

THE ART OF MANUFACTURING

ものづくり

monozukuri



ISSUE 3

Mitsubishi Electric Factory Automation Customer Magazine



MANUFACTURING IN THE NEW NORMAL

Social distancing
and other challenges

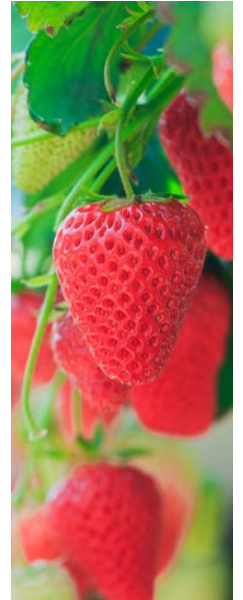
ICE CREAM MEETS DIGITAL MANUFACTURING

The e-F@ctory solution to
perfect ice cream

BELLA MOZZARELLA

Generating green energy
from farm waste

contents



Let's all create new value together 3

Manufacturing in the new normal 4

News from around the world 8

Ice cream makes chewy encounter with digital manufacturing 10

Launch pad 14

Mitsubishi Electric Europe Interview 16

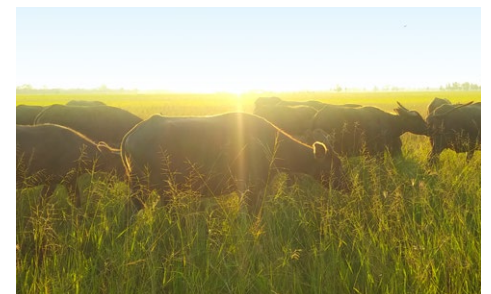
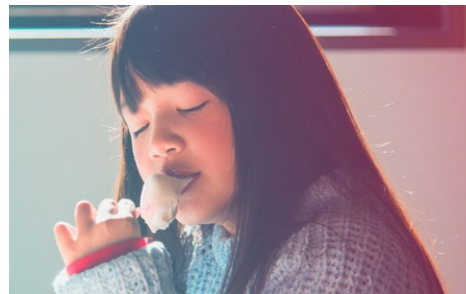
A new dawn: How developing face shields galvanized Mitsubishi Electric 20

Delicious automation: How machines produce our culinary joy 24

A Taste of Japan 28

Did you know? 30

Simple Motion Control 31



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Let's all create new value together



Mitsubishi Electric was founded in 1921, a time of both confusion and hope. Despite this uncertainty, the company set a clear vision for the next 100 years.

Since our founding, we have faced many challenges, but our dedication to improve peoples' lives has remained steadfast for 100 years. The Mitsubishi Electric Group continues to grow by contributing to the creation of a vibrant and sustainable society.

Now, as the world faces increasingly dramatic changes, we must again come together and look ahead to the next 100 years. Through our efforts to solve many complex issues facing societies around the world, our aim is to help create a sustainable and prosperous society in which everyone can share.

Our challenge for the next 100 years is to work towards this goal through our business activities, by combining all the strengths inside and outside of the Group, through continuous technological innovation and ceaseless creativity.

Synergy is the key. I, together with the 150,000 members of the Mitsubishi Electric family worldwide, am ready to work with every member of society to improve the future. And if each of us strengthens our individual dedication to this goal by finding synergies with each other, together we will be the driving force towards a brighter tomorrow.

Let's create a new future together.



Satoshi Takeda
Group Vice President.
Planning & Administration of
Factory Automation Systems.

Manufacturing in the new normal

Social distancing, protecting your employees, restarting operations and machines, catching up on supply chain gaps. Just like society as a whole, manufacturers are experiencing a lot of additional challenges they didn't expect, and to top it all many are facing reduced budgets. So how do you navigate the new manufacturing norm?



As an initial quick fix to social distancing in a factory, individuals could use face guards and masks. "Manufacturers are now trying to adapt to the changes in conditions, especially in two major aspects," said Hajime Sugiyama, Industrial IoT Evangelist of Factory Automations Systems Group, Mitsubishi Electric Corporation. "For example how do you implement social distancing in a factory?"

It's a very interesting question which has more permutations than most people initially consider. Starting with the individual we can all imagine the use of face guards and masks, and indeed many industries have traditionally used such PPE (Personal Protection Equipment), but this was driven from a hygiene or clean environment standpoint for industries producing such things as food, drugs or even sensitive electronics and semiconductors. But such PPE is not necessarily desirable in all industries. For example, in hot or humid environments the act of wearing a mask may actually increase risks of heat exhaustion, so care must be exercised in truly understanding the worker's environment. Some plant managers are considering using screens between

workers, but this is also not a panacea as there potentially can be space and restricted movement issues as well as possible problems around access to emergency devices (E-STOPs) or reporting/controlling devices... or simply visibility challenges.

Stepping back from the individual challenges, Sugiyama goes on to say, "Many manufacturers are focusing on social distancing through shift management. For shift management, you need to balance work shifts so that fewer people are working together at the same time to prevent a pandemic situation inside the factory. But this presents a whole new set of challenges."

While balancing shift patterns provides factory managers with a level of operational redundancy, i.e. if one shift needs to be 'suspended' due to infection, the second and/or third shifts can continue business as usual after the plant has had a thorough cleaning, it is a natural consequence that less people working will naturally lower the productivity. So how do you counter that?



Let your Co-bot take the strain

“Building extensive automation solutions takes a great deal of time, budget and planning,” says Sugiyama, “and in these times when manufacturers want to get up and running quickly and flexibly all three resources are likely to be in short supply.”

“Building extensive automation solutions takes a great deal of time, budget and planning,” says Sugiyama, “and in these times when manufacturers want to get up and running quickly and flexibly all three resources are likely to be in short supply.”

So what's the alternative? One possible solution is the increased use of industrial collaborative robots like 'Assista'. Typically these 'light' devices can be quickly deployed, are human friendly and so flexible that they can be quickly trained to do a variety of tasks, i.e., you do not need to have extensive robotics expertise. And probably a key deciding factor is that on the whole they are very cost effective. Enhancing the co-bot solution further with AI driven environmental management software as seen with solutions such as e-F@ctory Alliance partner Realtime Robotics reduce programing burdens even further and offer live travel path adaption so that the robot can dynamically navigate around obstacles such as humans, other robots and alike.



Some plant managers are considering using screens between workers, but this is not a panacea as there can be operational limitations. One possible solution is the increased use of industrial collaborative robots like 'Assista'. "It's clear one solution will not fit all, so flexibility to adopt the right social, 'mechanical' and collaborative solutions will be the norm. An additional area of consideration is remote access," claims Sugiyama.

