CNC GEAR HOBBING MACHINE

MODEL : GHO – 200

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CNC GEAR HOBBING MACHINE

MODEL: GHO-200

Offer No.:

Elaborated for:
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1. **Application**

The GHO-200 CNC Gear Hobbing Machine is designed to perform high speed, precision hobbing for automotive gear parts. The following operations according to a technological program are able to be done on the machine tool:

- Spur gear
- Helical gear
- Small Cone gear
- Crown gear
- Sprocket

The machine tool is provided with the following CNC axes:

- **X-axis**: column travel
- **Y-axis**: Hob shift
- **Z-axis**: hob head
- **A-axis**: Hob head swivel
- **C-axis**: Table rotation

The below figure presents the CNC axes and the directions of its motions.
### 2. Basic Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Ver. CNC GEAR HOBBING M/C</td>
</tr>
<tr>
<td><strong>Max. work-piece diameter</strong></td>
<td>Ø 200 mm/kg</td>
</tr>
<tr>
<td><strong>Max. module</strong></td>
<td>M4.5</td>
</tr>
<tr>
<td><strong>Table diameter</strong></td>
<td>Ø 240 mm</td>
</tr>
<tr>
<td><strong>Z-axis travel (AXIAL)</strong></td>
<td>350 mm</td>
</tr>
<tr>
<td><strong>X-axis travel (RADIAL)</strong></td>
<td>200 mm</td>
</tr>
<tr>
<td><strong>Hob swivel angle</strong></td>
<td>MAX ± 45 deg</td>
</tr>
<tr>
<td><strong>Hob arbor taper</strong></td>
<td>NT NO.40</td>
</tr>
<tr>
<td><strong>Max. hob diameter/length</strong></td>
<td>Ø 180/190 mm</td>
</tr>
<tr>
<td><strong>HOB shift travel</strong></td>
<td>170 mm</td>
</tr>
<tr>
<td><strong>Max. hob speed</strong></td>
<td>1500 rpm</td>
</tr>
<tr>
<td><strong>Max. table speed</strong></td>
<td>230 rpm</td>
</tr>
<tr>
<td><strong>TAIL STOCK stroke</strong></td>
<td>380–780 mm</td>
</tr>
<tr>
<td><strong>Z-axis rapid feed rate</strong></td>
<td>12 m/min</td>
</tr>
<tr>
<td><strong>X-axis rapid feed rate</strong></td>
<td>12 m/min</td>
</tr>
<tr>
<td><strong>Y-axis rapid feed rate (hob shift)</strong></td>
<td>4.2 mm/sec</td>
</tr>
<tr>
<td><strong>Travel distance from table surface to hob center (Z-axis)</strong></td>
<td>200–550 mm</td>
</tr>
<tr>
<td><strong>Travel distance from table center to hob center (X-axis)</strong></td>
<td>15–215 mm</td>
</tr>
<tr>
<td><strong>B-axis (Hob spindle)</strong></td>
<td>kW AC12/16</td>
</tr>
<tr>
<td><strong>A-axis (hob head swivel)</strong></td>
<td>Nm 6/10:1</td>
</tr>
<tr>
<td><strong>Z-axis</strong></td>
<td>Nm 27/2:1</td>
</tr>
<tr>
<td><strong>X-axis</strong></td>
<td>Nm 410</td>
</tr>
<tr>
<td><strong>Y-axis (hob shift)</strong></td>
<td>Nm 6/10:1</td>
</tr>
<tr>
<td><strong>Lubrication</strong></td>
<td>kW 0.2</td>
</tr>
<tr>
<td><strong>Coolant</strong></td>
<td>kW 0.9</td>
</tr>
<tr>
<td><strong>Hydraulic</strong></td>
<td>kW 3.7/2.2</td>
</tr>
<tr>
<td><strong>Hob head fixation</strong></td>
<td>ton 7.6</td>
</tr>
<tr>
<td><strong>Tail stock fixation</strong></td>
<td>ton 1.5</td>
</tr>
<tr>
<td><strong>Work-piece fixation</strong></td>
<td>Ton 3.3ton (Ø 120 CYLINDER)</td>
</tr>
<tr>
<td><strong>Number of Axes controlled by CNC</strong></td>
<td>5 (X, Y, Z, A, C)</td>
</tr>
<tr>
<td><strong>CNC CONTROL SYSTEM</strong></td>
<td>SIEMENS 840D/FANUC 18iMB</td>
</tr>
<tr>
<td><strong>Floor space (L×W×H)</strong></td>
<td>2702×3360×2810 mm</td>
</tr>
<tr>
<td><strong>Machine weight</strong></td>
<td>kg 9,000</td>
</tr>
</tbody>
</table>
3. Technical Description of Major Unit of Machine Tool

