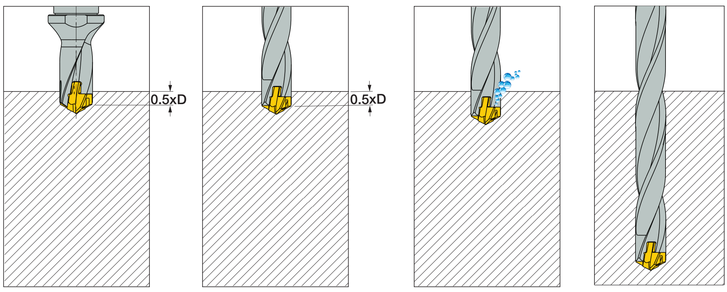
## Deep Drilling Cycle:

**1** Pre-hole 0.5xD deep for centering

**2** Slow rotation and feed while entering the pre-hole

**3** Maintain for 2-3 seconds and activate the cooling system

**4** Continue drilling at recommended cutting conditions



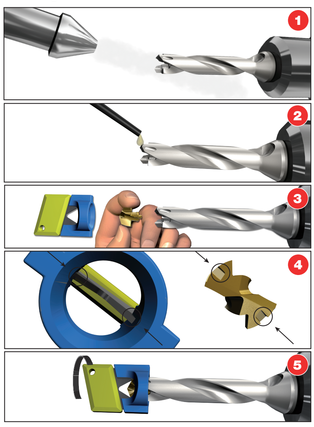

- Prior to using 8xD or 12xD drills, it is recommended to drill a 0.5xD pre-hole using a short or centering drill. Enter the pre-hole at slow speed and feed until 2-5 mm from its bottom. Start the cooling system and increase rotation to recommended drilling speed. Hold for 2-3 seconds, then, continue at the recommended drilling feed.
- When drilling stainless steel or high temperature alloys using the **ICM** drilling head, it is highly recommended to apply high pressure oil or 7-10% mineral or vegetable based oil emulsion.
- For optimal performance, it is recommended to adjust runout of outer points or chisel with a maximum of 0.02 mm. Large runout will influence drill performance tool life and hole quality.
- No setup time is needed after indexing the **SUMOCHAM** drill head.
- **SUMOCHAM** drills can be used either on milling centers or lathe machines.
- When using **SUMOCHAM** drill in stationary (lathe) applications, we recommend using the **FINE FIT** chuck with center alignment. Misalignment will cause poor performance of the **SUMOCHAM** drill or even tool breakage.

## PreHole Adjustment

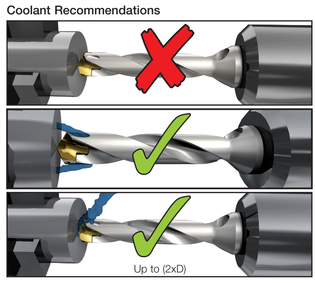
| Hole \ Pre-Hole | ICP/ ICM/ ICN | ICK | HCP/H3P | FCP | QCP | ICG |
|---|---|---|---|---|---|---|
| **ICP ICM ICN** | ICP/M/N Pre-Hole ✓ | ICK Pre-Hole ✗ | H#P Pre-Hole ✗ | FCP Pre-Hole ✗ | QCP Pre-Hole ✗ | ICG Pre-Hole ✗ |
| **ICK** | ICP/M/N Pre-Hole ✓ | ICK Pre-Hole ✓ | H#P Pre-Hole ✗ | FCP Pre-Hole ✗ | QCP Pre-Hole ✗ | ICG Pre-Hole ✗ |
| **HCP H3P** | ICP/M/N Pre-Hole ✓ | ICK Pre-Hole ✗ | H#P Pre-Hole ✓ | FCP Pre-Hole ✓ | QCP Pre-Hole ✗ | ICG Pre-Hole ✗ |
| **FCP** | ICP/M/N Pre-Hole ✗ | ICK Pre-Hole ✗ | H#P Pre-Hole ✗ | FCP Pre-Hole ✓ | QCP Pre-Hole ✗ | ICG Pre-Hole ✗ |
| **QCP** | ICP/M/N Pre-Hole ✓ | ICK Pre-Hole ✗ | H#P Pre-Hole ✗ | FCP Pre-Hole ✓ | QCP Pre-Hole ✓ | ICG Pre-Hole ✗ |
| **ICG** | ICP/M/N Pre-Hole ✓ | ICK Pre-Hole ✓ | H#P Pre-Hole ✗ | FCP Pre-Hole ✗ | QCP Pre-Hole ✗ | ICG Pre-Hole ✓ |