Remote is not just for homeworkers

Returning to full operations, restarting processes and lines often reveals underlying problems which were not previously visible and creates a maintenance nightmare of unquestionable proportions. Remote access is a key benefit but if the device you are accessing is not intelligent, the value is drastically reduced as the amount of information is restricted. However, if you are lucky enough to be using intelligent automation devices which have degrees of self-determination and extensive diagnostics resolving maintenance issues can be accelerated.

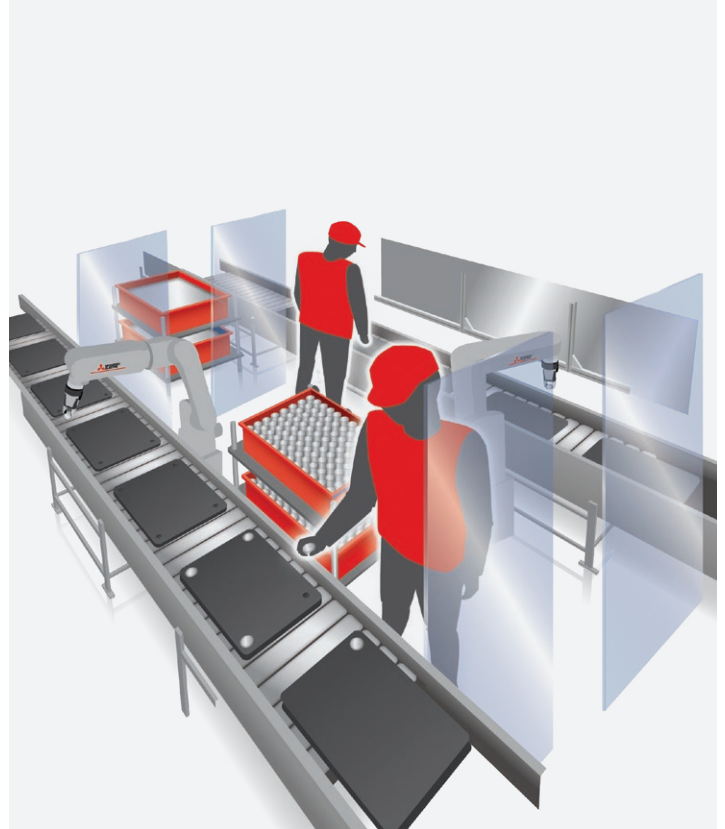
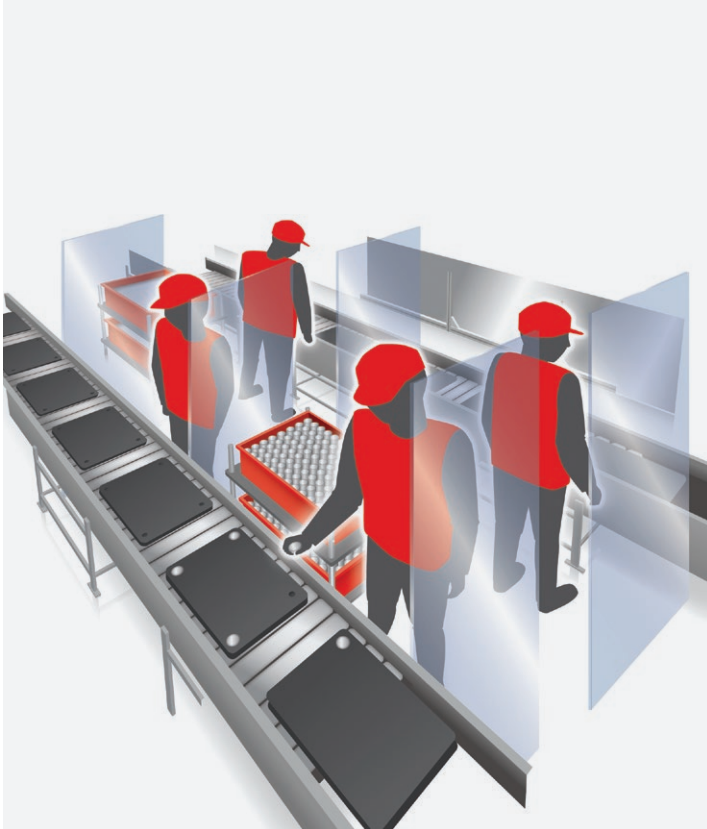
But aren't all automation devices intelligent?

"While the essential product performance/function maybe similar, you would be mistaken if you thought that all products are equal for example, it is not really true to say 'a drive is a drive, is a drive,'" states Sugiyama.

As an example many traditional users of Mitsubishi Electric's inverters will be familiar with simple features such as a 3-wire fan, the significance of which only becomes apparent in times like now. The benefit being the ability to diagnose the health of the cooling fan – which in turn helps extend the life of the inverter. In more recent products there are unique environmental sensors on the circuit boards to detect effects of corrosive or polluted atmospheres which is complimented by the merging of communications, intelligence and AI through the inverter hardware and partner software to provide advanced maintenance diagnostics.

Sugiyama explains, "Advances in product technology are not limited to the 'external function' of the device but also in how its operational life is managed and that means maintenance and performance KPIs – but such knowhow cannot remain locked up inside the product and really excels when it can be remotely accessed by the maintenance teams."

IIoT, Industrie 4.0, etc., have already been talked about for years, but at their core is the process of communication, extraction of data and subsequent analytics. However, often when plant managers consider remote access solutions they quake in their shoes as they contemplate a large, extensive SCADA system and all its associated paraphernalia. It is true these comprehensive systems are excellent for capturing vast amounts of data, providing alarming and analytics and



Screens are not always feasible, so Co-bots can be used.

reviewing historical data but as mentioned earlier they do take time to correctly plan and install. Other, quicker solutions can be remotely, but directly, connecting to an HMI device on the shop floor to mimic the local screen or accessing data over a wireless interface to finally the more recent trend towards utilizing Edge controllers.

So what is the new Norm?

Actually for Sugiyama he sums it up as “A practical approach is critical. Sometimes the answer is simply a partition screen, other times it is an investment in a co-bot, but the watch words are flexibility, scalability and results focused. So maybe the new norm is actually reminding us to identify what is important.”

Mitsubishi Electric Factory Automation Systems Group offers a vast range of automation and processing technologies that help bring higher productivity and quality to the factory floor. e-F@ctory is Mitsubishi Electric’s integrated concept to build reliable and flexible manufacturing systems that enable users to achieve many of their high speed, information driven manufacturing aspirations. ■



Learn more about industrial IoT through Webinars on the Mitsubishi Electric FA channel at: Latest Industry IoT trends for everybody (<https://bit.ly/32Nsf1R>)

News from around the world

GLOBAL

Mitsubishi Electric and EPLAN strengthen their digital partnership

Partnership

Mitsubishi Electric Corporation and long-term e-F@ctory alliance partner EPLAN are strengthening their digital solution's collaboration further as Mitsubishi Electric joins EPLAN's new partner network; an initiative to further facilitate the structured implementation of digital manufacturing.

