EXPERTISE IN MACHINING

ConeFit™ – for maximum flexibility.
ConeFit™ – Modular system for milling

THE TOOL SYSTEM
- Modular solid carbide milling system with self-centring thread (patent pending)
- Maximum concentricity thanks to conical centring
- The axial planar contact face ensures excellent rigidity
- Diameter range from 10 to 25 mm
- Extensive range of high-performance changeable heads for machining a wide variety of materials from ISO groups P, M, K, N, plus geometries for machining graphite
- TAX, TAZ, diamond (DIA) coating
- Steel and solid carbide shanks in different designs and lengths in mm and inches
- Monoblock adaptors in HSK63, SK40, MAS BT 40 and Capto C5 and C6

THE APPLICATION
- For the ISO material groups P, M, K, N, S, O
- For roughing and finishing all contours and machining an extremely wide variety of different shapes
- For use in general mechanical engineering, the automotive, energy, aerospace and mould and die making industries.

SPADE
- Low-cost Spade type variant
- Directly extruded including chip clearance
- Diameter range from 10 to 16 mm

THE APPLICATION
- Plunge milling, chamfering, centre-marking or spot-facing of holes

BENEFITS FOR YOU
- Modular design with different shank variants
- Extremely wide variety of different tool geometries
- Extremely high level of stability and precision due to planar and tapered contact surface with patented self-centring thread
- Long tool life in graphite machining applications thanks to special diamond coating and new geometries
- Large chip clearance on the Spade variant
ConeFit™ –
Selected examples from the range

Tool for graphite machining

- Optimised macrogeometry specifically developed for graphite
- DIA coating
- With corner radius for a stable cutting edge
- 4 cutting edges with corner radius

Tool for steel machining

- Optimised microgeometry specifically developed for ISO P materials
- TAZ coating
- ConeFit™ interface
- 4 cutting edges with differential pitch

Tough Guys – For universal application

- TAX coating
- With or without corner radius
- 50° helix angle
- 4 cutting edges with differential pitch

ConeFit™ Spade high-feed cutter with special Flash geometry

- TAX coating
- Long cutting edge 0.8 x D₁
- E10 to E16
- 10° helix angle
- Large chip space thanks to extruded variant

N 50 Tough Guys
H3E21317
H3E20317 with corner radius

N 10 Spade
H3E21317
H3E20317 with corner radius

Solid carbide milling
THE TOOL
- A solid carbide high-performance end mill specially designed for machining stainless steels
- Available with and without corner radius
- Corner radius from 0.5 to 4 mm
- Diameter range from 10 to 25 mm
- 50° helix angle
- 4 and 5 cutting edges
- ConeFit™ interface from E10 to E25
- TAA coating

THE APPLICATION
- Primary application: ISO material group M
- Secondary application: ISO material group S
- For roughing and finishing
- Machining full slots up to 0.55 x Dc
- Pocket milling, inclined plunging and contour milling
- Ideally suited to machines with an internal coolant supply
- Areas of use: General mechanical engineering, and the energy, medical and aerospace industries

BENEFITS FOR YOU
- Maximum metal removal rates which are up to 50% higher than the conventional modular tools on the market
- High metal removal rates which lead to high productivity when machining of stainless steels
- Low-vibration running due to the special helix and pitch
- Soft cutting action thanks to optimised microgeometry
- The highest level of process reliability through optimum chip evacuation due to the internal coolant supply
- Maximum tool life thanks to state-of-the-art TAA coating and internal coolant supply
THE TOOL
- Solid carbide high performance cutter with special high-feed geometry for machining stainless steels
- Diameter range from 10 to 25 mm
- 50° helix angle
- 4 cutting edges
- ConeFit™ interface from E10 to E25
- TAA coating

 Demo workpiece

| Workpiece material: | X6CrNiMoTi17 (1.4571) ISO M |
| Tensile strength: | 700 N/mm² |
| Tool: | Proto·max™ Inox with ConeFit™ interface H2EC38217-E12-12-0.5 |

