FOOD & BEVERAGE

Automation Solutions

Manufacturing &
Productivity Solutions

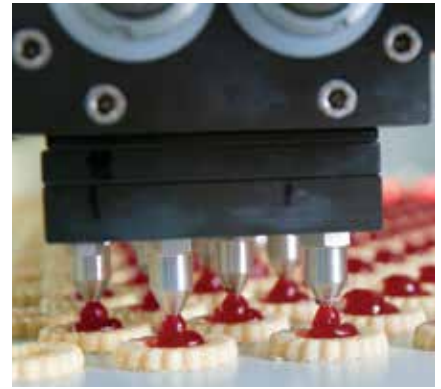**Increase yield / Improve quality / Increase profitability /**

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 information flow
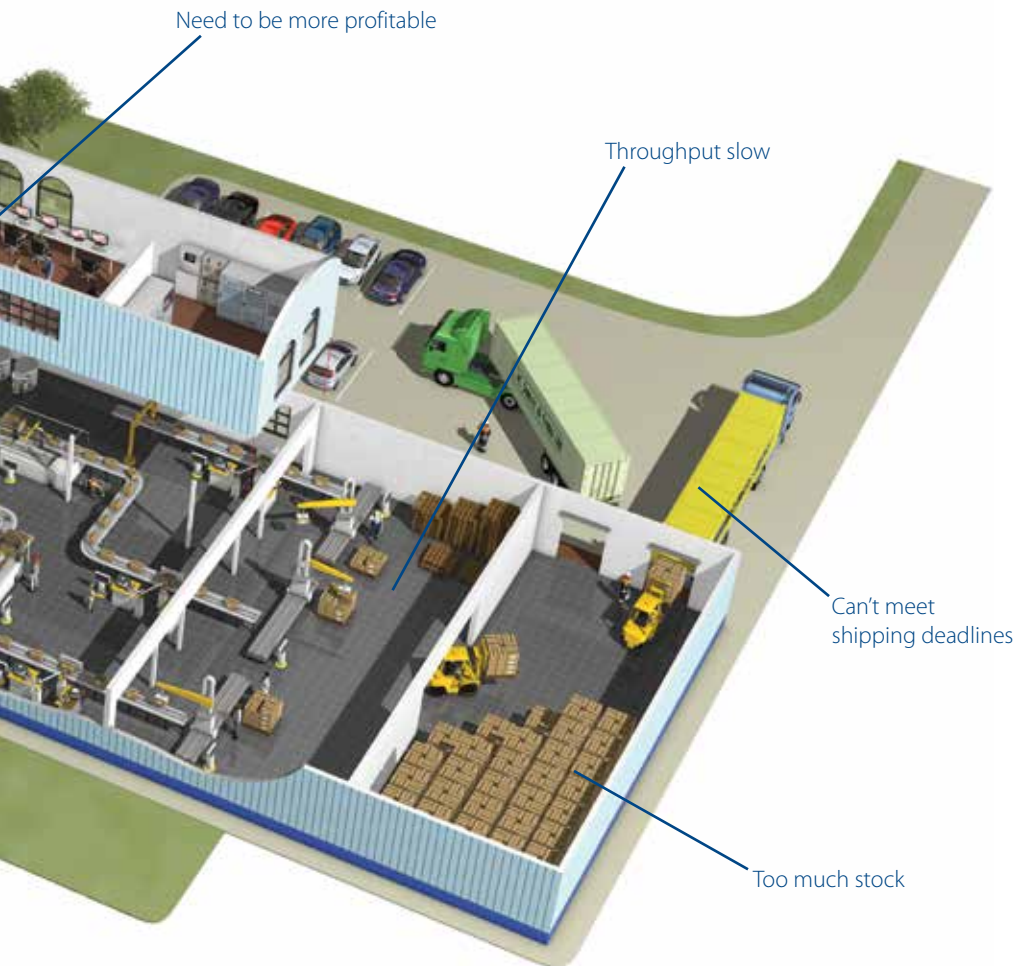
Too much wastage

