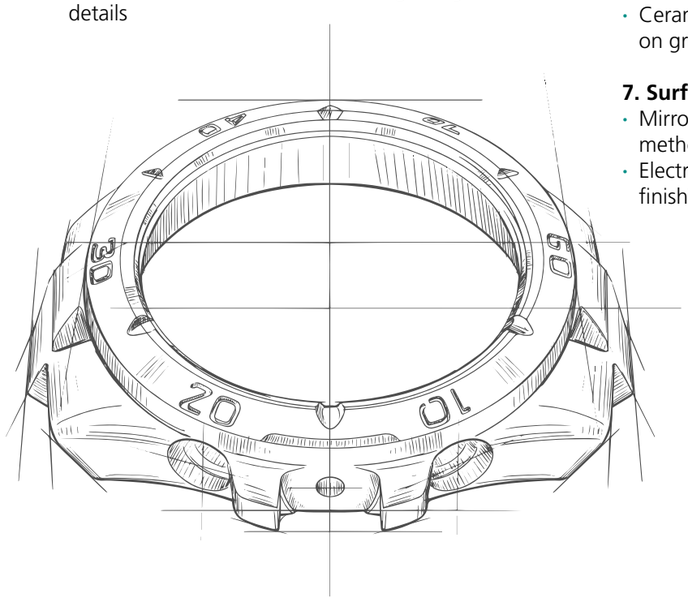
Watch case

The **CNC machining of watch cases** requires stringent precision, careful material choice and optimised machining strategies. The decisive factors are as follows:

1. Choice of materials and their machinability
- Stainless steel (316L, 904L) → High degree of hardness, challenging machinability and increased tool wear
- Titanium (Grade 5, Grade 2) → Lightweight, yet susceptible to strain hardening and poor thermal conductivity
- Ceramics (zirconia, silicon nitride) → Highly brittle, requires grinding and laser processing techniques
- Brass/Bronze (CuZn42, CuSn8) → Comparatively easy to process, though attention must be paid to tarnishing and oxidation
- Platinum → Extremely tough and resistant, challenging to machine, causing significant tool wear
- Gold (yellow, white, or rose gold) → Soft and readily machinable, particularly when using diamond tools

2. Precision and tight tolerances
- Watch cases have extremely tight tolerances (often in the range of ±0.005 mm)
- Crucial for ensuring the accurate fit of crystals, bezels, case backs, and seals

3. Tool selection and tool life
- High-performance carbide tools or PCD/CBN tools for hard materials
- Optimised tool geometries to reduce burring and thermal buildup
- Micro end mills (Ø <0.5 mm) for engravings and fine details



4. Cutting parameters and strategy
- High spindle speeds → Necessary for fine surface finishes and small tools
- Optimal feed rates and depths of cut → Prevents tool breakage, improves surface quality
- Multi-stage machining (roughing – semi-finishing – finishing) → Guarantees precise dimensions

5. Clamping technology and vibrations
- Precision clamping systems (zero-point clamping systems, vacuum clamping)
- Minimised vibration to achieve fine surface quality

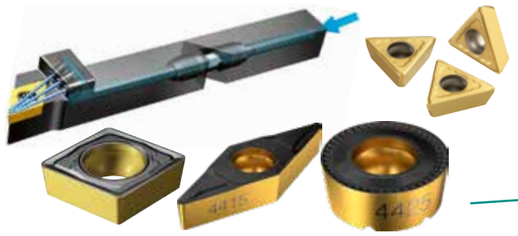
6. Cooling and lubrication
- Titanium & Stainless steel → High-pressure cooling or MQL for heat dissipation
- Brass & Bronze → Minimum quantity lubrication or dry machining
- Ceramics → Often machined without coolant, relying on grinding methods with temperature control

7. Surface quality and finishing
- Mirror polishing performed manually or via mechanical methods (e.g. tumbling and diamond finishing)
- Electrochemical plating or PVD coatings for surface finishing

