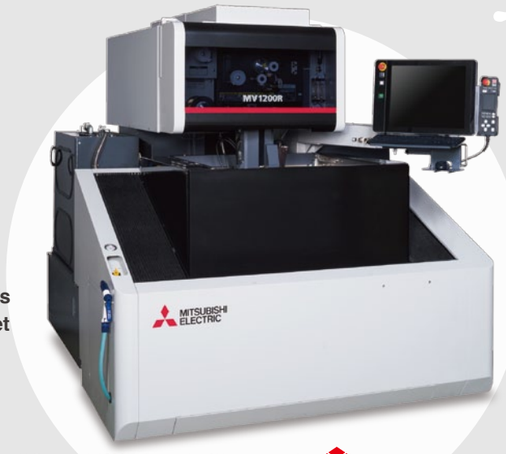
Development Story

MV Series equipped with New Controller D-CUBES

Wire-cut EDMs

In November 2016, Mitsubishi Electric released a MV Series wire-cut EDM equipped with the New Controller D-CUBES. This is a new model in the MV series, which first appeared on the market in 2012 and has been well-received in Japan and overseas. This new model is equipped with numerous functions that achieve higher productivity and features a computerized numerical controller (NC) that provides superior operability similar to mobile device operation and the ability to support a new care service due to strengthened network functions.



MV Series MV1200R Wire-cut EDM equipped with New Controller D-CUBES, released by Mitsubishi Electric in November 2016

D-CUBES

Comprehensive changes to NC in pursuit of user-friendliness

Hisashi Hara, Manager in the EDM Development & Design Section 1 of the EDM Manufacturing Department at Nagoya Works, was appointed leader of the new wire-cut EDM project launched by Mitsubishi Electric at the beginning of 2015. Mr. Hara was also project leader for development of the MV series, which was released in 2012, and is today the backbone supporting Mitsubishi Electric's EDM business.

Mitsuyoshi Wada, Senior Manager of the same section and overall coordinator presiding over this development, explained his reason for appointing Mr. Hara. "The MV Series was a major hit, so we had to ensure the new model wouldn't fail. Mr. Hara really understands the feelings of the engineers involved in the original MV Series development. I judged Mr. Hara to be the most appropriate person to understand his team and lead the project to success."

At the outset of the project, Mr. Hara also made the following pledge, "We will carry on the notions of the previous development team members while proactively changing that which needs to be changed."

Mr. Wada believes that one of the reasons for the success of the MV Series is that they "thoroughly researched the opinions of users, including overseas users." Based on this kind of market research, they succeeded at significantly improving work efficiency through an automatic termination function and other features, thus achieving cost-performance that led to the project's success.

While adhering to this policy, Mr. Hara and his team took on a new challenge; specifically, "Previous interviews had focused on users of EDMs made by Mitsubishi Electric. This time we decided to look for development hints by focusing on users of other companies' machines by going into our competitors' strongholds."

What the team wanted to know was, "Why don't these users use Mitsubishi Electric's machines?" Ken Inukai, Manager of the same section was appointed overall coordinator for software development, aggressively approached users in the competitors' strongholds. He reflected, "Sometimes they wouldn't speak with me straight away even when I went to see them. There are some companies I visited over fifty times."

Of the various issues, the one that users mentioned the most fell into was Mr. Inukai's territory—the NC. In developing the MV Series, most efforts were concentrated in evolving the hardware and the NC adopted was a conventional ADVANCE control unit, to which no major modifications were made. Perhaps due to this, users expressed their frank opinions of the NC, such as, "It's hard to operate. We want to be able to use it like a smartphone," and "It looks just like a plain box. Doesn't feel premium." (The first machine featuring the ADVANCE control unit was released in 2006.)

Unlike back then, today most users are familiar with operating mobile devices such as smartphones and tablets. There was a need to revise operating standards, such as being able to swipe and making it easy to search for targets. Moreover, users said the small screen and thick housing made the control unit seem "outdated".

The development team implemented drastic changes to the screen layout, directory and operating functions. It was decided that a new control unit based on the M800/M80 Series would be equipped on the new EDM.

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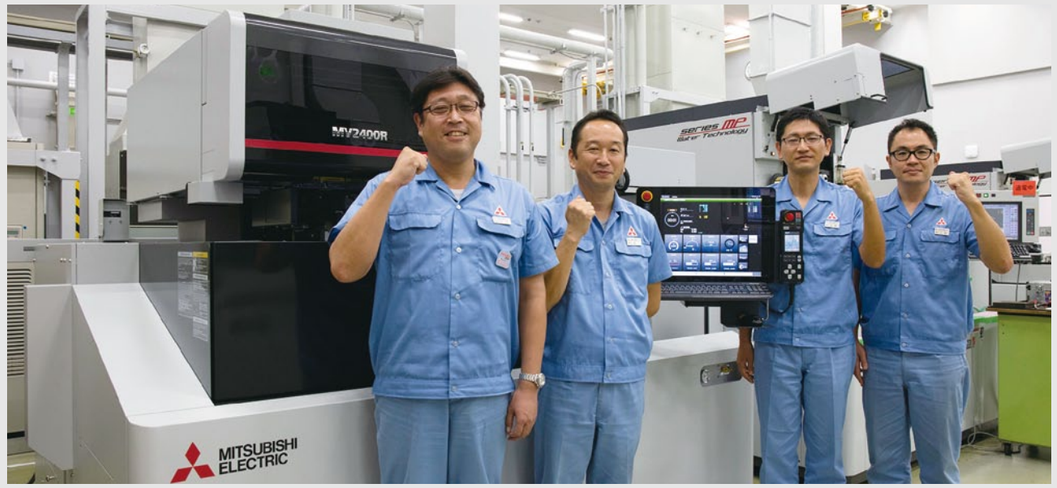

