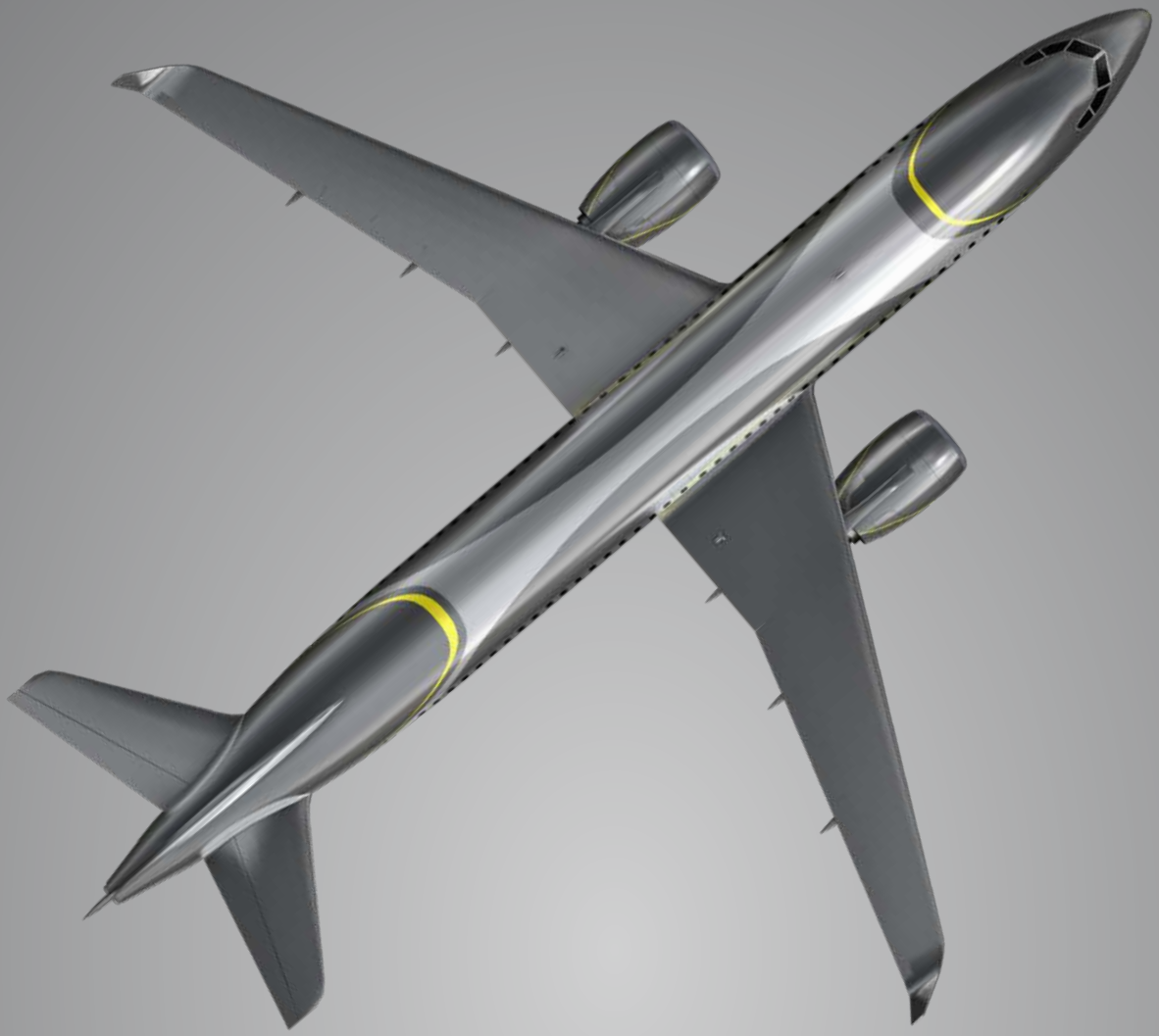
SANDVIK
Coromant

Aerospace engine

HRSA component solutions



Excellence in tooling and know-how

More demanding materials, complex component designs and time restraints, not to mention increased digitalization and the growing knowledge gap — there are many challenges encountered within the aerospace industry.

However, progress and rapid technical developments also offer numerous opportunities to seize. To succeed, you need proven solutions that combine the right programming techniques, optimized tools, thorough simulations and lab tests to get the most out of your production.

Sandvik Coromant has a long history in aerospace. Thanks to our strong focus on R&D and close industry partnership, we can provide tools and solutions together with in-depth application know-how. With a growing number of Sandvik Coromant Centers worldwide and dedicated aerospace specialists, we offer global support to meet your specific requirements.

Complete component feature solutions provider

Your machining challenge is our starting point. Based on your specific component, we work together to find a complete solution with optimized tools and machining methods. As we work globally in our dedicated aerospace centers, sharing knowledge within the organization, you can count on the collected competence from Sandvik Coromant.

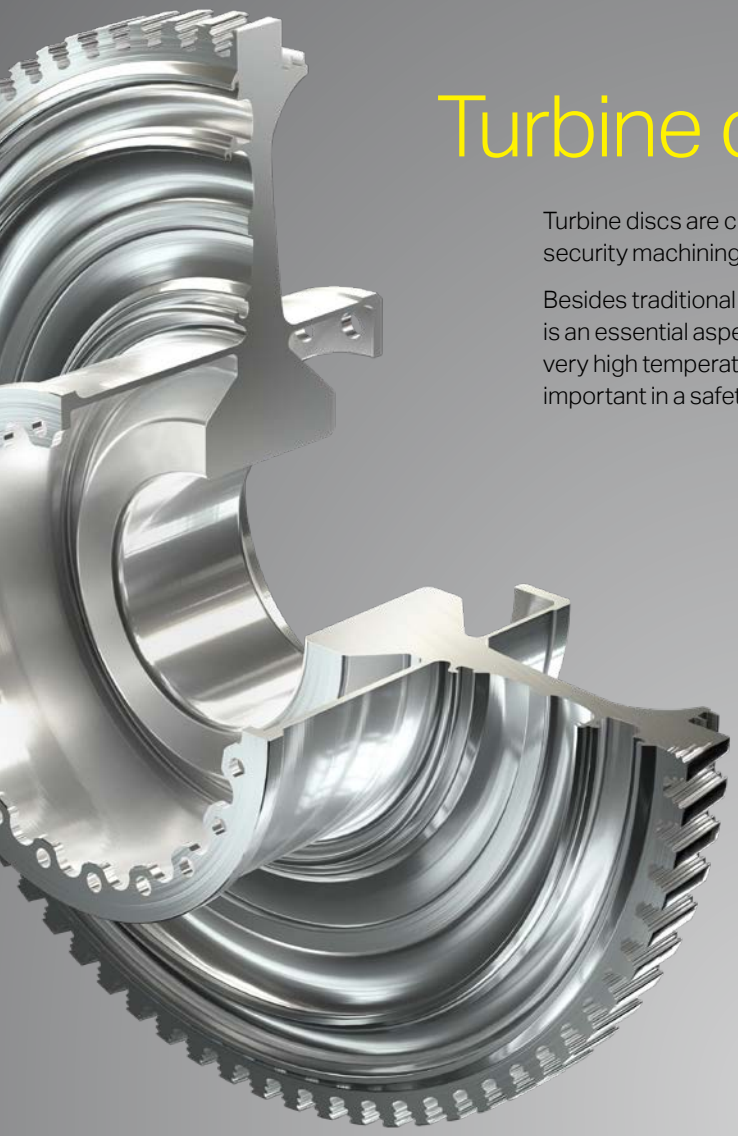
The idea behind feature-based component solutions and our way of working is that one component consists of several features, and that one feature can be found in many different components. We start by analyzing and mapping the component. Based on the findings, application and product development projects are initiated. The developed solution is then communicated with focus on a comprehensive competence transfer.

