

e-Factory

Creating productivity

Reducing manufacturing costs



Reduced wastage /// Reduced rework ///

Increased machine utilisation ///

Increased process visibility /// Productivity gains ///

Is this your problem?



“ Too much
product wastage ”

“ Throughput
to slow ”

“ Too many
product failures ”

“ Can't meet
shipping deadlines ”

Every manufacturing industry is experiencing the increasing speed of business in many areas including changing schedules, customer needs, costs of materials, business models, and technologies. At the same time, many manufacturing sites - particularly in the discrete industries - have growing complexity in their operations, which makes it more difficult to change.

Also, complexity is increasing with multiple product lines, varied production routings, dynamic customer demand, competition among products for the same production resources and compliance to government regulations.

As capital budgets are reduced, manufacturers should focus investments in projects with a clear and measurable return, such as initiatives that take costs out of manufacturing processes and supply chains, improve productivity and quality, and increase utilization of existing assets.

Source: ARC Advisory Group



“ Too much stock ”

“ Pressure to make it cheaper ”

“ Poor information flow ”

“ Shareholders demanding more profit ”

This is what we can deliver



Case Notes

Company: Mitsubishi Electric

Location: Nagoya, Japan

Production line: Servo motor

e-F@ctory delivered:

1.9 times machine utilization

65% reduction in line

engineering costs

50% reduction in lead time

Approaching zero defect rate

e-F@ctory was born out of the expertise Mitsubishi has developed in house as a global manufacturing enterprise facing essentially the same challenges our customers face. It has been implemented in real world applications and has delivered dramatic results. We are now sharing our expertise with those who are looking for the same benefits for their own manufacturing operations.

This is how



Transparent factory

Manufacturing companies today must survive in the face of tough competition. Customers expect perfect production quality and fast and punctual delivery, all for the lowest possible price. How can one further enhance the efficiency of production processes that are already almost entirely automated? Mitsubishi Electric's solution to this question is e-F@ctory – a concept based on integrated system solutions for industrial and factory automation that ensures a continuous flow of information through all levels, from the shop floor to management with a reduced total cost of ownership (TCO).

More transparency

Seamlessly integrated automation components and integrated information flows throughout the entire industrial process chain are the keys to achieving flexible, customer-focused and economical production.

Data on the availability of materials and machines must be transparently available at the touch of a button in exactly the same way as the current process status information. Only access to complete information in real time can enable fast decisions and optimisation of all production processes, from order processing to the finished product.

The weak point of many systems is inadequate or missing IT connections between the production and management levels. In many plants, data is still recorded by hand and information is passed on personally from employee to employee. In addition to the great potential for error, including the possibility of accidental data losses, this also slows down the information flow – and often also the entire production process. Manually-executed production processes, for example in quality control, also often hinder maximum efficiency, preventing faster throughput and delivery times.

Integrated information flow

The seamless flow of information between production and management is no longer a dream for the future but daily reality.

Thanks to e-F@ctory, company management can rely on up-to-date and meaningful information. This simplifies, improves and speeds up decision making.

It's so good we use it to produce our own products!



80% increase in productivity

The new Nagoya Works facility is an uncompromising implementation of Mitsubishi Electric's e-F@ctory concept. The result is a transparent factory, in which every employee – from the machine operator to the manager – always has real-time access to the process data that are relevant for them. The result is a productivity increase of 80% compared to conventional manufacturing facilities, combined with faster delivery times. The time required to produce servo motor has been halved – and that in a zero defects production facility without expensive wastage.

