335.19 & 335.18 DISC MILLING CUTTERS RANGE UPDATE AND ADDITIONS
SAFETY FIRST

Safety is our top priority

- Emergency Exit
- Emergency Number
- Alarm
- Assembly Point
- Protective Equipment
- Psychological Safety
AGENDA

- Introduction
- Why update the range? What customer issues are addressed?
- Technology and range updates
- Applications and targeted components
- Technical information and recommendations
- Competition landscape and Unique Selling Points (USPs)
- Support materials
- Summary
INTRODUCTION
Introduction

What is new?

The expanded range of 335.19 and 335.18 disc milling cutters are now upgraded with Combimaster™ connections, central coolant and close-pitch design.

- 335.19 cutter: now available with Combimaster™ connection from M10 to M20, from ø40-125 mm (1.5" to 4")
- 335.18 cutter: now available with Combimaster™ connection from M10 to M20, from ø32-63 mm (1.25" to 2")
WHY UPDATE THE RANGE?
WHAT CUSTOMER ISSUES ARE ADDRESSED?
What customer issues are addressed?

- Disc milling operations can be hard processes to optimize, especially in difficult-to-machine materials.
- The new 335.19 and 335.18 disc cutter has been developed to keep all kinds of disc milling operations smooth and problem free.
- Customers’ challenges and Seco’s solutions:
  - Lack of reliability, poor chip control, especially in sticky materials
  - High tooling cost with inconsistent insert life, particularly in areas difficult to access with external coolant
  - Underutilized machine tool capabilities (coolant through the spindle)

  **SECO’S SOLUTION**
  Internal coolant channels

  - Need greater productivity to ensure our customer’s competitiveness
  - Poor process stability
  - Struggling with slow feeds and speeds
  - Underutilized machine tool capabilities (high-speed machining)

  **SECO’S SOLUTION**
  Close-pitch pocket design and carbide inserts with four cutting edges

  - Limited radial and axial reach range for disc milling
  - Time-consuming tool assembly and spare parts management
  - Complicated tool management with too many items
  - Single-purpose tools limit flexibility and increase inventory cost

  **SECO’S SOLUTION**
  Modular Combimaster™ connection
TECHNOLOGY AND RANGE UPDATES
The new optimized design of the pocket seat and the chip flute enable close-pitch capabilities while ensuring a maximum radial engagement up to 30% of the diameter of the cutter. The resulting increase in strength of the pocket seat and the larger number of teeth significantly improve productivity and process stability.

The new 335.19 and 335.18 cutter are applicable to any type of machine – even the lighter ones – thanks to a product range starting from Ø32mm (1.25").

The internal coolant channels are directed towards the insert tip to optimize chip formation and evacuation for the most reliable processes possible, a particularly beneficial feature for applications involving sticky materials.

The tightened Combimaster™ connection offers high rigidity along with an increased radial depth-of-cut capacity, offering an exceptionally flexible solution that will always work with the appropriate holder configuration.

The 335.19 and 335.18 cutter bodies are made with nickel-coated hardened steel for the best possible stability to enable long body life and reduced tooling costs over time.
335.19 Range

- Ø40 mm Ø1.5"
- Ø50 mm Ø2.0"
- Ø63 mm Ø2.5"
- Ø80 mm Ø3.0"
- Ø100 mm Ø4.0"
- Ø125 mm
335.19 Range – Metric