All the tools you need

Proven solutions with documented results come from many years of hard work and dedication, with focus on advanced research and development. Sandvik Coromant has an outstanding offer of tooling solutions for the aerospace industry.

This brochure only shows a small selection of our tools and recommended machining strategies. You can find out more about our complete offer on aeroknowledge.com.

To see the complete offer, visit aeroknowledge.com



Turbine disc

Turbine discs are critical components made of challenging materials, requiring high security machining with superior cutting tools and solutions.

Besides traditional parameters such as tolerance and surface finish, part conformity is an essential aspect, since these components work at extreme conditions with very high temperatures and rotating speed. Proper functionality is also extremely important in a safety perspective.

Disc machining with round inserts

The disc design makes it suitable for applying round inserts. Discs usually have spline surfaces and relatively large internal corner radii to avoid stress areas, which allows use of larger radius inserts from a geometry point of view.

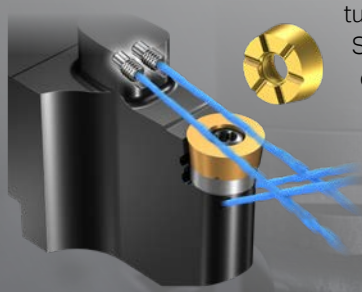
Round or full-radius inserts in combination with modern programming techniques such as dynamic and non-linear turning are optimal for features like grooves and pockets, which require plunging capability. Round inserts also reduce notches and provide long tool life, even wear and good heat resistance in demanding materials.

CoroTurn® 107 round inserts with rail interface

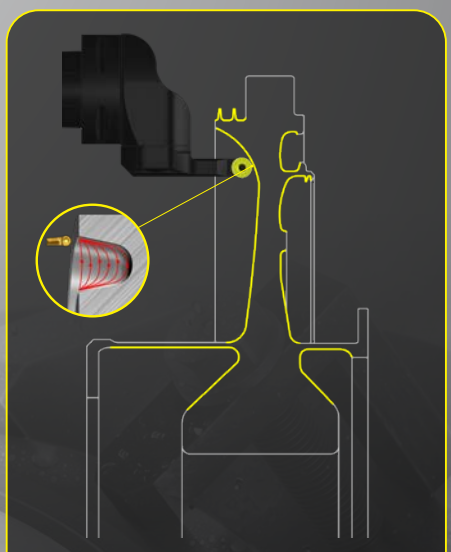
Rotation prevention and insert indexing have long been recurring challenges when machining with round inserts. To solve this issue, Sandvik Coromant has developed the CoroTurn® 107 concept with rail interface.

The ingenious rail interface locks the rotation of the insert, delivering higher performance and process security. Edge indexing also becomes very simple, which enables standardized processes and indexing repeatability.

The geometries and grade chain provide chip control in a large application area, including finishing and non-linear turning. And of course, as all modern Sandvik Coromant concepts, it is equipped with high precision over and under coolant for long tool life or higher cutting speeds.



View HRSA turning with round inserts in grade S205 and ceramics

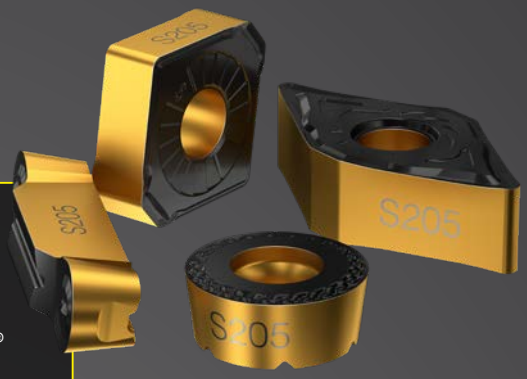


Round inserts are perfect for ramping, profiling and machining of restricted pockets, such as the diaphragm feature on the turbine disc.

S205 high speed grade for HRSA

Grade S205 is designed and verified for light roughing to finishing of HRSA materials with special attention to surface integrity. The second generation Inveio® coating technology enables an increase of cutting speeds by 30%–50% versus previous generation grades or competitors, stretching the limits of cutting speeds for coated inserts.

Grade S205 delivers an exceptional performance when applied with an entry angle up to 45 degrees and is a perfect choice for round inserts.



Inveio®
Uni-directional crystal orientation

Performance
CoroTurn® 107, roughing with grade S205

Feature: Face turning
Material: Age-hardened Inconel 718, S2.0.Z.AG, 43 HRc
Operation: Semi-finishing
Coolant pressure: 60 bars (870 PSI)

Insert	RCMT 12 04 MP-M3 S205
v_c, m/min (ft/min)	70 (230)
f_n, mm/rev (in/rev)	0.6 (0.024)
a_p, mm (inch)	1.8 (0.071)
Q, cm³/min (in³/min)	75.6 (4.61)
Tool life, min	**15**
Material removed, cm³ (in³)	**1134 (69.2)**

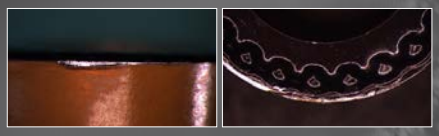
Time in cut 15 min, Vb 0.29 mm (0.011 inch)

Exceptionally high metal removal rate and tool life thanks to high speed grade S205 and CoroTurn® 107 equipped with secure rail interface.

