cerlikon

ADVANCING AEROSPACE AND DEFENSE

With high-end surface solutions, advanced materials, additive manufacturing and turbine components

Capability ready for ramp up of production

Oerlikon is your optimal choice with resources and capacity in place to meet the supply demands of the aerospace industry today and tomorrow. As one-stop-shop and dedicated program manager to simplify the supply chain for aerospace applications with the most comprehensive offering of:

- Advanced materials for surface engineering, additive manufacturing and other processes
- Surface engineering technologies and services including thin film, thermal spray and other solutions
- Heat treatment solutions such as hardening, vacuum and HIP furnace
- Conventional and non-conventional machining and manufacturing of turbine components
- Additive manufacturing solutions from application engineering, manufacturing to post processing

Our solutions for enhanced aircraft components

Coatings for tools used in chassis processing and structural development	
Landing gears and airframe components	
Cockpit instrumentation	
Air conditioning systems	
Interior decor	
Fan blades, LPC and HPC blades, vanes, shrouds and rotor seals	
Turbine hot section components such as combustors, bearings and bushings, HPT blades and vanes	
Engine pylons, fuel pumps	

Actuation systems

Manufacturing of lightweight materials

A GLOBAL, HIGH-TECH ENGINEERING GROUP WITH **UNIQUE COMPETENCIES**

Oerlikon is a market leader in advanced materials, surface engineering and polymer processing. Our solutions encompass materials, coating equipment, coating services, and the engineering of entire plants. We build our business on unique technology competencies, the widest global reach and trusted customer relations in highly demanding industries such as aerospace, automotive, energy and tooling.

Every day, we develop novel materials, new surface technologies, new applications and components to empower our customers to create and innovate better products.

Every major aero engine manufacturer trusts our technologies to boost performance, improve safety and fuel efficiency and reduce emissions.

Advancing Aerospace and Defense



MAKING AEROSPACE MORE SUSTAINABLE, POWERFUL AND EFFICIENT

Enhance engine performance and efficiency

- Lower fuel consumption
- Meet CO₂ and NO_x emission standards

Optimize hot engine components

- Operate at higher temperatures
- Increase efficiency and lifespan

Next-generation aircraft needs

- Satisfy strict standards for landing gears and airframe parts
- Replace harmful hard chromium processes

Reduce weight and costs

- Lighter, cost-effective engine and structural components
- Streamline production of complex and replacement parts

Our solutions



Engines sealed with abradable coatings achieve improved performance, increased safety, decreased fuel consumption and reduced CO₂ and NO_x emissions.



Landing gears coated with our high-velocity oxygen fuel thermal spray technology achieve superior performance and safety. These coatings replace the noxious hard chromium process.



Attractive colored coatings with longer service life and performance for interior appliances.



To improve aircraft engine efficiency, we produce sheet metal and machined components such as inserts and compressor vane assemblies.

Thermal barrier coatings used in combustor and turbine sections of engines protect underlying materials from temperatures that these substrates could otherwise not tolerate.

PVD coatings significantly improve the performance and durability of precision components and tools. Our coatings reduce friction and protect against wear to extend component service life.

The design freedom of additive manufacturing technology enables optimized performance of aerospace parts with reduced weight and part consolidation.

Functional coatings significantly improve the performance and durability of bearings and bushings in the engine, extending time on the wing by reducing friction and protecting against wear.

BALINIT TURBINE PRO

Anti-erosion and corrosion resistant coating

BALINIT® TURBINE PRO provides

excellent surface protection against solid particle erosion (SPE)

and liquid drop erosion (LDE)

The PVD coating is used on

aircraft low pressure and high

pressure compressors as well as

on helicopter axial compressors

PRO is 40 times more erosion

resistant than steel and 5 times

PVD coating solutions.

more erosion resistant than other

and impellers. BALINIT[®] TURBINE

without affecting your

components' fatigue life.

For high temperature applications

In order to improve the efficiency level of turbine engines, the operating temperatures are often increased to 1,200 °C (2,192°F) and beyond. The BALORA™ PVD MCrAIY coating meets these extraordinary requirements. It exhibits an excellent substrate adhesion, and can be applied up to a thickness of 100 micrometers without porosity.

Most importantly the MCrAIY composition in combination with the high density can be tailored to provide the optimal barrier against oxidation.

BALINIT TURBINE PRO

Coating material	TiAIN	NiCoCrAlY (Ni, Ni/Co, Co)	AlCrO
Coating hardness $H_{\rm IT}$	32 ± 2 GPa / 4641 ± 300 ksi	7 – 11 GPa	11 ± 1.5 GPa
Typical coating thickness (µm)	5 – 25	10 to > 100	10 - 17
Friction against steel, dry running	~ 0.5	~ 0.5	0.35 (**)
Coating temperature	< 500°C / < 932°F	500°C / 752 – 932°F	600°C / 1112 °F
Max. service temperature	< 750°C / < 1382°F	Appr. 1,200 °C / appr. 2,192 °F	1,400°C / 2,552 °F (*)
Color	Violet-gray	Gray	Dark gray
*Depending on substrate material **Against IN718 at 700°C / 1,292°F			

Cutting tools have to resist wear under serious conditions, from high cutting temperatures

Advantages of PVD and CVD coated tools

- Longer tool life
- Retention of tolerances and surface quality
- Productivity increase due to higher cutting speeds and feeds
- Possibility of reduced lubrication and dry machining
- Enable machining within smaller tolerances
- Excellent wear resistance of the tools

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THIN FILM COATINGS FOR AEROSPACE COMPONENTS AND CUTTING TOOLS

We are one of the world's leading suppliers of PVD and CVD thin-film technologies that significantly improve the performance and durability of precision components and tools. BALINIT® coatings provide outstanding wear resistance, low friction, and effective protection against corrosion and erosion. BALORA™ coatings are engineered for extreme high-temperature applications, such as turbine and compressor blades. Both solutions extend component lifetime and reduce maintenance costs. BALINIT®, BALIQ® and BALDIA® coated cutting tools meet the highest expectations in machining high-end aerospace materials like titanium and nickel alloys as well as CFRP (carbon fiber reinforced plastics).

