MSYSTEM continues to make same product available

2019

We do not easily stop manufacturing products once released in the market

Introduction
- One-Piece-At-a-Time production system - I (production process)
- One-Piece-At-a-Time production system - II (introduction of production plan and production line)
- Product development system
- Customer Center
- Our production system which continues to make same product available
- Special specifications without additional charge
- Strong emphasis on quality assurance system
- Introduction of Kyoto Research Center & Factory
- PID Pilot Plant
- Product line-up

37 Years Ago
- Plug-in Socket Mounted Signal Conditioner

Recent

M-SYSTEM CO., LTD.
www.m-system.com
Visit M-System website!
High-mix, Low-volume, Short lead time

Make-to-order system to manufacture products one by one

All sales are through our authorized distributors.

Strong emphasis on quality assurance system

We try to conform our products to international standards.

M-System is a comprehensive manufacturer. We strive to do everything we can.
of the instrumentation components.
to solve our customers' problems.

Quick Service Center expedites orders on the same day or next day after ordered for our customers' urgent needs.

Five policies of M-System

1. Continued Products Availability
   Details: The production system which we don't easily discontinue the production of product  
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2. Fast and Precise Delivery
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3. Special Specifications Service
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4. Special Repair Service
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5. Factory Setting Service with No Extra Charge
   Details: Introducing the high-mix, low-volume production line (calibration/inspection/configuration)  
   Page 7
We do not easily stop manufacturing products once released in the market.

From receiving an order to delivery

High-mix, low-volume production system

One-Piece-At-a-Time Production System

(Production process)

M-System uses the production master server to manage necessary information for the make-to-order system and manufactures the products one by one in order to realize the high-mix, low-volume production in short lead times. Here we introduce M-System’s own production process where we manufacture products with different specifications one by one while using chip mounters usually suitable for mass production.
We do not easily stop manufacturing products once released in the market.

From receiving an order to delivery, M-System uses the production master server to manage necessary information for the make-to-order system and manufactures the products one by one in order to realize high-mix, low-volume production in short lead times.

Here we introduce M-System’s own production process where we manufacture products with different specifications one by one while using chip mounters usually suitable for mass production.

The production master server, which contains all the data of 3,841 standardized models, controls the necessary information for production at all times. This production master server is systematically functioning in the production line of M-System.

M-System’s products
3,841 models

December 2018

M-System uses the production master server to control the entire process from receiving an order to shipping a product. In our production line, first we engrave 2D bar code on a printed circuit board, then we download data from the production master server based on the bar code in each stage of parts assembly, inspection, and calibration.
Statistics on our storage for parts

The number of parts models in stock
15,168 models

The number of parts used per month
Approx. 11,089,000 pieces

Total number of parts in stock
Approx. 35,134,000 pieces

If the parts supply stops under an emergency situation, the production can continue for
3 to 4 months

Orders and production plan processed in real-time

How the production plan is being filled

The current order status and how they are reflected to the production line are always on the monitor so that the Production Control Dept. can see the latest status at a glance. The bar graphs below show the changes of the daily order status and their reflection to the production line of signal conditioners by sampling data in the morning, afternoon, and evening respectively. You can see how fast we process the orders received and complete the production while leaving enough room for 2 days later and thereafter.

Starting the production on the next day or later is less common compared to the same day.

Some are already on the production in the morning of the same day. More products completed the production and ready for shipping on the same day.

The production order for the next day is issued the most during this time frame. We often move up the calibration schedule one day for some products.
Introducing our high-mix, low-volume production line

In the beginning of the production process, we engrave 2D bar code containing the information including product model, serial number (SER NO.) and the combination information onto each PCB. These 2D bar codes will be scanned in each process of the production process to download necessary information from the production master server.

We utilize the multiple in-line chip mounters compatible with the high-mix, low-volume production, which allows for automated implementation of products with different input, output, and power specifications. In this process, the production master server instantly selects the implementation program based on the 2D bar code data scanned.

Set approximately 350 types of parts in a wagon at the same time and produce different products without changing the setup.

