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5-axis Workholding

This work-piece clamping system maximizes the performance of your 5-axis machining center

The HSK interface (between the head and the work-holder) and the dovetail clamping (between the work-holder and the work-piece) create a compact design with less interference and high rigidity for metalworking applications

- The rigid system developed for metalworking applications.
- No interference and superior accessibility.
- Handling the work-piece is easy using a general-purpose robot.

Supports Various Work-Piece Shapes
Swift Klamp

5-axis Workholding

Dovetail Clamping System

Strong Clamping with Small Clamping Area

- By minimizing the clamping surface of the work-piece, optimum tool holder accessibility is possible.
- It allows stable and heavy machining from various directions without the work-piece rising.

![Dovetail Clamping vs Conventional Clamping](image)

<table>
<thead>
<tr>
<th>HSK Type</th>
<th>Clamping Force (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSK-A40</td>
<td>10</td>
</tr>
<tr>
<td>HSK-A63</td>
<td>20</td>
</tr>
<tr>
<td>HSK-A100</td>
<td>30</td>
</tr>
</tbody>
</table>

HSK Interface

Strong Clamping

- Uses the HSK-A type, time-proven tool holder shank to connect the head and the work-piece holder.

Superior Bending Rigidity

- The dovetail clamping work-holder with the HSK head works with heavy-duty milling.

![HSK Clamping Force](image)

- N: 1273 min⁻¹
- F: 190 mm/min

Carbide Drill: 6300 N
Swift Klamp 5-axis Workholding

High Positioning Accuracy

<table>
<thead>
<tr>
<th>Concentricity</th>
<th>Rotating Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2 \mu m/L$</td>
<td>$0.1 - 0.3 mm/D$</td>
</tr>
</tbody>
</table>

Concentricity $L$

$L = 3 \times D$

Z Axis Direction

$1 \mu m/L$

Offsetting the work-piece position in the rotating direction using a touch probe

- Measuring two locations along the work-piece side face using a touch probe enables you to offset the machine table angle easily.

BLUM high accuracy touch probe

Quick Work-piece Changing (Manual Clamping Head)

Off-line setup in advance allows quick work-piece changing, minimizing machine downtime.

For Automation (Hydraulic Automatic Clamping Head)

The hydraulic clamping design allows for automated work-piece changing, and makes it possible for you to combine your machining centers with robots to create a fully-automated system.
The Swift Klamp System:

**Workpiece Options**
- Dovetail (max. □ 200mm)
- Large Diameters (max. 200mm)
- Rectangular (max. depth 30mm)
- Square (max. 40mm)
- Small diameters (max. 25mm)

**Workholder Options**
- Dovetail Clamping Page 9
- Dovetail Vise Pages 9-10
- Flange Clamping Pages 14-15
- Side Clamp A Page 16
- Side Clamp B
- Collet Holder

**Head Options**
- Manual Clamping
  - Manual Clamping Head Page 8
  - Mounting Plate
- Automatic Clamping
  - Hydraulic Automatic Clamping Head Pages 17-18
  - Mounting Plate

**Machine Table**
## Manual Clamping Head (Manual Exchange)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HSK Type</th>
<th>Fig.</th>
<th>T</th>
<th>ØD</th>
<th>ØH</th>
<th>G1</th>
<th>G2</th>
<th>PCD</th>
<th>Clamping Force</th>
<th>Kg</th>
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<tr>
<td>MHK40-50</td>
<td>HSK-A40</td>
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<td>40</td>
<td>100</td>
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<td>M6x30</td>
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<td>70</td>
<td>63</td>
<td>125</td>
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<td>50</td>
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</table>

### Option
- Mounting plate
- T-handle wrench
- Mounting bolt×4pcs.

### Standard Accessories
- The manual clamping hole on the work holder is required for mounting.
- When you can't install it directly on the machine table, please use the mounting plate.
- Contact us about the custom-made mounting plate for your machine table.

### Mounting Plate

In the case where you can't mount the head directly to your machine table, please use this mounting plate. We can supply a blank that is customisable and also manufacture a special mounting plate just for you. For more information, please feel free to contact us.