Too many product failures
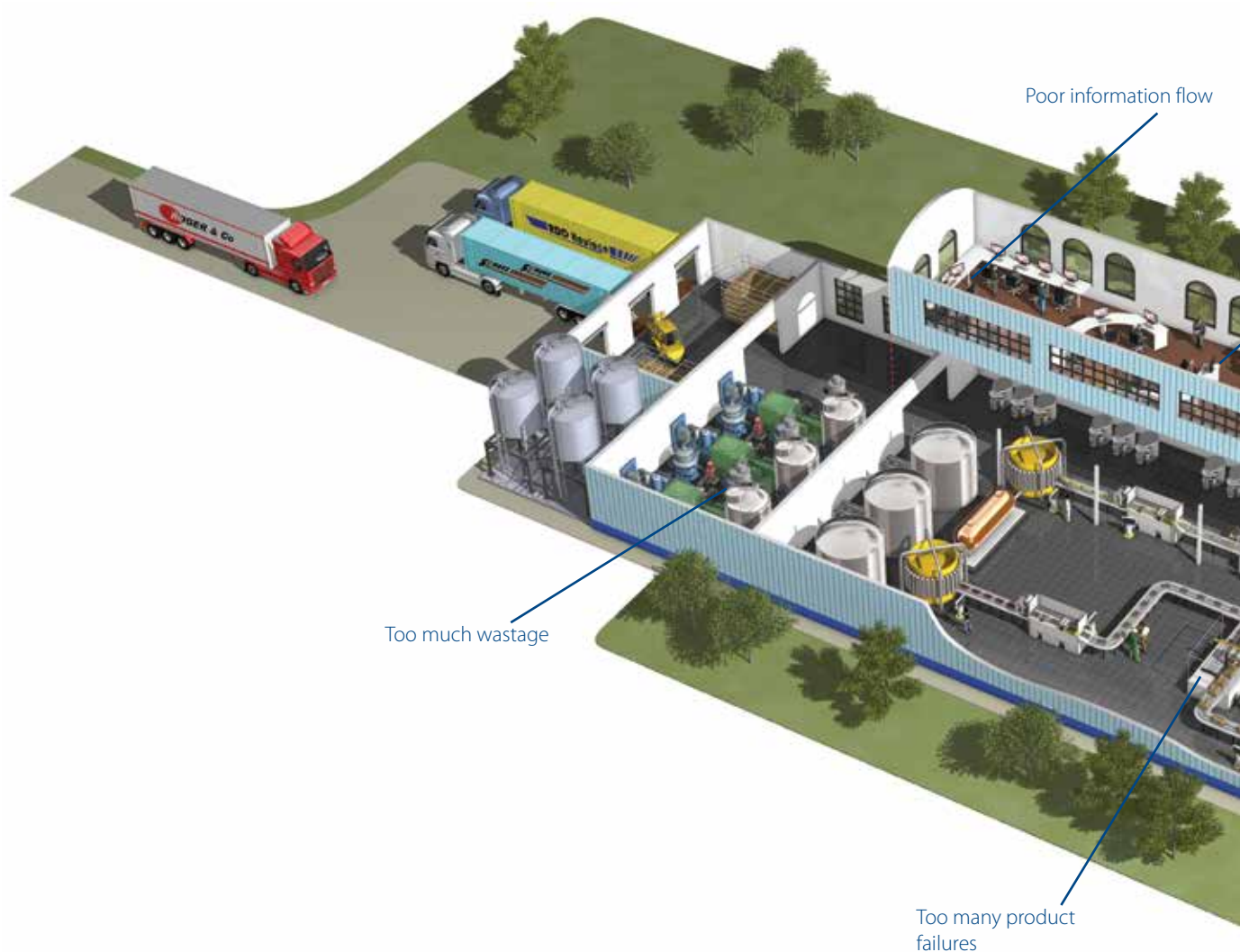
The market sectors of Food, Beverage and Consumer Packaged Goods (CPG) cover a wide range of sub sectors each with their own specific specialities and needs. The European Union's NACE definitions create 9 separate sub sectors for Food and Beverage alone:

- Meat products
- Oils and fats
- Animal feeds
- Fish products
- Dairy products
- Various food products
- Processed fruit and vegetables
- Flour and starch products
- Beverages

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

- Responding to market demand through 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
- Security

" *Typically, a production process covering the areas shown below, with manual interaction points between workflows will benefit from a MES proposition*"

Need to be more profitable

Throughput slow

Can't meet shipping deadlines

Too much stock

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

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 directly reporting in to 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.

