oerlikon
balzers

# Because every thread counts

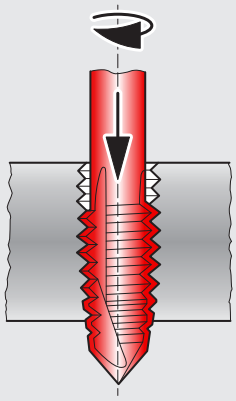
## High-performance coating solutions for outstanding threading results

Cutting Tools

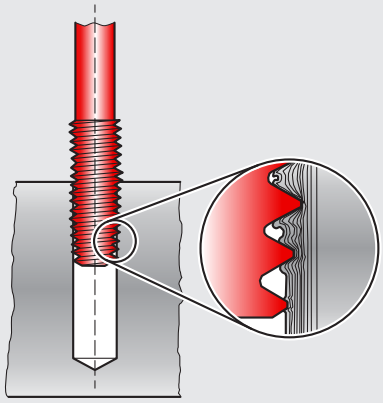
# High-performance, reliable and efficient threading tools with coating solutions from Oerlikon Balzers

Threading is often the final manufacturing step, and ensuring a high-quality product in the critical final phase requires threading tools to work efficiently and reliably. In addition to the base material, the geometry and the design of the cutting edge, a high-performance coating plays an important role in the threading process: it significantly improves wear resistance, enables a favourable torque curve and enhances chip formation and removal. Oerlikon Balzers' optimised coatings increase productivity and extend the service life of tools.

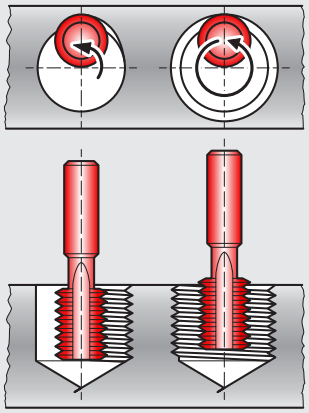
**Tapping**



**Thread forming**



**Thread milling**



# New manufacturing options with high process reliability

| Demands in threading | Coating solutions from Oerlikon Balzers |
|---|---|
| High stability and reliability of the manufacturing process | Revolutionary smooth and defect-free coatings with outstanding adhesion, no post-treatment needed |
| Universal tool coatings for a wide range of high-performance applications | Well-established solutions like BALINIT® B and A ensure a high level of performance. The latest Oerlikon Balzers technology enables coating design beyond TiN and TiCN, boosting tool performance in a variety of threading applications |
| Significantly reduced torque during threading for exceptional tool performance | Coating specifically designed to prevent welding between tool surface and work-piece, defect-free coating enables smooth chip flow |
| Resistance to abrasive wear | Oerlikon Balzers coating solutions, especially the AlCrN-based layers, provide a very high level of protection against abrasive wear, boosting performance for threading tools |
| High precision on the tool geometry | Innovative coating technology enables homogeneous coatings on the cutting edge |

# Our coating solutions for reliable threading applications

| | THREADING | | |
|---|---|---|---|
| **Material** | **Taps** | **Thread formers** | **Thread mills** |
| Unalloyed steel | AUR / ANT / B | ALC / AUR / A | ALC |
| Steel < 1000 N/mm² | AUR / ANT / B | ALC / AUR / A | ALC |
| Steel > 1000 N/mm² | AUR / ANT / B | ALC / AUR / A | ALC |
| Steel 45 - 56 HRC | AUR / ALC / B | | ALC / LM |
| Steel 56 - 72 HRC | | | TSP / TF / LM |
| Stainless steel | ANT / AUR / B | AUR / ALC / A | ALC / LM |
| Cast iron (GG, GGG) | AUR / ALC / B | | ALC |
| Wrought Al / Al alloys < 12% Si | MY / B | MY / A | MY / B |
| Al alloys > 12% Si | MY | MY | MY |
| Nickel alloys | ANT / AUR / B | | TSP / LM |
| Titanium, titanium alloys | ANT / AUR / B | ALC | TSP / LM |
| Brass, copper, bronze | MY | | MY / B |

