

Automotive Solutions Kit

Issue 5



Introduction

Challenges and Opportunities for the Automotive Industry

For decades, the automotive industry has had an increasingly significant impact on both regional and global economies. Total vehicle production, worldwide, has risen in the past five years to over 50 million vehicles annually, and car ownership density ranges from 800 cars per thousand people in the US, to 5.8 cars per thousand in the People's Republic of China.

While these statistics promise sustainable growth for the mid-range future, the automotive industry is currently facing stiff challenges in a number of key areas:

Globalization

- Increased competition, smaller share of markets
- Pressure to customize and segment vehicle production
- Need for standardization and support for advanced manufacturing across all markets
- Continued goal of a lower break-even point, becoming more cost effective
- Need to create a successful blend of "lean", transnational production capabilities
- Brand erosion

Industry Consolidation

- Increased scale and complexity of relationships with subcontractors and suppliers
- Pressure to lower component costs
- Outsourcing to reduce development costs and associated overhead, with suppliers assuming system responsibility
- Need for complete solutions



All types of motor vehicles can benefit from Oerlikon Metco's technologies. They decrease fuel and oil consumption, which contribute to saving resources and protecting the environment. They also protect against wear, corrosion, add decorative finishes and much more; thus adding value to the vehicles.



Oerlikon Metco surface technology is used in high performance, exclusive cars.

Technology & Innovation

- Search for flexible manufacturing, new design concepts, vehicles that are easier to assemble
- Regional environmental legislation
- Shorter product life cycles
- Higher, more stringent material requirements
- More sophisticated consumer demands

Even though these challenges affect all aspects of the industry, they can be met and overcome with the correct set of resources.

In order to compete effectively in this fast-paced and increasingly complex, competitive environment, enterprising automotive executives constantly optimize their business models and improve existing, or create new, technical solutions. Success requires competent and reliable partners, who can provide solutions and services that increase flexibility, speed operations, lower costs, provide technological advantages, and provide the edge needed to continue as successful players in an increasingly difficult market environment.

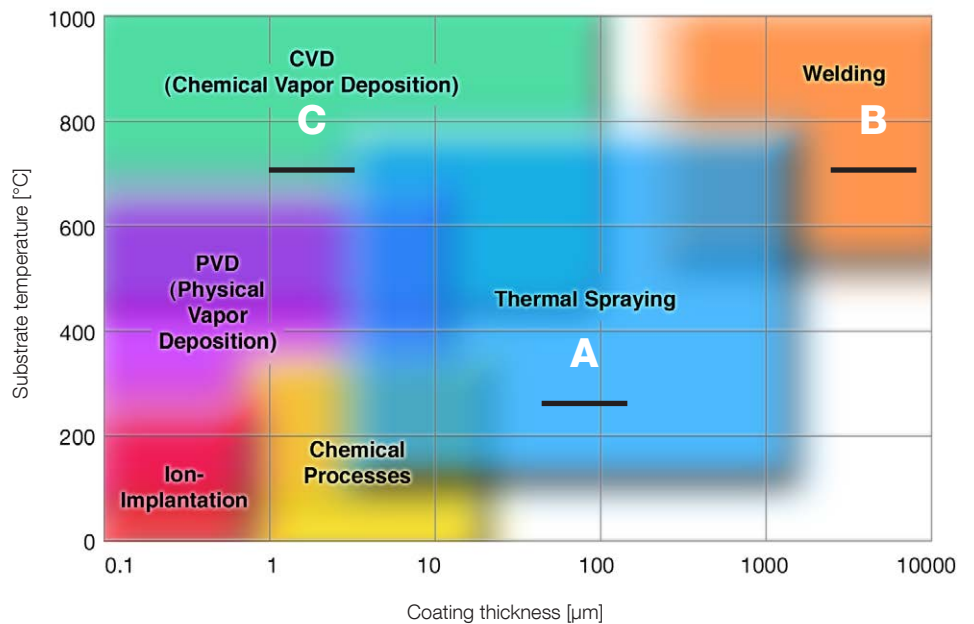
Advantages

Surface Enhancement Engineering Advances Your Goals

For many years, customers have turned to Oerlikon Metco for technological solutions that are effective and profitable. As a global leader in surface engineering solutions and services, we help solve the surface technology challenges faced by the automotive industry.

Surface enhancement engineering basically changes the surface of a material by additive processes such as thermal spray, plasma PVD (physical vapor deposition), CVD (chemical vapor deposition), plasma nitriding or nitrocarburizing (PNC—with or without oxidation) to deposit a thin film or coating that cost-effectively enhances the physical properties of the substrate. In effect, this coating creates a new material superior to either one by itself.

