PRAXAIR
SURFACE TECHNOLOGIES

Primary Metals

Get more

Praxair Surface Technologies delivers more experience, more innovation, more options and more support







Get more with Praxair…

Customized answers. Praxair Surface Technologies EXTREME Protection™ and ProtectionPLUS™ family of thermal spray coatings and laser overlays provides the ultimate in flexibility, ensuring we have the right answer for your unique challenge.

Design and application support. Our coatings help bring out the best in your components, while you always have the confidence of knowing your parts have been through real-world simulations.

Uniformity and repeatability. Whether your parts are produced in the Americas, Europe or Asia, you know you're getting consistent results you can rely on.

Innovation. Our scientists, renowned throughout the coating industry, rank among the most authoritative sources in application techniques, always looking for new surface enhancement options.

What does it mean to get more?

At Praxair, we go beyond the surface for individualized answers to your toughest problems

At Praxair Surface Technologies, we understand that your customers' requirements demand *more*. That's why we're dedicated to helping you deliver *more* product life, *more* ways to reduce operating costs, *more* ways to improve performance, *more* risk mitigation. Partner with us and you get *more* than protective coatings—you get complete access to our exclusive global network of resources.

> *Look for more*

At Praxair Surface Technologies, we have *more* down to a science. Look for the "greater than" symbol (>) to find out how working with us helps you get *more*.

> EXCLUSIVELY MORE:
PRAXAIR'S INDUSTRY-LEADING EXTRAS

- **Coating Design Optimization Unit**
  EXTREME Protection™ and ProtectionPLUS™ Coatings
- **Operational Excellence System**
- **Product Discovery Labs**

> *More than half a century of leadership*

Since the early 1950s, Praxair Surface Technologies has been partnering with original equipment manufacturers (OEMs), roll builders and steel company operations, and maintenance organizations to extend the life cycle and performance of critical rolls and components. Our expertise in wear-, corrosion- and thermal-resistant coatings has made us the preferred supplier in the industry.

Why does more matter?

When you get *more*, you can give *more*. Parts that include our advanced surface technologies help you improve component efficiency, performance and life—all of which enhance the overall performance of your product and the value you offer your customers while increasing your profitability. *More matters.*

The evolution of more

> *1904 More tradition*

Concentrated Acetylene Company (later known as Prest-o-Lite) is formed, creating headlights for early automobiles. Our work with acetylene would one day lead to the discovery of today's surface coating technology. We don't just date back to the beginning—we *are* the beginning.

Wide Range of Applications for Steel Producers

Blast Furnace

- Tuyeres

Cold Mill

- Bridle Rolls
- Deflector Rolls
- Mandrels
- Tensiometer Rolls

Finishing Line

- Bridle Rolls
- Deflector Rolls
- Flattening Rolls
- Leveler Rolls
- Mandrels

Galvanizing and Tinplating

- Bridle Rolls
- Deflector Rolls
- EGL Conductor Rolls
- ETL Conductor Rolls
- Furnace Rolls
- Pot Rolls
- Tower Rolls

Coatings for Furnace and Pot Rolls

You get more with Praxair Surface Technologies coatings for furnace rolls used in continuous annealing lines (CALs) and continuous galvanizing lines (CGLs) and pot rolls used in the molten zinc pots on CGLs. Our EXTREME Protection™ proprietary coatings reduce costs and increase productivity by providing cost-effective solutions for pickup, abrasive wear, profile loss, roughness loss, tracking and other wear-related challenges inherent in steel processing. Praxair's wear- and corrosion-resistant coatings create and maintain the optimum surface and surface roughness to extend the service life of critical rolls and prevent unplanned outages.

Coating Design Optimization Unit

More real-world component coating design and application support

The first step to finding the right answer for your needs is determining not only what those needs are, but also how a surface coating can bring out the best in your component or part. That's where our Coating Design Optimization Unit comes in. It works with your engineers to integrate more than a half century of coating expertise. Partnering with our Coating Design Optimization Unit from the beginning ensures you get *more* produceable coatings, *more* protection, *more* customization and *more* performance.