Performance
CoroTurn® 107, finishing with grade S205

Feature: Longitudinal turning
Material: Age-hardened Inconel 718, S2.0.Z.AG, 43 HRc
Operation: Finishing
Coolant pressure: 60 bars (870 PSI)

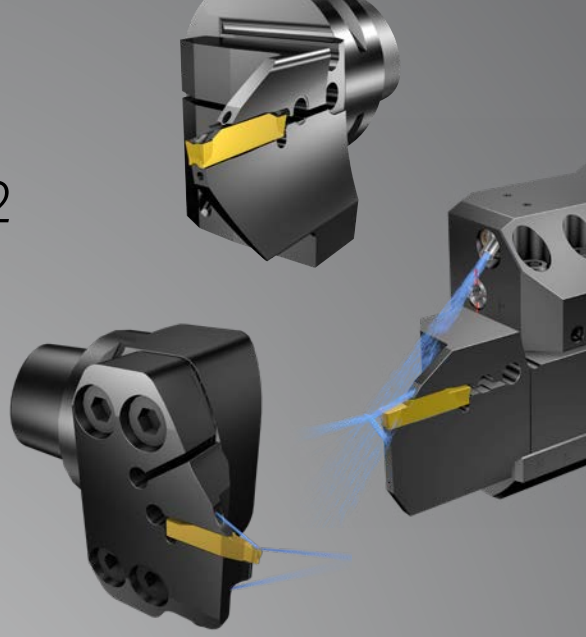
Insert	RCMT 10 T3 MP-L3 S205
v_c, m/min (ft/min)	100 (328)
f_n, mm/rev (in/rev)	0.25 (0.010)
a_p, mm (inch)	0.25 (0.010)
Tool life, min	**10**
SCL, m (ft)	**1000 (3280)**
Finished area, cm² (in²)	**2500 (388)**



Time in cut: 10 min, Vb 0.18 mm (0.007 inch)

The finishing geometry for round inserts provides excellent chip control, while grade S205 shows an outstanding combination of high cutting speed and small and predictable edge wear.

Versatile grooving with CoroCut® 1-2



With more than 700 insert types in the standard assortment, CoroCut® 1-2 stands out as the number one grooving concept on the market. The concept holds a large selection of carbide, CBN and ceramic insert grades. Besides for grooving, CoroCut® 1-2 tools hold an excellent pocketing and profiling capability.

The -RO geometry is first choice for HRSA materials and can be applied for roughing of small features. It is also an established solution for finishing of critical aerospace components as the turbine disc. The patented CoroCut® rail interface ensures mounting security.

Turbine disc machining with CoroCut® 1-2

Carbide inserts

- CoroCut® 1-2 with grade S205 is an excellent option for roughing of small or difficult-to-access grooves
- For finishing, CoroCut® 1-2 profile inserts are a versatile and years-proven choice, now enhanced with grade S205

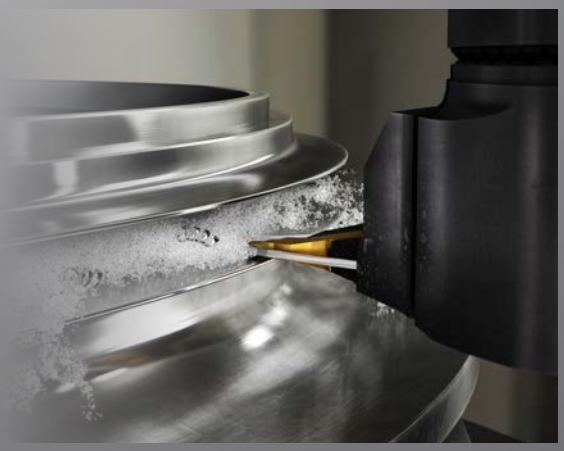
Ceramic and CBN inserts

- For small, vibration-sensitive features, use CoroCut® 1-2 profiling inserts with CBN grade CB7014

Seal fin grooving

Consistent chip control and process security are crucial aspects when machining the seal fin feature. CoroCut® 1-2 inserts for seal fin grooving combine a stable and rigid rail interface insert seat with a small and precise grinded cutting radius. The proven geometries and grades provide secure, reliable machining with approved surface integrity and excellent surface finish.

CoroCut® 1-2 inserts for seal fin grooving are ideal for roughing with dynamic turning and for high-precision finishing.

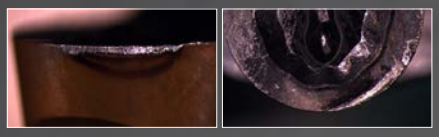


CoroCut® 1-2 angled inserts, so-called “hockey sticks”, are perfectly formed for difficult-to-access grooves, often featured on turbine discs. Combined with large CoroCut® tools and CoroTurn® SL adaptors, they provide an even more powerful performance.

Performance
CoroCut® 1-2 with -RO geometry, roughing with grade S205

Feature: Face turning
Material: Age-hardened Inconel 718, S2.0.Z.AG, 43 HRc
Operation: Semi-finishing
Coolant pressure: 60 bars (870 PSI)

Insert	N123L2-0800-RO S205
v_c, m/min (ft/min)	60 (197)
f_n, mm/rev (in/rev)	0.4 (0.016)
a_p, mm (inch)	1.25 (0.049)
Q, cm^3/min (in^3/min)	30 (1.83)
Tool life, min	**14**
Material removed, cm^3 (in^3)	**420 (25.6)**



Time in cut: 14 min, Vb 0.29 mm (0.011 inch)

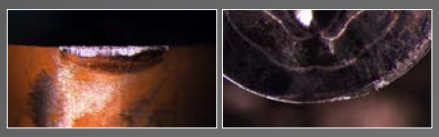
Even if CoroCut® 1-2 is a grooving concept, it can provide a good level of productivity in turning applications, thanks to the rigid insert seat and wear-resistant grade S205.

Key to success: using a small depth of cut (15% of insert width) and high feed.

Performance
CoroCut® 1-2 with -RO geometry, finishing with grade S205

Feature: Face turning
Material: Age-hardened Inconel 718, S2.0.Z.AG, 43 HRc
Operation: Finishing
Coolant pressure: 60 bars (870 PSI)

Insert	N123J2-0600-RO S205
v_c, m/min (ft/min)	120 (394)
f_n, mm/rev (in/rev)	0.25 (0.010)
a_p, mm (inch)	0.25 (0.010)
Tool life, min	**6.5**
SCL, m (ft)	**780 (2560)**
Finished area, cm^2 (in^2)	**1950 (302)**



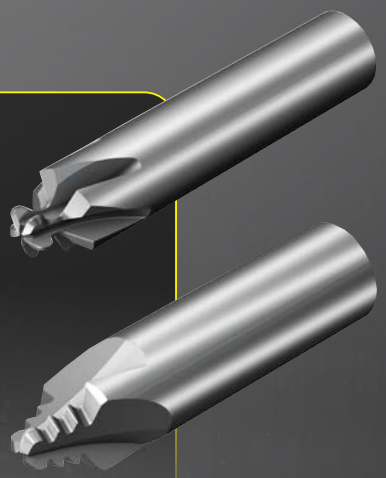
Time in cut: 6.5 min, Vb 0.2 mm (0.008 inch)

CoroCut® 1-2 combined with high speed grade S205 enables cutting speeds above 100 m/min (328 ft/min) in finishing of such demanding materials as age-hardened Inconel 718.