Classification of Surface Treatments



A – Thermal Spray Technology

The advantages of surface engineered thermal sprayed coatings are many:

- Coatings can be deposited at a high rate
- There is a broad range of coating choices
- Small areas as well as large can be coated
- Coatings can be applied to almost any metallic substrate
- The process imparts little heat to the substrate, avoiding distortion of metal surfaces
- Reproducible coating quality
- Portability options
- No volatile organic compounds (VOC's)
- No drying time required
- The coating process can be integrated into mass-production lines

B – Thin Film Technology

Our PVD thin film coating technology and plasma-supported heat treatment technology provide customers with a flexible choice of friction, wear and corrosion protection. Coatings can be tailored for:

- Tribological features, e.g., surface roughness and low friction coefficient
- Choice of coating hardness
- Heat conductivity
- Electrical insulation or conductivity
- Reduced adhesion of plastics, etc., to molds
- Varied thickness and ductility
- Durable, decorative colors
- Anti-corrosion

C – Friction Technology

We rank internationally among the leading manufacturers of wet friction linings, slip and anti-wear coatings and power transmission components for the passenger car and utility vehicle manufacturing industry.

We also develop and produce systems or complete modules according to the customers' requirements.

- Wet friction linings
- Carbon, brass and molybdenum friction linings
- Optimized coefficient of friction, specific for the individual application
- Slip and anti-wear coatings
- Reduced wear for longer life and lower maintenance of drive train components
- Design support for coating solutions

Surface Technologies

Oerlikon Metco Has Solutions for Auto Industry Challenges

Since the early days of automobiles, Oerlikon Metco's surface treatment repertoire has expanded to include a variety of advanced surface treatment processes, including:

Thermal Spray Technology

Combustion Powder

Economical, versatile and reliable, using a wide range of coating materials. Used for rebuild and salvage of crankshaft journals and camshafts, coatings provide impact resistance and chemical corrosion protection.

Combustion Wire

Portable and reliable, wire flame spray is an excellent solution for rebuild and salvage operations; for example, castings and mis-machined parts such as crankshafts, piston rods and small parts. Easily automated for synchronizing rings and other friction parts.

Electric Arc Wire

Uses electricity and compressed air. Minimal equipment is required, and no process gases. Easily automated, versatile and very reliable electric arc wire is used to coat transmission synchronizer rings, clutch discs and shifter forks.

High Velocity Oxy Fuel (HVOF)

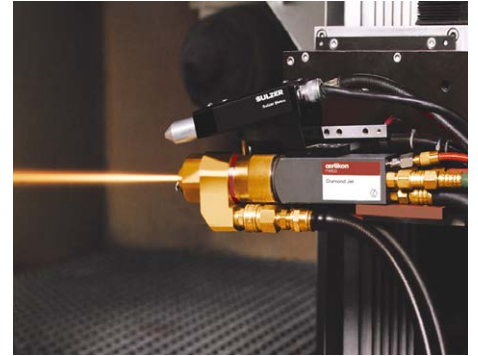
Premium quality coatings are dense, hard and can exhibit internal compressive stresses. Particularly well suited to control abrasive, sliding and particle wear. For example, HVOF coatings are used for sliding and wear protection on transmission shifter forks.

Atmospheric Plasma Spray

Delivers high quality coatings of almost any material that can be powdered, including ceramics, metals and cermets. An outstanding example is the Rota-Plasma 500 technology with the F210 Plasma Extension Gun used to coat auto engine cylinder bores.

ChamPro™

In-Chamber Controlled Atmosphere Process—Produces exceptional, high-purity plasma coatings not possible with atmospheric plasma spray. Ideal for producing coatings with precise oxygen levels and for greater thickness without heat distortion.



Diamond Jet HVOF Spray Gun, one of the many guns we offer to meet all of your spraying needs.



Oerlikon Metco offers complete turnkey solutions.

Surface Technologies

Oerlikon Metco Has Solutions for Auto Industry Challenges

Plasma-based PVD Thin Film Coatings and Plasma Heat Treatment

The fundamental issue regarding any surface treatment is life cycle economics. These systems not only provide durable, functional coatings, but do so in an environmentally sound, economical manner.

Plasma-based PVD (Physical Vapor Deposition)

Coating Services and Equipment for Application of MAXIT™ Low Friction & Hard Coatings – Provides durable, non-stick, coatings for plastic injection molds and metal stamping dies. Used with high quality automotive interior and exterior components for decorative and wear protection applications, and to apply low friction coatings for engine components to reduce fuel consumption.

Example: PVD coatings for engine parts, gear wheels and clutch hydraulic pistons – were initiated by racers for higher speed and less wear and tear. Today, the potential for fuel economy and better friction properties through this process is gaining widespread use in passenger vehicles.



Starter gear with diamond-like carbon coating.

Plasma Nitriding & Nitro-carburizing

Coating Services and Plasma Heat Treatment Equipment for application of IONIT™ Wear Resistant Coatings – Plasma-nitriding and plasma-nitrocarburizing, processes for diffusing nitrogen and carbon into the surface of steel-based materials, activated by plasma, and resulting in very hard surfaces.