A = BALINIT® A
B = BALINIT® B
LM = BALINIT® LATUMA
MY = BALINIT® MAYURA
TF = BALINIT® TISAFLEX
ALC = BALIQ® ALCRONOS
ANT = BALIQ® ANTOS
AUR = BALIQ® AUROS
TSP = BALIQ® TISINOS PRO

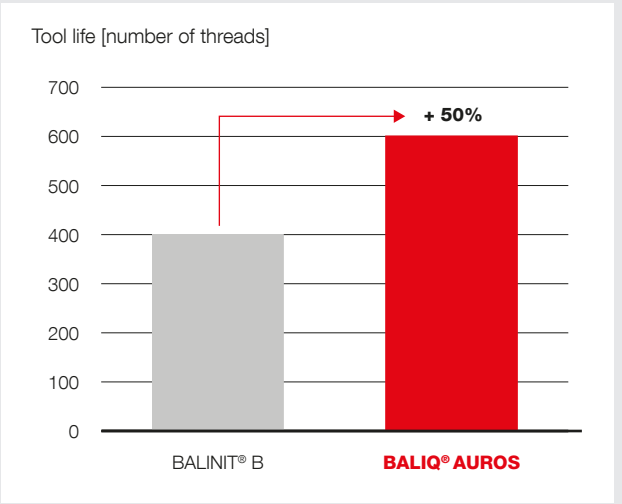
# Coating properties at a glance

| **BALINIT®** | Coating material | Coating hardness $H_{IT}$ (GPa) | Compressive stress (GPa) | Max. service temperature (°C) | Coating temperature (°C) | Coating colour |
|---|---|---|---|---|---|---|
| **A** | TiN | 30 +/- 3 | -2 +/- 1 | 600 | < 500 | golden yellow |
| **B** | TiCN | 37 +/- 3 | -3 +/- 1 | 400 | < 500 | blue grey |
| **LATUMA** | AlTiN-based | 35 +/- 3 | -3 +/- 1 | 1,000 | < 500 | grey |
| **MAYURA** | ta-C | > 65 | – | > 500 | < 150 | rainbow / rainbow black* |
| **TISAFLEX** | AlTiN/TiSiXN | 38 +/-5 | -5 +/-1 | 1,100 | < 600 | bronze |
| **BALIQ®** | | | | | | |
| **ALCRONOS** | AlCrN-based | 37 +/- 3 | -3.5 +/- 1 | 1,100 | < 500 | bright grey |
| **ANTOS** | AlCrN + WC/C | 35 +/- 2 \| 18 +/- 1 | -2.5 +/- 1 | 1,100 (AlCrN) | < 500 | dark grey |
| **AUROS** | AlCrTiN-based | 30 +/- 3 | -2.5 +/- 1 | 600 | < 500 | rose gold |
| **TISINOS PRO** | AlTiSiN-based | 38 +/- 1 | -3.1 +/- 1 | 1,000 | < 500 | bronze |

*Variations in colour depend on tool dimensions, applications and geometry
All given data are approximate values and depend on application, environment and test conditions.