The Mitsubishi architecture and openness offers Food and Beverage company's a unique capability of not only 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 a superior quality of supply in all aspects of the operations and management of these facilities.

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 a holistic approach using our MX4Business data management solution 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 the 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

- Waste
- Energy losses
- Process / Machinery issues
- People (de skilling)
- Product life cycle
- Process issues
- Workflow issues

DEFRA reports the food industry generates 10-20% waste by weight, which equates to between 3 and 8% of business turnover, and is more than some business' profit margins. It recommends the adoption of continuous improvement and "Lean Manufacturing" as methods of reducing waste and process improvement.

Process efficiency

- Plant flexibility
- Overall Equipment Effectiveness
  – Reduce downtime
- Product genealogy
  – Batch control S88
  – Track and Trace
- Flexible systems
  – Reduce change over times
  – Reduce clean down times
  – Reduce WIP
  – Reduce waste
- Improve accuracy of plant scheduling

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

These result in low productivity, poor quality, increased costs and wasted resources.

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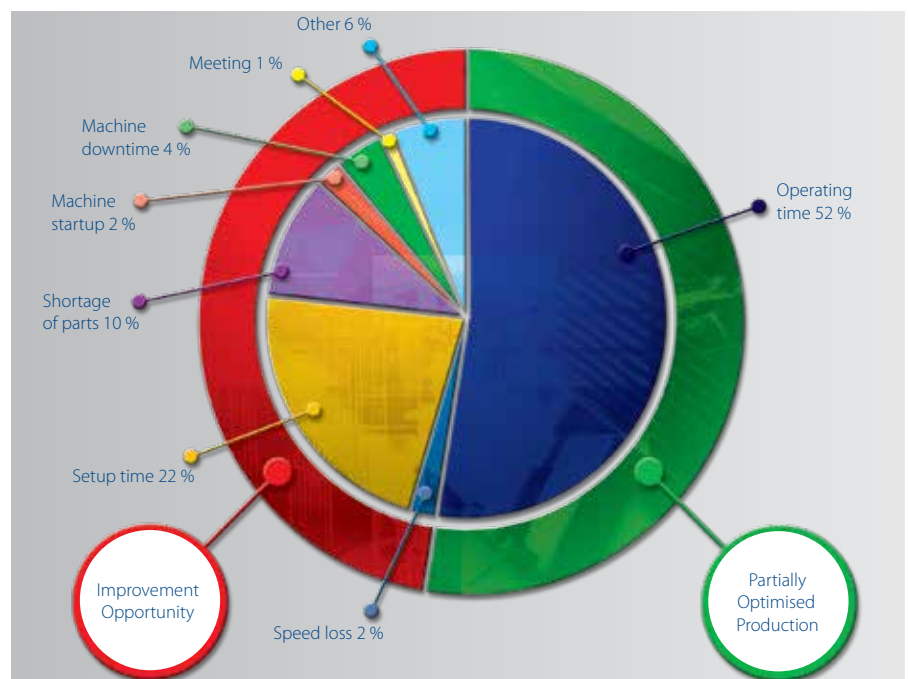
This is just one example of the positive impact Mitsubishi Electric automation has had on many Food and Beverage processes and applications.

Capabilities
and benefits

- Batch Control
- Track & Trace
- OEE
- PPR
- S88
- Delivering scalable solutions

Improve your production efficiency

Other 6 %

Meeting 1 %

Machine downtime 4 %

Machine startup 2 %

Shortage of parts 10 %

Setup time 22 %

Operating time 52 %

Improvement Opportunity

Speed loss 2 %

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

Of course everyone knows that plastics and other waste materials can be recycled, but not many people know 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 into a generator when carried loads are lowered.