Example: Automotive crankshafts –

The crankshaft performs one of the toughest jobs in the engine. Not only does it face extreme heat and pressure from contact with the connecting rods, but it must have a low friction coefficient and fight corrosion caused by petroleum products. Auto manufacturers have found they can improve crankshaft wear resistance greatly by use of the IONIT plasma process for nitrocarburizing. The results of this low temperature process are reduction of friction coefficient, greater corrosion resistance, and prevention of scuffing and metal adhesion due to increased physical stability of the surface.

Plasma Nitriding, Gas Nitro-carburizing Plasma Activation and Oxidation

Coating Services and Plasma Combination Equipment for application of IONIT OX™ Corrosion Resistant Coatings – A patented, extremely cost effective process developed for excellent corrosion and wear protection, and outstanding friction and sliding properties.

Example: Ball end steering assembly –

Used extensively for volume production in the automotive industry, the IONIT OX process is favored for its excellent corrosion protection, good friction properties and environmentally friendly features. This process guarantees increased surface hardness, improved fatigue strength and no metal distortion compared to salt bath nitriding or chrome plating. Apart from the significant metallurgical advantages of IONIT OX, its economic effectiveness is spurring its increased use.



Ball end steering assembly parts can be coated with IONIT OX

We Cover the World with Engineered Coating Solutions, Sales and Services

Our integrated advanced coating systems are used in the automotive industry throughout the world. As your single-source provider, Oerlikon Metco is able to supply:

- Materials
- Integrated Systems
- Coating Services
- Equipment
- Full Customer Support
- Coated Components

Surface Technologies

Oerlikon Metco Has Solutions for Auto Industry Challenges

Friction technology – for higher performance and substantially improved gear shifting

Synchronizer

Besides the time-tested molybdenum friction linings, the new carbon friction linings ensure a more compact synchromesh architecture with higher performance and substantially improved gear shifting. In automated manual transmissions, it is already possible to achieve gear shifting times of less than 60 milliseconds. Furthermore, our synchromesh components from formed sheet metal offer the substantial weight savings and cost reductions.

Friction discs

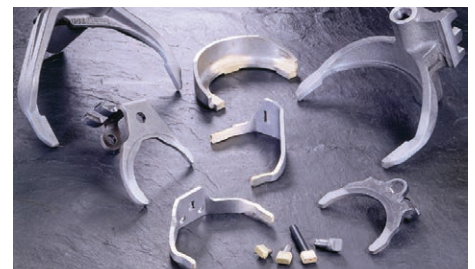
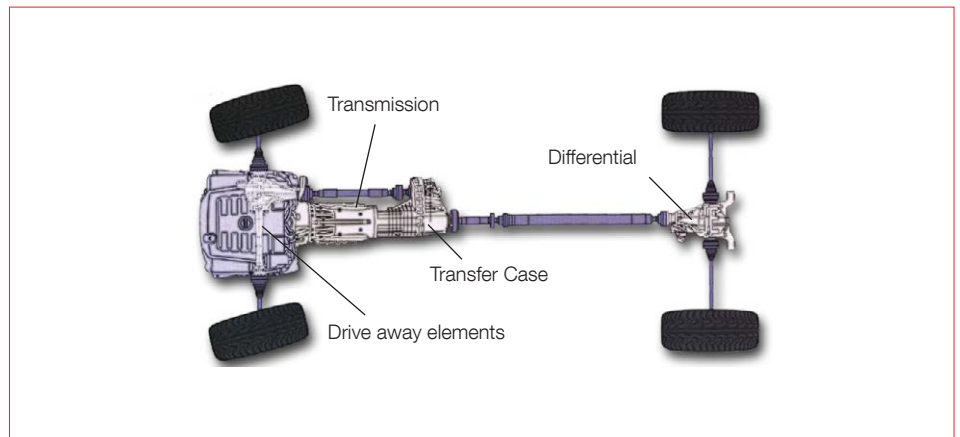
Oerlikon Friction Systems develops and manufactures friction discs for wet applications. We can meet the high demands imposed on the components by the various applications (limited slip differentials, four wheel drives, automatic power transmissions) through the optimized use of our various friction linings. In particular the minimal wear and the constant coefficients of friction are convincing arguments for our customers.

Torque converter lock-up clutches

In automatic transmissions the torque converter lockup clutch serves to transmit the engine torque directly to the power transmission, thus achieving a significant reduction in fuel consumption. The use of carbon friction linings simultaneously guarantees an optimization of the gear-shifting process and reduces the noises and vibrations typically associated with converters.

Gear-shifting components

For selector forks and shifting components we offer special molybdenum and brass coatings that guarantee high wear resistance. Even in automated manual transmissions with their high axial gear-shifting forces, our coatings have proven their high efficiency over time.