Our team begins by identifying:

- Function of the coating (thermal insulation, wear/corrosion resistance, etc.)
- Geometry, composition and properties of the substrate
- Environmental and production impact (corrosion, temperature and operating environment)

Once we've narrowed down the possible coating alternatives, we test each coating on your part in environmental simulations that replicate your everyday operating environment. When this exhaustive testing process is complete, you'll have more confidence knowing exactly how coatings will perform on your part day in and day out.

Real-world environmental testing simulates:

- Abrasion and impact wear
- Adhesion
- Bond strength
- Corrosion
- Fatigue
- Galling/sliding
- Oxidation and extreme temperatures
- Particle and water erosion
- Thermal shock

We customize our answers to fit your individual problem. For example, if wear and/or corrosion resistance is required at ambient or high temperature, we can tailor a coating to perform in either environment.

> *1948 More explosive discoveries*

Explorations into acetylene detonations lead to the discovery of a new groundbreaking flame-plating process. The technique developed from this breakthrough — which uses a "detonation gun" — forms the foundation of the modern thermal spray industry. To this day, we are the only company that can offer D-Gun and Super D-Gun® coatings, both benchmarks of the industry.

EXTREME Protection™ and ProtectionPLUS™ Coatings

More options for customized answers

There is no one coating answer to every surface problem. Your unique problems require unique answers. That's why we created our EXTREME Protection™ and ProtectionPLUS™ lines of surface coatings.

Our EXTREME Protection™ proprietary coatings are designed to provide customizable answers you can't get anywhere else.

Our ProtectionPLUS™ coatings are used throughout the industry and feature the additional, exclusive application techniques and knowledge-base of Praxair Surface Technologies. In fact, we originally developed and patented many of these methods and materials.

> *Engineered for steel*

The steel industry presents unique challenges: Components need to withstand extreme environmental, thermal and wear conditions at exceptionally high temperatures and pressures. That's why our surface enhancement solutions are designed with the toughest jobs in mind. Our advanced technology is designed to help you:

- Extend product life of critical rolls
- Reduce maintenance costs
- Improve performance
- Increase productivity

Answers in action:

We not only protect but also restore. We have in-house services that can strip, restore and remachine worn components.

More coating options

COATING SERVICES
Corrosion-resistant coatings
Oxidation-resistant coatings
Release coatings
Solid particle erosion-resistant coatings
Thermal barrier coatings
Wear-resistant coatings

> *1958 More exclusive innovations*

The innovations continue as we develop our exclusive plasma coating technique—which once again revolutionizes the thermal coating industry, delivering an exceptionally versatile solution.

> *1962 More flexibility*

A breakthrough coating process, high-velocity oxy-fuel (HVOF), is developed that introduces powders of metals or cermets into a high-temperature, high-velocity gas stream. The stream then heats and propels them against a prepared surface. The result is excellent wear and corrosion resistance.

Operational Excellence System

More uniformity, consistency and repeatability

From the initial conversation to the final inspection, the application of your coating follows our strict Operational Excellence System. This process guides our industry-leading quality control programs and guarantees consistent, uniform results that are on time, every time.

At the core of Operational Excellence are Six Sigma quality tools and a complete set of lean manufacturing techniques. Instead of batch production, we focus on one-piece-flow pull production that improves quality and shortens cycle and changeover times — which greatly improves turntimes for your applications.

Operational Excellence also allows us to deliver uniform, repeatable results you can rely on. You can be confident that whether your part is coated in the Americas, Europe or Asia, the processes—and coatings—are indistinguishable. *More usable parts, less risk.*

No matter the part, or place in the world, our Operational Excellence System ensures you get industry-leading quality coatings.

> *Vertical integration*

Praxair Surface Technologies controls the entire coating process from receipt of your component to completed coated part. Not only do we manufacture the gases and powders used to make the coatings, but we also invented many of the processes used to apply them.