Tulip and fir tree slots

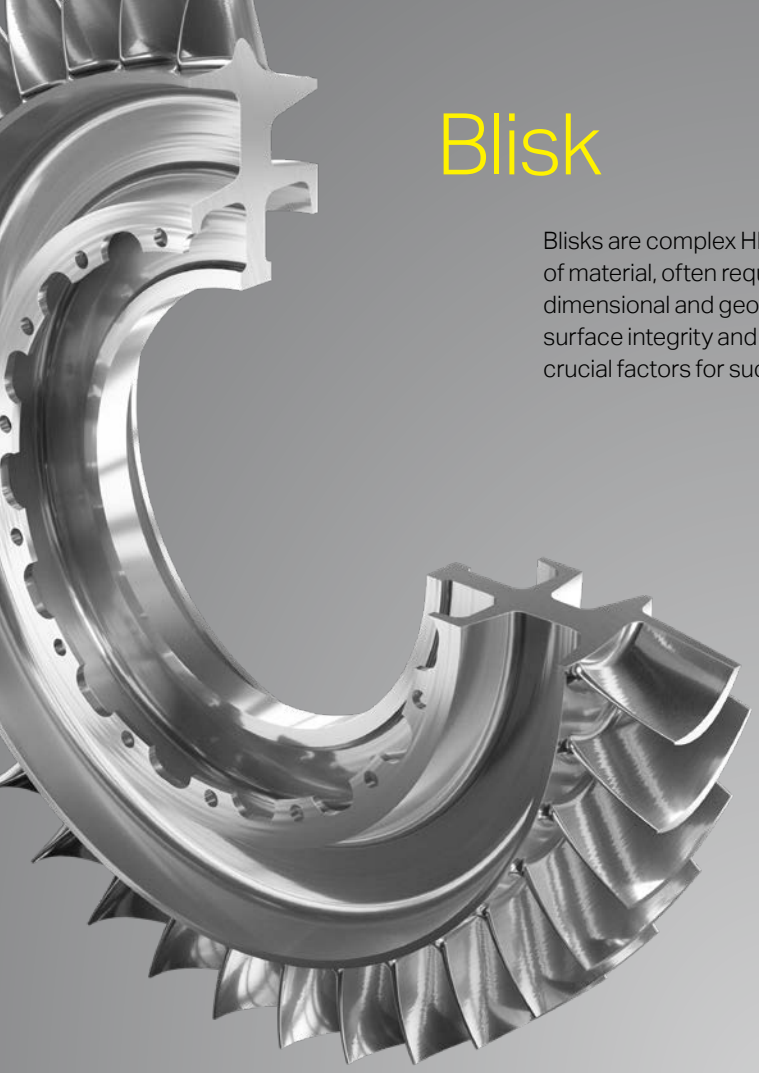
Tulip and fir tree cutters are solid end mills designed specifically for machining of tulip and fir tree applications on aerospace components, such as discs and spools.

The tools are optimized for semi-finishing and finishing of HRSA materials.



Blisk

Blisks are complex HRSA or titanium components made from one solid piece of material, often requiring five-axis machining. The component demands tight dimensional and geometrical tolerances, while maintaining high standards of surface integrity and surface finish. Optimized tools and process knowledge are crucial factors for succeeding in these challenging operations.



Blade machining

When machining the blade, you can either go for a top or side entry approach, or a combination of both strategies for different parts of the blade. A blade can come in many different shapes and measurements, and this reflects the various machining methods applicable.

The choice of method is based on blade height and curvature as well as amount of space between the blades. These factors often define cutter diameter and overhang. Machine configuration, material and cutting parameters are other important considerations.

Roughing of the blade

The main methods applied in blade roughing include full slot milling, high feed side milling (also known as dynamic or trochoidal milling), plunge milling and groove milling. Sandvik Coromant offers an extensive range of tools and application knowledge to support in choosing the most suitable solution for your need.

CoroMill® Plura end mills equipped with wear-resistant grade GC1610 provide exceptional metal removal rates in full slotting operations.

High feed side milling with CoroMill® Plura

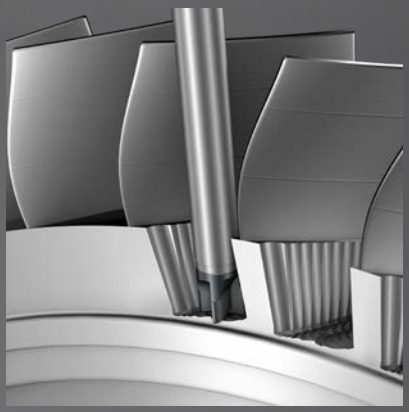
High feed side milling is an effective method for machining demanding materials. The small radial engagement allows for increased cutting speed, feed and cutting depth due to decreased heat, chip thickness and radial forces.

CoroMill® Plura high feed side milling end mills with grade GC1710 are specifically developed for nickel-based HRSA materials. Its core dimension optimized for high stiffness makes it first choice for reliable and productive milling of blisks.

Plunge milling

Applying a plunge milling strategy can make manufacturing of deep cavities more time and cost-efficient. Axial feed movement directs cutting forces into the spindle to avoid vibrations, even when machining with long tools. This makes it suitable for complex shapes and limited space between blades.

CoroMill® Plura Gannet is designed exclusively for plunge milling in HRSA. The unique concept is ideal for blisk machining with high process security and exceptional tool life. Limited tool diameter, long overhangs and hidden slots, e.g. closed blisk slots, are a few challenges that this end mill handles effectively.



Performance
Plunge milling in HRSA

Feature: Slot opening

Material: Inconel 718, S2.0.Z.AG

Operation: Roughing between blades

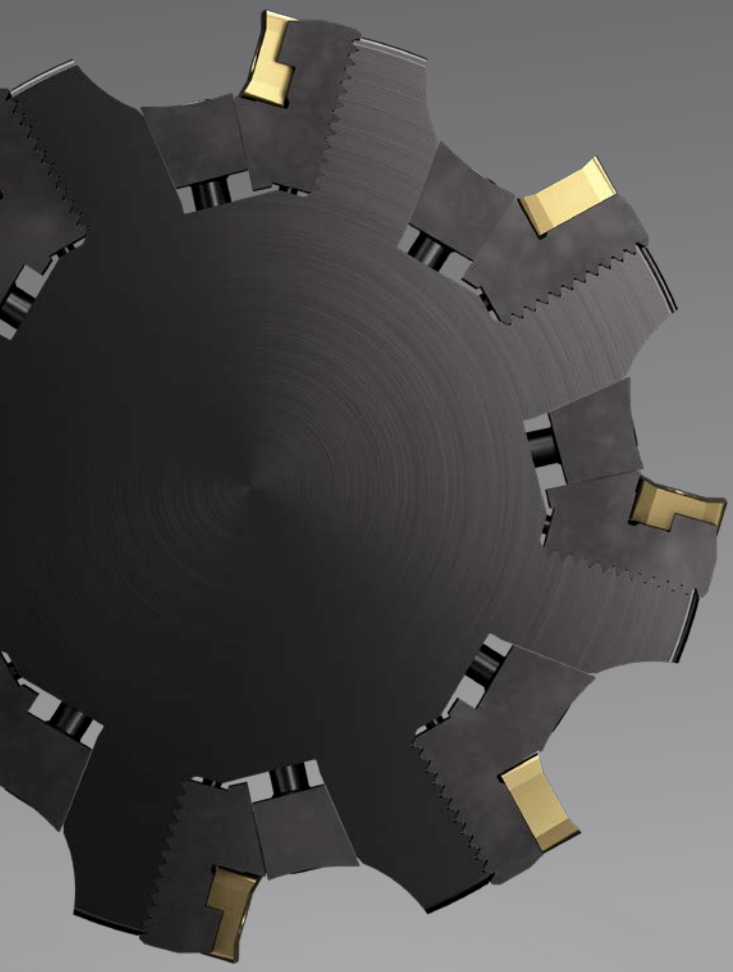
Method: Plunge milling

Tool after 15 minutes in cut:

