

LEXUS co.

Ultra High-Speed Attachment Spindle *AEGIS*

The Revolution of The High-Speed Small Diameter Micro-Machining



AEGIS-A600
(BT50 TYPE)

■ Max. Speed of Rotation : 60,000 [min⁻¹]

Correspond to 60,000 [min⁻¹] by adoption of Air-Cooling + Ceramic Bearings. Excellent machinability and machined surface accuracy are obtainable even for the small diameter end-mill in 1mmφ or less of diameters.

■ Spindle Precision

Spindle precision is within 1[μm] (Dynamic deflection accuracy is also controllable.). Allow using marketing standard high precision COLLET ER11 UP-EY11 AA-AR11 AA etc. (Recommend UP and more than AA class. Correspond to Tool-shank diam. : 0.5mmφ~6.0mmφ)

■ High-Power 370 [W] • High-Torque

Equipped high performance brush-less motor by which the flat torque property is obtained throughout working rotation 10,000~60,000 [min⁻¹] realizes high-power 370 [W].

■ "Zero" Rotation of Machine Main-Shaft

Since processing is performed by only rotation of this device without rotating the main shaft of the machine equipped AEGIS, the life of machine's shaft that equips AEGIS became longer and no change of positioning accuracy caused by generation of heat will occur.

■ Little Generation of Heat & Vibration

This device is driven by the electric motor. Since it's not the speed-increasing spindle used gears etc., there are little vibration and generation of heat on structure, and a fine machined surface accuracy is obtained. Also it allows continuation operation for a long time.

■ Correspondence to Coolant

■ Equipped Various Safety Protection Circuits

Equipped the safety protection circuits that functions suspending rotation automatically when the state of over-load, cooling air is blocked off and the number of rotation reached 64,000 [min⁻¹].

< The spindle for high-speed small diameter micro-machining that aimed at machined precision equivalent to high-speed M/C.>

◆ Example of Use (Small Diameter High-Speed Finish Machining)

- (1) Polishing(Grinding): Attach an electrodeposition-grindstone to the spindle tip part so that you use it for grinding.
- (2) Endmill Machining : High-speed cutting processing by the small diameter endmill (Material to be cut and processed : aluminum, copper, graphite, steel for the structure and resin etc.)
- (3) Punching Machining : Punching by the small diameter drill (Metal and Nonmetal).
- (4) Finish Machining of Molding Materials: Finish machining of NAK80-PX5 etc. by the endmill.

◆ Appearance of AEGIS Attachment Spindle

<AEGIS-A600-BT50>



◆ Feature of AEGIS Attachment Spindle

- (1) High-speed rotation and high precision micro-machining are possible.

- ① High-speed rotation between 10,000~60,000 [min⁻¹].
- ② A clamp deflection precision : 2 [μm] in 3D (our measured value)



Grasping diameter : Precise finish machining by the small diameter knife within 6mm diameter.

- (2) Realized Energy Saving : Since it drives by a built-in small motor in the main body, remarkable power saving is realized in finish machining of the small casting processing products.
- (3) Adoption of Torque Priority Type Motor : Realized max. torque : 5.88 [N·cm].
- (4) Adoption of Compact Power Unit : External dimension 220mmW × 220mmH × 42mmH
 - Power supply is AC100V (Input frequency 50/60Hz)
 - Cooling air(Recommend 0.3~0.5 MPa)
- (5) We correspond to manufacture various type of Taper (BT, HSK etc.), and please feel free to contact our marketing division.