3.1 Hob head

Material: Cast iron & Steel

Hob spindle motor: 1PH7133-2ND03-0BC2(SIEMENS)  12/16kW

Hob spindle bearing: B7017E. TPA. P4. UL

Hob spindle gear ratio: 3:1

Hob shift clamp: Disc spring (4 position), Clamping power 7.6ton

Hob swivel clamp: Disc spring (6 position), Clamping power 7.3ton

3.2 Tail stock

Material: Cast iron & Steel

Tail stock up/down cylinder: 35H-31FB63B400

(Clamp power at 30 bar: 840kgf)

Tail stock spindle bearing: B7010E.TPA.P4.UL

Tail stock clamp: Disc spring, Clamping power 1.5ton
3.3 Table(C-axis)

Material : Cast iron & Steel

Table(C-axis) Motor type :
  Built-in torque motor(Direct-Drive motor)

Table spindle bearing : NNU4938K P4

Table resolution : 0.001°

3.4 Bed

Material : Cast iron

Weight : 3,040kg

X-axis Ball screw : Ø50 x 907mm(Maker: CBC)

X-axis Ball screw bearing : 40TAC 90B DFD C10PN7A(Maker: NSK)

3.5 Column

Material : Cast iron

Weight : 1,850kg

Z-axis Ball screw : Ø50 x 850mm(Maker: CBC)

Z-axis Ball screw bearing : 40TAC 90B DFD C10PN7A(Maker: NSK)
3.6 Lubrication System

Lubrication tank for slideway
- Maker : Hansung
- Spec : HMGP303S-01-T12-F/P-F220

Lubrication tank for spindle gear box
- Maker : Hansung
- Spec : HMTP-3M-200-13MAVB(400x500x250)

3.7 Hydraulic System

Main Pump
- Maker : NACHI
- Spec : PVS-1B-22NS

Sub Pump
- Maker : SHIMADZU
- Spec : YP10-2.5A2H2-R

Sol V/V
- Maker : NACHI
- Spec : SS-G01-C5-R-C1-31(1EA), SS-G01-C6-R-C1-31(2EA), SS-G01-A3X-C1(4EA)

Hyd. Actuator
- Hob head unclamp, Hob swivel unclamp, Hob arbor unclamp, Hob arbor support Clamp/Unclamp, Tailstock Unclamp, Tailstock up/down, Work Clamp/Unclamp
3.8 Hobbing jig

Maker: S&T
Type: Collet, Face drive, Manual, Work arbor and Special type

3.9 Hob centering unit

Maker: S&T

3.10 Interactive Programming Environments

- Additional programming is not necessary. And gear processing is easy with just the input of specifications of hob cutter, workpiece, and cutting condition.
3.11 CNC Control System

- Controller: FANUC 18iM-B or SIEMENS 840D
- Controlled axis: 6-axis
- Simultaneous controlled axis: 4-axis
- Display unit: 8.4” Color LCD
4. Machine Tool Execution

4.1 Electrical equipment is adapted to the following parameters:
- Working voltage: 3 x 220V
- Frequency: 60Hz
- Control voltage: AC 110V
- Climate conditions: +10 ~ +35°C

NOTE:
The other parameters to be agreed. The working voltage and the frequency have to be finally specified in the Purchase Order. The adaption of the machine tool to the other voltage and/or frequency requires considerable modifications and results in higher costs.

4.2 Standard paint of the machine tools is as follows:
- Fixed elements: Dark Gray (8.3B 4.5/0.9)
- Movable elements: Bright Gray (2.2B 7.1/0.7)
- Platform, ladders: White (2.2B 8.8/0.6)

4.3 Technical acceptance of the machine tools at Manufacturer’s site will be carried out by S&T Dynamics Quality Control Department.

4.4 The geometrical accuracies of the machine tools will be checked according to KS standard defining the testing conditions of machine tools under no load or during finish machining conditions.
The geometrical accuracies of machine tools will be checked in ambient temperature of 20°C±1°C. Temperature fluctuation before 12 hours and during entire course of tests will not exceed 1°C. All thermal influences on tested machine tools from one side or draughts will be eliminated. Maximum gradient of changes in air temperature is 1°C at change in attitude by 5m. The machine tool will be installed on foundation separated from thermal influences, vibrations or shocks.
4.5 Positioning accuracies of assembly units of the machine tools will be tested in identical environmental conditions as those of the geometrical accuracies.

4.6 Preliminary acceptance of machine tools at Manufacturer’s will be carried out using both work piece and tools under the conditions complying with KS standard.

