SIGMA 20 / SIGMA 32
Sliding headstock single spindle automatic lathe
TORNOS PROVIDES SOLUTIONS TO HIGH-TECH INDUSTRIES SPECIALISING IN THE FOLLOWING SECTORS

AUTOMOTIVE

MEDICAL

ELECTRONICS

MICROMECHANICS
SIGMA 20 / SIGMA 32
IN A FEW WORDS!

The only sliding headstock automatic lathe on the market being able to produce parts using machining data of a fixed headstock lathe.

**Simplicity**
- Mirror like kinematic.
- Tool offsets 100% numerical.
- 2 independent tool systems: tooling completely compatible and interchangeable.

**Performance**
- High productivity.
- Identical main and counter spindles.
- Independent roughing tool.
- High power for optimum chip removal.
- Easy to set up.

**Rigidity**
- High machine rigidity, identical in main and counter operations.
- Capable of machining parts using machine data of a fixed headstock machine.
- Construction verified with finished elements.

**SIGMA 32 machining example**
Material: 316 Stainless Steel Ø 26 mm
Cycle time: 83 seconds

- Tuning of the middle dia with 2 tools, roughing and finishing simultaneously.
- Depth of cut: 4,5 mm.
- RPM: 2,800.
- Feed rate: 0.2 mm/rev = 6.4 sec.
- Gear cut by polygoning: 12 seconds.
SIGMA 20 / SIGMA 32
A KINEMATIC GEARED TOWARD MULTI TASKING AND PERFORMANCE!

Polyvalent
- The majority of tool holders and accessories can be mounted on either tool systems.
- Wide array of heavy duty tool holders, allowing to efficiently machine added high value operations up to 28 tool positions.

Performance
- Great capacity of large chip removal.
- Including the roughing tool, it is possible to have 3 tools in the cut simultaneously.
Rigidity
- The SIGMA 20/32 is the only lathe on the market offering identical rigidity in main and counter operations.
- Identical spindle in main and counter operations with the same great power (6.0/7.5 kW).

Simplicity
- Programming choice, ISO or TB-DECO (optional).
- ISO programming is very simple thanks to the 2 independent channels concept.
- Optimal ergonomic to facilitate the changing and setting of the tools (option).
- Tool pre-setting system.

Coupled with the Tornos SBF 532 bar loader the SIGMA 20/32 machines form a true and ideal machining cell from a single source supplier.
SIGMA 20 / SIGMA 32
A KINEMATIC ORIENTED TOWARD PERFORMANCE AND PRODUCTIVITY

- Kinematics with two completely independent tool systems.
- Open machining area provides optimum chip removal.
- Very easy access to tooling.
- Fully independent counter-spindle.

- Mirror-like kinematics providing complete flexibility for front and back operations.
- Tool offsets completely numerical.
- High pressure preparation.
<table>
<thead>
<tr>
<th>Axis</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1</td>
<td>Sliding headstock</td>
<td>Main spindle</td>
</tr>
<tr>
<td>C1</td>
<td>Axis C sliding headstock (option)</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>Main spindle</td>
<td></td>
</tr>
<tr>
<td>X1 / Y1</td>
<td>Platten 1 (main operations)</td>
<td>Motorisation of tools – main operations</td>
</tr>
<tr>
<td>S11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X4 / Y4</td>
<td>Platten 2 (back operations)</td>
<td>Motorisation of tools – back operations</td>
</tr>
<tr>
<td>S41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z4</td>
<td>Counter-spindle</td>
<td>Counter spindle</td>
</tr>
<tr>
<td>C4</td>
<td>Axis C counter spindle (option)</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SIGMA 20 / SIGMA 32
MULTI TASKING: THE GUARANTEE OF HIGH FLEXIBILITY!

- The tool holder system combines accuracy with flexibility and interchangeability.

- Attachments for operations such as polygon turning and thread whirling are easily integrated on the main spindle.

- A total of 28 tool positions allowing the machining of multiple operations. Depending on the machine configuration, we can have up to 12 rotating tools.

- All tool holders are designed with a quick change system.
Roughing tool, activated by M codes. (SIGMA 32 only).

End working tool block with 7 positions, Ø 20 mm bores, for steady tools.

