

# Ultra high speed machining via innovative *grinding technology*

Air turbine spindle for machining centers

# HTS1500ZZ-M2040

Tool shank diameter  $\phi 0.5 - \phi 4.0$  mm

The high speed rotation enables outstanding performance in ball end milling of R0.5 mm or less, where a high peripheral speed is required. Low heat generation due to air-driven cooling effect, which stabilizes Z-axis displacement (axial expansion) in 1 minute. Static torque, radial rigidity, and axial rigidity have been improved compared to the previous model HTS1501S.



Max.  
rotation speed  
**150,000**  
min<sup>-1</sup>

Spindle accuracy  
**1** Within  
 $\mu\text{m}$

Z-axis  
displacement  
stabilized in  
**1**  
minute

## Machining data

Rib machining with R0.3 mm CBN ball end mill



**Spindle** HTS1500ZZ-M2040

**Processing machine** Machining center  
Sodick MC430L

**Workpiece material** Plastic mold steel  
STAVAX (HRC 52)

**Tool** 2-flute CBN ball end mill  
R0.3  $\times$  5  
(NS TOOL/SSBL200)

**Processing** Groove milling

	Conventional conditions (machining center spindle)	Nakanishi's proposed conditions
Cutting speed [m/min]	57	283
Rotation speed [min <sup>-1</sup> ]	30,000	150,000
Feed speed [mm/min]	800	2,000
Feed [mm/tooth]	0.011	0.007
Cutting depth Ap [mm]	0.005	0.005
Processing time	1h 26 min 18 sec	37 min 56 sec

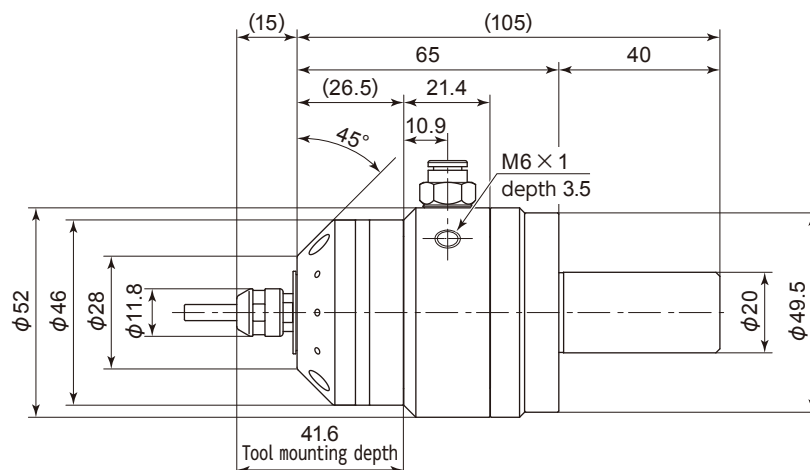
**56%**  
reduction



## Specifications




Code No.: 7919

Model: HTS1500ZZ-M2040



Max. power	Max. rotation speed	Spindle accuracy	Air consumption	Net weight	Corresponding tool		
54 W	150,000 min <sup>-1</sup>	Within 1 µm	175 NL/min	860 g	Square end mill φ1.0 mm or less	Ball end mill R0.5 mm or less	Grindstone φ4.0 mm or less
Standard equipment and accessories		Collet φ4.0 mm (CHA-4.0) / Collet nut (CHN-AA) / Wrench (8 × 5), (9 × 11): 1 pc. each Hose φ6 mm × 4 m (K-247) with Filter joint (FJ-01)					

## Combination example

Collet	Spindle	Air line kit
 <p>CHA φ0.5-φ4.0mm</p>	 <p>HTS1500ZZ-M2040</p>	 <p>AL-M1202</p> <p>or</p>  <p>AL-M1201BL</p> <p>*Supply clean, regulated, and lubricated air</p>

## Milling example

### High feed and low depth milling with R0.1 mm CBN ball end mill

- Workpiece material: cold die steel DC53 (HRC 60)
- Tool: 2-flute CBN ball end mill R0.1 × 0.6 (NS TOOL/SSBL200)

	Tool manufacturer's recommended conditions	Nakanishi's proposed conditions
Cutting speed [m/min]	31	<b>94</b>
Rotation speed [min <sup>-1</sup> ]	50,000	<b>150,000</b>
Feed speed [mm/min]	380	<b>2,250</b>
Feed [mm/tooth]	0.0038	<b>0.0075</b>
Cutting depth Ap × Ae [mm]	0.005 × 0.005	<b>0.05 × 0.01</b>
Processing time	-	<b>3 h 20 min</b>

Productivity  
**5.9 times**



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