4.7 Final acceptance of the machine tool will be carried out at Purchaser and will include the following:
- The geometry check of machine tools
- Test of machining accuracies using test work piece.
Optionally, the acceptance tests may include machining of a Purchaser’s regular work piece. Purchaser is to supply work piece, tools and fixtures and machining software.
Optionally, the machining software can be elaborated during at site training as a result of co-operation between the Purchaser’s and Contractor’s programming engineers.

4.8 Machine tools will be executed according to the Korean standards of industrial safety regulations and a CE declaration will be provided.

4.9 S&T Dynamics has been awarded with the following certificates:

4.10 The Manufacturer reserves a right to introduce any of changes in the design of machine tools and the offer conditions resulted from the Purchaser’s additional requirements.
5. Standard Equipment

<table>
<thead>
<tr>
<th>No.</th>
<th>Description of Equipment</th>
<th>Price in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Main body</td>
<td></td>
</tr>
<tr>
<td>5.2</td>
<td>Full splash guard</td>
<td></td>
</tr>
<tr>
<td>5.3</td>
<td>Hob arbor set(Ø25.4)</td>
<td></td>
</tr>
<tr>
<td>5.4</td>
<td>Leveling bolt &amp; Base plate</td>
<td></td>
</tr>
<tr>
<td>5.5</td>
<td>Standard tool kit</td>
<td></td>
</tr>
<tr>
<td>5.6</td>
<td>Work light</td>
<td></td>
</tr>
<tr>
<td>5.7</td>
<td>Oil cooler</td>
<td></td>
</tr>
<tr>
<td>5.8</td>
<td>Hob centering unit</td>
<td></td>
</tr>
<tr>
<td>5.9</td>
<td>M.Q.L unit</td>
<td></td>
</tr>
<tr>
<td>5.10</td>
<td>Base jig(Collet type)</td>
<td></td>
</tr>
<tr>
<td>5.13</td>
<td>SIEMENS 840D</td>
<td></td>
</tr>
<tr>
<td>5.14</td>
<td>Operation and Maintenance Manual</td>
<td></td>
</tr>
<tr>
<td>5.15</td>
<td>CNC system operating and programming documentation</td>
<td></td>
</tr>
</tbody>
</table>

Total

Assembly, Installation, Commissioning, Training, Tests and Acceptance at Purchaser’s site

Note: costs of accommodation and travels of Manufacturer’s Installation Team is not included
6. Optional Equipment

<table>
<thead>
<tr>
<th>CODE</th>
<th>NAME</th>
<th>Price in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Magnetic separator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maker: CHANGYONG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type: Block magnet type</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil mist collector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maker: YHB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Model: YOC-350</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hob arbor set</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*. Maker: S&amp;T</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*. Model: Ø22, 22.225, 27, 31.75, 32, 38.1, 40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPECIAL - Ø12.7, 13, 16, 19.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hobbing jig</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*. Maker: S&amp;T</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*. Model: User specification</td>
<td></td>
</tr>
</tbody>
</table>
### Hob cutter

* Maker: DTR  
* Model: User specification

### Auto door

* Maker: SMC, TPC

### Transformer

* Maker: SUNJIN TRANS  
* Model: 60kVA

### Deburring unit

* Maker: S&T

### Skiving sensing unit

* Maker: S&T
### Auto loading system

- **Maker:** S&T
- **Model:** User specification

### Coolant oil cooler

- **Maker:** MASTERTEC
- **Model:** MSCC-3000F
7. Warranty

7.1 The product liability for the supplied machine tool expires after 12 months from a date of positive acceptance at Purchaser’s site, but not later than 18 months from a date of delivery. Extension of the warranty period by each next 12 months results in price increase by 5% of a subject of delivery.

7.2 Contractor guarantees free-of-charge after sales servicing of the machine tool during warranty period and commercial services after the warranty expires.

Response time of after sales service

- 24 hours – in Korea

- 72 hours – outside Korea,
8. Training

8.1 Training by Machine Tools Manufacturer

The Manufacturer will submit the training program for the Purchaser’s personnel carried out by the Manufacturer. The training amounting received by the operators and maintenance staffs of the Purchaser.
– during the machine tool commissioning at the Purchaser’s site

9. Related Documentation to Purchase Order

9.1 The scope of delivery according to items 5.14 and 5.15 of the Standard Equipment covers the following:
- Operation and Maintenance Manual related to machine tools including the mechanical, hydraulic and electrical parts
- CNC system operating and programming documentation
- Remaining documents related to the Purchase Order, e.g. packing list, shipping documents, etc.