The EPLAN Partner Network (EPN) is a framework for participants to jointly develop and market interfaces between EPLAN's advanced planning software and field level devices and parts such as PLCs and their related simulators. The EPN partnership is based on common, binding goals, for enhancing and supporting such interfaces. This commitment both increases customer benefits and enhances quality.

The integrated automation solution provided by Mitsubishi Electric and EPLAN connects EPLAN Electric P8 to Mitsubishi Electric's MELSOFT iQ Works, an integrated engineering software for programming and managing factory automation devices.



SINGAPORE

Virtual exhibition ITAP

Conference and expo

Mitsubishi Electric's presence at ITAP virtual exhibition (October 20-22 2020) included a showcase for Smart Factory as well as the opportunity for visitors to explore smart manufacturing processes, including the application of a variety of technologies including AI, Big Data Analytics, Cloud Computing and IoT.

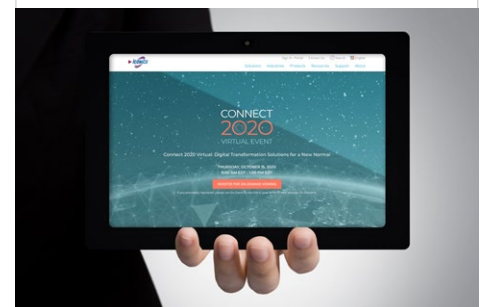


USA

ICONICS web event

Online Seminar

Digital transformation has taken on a whole new meaning in today's world. Have you adapted your business to the "new normal" yet? Join us from the comfort of your own home to learn how to maximize operational productivity, enable remote operations, and transform your workforce to succeed in the new reality! We look forward to connecting with you virtually to showcase digital transformation solutions, customer applications, relevant case studies, and how ICONICS software helps you transform your business quickly and easily.



PHILIPPINES

New FA center

Local support

The new facility, which was scheduled to start operating in October 2020, will strengthen servicing of Mitsubishi Electric factory automation (FA) products in the Philippines, thereby facilitating expansion of the company's local business in FA systems.

The Philippine FA market comprises of an expanding base of local and Japanese enterprise customers spanning diverse industries, including electrical and electronic, food and beverage, and automotive products, all requiring a wide range of services for FA products. Up until now, servicing of Mitsubishi Electric's FA products in the Philippines has been handled by the company's ASEAN FA Center (Singapore), but to improve local access to timely service and support, we have now decided to establish the Philippine FA Center, which will provide training, technical consultation and proactive proposals for system enhancements and upgrades to meet the rising expectations of local customers.

GLOBAL

New LinkedIn channels

Website

As a means of enhancing its marketing channels during this challenging period of global pandemic, Mitsubishi Electric is in the process of broadening its online presence, through accelerated social media activity alongside new LinkedIn channels for FA Global, e-F@ctory Global and e-F@ctory Alliance Global. With steadily growing profiles, these new channels are presenting themselves as highly effective ways to traverse boundaries, reach new audiences, strengthen existing relationships and engage in broader industry networking.



Mitsubishi Electric | FA | Global
www.linkedin.com/company/mitsubishi-electric-fa-global

e-F@ctory | Global
www.linkedin.com/showcase/e-factory-global/

e-F@ctory Alliance | Global
www.linkedin.com/showcase/e-factory-alliance-global/

GLOBAL

Digital Manufacturing from Mitsubishi Electric

Website

Industry 4.0 and digital processes are indispensable for future manufacturing growth. While many companies understand the importance of automation, they sometimes struggle to make it a reality. They need a strong partner with the know-how to guide them.

Mitsubishi Electric has a 100-year history of supporting manufacturers, plus a prolific track record for achieving factory automation at its own and other manufacturers' facilities. The approach embodies the Japanese philosophy of Kaizen that is now recognized worldwide.

The company's new website titled "Digital Manufacturing" demonstrates a framework that enables management to make decisions on step-by-step investments to maximize profitability and accelerate growth. This approach, called the "Smart Manufacturing Kaizen Level (SMKL)," is a maturity model to help manufacturers navigate their way through the digital morass by defining shared key actions and expected outcomes across their organization with the target of achieving a high ROI from their digital manufacturing initiatives.



<https://www.mitsubishielectric.com/fa/sols/digital-manufacturing/en/>

Would you like to be featured in the next edition of monozukuri – The Art of Manufacturing? **Get in touch and share your success story.**

Ice cream makes chewy encounter with digital manufacturing



Since its launch in 1981, Lotte's Yukimi Daifuku has been loved by people of all ages as a popular Japanese household favorite. Many have tried the unforgettable flavor and texture of the vanilla ice cream balls wrapped in soft, chewy mochi rice cake. "Delicious whenever eaten, regardless of the season." However, to achieve that deceptively simple goal of consistent texture, quality and taste is actually more difficult than most people would have thought. To solve this challenge Lotte has introduced Mitsubishi Electric's e-F@ctory to the production of Yukimi Daifuku.



“Before introducing e-F@ctory, there was an issue of inconsistency of the rice cake quality,” said Hiroshi Sugimoto, Manager of the Facilities Department, Urawa Plant, LOTTE Co., Ltd. “When wrapping the ice cream, the hardness of rice cake used to vary depending on the temperature and water content. Some operations were dependent on people, and losses arose out of the need to finely adjust the machine parameters.”

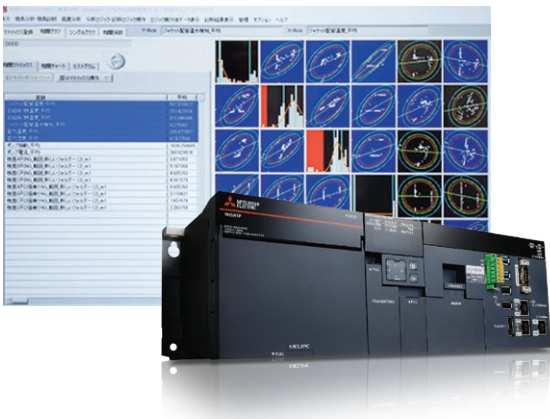
“The e-F@ctory system allows us to conduct improvement activities such as enhancing the operating rate, stabilizing quality, and optimizing staffing for production activities. The extendibility of the system, depending on what we want to do, was also appealing,” Hiroshi Sugimoto added.

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case study



Lotte is a leading manufacturer of confectioneries, ice cream, general merchandise, and others.