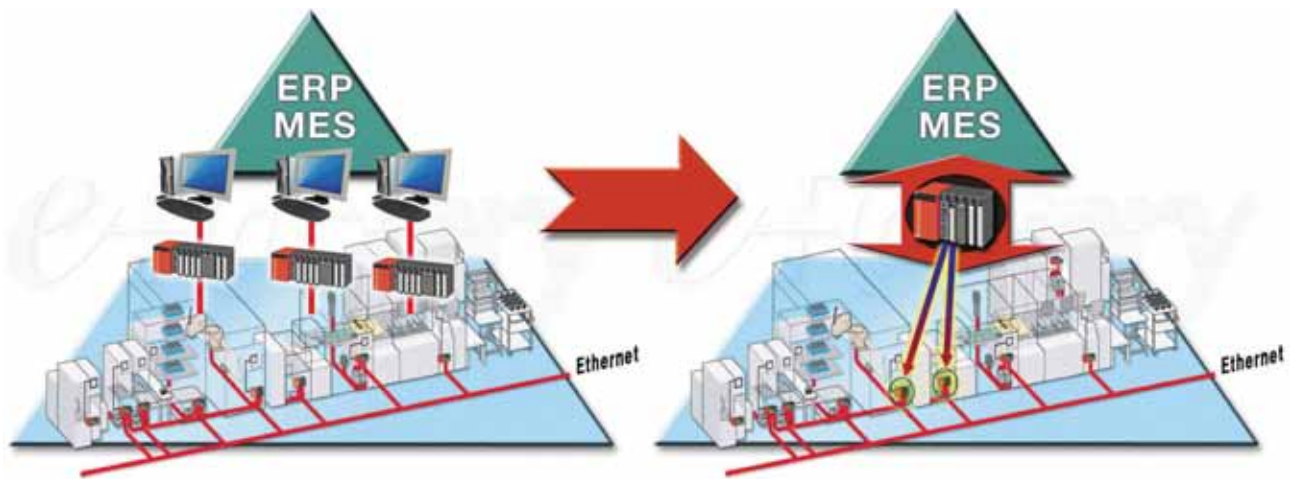


The future has already begun behind the gates of Mitsubishi Electric's Nagoya Works, Japan, where one of the world's most advanced production lines for servo motors went into operation. Every year up to 1,000,000 fully assembled and tested motors, using latest generation technology, leave the fully automated production facility. The brushless servo motors are manufactured round the clock in batches in response to incoming orders, in a variety of sizes and capacities.

The engineers who designed the facility were able to build on Mitsubishi's wide range of automation products in the company's portfolio. A look around the shop floor reveals MELSEC System Q modular controllers, industrial robots and advanced drive systems, all from Mitsubishi. Servo motors of the previous generation are being used to manufacture their more advanced successors. Control terminals of the GOT1000 series provide detailed information on the production process and industrial networks keep the data flowing smoothly. Even the automated quality control is performed using Mitsubishi's own intelligent measurement systems.

In-process quality assurance

The ultra-modern production line demonstrates the benefits of an intelligently networked factory: With extreme precision, a robot winds copper wire around the pole shoe of an open stator. As soon as this step has been completed, automatic quality control is performed. The unerring measurement systems compare the actual values with the present tolerances and if a winding is found to be faulty the component is removed from the process and a message is generated. Every production unit has a display that makes the up-to-date processed information available via the intranet using Microsoft Internet Explorer. This enables workers in production to respond immediately to the new situation and to make an informed decision on what to do – for example to repair or dispose of the defective component.



Removing one layer of complexity and reliability risks, strengthens the whole operation and reduces maintenance and engineering costs

The process continues step by step by fully automated step until the entire servo motor has been completely assembled. Assemblies and functional groups are tested in-process and removed directly if defective. At the end of the process only error free, fully tested motors leave the production facility. During production, each motor is assigned a unique identification number, with which all manufacturing steps and quality controls can be tracked minutely, batch for batch – even years later.

All production and quality data are available in real-time and management always has full information on the production process. Reliable access to current and past process data is the foundation for good decisions and enables management to identify and correct weaknesses in production, thus further increasing the efficiency of motor production.

A user-friendly configuration tool makes it easy for PLC programmers to enter the data required for controlling all the production and business processes. Communication in the other direction works in the same way: It is equally possible to access the MES module and the controller via the database.



