TAPER-FACE TOOLHOLDERS
Introduction

- Influences of the machine tool on a machining process
  - Current requirements are very high for production companies. Machining time and process reliability are key factors in production.
    - A winning solution requires optimised performance of the machine tool.
    - The machine tool interface influences performance. However, when new investments are made, users often don’t give enough importance to the choice of the interface. Some tests or specific analysis are only done partially for certain applications but rarely for a complete machining process with different requirements.
  - In this process, there are two interfaces to take into account:
    1. The interface machine – toolholder
    2. The interface toolholder – cutting tool
Introduction

- The optimal interface: machine - toolholders
  - In order to have the best machining results, the interface machine - toolholder must have maximum rigidity. This can be achieved by:
    - reducing the overall length of the toolholder
    - Increasing the bearing surface e.g.: a contact with both cone and face, means Taper-Face.
  - In some machining processes, an important success factor is the precise positioning of the tool edge.
Introduction

- Requirements for toolholders
  - Rigidity
  - Clamping technology
  - Tightening force
  - Transmittable torque
  - Stability and smoothness of functioning
  - Balancing quality
  - Repeat accuracy
  - Run-out precision
  - Vibration absorption
  - Ease of use
  - Lifetime
  - Cost
Introduction

- The new range of Taper-Face tooling allows Seco to completely equip machine-tools with Taper-face spindle systems.

- Taper-Face spindle system connection types are BT TF, CAT TF and DIN TF.
  - BT TF spindle connection, also called BBT, is the most popular worldwide, mainly in the Asian market.
  - CAT TF spindle connection is common in the NAFTA market.
  - DIN TF spindle connection is mostly only used in Europe.
PRINCIPLE – HOW IT WORKS
Connection Illustration:
Taper-Face vs. Conventional taper

TAPER-FACE SPINDLE

Taper-Face holders

Dual contact

Gap

Conventional SA taper
Principle – how it works

- The Taper-Face Spindle System uses elastic deformation of the machine spindle to achieve simultaneous fit of both taper and flange face from holder.
  - During assembly just before complete clamping, the clearance between the taper and face contact is 0.02 mm.
Principle – How it works

- The Taper-Face Spindle System utilises elastic deformation of the machine spindle to achieve simultaneous fit of both taper and flange face from holder.
  - Machining position: Taper & Face contact due to elastic deformation
**Concept – Conventional taper vs. Taper-Face**

- The taper and face simultaneous contact results from a remarkable improvement of rigidity against bending in relation to the Ø:

  - **Example:**
    - BT 40 Conventional vs. BT 40 Taper-Face
    - With EPB 5600 shrinkfit, reinforced type and tool Ø25 mm.

  - The face contact provides a minimum of four times more rigidity for taper sizes 30, 40 and 50.
Concept – Why use a Taper-Face contact instead of Conventional taper?

- With Conventional taper, during machining at high speed rotation, a machine spindle expands due to centrifugal force and heat and pulls the toolholder in.
  - Variation of projection length in Z axis
  - Dilation due to heat

- With Taper-Face contact, the toolholder is not pulled into the machine spindle even at high speed rotation because the flange face fits the machine spindle nose.
  - Variation of projection length in Z axis is eliminated
  - Dilation due to heat will always exists
Concept – Why use a Taper-Face contact instead of Conventional taper?

- The difference is evident during machining. Below is a comparison of the Z axis at high speeds using BT TF 40 Conventional and Taper face contacts.
Summary – Taper-Face knowledge

- Technical characteristic differences between the Taper-Face vs. Conventional contact:
  - Higher rigidity due to larger contact diameter
    - Minimum of four times more vs. steep taper, especially for long overhang
  - Improved repeatability after Automatic Tool Change
  - Elimination of axial movement at high speeds
    - Higher run-out precision, better machining accuracy
  - Taper-Face tooling can be used on conventional steep taper spindles but it looses the face contact advantages.
PRODUCT RANGE – WORKPIECE SIDE TYPE
## Product range – Workpiece side type

<table>
<thead>
<tr>
<th>PRODUCT RANGE</th>
<th>Machine Side connection</th>
<th>BT Taper-Face size</th>
<th>CAT Taper-Face size</th>
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<tr>
<td>Code Type</td>
<td>Technology at Workpiece Side</td>
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Market overview

- Asia Pacific tooling systems market – feedback for Machine Tool Builders:
  - BT 40 Taper-Face and BT 50 Taper-Face spindle system
    - DECKEL MAHO
    - DOOSAN
    - MAKINO
    - MATSUURA
    - MAZAK
    - MORI SEIKI
    - OKUMA
    - STAMA
    - YASDA
    - Etc.
Market overview

- NAFTA tooling systems market – feedback for Machine Tool Builders:
  - BT 30 Taper-Face spindle system for MTB
    - FANUC Robodrill
    - DMG Mill/Tap
    - BROTHER Speedio
    - Etc.
  - CAT 40 & 50 Taper-Face spindle for MTB
    - MORI SEIKI
    - MAZAK
    - Etc.
Mounting possibility for Taper-Face holder

It is possible to fit a Taper-Face holder into a Conventional Steep Taper spindle, however, the face contact advantages are lost because of the clearance after mounting and locking.
Mounting possibility for Taper-Face spindle

It is possible to fit a conventional SA toolholder into a Taper-Face spindle, however, the Face contact advantages will be lost because of the clearance after mounting and locking.
Taper-Face Tooling range

- Launched in update catalogue 2016 -1, February 1\textsuperscript{st}, 2016.
- Released for sales November 11\textsuperscript{th}, 2015.