<table>
<thead>
<tr>
<th>Cutting data</th>
<th>Previously without internal cooling</th>
<th>Proto-max™ Inox with internal cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø</td>
<td>12 mm</td>
<td>12 mm</td>
</tr>
<tr>
<td>z</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>ae</td>
<td>10 mm</td>
<td>10 mm</td>
</tr>
<tr>
<td>ap</td>
<td>2 mm</td>
<td>2 mm</td>
</tr>
<tr>
<td>vc</td>
<td>82 m/min</td>
<td>82 m/min</td>
</tr>
<tr>
<td>n</td>
<td>2200 rpm</td>
<td>2200 rpm</td>
</tr>
<tr>
<td>fz</td>
<td>0.05 mm</td>
<td>0.05 mm</td>
</tr>
<tr>
<td>vf</td>
<td>433 mm/min</td>
<td>433 mm/min</td>
</tr>
</tbody>
</table>

Tool life in metres

<table>
<thead>
<tr>
<th>Tool life in metres</th>
<th>Previous</th>
<th>Proto-max™ Inox</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>35</td>
</tr>
</tbody>
</table>

+75%
ConeFit™ – System overview

100% flexibility
All adaptors accommodate all cutters

Shoulder milling

Slot/shoulder milling

Cylindrical adaptors

Type B
Carbide
AK610...C

Type A
Carbide
AK610...C

Type C
Steel
AK610

Type B
Steel
AK610

Type A
Steel
AK610

Type A
Steel reinforced
AK610

Monoblock adaptors

Walter Capto™
C5 + C6
AK601

HSK 63A
AK631

SK40 +
MAS-BT 40
AK641

Proto∙max™
H2E34217

Proto max™ Inox
H2EC34217

AL 45
Z = 3
H6E2211

AL 45
Z = 2
H6E2511

Qmax F 40
H3E82378

Qmax F 45
H3E85378

Tough Guys
H4E34217

H6E2211

H6E2511

N 50
H3E23138

H3E21138

N 50
H3E21138

With radius

Z = 2

Z = 3

Solid carbide milling
### Slot/shoulder milling with corner radius

- **Proto∙max™ Inox**
  - H2EC94717
  - N 10
  - H1E12018

- **Proto∙max™ Inox**
  - H2EC38217
  - N 50 for graphite
  - H3E20419

- **Flash**
  - Z = 4
  - H3E94718

- **Flash**
  - Z = 3
  - H3E93718

- **Spade**
  - N 40
  - H6E2311

- **Proto max™ ST**
  - H4E38217

- **Tough Guys**
  - H3E20317

### Copy milling

- **Spade**
  - N 10
  - H1E92718

- **Flash**
  - Z = 4
  - H3E94718

- **Flash**
  - Z = 3
  - H3E93718

### Profile milling

- **Spade**
  - M 40
  - H8E11118

- **N 40**
  - Z = 2
  - H8E11118

- **Chamfer milling cutter 120°**
  - Z = 6
  - H3E58118

- **Corner rounding end mill**
  - Z = 4
  - H3E58118

- **Chamfer milling cutter 90°**
  - Z = 2
  - H1E58018

- **Chamfer milling cutter 80°**
  - Z = 2
  - H1E58018

- **Chamfer milling cutter 120°**
  - Z = 2
  - H1E58118

- **Chamfer milling cutter 20°**
  - Z = 2
  - H1E58018

- **Chamfer milling cutter 90°**
  - Z = 2
  - H1E58018

- **Chamfer milling cutter 60°**
  - Z = 2
  - H1E58018
## ConeFit™ – Tool description (selected examples)

