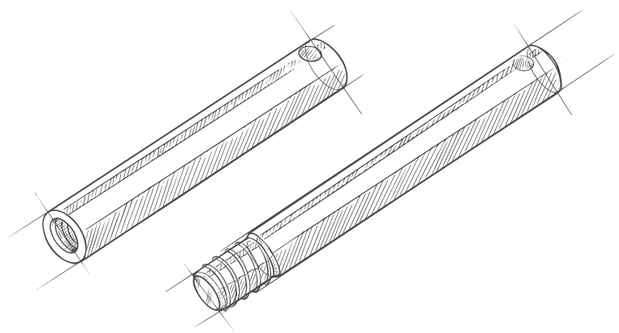
Watch strap with spring bar

Challenges in machining watch straps in the watch-making industry
Watch straps for high-quality watches are made from metal, leather, rubber or ceramic. Metal watch straps in particular pose significant manufacturing challenges, as they require both high mechanical precision and flawless surface quality.

1. Choice of materials and their machinability
Watch straps are made from various materials, each presenting specific challenges:
- Stainless steel (316L, 904L, 17-4PH) → Difficult to machine, high tool wear, challenging to polish
- Titanium (Grade 2, Grade 5) → Lightweight, yet susceptible to strain hardening and difficult to polish
- Gold (18k yellow, white, or rose gold) → Soft and readily machinable, but tends to scratching
- Platinum → Extremely tough, high tool wear, complex surface finishing
- Ceramics (ZrO_2, Si_3N_4) → Extremely hard, requires grinding or injection-moulding processes
- Rubber/silicone → Requires precise moulding, sensitive to abrasion
- Leather → Manual processing, sensitive to moisture and aging

2. Precision and tolerances
- Tight tolerances for links and hinges → Requires a perfect fit to ensure a smooth strap feel
- Consistent width and thickness → Especially important for metal and ceramic watch straps
- Perfect hinges and clasps → Must operate smoothly yet close securely



3. Machining techniques and challenges
a) CNC milling and turning
- Highly precise milling and turning operations necessary for links and connectors
- Challenging machining of hard materials such as titanium or ceramics
- Heavy burr formation with stainless steel and titanium → Requires extensive rework

b) Grinding, polishing and satin finishing
- Polishing effort for stainless steel, gold, and platinum → Time-consuming, often manual
- Satin-finished or brushed surfaces → Must be perfectly uniform
- Ceramics require diamond tools for a perfect finish

c) Joining techniques and assembly
- Invisible screws or snap-fit connections require the highest precision
- Hinges must be durable and free of play
- Water-resistant or flexible joints in certain models

4. Ergonomics and wearing comfort
- Watch strap flexibility → Must fit the wrist comfortably
- Balanced weight → Especially important for solid gold or platinum watch straps
- Skin compatibility of materials → No allergenic potential, no sharp edges

5. Surface finishing
- Electroplating (gold-plating, rhodium plating, PVD-plating) for protection and appearance
- A combination of polished and satin-finished surfaces → Very time-consuming and often manual
- Ceramic watch straps require rework to prevent sharp edges

CONCLUSION

Machining watch straps is extremely demanding, as it requires both mechanical precision and high-quality surface finishing. Particularly challenging are high tool wear, burr formation, assembly precision and labour-intensive polishing.