*For proper insert performance and centering, a bigger insert within a 1.0 mm range of the same diameter may be used

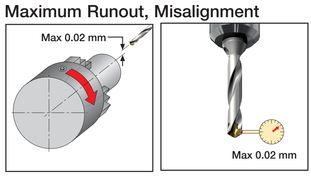
### Drilling Head Mounting Procedure




### Coolant Recommendations




### Maximum Runout, Misalignment




## Material Groups

## Recommended Machining Conditions

| ISO | Material | | Condition | Tensile Strength [N/mm²] | Hardness HB | Material No. | Mtl. No.(1) | V m/min | SUMOCHAM Feed vs. Drill Diameter mm/rev D=6-7.9 | D=8-9.9 | D=10-11.9 | D=12-13.9 | D=14-15.9 | D=16-19.9 | D=20-25.9 | D=26-32.9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Non-alloy steel and cast steel, free cutting steel | < 0.25 %C | Annealed | 420 | 125 | 1 | 1 | 80-110-140 | 0.09 | 0.12 | 0.15 | 0.18 | 0.20 | 0.25 | 0.25 | 0.30 |
| | | >= 0.25 %C | Annealed | 650 | 190 | 2 | 2 | 80-105-130 | 0.11 | 0.17 | 0.21 | 0.24 | 0.27 | 0.35 | 0.35 | 0.40 |
| | | < 0.55 %C | Quenched and tempered | 850 | 250 | 3 | 3 | 80-100-120 | 0.13 | 0.22 | 0.28 | 0.30 | 0.35 | 0.45 | 0.45 | 0.50 |
| | | >= 0.55 %C | Annealed | 750 | 220 | 4 | 4 | 70-90-110 | | | | | | | | |
| | | | Quenched and tempered | 1000 | 300 | 5 | 5 | 50-70-90 | | | | | | | | |
| | Low alloy steel and cast steel (less than 5% of alloying elements) | | Annealed | 600 | 200 | 6 | 6 | 80-100-120 | 0.09 | 0.12 | 0.14 | 0.16 | 0.18 | 0.23 | 0.25 | 0.30 |
| | | | Quenched and tempered | 930 | 275 | 7 | 7 | 70-90-110 | 0.12 | 0.18 | 0.21 | 0.24 | 0.26 | 0.31 | 0.35 | 0.40 |
| | | | | 1000 | 300 | 8 | 8 | 50-70-90 | 0.15 | 0.25 | 0.28 | 0.32 | 0.35 | 0.40 | 0.45 | 0.50 |
| | | | | 1200 | 350 | 9 | 9 | 40-55-70 | | | | | | | | |
| | High alloyed steel, cast steel, and tool steel | | Annealed | 680 | 200 | 10 | 10 | 50-70-90 | 0.09 | 0.12 | 0.12 | 0.15 | 0.18 | 0.20 | 0.22 | 0.25 |
| | | | Quenched and tempered | 1100 | 325 | 11 | 11 | 40-60-80 | 0.11 | 0.16 | 0.17 | 0.20 | 0.23 | 0.25 | 0.27 | 0.30 |
| | | | | | | | | | 0.12 | 0.20 | 0.22 | 0.25 | 0.28 | 0.30 | 0.33 | 0.35 |
| | Stainless steel and cast steel | | Ferritic/martensitic | 680 | 200 | 12 | 12 | 40-55-70 | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0.16 | 0.18 | 0.20 |
| | | | Martensitic | 820 | 240 | 13 | 13 | 40-55-70 | 0.09 | 0.12 | 0.15 | 0.17 | 0.20 | 0.21 | 0.24 | 0.27 |
| | | | | | | | | | 0.10 | 0.15 | 0.18 | 0.20 | 0.24 | 0.26 | 0.30 | 0.35 |
| M | Stainless steel | | Austenitic | 600 | 180 | 14 | 14 | 30-50-70 | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0.16 | 0.18 | 0.20 |
| | | | | | | | | | 0.09 | 0.12 | 0.15 | 0.17 | 0.20 | 0.21 | 0.24 | 0.27 |
| | | | | | | | | | 0.10 | 0.15 | 0.18 | 0.20 | 0.24 | 0.26 | 0.30 | 0.35 |
| K | Grey cast iron (GG) | | Ferritic/pearlitic | | 180 | 15 | 15 | 90-125-160 | 0.12 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.35 | 0.40 |
| | | | Pearlitic | | 260 | 16 | 16 | 80-110-140 | 0.15 | 0.22 | 0.27 | 0.32 | 0.37 | 0.45 | 0.47 | 0.50 |