> *1965-69 More global uniformity*

The first overseas production plants open in England, Japan and Switzerland as our unique quality control process begins to develop, ensuring uniformity and repeatability regardless of the component or continent.

> *1992 More efficiency*

We become the independent company you know today: Praxair Surface Technologies. The change gives us greater control over raw materials and resources, enabling us to become the first vertically integrated operation in the industry. In 1998, ASM International recognized our Speedway (Indianapolis) Laboratories as a historical landmark.

Product Discovery Labs

More innovative answers

At Praxair Surface Technologies, we have a long-standing tradition of excellence in innovation. Many of the materials and processes in use today throughout the industry began in our world-class Product Discovery Labs. The focus of these labs is singular: develop next-generation surface coating technologies that solve the performance problems you face today and tomorrow.

> *Top research scientists*

We provide access to the most renowned scientists in the coatings industry. These highly qualified professionals have published extensively and, in many cases, literally *written the book* when it comes to application techniques. Working with a staff of experienced lab technicians, specialists and research engineers, our scientists are continually developing new coating processes and products that are designed to find real-world, groundbreaking answers to even your toughest performance problems.

Ongoing testing is critical for discovering new ways to solve your performance problems.

> *More discovery*

Coating processes that are the foundation of today's surface technologies were invented by Praxair Surface Technologies, including:

- Detonation gun (D-Gun) coating process*
- Super D-Gun® coating process*
- HVOF (high-velocity oxy-fuel) coating process
- Plasma spray coating process
- Tribomet® electrodeposition coating process*

** Exclusive, proprietary Praxair Surface Technologies process*

> *2009 More capabilities*

Praxair Surface Technologies expands its product and service offerings by acquiring Sermatech International and its line of SermeTel®, SermaLoy™ and ShorCoat® high-performance slurries. The partnership delivers coating options and capabilities unmatched throughout the industry.

What can more *mean for you?*

Let's work together to find your answers

It starts with a conversation. It ends with an answer to even your toughest performance problems. The unmatched service, experience, innovation and dedication between those two points? That's *more*. We offer *more* support, *more* coatings, *more* knowledge, *more* testing, *more* consistency. No one else even comes close. For answers to the tough problems, demand *more*.

Coating processes

- Cold Spray – LOXPlate® coating
- Electrodeposition – Tribomet® coating
- High-Performance Slurries
  - SermaLon® metallic ceramic polymers
  - SermaGard® slurries
  - SermeTel® metallic ceramics
- High-Power Laser Processing
  - Laser Cladding/Hardfacing
  - Laser Hardening
  - Laser Welding
- Thermal Spray Coatings
  - D-Gun and Super D-Gun® coatings
  - High-Velocity Oxy-Fuel (HVOF)
  - Plasma Spray
  - Wire Arc Spray

Finishing and machining

- Brushing
- Honing
- Lapping
- Machining
- Polishing
- Precision grinding
- Sanding
- Super finishing
- Surface grinding
- Vibratory

