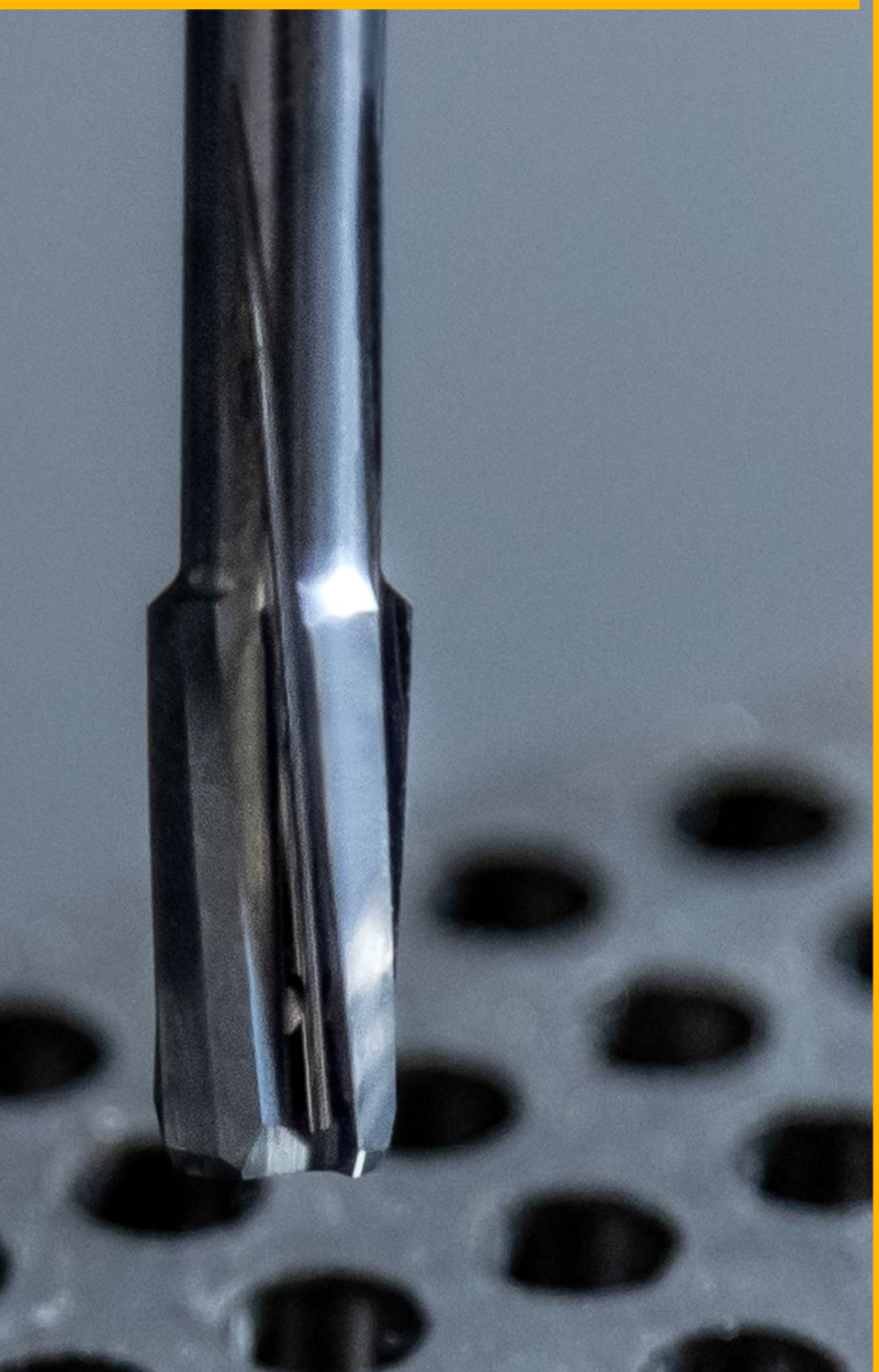
JSK PRECISION TOOLS LTD

# REAMERS



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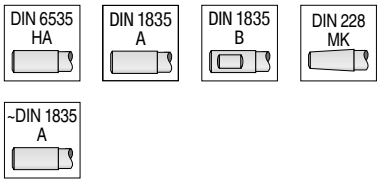
# Symbol explanation