Imagine all the waste heat and finally energy disappearing in to the environment from a hot forming or oven process. However, with the use of heat pump technologies the "waste" hot air can be easily turned into useful hot water for use as process water or even as showers for the line workers. Also using an air to air system 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 it's customers 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.

Further more Mitsubishi's innovative total energy management system brings together all the parts needed to create a modular energy management solution. From feasibility study to proposal, predefined solutions leaving the last 20% for customisation are available to speed up the system implementation and, of course, lower costs.

Our experience

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.

Naturally the value of these saving varies country by country and in fact increases over time as the tariff rates increase.
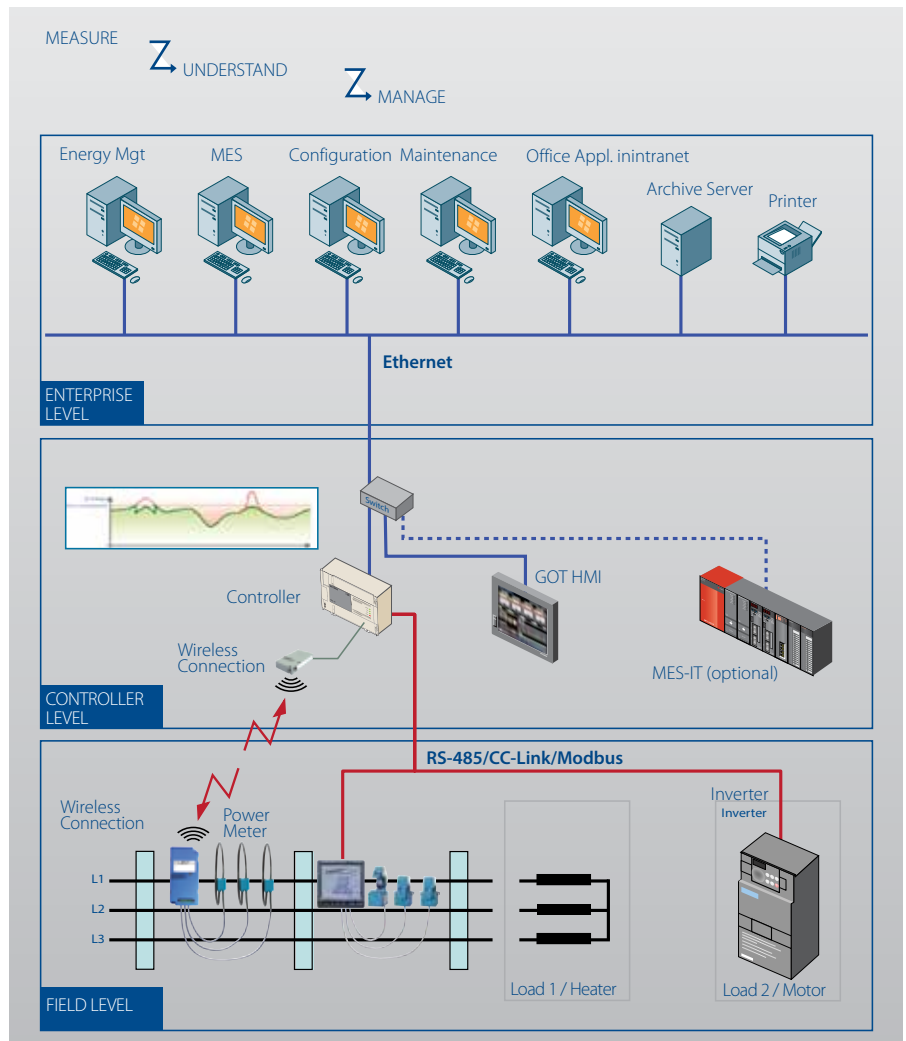
Energy management concept

Capabilities and benefits:

- CRC Reporting / compliance
- Energy survey / consultancy
- Enhanced Capital Allowance certified products & solutions
- Power quality solutions
- Display Energy Certification
- Ground source & air source heating solutions
- Heating & cooling solutions

Batch implementation

Batch implimentation

Improved quality and traceability

C Batch delivers Batch control in a PC-less environment

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).