Supporting a remote service offering remote management, and operations and maintenance care

In actuality, development of the new EDM was given a tough deadline from the outset of the project. It was decided that the machine would be exhibited at the Japan International Machine Tool Fair (JIMTOF), scheduled for November 2016. This exhibition attracts many machine tool users and is an excellent opportunity to promote new products.

For this reason, the new model had to be completed by September at the latest. Mr. Inukai commented, "Due to the short development timeframe, I initially believed all we could do was rearrange the display design." But after hearing the brutally honest opinions of users regarding their impression of Mitsubishi Electric's NC unit, Mr. Inukai made up his mind to develop a new one.

The screen of the new control unit was increased to 19in, 4in larger compared to the 15in screen of the ADVANCE control unit, and it was also made thinner. However, there remained an issue in that operations convenient on the small screen of a smartphone were hard to execute on the larger screen due to the wider arm movement required.

Accordingly, the development team exhaustively debated the best type of unit from the perspective of user-friendliness. Furthermore, just like a computer's browser, the number of operations to execute the machining of choice was reduced by conceiving an interface that makes the current step in operation easy to identify.

New control unit. The screen has been made larger (19in) and thinner. A touch panel is incorporated, enabling operation similar to using a smartphone or tablet.

Meanwhile, Yoshinori Saegusa, Manager of the same section as Mr. Inukai, was put in charge of hardware design. The MV Series consists of two models, the MV-R, a high-end model with excellent machining accuracy, and the MV-S, which offers superior cost-performance. However, users said they were unable to differentiate between the two models in terms of design.

Regarding this, Mr. Saegusa made the following remark, "Up until now, we had mainly focused on functionality differences and simply used a different color for the exterior. So this was an opportunity for us to thoroughly reconsider how we could make the exterior look different, as this is what consumers demanded. But we had to avoid a significant increase in manufacturing cost for the MV-R. The part we really struggled with was how to select parts that could be made common between the R and S while, at the same time, achieve differentiation."

The door of MV1200S was kept manual, as it had been for previous models. However, a design with a more premium appeal was introduced for the R, including an automatic door on 1200R, a wire cover on the rear of 2400R, and making all of the corners curved among other changes.

Following repeated struggles such as these, a prototype of the new EDM was completed in the fall of 2015. However, many of the concerned members who saw the prototype made the comment, "The NC is too big and makes it look off-balance." The LCD screen was 19in, so naturally it was going to be bigger. The problem was that the housing for the screen was too large. Mr. Inukai and Mr. Saegusa asked for help from team members involved in the electronics aspect and implemented repeated revisions to the structural design and layout of electronic components. Finally, in summer of 2016, a prototype for mass production was completed.

But Mr. Inukai still had one assignment left to complete. There was a requirement for the new EDM to also support iQ Care Remote4U, a remote service launched in April 2016 primarily for laser processing machines, and the instruction was to enhance functions unique to an EDM.

Mr. Hara explained, "When we asked users from our competitors' strongholds, they said 'Compared with other companies, what makes a product distinctly look and feel like Mitsubishi Electric?'. We thought about this and decided that Mitsubishi Electric is really about FA total solutions. As such, we decided to develop functions unique to EDMs that could utilize a remote service capable of remotely supporting management, operations and maintenance via the Internet, thereby improving our customers' productivity."

In addition to already revising the NC from scratch, now there was a need to develop a new function. Some members of the software development team expressed their discontent. However, Mr. Inukai persuaded them to exert their best effort by saying, "Many of our competitors are specialists in EDMs. Achieving this remote service, which is something only Mitsubishi Electric offers, is a major differentiation point."

In April 2016, the name for the new EDM was determined, the MV Series Wire-cut EDM with new "D-CUBES" control unit. While keeping "MV Series" in the name, Mitsubishi Electric originality is expressed using the first letters of "Dimension," "Connect," "Universal," "Brain," "Evolution" and "Smooth."

At long last, in late September of the same year, a prototype for mass production was completed and exhibited at JIMTOF as planned. Now it is a matter of waiting to see if this new model will also be a major hit. The development team is eagerly awaiting feedback from users.

Article by Toshiaki Saito / Photo by Masahide Yoshimi