Turning

6 INTERNAL AND EXTERNAL TURNING OF THIN COMPONENTS

SANDVIK coromant
CoroTurn 107
For internal and external turning of thin components

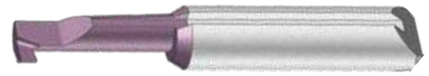


APPLITEC SWISS TOOLING
ISO-Line turning system
Versatile turning programme with ISO indexable inserts for internal and external machining

4 FACE GROOVING AND THREAD MACHINING

ISCAR
PiccoCut Grooving steel
Angled parting-off steel

IFANGER
Micro-Turn Grooving steel
Angled parting-off steel MTNU available in left- or right-hand versions, with TiAlN coating



3 INTERNAL AND EXTERNAL THREAD TURNING

SANDVIK coromant
CoroThread 266
High-stability internal and external thread turning

7 FACETING

IFANGER
Micro-turn faceting steel
Faceting steel MTFA available in left- or right-hand versions, with TiAlN coating

2 FACE GROOVING AND THREAD MACHINING

SANDVIK coromant
CoroThread 254
Sharp cutting edges for high-quality grooves

5 PARTING OFF

SANDVIK coromant
CoroCut QD
Dependable and process-safe parting-off operations

1 SERIES-COMPATIBLE MULTI-OPERATION MACHINING

ISCAR
PICCO-MFT
Drilling, internal and external turning, facing, chamfering and 60° thread turning, from Ø 3.9 mm

SWISS TOOLS
Precision boring head
for perfect roundness and diameter cylindricity, adjustable to 1 µm

Milling and threading

1 FACETING AND ROUNDING

magafor

Form cutters and chamfer mills
Specialised micro-tools for edge rounding starting at R 0.2 mm and faceting from Ø 0.2 mm

2 FULL-DEPTH THREAD MILLING

DC THREADING TECHNOLOGY

Thread mill GF6110VS-INT-SP
in accordance with NIHS 60-30

3 EXTERNAL CONTOUR CORNER AND GROOVE MILLS

SANDVIK coromant

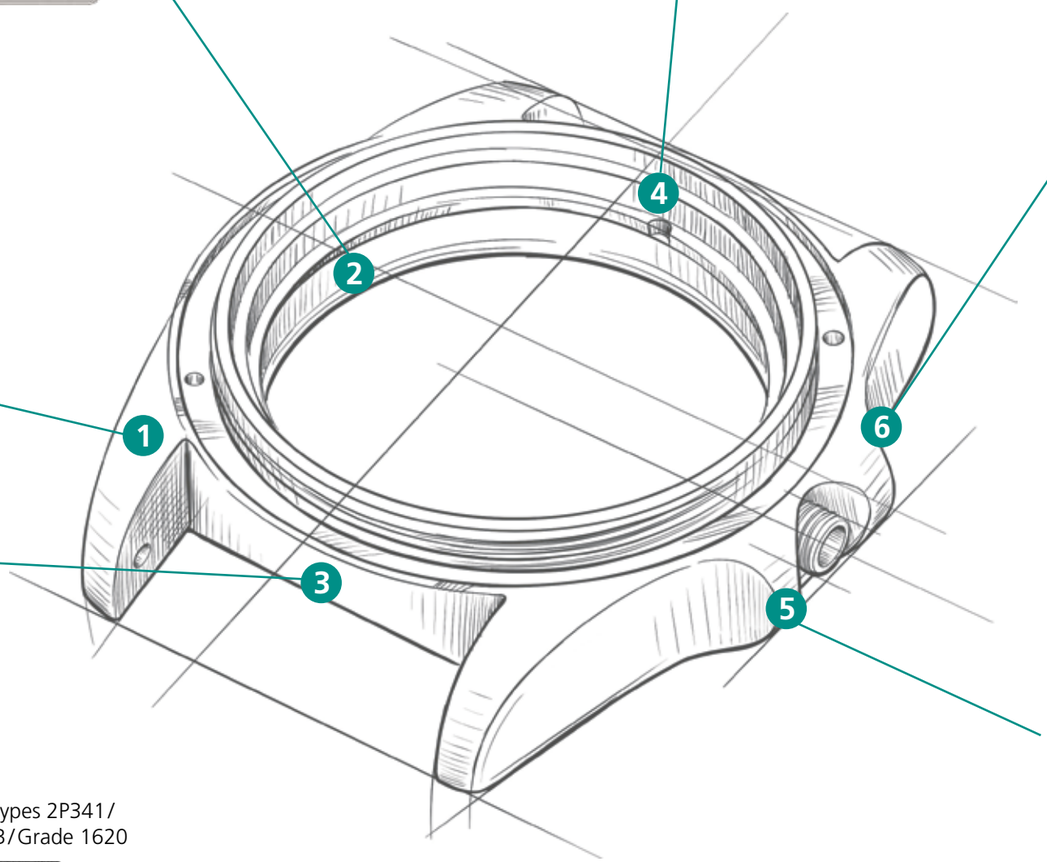
CoroMill 316
Modular system with Coromant EH interface, corner milling, chamfer milling, profile milling and copy milling