Cutter	CoroMill® Plura Gannet (Ø10, grade GC1610)
v_c, m/min (ft/min)	25 (82)
f_z, mm/z (in/z)	0.045 (0.0018)
h_{ex}, mm (inch)	0.045 (0.0018)
v_f, mm/min (in/min)	143 (5.63)
a_e, mm (inch)	40 (1.57)
a_p, mm (inch)	Max. 3 (0.118)
n, rpm	796
z, no. of flutes	4
Tool overhang, mm	45 (1.77)
Tool life, min	**15**

The gannet cutter can be a very effective solution even with a moderate overhang (4.5×D in this case), providing a metal removal rate of up to 4.5 cm^3/min (0.275 cm^3/min).

View plunge milling in HRSA in action



Groove milling with disc cutters

CoroMill® 331 and CoroMill® QD indexable groove milling cutters are powerful alternatives to effectively remove large volumes of material between blades in a fast and cost-efficient way. Combined with Silent Tools™ damped milling adaptors, the concepts provide vibration-free grooving operations when machining with long overhangs and when blisk and machine configuration allow access with reasonable assembly length.

Semi-finishing and finishing of the blade

Due to the double-curved surfaces, the main strategy for semi-finishing is profile milling with ball-nose or conical ball-nose end mills, where CoroMill® Plura and CoroMill® 316 are proven choices. When machining long blades, the lower area of the blade requires long tools and good accessibility. Conical ball nose end mills are often the only choice. For areas higher up on the blade, shorter and stiffer non-conical tools can be applied together with increased cutting data.

Finishing of blisk features is typically carried out with profile milling with small depth of cut, small cutting width and with high cutting speeds. CoroMill® Plura ball nose end mill cutters can successfully be applied, carrying out several passes to provide the required surface finish.

Ball nose and conical ball nose end mills are essential for successful blade semi-finishing and finishing.

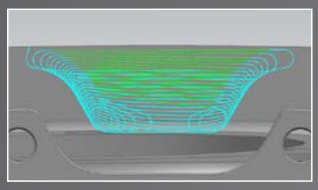
Scallop milling

The scallop is one of the most difficult aerospace engine features to machine, as it is usually located on a thin flange and is made of demanding HRSA materials. Poor tool life and burr formation are two major challenges encountered in this operation.

The CoroMill® Plura high feed side milling concept offers excellent stability and wear resistance when machining complex applications in challenging HRSA materials. Combined with a dedicated machining strategy, these top-performing end mills help overcome the challenges involved in scallop milling.

Performance
Rough milling of scallop

Feature: Scallop on HRSA engine casing
Material: Alloy 718, S2.0.Z.AG, 44 HRc
Operation: Roughing
Method: Trochoidal milling



Cutter	CoroMill® Plura R215.26-10050EAC-22H 1610
v_c, m/min (ft/min)	100 (328)
h_{ex}, mm (inch)	0.022 (0.001)
f_z, mm/z (in/z)	0.05 (0.002)
v_f, mm/min (in/min)	955 (37.6)
a_e, mm (inch)	0.5 (0.02)
a_p, mm (inch)	3–5 (0.118–0.197)
n, rpm	3183
z, no. of flutes	6
Tool life	12 scallops or more per edge position (scallop size: L30D10W3)
APMX, mm (inch)	22 (0.866)

It is recommended to optimize the air time (when the tool is in the air after each cutting pass) and also use constant h_{ex}. Feed reduction during the first few seconds with a new tool helps to increase tool life.

Performance
Finish milling of scallop

Feature: Scallop on HRSA engine casing
Material: Alloy 718, S2.0.Z.AG, 44 HRc
Operation: Finishing
Method: Side milling

Cutter	CoroMill® Plura R215.3A-10030-AC22H 1610
v_c, m/min (ft/min)	100 (328)
h_{ex}, mm (inch)	0.005 (0.0002)
f_z, mm/z (in/z)	0.02 (0.001)
v_f, mm/min (in/min)	637 (25.1)
a_e, mm (inch)	0.15 (0.006)
a_p, mm (inch)	3–5 (0.118–0.197)
n, rpm	3183
z, no. of flutes	10
Tool life	Over 25 scallops per edge position (scallop size: L30D10W3)
APMX, mm (inch)	22 (0.866)

This method provides high productivity due to the large number of flutes. Achieved surface finish is in the range of Ra 0.3–0.4 micron.

Surface integrity

The cutting process can affect the integrity of the final component. This can ultimately lead to part distortion on thin parts or reduced fatigue life in critical rotating parts, such as discs and shafts. The combination of cutting force and elevated temperatures generated during machining leads to alterations of the microstructure, which can cause changes in micro hardness, plastic deformation of the grain boundaries and residual stresses in the component sub-surface.

Sandvik Coromant leads R&D with the AMRC (Advanced Manufacturing Research Centre) in Sheffield, UK, to develop optimized grades, geometries and cutting parameters to leave the component in optimum condition.

Key factors that affect the severity of the surface change are:

1. Cutting parameters. There is little effect with change of feed. However, increase in cutting speed has a detrimental effect on the surface characteristic with a worn edge in HRSA materials.
2. Grade and geometry effect on insert wear. The critical point is the 'trailing edge' of the insert. This is the part of the edge which transmits heat into the component and generates the finished diameter. Wear at this point increases the temperature and forces, resulting in more spring passes and component deflection.

Predictive machining

To ensure that the chosen insert style and grade can make one pass, we provide spiral cutting length (SCL) information. For a given diameter and length of cut, the SCL can be calculated for a specified feed rate. The correct speed can then be applied to guarantee making the pass with acceptable wear, good surface integrity and dimension, and without any need to re-cut.

Best practice for finishing

Roughing: If using ceramic inserts, stop within 1 mm (0.039 inch) due to high material deformation.