Capabilities

Systems Capabilities and Customized Solutions

Whether your requirements include materials, equipment or finished components, we have a surface engineering solution in our portfolio – thin film or thermal spray – for your project. If not, we'll develop it.

Today, Oerlikon Metco scientists and engineers routinely research and develop coatings and systems to benefit automotive customers seeking high-quality, cost-effective surface engineering solutions.

The concept stage

We will partner with you in selecting specific surface solutions, develop the most cost-efficient application method, and write the complete coating application specifications.

The prototype stage

We apply the coating solution to selected components to verify that the system and coating are practical, functional and can be integrated into the overall production scheme.

The production stage

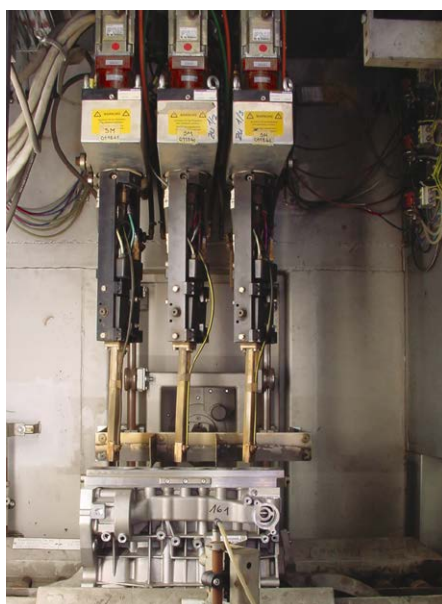
We plan, design, develop and build an integrated turnkey coating facility.

The maintenance stage

We'll be there for the entire lifecycle of your system, providing round-the-clock service, technical support and maintenance contracts to insure smooth operations. No other coating equipment supplier has as many service technicians available as Oerlikon Metco.



Our concept stage develops cost-efficient applications and complete specifications.



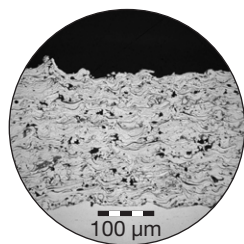
RotaPlasma and Metco SM-F210 Plasma Spray guns are used to coat engine cylinder bores for more complete coverage.



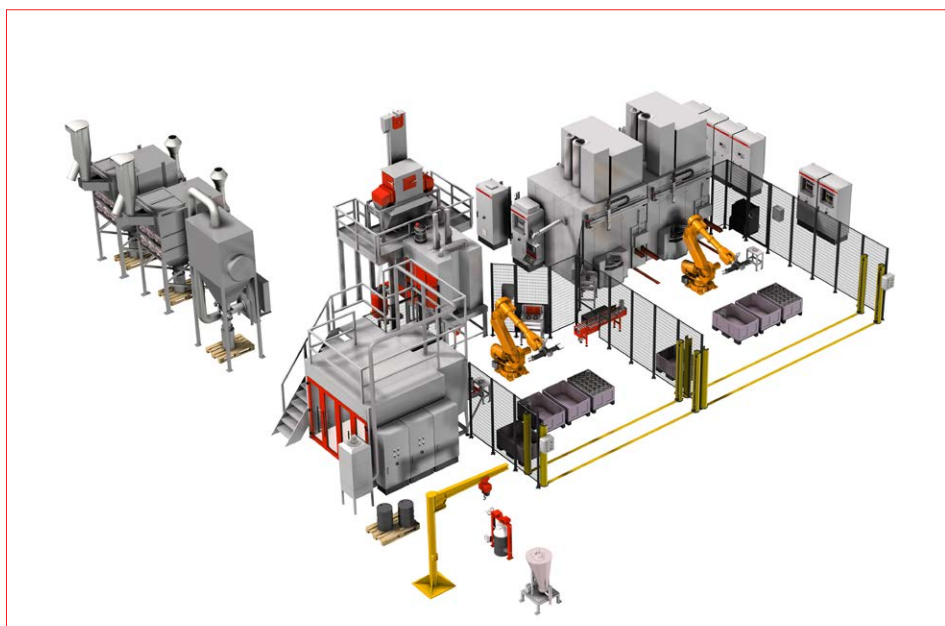
Spray parameters are checked before engine cylinder bores are coated.

A high-end, customized Thermal Spray engine cylinder Bore Coating solution

Fully integrated into the manufacturing production cell



Coating: Wear resistant and lubricious iron-based material



Capabilities

Systems Capabilities and Customized Solutions

Our engineered solutions yield proven benefits

We can partner with you to deliver a turnkey solution that meets your surface treatment needs. Below are examples of how our sales, design, engineering and manufacturing talents are coordinated and focused to meet your specific requirements:

Automotive cylinder bore coating system

Working in close cooperation with major automotive manufacturers, Oerlikon Metco developed advanced spray technology to deposit a thin (150 – 200 microns) plasma coating directly onto aluminum alloy cylinder bores. This process eliminates the need for cast iron or composite cylinder liners.