SANDVIK coromant

CoroMill Plura
Roughing of stainless steel, types 2P341/ Grade 1640, R216.34–BCxxB/Grade 1620

EMUGE FRANKEN

FRANKEN TOP-CUT
with TiAlN coating, from Ø 1.5–20.0 mm, the variable helix angle actively minimises vibrations



4 MICRO CORNER MILLS

DIXI polytool

Solid carbide end mill 7583
Micro high-performance end mills with reinforced shank, from Ø 0.3 mm

5 THREADING

DIXI polytool

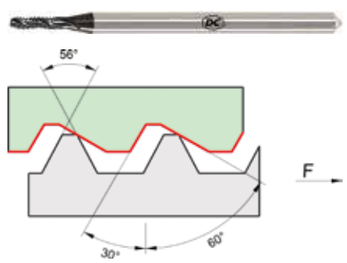
Thread whirler 1737
No burr formation thanks to the full profile in accordance with NIHS 06-10

DC THREADING TECHNOLOGY

Thread whirler GW3015VS
Thread production from M0.8 using a multi-tooth double profile

DC THREADING TECHNOLOGY Micro Safelock

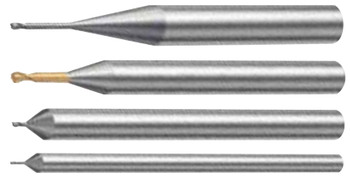
Self-locking threads with Safelock system
Guaranteed resistance to impact and vibration