Download the standard images of the printed circuit board from the production master server based on the 2D bar code data scanned. Check them against the inspection images to make a pass/fail decision.

We begin the process of manual cell assembly, calibration, and inspection by downloading manuals from the production master server based on the 2D bar codes scanned. M-System provides free configuration services for the necessary products prior to shipping if requested from the customer on the order.
M-System has been engaged in the development of products featuring the analog circuit technology accumulated over 40 years. Combining our own kind of analog technology and the latest digital circuit technology, we continue to supply new products at reasonable price, which are convenient to use and meet market demand.

System to create new products as quickly as possible

- **Development period** = About 6 months.
- **Product competitiveness** = We organize a salon-style session to discuss the plan thoroughly every week.
- **Product appeal** = We have a product appeal brought by the synergy effect of combining analog circuit technology, digital circuit technology, and application technology.
- **Well-established environment** = We are capable of performing a timely type test at our test site certified and registered by the official body. We have achieved short-term prototype manufacturing using our dedicated prototype production line.

Let M-System handle your open network needs for controllers.

Open concept of the communication technologies for FA control, PA control, and BA control is a trend quickly spreading in the industry. M-System has been developing products using various open control network to meet our customers’ needs by streamlining the production system, improving the device functionalities, and reducing the wiring between the devices.
Turning an idea into a product

M-System has a dedicated marketing department to catch up with the fast-changing market. We have emphasis on the R&D (Research and Development) activities such as reflecting new information on our new products at the weekly marketing salon. In our development process, we quickly create a prototype in the dedicated prototype production line. The test site certified and registered by the official body also allows us to develop new products on a timely basis.
Contact our Customer Center for any question

- We take your call immediately.
- Your call will be attended quickly.
- Our Customer Center receives about 500 phone calls a day.

Our Customer Center receives about 500 phone calls daily. We receive various inquiries by phone, such as questions about delivery date and pricing, expediting the delivery, technical questions about the product, troubleshooting, request for a meeting on the specifications, and product support request, etc. If we need to make adjustments with the related department internally regarding the question or inquiry, we will make sure to have the person who received your inquiry get back to you as soon as possible.

Even if it seems a difficult problem, just call our hotline.

Even if it seems a difficult problem, just call our hotline.

There may be a possibility we may not be able to meet the product request. For such inquiries we were unable to meet, we will accept them as customers' request and save them in the database to determine if we need to improve our products further or to develop new products in our daily operation. We may develop a new product from such request. Even if it seems like an unreasonable request, just call our hotline.

[Examples of products we developed from customers' requests]

- Absolute Value Output Transmitter (model: W2VABS)
- Digital Panel Meter (totalized pulse input) (model: 47LPQ)
- Encoder Signal Distributor (model: WRPP)
We supply our products in fast and precise delivery time.

The standard manufacturing lead time for most M-System products with customer’s specified range is 5 days. But more than quarter of the total shipments are delivered in shorter lead time, and Quick Service Center (QSC) expedites more than 600 orders every month on the same day or the next day after ordered. So do not worry too much about the standard delivery. Just let us know ‘When’ you need one of our products. Once a delivery time is promised, you can of course count on us to deliver them precisely on time.

About M-System’s quick delivery

Contact M-System if you have troubles with delivery time. We will check the specifications you request and propose a model that we can provide you in the shortest delivery time. For an emergency, we might use the "Same day or next day production" even for the models not supported by the Quick Service Center.
Once released in the market

Production system which we do not easily stop manufacturing products without compatible replacements

The greatest difficulty to keep production of the electronic devices is either by due to the interruption of electronic parts supply caused by accident or disaster, change in regulation or parts discontinued. We do not easily stop manufacturing products once released in the market, without trying to supply compatible products of equal or better performance to replace with, because we believe it is an important responsibility as the world’s leading manufacturer to continue serving people who maintain the performance of process control systems.