### Table

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HSK Type</th>
<th>Fig.</th>
<th>T</th>
<th>ØD</th>
<th>ØH</th>
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Dovetail Clamping

Dovetail Workholder

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<th>G</th>
<th>SW</th>
<th>Kg</th>
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<td>M10</td>
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<td>M12</td>
<td>10</td>
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</table>

**Note**
Dovetail machining of the work-piece clamping area using an angular cutter is required prior to machining.

**Dovetail Vice A**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HSK Type</th>
<th>S</th>
<th>W</th>
<th>G (depth)</th>
<th>L</th>
<th>L_1</th>
<th>Kg</th>
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<td>HSK-A63</td>
<td>110</td>
<td>36–80</td>
<td>24 – M8(10)</td>
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<tr>
<td>DAK100-140</td>
<td>HSK-A100</td>
<td>140</td>
<td>36–110</td>
<td>52 – M8(10)</td>
<td>100</td>
<td>35</td>
<td>9.9</td>
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</table>

**Standard Accessories**
- 8mm hex wrench

**Note**
- Dovetail machining of the work-piece clamping area using an angular cutter is required prior to machining.
- Work-piece clamping jaws move individually.
- Please use screw holes on the top face as necessary.
Dovetail Vice

Dovetail Vice B

<table>
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<tr>
<th>Part No.</th>
<th>HSK Type</th>
<th>No. of Grooves</th>
<th>B</th>
<th>W</th>
<th>G (depth)</th>
<th>L</th>
<th>L</th>
<th>Kg</th>
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<td>90</td>
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<td>140</td>
<td>12–73</td>
<td>30 – M4(6)</td>
<td>100</td>
<td>35</td>
<td>7.7</td>
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Standard Accessories

- 8mm hex wrench

Note

- Dovetail machining of the work-piece clamping area using an angular cutter is required prior to machining.
- Work-piece clamping jaws move individually.
- Please use screw holes on the top face as necessary.

Dovetail Preparation Process
Dovetail Preparation

Dovetail Grooving | Dovetail Dimensions

<table>
<thead>
<tr>
<th>Work holder Size</th>
<th>W</th>
<th>H</th>
<th>P</th>
<th>SW</th>
<th>SD</th>
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</thead>
<tbody>
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<td>17.5</td>
<td>2.5</td>
<td>2.5</td>
<td>4</td>
<td>2</td>
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<td>25</td>
<td>25</td>
<td>3.5</td>
<td>2.5</td>
<td>6</td>
<td>2.5</td>
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<td>35</td>
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<tr>
<td>70</td>
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</tr>
<tr>
<td>100</td>
<td>100</td>
<td>10.5</td>
<td>26</td>
<td>15</td>
<td>4</td>
</tr>
</tbody>
</table>

Procedures for Machining a Work-piece

1. Pre-machining a dovetail on the work-piece using the angular cutter.
2. Insert the dovetail into the dovetail groove, tighten it and you are ready to machine.
3. Cut off the work-piece dovetail.

Swift Klamp Dovetail Cutter

The Swift Klamp dovetail cutter can be used to prepare all workpieces for all the Swift Klamp dovetail systems. The TDC60A three flute solid carbide (micrograde) 60 degree angle dovetail cutter is intended for hard-material workpieces: steel, titanium, and others.

All Swift Klamp Dovetail work holders are attached to the workpiece using a simple dovetail. Setup is quick, easy and dovetail work holders only require the minimum of material to hold the workpiece. That means less waste, easy preparation, and no distortion to the workpiece.

- Suitable to machine Aluminium, Steel and Titanium
- Solid carbide (Micrograin Grade)
- Fully CNC ground
- One size fits all - Swift Klamp dovetail cutter to suit all workholder sizes

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Cutter Ø D1</th>
<th>Shank Ø D2</th>
<th>Neck Ø D3</th>
<th>Cutter Length L1</th>
<th>Cutting Head Depth L2</th>
<th>Cutter Angle A</th>
<th>Corner Radius R</th>
<th>No. of Flutes</th>
<th>Weight Kgs</th>
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<tr>
<td>TDC60A</td>
<td>20</td>
<td>20</td>
<td>8.45</td>
<td>90</td>
<td>10</td>
<td>60°</td>
<td>0.3</td>
<td>3</td>
<td>0.25</td>
</tr>
</tbody>
</table>
Swift Klamp
5-axis Workholding