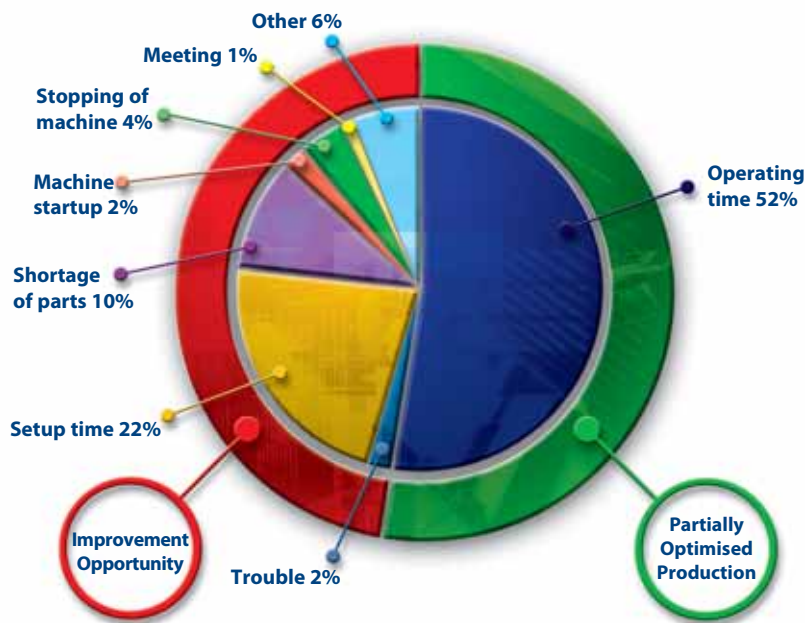
No gateway PC

This transparency is made possible by the MES Interface, which is a new microprocessor module for the MELSEC System Q automation platform. One of these communications modules for Mitsubishi Electric's most powerful modular PLC (programmable logic controller) is installed in every production cell. The machines and other systems there are connected with the main controller via a field bus system. The module inputs the data collected and pre-processed by the controller via the backplane bus and sends it directly to the central database.

Communication takes place with the standard SQL (Structured Query Language) database language via an Ethernet interface integrated in the module and using TCP/IP (Transmission Control Protocol/Internet Protocol). Support is also included for exchanging documents in the equally non-proprietary XML (Extensible Markup Language) format. The MES interface interoperates with all standard databases but it is specially optimised for the very popular Oracle Fusion Middleware database family.

These savings and benefits do not apply just to us. Currently hundreds of manufacturers and companies per year are also benefiting from our e-F@ctory concepts.

The benefits of improved plant optimisation



By integrating MES with control systems, manufacturing becomes more agile for responding to change in this increasingly dynamic business environment. Integrating the control system with the MES allows for a more effective and broader set of production management functions to improve operational performance. To improve their response to operational issues, managers look to technology for connecting plant floor and business systems for automated business processes.

Some manufacturers have implemented point solutions on a case-by-case basis. Because of the higher development costs and support issues, this approach is not optimal. An integration platform is needed.

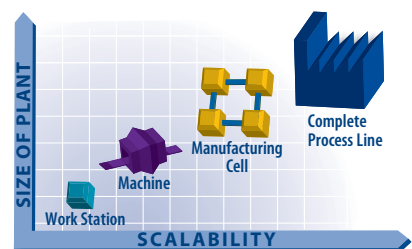
Superior Platform

Mitsubishi Electric's e-F@ctory concept for manufacturing systems provides data integrity while supporting network security and lower project risk. e-F@ctory provides a far superior platform than one based on a point integration solution with a Windows PC.

The demands for improved speed and agility conflict with a business' ability to respond. Visibility into current operations, including the control system, is the primary reason manufacturers buy Manufacturing Execution Systems (MES). This visibility provides the information necessary for informed decision making in real-time by all levels of personnel – plant floor to the executives. However, where does the MES get its data from?

Open automation

MES applications contain the critical business processes for executing a production schedule. These systems perform the production-centric functions of planning, controlling, operating, and informing. Control systems execute these functions to produce the goods needed to fulfill customer orders.





Intelligent networking

An e-F@ctory solution can completely integrate factory equipment within business processes, using common systems, protocols and networks to bring these functions together. This can be achieved using a single communications network or even through the integration of multiple and disparate networks.

The control platform is highly scalable, capable of accommodating just a handful of I/O channels ranging up to several thousand. It can monitor, or map, all channels concurrently, which means that business functions can be integrated more effectively.