| | Nodular cast iron (GGG) | | Ferritic | | 160 | 17 | 17 | 90-135-180 | 0.18 | 0.30 | 0.35 | 0.40 | 0.45 | 0.55 | 0.60 | 0.60 |
| | | | Pearlitic | | 250 | 18 | 18 | 80-110-140 | | | | | | | | |
| | Malleable cast iron | | Ferritic | | 130 | 19 | 19 | 90-125-160 | | | | | | | | |
| | | | Pearlitic | | 230 | 20 | 20 | 80-110-140 | | | | | | | | |
| N | Aluminum-wrought alloy | | Not cureable | | 60 | 21 | 21 | 90-155-220 | | | | | | | | |
| | | | Cured | | 100 | 22 | 22 | | | | | | | | | |
| | Aluminum-cast, alloyed | <=12% Si | Not cureable | | 75 | 23 | 23 | | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 | |
| | | | Cured | | 90 | 24 | 24 | | 0.27 | 0.32 | 0.37 | 0.42 | 0.50 | 0.57 | 0.67 | |
| | | >12% Si | High temperature | | 130 | 25 | 25 | 80-120-160 | 0.35 | 0.40 | 0.45 | 0.50 | 0.60 | 0.70 | 0.75 | |
| | Copper alloys | >1% Pb | Free cutting | | 110 | 26 | 26 | 90-155-220 | | | | | | | | |
| | | | Brass | | 90 | 27 | 27 | | | | | | | | | |
| | | | Electrolitic copper | | 100 | 28 | 28 | | | | | | | | | |
| | Non-metallic | | Duroplastics, fiber plastics | | | 29 | 29 | | | | | | | | | |
| | | | Hard rubber | | | 30 | 30 | | | | | | | | | |
| S | High temp. alloys | Fe based | Annealed | | 200 | 31 | 31 | 30-45-60 | | | | | | | | |
| | | | Cured | | 280 | 32 | 32 | | 0.05 | 0.06 | 0.08 | 0.10 | 0.12 | 0.12 | 0.14 | 0.16 |
| | | Ni or Co based | Annealed | | 250 | 33 | 33 | 20-35-50 | 0.06 | 0.08 | 0.10 | 0.12 | 0.15 | 0.16 | 0.18 | 0.20 |
| | | | Cured | | 350 | 34 | 34 | | 0.07 | 0.11 | 0.13 | 0.15 | 0.18 | 0.20 | 0.22 | 0.25 |
| | | | Cast | | 320 | 35 | 35 | | | | | | | | | |
| | Titanium Ti alloys | | | RM 400 | | 36 | 36 | 20-35-50 | 0.05 | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0.18 |
| | | | Alpha+beta alloys cured | RM 1050 | | 37 | 37 | | 0.06 | 0.09 | 0.11 | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 |
| | | | | | | | | | 0.07 | 0.12 | 0.15 | 0.18 | 0.20 | 0.22 | 0.25 | 0.27 |
| H | Hardened steel | | Hardened | | 55 HRC | 38 | 38 | 20-35-50 | 0.05 | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0.18 |
| | | | Hardened | | 60 HRC | 39 | 39 | | 0.06 | 0.09 | 0.11 | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 |
| | | | | | | | | | 0.07 | 0.12 | 0.15 | 0.18 | 0.20 | 0.22 | 0.25 | 0.27 |

- When using external coolant supply only, reduce cutting speed by 10%
- Use internal coolant supply when machining austenitic stainless steel
- When using more than 5XD drill ratio, reduce cutting parameters by 10%

Recommended cutting data

Machining Stainless Steel is not recommended with QCP & HCP geometry

(1) As a starting value, the middle of the recommended machining range should be used. Then, according to the wear results, conditions can be changed to optimize performance. The data refers to carbide grade IC908