The controlled porosity of the plasma coating helps to significantly reduce the coefficient of friction through a micro-cavity lubrication system. Fully automatic spray facilities, such as those created by Oerlikon Metco, can be integrated into any production setup — in line or cell. Prototype engines using our cylinder bore coating system were operated for up to 400,000 km (250,000 miles) without need of repair. Following on this example, thousands of production cars have been manufactured using our cylinder bore solution. This technology works for gasoline as well as diesel engines and Oerlikon Metco also applies it to high performance race cars, go-karts, motor bike engines, aeroplanes and heavy duty diesel engines.

Automotive transmission components

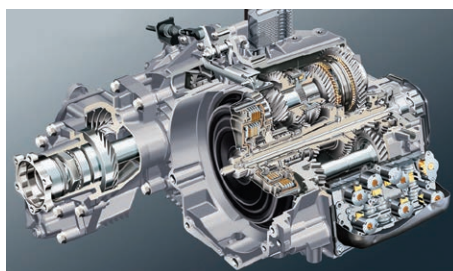
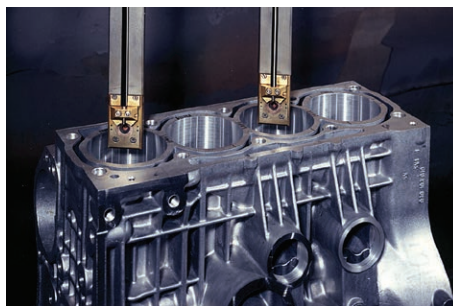
Oerlikon Metco provides the worldwide standard solution for thermal spray coating of synchronization rings, clutch discs and gearshift forks. About 50 % of all cars worldwide have manual transmissions, and drivers are demanding quick, smooth, compact and comfortable shifting. Our total coating solution meets that demand.

Thermal spray coating with molybdenum wire, applied in a highly automated system, guarantees total process reliability and coating reproducibility. The coating provides the correct balance between meshing and gear separation — giving the right feel when a driver changes gears. In the example of the sequential transmission, we offer a patented, hard carbon coating for synchronization rings to meet increased performance and service demands.

Gear selector shaft and other applications

IONIT OX-treated gear selector shafts offer an optimum combination of wear and corrosion protection to the component. IONIT OX is a combination of plasma nitriding, gas nitrocarburizing, plasma activation and oxidizing. Cost effective and offering a great improvement in mechanical properties, such as improved fatigue limit, many automotive products currently utilize this process:

- Transmission components
- Gear selector shafts
- Pneumatic spring piston rods
- Guide bolts
- Other components



Applications

Surface Protection Engineering for Automotive Applications

Automotive Applications	Surface Engineering Problem	Oerlikon Metco Coating Solutions	Surface Treatment Process	Benefit
Drivetrain				
Gear Shift Forks Synchronizing Rings Clutch Disks	Friction linings Slip and anti-wear	Carbon friction linings	Carbon solutions	Higher efficiency
Gear Wheels	High friction/heavy wear/ cold welding	DLC: (W-C:H)	Plasma PVD MAXIT Process	Excellent wear behavior, less friction
Phasing Gears Synchronizing Rings	Excessive wear and fatigue/cold welding	Ion Nitriding	IONIT Plasma Nitriding	Improvement of fatigue strength, low friction coefficient
Ball Joints Gear Selector Shaft Differential Gear Shaft	Corrosion/friction wear	Nitriding/Oxidation	IONIT OX Process	Excellent corrosion & wear resistance, less friction, cost savings
Brake System				
Brake Disc Rotors	Lack of constant friction coefficient	Metco 101 Ceramic	Plasma Spray	Better stopping with no friction loss in rain
Brake Shoes	Rapid wear	Metco 447 Ni/Mo	Plasma Spray	Longer service life
Brake Pistons	Wear/corrosion	Nitriding/oxidation	IONIT OX Process	Excellent corrosion & wear resistance, less friction, cost savings
Engine System				
Cylinder Bores	Heavy cast iron linings/ friction/oil consumption	Mo, Fe/Mo, Fe and other materials	RotaPlasma/Plasma Spray	Eliminates sleeves for lighter, smaller, more fuel efficient engine
Truck Liner	Corrosion/friction wear	Fe-based/MMC coatings		Longer life, reduced oil and fuel consumption
Turbocharger Housings	Large clearance path/loss of efficiency	Metco 310 AlSi Graphite	Plasma Spray or HVOF	Increased engine efficiency of up to 5 %
Piston Rings	Adhesive wear tolerances/high oil consumption	Mo + NiCrBSi or Cr ₃ C ₂	Air Plasma, Combustion Powder or HVOF	Better engine perfor- mance, less friction
Valve/Valve Stems	Wear/corrosion	Steel/Aluminum	Electric Arc Wire	Longer valve life
Diesel Injection Pistons	Corrosion/wear	Mo Cr ₃ C ₂ -NiCr WC:H	Plasma Spray, HVOF or MAXIT PVD-Arc Process	Longer life, less corrosion
Compression Springs Crankshafts	Excessive wear and fa- tigue/cold welding	Ion Nitriding	IONIT Plasma Nitriding	Improved fatigue strength, less friction
Guide Bolts	Corrosion/friction wear	Nitriding/Oxidation	IONIT OX Process	Excellent corrosion & wear resistance, less friction, cost savings
Other Applications				
Metal Forming Tools (molds) Plastic Processing Tools (molds, dies)	Wear, sticking and adhesion	TiN, CrN, AlTiN, ZrN, TiCN and others	MAXIT PVD-Arc Process	Longer life, less adhesion
Automotive Interior/Exterior Decorative Parts	Corrosion/wear/design parameters	ZrN, CrN, TiN	MAXIT PVD-Arc Process	Long lasting beauty, cost effectiveness
Tappets Bearing Washers Hydraulic Pistons	High friction/heavy wear/ cold welding	DLC: (W-C:H)	MAXIT Plasma PVD Process	Excellent wear behavior, less friction
Hydraulic Pistons Gas Spring Rods	Corrosion/friction wear	Nitriding/Oxidation	IONIT OX Process	Excellent corrosion & wear resistance, less friction, cost savings
Exhaust Muffler	Corrosion	AlZn Wire	Combustion Wire or Electric Arc Wire	Lower cost, longer life
Catalytic Converters Heat Exchangers EGR Coolers	High volume joining/corrosion	High strength, cost effective braze alloys	Reduced nickel, boron-free filler metals	Lower cost, excellent corrosion resistance, high strength