Pre-machining Vice for Raw Billet Dovetail Preparation

- High rigidity steel body
- Low height – offering a large machining area
- Aluminium jaws provided as standard allowing irregular and circular workpieces to be gripped by forming
- Large jaw opening allowing up to 204mm workpieces to be gripped.
- Stable clamping force provided by the mechanical force amplifier toggle mechanism
- Minimal jaw lift – 0.015mm or less

Aluminium Jaws Application

Irregular Workpiece Gripping

Model | Clamping Force Range | 3 | 2 | 1 | 0
--- | --- | --- | --- | --- | ---
VC103N | 20kN | 15kN | 10kN | 8kN
VC104N | 20kN | 19kN | 17kN | 13kN

* Zero range means clamp without a step-up mechanism. Clamp force shows an allowable amount.

Other vice specifications are available. For more information, please contact us.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>Max. Clamping force kN</th>
<th>Kg</th>
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<tbody>
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<td>181</td>
<td>204</td>
<td>112</td>
<td>20</td>
<td>19</td>
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</tbody>
</table>

Standard Accessories

- Clamp device assembly (clamp device, T-nut(s), bolt(s), washer(s)), handle, L-shaped hexagonal wrench, C-caps, slide cover.

Option

- Parallel clamp device, stepped guide block, ratchet handle, extension bar, soft jaws (a set of moving side and fixed side jaws).
- The guide block can be changed to suit the machine. In this case please contact us.
Swift Klamp 5-axis Workholding

**Machine Ready Dovetailed Prototype Blanks**

Pre-machined prototype blanks enable you to use your Swift Klamp system straight away

Swift Klamp Dovetailed prototype blanks are available in EN3B Steel (UK: 070M20, Germany: CK20, France: C18) or He30 Aluminium (UK: 6082-T6, Euro Std: EN-AW-6082, Sweden: 6082) and are supplied as standard sizes specified below. Each blank includes a machined dovetail feature to match your specific Swift Klamp dovetail work holder, ready to go into your machining centres and start cutting straight away.

Maximize your investment in Swift Klamp dovetail work holders with ‘ready to go’ dovetailed blanks which enables you to:

- Prototype and test your machining process
- Reduce setup time, including the number of setups
- Make fixturing and clamping faster and easier

<table>
<thead>
<tr>
<th>Work Holder Size</th>
<th>Part No.</th>
<th>Raw Billet dimensions A x B x C</th>
<th>Raw Billet Weight (EN3B Steel) Kgs</th>
<th>Wedge Width W</th>
<th>Wedge Height H</th>
<th>Slot offset P</th>
<th>Slot width SW</th>
<th>Slot Depth SD</th>
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Standard Machine Ready Dovetailed Prototype Blanks

- Other dimensions are available – for more information, contact us.

[Image of RB25-558 pre-machined aluminium dovetailed blank with positioning slot]
Flange Clamping

Flange Clamp Workholder

Centering Boss (Flange Clamping)

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<th>ØD2</th>
<th>ØD3</th>
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<th>h2</th>
<th>T1</th>
<th>T2</th>
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<th>G2</th>
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Standard Accessories
- Center bolt (G1) x 1pc.
- Set screw (G2) x 3pcs.
- M6 special small head bolt (the head diameter size is the same as the M5 bolt) x 3pcs.
- Adapter

Note
- Centering boss
- Adapter

Not Option
- Use the G2 set screw when you use the center blot to clamp the work-piece. When you need whirl-stop machining of a work-piece, make a flat surface on the work-piece and clamp it using a set screw (G2).

When you do not want the work-piece to rotate, make a flat surface on the ØD (B1) of the boss, and fix it using a set screw (G2).
Swift Klamp  
5-axis Workholding

**Adapter (Flange Clamping)**

- Used with the flange clamping work holder
- Minimizing clamping area for a small-size work-piece, reducing the machining interference area.

**Work-piece Mounting Methods**

**Center Bolt Type**
The center bolt clamps the work-piece from behind the work holder taper shank.

**Flange Tap Type**
The work-piece is clamped using the thread on the work holder. Screw holes are required on the work-piece.

**Flange Bolt Type**
Bolts clamp the work-piece through the work holder bolt holes. Screw holes are required on the work-piece.