Pre-settable turning tool holder for work in main or counter operations.

Adjustable angle drilling or milling attachment. Can be mounted in main or counter operations.

Double cone collet for headstock.

Motorized end working tool block for up to 4 rotating or steady tools.
SIGMA 20 / SIGMA 32
SIMPLICITY: THE GUARANTEE OF USER-FRIENDLY OPERATION!

The new Tornos innovations coupled with tried and tested solutions will very quickly enable the operator to successfully use the Sigma 20 & Sigma 32.

- Rapid tool changing systems.
- Entirely numeric tool setting and adjustment (all tools are fitted on 3 axes with no mechanical adjustments).
- Very easy programming in ISO language thanks to the kinematic concept that uses two completely independent tool systems.

- TORNOS macro assistant simplifies cutting, bar feeding and bar end operations.
- ISO programming and TB-DECO as an option.
- Manual Pulse Generator (setting of the tools + scrolling of part program).
SIGMA 20 / SIGMA 32
RIGIDITY: THE GUARANTEE OF QUALITY MACHINING

- With 3 times more rigidity in counter operations than its competitors, the SIGMA 20/SIGMA 32 enable a profitability of up to 30% better for parts requiring balanced machining in main and counter operations.

- Identical rigidity and identical spindles in main and counter operations.

- The tool wear and the machining quality are directly connected to the machine rigidity. On the SIGMA 20/SIGMA 32 there is longer the need to favor the machining operations at the bushing so to optimize quality and the machining autonomy of the machine.

- Main and counter spindle on the same plane.

- Damping system to absorb the rapid moves.
SIGMA 20 / SIGMA 32
PERFORMANCE:
THE GUARANTEE OF OPTIMUM PRODUCTIVITY

- The power of the SIGMA 32 main spindle (6.0/7.5 kW) added to the roughing tool grants the SIGMA the capacity of substantial chip removal.

- The spindles have a very strong clamping force. It is also possible to use double cone collets in main operations and a large opening collet in counter operations if needed.

- SIGMA 20 and SIGMA 32 have identical power and rigidity in main and counter operations.

- All machining operations such as turning, drilling, radial milling, axial drilling can also be done in counter operations.

- Machining in counter operations is 100% overlapped.
## TECHNICAL SPECIFICATIONS

### MAIN OPERATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SIGMA 20</th>
<th>SIGMA 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1 axis travel (sliding headstock) (mm / Inch)</td>
<td>230 / 9.06</td>
<td>230 / 9.06</td>
</tr>
<tr>
<td>Bar capacity (mm / Inch)</td>
<td>20 (25.4) / 1</td>
<td>32 / 1.26</td>
</tr>
<tr>
<td>Main spindle speed max. (rpm)</td>
<td>10'000</td>
<td>0-8'000</td>
</tr>
<tr>
<td>Main spindle power (kW)</td>
<td>3.7 / 5.5</td>
<td>6.0 / 7.5</td>
</tr>
<tr>
<td>Clamping collets</td>
<td>F20; F25; F30</td>
<td>F25; F30; F37</td>
</tr>
<tr>
<td>Guide bush</td>
<td>Fixed; turning; Habegger</td>
<td>Fixed; turning; Habegger</td>
</tr>
<tr>
<td>Number of tools for main operations</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Speed of S11 rotating tools (rpm)</td>
<td>10'000</td>
<td>10'000</td>
</tr>
<tr>
<td>Rotating tool section (mm / Inch)</td>
<td>16 x 16 / 0.63 x 0.63</td>
<td>16 x 16 / 0.63 x 0.63</td>
</tr>
<tr>
<td>Number of radial rotating tools</td>
<td>4 max.</td>
<td>4 max.</td>
</tr>
<tr>
<td>Number of axial rotating tools</td>
<td>4 max.</td>
<td>4 max.</td>
</tr>
</tbody>
</table>