Applications

Plasma Coated Engine Cylinder Bores

Cut costs, reduce friction, improve fuel use with a longer lasting solution

Endeavoring to meet cost and weight constraints, as well as fuel economy standards, the auto industry has been moving away from heavy cast iron engine blocks to lighter aluminum alloys (AlSi).

To help enable this process, Oerlikon Metco has developed an advanced plasma spray technology for coating AlSi cylinder bores that eliminates the need for cast iron sleeves or composite liners, saving space and weight. Wear resistance of these coatings is an order of magnitude better than cast iron and the heat flow between the combustion chamber and the engine block is much more predictable. Weight of the cylinder block, as well as the pitch distance between bores, is reduced.

Result: a lighter, more compact and fuel-efficient engine, with significantly reduced oil consumption and lower emissions.

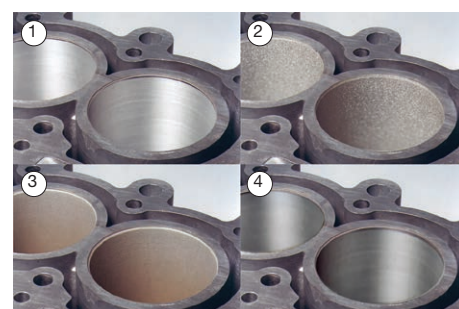
The main challenge of an industrial solution for the coating of cylinder bores is not only to develop a suitable material and process, but also to integrate that process into a cost-effective, high-volume, fully automated production coating system. We have met this challenge.

Coatings designed to beat friction

Cylinder bore, piston and piston ring friction represent nearly 40 % of the mechanical power losses in the engine.

Using extensive R&D knowledge, Oerlikon Metco has produced a variety of low-friction coatings for aluminum/silicon (AlSi) engine cylinder bore applications. The coatings exhibit:

- Low coefficient of friction
- Superior bonding to the AlSi cylinder bore substrate
- Thermal shock resistance
- Scuff resistance
- Lower wear rate than cast iron
- Reduction of oil consumption



Oerlikon Metco's cylinder bore solution

- 1 – As cast and machined
- 2 – Surface activated
- 3 – Coated cylinder bore
- 4 – Final machined (diamond honing)

Plasma cylinder bore coating compared to competition

Criteria	Cast iron liner	Electric Arc Wire	Nickel/silicon	Oerlikon Metco plasma coating
Reduced engine size and weight	Adds to engine size and weight	No added engine size or weight	No added engine size or weight	No added engine size or weight
Reduced friction between rings and coating/liner	Shows more friction	Less friction, similar to plasma coating	Less friction than cast iron, more than plasma coating	Shows least friction Solution against bore polishing (EGR)
Wear resistance for heavy duty diesel	Sensitive to bore polishing	No advantage compared to cast iron	Solution not possible	Solution for EGR engine
Reduced engine oil consumption	Shows more oil consumption	slightly reduces oil consumption	Shows more oil sensitivity	Reduces oil consumption
Liner or coating resists corrosion against H ₂ SO ₄ and formic acids (new fuels)	More corrosion resistant than Ni/SiC	Same corrosion resistance as cast iron	Corrosion from H ₂ SO ₄	Corrosion resistant coatings for gasolines and diesels
Environmental impact from manufacturing	Environmental concerns	Few environmental concerns	Major environmental concerns	Few environmental concerns
Easy integration into production lines	Easy to integrate	Easy to integrate	Difficult to integrate	Easy to integrate
Cost advantage	Plasma coating is less costly	Similar to plasma coating	Plasma coating is much less costly	Saving of resources