◆ **Bench Data of Processing Machining - Proof Material** (Endmill Machining data of the mold material)

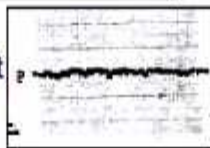
NAK80

50,000min⁻¹, F=2,500mm, Lancing =0.05

Up Cut



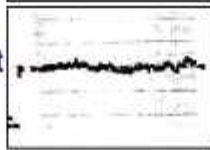
Surface Fault
Rz0.44



Down Cutting



Surface Fault
Rz0.46



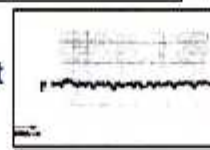
A7075

60,000min⁻¹, F=4,000mm, Lancing=0.05

Up Cut



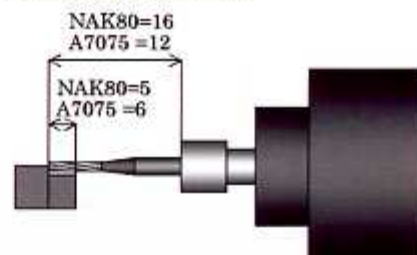
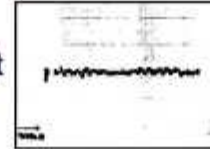
Surface Fault
Rz0.80



Down Cutting



Surface Fault
Rz0.68



◆ **Endmill Machining Date of Quenching Cold Dice Steel**

(Data were provided by Katayama Seiko Corporation. : <http://www.katayama-corp.co.jp/>)

- Purpose : Verify whether machine being done by high-speed M/C can be processed by general-purpose M/C or not.
- Material : SKD11 (HRC58±2), Work Configuration : Bead Molding.
- Comparison with the conventional machining (the following indicates only finish machining)
- Ultra-hard ball end mill (Coating) : R0.2
- Result :

Even if machining work compares with the conventional high-speed M/C, it is in tolerance level, and the life of a tool was also equal. Since machining time is much less than the former, it was evaluated that efficiency of an attachment spindle was fully expectable.

	AEGIS-A600-BT30	High-Speed M/C
No. of Revolution (min ⁻¹)	50,000	32,000
Feed : F (mm/min)	780	500
Lancing (Z-direction) (mm)	0.005	0.005
Degree of Surface Fault	○ (Visual Observation)	○ (Visual Observation)
Tools Life	△ (Single-use tool)	△ (Single-use tool)
Machining time: (min)	98	158

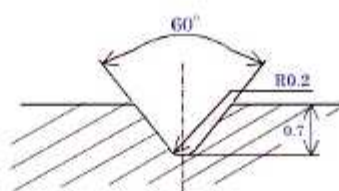
◆ **Groove Machining Data of Quenching Cold Dice Steel**

(Data were provided by Takahashi Teknia Co., Ltd. <http://www.tekna.co.jp>)

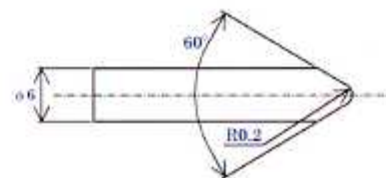
- Purpose : To verify whether conventional M/C using attachment spindle can perform machining work that was processed by conventional M/C, and to verify possibility of shortening machining time.
- Material : SKD11 (HRC61 or over)
- Comparison with conventional machining (the following indicates only the finish machining)
- Ultra-hard solid molding end mill (Non coating) : R0.2 (by down cut)
- Length of machining groove : 143mm
- Result :

When our attachment spindle was used, user decided to purchase by obtaining the following evaluation : The surface fault degree and the tool life are almost equivalent levels, and effect of shortening machining time can be considerably expected (Actual purchase was BT40 type). (In actual machining, there are groove machining of 30 or more per product. It becomes 20 hours in total when making it to machining time. → expected to be about 2hours) It is considered more than equal in the past about the tool life. (It is uncertain whether there is an effect of the extension of the longevity, because it ended the processing in five grooves this time.

	AEGIS-A600-BT50	Conventional M/C
No. of Revolution (min ⁻¹)	50,000	5,000
Feed : F (mm/min)	250	15
Lancing (Z-direction) (mm)	0.1	0.05
Degree of Surface Fault	○ (Visual Observation)	○ (Visual Observation)
Tools Life	○ (Equal in the past)	○
Machining time per one groove (min)	3 min.20 seconds	over 40 min.



Groove Cross Section



Tool

Note : Design and specification are subject to change without notice.

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