Small investment

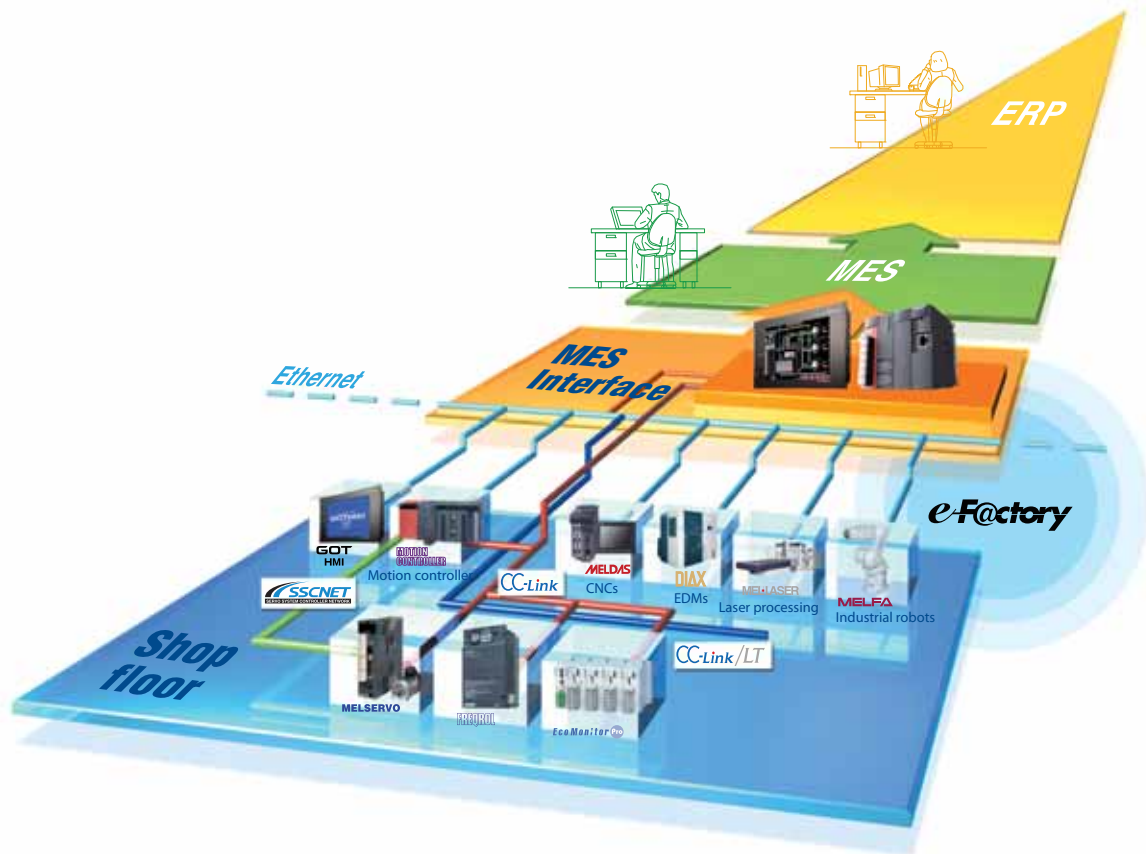
The capital investment required to start achieving some, if not all of the benefits of an e-F@ctory system can be relatively small, compared to the significant benefits that can be achieved. Most legacy/existing control systems can be utilised and unnecessary devices eliminated.

More profitability

By reducing costs, improving output and avoiding unnecessary wastage, Mitsubishi's Nagoya Works has already demonstrated how its e-F@ctory solution has improved its Return On Investment (ROI) and achieved a much shorter time-to-value – which is so critical in today's demanding manufacturing world.

To find out how e-F@ctory can boost your profitability come and talk with us.