## Shank



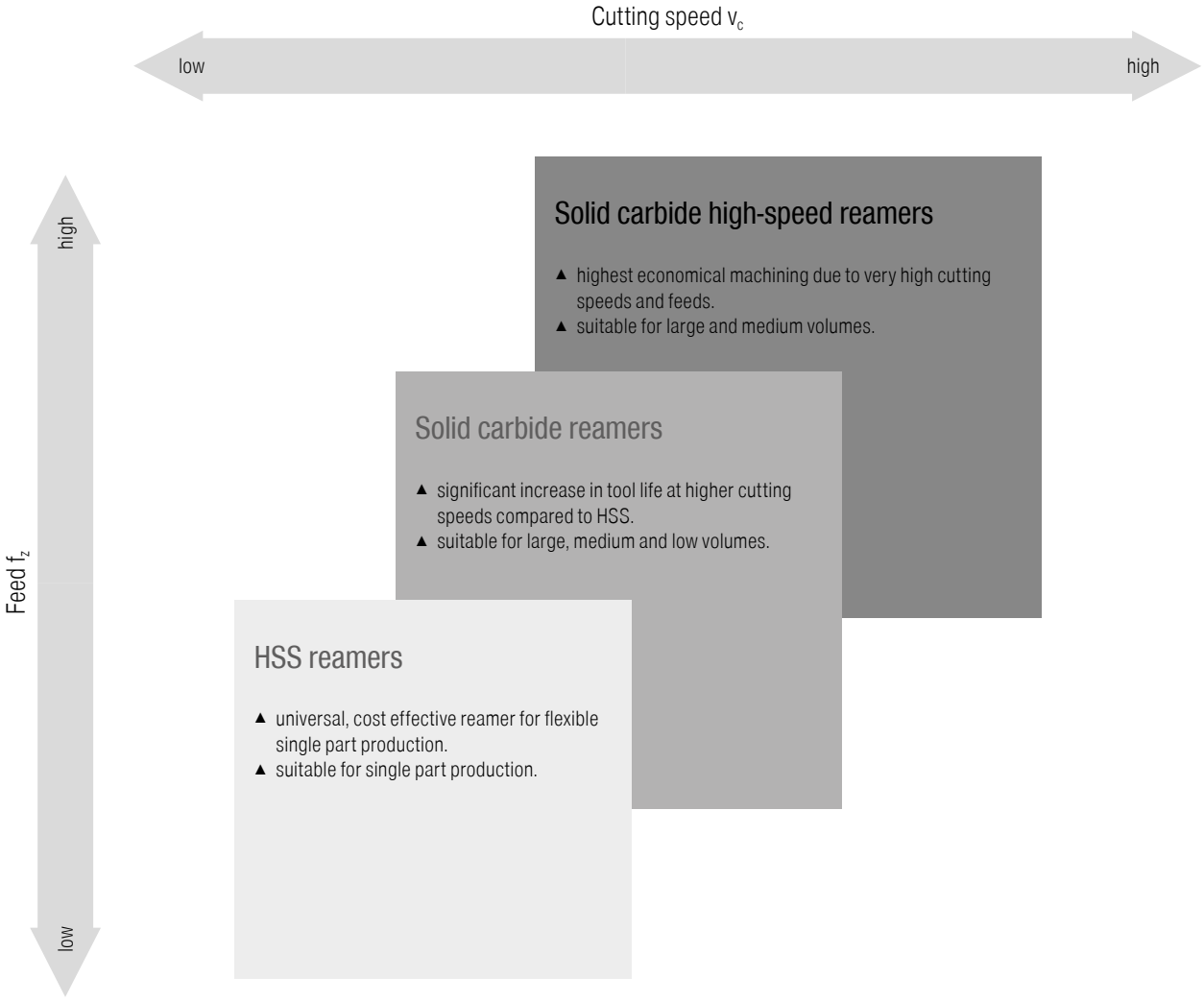

## Version

Central internal coolant

Lateral internal coolant

ZEFP = Number of teeth
● = **Main Application**
○ = Extended application

# Toolfinder – Reamers

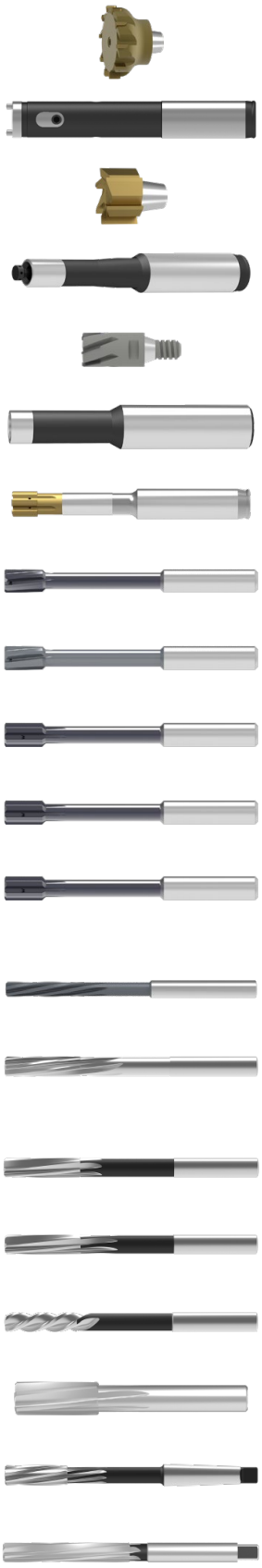


# Toolfinder – Reamers

Solid carbide – High speed reamers

Solid carbide – Reamers

HSS – Reamers



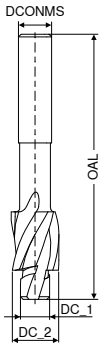
| Hole diameter in mm Ø DC | Standard tolerance | Through hole | Blind hole | Int. coolant supply | Steel | Stainless steel | Cast iron | Non-ferrous metals | Heat-resistant | Hardened materials |
|---|---|---|---|---|---|---|---|---|---|---|
| 18,00–65,00 | H7 | ✓ | ✓ | ✓ | ● | ● | ● | ● | | |
| | 1/100 | | | | | | | | | |
| | | | | ✓ | | | | | | |
| 12,50–40,00 | H7 | ✓ | ✓ | ✓ | ● | ● | ● | ● | | |
| | 1/100 | | | | | | | | | |
| | | | | ✓ | | | | | | |
| 8,00–30,20 | H7 | ✓ | ✓ | ✓ | ● | ● | ● | ● | ○ | |
| | 1/100 | | | | | | | | | |
| | | | | ✓ | | | | | | |
