

Mitsubishi Heavy Industries, Ltd.

Main office address : 2-16-5 Konan, Minato-ku, Tokyo
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Established : November 1, 1950

Capitalization : 265.6 billion (as of March 31, 2008)

Annual sales : (Consolidated) 3,203 trillion (April 1, 2007 to March 31, 2008) Mitsubishi Heavy Industries Ltd (MHI)

Nagoya Guidance and Propulsion Systems production at 160.9 billion (April 1, 2007 to March 31, 2008)

Number of employees : 33,089 (as of March 31, 2008)

At Nagoya Guidance and Propulsion Systems : 1,810 (as of April 1, 2007)

Business areas : Development, production and sale of products for energy, aeronautics and aerospace

Nagoya Guidance and Propulsion Systems : Development, production and repair of air body components, aircraft and aerospace engines, controllers

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



MHI installed Asprova to automate scheduling work and, with the addition of the Sales option, found it very effective in making production planning more uniform.

The Nagoya Guidance and Propulsion Systems of Mitsubishi Heavy Industries, Ltd, was founded in 1920 as the Nagoya Plant of Mitsubishi Internal Combustion Engine Manufacturing Co. Ltd. (*Mitsubishi Nainenki Seizo KK*). Up to the end of the Second World War, Mitsubishi built the A6M Zero fighter plane. In the postwar period, it restarted its aircraft division and also began the repair of aircraft engines. Since then MHI has participated in a wide variety of aircraft and aerospace development and in the launching of rockets. At the present time, more than half of its production goes into missile related products such as anti-aircraft missile guidance systems (for the Patriot missile).

In 2003, NGPS installed Asprova to get greater efficiency out of the planning they had been doing manually up to that time. In 2007, they added the Sales option to obtain more uniform production planning. Kazuhiro Yoshino, manager of the Production-engineering Department at NGPS Works told us about the background for Asprova installation, the efficiencies gained through installation and the future outlook for the program.

We installed Asprova to achieve greater precision in automating our scheduling work

The subject for today's installation of Asprova installation is the production line that builds a device known as a disk, a component that is part of the structure of aircraft engines used in private aircraft and is used to convert the force of combusting gases within the engine into dynamic power. The flow of production is one in which NGPS produces a wide variety of parts that include these disks and supplies them to the engine manufacturers. The engine maker assembles those parts into final form and ships the engine to the airline company.

Since 2003, NGPS has been working on increasing the efficiency of scheduling, which until then was done by hand. At that time, manual scheduling often required a complete reworking of the schedule, which led to a constant problem of delayed operations. Then, when the revisions were complete, they would find that the very situation for which the revisions had been made was completely different preventing them from making accurate forecasts of completion. That was the situation that led to NGPS's decision to install Asprova. They also wanted to lighten the operational load and make schedules that were much more precise. Kazuhiro

Yoshino, manager of the Manufacturing Department's Production Engineering Section gave the reasons that they selected Asprova.

"The first reason for our selection was the large number of parameters that we, the user, could assign for ourselves. I'm sure that this is the case at any plant, but there are particular conditions and requirements here that are unique to us. Asprova's flexibility really fills the bill in that regard."

We tried a lot of other schedulers, and almost all of them support the production lines that are part of the assembly system, but we judged that Asprova was the one product that best took care of the main lines in our process system. (Yoshino).

We placed the focus for the installation of Asprova on our disk production line, and the reason for placing there was that the equipment is fixed, the line is limited, and a decrease in the number of items will hold down and variable factors. In short, the flow of disk manufacturing goes through cutting material→grooving→drilling holes→rounding→aperture polishing→inspection--a total of about 15 processes including detailed items.

■Comments from the customer



Kazuhiro Yoshino
Manager,
Production-engineering
Department,
Manufacturing Division of
NGPS Works,
Mitsubishi Heavy Industries, Ltd.

Our initial intention in installing Asprova was to automate the scheduling of work, but we were unable to fit in maintenance of master data and that did not lead to the result we had hoped for. However, a smaller core system, and the arrival of the Asprova Sales option gave greater incentive to use Asprova to the utmost extent that we could. We have now broadened the ways in which the system is used and that includes leveling our production planning. Asprova uses opportunities gained through releasing the order-receive option to smooth out production planning

■Points on which Asprova was highly praised

- Automates scheduling operations that had been done by hand led to greater efficiencies.
- Makes production planning more uniform
- More precise production plans

After installing Asprova, work conditions required that NGPS reach an operational level at which it would have sufficient forward motion. But that led to snags caused primarily by the human element. As Mr. Yoshino tells it, those snags arose from the enormous time and effort required by employees to assemble and collate data.