Statistics on the parts outage

247 cases (2018)

Number of electrical parts outage

16,734 times (2018)

Number of times of designing changes by parts outage

When obtaining the electrical parts becomes difficult, we tend to think that it is due to the one-sided situation of the parts manufacturers, but it is not always the case. The designing change was necessary in some cases to comply with the RoHS directive, a part of the global environment activities. Also, there were cases where obtaining the parts was difficult when the parts factory was damaged by the Great East Japan Earthquake or when the factory in Thailand was flooded.

Electrical parts outage and historical background

The greatest difficulty to keep production of the electronic devices is either by due to the interruption of electronic parts supply caused by accident or disaster, change in regulation or parts discontinued. We do not easily stop manufacturing products once released in the market, without trying to supply compatible products of equal or better performance to replace with, because we believe it is an important responsibility as the world’s leading manufacturer to continue serving people who maintain the performance of process control systems.

Number of electrical parts outage

Number of times of designing changes by parts outage

Obtaining the capacitor parts became difficult due to the effects of the Great East Japan Earthquake, and we changed the manufacturer.
Designing changes: 259 times

Obtaining the capacitor parts became difficult due to the effects of the Great East Japan Earthquake, and we changed the manufacturer.
Designing changes: 6,214 times

The transistor parts were discontinued by the flooding in Thailand, and we changed the manufacturer.
Designing changes: 281 times

We started using a new transformer component manufacturer due to the previous manufacturer’s abolition of transformer component business.
Designing changes: 5,588 times

We started using a new semiconductor manufacturer due to the previous manufacturer’s abolition of semiconductor components as a result of its business office integration.
Designing changes: 4,707 times
Electrical parts outage and design changes

If we cannot avoid supply outage of electronic parts, we will cover it by the designing speed.

If the electronic parts will be discontinued, we will receive an advance notice from the parts manufacturer. As soon as the notice is received, the Design Dept. will calculate the time required for designing change. The Production Control Dept. will calculate the volume of shipping within the designing period and order the necessary quantity to the parts manufacturer.

If it involves circuit changes, we will need to redo many processes including evaluation test. However, M-System has its own test facilities such as the anechoic chamber and the shielded room certified and registered by the official body to perform the change tasks efficiently at any time.

<table>
<thead>
<tr>
<th>Production Control Dept.</th>
<th>Design Dept.</th>
<th>Quality Assurance Dept.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notice of product discontinuation from the parts manufacturers</td>
<td>Technology review</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Review the technology review result</td>
<td>Evaluation test</td>
</tr>
<tr>
<td></td>
<td>Change design drawings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Review by the design review meeting</td>
<td></td>
</tr>
<tr>
<td>Register to the production master server</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Please allow us further two months to modify the entire printed board.

2009 10 11 12 13 14 17 18 20,000 24,000 16,000 12,000 8,000 4,000 0 50 100 250 300 150 200 Y ear

276 276 276 276 276 276 276 58 80 109 113 113 102 130 127 247 7,158 15,866 14,948 16,734 7,468 4,476 6,177 6,408 1,303 23,131 160 160 12 13
Statistics on special specification items

Number of reviewing annual average special specification

941 cases

The trend for the number of reviewing special specification

Flow from inquiring special specification items to the shipping

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1,010</td>
</tr>
<tr>
<td>2010</td>
<td>1,237</td>
</tr>
<tr>
<td>2011</td>
<td>1,240</td>
</tr>
<tr>
<td>2012</td>
<td>1,142</td>
</tr>
<tr>
<td>2013</td>
<td>952</td>
</tr>
<tr>
<td>2014</td>
<td>799</td>
</tr>
<tr>
<td>2015</td>
<td>775</td>
</tr>
<tr>
<td>2016</td>
<td>732</td>
</tr>
<tr>
<td>2017</td>
<td>614</td>
</tr>
</tbody>
</table>


- Inquiry from customers
- Technology review
- Register a review result in the database
- Create a delivery specification
- Respond to customers
- Create production drawings
- Review production drawings
- Evaluation test
- Production
- Shipping

Same day technology review (If we receive an inquiry by 15:00*)

*Japan Standard Time

We strive toward complete offerings with special specification products.