Future proof flexibility

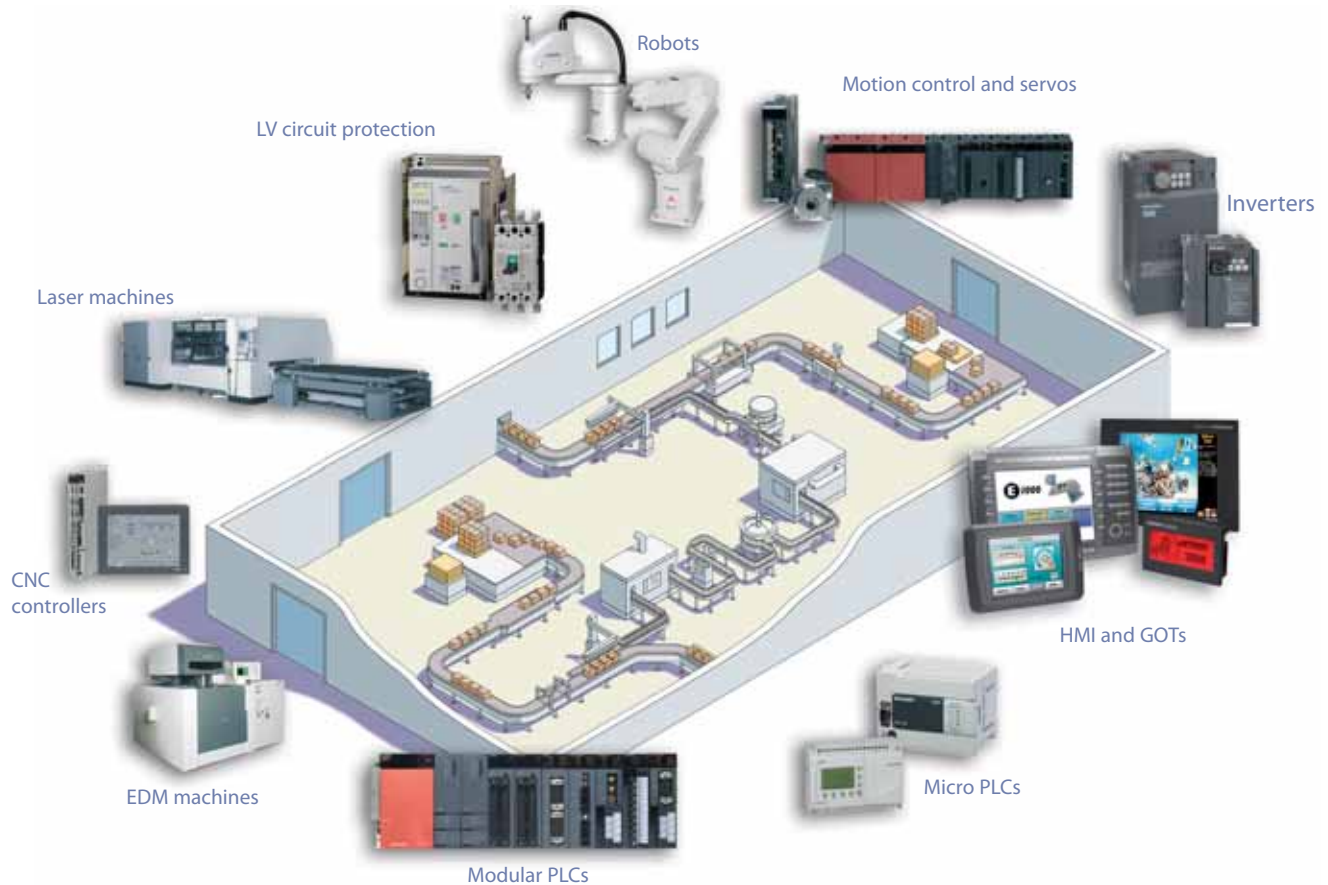


e-F@ctory provides an information connection between the control systems and IT systems in a manner that is particularly appropriate for MES and enterprise applications. It communicates among these domains using technology that provides high performance and ease-of-implementation while at the same time allowing the domains to retain their solidarity and independence.

Often, integration across domains is a huge risk to a project's success, i.e. completion on-time and in budget. With e-F@ctory's ease-of-use, there is less complexity. This provides faster project completion with lower risk. The direct connection between control systems and business systems eliminates a middle layer of software and systems thus reducing potential points of failure. With faster time-to-value, the project's ROI improves.

The benefits of e-F@ctory do not stop with the initial project and its commissioning. Designing connectivity solutions to meet the needs of only the immediate project will lead to a solution that is fixed with limited bandwidth to handle added applications. e-F@ctory provides flexibility to adapt to change. This can be in the form of changes to the existing project or the addition of other data sources as the business needs expand. Without changing the equipment interface, this connectivity solution has the agility to add additional support for systems including QA, PDM (Product Data Management), performance management and others as defined by a business' needs. Simply add new transactions that point to the additional data sources and destinations. Essentially, e-F@ctory "future proofs" projects for manufacturers.

A world of automation solutions



Mitsubishi offer 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 name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized 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, 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.

As one of the world's leading companies with a global turnover of 3.4 trillion Yen (approximately \$30.8 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.

Global Partner. Local Friend.

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