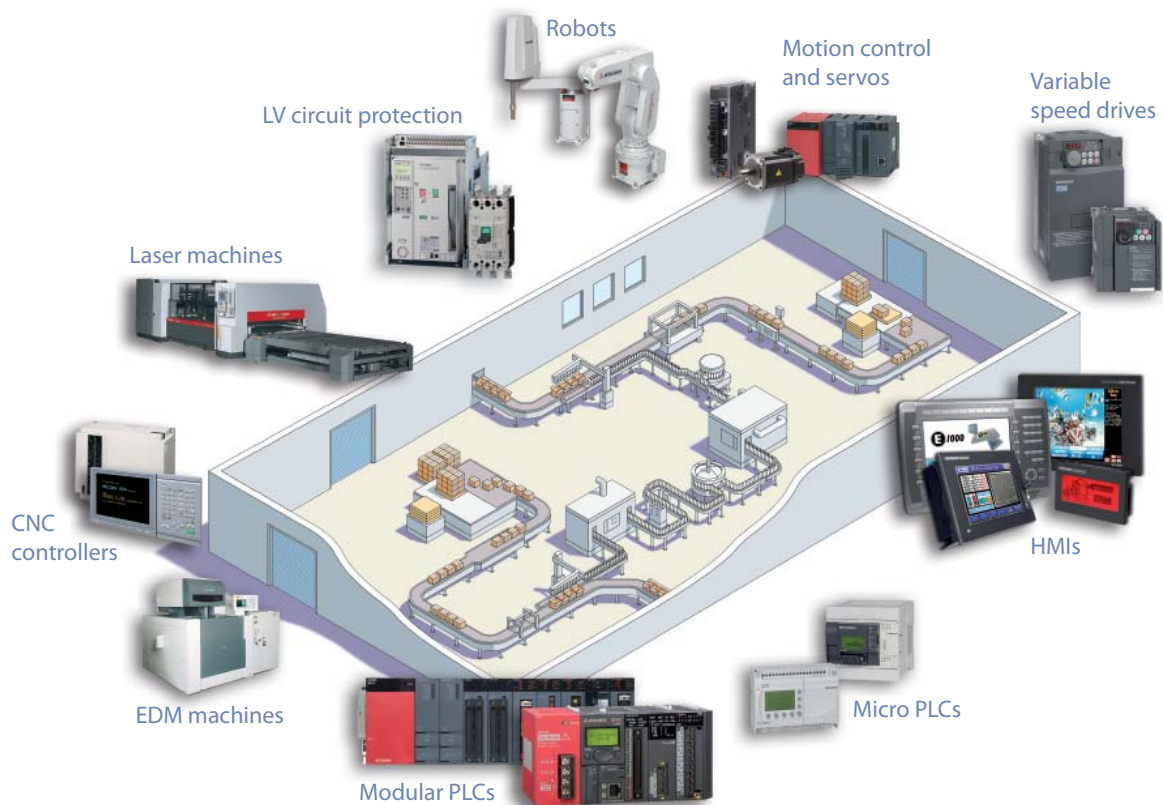
Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognised around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semiconductors, energy systems, communications and information processing, audio visual equipment, home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on a Mitsubishi automation solution – because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of 4 trillion Yen (over $40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.

System Service & Support Services

■ Dedicated technical support

■ 24/7 on site engineer call-out availability

■ Annual maintenance visits

■ Extended warranty

■ Technical manual library

■ Multi vender product support

■ Legacy product survey & risk assessment

■ Commissioning service

■ Repair services

Global partner. Local friend.

Version check