We offer an enormous selection of signal conditioners and remote I/Os, power monitors, paperless recorders, panel meters, surge suppressors and valve actuators, and even that may not be enough for your particular needs. But do not give up easily. Just ask us. We continue to work toward full product offerings with special specifications without additional charge, starting with major product series. In addition, we put our effort to make them into standard selections so that they are more easily accessible to you and everyone else in the future.

Contact M-System if you have any troubles

Special specifications without additional charge

“Oh No! We need to convert a sensor signal that is not found in the standard.” Have you encountered a situation like this? It takes some efforts to look for products called special specification items. In the case like this, just contact M-System. We will do anything we can even for special specifications by utilizing our long-year experiences and analog technology accumulated.
We will standardize the special specification items, beginning with the ones most requested. Once they are standardized, you will no longer need troublesome meetings or specification check when you place an order.

### Flow of transforming a special specification item into a standardized item

1. **Marketing Dept.** Decide standardization (design review meeting)
2. **Design Dept.** Technology review
3. **Quality Assurance Dept.** Evaluation test
4. **Production Control Dept.** Change design drawings
   - Review by the design review meeting

#### Number of standardizing special specifications

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>113</td>
<td>320</td>
<td>882</td>
<td>1,164</td>
<td>1,624</td>
<td>2,235</td>
<td>2,618</td>
<td>2,790</td>
<td>3,103</td>
</tr>
</tbody>
</table>

#### Various special specifications
- **The range does not match with that of the standard specification**
  We want to set the ranges of input signal and output signal to the ones not included in the existing code.
- **We want to combine with the special sensor**
  We want to combine with special sensor or thermistor not included in the standard.
- **Different power supply voltage**
  We want to use the power supply compatible with the special CVCF (constant voltage and constant frequency unit).
  We want to match a marine power supply.
- **We want to have our desired response speed**
  Excessively fast response speed picks up the noise, so we want the optimal value.
- **We want an external volume**
  We want to attach the volume to adjust the bias of the ratio conditioner onto the control panel surface.
Evaluation test

Our Quality Assurance Dept. conducts a prototype evaluation before releasing a new product. We validate the products based on the various regulations / standards and the company standards mainly classified into four categories. In addition, we conduct an EMC\(^1\) test as a part of the evaluation test. Our anechoic chamber used for the EMC test is certified and registered by the official body (VCCI\(^2\)), and we conduct an official test instead of a simplified test.

The EMC test required for M-System to acquire the CE marking has the following test items and all of them are conducted by our own facility at Kyoto Techno Center (Kizu-City, Kyoto).

### EMG test required by the EMC directive

<table>
<thead>
<tr>
<th>Reference standards</th>
<th>Base standards</th>
<th>Name</th>
<th>Test locations in M-System</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN61000-6-2</td>
<td>IEC61000-4-2</td>
<td>Electrostatic discharge immunity test</td>
<td>Shielded room</td>
</tr>
<tr>
<td></td>
<td>IEC61000-4-3</td>
<td>Radiated, radio-frequency, electromagnetic field immunity test</td>
<td>Anechoic chamber</td>
</tr>
<tr>
<td></td>
<td>IEC61000-4-4</td>
<td>Electrical fast transient/burst immunity test</td>
<td>Shielded room</td>
</tr>
<tr>
<td></td>
<td>IEC61000-4-5</td>
<td>Surge immunity test</td>
<td>Shielded room</td>
</tr>
<tr>
<td></td>
<td>IEC61000-4-6</td>
<td>Immunity against conducted emission induced by radio-frequency fields</td>
<td>Shielded room</td>
</tr>
<tr>
<td></td>
<td>IEC61000-4-8</td>
<td>Power frequency magnetic field immunity test</td>
<td>Shielded room</td>
</tr>
<tr>
<td></td>
<td>IEC61000-4-11</td>
<td>Voltage dips, short interruptions and voltage variations immunity tests</td>
<td>Shielded room</td>
</tr>
<tr>
<td>EN61000-6-4</td>
<td>CISPR16-2-3</td>
<td>Enclosure ports - Release area testing locations and hemi-anechoic method</td>
<td>Anechoic chamber</td>
</tr>
<tr>
<td></td>
<td>CISPR16-2-1</td>
<td>Low-voltage AC power supply port</td>
<td>Shielded room</td>
</tr>
<tr>
<td></td>
<td>CISPR16-1-2</td>
<td></td>
<td>Shielded room</td>
</tr>
<tr>
<td></td>
<td>CISPR22</td>
<td>Electrical communications/circuit network port</td>
<td>Shielded room</td>
</tr>
</tbody>
</table>