"Our core system at that time was centered on a host computer, and its data was incorporated automatically into Asprova, but the work of creating master data was quite difficult. We dealt with the problem by getting the data through batch processing and then manually, but there were limits to what we could do. Asprova would conduct master maintenance and our people who were in charge of the system would have to learn how to operate it. But that created a situation in which they were the only people who knew how to run it. The everyday work was what got the highest priority and maintenance was frequently neglected. We were not doing very well in our use of the new system."

We broke through that bottleneck in 2006 when Asprova encouraged us to replace that core system with a more downsized system. That again placed the spotlight on Asprova. It was very easy for us to incorporate the master data and the progress data in Asprova through linkage between servers.

And under this timing for moving to a smaller system, Asprova released the "Sales option" that pegged and linked production planning within the factory to Sales data. This is another of the factors further spurring on our active use of Asprova.

"I was one of those working in the production planning department and we wanted to make our planning more uniform. We build a predetermined number of engine frames annually, and we can manufacture new items on an ordered production basis. However, we also repair components and overhaul engines. The replacement parts that we need for those jobs and the number of orders we have for them can fluctuate wildly depending on what the situation is with the airline companies so we really need to have forecasts on production. That was another of the reasons we thought we would be able to make good use of Asprova for setting up production planning." (Yoshino)

This is why Sales data had to be incorporated in Asprova and linked to draft planning operations, something that was made possible with the release of the Sales option. "The time at which our core system was reduced in size and the time when the Sales option was released coincided very well. We were able to solve the problems previous to that in operations with Asprova and at the same time achieved the new goal of making production planning more uniform," says Mr. Yoshino

Developed a user interface for easier operation, one that takes into consideration ease of use at the plant site

Replacement of the core system was completed in February 2007, and the adjustments made in Asprova, with its object as the disk production line, were finished in June 2007. NGPS then embarked on the development of an interface that would improve Asprova operability. Yoshino explained to us what was behind that move:

"We had a problem with the direct viewing of Asprova during actual operations. To use Asprova, one has to be trained in its operation and that provided to be quite

an additional load for people on the floor. Any situation where only designated persons are able to operate equipment is something to be avoided. So a new user interface was developed that allowed anyone to use the Asprova."

The easiest way to operate for people on site is to not have them directly manipulate Asprova but to enter conditions, click on a button and generate a schedule automatically. We developed the interface for that purpose, and it was completed at the end of 2007.

Installing the Sales option gave faster speeds and greater precision to production planning

NGPS started installing the Sales option at the end of November 2007, completed installation in about one month and then took two or three months to tune it before putting it into online operation. That made it possible to draft a production plan from order data, all the while taking safe inventory into consideration.

"Now, for example, we assign quantities in inventory and everyone knows exactly what that data is. Before, we had to go directly to the people in charge and ask them. Now, management people can look at the data and debate the adjustments needed in production planning. Another thing is that we can accurately measure the number of lots for each part that flows buy in whatever number of units, one or two, and that greatly enhances the precision of production planning. Each supervisor reviews the various details of the operation, and if, at that time, they find any factors responsible for fluctuations, those factors are be organized together and the work rescheduled. We must repeat the detailed approach toward work on site that is the Asprova parameter known as conditional assignment, otherwise we won't get results like those shown in the image. This is an operation that cannot be avoided if you intend to get the best use out of Asprova," says Yoshino

NGSP reexamines its production planning in three month units, but the use of the installed Sales option, has allowed operations that once took a total of one week to accomplish are now be done in one or two days. When different parts enter the same process or when there is a conflict between equipment in the production process, each employee in charge must get together and work on a solution. However, that was not getting done well enough. Yoshino says, "The plans were getting made, but there were scheduling problems that made them difficult to execute. "Creating a production plan that took everything, even equipment planning, into account, solved these problems.

"At the present time, we are devising a production plan using Asprova once every two weeks. Then we make manual adjustments of the created plan every week. Ideally we would like to run Asprova every day to make adjustments in the schedule but we have a pretty firmly established tradition of handing out work instructions to the work floor that are written on paper and we just can't change that too quickly. We are going to start taking more time to set up and transmit daily instructions electronically. If we do that we will also be raising the frequency with which we operate Asprova.

"In the future, we are going to have more automatic understanding of performance and by building a structure that will reflect more on Asprova we will further raise the level of precision in Asprova production planning."

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