| 5,60–25,89 | H7 | ✓ | ✓ | ✓ | ● | ● | ● | | | |
| | 1/100 | | | | | | | | | |
| 4,00–16,00 | H7 | ✓ | ✓ | ✓ | ● | | ● | | | |
| 2,96–20,05 | 1/100 | | | | | | | | | |
| 4,00–16,00 | H7 | ✓ | ✓ | ✓ | | ● | | | | |
| 2,96–20,05 | 1/100 | | | | | | | | | |
| 2,96–20,05 | 1/100 | ✓ | ✓ | ✓ | | | ● | | | |
| 4,00–16,00 | H7 | ✓ | ✓ | ✓ | | | | ● | | |
| 2,96–20,05 | 1/100 | | | | | | | | | |
| 2,96–20,05 | 1/100 | ✓ | ✓ | ✓ | | | | | | ● |
| 2,00–30,00 | H7 | ✓ | | | ● | | ● | ● | ○ | |
| 0,59–12,05 | 1/100 | | | | | | | | | |
| 2,00–12,00 | H7 | ✓ | | | ● | | ● | ● | ○ | |
| 1,50–20,00 | H7 | ✓ | | | ● | ○ | ● | ● | ○ | |
| 0,95–12,00 | 1/100 | | | | | | | | | |
| 1,00–20,00 | H7 | ✓ | | | ● | ○ | ● | ● | ○ | |
| 0,95–12,00 | 1/100 | | | | | | | | | |
| 1,00–20,00 | H7 | ✓ | | | ● | | | ● | | |
| 4,00–20,00 | H7 | ✓ | | | ● | ○ | ● | ● | ○ | |
| 3,76–12,00 | 1/100 | | | | | | | | | |
| 16,00–50,00 | H7 | ✓ | | | ● | ○ | ● | ● | ○ | |
| 1,00–40,00 | H7 | ✓ | | | ● | ○ | ● | ● | ○ | |