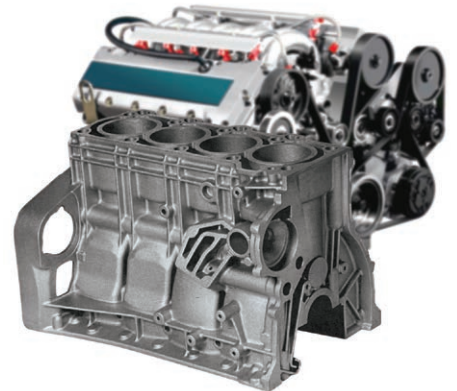
Solutions

Engineering Solutions for All Types of Vehicles

Oerlikon Metco's engineered coating solutions help automotive OEMs extend productivity and cut costs without sacrificing quality. Engineered coatings modify a material's surface and substrate together as a system. This gives effective performance enhancement, which neither the substrate nor the coating could provide on their own. These coatings can be applied under

standard atmospheric conditions or in specialized, highly controlled environments, including nearly total vacuum.

Our engineered surface solutions provide superior performance characteristics to many automotive products, both new and remanufactured, as shown below.



Cylinder bores of various engine types can be coated, eliminating the need for cylinder liners.



Timing case cover

Camshaft

Valves

Valve spring



Valve guides

Tappets

Push rods

Rocker arms



Catalytic converter,
EGR cooler, heat exchanger

Piston rings

Pistons

Crankshaft



Journal bearing

Engine bearings

Engine sensors

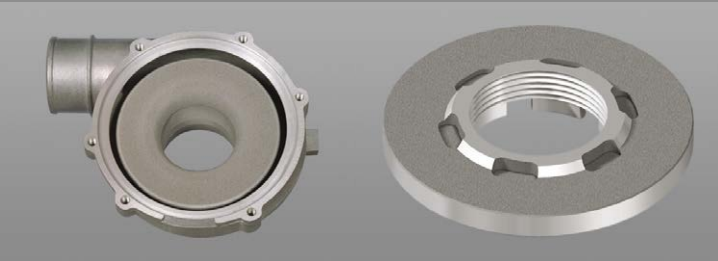
Oxygen sensors

Solutions

Engineering Solutions for All Types of Vehicles



Cutaway of automobile showing various parts that are coated to enhance longevity and improve performance.



Turbo housing

Swash plate



Alternator

Drive shaft yoke



Ball joints



Synchronization rings



Gear shifting components

Friction discs

Muffler

Brake discs

Flexibility

Our Coating Services Offer Flexibility



Coating Facilities for the Automotive Industry

We're Flexible: We Can Source Your Components... Coat Your Components... Or Supply You with Equipment and Material

If investing in coating equipment and know-how is not appropriate for your business, we will coat your components, finish them, and return them to you, ready to install.

Oerlikon Metco has vast experience in equipment manufacture and surface engineered coatings. Our coating knowledge and expertise, when applied to subcontract surface treatment – whether thermal spray, plasma nitriding, plasma oxidizing, or PVD – can provide superb quality and value, increasing customer profitability.

Oerlikon Metco has coating services facilities in the Americas, Europe and Japan capable of providing tailored coatings with the following state-of-the-art equipment:

Our coating services

Thermal Spray technology	Thin Film technology	Friction technology
Processes <ul style="list-style-type: none"> ■ Powder Combustion ■ High Velocity Oxy Fuel (HVOF) ■ Wire Combustion ■ Electric Arc Wire ■ Air Plasma 	Processes <ul style="list-style-type: none"> ■ MAXIT– PVD Arc ■ MAXIT– PVD Sputtering ■ IONIT– Plasma Nitrocarburizing ■ IONIT OX– Gas/ Plasma Nitrocarburizing/ Oxidation 	Processes <ul style="list-style-type: none"> ■ Thermal Spray Friction Linings with Molybdenum ■ Thermal Spray Friction Linings with Brass ■ Carbon Friction Linings
Equipment <ul style="list-style-type: none"> ■ Spray Guns ■ Gun Extensions ■ Controllers ■ Powder Feeders ■ Power Supplies ■ Heat Exchangers/Chillers ■ Handling Equipment ■ Spray Booths ■ Robotics ■ Filters/ Dust Collectors ■ Auxiliary Equipment 	Equipment <ul style="list-style-type: none"> ■ PVD-Arc Systems ■ PVD-Sputtering Systems ■ Plasma Nitrocarburizing Systems ■ Gas Plasma Nitrocarburizing/ Oxidation systems 	Oerlikon Metco's offering <ul style="list-style-type: none"> ■ Our Oerlikon Friction Systems wet friction lining solutions are offered through our Surface Solutions business unit.

