

November 07, 2022

## New finished goods

### **Announcement to launch “AL i Groove + Edition” series wire-cut EDM that achieves high speed, high precision, and high quality, and contributes to reduced power consumption, improved productivity, and automation**

Sodick Co., Ltd. has developed the “AL i Groove + Edition” series as finished goods of the linear motor drive wire-cut EDM AL series, which has been well received, and will be released in December 2022.

As the global movement toward the realization of a decarbonized society accelerates, markets are undergoing significant changes, including the automobile market which is undergoing a shift toward electric vehicles (EVs), the semiconductor and electronic components markets, and the renewable energy-related markets. A decarbonized society is an issue that must be addressed by all companies, as the movement to reduce emissions not only by individual companies but also by the entire supply chain is expanding both in Japan and overseas. In addition, further corporate efforts are required, such as contributing to the Sustainable Development Goals (SDGs) set by the United Nations.

On the other hand, at production sites, there is an increasing demand for improved performance, such as increased machining speed, stable processing dimensions, and uniform finished surface quality, as well as reduced running costs, in order to improve productivity. In addition, there is a growing need to respond to automation, which was spurred by the COVID-19 pandemic due to labor shortages and changes in working styles.

Wire-cut EDM is widely used in machining fields that require high precision, such as the production of press molds for motor cores and the production of precision parts, which are directly linked to the performance of driving motors for EVs, but further improvements in productivity, further reductions in power consumption and environmental measures are needed as we move toward a decarbonized society.

“AL i Groove + Edition Series” has achieved both a 20% improvement in machining speed and an improvement in machining accuracy by working on major improvements in the electrical discharge circuit and control, which are the essence of wire-cut EDM.

In addition to a 20% reduction in power consumption, wire consumption has also been reduced, making this machine environmentally compatible and reducing power consumption for a decarbonized society. Furthermore, it is an excellent new finished goods that can meet various customer demands, such as improved processing quality, improved productivity, production cost reduction, automation support, and improved operability.

The finished goods will be exhibited at the Japan Machine Tool Fair (JIMTOF2022) to be held from November 8, 2022.

#### ■ Main features of “ALi Groove + Edition series”

##### ① Adoption of newly developed EDM control “Digital HF control”

We have developed a new “Digital HF control” and installed it in the wire-cut EDM AL series. In conventional machining control, the machining speed and various controls were performed according to the average voltage state of the machining gap between the wire electrode and the workpiece. While it is possible to judge the machining status in a stable manner, there is an aspect that it is affected by disturbances, such as machining jets, water quality, and dirt.

The newly developed “Digital HF Control” can be adopted to a variety of EDM control and linear motor drive individual axis servo control by detecting the behavior and change of discharge voltage, which is a high frequency, in detail for each discharge pulse, resulting in a leap in machining speed and quality. Improved machining speed and shortened overall machining time have a great effect on improving productivity and saving energy, and compared to the conventional method, improving machining speed by 20% and improving machining accuracy, including corners, were both achieved.

“Digital-HF control” also improves resistance to disturbances that are easily affected by voltage, such as changes in the water quality of dielectric and chip lumps, reducing edge corner drip, and improving floating machining accuracy. Even in areas where the thickness in the height direction of the workpiece varies due to the instability of the discharge energy, such as shapes with counterbore holes and shapes with variable thickness, machining accuracy has been further improved by enhancing high-precision machining conditions using jet control and high-performance servo control based on appropriate situational judgment. (\*Our model case)

② **Improved machining performance and reduced wire consumption by wire rotation mechanism**

Sodick’s unique “wire rotation mechanism” gently rotates the wire to eliminate the effects of electrode wear on machining. With this new technology, it is possible to machine the workpiece from top to bottom with a non-consumed wire surface, achieving stable high-precision machining dimensions and a uniform, high-quality machined surface. In addition, this technology reduces wire consumption by improving machining speed and effectively utilizing the entire circumference of the wire electrode, contributing to reduced running costs and ecology. There is a wire reduction effect of up to 30% in the finishing area.

③ **Reduction of power consumption by optimal control of dielectric treatment system**

In wire-cut EDM, electricity used in the dielectric processing system, such as the flushing, circulation, and temperature optimum adjustment of dielectric, is larger than electricity used in machining itself, accounting for approximately 70%. Our company considers it important to reduce this portion to reduce power consumption, and in “AL i Groove + Edition Series,” the jet, circulation, and feed pumps for dielectric are fully inverted, and the flow rate of dielectric is monitored to optimally control their operation according to the processing condition, thus reducing power consumption by 20% compared to previous models. (\*Our model case)

④ **Energy saving with accuracy maintenance mechanism by overall temperature control**

In addition to the high-rigidity mechanical structure that uses a large amount of ceramics to suppress thermal displacement, it comes standard with the thermal displacement correction function “TH COM” that can handle everything from high-precision environments to rough temperature environments. Overall temperature control (dielectric temperature control, accurate thermal displacement correction function, environmental temperature diagnosis) enables the stable maintenance of mechanical accuracy without the need for thermal displacement countermeasures that require power consumption, such as excessive room temperature control by cooling devices and factory air conditioning systems to maintain accuracy.