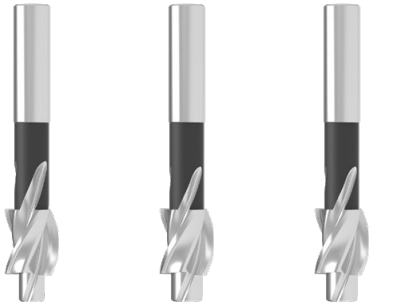
# Countersinks Overview

| | Coating | Hole diameter in mm Ø DC | Point angle | Steel | Stainless steel | Cast iron | Non-ferrous metals | Heat-resistant | Hardened materials |
|---|---|---|---|---|---|---|---|---|---|
| **Indexable Insert Counterbore Tool** | | | | | | | | | |
|  | | 15,0–33,0 | | ● | ○ | ● | ● | ○ | |
| **HSS – Counterbores** | | | | | | | | | |
|  | | 6,0–20,0 | | ● | ● | ● | ● | ○ | |
| **Solid Carbide Countersinks** | | | | | | | | | |
|  | | 6,3–31,0 | 90° | ● | ○ | ● | ● | ○ | ○ |
|  | | 12,5–25,0 | 60° | ● | ○ | ● | ● | ○ | |
|  | | 10,4–31,0 | 90° | ● | ○ | ● | ● | ○ | |
| **HSS Countersinks** | | | | | | | | | |
|  | | 6,3–25,0 | 60° | ● | ○ | ● | ● | ○ | |
|  | | 16,0–80,0 | 60° | ● | ○ | ● | ● | ○ | |
|  | Ti50 | 4,3–31,0 | 90° | ● | ○ | ● | ● | ○ | |
|  | | 4,3–31,0 | 90° | ● | ○ | ● | ● | ○ | |
|  | TiN | 5,0–31,0 | 90° | ● | ○ | ● | ● | ○ | |
|  | TiAlN | 5,0–31,0 | 90° | ● | ○ | ● | ● | ○ | |
|  | TiAlN | 6,3–31,0 | 90° | | ● | | | | |
|  | | 6,3–31,0 | 90° | | | | ● | | |
|  | | 16,5–80,0 | 90° | ● | ○ | ● | ● | ○ | |
|  | | 6,3–25,0 | 120° | ● | ○ | ● | ● | ○ | |

# Counterbore, DIN 373

- with fixed pilot
- with 3 cutting edges, right-hand flutes for counterbores
- for countersinking to suit hexagon socket screws