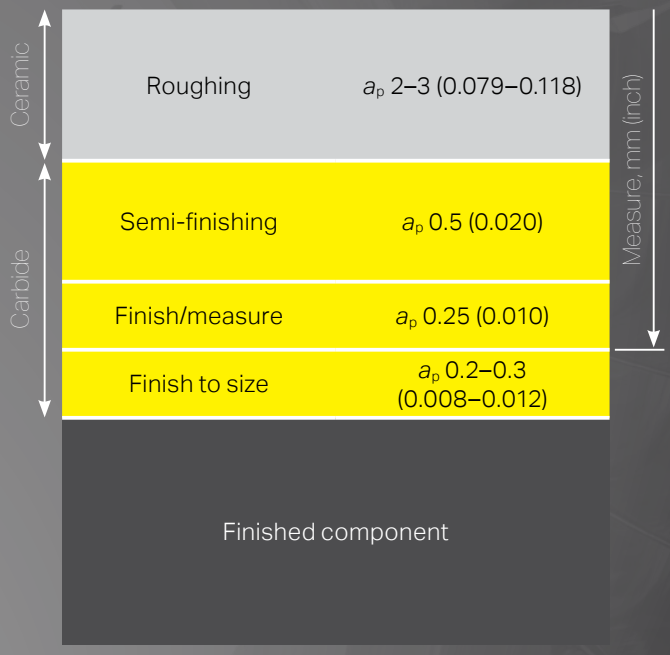
Finish with carbide, 3 passes: Use SCL to ensure cutting data gives the required cutting length.

1. Semi-finishing: 0.5 mm (0.020 inch)

2a. Finish/measure with same insert style and geometry as finish cut: 0.25 mm (0.010 inch)

2b. Measure component to gauge last cut, size to correct offset of tools

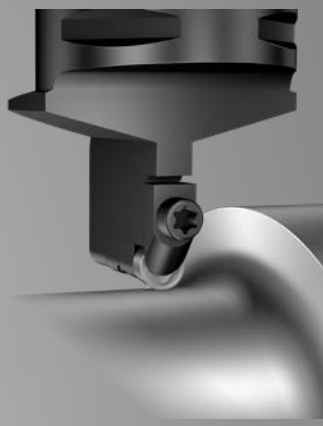
3. Finish cut to size



Spool

Deep internal chambers and external blade dovetail grooves are two demanding features encountered when machining the spool. A well-thought-out methodology in combination with optimized grades are key to success for these components.

Sandvik Coromant offers a comprehensive assortment of ceramic and CBN grades, many of them developed in close collaboration with the aerospace industry.



Productive inner pocket operations

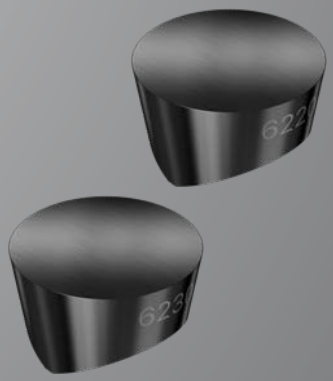
T-Max® P is a year-proven, trusted concept with a wide assortment of V-bottom and double-sided flat inserts with strong edges for reliable and secure machining. The concept offers stable clamping for inserts both with and without hole.

V-bottom inserts are optimal for profiling and deep inner pocket operations. A wide range of insert materials are available: Use ceramics for roughing, while V-bottom carbide inserts can be used for roughing and finishing operations. Finally, to achieve good surface integrity, apply CBN inserts in your finishing operations .

Higher cutting speeds with ceramics

Ceramic insert grades, with their strong hot-hardness and low reactivity with workpiece materials, offer a powerful alternative to cemented carbide grades in HRSA machining. Choose between SiAlON, composite and whisker grades, depending on your operation:

- SiAlON grades CC6160 and CC6165 are first choice in most conditions, thanks to their notch resistance
- Composite grades CC6220 and CC6230 excel in intermediate machining with even higher cutting speeds. These grades are ideal for new, demanding powder-based materials where other grades fall short
- Whisker grade CC670 can be applied for toughness-demanding operations in difficult conditions



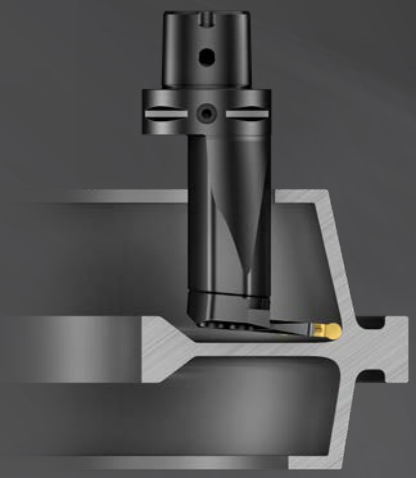
Discover inserts and grades for HRSA materials

Designed for aerospace engine components

CoroTurn® SL70 is a modular tooling system created to solve the tasks of accessing aerospace engine component features, such as difficult-to-access grooves and pockets.

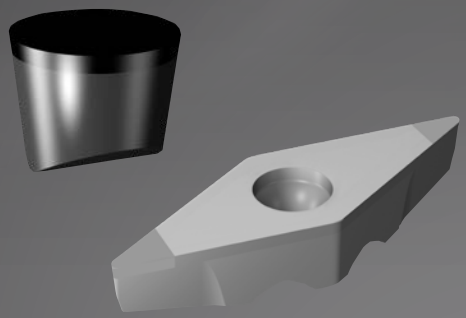
By combining different adaptors and blades, it is possible to acquire a variety of complex-shaped tools with different access angles, width and length. This allows for machining of several restricted features without the need of engineered tools.

The main advantage of CoroTurn® SL is the oval Serration Lock (SL) interface between adaptor and cutting head. The robust locking interface provides both excellent rigidity and accessibility, making it ideal for profiling and grooving operations on large components.



An insert for every groove shape

CoroCut® 1-2 angled inserts can successfully be applied for machining challenging external dovetail grooves. Besides the standard CoroCut® 90-degree inserts, blanks are also available in 90, 45 degree and T-shape for special requirements.



CBN inserts optimized for nickel-based engine components

Carbide inserts are often used at low speeds when finish turning aerospace components in demanding nickel-based alloys. Using CBN inserts allows for increased cutting speeds and improved productivity, while maintaining good surface integrity on the component.

Performance
CoroTurn® 107, high speed finishing with grade CB7014

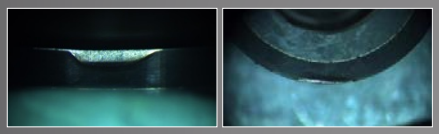
Feature: Longitudinal turning

Material: Age-hardened Inconel 718, S2.0.Z.AG, 43 HRc

Operation: High speed finishing with CBN insert

Coolant pressure: 60 bars (870 PSI)

Insert	RCGW 08 03 MT D-E 7014
v_c, m/min (ft/min)	250 (820)
f_n, mm/rev (in/rev)	0.25 (0.010)
a_p, mm (inch)	0.3 (0.012)
Tool life, min	**15**
SCL, m (ft)	**3750 (12303)**
Machined area, cm² (in²)	**9375 (1453)**



Time in cut 15 min, Vb 0.31 mm (0.012 inch)

CoroTurn® 107 with rail interface can be equipped with CBN brazed ring allowing to run finishing at high cutting speeds, providing great surface finish (during this test Ra 0.47–0.97) and up to 12 edges with easy and precise indexation.