Watch strap machining

3 SLOTTING

DIXI polytool

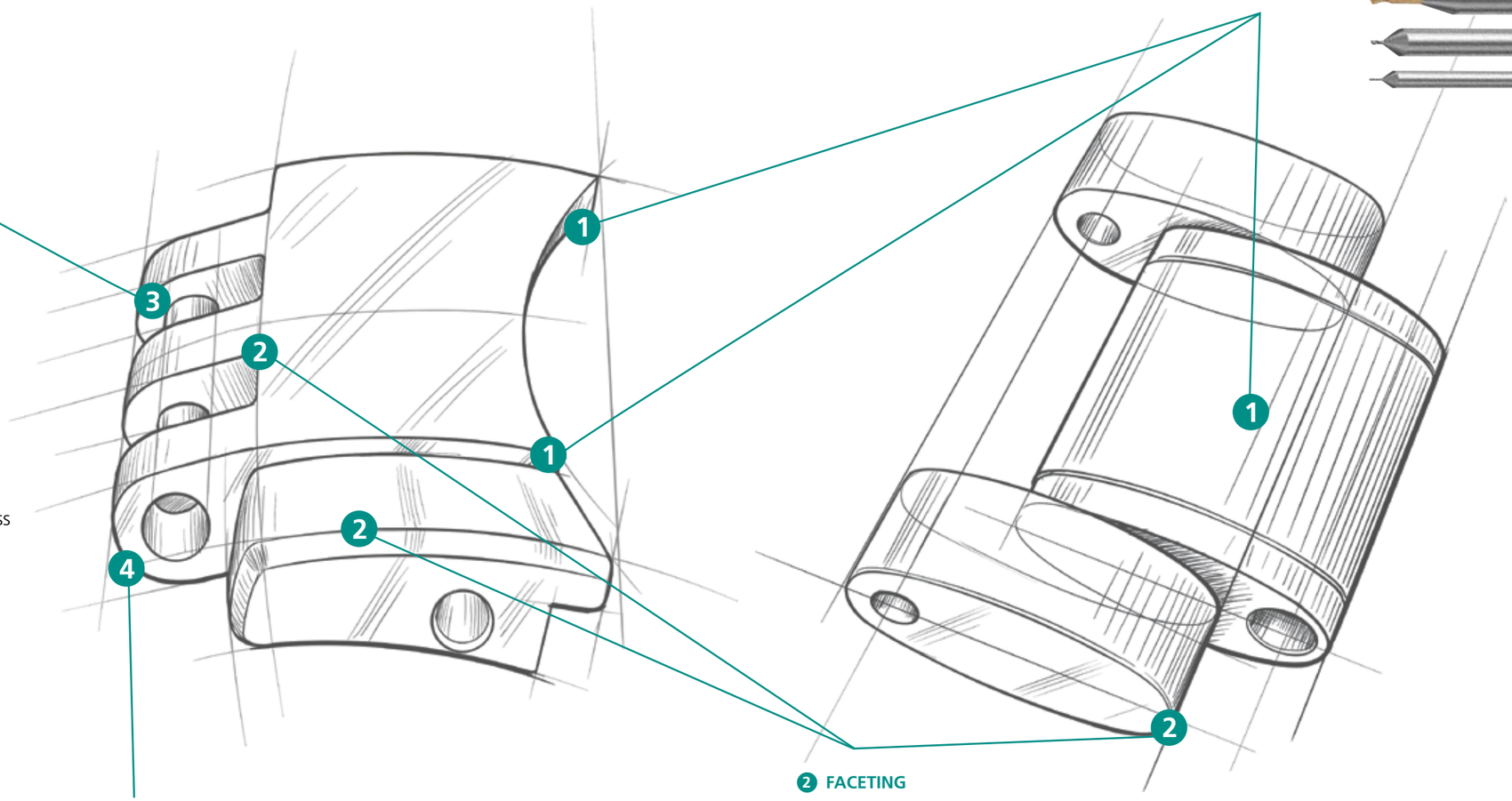
Circular saw blade 1533
Solid carbide slitting saw, Type A, fine-toothed, in accordance with DIN 1837A, from 0.2 mm thickness

APPLITEC SWISS TOOLING

Circular saw blade 1101 / 1103
Ultrafine-toothed circular saw blades, from 0.1 mm thickness

APPLITEC SWISS TOOLING

Circular saw blade 1104
Ultrafine-toothed circular saw blades for stainless steel materials, from 0.8 mm thickness



1 EXTERNAL CONTOUR MILLING

DIXI polytool

Multi-tooth milling cutter 7520
Ideal for finishing at elevated temperatures in demanding materials, available from Ø 0.35 mm

DIXI polytool

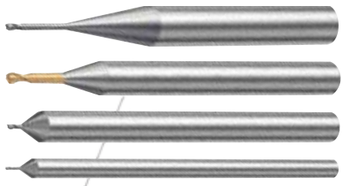
Multi-tooth milling cutter 7560
Designed for finishing stainless steels and superalloys, from Ø 0.4 mm

