

AI IN MANUFACTURING: NEW JAPANESE SOFTWARE TAKES ON SKILLED WORK WITH HIGH EFFICIENCY

One of the central themes of the World Economic Forum Annual Meeting 2025 in Davos, from January 20 to 24, is the impact of artificial intelligence (AI) on industry. In Japan, AI-based software capable of writing complex machining programs in place of skilled technicians is transforming the field of precision component processing, achieving dramatic efficiency gains and cost reductions.

From smartphones and automobiles to medical devices and satellites, innovative technologies indispensable to our daily lives are evolving at a rapid pace. Hidden behind these technologies are precision components that play a crucial supporting role. For example, an automobile engine, the “heart” of the vehicle, consists of approximately 10,000 components that interact so intricately that even micron-level deviations would significantly impact functionality and safety. Yet, the manufacture of these vital components now faces a serious challenge.

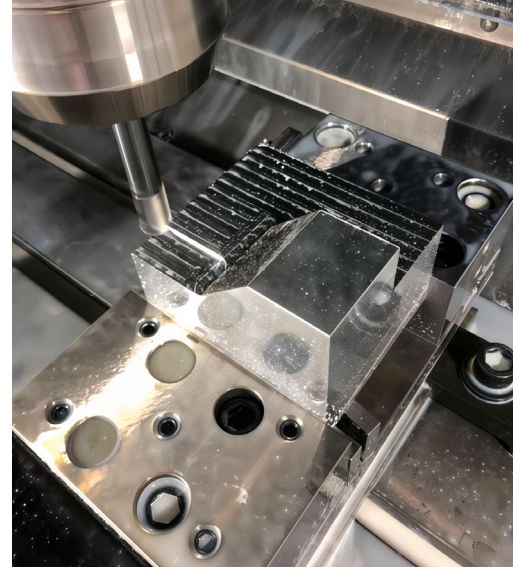
Creating the complex, detailed processing programs necessary to achieve the high accuracy of precision components has traditionally required skilled technicians for each individual part. However, there is a growing global shortage of these vital workers due to aging and other factors. In Japan, a key manufacturer of precision components, skilled

“The risk of supply disruptions in precision components to manufacturing industries such as automobiles and smartphones is fast approaching. It is our mission to address these challenges,” said HIRAYAMA Takayuki, CEO of ARUM Inc. ARUMINC.

workers in the field have dropped from over 250,000 in 2000 to just around 150,000 in 2020. Many processing companies are small- to medium-sized enterprises that are lagging behind in digitalization, of which some cannot secure even a single technician, leading to closures. But a new technology with the potential to dramatically change this situation has emerged and is garnering attention.

ARUMCODE, released in 2021, is an AI-based software that can automatically write machining programs, taking the place of skilled technicians. By simply

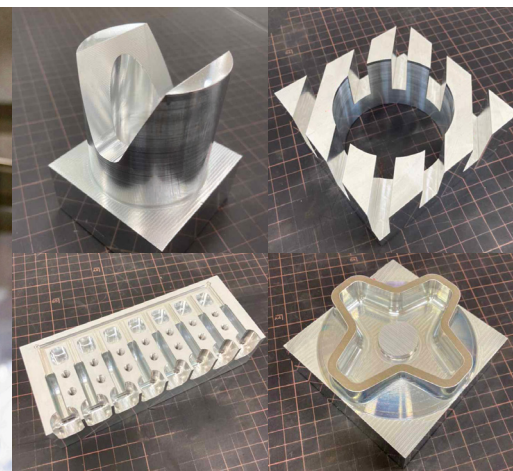
uploading a design and pressing the start button, even untrained workers can create complex precision component programs. The time required for creating a program is significantly reduced—for example, in one case a task that would normally take a skilled technician 16 hours was completed in just 15 minutes. In addition, the costs for programming, which generally account for about 50% of the whole processing cost, could be cut by nearly half. “Even if you were to upload 100 drawings before leaving work, you’d find them all ready the next morning,”



said HIRAYAMA Takayuki, CEO of ARUM Inc., the developer of ARUMCODE.

ARUM Inc. has automated the thinking process and techniques of skilled technicians through its proprietary “manufacturing AI,” which incorporates manufacturing expertise and theoretical knowledge. The AI was first trained on a database that systematized some 5,000 types of tools and over 10 billion machining conditions, before being further enhanced

Components machined using ARUMCODE, which can write programs for the high-precision manufacture of a variety of complex shapes. ARUMINC.



A machining process using a program automatically generated by ARUMCODE. Machining requires switching between multiple tools to shape metal with high accuracy, making it an optimal process for precision components, but it has traditionally relied on the experience and expertise of technicians. ARUMINC.

using various manufacturing theories from materials science and mechanical engineering, creating a proprietary algorithm used to determine optimal processing methods. In ARUMCODE’s initial development stage, skilled technicians performed countless manual checks and verifications to bridge the gap between theoretical calculations and practical machining, achieving an accuracy level of 5 microns.

Its peerless usability and dependable precision have earned broad support from Japanese manufacturers, with about 150 companies, ranging from a major automaker to a firm staffed by only a few employees, having already adopted it via a cloud-based subscription service. By the end of 2025, ARUM Inc. expects to expand its domestic clientele to at least 700 firms and will begin pursuing business opportunities in overseas markets such as the United States and India.

Meanwhile, ARUM Inc. is also taking on the challenge of developing new AI. According to Hirayama, “Various unexpected problems may occur during actual machining, such as metal deformation due to high temperatures. We are now developing an AI that continuously learns these physical laws and principles—something that skilled

workers take years to master. It will also become increasingly smart as it learns from machining data created in our cloud system.”

Fueling the attention on advanced automation is the growing manufacturing trend toward greater high-mix, low-volume production. Hirayama explained, “There are more than 1.2 million component-processing companies worldwide, many of which engage in high-mix, low-volume production with little advancement in automation.” If the trend intensifies further due to the acceleration of technological innovation and diversification of consumer needs, these companies risk straining their current supply. That situation is bound to change dramatically, though, with the spread of AI technologies such as ARUMCODE. As we aim toward a more flexible and sustainable manufacturing future, these developments are certainly worth keeping a keen eye on. ●



At a subsidiary specializing in component machining, skilled technicians routinely conduct machining tests and verifications to improve ARUM Inc.’s proprietary technology. ARUMINC.