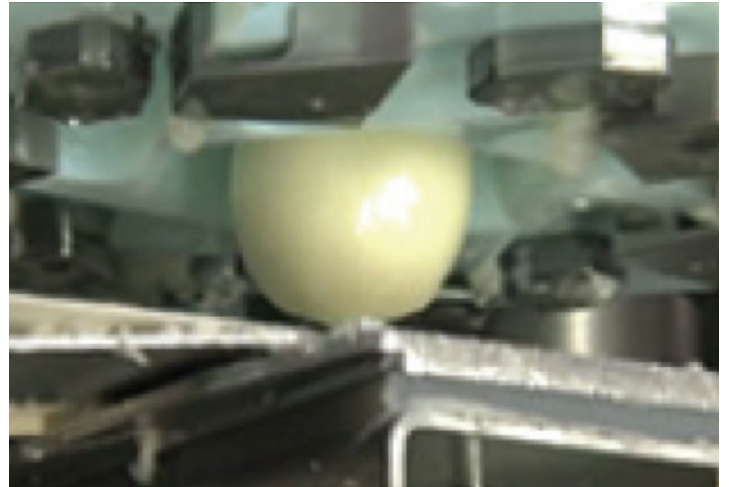


The Real-time Data Analyzer (left) is running on the Mitsubishi Electric “MELIPC” industrial PC (right) where it gathers and analyzes data and conducts diagnostics.

At each of the Yukimi Daifuku production lines the state of the product and the operating status of the machines is collected by PLCs installed in each process. Vast amounts of data, such as vibration data from the rice cake hopper to data from the conveying inverters is collected. All of the data can be understood in real-time not only through the overall SCADA monitoring system, which is installed in the control room, but also through on-site computer displays.

“By introducing this system, data became centralized, making it possible to view and investigate conditions whenever we want,” remarked Hiroshi Akimoto, Section Manager of Facilities Department, Urawa Plant, LOTTE Co., Ltd. “Because the data volume is extremely high, having all the data centralized in one place has a positive effect. One big benefit is that we can now gather and analyze data and conduct data diagnostics using a real-time data analyzer. This system not only helps us stabilize the state of the rice cakes used for the Yukimi Daifuku, but also promotes improvement activities within the plant.”

“Another benefit is the adjustment of the blending ratio of rice cake and ice cream,” Hiroshi Akimoto continued. “This was usually done by experienced operators, who monitored the state of the rice cakes as they come out of the wrapping machine by kneading them with their fingers. We thought it would be great if we could automate this process. By automating such processes, which were conventionally performed based on human senses, and by capturing signs of any poor quality of the wrapped rice cakes beforehand, we can eliminate problems. That was our ultimate goal.”



Rice cakes are made by steaming and kneading (left), then combined with cold ice cream (right). The rice cake temperature is key to Yukimi Daifuku's soft and supple texture, which is the key feature of this popular ice cream.

"As you know, ice cream is a cold material. This cold ice cream is combined with rice cake, which is warm when it is made," said Takayuki Manako, Executive Director & Plant Manager of Urawa Plant, LOTTE Co., Ltd. "This technical aspect of combining a cold item with a warm one in a good balance is what makes Yukimi Daifuku a complex product. But I think this challenge is something that inspires us to find new ways to overcome it. The temperature in the manufacturing room varies all year round. We strive to maintain consistent conditions, but at the same time, we try to reliably create even better conditions. We introduced the e-F@ctory manufacturing concept with the expectation of realizing this in the future."

"In the course of daily production, machines do not operate in the same condition every day. Previously experienced staff members checked and adjusted the settings of the machines," Takayuki Manako continued, "but with e-F@ctory we can visualize the condition of machines and the machines themselves can issue instructions to make adjustments. Another thing is that maintenance and failures are unavoidable with machines. We expect that these can also be better managed by using e-F@ctory's symptom management features."

"The use of IoT has only just been introduced to the production of Yukimi Daifuku, however, the Urawa Plant has many other lines making chocolates and ice creams, so Yukimi Daifuku is not our only challenge," Takayuki Manako added. "We aim to horizontally deploy this system and construct a smart plant in which 'symptom management' and 'operating rate improvement' are implemented on numerous lines. Stable plant operation and manpower savings will eventually make a major contribution in terms of costs and so on. If we consider LOTTE as a whole, our goal is to further evolve this technology and extend it to other plants." ■



Hiroshi Sugimoto, Manager of the Facilities Department, said, "The extendibility of the system, depending on what we want to do, was also appealing."



Hiroshi Akimoto, Section Manager of Facilities Department, said, "This system not only helps us stabilize the state of the rice cakes used for the Yukimi Daifuku, but also promotes improvement activities within the plant."

MELFA ASSISTA Collaborative Robots

Advances in safety technology enables humans to share a workspace with robots, without the need for specialized robotic knowledge and safety fences.



Safety features such as collision detection and strict compliance with robotic standards ISO 10218-1 and ISO/TS15066 enable ASSISTA to work collaboratively alongside humans.

On top of that, with an intuitive programming tool, RT-Visual-Box and new control panel design, no specialized knowledge or expertise is required for programming and control.

MELFA AssistA and RT-Visual-box provide more efficient production, reduce the total cost of ownership (TCO) of robotic manufacturing systems while meeting the needs of manufacturing in the new normal, and achieves adequate distancing of workers at shop floors without safety fences.

- **Easy Programming / Visual programming with a touch screen.**
The RT-Visual-Box enables intuitive creation of operating sequences, linking block diagrams in event chains and incorporating devices such as robot hands and cameras.
- **Easy Control / Move easily, setup speedy with a simple operation design.**
Robot movements can be taught and recorded quickly via a dedicated control panel on the robot arm. The control panel is simply designed with a minimum six buttons. And the bright LED on the arm displays the status of the robot. Even inexperienced workers can operate it.
- **Easy Connection / A wide variety of components is ready.**
Making set-up and configuration easy for customers application, MELFA robot partners offer variety of components – Grippers, Fingers, Vision and others.



Scan or click here to learn more.

EcoAdviser (AI-enabled Energy Software)

The new EcoAdviser data-analysis and diagnostic software (MES3-EAP1-AI) uses Mitsubishi Electric's Maisart®-branded artificial-intelligence technology for highly effective energy-saving functions such as identifying energy losses, diagnosing potential energy-loss factors and quantifying the expected effects of energy-saving measures. The new EcoAdviser provides essential information that go beyond simple visualization to help mitigate rising environmental and energy costs at manufacturing sector.

- **Automatically identifies energy loss at shopfloor with Maisart AI and 5-point methodology**

1. Equipment time-loss when starting up,
2. Equipment time-loss when shutting down,
3. Operational time-loss of utility equipment,
4. Non-operation rate of equipment, and
5. Specific energy consumption.