**Using an Adapter**
The small work-piece is mounted using a adapter with a large diameter holder.

---

**Adapter (Flange Clamping)**

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<th>T,</th>
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**Standard Accessories**
- Center screw (G,) × 1pc.
- Set screw (G,) × 3pcs.
- Fixing bolt (G,) × 3pcs.

**Note**
- Clamp the work-piece with the center bolt (G,). When you do not want the work-piece to rotate, secure the chamfering surface using a set screw.
Side Clamp Workholder

**Side Clamp A**

![Diagram of Side Clamp A]

<table>
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<th>HSK Type</th>
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<th>W₂</th>
<th>B</th>
<th>L</th>
<th>L₁</th>
<th>ØC</th>
<th>H</th>
<th>H₁</th>
<th>G₁</th>
<th>G₂</th>
<th>G₃</th>
<th>Kg</th>
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**Standard Accessories**

- Large screw (G₁) × 2 pcs.

**Side Clamp B**

![Diagram of Side Clamp B]

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<th>H₁</th>
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<th>Kg</th>
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**Standard Accessories**

- Large screw (G₁) × 4 pcs.
Overview of Automation

The System Development with the Systems Integrator

- We can provide the Swift Klamp operation unit, pump unit, work-stocker, robot finger and tool holder.
- Required specifications at 5-axis machining center, plumbing of 2 channels of hydraulic and 2 channels of pneumatic are required.
- Contact us for details.

Hydraulic Automatic Clamping Head (Automatic Exchange)

We can provide the Swift Klamp operation unit, pump unit, work-stocker, robot finger and tool holder.

**Part No.** | HSK Type | L | ØD | ØD₂ | ØS₃(h6) | L₁ | G | PCD₁ | PCD₂ | Clamping Force kN | Max Loading Weight | Kg
---|---|---|---|---|---|---|---|---|---|---|---|---
AHK40-64 | HSK-A40 | 64 | 40 | 70 | 45 | 35 | M5x20 | 55 | 35 | 6 | 50 | 1.1
AHK63-89 | HSK-A63 | 89 | 63 | 100 | 65 | 50 | M6x30 | 80 | 55 | 24 | 140 | 3.1
AHK100-139 | HSK-A100 | 139 | 100 | 140 | 100 | 80 | M8x45 | 120 | 88 | 55 | 640 | 9.7

Note: Hydraulic capacity: 3.5MPa
Hydraulic Automatic Clamping Head Specifications

**Seating Confirmation**

- HSK Two Face Contact
- Surface
- Head
- Clamping (hydraulic)
- Mounting Plate
- Work Holder

**Low-pressure Hydraulic (3.5MPa) System**

- 3.5MPa
- Prevents the intake of cutting chips into the head
- Detecting poor work holder seating

**Mounting Plate**

A mounting plate is required for the hydraulic clamping-type auto-head. The mounting plate is the adapter for installation on the machine table and for connecting the hydraulic and pneumatic lines.

**Note**

Please provide us with a detailed drawing of your machine table and the plumbing drawing of your hydraulic and pneumatic lines. We can design and produce an exclusive mounting plate, so please contact us for more information.
Direct Clamping (Direct Mounting Type on the Machine Table)

- It clamps a work-piece with the shortest length thanks to direct mounting on the table, and provides a larger machining area.

Dovetail Clamping

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Standard Accessories
- Fixing bolt × 4 pcs.

Note
- Dovetail machining of the workpiece clamping area using an angular cutter is required prior to machining.
- The mounting plate is required to install it on the machine table.

Option
- Mounting plate

Flange Clamping

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Standard Accessories
- Fixing bolt × 4 pcs.

Note
- The mounting plate is required to install it on the machine table.

Option
- Mounting plate • Positioner boss • Adapter

Mounting Plate

The mounting plate is required to install the direct clamping type, Smart Grip, on the machine table. We can design and produce an exclusive mounting plate to meet your needs, so please contact us for more information.

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Angular Cutter
For more information, please go to page 11.
Using the charts below, please confirm the machining load limits for your work-piece size (length L and dia R). When you start machining using the Smart Grip, reduce the machining load 60–80% based upon the chart. Please choose the optimum work holder for your machining conditions.

(ex.) The value of maximum cutting force

Maximum cutting force?

Please confirm the machining load limit value (N) of the HSK-A63 with L=175mm from the chart. Max. 4,000N (please start at 2,400–3,200N)