SANDVIK Coromant

CoroMill Plura HFS
Optimised for ISO M and ISO S/Type 2P341/ Grade 1640, from Ø 2.0–25.0 mm

SANDVIK Coromant

CoroMill Plura
Solid carbide micro copy mills 2P211-PC/2P212-PC, from Ø 0.5 mm



4 SLOT-MILLING

GÜHRING

G-Mold 55B
Optimised for ISO M/S and ISO H from Ø 0.5–12.0 mm

2 FACETING

magafor

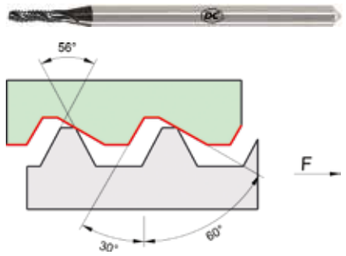
Bi-FACE 845 / 846 M
Bi-FACE chamfer cutter for faceting from Ø 0.2 mm, ideal for stainless steel and superalloys

Watch strap machining

1 THREADING

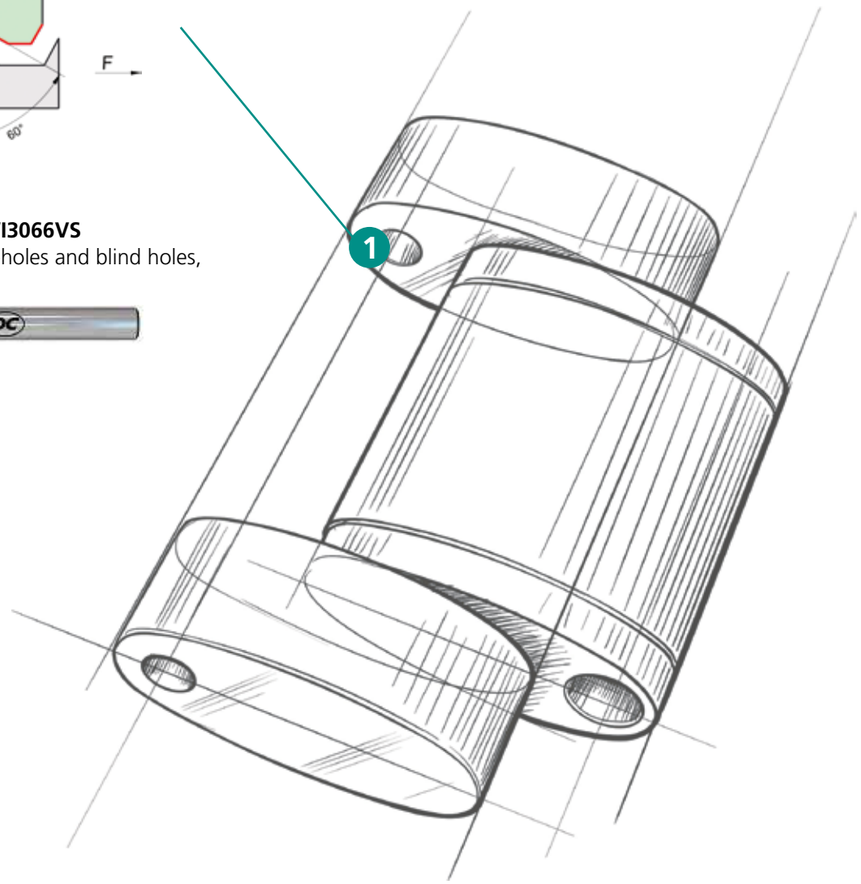
DC THREADING TECHNOLOGY Micro Safelock

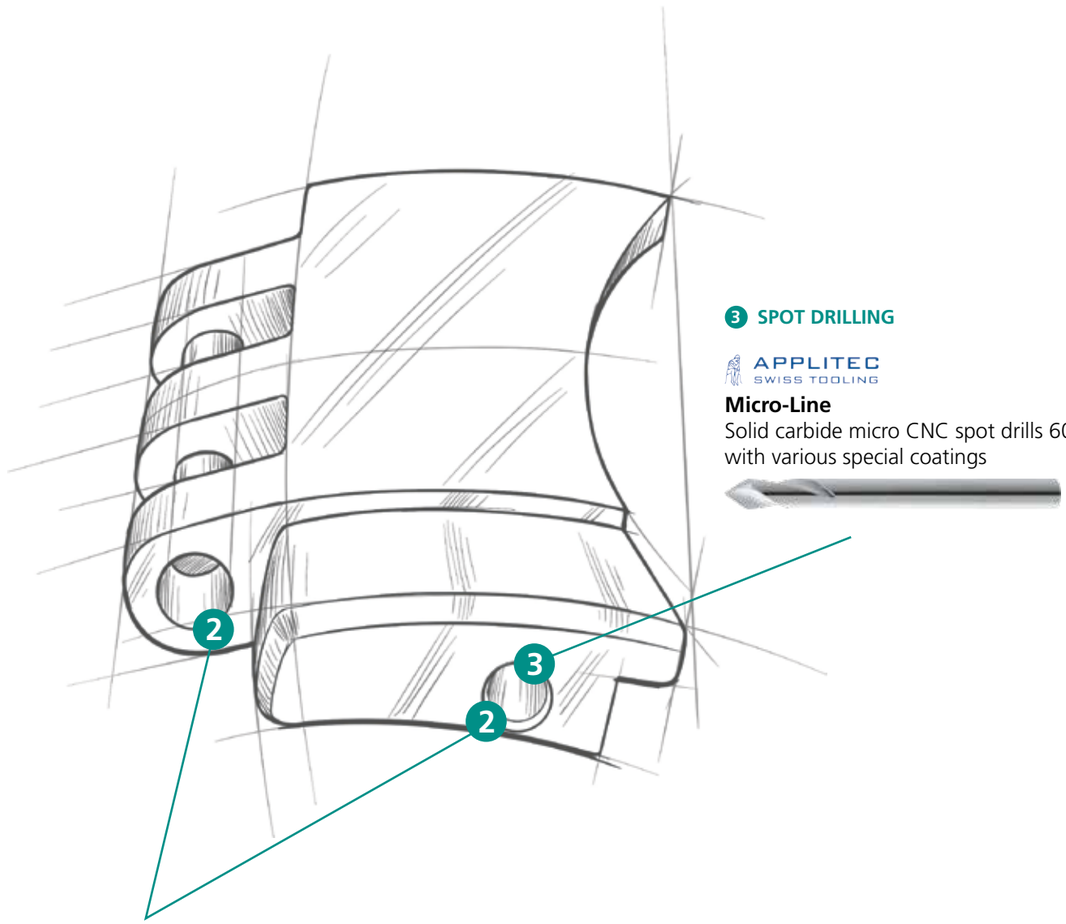
Self-locking threads with Safelock system
Guaranteed resistance to impact and vibration



DC THREADING TECHNOLOGY

Thread whirler GWI3066VS
Suitable for through-holes and blind holes, from M 0.8 to M 8





3 SPOT DRILLING

APPLITEC SWISS TOOLING

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

2 HOLE FOR WATCH STRAP LINK

magafor

Magaforce 82X
Micro-drills 3xD/5xD/8xD, from Ø 0.1 mm in 0.01 mm increments

SANDVIK coromant

CoroDrill 462 XM- X0BU
Versatile multi-material drilling with external cooling, from Ø 0.03–3.0 mm

APPLITEC SWISS TOOLING

Micro drill 2020
Solid carbide drill with 130° point angle, from Ø 0.1–2.0 mm

DIXI polytool

Twist Drill- Solid Carbide Drill 1345
Self-centring high-performance drill with internal cooling for series production, from Ø 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

Spring bar machining

1 HIGH-PRECISION MACHINING

APPLITEC SWISS TOOLING

TOP-Line 711
Indexable insert for parting off,
Type 711-0.5-TIALN

APPLITEC SWISS TOOLING

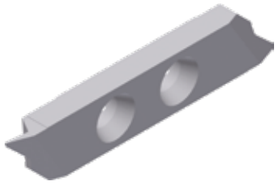
TOP-Line 712
Indexable insert for forward turning,
Type 712-30-TIALN