\(^1\) EMC (Electro Magnetic Compatibility): Tests to check the effect by applying an electromagnetic noise to a device and to measure the electromagnetic wave and conductive common mode noise emitted from the device.

\(^2\) VCCI (Voluntary Control Council for Interference by Information Technology Equipment): Formerly known as Voluntary Control Council for Information Technology Equipment. An industry organization in Japan that discusses the regulations on the radio waves emitted from the information technology equipment.

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**Strong emphasis on quality assurance system**

Kyoto Techno Center has the Reliability Testing Section of the Quality Assurance Dept. to conduct a type test of all products released from M-System. We conduct a type test to verify the quality on not only new products but also products of which we changed the design.
Vibration test system combined with temperature and humidity

M-System completed the vibration testing facility at Kyoto Techno Center in June 2014. It is combined with the environmental test chamber by which the vibration test can be conducted both vertically and horizontally under the harsh environments to cover the temperature -40°C to +140°C and the humidity 20% to 90% RH.

Improvements in environmental durability

The reliability and durability of electronic devices and highly mechanized mechatronic products is significantly affected by environmental stresses such as temperature, humidity, and vibration. It was thus determined that there was a need for vibration tests which served as environmental tests for products, and combined vibration tests including temperature and humidity. We carry out tests in order, beginning with products which are called on to endure particularly severe environments.

Improvements in development speed

Formerly we outsourced comparatively heavy products such as mechatronics and single-loop controllers to external test sites, but these sites were often fully booked, making rapid response difficult. We are now able to respond rapidly, as we can run the site as a dedicated facility for M-System products.

Special Repair Service

Based on our “Customer Creed” policy, we go beyond normal manufacturers’ obligations with our special repair service. If you suspect damage to a product by mistakes in handling, contact our Customer Center. We would be happy to check and repair it without charge. Consult M-System web site for detailed terms and conditions applicable to this service.
Core production facility with the test plant of the air-conditioning control system

Kyoto Research Center & Factory

M-System’s Kyoto Research Center & Factory, opened October 1, 2013 in Kizugawa City, Kyoto, is not only an important manufacturing site for us but is also a showcase plant using M-System BA controllers. From I/O to controllers and SCADA, M-System’s BA components for HVAC and energy management system are contributing to build up flexible BMS via open networks. They are used by many projects including the prestigious buildings in Tokyo where these cutting-edge solutions are tested and proved.

In order to promote the idea of open system by multiple vendors, we have built a miniature showcase plant of our own simulating a typical commercial building using combined centralized and packaged HVAC solutions. We invite building owners, component suppliers and building contractors to show M-System’s controllers and I/Os in operation. The entire building is equipped also with more than 800 LED tube lights by our own design and manufacturing. We will be happy to receive you at our Kyoto factory any time.

Risk Management

Based on lessons we learned from the Great East Japan Earthquake, we made an overall review of our existing BCP (Business Continuity Plan) and disaster prevention schemes. In order to minimize the impact on product supply during a large-scale disaster and to fulfill our social responsibility of business, we worked on enhancing BCP by implementing anti-inundation and anti-earthquake measures as well as strengthening the logistics to allow our core manufacturing sector to continue operations and quickly recover from such disaster.

Multiple production sites

Our Kyoto Research Center & Factory is located in suburban area where the elevation is 62 meters above sea level.

Shelter Area for Power Outage

We have set up an area to "maintain power supply to the power outlets and keep the air-conditioning and lighting on" in order to keep our employees safe and to maintain the production system in case of a power outage.