Flexibility

Our Coating Services Offer Flexibility

Other services

- Turning
- Grinding
- Drilling
- Polishing
- Finishing
- Welding
- Milling
- Machining
- Cleaning
- Heat Treatment

Coated components

We can source semi-finished, uncoated components for your equipment, apply the desired surface engineered solution, and perform any necessary finishing.

We specialize in component design and development. We analyze the mechanical, chemical and tribological requirements of the proposed component, draw up specifications for coating, and perform the testing.

We will manufacture or repair your components

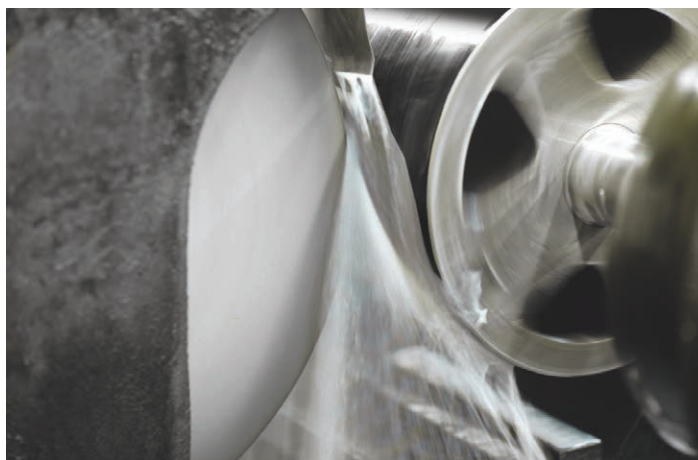
Our engineers will draw up specifications for the manufacture or repair of your components, order the raw materials for in-house work, or subcontract the repair.

We will apply the required coating, finish and perform the final inspection

We can mass-produce parts or single items. We will perform post-finishing operations, such as grinding, etc., and perform a final inspection, including statistical control.



Automated milling and fabrication guarantee accurate, high quality parts.



Precision grinding and finishing services are part of the complete Oerlikon Metco solution.

Services

Solutions and Services with Lasting Impact

As a result of years of offering technology-based solutions, Oerlikon Metco has developed the most comprehensive line of surface enhancement equipment and materials in the world. All of our facilities, including our manufacturing facilities, are certified to ISO 9001 standards.

Our full line product portfolio consists of:

- Advanced surface technology equipment, systems and materials
- Thermal spray, thin film coating and surface enhancement services
- Manufactured turbine, automotive and other components
- Global customer support services

A truly global company, Oerlikon Metco has sales offices and facilities in 18 countries on five continents. Our family of more than 1800 dedicated professionals work from these locations to deliver advanced surface engineering solutions, services and products. We support thousands of customers in hundreds of industries, with leading-edge applications development, state-of-the-art automated systems, field service, calibration, specialized coating services, spare parts, customer support, high quality braze products and more than 400 top-quality surface engineering spray powders and wires.



Thoroughly trained, tested and experienced technicians offer global service.

Oerlikon Metco has what it takes to create and sustain success: world class products, systems and services. Our global team has the enthusiasm, vigor and commitment to make Oerlikon Metco a respected partner for our customers and a value for long-term investors.



We offer a full line of surface enhancement materials and continually improve and add new products to our portfolio.



The materials we manufacture are consistently evaluated to make sure they conform to our rigid standards.

Automotive

Advanced Technology Solutions and Services

Perfect solutions through optimum materials and innovative technologies

Oerlikon Metco is a global leader in surface engineering solutions and services offering:

- A broad range of thermal spray, thin film, laser cladding and other advanced surface technology equipment and materials
- Integrated systems
- Specialized coating and surface enhancement services
- Manufactured components for the turbine, automotive and other industries
- Customer support services

Oerlikon Metco provides a comprehensive manufacturing, distribution and service network, catering to aerospace, power generation, automotive and other strategic growth industries.

To take control of your surface engineering challenges, contact your Oerlikon Metco sales office, visit our website at www.oerlikon.com/metco or email us at info@oerlikonmetco.com

About Oerlikon Metco

Oerlikon Metco enhances surfaces that bring benefits to customers through a uniquely broad range of surface technologies, equipment, materials, services, specialized machining services and components. The surface technologies such as Thermal Spray, Thin Film, Plasma Heat Treatment and Laser Cladding improve the performance and increase efficiency and reliability. Oerlikon Metco serves industries such as aviation, power generation, automotive, oil & gas, industrial and other specialized markets and operates a dynamically growing network of more than 50 sites in EMEA, Americas and Asia Pacific. Oerlikon Metco, together with Oerlikon Balzers, belongs to the Surface Solutions Segment of the Switzerland-based Oerlikon Group.

Information is subject to change without prior notice.