APPLITEC SWISS TOOLING

TOP-Line 714
Indexable insert for precision turning,
Type 714-0.5 TiaIN

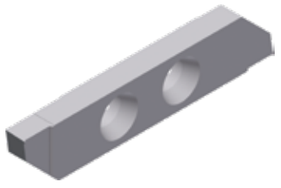
APPLITEC SWISS TOOLING

TOP-Watch 743SF
Indexable insert for reverse precision
turning, Type 743SF-10/3-HTAF



APPLITEC SWISS TOOLING

TOP-Watch 748SF
Indexable inserts for micro-grooves,
Type 748SF-E03-A45°

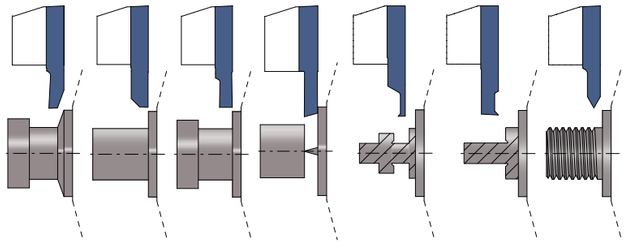


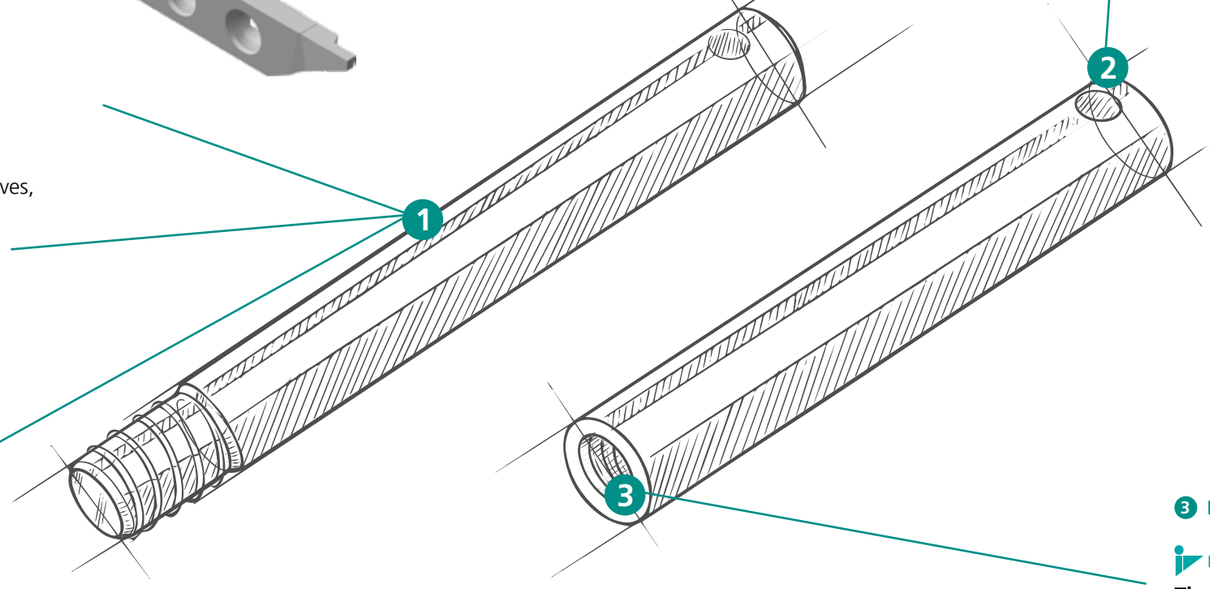
APPLITEC SWISS TOOLING

TOP-Watch SFX
Indexable insert for micro-thread
turning, Type 746SFX/736SFX

APPLITEC SWISS TOOLING

TOP-Watch SF
Indexable inserts for precision turning in the watchmaking
industry, various geometries





2 DRILLING ON CONVEX SURFACES

SANDVIK coromant

CoroDrill 462 XM- X0BU
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

3 MICRO THREAD TURNING

IFANGER

Thread steel MTGE
with 60° profile angle, TiAlN-coated

IFANGER

Thread steel MTGW
with 55° profile angle, TiAlN-coated