* Characteristics of medium-pressure gas pipe

The medium-pressure gas pipes will not stop the gas supply as they are strong enough to withstand massive earthquakes like the Great Hanshin/Awaji Earthquake and the Great East Japan Earthquake. We have constructed a highly-reliable energy supply system by supplying gas to the cogeneration systems through the medium-pressure gas pipes.
Facilities in Kyoto Research Center & Factory

- **Central air-conditioning control system**

- **Energy-saving monitoring system**

- **Diversification of energy sources and energy-saving measures**
  - **Gas cogeneration system**
    Generate power by gas engines (35 kWh x 2 units) and at the same time utilize waste heat for central air conditioning.
  - **Solar power generation**
    High-efficiency solar cell (approx. 15 kWh) installed.

  - **Countermeasures to reduce thermal load to the building**
    Reduce the thermal load to the building by exterior thermal insulation method, heat shield coating for outer wall, roof greening, and blocking the sun’s rays by solar panels.

  - **Energy-saving for lighting**
    Energy-saving straight tube LED (LS1200) installed in the entire center. Energy-efficient equipment also adopted in the related facilities.

- **OHU seen from outside**
- **Solar power generation panel**
- **Hot-and-chilled-water generator**
- **Emergency-ready Gas cogeneration**

- **Lithium-ion battery**
- **Multiple in-line chip mounters (1st floor)**
- **Storage for parts (2nd floor)**
- **Power outage shelter area (3rd floor)**
  (Red power outlet can be used even during power outage)
The PID Pilot Plant is a full-fledged mini-plant for learning purposes that is equipped with machinery and instrumentation systems equivalent to those of a real plant. You can learn the basics and applications of process automation (PA), including PID control and batch control in an environment close to the actual operation site. The plant is located in M-System’s headquarters and is open to customers. We recommend the use of the plant for your new operators and instrumentation personnel who need to learn the operation of plants and instrumentation systems.

We recommend the use of the PID Pilot Plant for your new operators and instrumentation personnel who need to learn the operation of plants and instrumentation systems.
Participants can see and touch actual on-site instruments. They can experience the real operation of M-System’s Multi-function PID Controller and the operation of a plant with supervisory control and data acquisition (SCADA).

Operation of Multi-function PID Controller
Learners can control the SC-series Multi-function PID Controller and make settings that will allow them to experience the realistic operation of an actual plant.

Participants can learn with actual on-site instruments.
We use real devices, such as water level meters, flowmeters, and control valves, thus making it possible to provide learners with real operation experiences.

Equipped with a classroom to accommodate up to eight participants.
The classroom that can accommodate eight participants is next to the PID Pilot Plant. Participants can learn control theory and use a large-scale screen to learn the operation of the PID Pilot Plant.

Plant (Nomenclature)

Host HMI Software
The host PC with HMI software is connected to the SC-series Multi-function PID Controller to enable participants to learn the monitoring and operation of a plant with SCADA.

Control Panel (Nomenclature)

Logging
All measurement data and control information are logged by the Web Data Logger (DL8) and the Tablet Recorder (TR30) in the control panel, which makes it possible for users to monitor the data and information on their handheld tablet or smartphone through the wireless LAN access point Tower Light (IT40SW2).
M-System does not provide mobile terminals (smart phones, tablets) or mobile network operator services.
Introduction

One-Piece-At-a-Time production system - I (production process)

One-Piece-At-a-Time production system - II (introduction of production plan and production line)

Product development system

Customer Center

Our production system which continues to make same product available

Special specifications without additional charge

Strong emphasis on quality assurance system

Introduction of Kyoto Research Center & Factory

PID Pilot Plant

Product line-up

Total number of visitors

Approx. 7,100 people/day

Total number of pages

Approx. 6,150 pages


Website

The number of documents available for search

Approx. 16,900 documents or more

Total number of pages

Approx. 101,400 pages or more


Website (documents)

Visit M-System website!

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Tel: +81(6)6659-8201 Fax: +81(6)6659-8510

Specifications are subject to change without notice. When ordering, use the latest data sheets available at M-System web site: www.m-system.com