- **Visualization of improvements realized through energy-saving initiatives**

Users can confirm the scope of improvement through before-and after comparisons of results and continuous quantitative analysis of each initiative.

- **Customizable energy dashboard enables diverse analytics**

A customizable dashboard allows users to focus on priority issues and key performance indicators (KPIs). EcoAdviser offers diverse analytical graphics, including pie charts, rankings, time series, box plots, scatter diagrams, pareto charts and histograms.



Scan or click here to learn more.



AE V Series Air Circuit Breakers

Looks the same but totally different.
Reducing maintenance time and more.

Targeted at commercial facilities, factories and other buildings, Mitsubishi Electric's new air circuit breakers (ACBs) have a number of important benefits at each stage.

At installation the universal terminals make wiring easier and more flexible, which in turn reduces unnecessary time wastage and streamlines stock holding. The overall unit design consolidates many points within the main breaker frame, reducing the number of required external devices.

Maintenance processes can be reduced by 30% over existing models, helping to reduce both the maintenance time and time the breaker is offline. And as the C-class can be "charged" electronically via the solenoid, the charging power can be reduced by 88% when compared to spring-charge type ACBs. Charging noise can also be kept extremely low, again, providing increased benefit in maintenance.

Going forward, additional high-end models in the AE V series will be released in the future. These bring the promise of network connectivity, supporting users as they integrate power management into their Smart Factories and Digital Manufacturing processes. Furthermore, IoT functions and the possibility to consider new ways of access, including wireless monitoring by the users' smart devices such as tablets and smartphones are also being planned.



Scan or click here to learn more.



From buffalo mozzarella to green energy



Maximizing the use of agricultural by-products to reduce waste and improve sustainability has several positives; including reducing a business' environmental impact and maximizing an important profit opportunity. This is why Italian farm Roana has invested in a biomass plant that utilizes livestock manure and other organic waste to generate energy.



Roana Zootechnical Farm,
Latina, Italy

To optimize its automation infrastructure, the farm required an advanced control network to monitor the anaerobic digestion process and maximize productivity. CCLink IE Field provided the right solution, connecting a series of Mitsubishi Electric factory automation components with a flexible open industrial Ethernet solution delivering Gigabit bandwidth.

Roana Zootechnical farm is in the countryside of Latina, Italy, and is home to approximately 1100 water buffaloes. Every day, these animals provide over 3 tonnes of milk, which is used to produce a celebrated buffalo mozzarella cheese. Along with product, the herd produces approximately 60 m³ per day of usable livestock manure. Before this becomes fertilizer for Roana's agricultural fields, however, it can be used to produce bio-energy. The farm was interested in maximizing the use of this byproduct to have a positive impact on the environment whilst generating increased revenue for the business. Local renewable energy specialist ProgestAmbiente was chosen to build the green power plant.

Carmen Iemma, Co-owner of Roana, explains: "Roana has been interested in implementing a biomass plant for years. The project suggested by ProgestAmbiente was particularly appealing, as the company was able to tailor a solution that would address our commercial requirements and still fit with our existing operations and infrastructure."

The anatomy of Roana's biomass power plant

The plant consists of scrapers and pipelines, collecting all the manure from the stables into a pretreatment tank, which homogenizes and equalizes the material. This tank is connected to an anaerobic digester system equipped with submersible mixers. At this stage, different bacterial strains digest biomass in an oxygen-free environment at temperatures similar to those in a buffalo's stomach. As a result of this biochemical process, bacteria break down complex organic substances, generating a methanogenic biogas.

The gas produced in the digester moves upwards, towards the dome, and is then directed to a gas treatment unit, where a thermal process helps to purify the gas, increasing the concentration of methane. The end product is sent to a gas-powered generator, which produces enough electricity to push power back to the grid.

case study



John Browett, General Manager at CLPA Europe, "open networks like CC-Link IE are essential for building strong systems."



Roana Zootechnical farm is in the countryside of Latina, Italy, and is home to approximately 1100 water buffalos. www.youtube.com/watch?v=PS7lWVpIEIY

The control of critical process parameters, such as temperature, gas pressure, in-feed rates and mixing within the digester, plays a crucial role in maximizing both the volume of methane produced and its purity. The sensitivity of the system and its coordination can make the difference between it being profitable or not, so responsive automation and network communications are vital to the commercial success of the project.

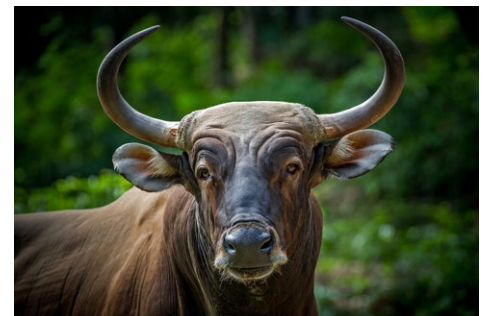
Relying on high-quality automation solutions

Michele Di Stefano, Project Manager at ProgestAmbiente, adds: "One of the most important aspects for ProgestAmbiente is offering the best functional process equipment and operator tools, featuring state-of-the-art technologies and high reliability. In this case, we chose a combination of Mitsubishi Electric and CC-Link IE.

"We rely on Mitsubishi Electric's automation products and the CC-Link IE family of open industrial Ethernet technologies for our bio-gas production and water treatment projects. In fact, we believe that the performance offered by these solutions is currently unmatched on the market."

To support Roana's bio-gas operations, CC-Link IE Field gigabit Ethernet connects a number of automation devices from Mitsubishi Electric to ensure high-performance communications. More precisely, MAPS SCADA system is linked to a MELSEC Q series PLC. This is then connected to five inverters, from Mitsubishi Electric's energy-saving FR-F800 series, that regulate the functioning of all the electro-mechanical devices and components used in the process. As a result, operators have a comprehensive view of the entire plant and its processes in real-time, adjusting critical process parameters as well as conducting predictive maintenance strategies.

Alberto Griffini, Product Manager at Mitsubishi Electric, comments: "Our main goal was delivering a system that is highly functional but also easy to use, maintain and expand. For example, as the plant develops and increases its volume of processed livestock manure, Roana could easily upgrade its system by installing a newer MELSEC iQ-R controller, which provides more advanced onboard features and supports a broader range of I/O modules. The networking solution is already very flexible and advanced so effectively futureproofs the installation."



Network speed and openness as gateway to future-proof operations

Key elements of CC-Link IE Field that helped implement the vision described by Alberto Griffini are the network technology's gigabit bandwidth and its openness. Michele Di Stefano explains: "Thanks to CC-Link IE Field, Roana could leverage a high-speed system that benefited from a fast response time as well as an infrastructure that can be easily modified and upgraded to address future needs."

