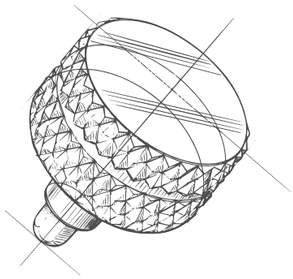
Pull-out piece/ Watch crown

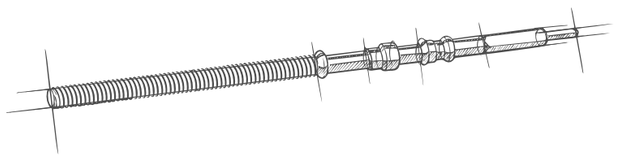
Pull-out piece
Material: Ø 1.0 / 20AP steel

Challenges in machining pull-out pieces and watch crowns
Pull-out pieces and watch crowns are the key control elements of a watch. They must be manufactured with precision to ensure reliable function and high aesthetic quality. This involves several challenges in the machining process.

1. Choice of materials and their machinability
Pull-out pieces and crowns frequently consist of the following materials:
- Stainless steel (316L, 904L, 17-4PH) → High degree of corrosion resistance, but difficult to machine (increased tool wear)
- Titanium (Grade 2, Grade 5) → Lightweight, yet susceptible to strain hardening, requiring special cutting strategies
- Gold (18k yellow, white, or rose gold) → Soft and readily machinable, but prone to scratching
- Platinum → Extremely tough, high tool wear, difficult to polish
- Ceramics → Extremely hard, requires grinding or injection-moulding processes

2. High precision and tight tolerances
- Dimensional tolerances in the range of ±2–5 µm → Especially important for threads and sealing surfaces
- Run-out accuracy of the crown → Must be perfectly matched to the case
- Perfect fit of the pull-out piece → Essential for the winding and hand-setting mechanism to function properly





3. Machining techniques and challenges
a) Turning and milling (CNC)
- Fine threads (e.g., M1.2 or smaller) are difficult to manufacture
- Risk of burr formation, especially with stainless steel and titanium
- High demands on clamping technology to prevent deformation and vibrations

b) Micro machining (laser, EDM, polishing)
- Laser engraving for logos or textures → Requires utmost precision
- EDM (electrical discharge machining) for complex structures → Slow but highly precise
- Polishing gold or platinum → Very time-consuming, frequently manual

c) Surface finishing
- Electroplating (rhodium plating, gold plating) for corrosion protection and appearance
- Satin finishing or matting for premium surface aesthetics
- PVD coating for coloured crowns (e.g., black, blue)

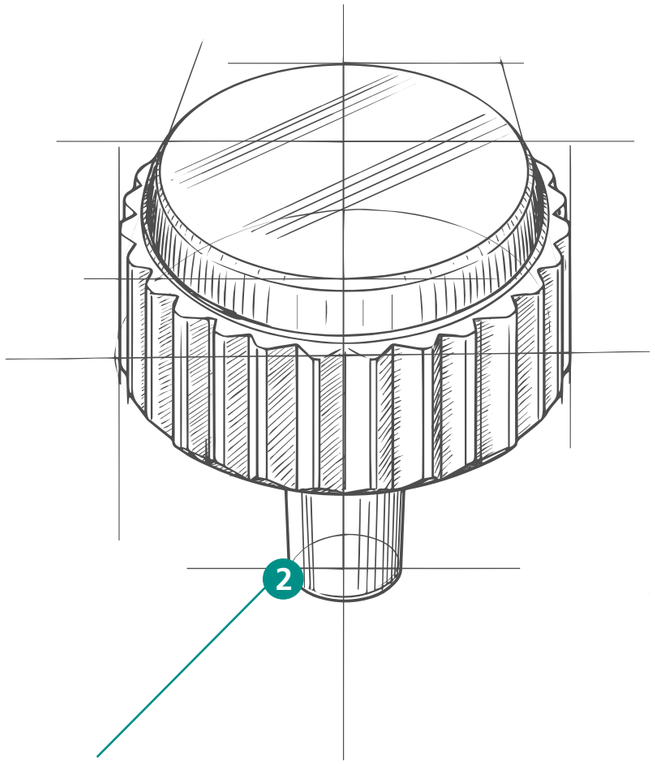
4. Sealing and functionality
- Water resistance → Requires precise sealing surfaces and high-quality seals
- Perfect thread fit between crown and case → Avoidance of play or stiffness
- Compression and tensile stress on the pull-out piece → It must withstand stresses without bending

CONCLUSION

Machining pull-out pieces and watch crowns is challenging because it requires the utmost precision, fine threads, flawless surfaces and durable seals. Burr formation, tool wear and demanding finishing are particularly problematic.