Capabilities and 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

Food safe robotics

Compact and cost effective

Mitsubishi Electric robots offer flexible solutions in food process applications, food producers can benefit from less waste, more productivity and better quality.

Waterproof model

- IP65/IP67 rating designed to withstand wash-down
- Anodized aluminium construction
- Uses NSF H1 food grade lubrication

Clean model

- Class 100 completely sealed
- Suitable for clean environments
- Minimal particulate matter generation

The food safe range of robots offer ergonomic designs that help save space and increase productivity.

They are designed for high speed applications and their super-fast cycle times speak for themselves.

With compact design and overhead installation, these robots do not take up valuable space in the work area next to the installation. This even smaller work cell design means it can access any point within its 700mm diameter workspace and offers exceptional repeatability.

Benefits

- Space saving design
- Simplified layout removes operation restrictions of conventional robots
- High speed, fast cycle times increase throughput
- Fully integrated with PLC, HMI and Vision for the ultimate in control and operator feedback, reducing downtime and increasing yield


IP65 and IP67 grade robots

Applications

- Food assembly
- Food decoration
- Packaging
- Transfer lines
- Quality control

Powerful Software tools

Comprehensive software for programming, system development and simulation make application of robot work routines much faster and more efficient.

Tools are provided for debugging and planning optimum cycle times for maximum productivity.
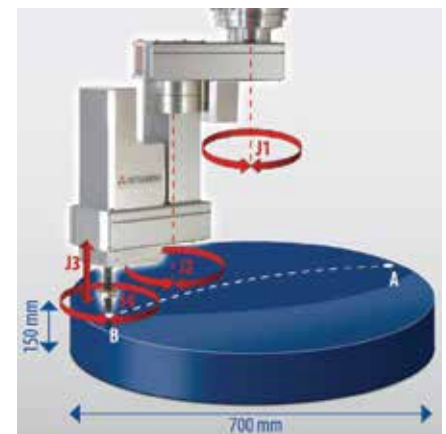
All inclusive operating area

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 offers direct connection from the plant/asset to enterprise systems such as SAP, Oracle, DB2 etc within a ruggedised industrial form factor.