John Browett, General Manager at CLPA, adds: "By offering gigabit bandwidth, we can help processing plants, such as Roana, to make sure time-critical data is shared in a highly deterministic manner. CC-Link IE Field supports interconnectivity between 1Gbit devices from multiple vendors so it allows the integrator to choose from more options."

Carmen lemma adds: "Using a reliable and responsive monitoring system and high performance communications is particularly important for Roana, as it allows us to promptly intervene if anomalies are detected, reducing downtime."

The benefits of a well designed and implemented by-product synergy strategy

Now that the biomass power plant and its network infrastructure are operational, Roana can produce 2,400 kWh of electric energy every day. This is supplied to the national electrical grid, generating an extra revenue of EUR 15,000 per month for Roana.

Carmen lemma comments: "We are very happy with the solution provided, as it clearly shows the benefits of shifting towards renewable energy and maximizing by-product synergies. In particular, we appreciate the fact that the plant can manage itself autonomously, without requiring our staff to acquire new technical skills in order to control the plant. The system is intuitive and easy to use, helping all of our operators to effectively use the system."

John Browett concludes: "Reducing the environmental impact of manufacturing and processing activities is a global priority and we are happy to play a key role, helping businesses adopt more sustainable practices. In addition, by supporting Roana, we can show how our open network technologies can address the needs of a wide variety of industrial sectors." ■

“Using a reliable and responsive monitoring system and high performance communications is particularly important for Roana, as it allows us to promptly intervene if anomalies are detected, reducing downtime.”

Carmen lemma, co-owner Roana Zootechnical farm



A New Dawn: How Developing Face Shields Galvanized Mitsubishi Electric

In response to the COVID-19 pandemic, manufacturers around the world have stepped up to the plate to mass-produce products that can help mitigate the spread of the virus. Among them is Mitsubishi Electric, whose design and production of face shields – expedited by some of the company's top engineers – represent the company's commitment to both its social responsibility and its product development philosophy.



Providing PPE to Those in Need

The scale of the COVID-19 pandemic is unprecedented in modern history, testing the resolve of companies around the world to meet their social responsibilities. Mitsubishi Electric has not only stood firm in its commitment to society, but has also deployed its top engineers to develop an important tool for preventing the spread of COVID-19: face shields.

Work began in April 2020, at a time when leaders around the world were taking the drastic step of putting their biggest cities into lockdown to quell the raging spread of COVID-19. Even Japan, which initially seemed to have escaped the worst of the pandemic, began to see a rise in infections, forcing the government to declare a state of emergency.

As the pandemic continued, public attention began to focus on our essential workers: the people standing at the front lines of our society, even at risk of infection, to ensure that our lives continue to function at a basic level. These workers include, of course, the medical professionals tasked with treating infected patients – but other essential workers such as people in distribution, retail, and manufacturing, as well as civil servants.

To ensure their safety, essential workers need to be provided with personal protective equipment (PPE) such as protective clothing and masks. In Japan, however, supply constantly failed to meet demand, putting these pillars of society at risk. The crisis required an urgent solution, and Mitsubishi Electric took action by developing face shields that would protect these workers from aerosol particles spread by people infected by the coronavirus.



A Race Against Time

Mitsubishi Electric has developed two types of face shields: one that can be attached to a cap, and one that can be worn around the head. The former was developed for workers at Mitsubishi Electric Group factories and other locations who are required to wear specified headwear at all times; Mitsubishi Electric prioritized work on this face shield to ensure the group could safely maintain their manufacturing operations without draining public stocks of PPE.

“It helped that every engineer working on the project, from the modelers who converted the hand-drawn sketches to CAD to the engineers who created the test models using 3D printers, was eager to produce something fast.”

The latter can be worn by a wide range of essential workers, from civil servants to social welfare workers. While the attachable face shield was developed at the company’s Manufacturing Engineering Center, the head-worn face shield was developed at their Nagoya Works.

“It took us just seven days to draft up a blueprint and create the first test model using a 3D printer,” says Noriyoshi Hara, an engineer in the Manufacturing Engineering Center who created the basic design of the head-worn face shield. “It helped that every engineer working on the project, from the modelers who converted the hand-drawn sketches to CAD to the engineers who created the test models using 3D printers, was eager to produce something fast.”

case study



The attachable face shield had a similarly tight schedule, but the development team, composed of some of the company's top engineers, managed to complete the product without a hitch. "If you're given a deadline," says Nao Shimosada, also in the Manufacturing Engineering Center, "then you have to meet it." He explains that one of the motivating factors was their collective sense of duty – that as one of the leading companies in Japan, they needed to give back to society. Another factor was the seriousness with which they approach product development.

Mitsubishi Electric's strength has always come from their engineers' belief in the creative process. They have no reluctance about trading ideas with each other instead of keeping them to themselves and are more than happy to collaborate with others if it means accomplishing a goal. Perhaps no project has embodied this concept more than the face shields: halfway through the project, the Manufacturing Engineering Center and Nagoya Works began working more closely, resulting in a speedier, more efficient development process. When Mitsubishi Electric says that they are serious about product development, this is what they mean.

A New Age of Product Development

In July 2020, Mitsubishi Electric began delivering head-worn face shields for free to a wide range of industries, having already provided attachable face shields (which were developed first) to select businesses. Both represent the culmination of an unprecedented project that involved engineers in multiple divisions and departments, who all came together to achieve one of Mitsubishi Electric's four principles of product quality: "The product must be both safe and useful."

"Face shields are the latest addition to the many pieces of equipment that factory workers must wear at all times for their own safety," says Shimosada. "To make it easier for these workers, such equipment should be designed to be as easy to use and non-cumbersome as possible. This was our approach with the face shields."

"The shields don't fog up easily," says Osamu Higashioka, a Nagoya Works engineer. "When you shake your head, the shield doesn't bump into your shoulders. And it can be used for long periods of time without a drop in quality. Its design is simple, and it's easy to use – the very essence of a Mitsubishi Electric product."

Because Mitsubishi Electric was responding to events as they unfolded, they inevitably had to give the project a much shorter timeline than what they might normally allow. However, the project freed engineers in many different departments to apply their combined knowledge towards developing a pair of face shields that were more reliable and higher in quality than anything else on the market.

The experience garnered from this project may lead to a new age of product development at the company, suggests Yasunori Matsumoto, General Manager of the Manufacturing Engineering Center.

"Engineers from many different departments came together for this project," he says. "This interdepartmental activity gave our engineers a chance to work closely – or even as a team – with counterparts in other departments. I think this valuable experience will have an immense impact on future projects." ■

We needed intelligent manufacturing.