6 PROFILE MILLS

SANDVIK coromant

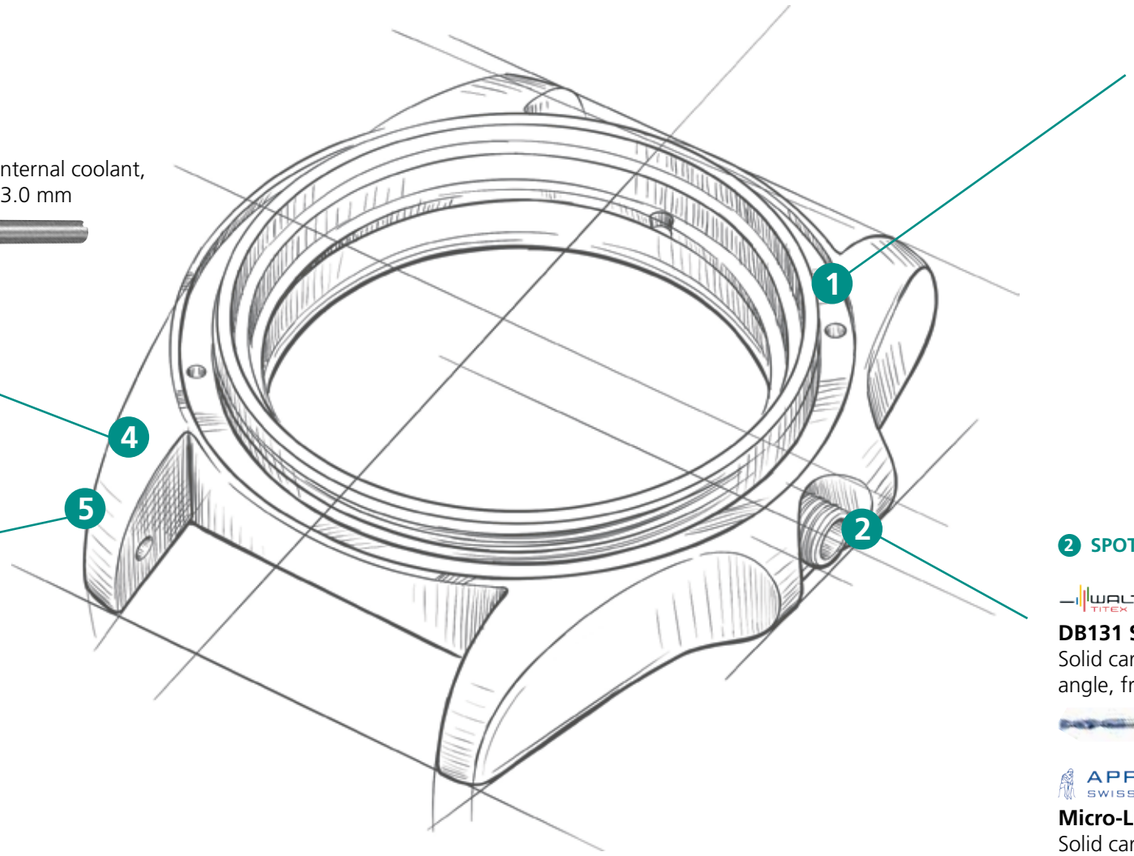
CoroMill Plura
Solid carbide Micro Ballnose Milling cutters 2P211-PC/2P212-PC, from Ø 0.5 mm



GÜHRING

G-Mold 55B
Optimised for ISO M/S and ISO H, from Ø 0.5 mm

Drilling and reaming



4 MICRO DRILLING WITH BALL-NOSE ENTRY GEOMETRY

SANDVIK coromant
CoroDrill 862-GM-X2BL
Optimised multi-material, external coolant, solid carbide, from Ø 0.3–3.0 mm

SANDVIK coromant
CoroDrill 862-GM-X2BM
Optimised multi-material, internal coolant, solid carbide, from Ø 1.0–3.0 mm

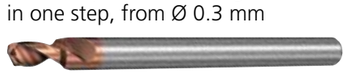
5 MICRO REAMERS

magafor
Magaforce 8610 Reamer
Step size of 0.005 mm for the most precise holes, from Ø 0.2 mm, with left-hand flutes

DIXI polytool
POLY 4007-TC
Solid carbide machine reamer with left-hand helix angle, from Ø 0.37 mm, featuring unequal pitch

3 MICRO STEP DRILLING

SANDVIK coromant
CoroDrill Dura 862
Micro step drill for drilling and chamfering in one step, from Ø 0.3 mm



1 MULTI-MATERIAL MICRO DRILLING

magafor
MicroForce
Solid carbide micro drills from Ø 0.1 mm

SANDVIK coromant
CoroDrill 462 XM- H10F
Versatile multi-material drilling with external cooling, from Ø 0.03–3.0 mm

SANDVIK coromant
CoroDrill 862 PCD
Offers longer tool life than solid carbide drills, suitable for challenging materials such as platinum and ceramic greenware, from Ø 0.3–3.0 mm

2 SPOT DRILLING

WALTER TITEX
DB131 Supreme
Solid carbide micro pilot drill with 150° point angle, from Ø 0.5–1.9 mm

APPLITEC SWISS TOOLING
Micro-Line
Solid carbide micro CNC spot drills 60°/90°, with various special coatings