

Mitsubishi Electric Corporation

Founded: January 15, 1921

Capital: 175,820 million yen

Annual turnover: 3,604,185 million yen

Number of employees: 99,444

Nagoya Plant

Production of: heavy electric machinery systems, industrial mechatronics, information and telecommunications systems, electronic devices, manufacturing and sales of home electric appliances, etc.

URL: <http://www.mitsubishielectric.co.jp>



Shortening Scheduling Time and Reducing Implementation Overheads with Asprova

Mitsubishi Electric Corporation's Nagoya Plant manufactures equipment related to Factory Automation (hereafter referred to as FA), and holds a workforce of about 5,000 employees. This plant manufactures a diverse range of products including electrical discharge machines, laser processing machines, sequencers, programmable indicators, inverters, servo machinery, NC equipment, and industrial robots.

The plant which manufactures electrical discharge processing machines is a model plant for the Mitsubishi Electric Corporation advocated FA integrated solution "e-F@ctory". The introduction of this e-F@ctory took place in 2001 when the plant facilities were refurbished. At that time, Asprova was adopted as a production scheduler. Yoshihiro Kato, Manager of the Electrical Discharge Machine Tool Department, Mechatronics Machine Tool Division, comments on the issues prior to the introduction of Asprova, the reasons why Asprova was adopted, and the effects on its introduction.

"Scheduling took up to 5-10 minutes with the old in-house developed scheduler"

For electrical discharge processing machines processed at this plant, the number of processing parts per machine is about 8 parts. Asprova schedules the manufacturing processes that are divided up into about 1,300 orders every monthly. For these operations, use of Asprova allows optimization of the operational planning taking into account the set up work such as the tool replacement of the machining centers, etc.



Yoshihiro Kato

Electrical discharge Machine Tool
Department Manager,
Mechatronics Machine Tool Division

Although we have developed our own in-house scheduler in the past, it required a great deal of troublesome work in establishing a system. In addition, scheduling took a long time when it is put in actual use. In order to solve such problems, we considered the introduction of the packaged solution Asprova.

Introduction of Asprova coincided with FA system refurbishment

The "e-F@ctory" is a solution based on the concept of utilizing computerized technology to allow visualization of the plant status, and aims at improving productivity at the shop floor. On-site information such as production results, operational results, and quality information from facilities and equipment is streamed in on a real time basis. This information system is used to support improvements in quality, construction schedule and productivity. Mitsubishi Electric Corporation cooperates with a number of partners and provides access to e-F@ctory to the plants of our user companies.

The electrical discharge processing machine plant of Nagoya Works is known as a model plant where this e-F@ctory has been introduced. Given these circumstances, we are continually receiving requests to visit the plant and study our implementation.

This plant manufactures electrical discharge processing machines, which literally grind down metal materials through the utilization of the "electrical discharge" phenomenon and are commonly use in producing dies and moulds. The Nagoya plant manufactures both "wire-type electrical discharge processing machines" which employ a wire with the thickness of a hair at their processing electrode and "shaped electrical discharge process machines", which employ an electrode that fits the shape of the product.

Asprova is used on the production line which processes parts such as the columns and beds that compose the bulk of electrical discharge processing machines. This production line consists of automated warehouse where materials are stored, unmanned transport vehicles that transport parts, two horizontal machining centers and one "5 face processing machine."

The 4 types of processing treatments - milling, end mill, boring, tapping - are carried out while the product is kept in a fixed position. In this situation, no processing can be undertaken on the side which is currently clamped down. Following the completion of the first processing, the remaining processing is undertaken after turning the product over.

As stated earlier, the said plant renovated the plant facilities and equipment in 2001. The introduction of Asprova for line scheduling was carried out at the same time as the e-F@ctory changes were made.



Asprova APS

Points highly rated by Mitsubishi Electric Corporation :

- Scheduling time reduction
- Implementation schedule reduced by about 80%

The aforementioned production control system manages the overall production planning for electrical discharge processing machines. After taking into account the receiving orders status, it also determines the number of units to be manufactured monthly, and prepares a "rough schedule" plan that extends until the point of shipping. The manufacturing period per machine is set up for three to four days, based on which the instructions are to be given on both starting date and completion date.

Asprova first excludes the machines that need to be outsourced, and then sets up the schedules for both starting date and completion date. Then the required parts will be calculated, along with the manufacturing processes necessary. After that, those results will be assigned to the processing machine.

Scheduling by Asprova is run both once a month and once a week. Yoshihiro Kato comments on the timing of scheduling.

"Scheduling is done once a month in order to make the detailed planning for manufacturing processes based on the rough schedule planning. Electrical Discharge Processing Machines are produced by so-called "lot-based production". After their production planning is set up once a month, it normally remains unchanged.

Scheduling is then done once a week on Saturday in order to make changes on the type of operations, based on the busyness of input work. Employees normally work at the plant on Monday through Friday either on a 2 shift system or with a daytime work plus overtime system. The shift type for the coming week is decided on Saturday. This is where the weekly Asprova schedule is applied."

Prior to the introduction of Asprova, the plant depended on the in-house developed COBOL language based system to carry out this kind of scheduling. Around that time, each scheduling took up to 5 to 10 minutes at a time.

"Back then, the scheduling was not undertaken for the whole month but was done on the case-by-case basis. That is to say, the orders were first sequenced up based on their due dates. After a certain order was dealt with, the remaining ones that were in need of scheduling were carried out one-by-one, with

consideration given to their priority and whether the necessary parts were actually available at the time. However, such scheduling took 5 to 10 minutes at a time," says Mr. Kato.

In addition, the facilities and equipment that had been in place before 2001 were introduced at the plant in 1982. The aforementioned COBOL based scheduling system was also established at that time. It was estimated that that it would be necessary for 24 senior engineers to spend about 1 year in order to re-establish a similar system, including software and peripheral interface portions.

"Asprova not only shortened scheduling time down to 1-2 seconds but also reduced our implementation schedule by about 80%"

"After the introduction of e-F@ctory, there were times when we utilized the new information system. At that time, we were considering using package software which would allow for faster scheduling and require neither an extra introduction lead time nor an introduction cost," says Mr. Kato. In response to these needs, Asprova was introduced.

"We started the project after the introduction of e-F@ctory. Around that time, we began studying schedulers and the first information we received was about Asprova. So we made a thorough investigation on this product, and learned that our plant in Nakatsugawa had already purchased 8 packages of Asprova. To find out more about it, we went there and heard that they hadn't purchased all of them at once but instead had gradually increased the extent to which Asprova was applied. With these repeat purchases of Asprova indicating that our sister plant had found the package very beneficial, we attended Asprova seminars and were also convinced that this product could be of great use."

Scheduling speed was the foremost point considered when evaluating Asprova. "The scheduling speed of Asprova is really fast. It produces results within 1 or 2 seconds," says Mr. Kato.

By replacing our in-house developed scheduler with Asprova, "our implementation schedule has been reduced by 80%" says Mr. Kato. Asprova has not only improved the scheduling time a great deal but also drastically shortened the implementation overhead.

Asprova Corporation

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