“ Producing 8,000 varieties of sensor we needed lean and flexible production, so we chose the e-F@ctory production model. ”

Xie Yong, Deputy General Manager of Shanghai Lanbao Sensing Technology Co., Ltd.

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Let me tell you my story: Shanghai Lanbao Sensing Technology is a typical manufacturer of discrete sensors with multiple varieties and small batches, so we have to constantly change production set-up, which is a painful time.

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Delicious Automation:

How machines produce our culinary joy

Robots may seem to have nothing in common with our food, but they are playing an increasingly major role in producing some of our favorite indulgences — ice cream, cheese, chocolate, and beer — and in serving us at locations such as conveyor belt sushi restaurants and cafes. Not only is automation helping us get the food we want more quickly — it's also ensuring we get to enjoy flavors that will knock us off our feet!

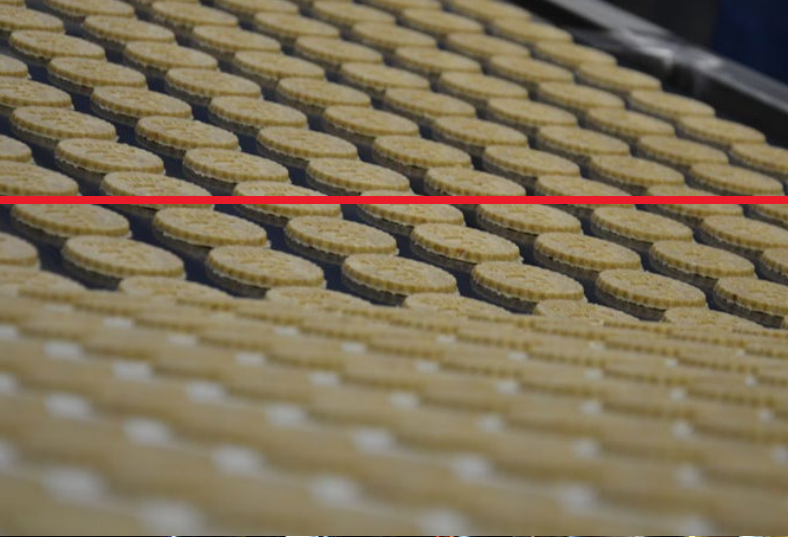


Factory Automation — The New Flavor

What springs to mind when you hear the term, "factory automation"? The sound of metal clanking as robots assemble machines in a dreary industrial plant? If so, you may be surprised to learn that factory automation is playing an increasingly crucial role in a more cheerful domain: our food.

For example, FA is already being used to monitor the temperature and humidity levels for growing strawberries and other delicate fruit to improve their flavor. The possibilities of FA in food production are as limitless as our food itself — it could be used in the production of desserts such as soft serves and cakes, or fermented products such as craft cheeses and beers. FA could also play a role in adding pizzazz to our food scenes — remove a robot arm from a factory and put it behind the counter of a coffee shop, and it could serve as an entertaining new twist on the barista.

Technological advances have improved FA to a point where robots can apply artisanal knowledge and experience to food production more consistently than a human, allowing food industry professionals to focus on more creative aspects of food production. Let's take a look at a few examples from around the world.



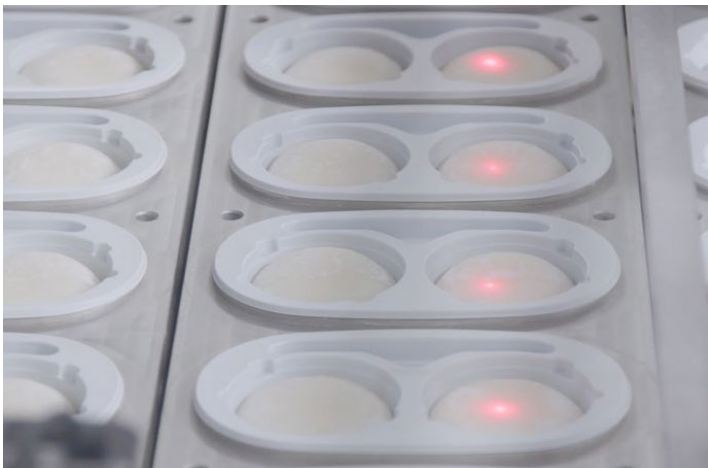
industry focus



Prizewinning Cheeses

Of the many cheese makers located in the pasture lands of Lancashire, England, perhaps none are more famous than Dewlay. Established in 1957, the cheese maker prides itself on having the best Lancashire cheeses – underpinned by its numerous international awards. Inside Dewlay's factory, Mitsubishi Electric's FA technologies constantly monitor the fermentation process to ensure the company can produce cheese throughout the year at a consistently high level. This is necessary, as anything from the weather to the genetic and biological traits of the milk can affect the quality of the cheese.

"Ours is a fast-paced production environment simply because we have so many cheese vats at different stages of the production cycle, each following individual recipes," explains production supervisor Richard Jones. He adds that by automating the process without sacrificing the cheese making knowledge and experience that has gone into it over the years, Dewlay has managed to both boost production and satisfy their customers."



When Mochi Meets Ice Cream

One long-running ice cream hit in Japan is Lotte's Yukimi Daifuku – vanilla ice cream balls wrapped in soft, chewy mochi rice dough. The unlikely pairing proved a hit when the product was first launched in 1981, and it remains popular forty years later.

At Lotte's Yukimi Daifuku factory, Mitsubishi Electric FA technologies have been incorporated to meet various goals – for example, consistency in quality and increased operability. Factors that were once at the mercy of the supervising employee's intuition and instincts – such as the ratio of the ingredients mixed to produce the vanilla balls and the temperature needed to imbue the mochi with an ideal chewiness – have now been streamlined through FA. The result is consistent quality achieved across high production volumes, allowing more consumers than ever to enjoy the chilled, chewy deliciousness of Yukimi Daifuku.



An Extensive Health Food Lineup

Sante – derived from *santé*, which is French for "health" – is a Polish health food maker established in 1992. Its lineup of over 150 products includes cereals, energy bars, soy pâté, and other products designed with the consumer's health in mind. All products are manufactured at a south Warsaw factory working at full capacity.

For a company like Sante to survive, it needs to be able to meet the growing demands for healthier foods and greater quality brought about by increasingly food-conscious consumers. This is why Sante became an early adopter of FA. The decision has reaped numerous benefits for the company, which has been able to optimize its production efficiency and develop a much clearer interface for operating the factory machinery. Most importantly, FA has allowed the company to create a comprehensive monitoring system that collects important data from all factory equipment and presents it in a way that is intuitive and easy to understand.