<table>
<thead>
<tr>
<th>Features</th>
<th>Tool Type</th>
<th>Remarks on field of application</th>
<th>Workpiece material group</th>
<th>P</th>
<th>M</th>
<th>K</th>
<th>N</th>
<th>S</th>
<th>H</th>
<th>O</th>
<th>Helix angle</th>
<th>Coating</th>
</tr>
</thead>
</table>
| Roughing   | Qmax          | Qmax HR  
Solid carbide roughing milling cutters with HR Kordel profile  
Without internal cooling  
Can be used purely for roughing operations  
Particularly suitable for unstable conditions | Steel  
Stainless steel  
Cast iron  
NF metals  
Difficult-to-machine materials  
Heat resistant  
Other | ● | ● | ● | ● | ● | 45° / 50° | TAX |
|            | Flash         | N 50 to 55 HRC  
Solid carbide milling cutters with special end geometry for Hi-Feed machining  
Without internal cooling  
For universal use | Steel  
Stainless steel  
Cast iron  
NF metals  
Difficult-to-machine materials  
Heat resistant  
Other | ● | ● | ● | ● | ● | 50° | TAX |
|            | Proto-max™ ST | 4-edge tools  
Solid carbide high performance cutters for machining slots to a depth of 0.4 x Dc  
With or without corner radius  
Specially developed for steel materials, but also includes stainless materials | Steel  
Stainless steel  
Cast iron  
NF metals  
Difficult-to-machine materials  
Heat resistant  
Other | ● | ● | ● | ● | ● | 50° | TAZ |
|            | Tough Guys    | N 50 to 48 HRC  
Solid carbide high performance cutters with or without corner radius  
For universal use | Steel  
Stainless steel  
Cast iron  
NF metals  
Difficult-to-machine materials  
Heat resistant  
Other | ● | ● | ● | ● | ● | 50° | TAX |
|            | Ball-nose copy mills | N 10 to N 40  
2 to 4 cutting edges  
With centre cut  
For roughing, semi-finishing and finishing contours | Steel  
Stainless steel  
Cast iron  
NF metals  
Difficult-to-machine materials  
Heat resistant  
Other | ● | ● | ● | ● | ● | 10° / 40° | Uncoated / TAX |
|            | Multipurpose cutters | N 50  
Solid carbide high performance cutters with 6 to 8 cutting edges  
Dc Diameters from 10 to 25 mm  
50° helix angle specially developed for finishing operations | Steel  
Stainless steel  
Cast iron  
NF metals  
Difficult-to-machine materials  
Heat resistant  
Other | ● | ● | ● | ● | ● | 50° | TAX |
**ConeFit™ – Application examples**

### Support arm: Contour milling

**Workpiece material:** 1.4301 (XCrNi1810) Stainless Steel  
**Tool:** ConeFit™ Tough Guys  
H3E20317-E16-16  
Diameter 16 mm, Z=4, R=2

**Cutting data**

<table>
<thead>
<tr>
<th>Competition</th>
<th>ConeFit™</th>
</tr>
</thead>
<tbody>
<tr>
<td>(v_c)</td>
<td>126 m/min</td>
</tr>
<tr>
<td>(n)</td>
<td>2507 rpm</td>
</tr>
<tr>
<td>(z)</td>
<td>4</td>
</tr>
<tr>
<td>(f_z)</td>
<td>0.07 mm</td>
</tr>
<tr>
<td>(V_f)</td>
<td>700 mm/min</td>
</tr>
<tr>
<td>(a_p)</td>
<td>5 mm</td>
</tr>
<tr>
<td>(a_e)</td>
<td>8 mm</td>
</tr>
</tbody>
</table>

**Total costs per batch (in EUR)**

<table>
<thead>
<tr>
<th>Competition</th>
<th>ConeFit™</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 3100</td>
<td>€ 1950</td>
</tr>
</tbody>
</table>

The result:  
Reduction of tool costs by 63 %

### Valve bank: Slot milling

**Workpiece material:** 1.4301 (XCrNi1810) Stainless Steel  
**Tool:** ConeFit™ ball-nose copy mill  
H8E11118-E16-16  
Diameter 16 mm, Z=4, R=8