### COUNTER OPERATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SIGMA 20</th>
<th>SIGMA 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping range of the counter spindle (mm / Inch)</td>
<td>20 (25.4) / 1</td>
<td>32 / 1.26</td>
</tr>
<tr>
<td>Counter spindle speed max. (rpm)</td>
<td>10'000</td>
<td>0-8'000</td>
</tr>
<tr>
<td>Counter spindle power (kW)</td>
<td>3.7 / 5.5</td>
<td>6.0 / 7.5</td>
</tr>
<tr>
<td>Clamping collets</td>
<td>F20; F25; F30</td>
<td>F25; F30; F37</td>
</tr>
<tr>
<td>Number of tools for counter operations</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Speed of S41 rotating tools (optional) (rpm)</td>
<td>10'000</td>
<td>10'000</td>
</tr>
<tr>
<td>Rotating tool section (mm / Inch)</td>
<td>16 x 16 / 0.63 x 0.63</td>
<td>16 x 16 / 0.63 x 0.63</td>
</tr>
<tr>
<td>Number of radial rotating tools</td>
<td>4 max.</td>
<td>4 max.</td>
</tr>
<tr>
<td>Number of axial rotating tools</td>
<td>4 max.</td>
<td>4 max.</td>
</tr>
</tbody>
</table>

### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SIGMA 20</th>
<th>SIGMA 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of linear axes</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Rapid traverse rate (m/min)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>3'000</td>
<td>3'000</td>
</tr>
<tr>
<td>Dimensions (length x width x height) (mm / Inch)</td>
<td>2'400 x 1'380 x 2'050 / 94.5 x 54.5 x 80.8</td>
<td>2'400 x 1'380 x 2'050 / 94.5 x 54.5 x 80.8</td>
</tr>
<tr>
<td>Installed power (KVA)</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>
SIGMA 20 / SIGMA 32
TECHNICAL SPECIFICATIONS

NUMERICAL CONTROL

FANUC 31i numerical control
10.4" colour screen
Manual Pulse Generator (setting of the tools + scrolling of part program)
Ethernet interface, RS232, Flash memory card
ISO programming
64 KBytes program memory
32 tool geometries and 32 tool correctors
Tool radius compensation
Loading and editing of part program as a background task
Display of work hours and part counter
Display of the component cycle time or a specific operation
Standard basic cycles: initialization, new part, new bar
Tool adjustment cycle
Standard tool threading cycle
Rigid tapping function
G96 constant surface speed function
S1 indexing by increments of 0.001 degree on the main spindle
Simple stop function on counter spindle

Max bars | L | L1 | L2
---------|---|----|----
3200     | 7575| 6455| 4055
4200     | 8575| 7455| 5055
length (mm) | 3200 | 280 | 185
length (Inch) | 12 ft | 324 |

SIGMA 20 / 6  |  SIGMA 32 / 6
SIGMA 20 / SIGMA 32
TECHNICAL SPECIFICATIONS
### NUMERIC CONTROL MEMORY AND SOFTWARE OPTIONS

- C1 axis operation on main spindle
- S4 indexing by increments of 0.001 degree on the counter spindle
- Function of axis C4 on counter-spindle
- Up to 8 MBytes of memory for part programs
- 64 tool geometries and 64 tool correctors
- Inch/metric
- Chamfer or radius at stop + angle programming
- Interpolation in polar co-ordinates (Transmit function)
- Helicoidal interpolation (X, Y, and Z with G2 or G3)
- Cylindrical interpolation
- Polygon function with two spindles
- Graphical view of the tool's trajectory
- Factory operations: drilling/stripping
- Customer B macro
- Management of Tool Service Life
- Linear increment of the tool wear in X
- Numeric control interface for automatic correction of dimensions by RS232
- Automatic machine warm-up cycle
- Ethernet interface for production control (OEE)
- TB-DECO programming

### STANDARD ACCESSORIES

- Part catcher
- Removable chip tray
- Oil tank
- Coolant pump
- Work light
- Electrical interface for bar loader
- Electrical interface for fire prevention system

### OPTIONAL ACCESSORIES

- Additional coolant pump for cooling via the inside of tool holders (Sigma 20)
- Swarf conveyor
- Tool breakage detector
- Part conveyor belt
- Device for long parts
- Mist collector
- 20 and 120 bar high-pressure device
- Device for regulating cutting oil temperature
- Fire prevention system
- Tool presetter
- Automatic bar loader

### COMPLIES WITH CE AND CEM STANDARDS