HSS
Core hole

fine
HSS
Through hole

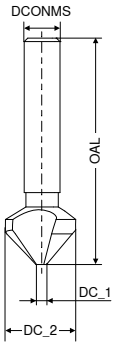
medium
HSS
Through hole

| Thread | DC_2 z9 | DCONMS h9 | OAL | DC_1 e8 |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| **M3** | 6 | 5.0 | 71 | 2.5 |
| **M3** | 6 | 5.0 | 71 | 3.2 |
| **M3** | 6 | 5.0 | 71 | 3.4 |
| **M4** | 8 | 5.0 | 71 | 3.3 |
| **M4** | 8 | 5.0 | 71 | 4.3 |
| **M4** | 8 | 5.0 | 71 | 4.5 |
| **M5** | 10 | 8.0 | 80 | 4.2 |
| **M5** | 10 | 8.0 | 80 | 5.3 |
| **M5** | 10 | 8.0 | 80 | 5.5 |
| **M6** | 11 | 8.0 | 80 | 5.0 |
| **M6** | 11 | 8.0 | 80 | 6.4 |
| **M6** | 11 | 8.0 | 80 | 6.6 |
| **M8** | 15 | 12.5 | 100 | 6.8 |
| **M8** | 15 | 12.5 | 100 | 8.4 |
| **M8** | 15 | 12.5 | 100 | 9.0 |
| **M10** | 18 | 12.5 | 100 | 8.5 |
| **M10** | 18 | 12.5 | 100 | 10.5 |
| **M10** | 18 | 12.5 | 100 | 11.0 |
| **M12** | 20 | 12.5 | 100 | 10.2 |
| **M12** | 20 | 12.5 | 100 | 13.0 |
| **M12** | 20 | 12.5 | 100 | 13.5 |

# Counterbore, DIN 373

**Scope of supply:**
Counterbores M3; M4; M5; M6; M8; M10 in case

# Countersink 90°



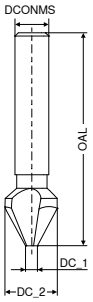

90°

| DC_2 z9 | DC_1 | DCONMS h6 | OAL | |
|---|---|---|---|---|
| mm | mm | mm | mm | |
| **6.3** | 1.5 | 5 | 45 | M3 |
| **8.3** | 2.0 | 6 | 50 | M4 |
| **10.4** | 2.5 | 6 | 50 | M5 |
| **12.4** | 2.8 | 8 | 56 | M6 |
| **16.5** | 3.2 | 10 | 60 | M8 |
| **20.5** | 3.5 | 10 | 63 | M10 |
| **25.0** | 3.8 | 10 | 67 | M12 |
| **31.0** | 4.2 | 12 | 71 | M16 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ○ |
| Cast iron | ● |
| Non ferrous metals | ● |
| Heat resistant alloys | ○ |
| Hardened materials | ○ |

# Countersink 60°

▲ with 3 cutting edges for countersinking and deburring in high-tensile steels, grey cast iron, aluminium alloys containing silicon and corrosion resistant steels

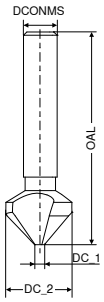




| DC_2 z9 | DC_1 | DCONMS h9 | OAL |
|---|---|---|---|
| **mm** | mm | mm | mm |
| **12.5** | 3.2 | 8 | 56 |
| **16.0** | 4.0 | 10 | 63 |
| **20.0** | 5.0 | 10 | 67 |
| **25.0** | 6.3 | 10 | 71 |

# Countersink 90°

▲ with 3 cutting edges for countersinking and deburring in high-tensile steels, grey cast iron, alumínium alloys containing silicon and corrosion resistant steels

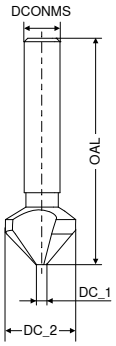




| DC_2 z9 | DC_1 | DCONMS h9 | OAL |
|---|---|---|---|
| **mm** | mm | mm | mm |
| **10.4** | 2.5 | 8 | 46 |
| **12.4** | 2.8 | 8 | 56 |
| **15.0** | 3.2 | 10 | 60 |
| **16.5** | 3.2 | 10 | 60 |
| **20.5** | 3.5 | 10 | 63 |
| **25.0** | 3.8 | 10 | 67 |
| **31.0** | 4.2 | 12 | 71 |

# Countersink 90° with irregular pitch, DIN 335-C

- ▲ all sizes with 3 cutting edges and highly irregular pitch, resulting in smooth running, excellent roundness and chatter reduction giving the highest surface quality
- ▲ special Ti coating
- ▲ for very high tool life in almost all materials
- ▲ greatly reduced axial and radial forces