NEW features in red

<table>
<thead>
<tr>
<th>ø40 mm</th>
<th>ø50 mm</th>
<th>ø63 mm</th>
<th>ø80 mm</th>
<th>ø100 mm</th>
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<tbody>
<tr>
<td>• Combimaster™ M10</td>
<td>• Combimaster™ M12 (instead of M16)</td>
<td>• Combimaster™ M16</td>
<td>• Combimaster™ M16</td>
<td>• Combimaster™ M20</td>
<td>• Combimaster™ M20</td>
</tr>
<tr>
<td>• Aₚ 4 &amp; 5 mm (ZNP=4)</td>
<td>• Aₚ 4 &amp; 5 mm (ZNP=6) close pitch</td>
<td>• Aₚ 4 &amp; 5 mm (ZNP=8) close pitch</td>
<td>• Aₚ 4&amp;5 mm (ZNP=10) close pitch</td>
<td>• Aₚ 4 &amp; 5 mm (ZNP=14) close pitch</td>
<td>• Aₚ 4&amp;5 mm (ZNP=16) close pitch</td>
</tr>
<tr>
<td>• Internal coolant</td>
<td>• Aₚ 6mm (ZNP=4)</td>
<td>• Aₚ 6 &amp; 7/8 mm (ZNP=6)</td>
<td>• Aₚ 6 &amp; 7/8 mm (ZNP=8)</td>
<td>• Aₚ 6mm (ZNP=12) close pitch</td>
<td>• Aₚ 6 mm (ZNP=12) close pitch</td>
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<td>• Internal coolant</td>
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</table>
NEW features in red

335.19 Range – Inch

**Ø1.5”**
- **Combimaster™ M10**
- \( A_p \) 0.156 & 0.187” (ZNP=4)
- **Internal coolant**

**Ø2.0”**
- **Combimaster™ M12** (instead of M16)
- \( A_p \) 0.15” & 0.18” (ZNP=6) close pitch
- \( A_p \) 0.250” (ZNP=4)
- **Internal coolant**

**Ø2.5”**
- **Combimaster™ M16**
- \( A_p \) 0.156” & 0.187” (ZNP=8) close pitch
- \( A_p \) 0.250” (ZNP=6)
- **Internal coolant**

**Ø3.0”**
- **Combimaster™ M16**
- \( A_p \) 0.156” & 0.187” (ZNP=10) close pitch
- \( A_p \) 0.250” (ZNP=8)
- **Internal coolant**

**Ø4”**
- **Combimaster™ M20**
- \( A_p \) 0.156” & 0.187” (ZNP=14) close pitch
- \( A_p \) 0.250” (ZNP=12) close pitch
- **Internal coolant**
335.18 Range

ø32 mm
ø1.25"

ø40 mm
ø2.0"

ø50 mm

ø63 mm
335.18 Range – Metric

NEW features in red

Ø32 mm
- Combimaster™ M10
- $A_p$ 8 & 10 mm (ZNP=4) close pitch
- Internal coolant

Ø40 mm
- Combimaster™ M12
- $A_p$ 8 & 10 mm (ZNP=4)
- Internal coolant

Ø50 mm
- Combimaster™ M16
- $A_p$ 8 & 10 & 12 mm (ZNP=6)
- Internal coolant

Ø63 mm
- Combimaster™ M20
- $A_p$ 8 & 10 & 12 mm (ZNP=8)
- Internal coolant
### 335.18 Range – Inch

<table>
<thead>
<tr>
<th>ø1.25”</th>
<th>ø1.5”</th>
<th>ø2.0”</th>
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</thead>
<tbody>
<tr>
<td><strong>NEW features in red</strong></td>
<td><strong>NEW features in red</strong></td>
<td><strong>NEW features in red</strong></td>
</tr>
<tr>
<td>• Combimaster™ M10</td>
<td>• Combimaster™ M12</td>
<td>• Combimaster™ M16</td>
</tr>
<tr>
<td>• Aₚ 0.312” &amp; 0.375” (ZNP=4) close pitch</td>
<td>• Aₚ 0.312” &amp; 0.375” (ZNP=4)</td>
<td>• Aₚ 0.312” &amp; 0.375” &amp; 0.500” (ZNP=6)</td>
</tr>
<tr>
<td>• Internal coolant</td>
<td>• Internal coolant</td>
<td>• Internal coolant</td>
</tr>
</tbody>
</table>
APPLICATIONS AND TARGETED COMPONENTS
Applications

- The 335.19 and 335.18 disc milling cutters are suitable for:
  - Linear slotting
  - Slotting by circular interpolation
  - Back facing
  - Cutting-off operations (up to a maximum width of 8 mm)

- Any type of insert corner radius can be applied to these cutters, including both SNHQ and LNK inserts from radius 0.2 mm up to radius 4 mm. Full radius profile is available for the 335.19 cutter.