Watch crown
Material: Ø 6.50 / Inox 1.4427

Precision-turned watch crown



2 PARTING OFF

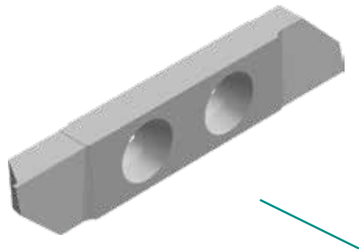
APPLITEC SWISS TOOLING

TOP-Line 741
Indexable inserts for parting-off with chip breaker, Type 741U-HTA

5 RADIAL GROOVING

APPLITEC SWISS TOOLING

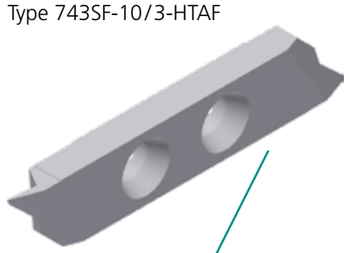
TOP-Line 745
Indexable insert for grooving narrow widths, type 745-0202-HTA

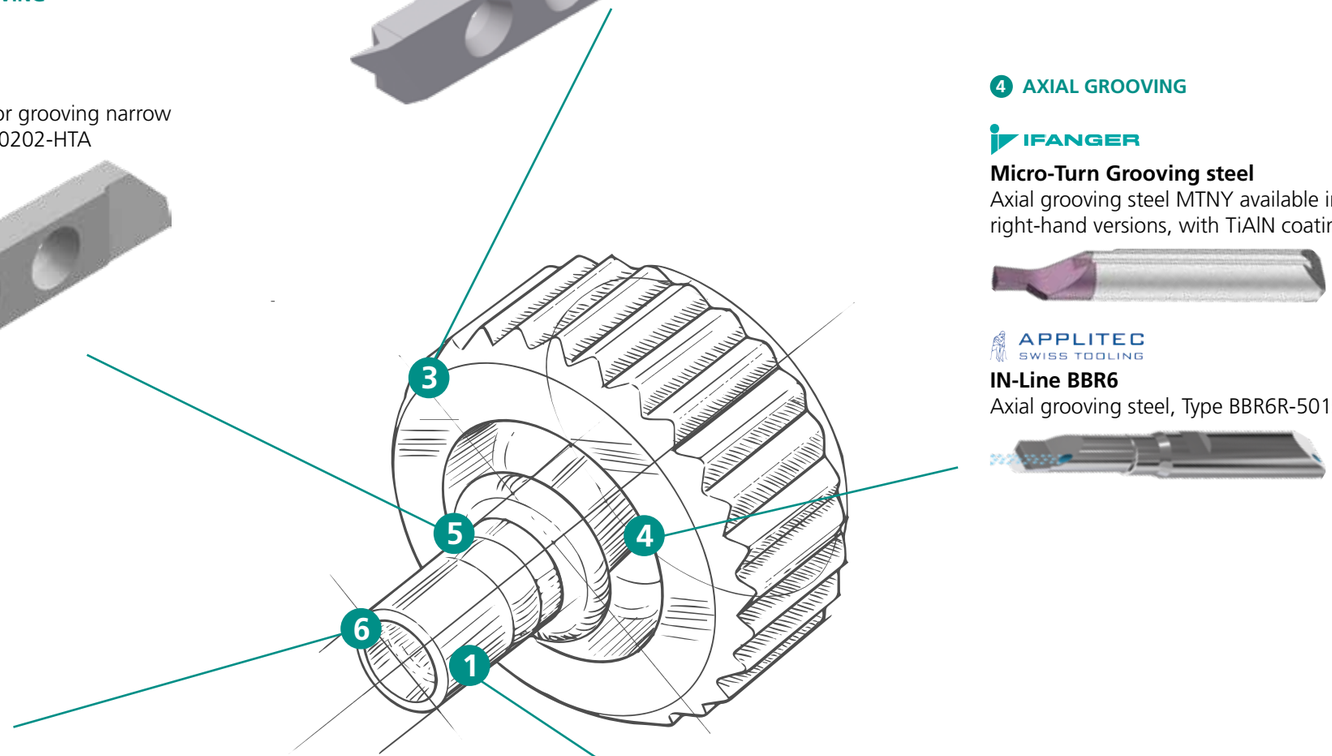


3 REVERSE PRECISION TURNING

APPLITEC SWISS TOOLING

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





4 AXIAL GROOVING

IFANGER

Micro-Turn Grooving steel
Axial grooving steel MTNY available in left- or right-hand versions, with TiAlN coating

APPLITEC SWISS TOOLING

IN-Line BBR6
Axial grooving steel, Type BBR6R-50150-FEG150X

6 INTERNAL THREAD TURNING

IFANGER

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

IFANGER

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

1 FORWARD TURNING

APPLITEC SWISS TOOLING

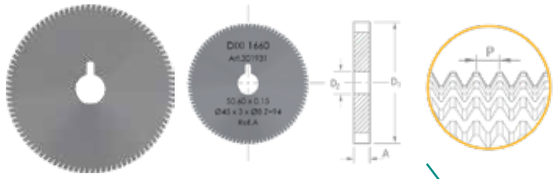
TOP-Line 732
Indexable insert for forward turning, Type 732-2° TiAlX