Casing

Machining of casings requires numerous complex operations, where process security and consistent chip control are critical. Since the shell thickness often is quite thin, the casings are vibration-sensitive and can potentially deform during machining. An optimized cutting process is important to achieve lower radial forces and ensure a successful result.

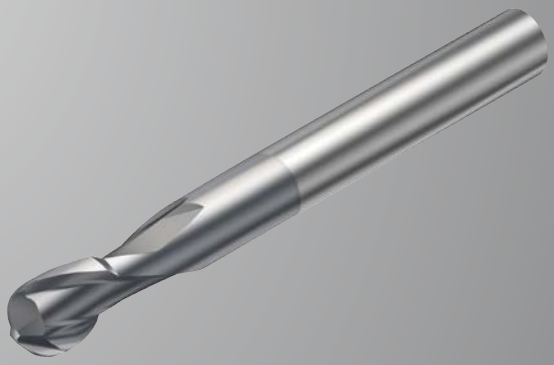
Machining of the boss

A combustion casing contains boss features of different shapes and sizes. Bosses have flat flange surfaces and a curved connection to the casing drum. Their location and proximity to other features on the casing are important factors when choosing the optimal cutting strategy.

CoroMill® Plura end mills are ideal for every step of the machining process, from removing material between the features and roughing, to delivering the required form and surface finish to the blend.

Boss blend roughing

Multi-axis side milling with the CoroMill® Plura ball nose end mill is a suitable method for roughing the blend with the best result. As it can be challenging to rough in one pass and match the blend radius, it is recommended to machine in several passes.

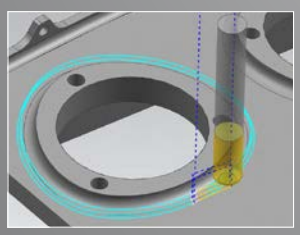


Performance
Boss blend roughing

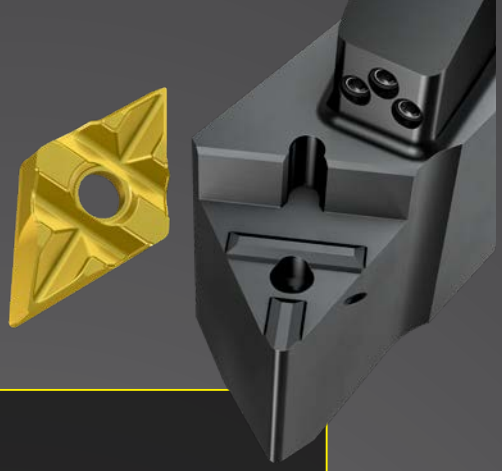
Process: Machining of boss blend

Material: Alloy 718, S2.0.Z.AG, 44 HRc

Method: Multi-axis side milling, multiple levels



Tool	CoroMill® Plura
Cutter	R216.44-12030-AI12G DC: 12 mm (0.472 inch)
Grade	GC1610
Purpose	When boss is surrounded by other features
v_c, m/min (ft/min)	40 (131)
f_z, mm/z (in/z)	0.05 (0.0020)
v_f, mm/min (in/min)	212 (8.35)
a_e, mm (inch)	1–3 (0.039–0.118)
a_p, mm (inch)	Up to 10 (0.394)
n, rpm	1061
z, no. of flutes	4
Tool life, min	**32**



iLock®
ingenious locking interface

Secure and stable profiling

CoroTurn® TR provides secure and productive external and internal profiling with high tolerances. The concept also includes a three-pass method for extra fine tolerances to achieve your dimensions requirement.

The key to achieve the highest profile quality is to prevent cutting forces from causing micro-movements of the insert. The stable iLock® interface is developed to bridge this challenge, while also providing easy and accurate insert indexing.

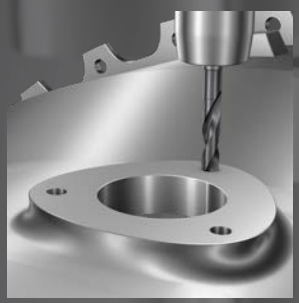
Secure short hole drilling

Process security along with repeatability and hole tolerance are the most important criteria when drilling nickel-based alloys.

CoroDrill® 860 with -SM geometry offers a reliable, repeatable performance, making it highly suitable for aerospace boss and scallop features. The robust design, consistent cutting edge and wear-resistant top coating makes it first choice for a lower cost per hole.

Performance
CoroDrill® 860 with -SM geometry, drilling of boss face holes

Process: Drilling at boss face
Material: Alloy 718, S2.0.Z.AG, 44 HRc
Method: Drilling with internal coolant



Tool	CoroDrill® 860 with -SM geometry
Cutter	860.1-0510-016A1-SM 1210, DC: 5.1 mm (0.201 inch), LU:3×D
v_c, m/min (ft/min)	22 (72)
f_n, mm/rev (in/rev)	0.06 (0.0024)
v_f, mm/min (inch/min)	83 (3.27)
n, rpm	1373
Tool life, no of holes	**70 (10 mm (0.394 inch) deep holes)**

For drilling of the face holes, drilling with reduced feed at entry is recommended. Diameter 5.1 mm (0.201 inch) is selected for M6 as an example. Suitable diameter to be chosen for respective thread standard.

Learn more about CoroDrill® 860

Shaft

Shafts are usually made from high-alloy steels or Inconel superalloys. These strong, tough-to machine materials often contain an extremely low amount of carbon, which make them hard to chip break and prone to fast tool wear. The length and intricate internal features also constitute major challenges.

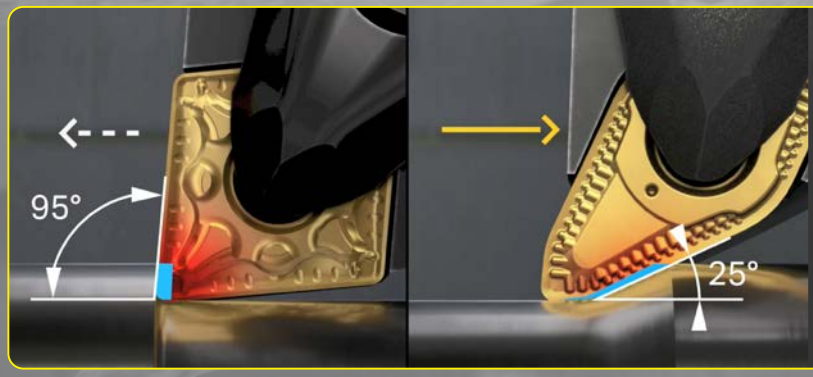
A carefully planned tool configuration with a robust process and optimized chip control is essential in order to achieve good component quality.