- With a range of cutter diameters starting from Ø32 mm/1.25", with close-pitch design and internal coolant, these cutters are well-suited for small, light and fast machines or multi-tasking platforms.
Target Components

**Aerospace**: structural parts, casing (slotting and back facing)
- Internal coolant offers consistent and long tool life in S materials as well as reliable chip evacuation.

**Automotive**: steering knuckles, break disc balancing, turbo housing, connecting rod (slotting, cutting-off, half side and facing)
- Close-pitch design provides higher productivity and stability.
- Internal coolant eases machining for difficult cast irons.
- May be attached to a robotic arm for automated production.
- Combimaster™ connection extends the tool’s reach.

**Medical**: various parts (cutting-off)
- Internal coolant, close-pitch design and high radial reach offer superior performance.

**General engineering**: various parts (slotting, back facing or cutting off)
- The new range is specifically designed for the next generation of fast and light machines for the highest level of productivity.
Case Study

R335.19 (Ø100 mm)

Application: Cutting off titanium connecting rod (Ti-6Al-4V)
Machining Center: Makino with HSK 63

Previous solution:
- R335.19 (Ø100 mm, width 4 mm, 6 effective teeth)
- Insert SNHQ110208 M07 F40M
- External coolant
- $V_c = 38 \text{ m/min and } f_z = 0.08 \text{ mm/tooth}$

New solution:
- R335.19 (Ø100 width, 4mm, 7 effective teeth with internal coolant)
- Insert SNHQ110208 M07 F40M
- Central coolant
- $V_c = 38 \text{ m/min and } f_z = 0.08 \text{ mm/tooth}$

Benefits:
- Tool life up 50% from 48 to 72 pieces
- Productivity up 16% with one more effective tooth
- Better chip evacuation with internal central coolant
- Even insert wear between RH and LH side with ICC
- Consistent, predictable tool life
Case Study

R335.19 (ø100 mm)

**Application:** Slotting of a steel clamping device (SMG P8, X210CrW12)

**Machining Center:** Deckel Maho DMC-60T

**Previous solution:**
- R335.19 (ø100 mm, width 6 mm, 5 effective teeth)
- Insert SNHQ120312TR/L4-M07 F40M
- External coolant
- $V_c = 200$ m/min and $f_z = 0.047$ mm/tooth

**New solution:**
- R335.19 (ø100 mm, width 6 mm, 6 effective teeth with internal coolant)
- Insert SNHQ120312TR/L4-M07 F40M
- Central coolant
- $V_c = 200$ m/min and $f_z = 0.047$ mm/tooth

**Slot:**
- Width: 6 mm
- Depth: 23 mm

**Benefits:**
- Tool life doubled
- Productivity up 16% with 1 more effective tooth
- Radial reach up 50%, no need to rework the cutter
Case Study

R335.19 (ø125 mm)

**Application:** Side milling and slotting of a steel forklift chain adjuster (SMG P5)

**Machining Center:** Kitamura with 50 taper spindle

**Previous solution:**
- ø100 mm cutter modified for slotting & ø125 mm cutter for side milling
- Insert SNHQ110304TR/L4-M07 F40M
- External coolant
- Slotting: $V_c = 170$ m/min and $f_z = 0.1$ mm/tooth
- Side Milling: $V_c = 220$ m/min and $f_z = 0.15$ mm/tooth

**New solution:**
- R335.19 (ø125 mm, width 5 mm, **8 effective teeth with internal coolant**)
- Insert SNHQ110304TR/L4-M07 F40M
- Central coolant
- $V_c = 220$ m/min and $f_z = 0.047$ mm/tooth

**Benefits:**
- Slotting productivity doubled
- One tool for all operations
- Uniform, predictable insert wear
- Safe chip formation and evacuation with internal coolant channels

**Slots:**
- width: 5 mm
- depth: 25 mm

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TECHNICAL INFORMATION AND RECOMMENDATIONS
Maximum Radial Engagement

Due to the close-pitch design, we recommend not exceeding a radial engagement of 30% of the cutter diameter when slotting to ensure good chip evacuation, especially in sticky materials (low-carbon steel, stainless steel, aluminum, titanium, high-temp alloys, etc.).

