Troubleshooting and Wear Patterns
Core Hole

- **Out of Round Holes**
  - true circle

- **Hardened Holes**
  - actual hole
  - work hardened area

- **Undersized or Oversized Holes**

- **Badly Burred Holes**
  - burrs
Core Hole

- **Bell Mouth Tapered Holes**
  - Bell mouth
  - True hole

- **Bent or Crooked Holes**
  - Actual hole
  - True hole

- **Torn or Scored Holes**
  - Actual hole
  - True hole

- **Stepped Holes**
  - Actual hole
  - True hole
Reasons for Inaccurate Threads

- Tap drill too small
- Tap cuts with its root diameter
- Correct tap drill size
- Tap does not cut at its root

Material

Tap

Material

Tap
Reasons for Inaccurate Threads

- Mis-alignment
- Axial tension or compression
- Unsuitable geometry (wrong tap)
Thread Gaging

Go / No-Go Plug Gage

Go Plug Gage
- Checks lower limit of Pitch diameter
- Checks form roundness / straightness
- Checks lower limit of Major diameter

No-Go Plug Gage
- Checks upper limit of Pitch Diameter
- Should not exceed 2.5 turns
Axial Miscut

- Go Gage is unable to thread into part

- No Go Gage is able to thread into part more than 2.5 turns
Abrasion

Cause

• Low thread relief

• Inappropriate coating or surface treatment
Chipping on the chamfer

Cause

• Rake angle is too positive
• High tool hardness
Oversize threads

To avoid oversize threads:

• Check class of fit

• Rigid tapping / Synchronous machining

• Use a material specific tap

• Use a tap with lower spiral angle where appropriate

• Use taps that have had a special blasting treatment
Bird nesting

- Due to poor chip formation
- Occasional peaks in torque
- Results in tool chipping
- Breakage on small diameters
Bird nesting

**To improve chip formation:**

- Use bright or steam-oxide taps instead of PVD-coated tools
- Use THL instead of TIN and TICN
- Reduce the rake angle
- Shorten the chamfer length
- Reduce the number of flutes
Cold welding

Causes

• Thread relief too high
• Surface finish of tool inappropriate
Flank wear

Causes:

- Friction between the tool’s flank and workpiece due to relatively small relief angles
- Greater reliefs only possible with synchronous thread cutting!
Here, particularly in the core area of the first chamfer tooth.

Cause:
- Hardening of the core hole from drilling with solid carbide twist drill and oil as lubricant.
Flank wear

Wear on the first full tooth facilitates wear at the second tooth, etc.

The tapering of the guide section means that the cut thread becomes increasingly smaller.
Flank wear

Creation of burrs in the core of the internal screw thread particularly when the screw taps wear more in the core due to hardening of the core holes

Core diameter may therefore even become smaller!
Crater wear

Cause:
• Cutting speed too high

Occurs more in materials that are difficult to cut

Example:
Prototex ECO-HT in 42CrMo4
Rounded cutting edges

Cause:
- Sum of flank and face wear immediately on the cutting edge

Positively affects the creation of chips and true-to-gauge properties
Built-up-edge cutting

Causes:

• Insufficient cutting speed

• Insufficient lubrication
Bonded deposits

Causes:
- Insufficient lubrication
- Lacking or unsuitable coating
- Relief angle too small
Chipping on the heel

- Chips getting stuck during reversing
- Usually occurs in blind holes
Wear usually commences on the first full tooth

Causes:

- Material in the last deformation stage has already strain hardened the most
- Greatest exposure to pressure
Advanced wear

Wear progresses tooth by tooth in the guide section
Thank you