A Century-Old Craft Beer Brand

Craft beer is conquering the world – and FA is playing a role in this field, too. Take Sadler's Ales, a British brand that dates all the way back to 1900. To accommodate the growing craft beer market, the company decided to automate its factory processes; at the end of the day, beer making is a scientific process that requires every step, from boiling the malts to producing the wort, to be closely monitored.

"I have been brewing without the support of an automated process control system for many years, so initially I was a little apprehensive," says production manager Sam Pegg. However, just one month after automating their factory, Sadler's Ales enjoyed a threefold increase in productivity. "I was pleasantly surprised," says Pegg. "The new solution is straightforward and easy to use, which means I can now focus on more interesting aspects of brewing, such as developing new beers and recipes."

A World of Culinary Delights

Today, we have access to a greater variety of foods than ever. As a result, our palates have become more sophisticated and demanding – the moment we taste something incredible, we want more of it or something even better. FA not only allows food manufacturers to ensure that we get to enjoy the same great flavor every time, it also frees up staff from the painstaking production process so they can focus on improving recipes or crafting new products. As a result, our food choices are about to become a lot richer and more exciting – welcome news for food lovers around the world! ■

Taste_{of} Japan

The all-encompassing Mitsubishi Electric family includes those who know quite a bit about Japan, and those whose knowledge is possibly limited to geisha, samurai and Mt Fuji. So here, for the education and enjoyment of all, are some examples of the culture and art of Japan.



Mochi 餅

The Mochi is a rice cake made of mochigome – a short-grain japonica glutinous rice. It is sometimes made with additional ingredients including water, sugar and cornstarch.

Traditionally made in a ceremony called mochitsuki, the polished, glutinous rice is soaked overnight then steamed. The steamed rice is then mashed and pounded into a paste with wooden mallets and the sticky mass is cut or moulded into a variety of shapes. Seasonal specialties of mochi include New Year, Spring Time, Girls' Day and Children's Day.



Onigiri Rice Ball おにぎり

These balls of plain, steamed rice, stuffed with a variety of meat or vegetable fillings and then wrapped with nori seaweed, are as common in Japan as sandwiches are in the West. Highly popular on-the-go quick and easy snacks, they were developed centuries ago as a way to keep rice fresh by filling it with salty or sour ingredients as natural preservers. The most common fillings for onigiri rice balls are salted salmon, pickled plum, bonito flakes, canned tuna and salted cod roe.



Bento 弁当

The word 'Bento' refers to a kind of lunchbox which contains carefully prepared single portions to constitute a home packed meal. In Japan, the word 'bento' is written as 弁当. This word originates from the Southern Song term 便當 ('biàndāng') which means 'convenience' and it has been around since at least the 13th century.

A bento box may contain rice or noodles with fish or meat along with pickled and cooked vegetables. When Japanese people prepare bento boxes for their family members, they take care to include a variety of tastes.

Preparing a bento box in this way is associated with love, as people tailor the ingredients to suit the preferences of the one for whom you are preparing the bento. Thus, the bento box typically contains multiple compartments for different portions and a variety of textures, flavors and food groups all in the one box. In Japan, the bento is also readily available as a form of street food.

Did you know?



Mitsubishi Electric celebrated its 100 year anniversary in February 2021. The Factory Automation business has been a substantial part of that success story for almost as long. Here are just a few factory automation highlights from over the past years:

1924 97 years young! Starting in 1924 with the foundation of Nagoya Works the factory automation business has been contributing to Mitsubishi Electric's success.

1929



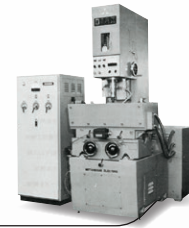
Industry first! Working with Westinghouse Electric of the USA since 1929, Mitsubishi Electric further developed LV technology including launching Japan's first fuseless 15-35A circuit breaker in 1933.

1973



MELSEC A Series – the successor of the MELSEC 310

Company first! The company's first programmable logic controller (PLC), the MELSEC-310, was completed. By utilizing semiconductors with integrated circuits and digital technologies developed to support the rise in electronic computers.



1964

Technology leader! Utilized thyristor semiconductors for the power supply of electronic discharge machines to solve one of the industry's biggest challenges; excessive electrode wear

1991

Industry first! Development of the FREQROL-Z024 series. The industry's first pocket book (A6) sized ultra-compact inverter



e-Factory

2003 Proposing Digital Manufacturing before it became fashionable.

1999

Performance leader! In 1999, Mitsubishi Electric released the AC servo MELSERVO-J2-Super series to address higher productivity demands in semiconductor manufacturing equipment and machine tools.



2018

Industry Pioneer! Release of AI enabled IQ Edgecross Real Time Data Analyser software

EDGE CROSS

Maisart

For full details visit www.mitsubishielectric.com

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Simple motion control for elegant solutions

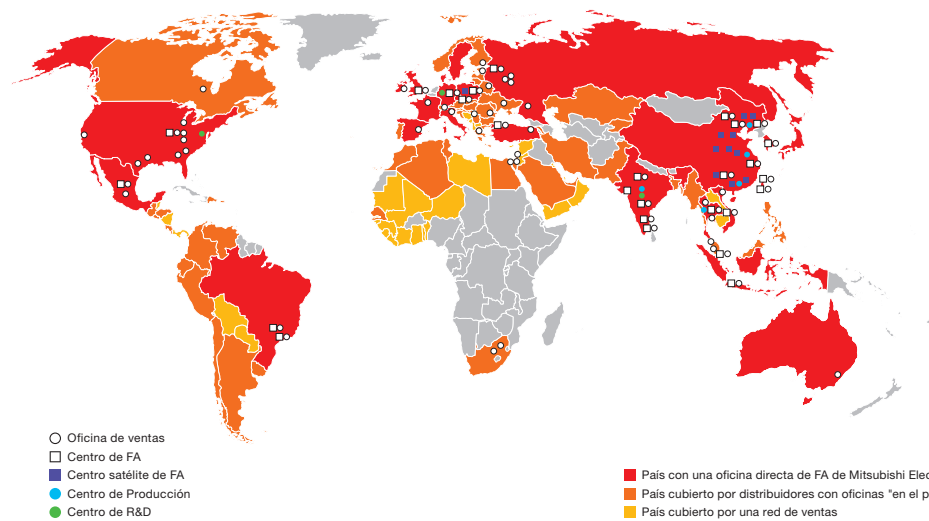
By combining iQ-F controllers, MR-JE servo systems and GS display technology users can experience superior cost-performance benefits without the stress of hours of set-up and trial and error. Easy configurations, simple motion programming, automatic optimization, vibration suppression and system tuning are complemented by elegant graphics.

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