High-pressure internal coolant is highly recommended to help in evacuating the chips from the cut.

Max \( a_r = 30\% \) of DC
Extended Radial Reach

The new 335.19 range is particularly beneficial when you are looking for long radial reach (CDX) with a limited cutter diameter (DC). It is a unique feature to Seco Tools and offers a great advantage considering the limitations of some machine tool magazines capacities when it comes to large cutter diameter (quite often the limitation is ø125 mm). Additionally, smaller cutter diameters reduce torque and increase productivity (higher rpm).

Examples:

- New 335.19 Combimaster™ cutter ø125 mm offers larger CDX than B type 335.19 cutter ø160 mm!
- New 335.19 Combimaster™ cutter ø100 mm offers larger CDX than B type 335.19 cutter ø125 mm!
- New 335.19 Combimaster™ cutter ø80 mm offers larger CDX than B type 335.19 cutter ø100 mm!
Holder Recommendations

For the best results in terms of precision, reliability and stability, it is recommended to use the Seco Combimaster™ holders 5820/5821/5822 with R335.19 and R335.18 cutters.

Benefits of Combimaster™

▪ Internal coolant with no dedicated holder (Coromant uses dedicated holders that are only compatible with their slim disc milling cutter, for example).
▪ A broad range of holders available with short and long reach for all connection types, with even more additional holders with longer reach capabilities coming with Combimaster™ M20 in SN2020.1.
▪ Easy-to-use system with no spare or loose parts.
▪ Optimal radial reach (a_r), especially in comparison to shell-type end mills.
▪ Extra long reach available with Steadyline® Combimaster™ Holder (EPB K820/821).
Wrench for Combimaster™ Connection

### Combimaster size:

![Combimaster size diagram]

<table>
<thead>
<tr>
<th>Combimaster size</th>
<th>X (mm)</th>
<th>Y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M06</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>M08</td>
<td>6.5</td>
<td>11</td>
</tr>
<tr>
<td>M10</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>M12</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>M16</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>M20</td>
<td>11.5</td>
<td>32</td>
</tr>
</tbody>
</table>

### Wrench - acc. to ISO 10102 / NF E 74-304 / DIN 3110

![Wrench diagram]

<table>
<thead>
<tr>
<th>A (mm)</th>
<th>E (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>3.8</td>
</tr>
<tr>
<td>11</td>
<td>5.1</td>
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<tr>
<td>15</td>
<td>5.8</td>
</tr>
<tr>
<td>19</td>
<td>7.3</td>
</tr>
<tr>
<td>26</td>
<td>8.8</td>
</tr>
<tr>
<td>32</td>
<td>9.8</td>
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</tbody>
</table>

Example: double end

Example of end for dynamometric key

The Power series open end Wrench (used for very high tightening torque in metallic constructions for example), often available in workshops, are generally too thick for Combimaster head locking.
Wrench for Combimaster™ Connection (Inch)

Combimaster size:

<table>
<thead>
<tr>
<th>CombiMaster Size</th>
<th>X (inches)</th>
<th>Y (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M06</td>
<td>0.197</td>
<td>3/8</td>
</tr>
<tr>
<td>M08</td>
<td>0.256</td>
<td>7/16</td>
</tr>
<tr>
<td>M10</td>
<td>0.315</td>
<td>5/8</td>
</tr>
<tr>
<td>M12</td>
<td>0.394</td>
<td>3/4</td>
</tr>
<tr>
<td>M16</td>
<td>0.433</td>
<td>1 1/16</td>
</tr>
<tr>
<td>M20</td>
<td>0.453</td>
<td>1 1/4</td>
</tr>
</tbody>
</table>