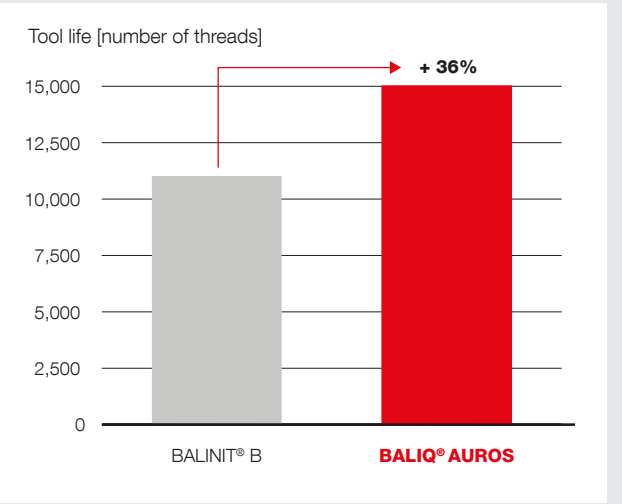
# Outstanding threading results

## BALIQ AUROS
### Tapping low alloyed steel



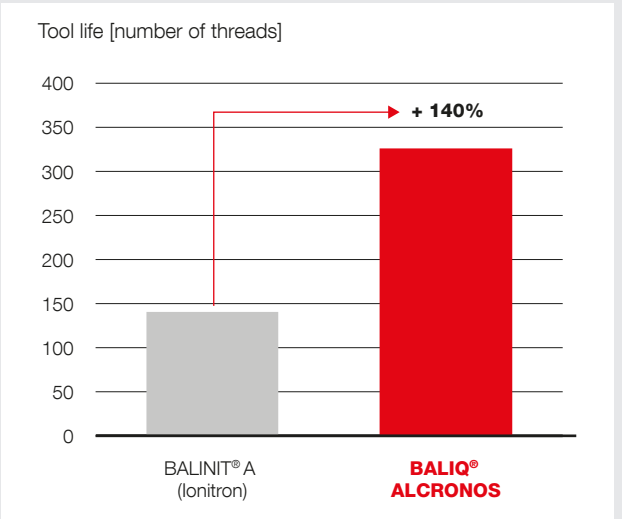

| | |
|---|---|
| **Tool** | PM-HSS tap M15 |
| **Workpiece** | Steel 1.7225, 42CrMo4 (AISI4140, SCM440)<br>1000 N/mm² |
| **Cutting parameters** | $v_c$ = 20 m/min<br>Thread depth: 40 mm<br>Blind hole<br>Emulsion |
| **Source** | Tool manufacturer |

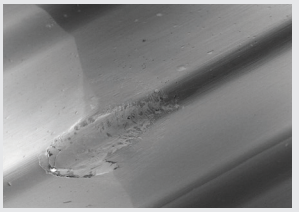
## BALIQ AUROS
### Tapping carbon steel



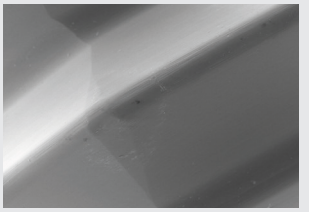

| | |
|---|---|
| **Tool** | PM-HSS tap M6 |
| **Workpiece** | Steel 1.1141, Ck15 (AISI 1015, JIS S15C)<br>120 - 140 HB |
| **Cutting parameters** | $v_c$ = 30 m/min<br>Thread depth: 10 mm<br>Blind hole<br>Emulsion |
| **Source** | Tool manufacturer |

## Process reliability in thread forming
### Application: Steel



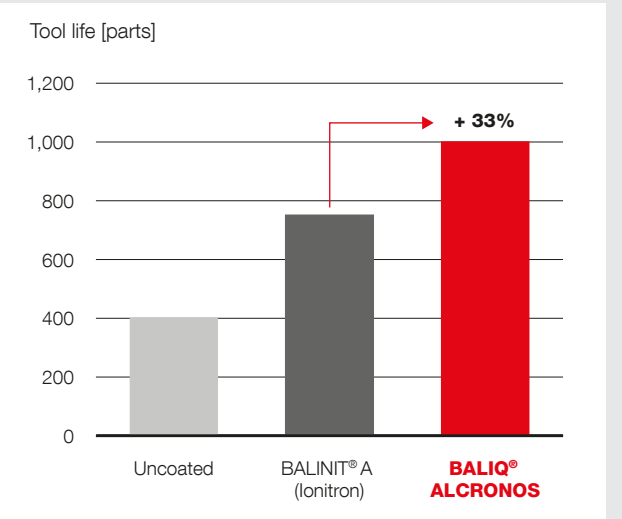



BALINIT A® (Ionitron)