⑤ **Software for energy saving and digital transformation (DX)**

“AL i Groove + Edition Series” displays the amount of power consumption and consumables used on the CNC unit with the "ECO Collection" function, which encourages machine users to save energy and resources, making analysis and equipment management easier and enabling customers to improve their worksites. “Scheduled operation” and “idling stop function” reduce unnecessary machine operating time as much as possible. In addition, the software “LQ message,” which displays machine operation status data and notifies you of the operation status by e-mail, is attached as standard, helping to reduce downtime and improve the machine operating rate.

In manufacturing in the future, it is important to use production solution techniques to improve the interlocking and productivity of various processing machines, shorten the setup time, etc., and shorten the production cycle time to the completion of one workpiece. In addition to supporting network connections via MTCConnect and OPC-UA, which are becoming increasingly standardized internationally, we also facilitate data connections to various production systems, and together with our customers’ skills and know-how, we support smart manufacturing in the DX era.

⑥ **Long-term, high-precision, stable operation, automation, and labor-saving are strengthened to support improvement of productivity**

• **Equipped with in-house linear motors on XYUV 4 axes**

Direct drive by a high-performance linear motor maintains accurate axis movement without backlash semi-permanently. High responsiveness and high followability enable accurate position control and excellent discharge characteristics during machining.

• **High speed automatic wire threader “FJ-AWT”**

Equipped with high-precision annealing and pop-up search functions, FJ-AWT boasts high reliability. In addition, by improving the wire running system, wire damage due to reaction against sudden wire breakage during processing is reduced, ensuring automatic recovery and continuation of processing.

• **Expansion of option lineup for automation**

In addition to the popular automatic core processor “S3CORE (Score),” we have added optional probe-type, camera-type, and other functions for onboard measurement and utilization, as well as supporting automated equipment, such as robots and pallet changers.

⑦ **Recycling (environmental circulation) system using genuine supplies**

Wire electrodes, filters, ion-exchange resins, and other supplies for wire-cut EDM are all valuable resources, but were usually treated as industrial waste. With regard to these consumables, we believe that it is important to take measures that are friendly to the global environment from the perspective of reuse, recycling, and resource reduction, and our company will establish a recycling system for supplies that is beneficial to energy conservation and eco-friendliness, and actively promote their use.

## ■ Lineup and planned sales price (excluding tax)

AL i Groove +Edition Series has the following 8 types as a model change machine of AL Series.

• ALN400Q	:	18 million yen~	• ALN600Q	:	20 million yen~
• ALN400G	:	20 million yen~	• ALN600G	:	22 million yen~
• AL400G	:	20.5 million yen~	• AL600G	:	22.5 million yen~
• AL400P	:	23 million yen~	• AL600P	:	25 million yen~

## ■ Main specifications (AL i Groove + Edition “AL400G / AL600G”)

	AL400G	AL600G	
Max. workpiece size (W × D × H)	600×470×240	800×570×340	mm
Max. workpiece weight	500	1,000	Kg
Work tank inner dimensions (W × D)	850×610	1,050×710	mm
Stroke of each axis (X-axis × Y-axis × Z-axis)	400×300×250	600×400×350	mm
Auxiliary axis stroke (U axis × V axis)	150×150	150×150	mm
Max. taper angle (thickness 130mm)	±25	±25	°
Wire electrode diameter	φ0.1~φ0.3 (φ0.05~0.07: OP)	φ0.1~φ0.3 (φ0.05~0.07: OP)	mm
Machine tool dimensions (W × D × H)	2,190×2,590×2,230	2,575×2,945×2,345	mm
*Including machine body, power supply, and dielectric tank			
Machine tool weight (including machine body and power supply)	3,400	4,600	kg
Dielectric filter (internal pressure type)	4	4	filters
Total power capacity	13	13	KVA
Max. machining current	40 (60: OP)	40 (60: OP)	A
NC unit	Multi-tasking OS M4-LINK system	Multi-tasking OS M4-LINK system	
Max. No. of simultaneous control axes	4	4	Axes

■ Appearance (AL i Groove + Edition “AL600G”)