Example: double end

Wrench - acc. to ANSI B107.100

<table>
<thead>
<tr>
<th>A (inch)</th>
<th>E (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>0.165</td>
</tr>
<tr>
<td>7/16</td>
<td>0.193</td>
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<tr>
<td>5/8</td>
<td>0.224</td>
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<tr>
<td>3/4</td>
<td>0.287</td>
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<tr>
<td>1 1/16</td>
<td>0.374</td>
</tr>
<tr>
<td>1 1/4</td>
<td>0.386</td>
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</tbody>
</table>

Example of end for dynamometric key

The Power series open end Wrench (used for very high tightening torque in metallic constructions for example), often available in workshops, are generally too thick for CombiMaster head locking.
## SNHQ Insert Recommendations – R335.19

<table>
<thead>
<tr>
<th>SMG</th>
<th>1st choice</th>
<th>If wear resistance needed</th>
<th>If more toughness needed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P</strong></td>
<td>P1-&gt;P5</td>
<td>M07 - F40M</td>
<td>M07 - MP2501</td>
</tr>
<tr>
<td></td>
<td>P6-&gt;P8</td>
<td>M07 - MP2501 &amp; F30M</td>
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<tr>
<td></td>
<td>P11-P12</td>
<td>M07 - F40M</td>
<td>M07 - MP2501</td>
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<tr>
<td><strong>H</strong></td>
<td></td>
<td>M07 - MP2501 &amp; F30M</td>
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</tr>
<tr>
<td><strong>M</strong></td>
<td></td>
<td>M07 - F40M</td>
<td>M07 - F30M</td>
</tr>
<tr>
<td><strong>K</strong></td>
<td></td>
<td>M07 - MP2501 &amp; F30M</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td></td>
<td>E05 -H25</td>
<td></td>
</tr>
<tr>
<td><strong>S</strong></td>
<td></td>
<td>M07 - F40M</td>
<td>M07 - F30M</td>
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**LNK. Insert Recommendations – R335.18**

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<tbody>
<tr>
<td><strong>P</strong></td>
<td>M06 - F40M</td>
<td>M06 - MP2501 / MP3000</td>
<td>M06 - MM4500</td>
</tr>
<tr>
<td></td>
<td>P1-P5</td>
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<td>P11-P12</td>
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<tr>
<td></td>
<td>P6-P8</td>
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<td></td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>M06 / MD08 - MP2501 &amp; M06 MP3000</td>
<td></td>
<td>M06 - F40M</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>M06 - F40M</td>
<td>M06 - MP3000</td>
<td>M06 - MM450M</td>
</tr>
<tr>
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<td>M06 / MD08 - MK2050</td>
<td>M06 / MD08 - MK1500</td>
<td>M06 - F40M</td>
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<tr>
<td><strong>N</strong></td>
<td>E05 - H25</td>
<td></td>
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</tr>
<tr>
<td><strong>S</strong></td>
<td>M06 - F40M</td>
<td>M06 - MP3000</td>
<td>M06 - MM4500</td>
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</tbody>
</table>
SUPPORT MATERIAL
Support Materials Available

- Seco News Summary brochure
- Seco News 2019.2 catalog pages
- Milling Navigator updates
- PowerPoint presentation
- Video demonstration
- Animation showing assembly of Combimaster™ cutter and holder coolant-through capability
Summary

Range Overview

- R335.19
  - Available from Ø40 to Ø125 mm / Ø1.5" to Ø4.0"
  - Width from 4 to 8 mm / 0.156" to 0.250"
- R335.18
  - Available from Ø32 to Ø63 mm / Ø1.25" to Ø2"
  - Width from 8 to 12 mm / 0.312" to 0.500"

Key features and main issues addressed

- Internal coolant channels across the range ensures problem-free disc milling operations
- Close-pitch design increases productivity and reduces production cost
- Modular Combimaster™ connection makes for easy and simple tool management