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 even remote management over a VNC connection mean 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 minimising the risk.
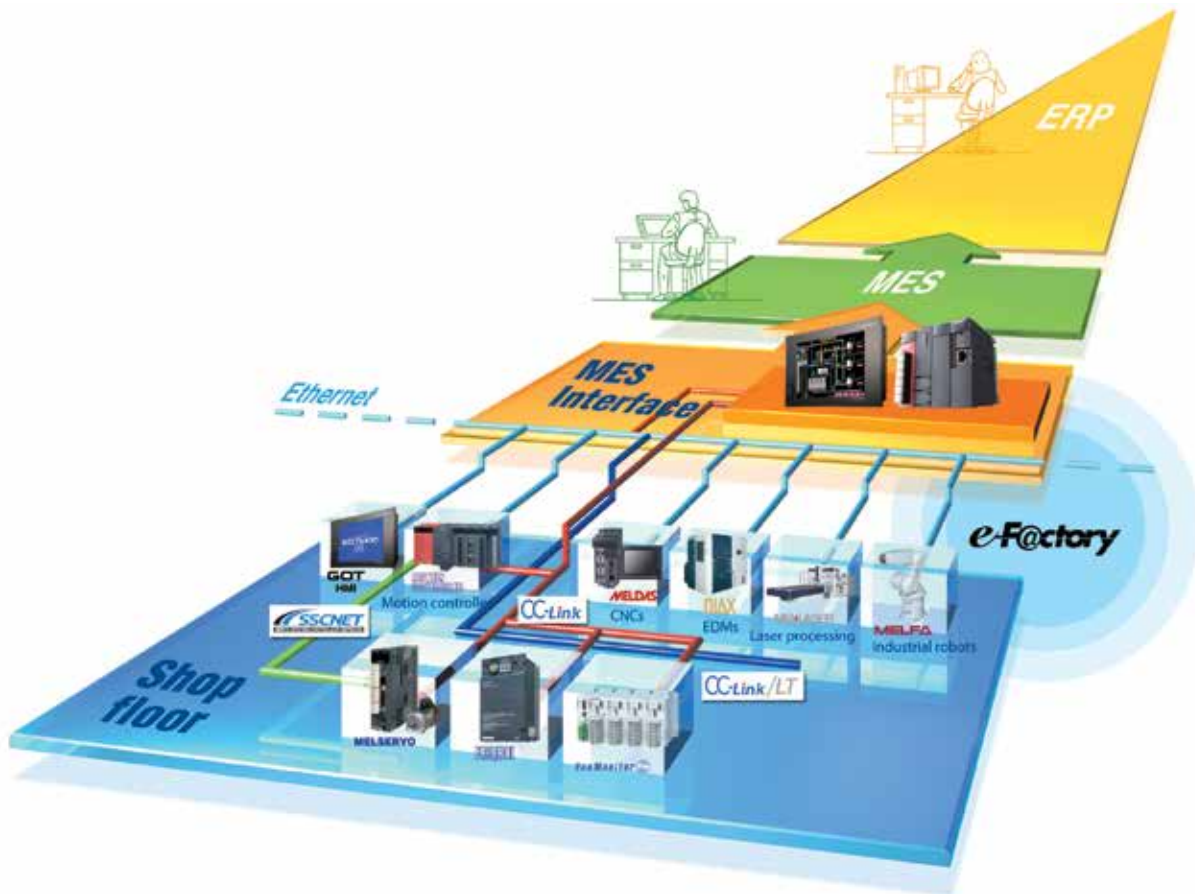
Data flow in manufacturing or process control systems

Key benefits

- Simple connection of the Shop-Floor to the complex IT-World
- Direct and consistent communication to all standard databases
- No programming, just parameterising
- Transparency - real time during production
- No data loss during network failure
- Open - connection to 3rd party devices
- Comprehensive solution
- High-priced gateways not applicable
- Short start-up time
- Broad reduction of total cost of ownership
- 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 ever more important the MES IT module allows user access to be tailored to their information needs. IT teams can access automation process data without fear of inadvertently affecting operational processes while still allowing engineering staff to carry out their normal functions with no risk to IT infrastructures.
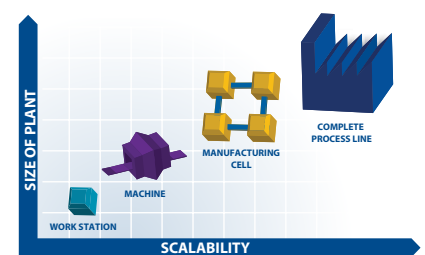
Scalable solutions

Improving productivity with e-F@ctory

Meeting the needs of high speed production lines

e-F@ctory is the Mitsubishi Electric solution for improving the performance of any manufacturing enterprise, providing key benefits: Reduced total cost of ownership, maximised productivity, and seamless integration.

It was 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 us 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

Here's a taster of what some of the solutions can do for the food industry.

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.