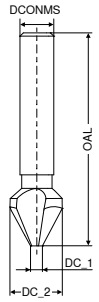

90°
HSS

| DC_2 z9 | DC_1 | DCONMS | OAL | | |
|---|---|---|---|---|---|
| **mm** | mm | mm | mm | | |
| **4.3** | 1.3 | 4 | 40 | M2 | |
| **6.0** | 1.5 | 5 | 45 | M3 | |
| **6.3** | 1.5 | 5 | 45 | | M3 |
| **8.0** | 2.0 | 6 | 50 | M4 | |
| **8.3** | 2.0 | 6 | 50 | | M4 |
| **10.0** | 2.5 | 6 | 50 | M5 | |
| **10.4** | 2.5 | 6 | 50 | | M5 |
| **11.5** | 2.8 | 8 | 56 | M6 | |
| **12.4** | 2.8 | 8 | 56 | | M6 |
| **15.0** | 3.2 | 10 | 60 | M8 | |
| **16.5** | 3.2 | 10 | 60 | | M8 |
| **19.0** | 3.5 | 10 | 63 | M10 | |
| **20.5** | 3.5 | 10 | 63 | | M10 |
| **23.0** | 3.8 | 10 | 67 | M12 | |
| **25.0** | 3.8 | 10 | 67 | | M12 |
| **31.0** | 4.2 | 12 | 71 | | M16 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ○ |
| Cast iron | ● |
| Non ferrous metals | ● |
| Heat resistant alloys | ○ |
| Hardened materials | |

# Countersink 60°, DIN 334-C

▲ 3 cutting edges for countersinking and deburring in virtually all materials

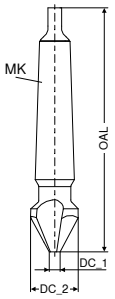




| DC_2 z9 | DC_1 | DCONMS h9 | OAL |
|---|---|---|---|
| **mm** | mm | mm | mm |
| **6.3** | 1.6 | 5 | 45 |
| **8.0** | 2.0 | 6 | 50 |
| **10.0** | 2.5 | 6 | 52 |
| **12.5** | 3.2 | 8 | 56 |
| **16.0** | 4.0 | 10 | 63 |
| **20.0** | 5.0 | 10 | 67 |
| **25.0** | 6.3 | 10 | 71 |

# Countersink 60°, DIN 334-D

▲ 3 cutting edges for countersinking and deburring in virtually all materials

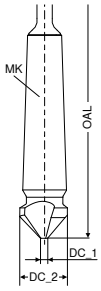




| DC_2 z9 | DC_1 | OAL | MK |
|---|---|---|---|
| **mm** | mm | mm | |
| **16.0** | 4.0 | 90 | 1 |
| **20.0** | 5.0 | 106 | 2 |
| **25.0** | 6.3 | 112 | 2 |
| **31.5** | 10.0 | 118 | 2 |
| **40.0** | 12.5 | 150 | 3 |
| **50.0** | 16.0 | 160 | 3 |
| **63.0** | 20.0 | 190 | 4 |
| **80.0** | 25.0 | 200 | 4 |

# Countersink 90°

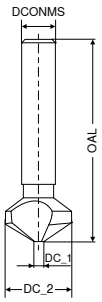
▲ 3 cutting edges to avoid burrs and chatter marks when countersinking and deburring in virtually all materials.




MK
90°
HSS

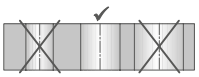
# Countersink 120°, factory standard-C

▲ 3 cutting edges for countersinking and deburring in virtually all materials




120°
HSS

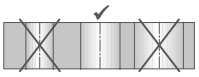
# Problems / possible causes / solutions



## Hole too large

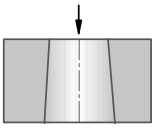
- runout error for reamer in the spindle → use DAH compensation system and correct runout
- inaccurate alignment, reamer back-cuts → correct alignment and use DPS floating holder
- built-up edge → reduce cutting speed $v_c$ for uncoated carbide cutting material, increase it for DST and coated cutting material or increase the oil content of the coolant
- reamer too large → have reamer adapted