Doubled tool life and productivity with PrimeTurning™

PrimeTurning™ enables you to do turning in all directions in a much more efficient and productive way compared to conventional turning — you can actually double both productivity and tool life at the same time.

What makes PrimeTurning™ so exceptional? The key lies in the small entry angle, which is very well suited for machining HRSA and titanium alloys. The generated chip thinning effect allows an increase of feed per revolution with up to three times. Another benefit of small entry angles specific to HRSA machining is the decreased risk of notch wear.

The possibility to use a one-pass strategy, thereby avoiding unwanted seams in the surface, is an additional feature that makes the PrimeTurning™ methodology and CoroTurn® Prime tools highly productive for both internal and external turning.



The small entry angle evens out heat distribution to reduce notch wear. This way you can use more wear-resistant CVD-coated grades, such as grade S205, which allow increased cutting speed.

Performance
Conventional turning versus PrimeTurning™ in Inconel 718

Component: Aerospace component

Material: Age-hardened Inconel 718, S2.0.Z.AG, 43 HRc

Coolant pressure: 30 bars (435 PSI)

	Conventional turning	PrimeTurning™
Grade	GC1105	S205
Insert	CNMG 120408-SMR 1105	CP-B1 108-H3 S205
v_c, m/min (ft/min)	40 (131)	40 (131)
f_n, mm/rev (in/rev)	0.25 (0.010)	0.78 (0.031)
a_p, mm (inch)	2 (0.079)	2 (0.079)
Tool life (min)	9	17.2
Q, cm^3/min (in^3/min)	20 (1.22)	62.4 (3.81)
Q_{tot}, cm^3 (in^3)	180 (11.0)	1076 (65.7)

+91% Tool life

+498% Metal removal rate

CoroPlus® Tool Path for PrimeTurning™

The PrimeTurning™ concept is comprised of the PrimeTurning™ method, dedicated CoroTurn® Prime tools and a software providing the tool path.

The CoroPlus® Tool Path software for PrimeTurning™ supplies programming codes and techniques to set up proper parameters and variables for a particular application to secure maximum output.

CoroPlus®

CoroPlus® is Sandvik Coromant's digital platform consisting of software applications, sensorised cutting tools and digital manufacturing support systems combined with productivity-increasing services.

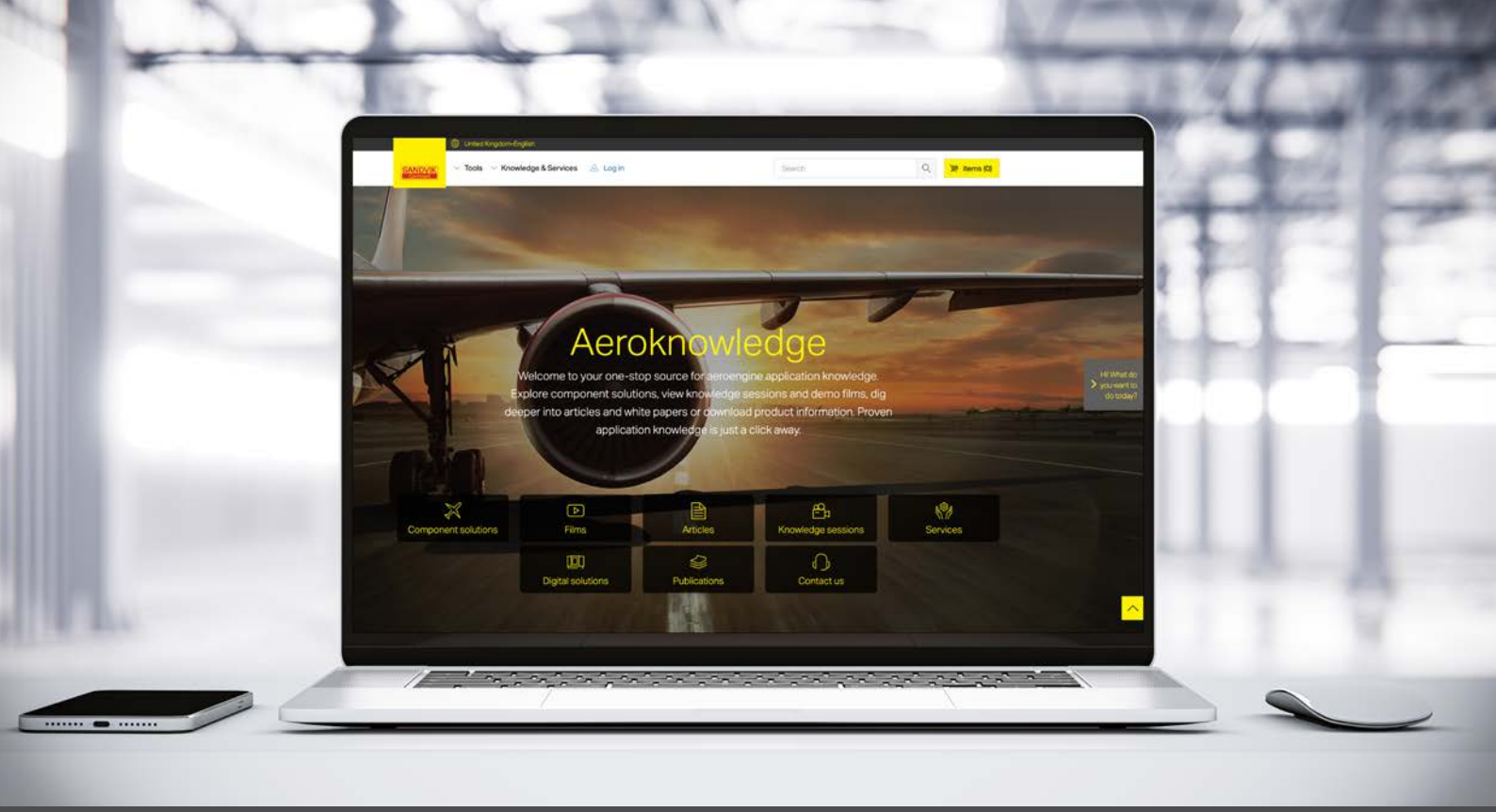
Silent Tools™ Plus damped adaptors

Silent Tools™ Plus adaptors are equipped with sensors, which can measure important parameters such as height, temperature and load. The adaptors then transmit this data automatically to the machine, minimizing tool set-up time and improving operator control when the tool is in cut.

Ensuring that tools are correctly set up and working to appropriate loads and measurements can effectively minimize downtime and waste of resources. This is particularly important in the aerospace industry, since accuracy is key in preventing the need to scrap partly machined components in costly materials.

Silent Tools™ Plus turning adaptor, featuring connectivity capability for digital machining.

View our digital machining offer



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