**BALIQ® ALCRONOS**

## BALIQ ALCRONOS
### Steel tapping in moderate cutting conditions



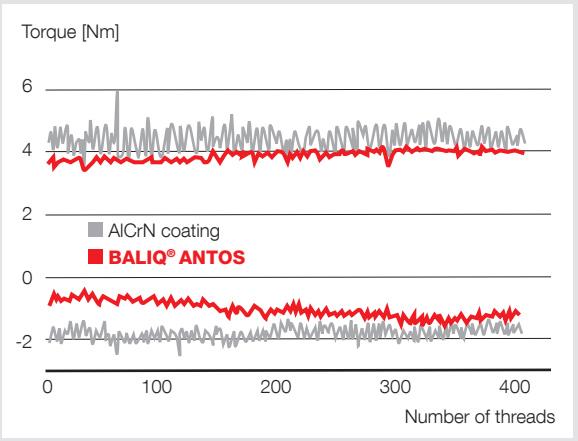

| | |
|---|---|
| **Tool** | HSS taps M12 x 1.25 spiral flute |
| **Workpiece** | Steel 1.1141, Ck15 (AISI 1015, JIS S15C)<br>120 - 140 HB |
| **Cutting parameters** | Spindle speed: 600 rpm<br>Criteria for end of tool life:<br>Thread quality |
| **Source** | Automotive industry end user |

# BALIQ ANTOS: Running smoothly into stainless steels for longer tool life

We have used all our experience and expertise to develop BALIQ® ANTOS, our latest coating solution for threading. It is based on the pioneering S3p technology, which enables extremely hard coatings with very smooth surfaces and outstanding adhesion. BALIQ® ANTOS consists of an AlCrN base coating with excellent wear resistance that offers high performance, especially when tapping stainless steel. The WC/C top coating provides exceptional friction and lubrication properties with high temperature resistance. This produces a smooth running-in effect, with optimised chip formation and removal as a result. The low torque with fewer peak loads helps ensure stable performance and longer tool service life.

## BALIQ ANTOS
## Tapping into stainless steel

| | |
|---|---|
| **Tool** | HSS M6 tap |
| **Workpiece** | Steel 1.4571 (X6 CrNiMoTi 17 12 2) |
| **Cutting parameters** | $v_c$ = 5 m/min<br>$a_p$ = 12 mm<br>Blind hole<br>Emulsion 8% |
| **Source** | Oerlikon Balzers |