Thanks to our network of Nadcap-certified customer centers in all relevant industry locations around the globe, you benefit from high-end coating services wherever you are.



BALORA TECH PRO

For high-temperature oxidation and wear resistance

This PVD coating significantly extends the service life of aerospace components by providing robust protection against hot corrosion, oxidation, and mechanical wear up to 1,400°C (2,552°F). The wellbonded aluminum oxide-based coating adheres effectively to various substrates, enhancing the durability and performance of critical components used in all sections of a turbine engine such as low- and high-pressure turbine blades (LPT/HPT) and lowand high-pressure compressor blades (LPC/HPC).

BALORA PVD MCrAIY

BALORA TECH PRO

Coatings for cutting tools to machine aerospace components

to heavy loads causing friction and difficulties in removing chips.









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THERMAL SPRAY SOLUTIONS FOR MAXIMUM PROTECTION, PERFORMANCE, AND DURABILITY

Today, almost all turbine-powered aircrafts have our solutions on board, and we have more OEM approvals than any other coating material supplier. Our next-generation solutions are designed to protect expensive aerospace components from wear, corrosion, oxidation, thermal attack and more. Even as operating temperatures continue to rise for aircraft engines, our solutions will be there to keep them operating efficiently and safely. High-tech protection

Innovative solutions to resist attack

Our advanced EBC coating solutions protect ceramic matrix composite components from the harsh service conditions. New materials are continually being developed to arrest coating degradation caused by CMAS; allowing engines to operate longer in harsh environments.



coatings, we Advanced corrosi HPT and LPT blac

As the leader in abradable coatings, we continually evolve our solutions to more effectively improve efficiency in all parts of the engine.

Advanced corrosion coatings protect HPC, HPT and LPT blades from oxidation and corrosion.

Technology and services for optimal performance and efficiency

We ensure our customers get the best solution by using all of our expertise and know-how during every step of the process. Our goal is to provide our customers with a solution that not only meets their exact technical requirements, but is also as efficient and cost-effective as possible.



Advancing Aerospace and Defense



Coatings for turbine engine compressors with improved corrosion resistance that reduces maintenance and operating costs.



New compositions for advanced structured TBCs and efficient approaches to applying them allow engines to operate at higher temperature over long service intervals.

Additive Component Manufacturing

At our 125,000 square foot production site in Huntersville, NC, USA, we operate more than 20 metal printers, offering small to large-scale production. Our capabilities include end-to-end engineering, manufacturing, and a state-of-the-art research and development center. Additionally, we offer a wide range of postprocessing capabilities such as heat treatment and CNC machining.

Large Format Additive Manufacturing and Coatings

At our Laser Center of Competence in Wohlen, Switzerland, we advance aerospace manufacturing with DED technology—producing large, precise components over one meter in height with wall thicknesses under one millimeter, incorporating intricate features like cooling channels. Combined with Thermal Barrier Coatings, this enhances performance, efficiency, and durability.

We have AS9100, ISO9110, and NADCAP certifications, are ITAR registered, and maintain an FFL for manufacturing.

Aerospace and defense applications

Leverage our expertise in materials development and advanced processes, including Laser Powder Bed Fusion (LPBF) and Directed Energy Deposition (DED) paired with thermal barrier coatings to drive performance and innovation in your projects.



Optimize RF components with precise, lightweight designs and parts consolidation using Additive Manufacturing.



The design freedom of Additive Manufacturing enables complex cooling channels, enhancing cold plate performance.

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REVOLUTIONIZING AEROSPACE AND DEFENSE WITH ADDITIVE MANUFACTURING

Additive manufacturing (AM) is transforming aerospace and defense engineering by enabling the creation of lighter, stronger, and more complex geometries. This technology offers significant benefits, including parts consolidation, enhanced thermal management, and weight reduction, which are crucial for applications such as RF components, heat exchangers, cold plates, and rocket components.

At Oerlikon, we're integrating and scaling the entire additive manufacturing value chain. Our comprehensive solutions encompass additive manufacturing metal powders, additive component manufacturing, and advanced surface treatments, including PVD, CVD, and thermal spray coatings.

Additive Manufacturing Metal Powders

With over 85 years of experience in materials development and production, Oerlikon offers a comprehensive portfolio of metal powders, each designed, tested, and manufactured to meet the exacting standards of Additive Manufacturing.

The MetcoAdd[™] product range includes a great variety of **Nickel, Cobalt, Iron**, and **Titanium alloys**.

Create lighter rocket engine components with complex geometries that enhance thermal management.

Thermal barrier coatings protect components from extreme heat, improving durability, efficiency, and performance.

COUNT ON A POWERFUL NETWORK WORLDWIDE



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Certified to EN 9100 / AS 9100 / JISQ 9100

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