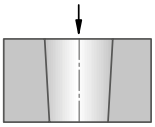
## Hole too small

- worn reamer → have reamer adjusted, replaced or repaired
- reaming allowance too small → increase reaming allowance
- cutting force too high → reduce feed or select other lead geometry (ASG)
- reamer too small → have reamer adjusted, replaced or repaired



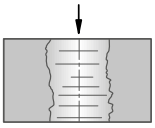
## Conical hole, tapered backwards

- inaccurate alignment → correct alignment and use DPS floating holder
- misalignment between headstock and turret → correct turret and use DPS floating holder



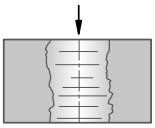
## Conical hole, tapered forwards

- poor alignment, cutting edges push initially → correct alignment and use DPS floating holder



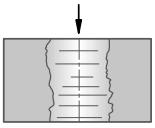
## Hole is not round

- reamer runout error too large → correct the runout with DAH compensation system
- alignment error → correct alignment error and use DPS floating holder
- asymmetric initial cutting through angled entry surface → countersink hole
- workpiece tensioning → correct clamping of the workpieces
- poor pre-machining → optimise pre-machining
- feed too high → reduce feed



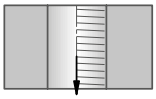
## Hole exhibits chatter marks

- cutting speed $v_c$ too high → reduce cutting speed
- OAL to DC ratio too high→ reduce the speed of entry, pilot the bore or select other lead geometry (ASG)



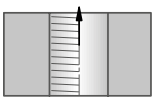
## Non clean-up

- built-up edge → reduce cutting speed $v_c$ for uncoated carbide cutting material, increase it for DST and coated cutting material or increase the oil content of the coolant
- cutting edge worn→ have cutting edge repaired or replace the tool
- reamer runout error → correct the runout with DAH compensation system
- no or insufficient cooling, chips are getting trapped → use thro' coolant supply and increase coolant pressure
- unsuitable coolant → increase the oil content of the coolant
- incorrect cutting data→ use data according to catalogue recommendation



## Grooves in the hole "feed marking"

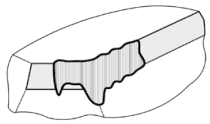
- faulty cutting edge (edge breakage) → have reamer replaced or repaired
- built-up edges → reduce cutting speed $v_c$ for uncoated carbide cutting material, increase it for DST and coated cutting material or increase the oil content of the coolant



## Grooves in the hole "retraction marking"

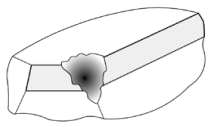
- cutting edges moved too far out of the hole → move no more than lead length + 2 mm out of the hole
- material springs back → do not retract at high speed but with increased (2-3 times) feed rate

# Types of wear



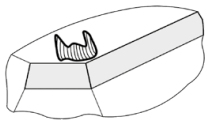
## Wear on clearance face

Reduce the cutting speed and select a more wear resistant cutting material or coating.



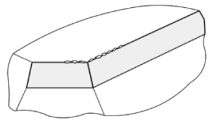
## Cutting edge breakage

Reduce feed and reaming allowance. In the case of interrupted holes, use coated carbide instead of DST.



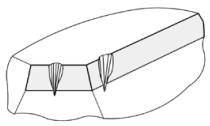
## Cratering

Reduce the cutting speed and use a positive cutting edge geometry.



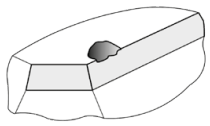
## Edge breakages

Increase the cutting speed and use larger rake angle.



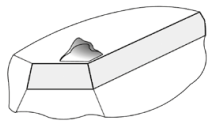
## Notch wear

Reduce the cutting speed and select a more wear resistant cutting material or coating.



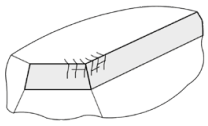
## Fatigue fracture

Reduce feed, increase reamer stability.



## Built-up edge

Use positive cutting edge geometry, increase the oil content of the coolant, reduce the cutting speed $v_c$ for uncoated carbide cutting material, increase it for DST and coated cutting material.



## Cracks at right angles to the cutting edge

Use sufficient coolant and thro' coolant, reduce the cutting speed.