Intelligent automation

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 are 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 Automation Process Suite (MAPS).
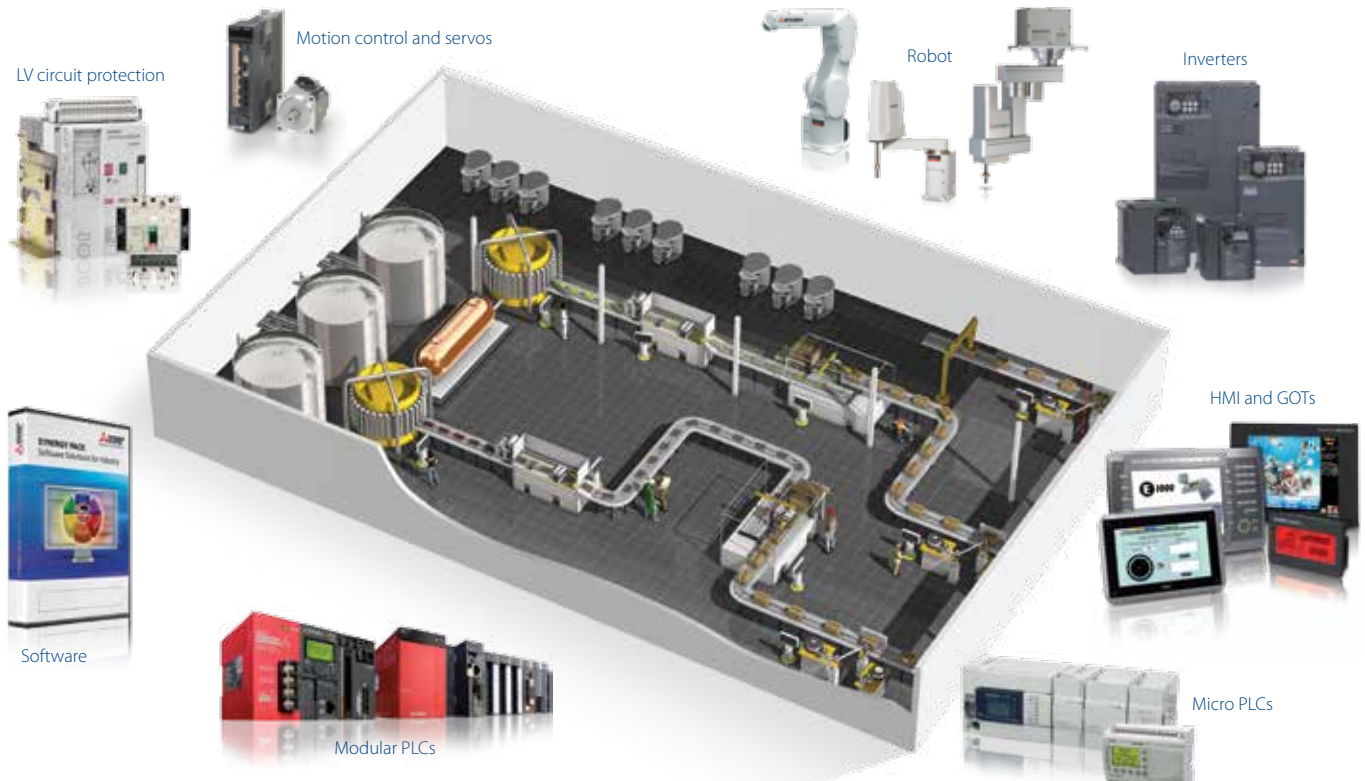
(MAPS) is a life-cycle software tool that offers value along the entire value chain. It addresses the shortcomings of most PLC SCADA integration tools in that it offers value to the engineering and integration phases. It also extends the integrity of the 'as delivered' solution and offers customers the 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

LV circuit protection

Motion control and servos

Robot

Inverters

HMI and GOTs

Software

Modular PLCs

Micro PLCs

Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines

A name to trust

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

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

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

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

As one of the world's leading companies with a global turnover of 4 trillion Yen (approximately $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.

Service & Support

As with any activity, maintaining the quality and operational function of your equipment is essential. Downtime from any operational failure is never good news. In today's tough business conditions returning to full production as soon as possible is critical. At Mitsubishi Electric we aim to deliver industry leading levels of service and support that will provide cost savings, improved machine availability and system uptime to our customers and minimise implementation risk.

We provide a professional on-site service through our System Service Team and Service Agent network and offer a tailored range of service contracts for single and multisite companies, on an annual or project basis called our 3 Diamond Service.

- Dedicated technical support
- 24/7 on site engineer call-out availability
- Annual maintenance visits
- Extended warranty
- Technical manual library
- Multi-vendor product support
- Legacy product survey and risk assessment
- Commissioning service
- Repair services

Global partner. Local friend.

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Version check

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