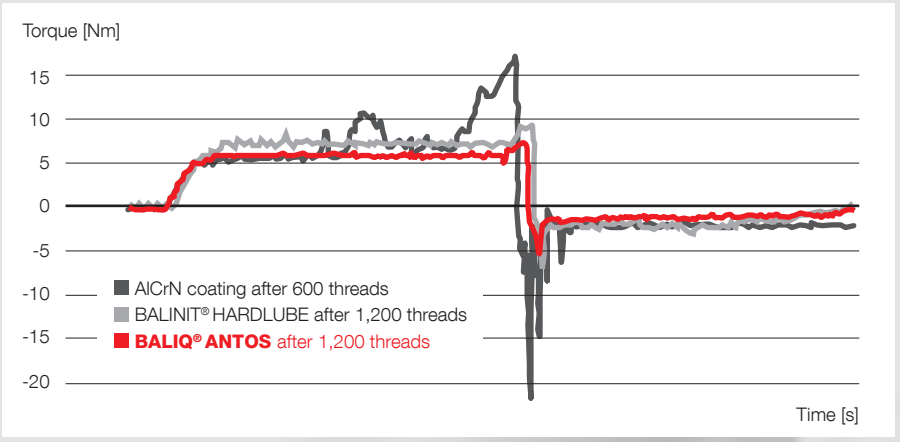


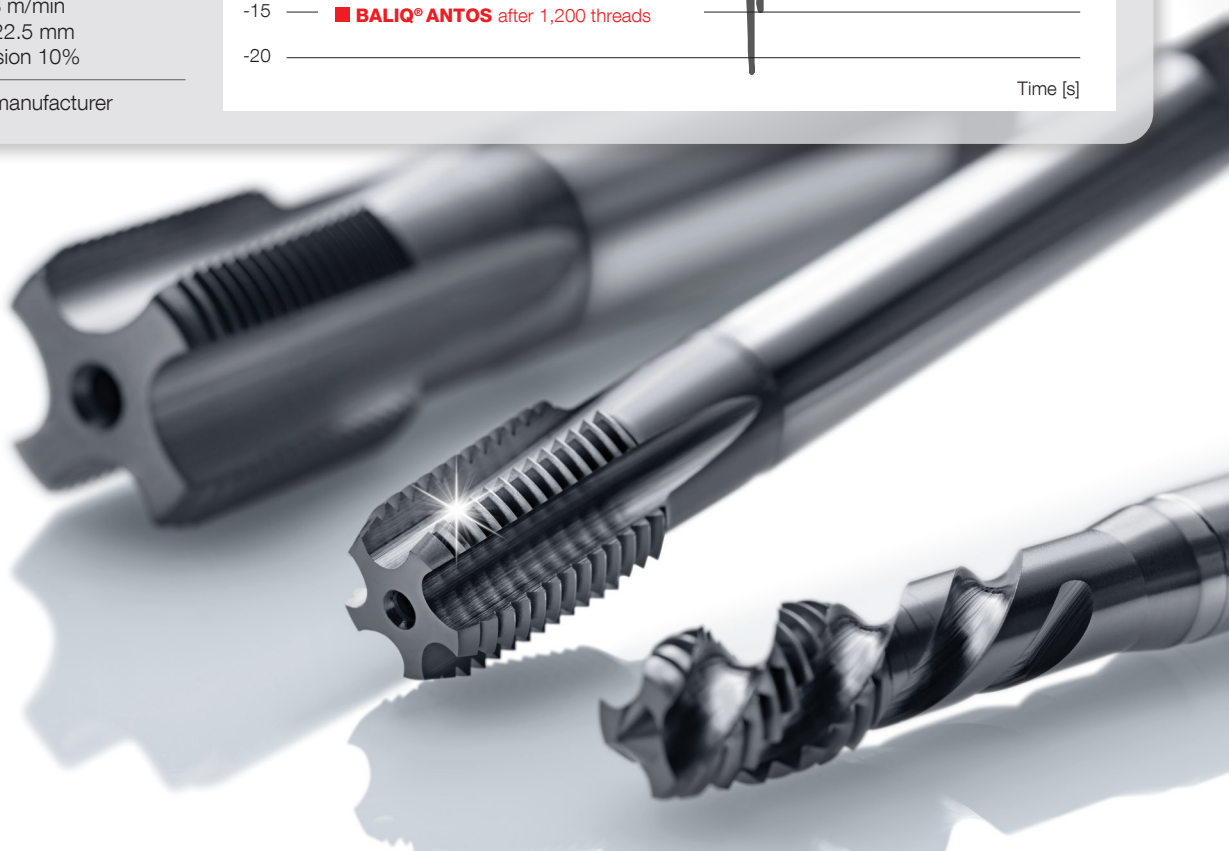

AlCrN coating

**BALIQ® ANTOS**

## BALIQ ANTOS
## Lower torque with fewer peak loads

| | |
|---|---|
| **Tool** | HSS M8 spiral tap |
| **Workpiece** | Steel 1.4301 (X5CrNi18-10) |
| **Cutting parameters** | $v_c$ = 8 m/min<br>$a_p$ = 22.5 mm<br>Emulsion 10% |
| **Source** | Tool manufacturer |



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