**Cutting data**

<table>
<thead>
<tr>
<th>Competition</th>
<th>ConeFit™</th>
</tr>
</thead>
<tbody>
<tr>
<td>(v_c)</td>
<td>50 m/min</td>
</tr>
<tr>
<td>(n)</td>
<td>995 rpm</td>
</tr>
<tr>
<td>(z)</td>
<td>4</td>
</tr>
<tr>
<td>(f_z)</td>
<td>0.04 mm</td>
</tr>
<tr>
<td>(V_f)</td>
<td>150 mm/min</td>
</tr>
<tr>
<td>(a_p)</td>
<td>3 mm</td>
</tr>
<tr>
<td>(a_e)</td>
<td>8 mm</td>
</tr>
</tbody>
</table>

**Machining time per component (in seconds)**

<table>
<thead>
<tr>
<th>Competition</th>
<th>ConeFit™</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 sec.</td>
<td>36 sec.</td>
</tr>
</tbody>
</table>

The result:  
Reduction of machining time by 94 %, with simultaneous increase from 7 to 15 components per tool.

### Supercharger block: Shoulder milling

**Workpiece material:** 0.7060 (GGG60) SG Iron  
**Tool:** ConeFit™ N 50 multi purpose cutter  
H3E21138-E25-25  
Diameter 25 mm, Z=8

**Cutting data**

<table>
<thead>
<tr>
<th>Competition</th>
<th>ConeFit™</th>
</tr>
</thead>
<tbody>
<tr>
<td>(v_c)</td>
<td>212 m/min</td>
</tr>
<tr>
<td>(n)</td>
<td>2790 rpm</td>
</tr>
<tr>
<td>(z)</td>
<td>4</td>
</tr>
<tr>
<td>(f_z)</td>
<td>0.03 mm</td>
</tr>
<tr>
<td>(V_f)</td>
<td>324 mm/min</td>
</tr>
<tr>
<td>(a_p)</td>
<td>2 mm</td>
</tr>
<tr>
<td>(a_e)</td>
<td>18 mm</td>
</tr>
</tbody>
</table>

**Total costs (in EUR)**

<table>
<thead>
<tr>
<th>Competition</th>
<th>ConeFit™</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 41,100</td>
<td>€ 22,800</td>
</tr>
</tbody>
</table>

The result:  
Reduction of machining time by 54 % and therefore a cost saving of 45 %.
ConeFit™ – Solutions for special tools from blanks

Blanks for special forms
– For manufacturing special solutions, such as a T-slot cutter with ConeFit™ interface
– Available with the interface sizes E10, E12, E16, E20 and E25

Tabular overview for overlength blanks (up to 1.5 x Dc)
– For manufacturing special solutions with ConeFit™ interface
– Available with the interface sizes E10, E12, E16, E20 and E25

<table>
<thead>
<tr>
<th>Dc (mm)</th>
<th>Lc (mm)</th>
<th>d1 (mm)</th>
<th>l2 (mm)</th>
<th>l4 (mm)</th>
<th>d4 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,2</td>
<td>15,8</td>
<td>9,7</td>
<td>33,4</td>
<td>22,6</td>
<td>E10</td>
</tr>
<tr>
<td>12,2</td>
<td>18,8</td>
<td>11,7</td>
<td>40,1</td>
<td>26,7</td>
<td>E12</td>
</tr>
<tr>
<td>16,2</td>
<td>24,8</td>
<td>15,5</td>
<td>51,5</td>
<td>34,9</td>
<td>E16</td>
</tr>
<tr>
<td>20,2</td>
<td>30,8</td>
<td>19,3</td>
<td>60,1</td>
<td>41</td>
<td>E20</td>
</tr>
<tr>
<td>25,2</td>
<td>38,3</td>
<td>24,2</td>
<td>74,1</td>
<td>50,5</td>
<td>E25</td>
</tr>
</tbody>
</table>