Precision-turned pull-out piece

1 MICRO-THREAD TURNING / MILLING

DIXI polytool

Hobbing cutter 1660
Hobbing cutter for miniature threads, short cycle times, perfect thread quality even under the highest demands, also available with NIHS threads



APPLITEC SWISS TOOLING

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

2 FORWARD TURNING

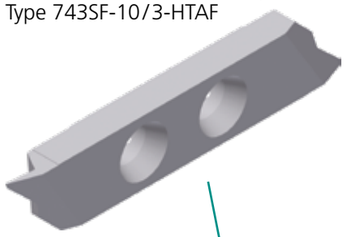
APPLITEC SWISS TOOLING

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

3 REVERSE FINE CONTOUR TURNING

APPLITEC SWISS TOOLING

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



5 PARTING OFF

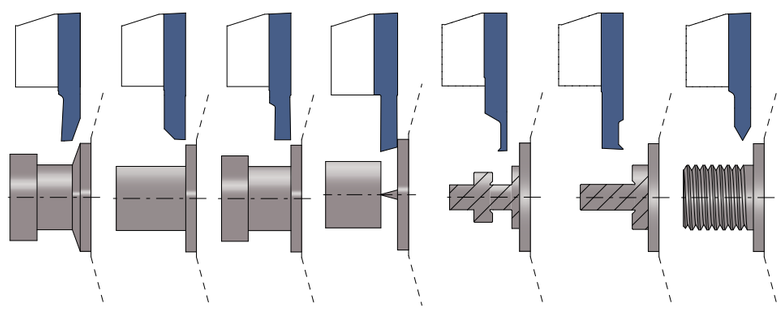
APPLITEC SWISS TOOLING

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

4 FORWARD FINE CONTOUR TURNING

APPLITEC SWISS TOOLING

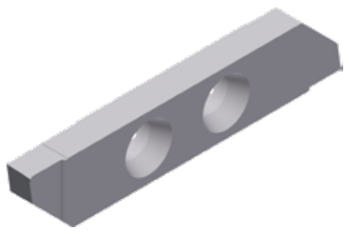
TOP-Watch SF
Indexable inserts for precision turning in the watchmaking industry, various geometries



6 GROOVING

APPLITEC SWISS TOOLING

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



APPLITEC SWISS TOOLING

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