Inspecting and testing

- Fluorescent penetrant
- Gaging and dimensioning
- Profilometer

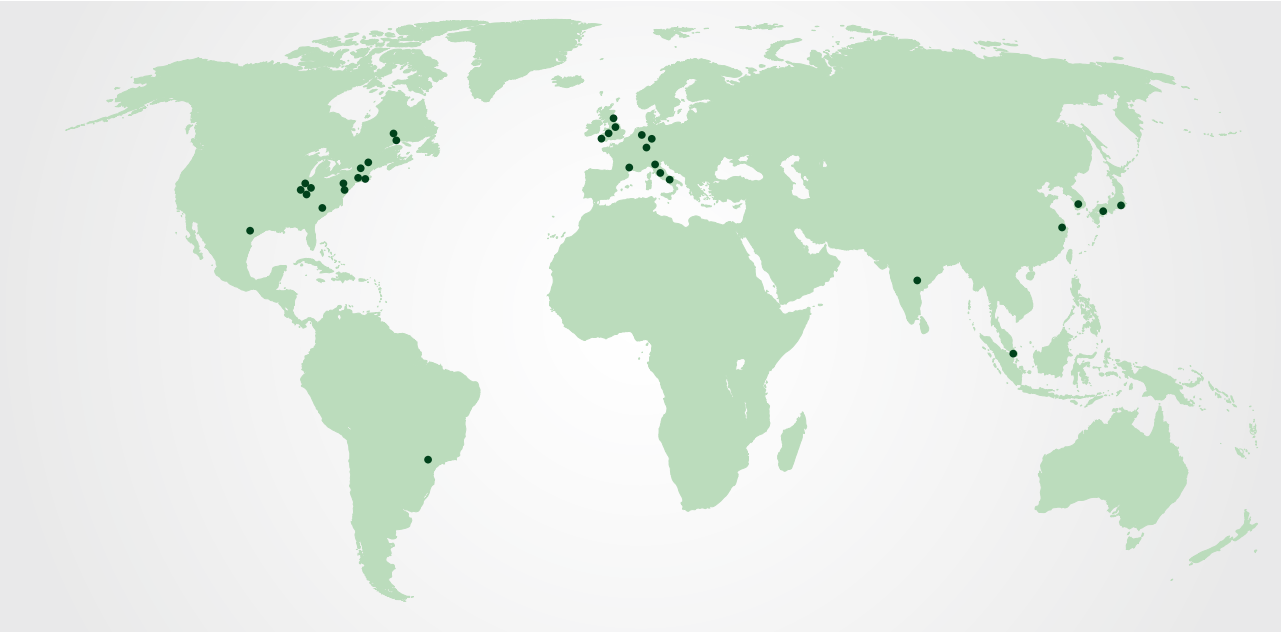
Other service operations

- Abrasive blasting
- Aluminum oxide blasting
- Chemical stripping
- Electrolytic stripping
- Gaging and dimensioning
- Glass bead peening
- Grit blasting
- Mechanical stripping
- On-site services
- Sealing
- Shot peening
- Silicon carbide blasting
- Turnkey operations

Coating and other service options include, but are not limited to, those listed above. Capabilities listed not available at all production facilities.

Primary Metals

2,500 people, more than 35 facilities and 12 countries



Primary Facilities

Brazil
Pinhais, Brazil
Tel. +55.41.3661.6200

Canada
Dorval, Quebec, Canada
Tel. 514.631.2240

Saint Laurent, Quebec, Canada
Tel. 514.333.0030

China
Changzhou, China
Tel. +86.519.8622.9000

France
St. Etienne, France
Tel. +33.4.77.42.62.62

Germany
Ratingen, Germany
Tel. +49.2102.495.0

Schluechtern, Germany
Tel. +49.6661.96780

India
Coimbatore, India
Tel. +91.4255.324743

Italy
Fornovo, Italy
Tel. +39.0525.401704

Monte Marenzo, Italy
Tel. +39.0341.601111

Novara, Italy
Tel. +39.0321.674803

Japan
Kozuki, Japan
Tel. +81.790.88.0564

Okegawa, Japan
Tel. +81.48.5.91.0731

Singapore
Singapore
Tel. +65.6861.8374

South Korea
Changwon, South Korea
Tel. +82.55.260.2482

United Kingdom
Lincoln, England
Tel.+44.1522.878200

Southam, England
Tel. +44.1926.81.2348

Swindon, England
Tel. +44.1.793.512.555

Weston-super-Mare, England
Tel. +44.1934.411301

United States
Manchester, CT
Tel. 860.646.0700

North Haven, CT
Tel. 203.287.2700

Indianapolis, IN
Tel. 317.240.2500

Biddeford, ME
Tel. 207.282.3787

Charlotte, NC
Tel. 704.921.5400

New Castle, PA
Tel. 724.598.1300

Houston, TX
Tel. 713.849.9474

Praxair Surface Technologies maintains additional coating and administrative facilities not listed above.

PRAXAIR
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Praxair Surface Technologies, Inc.
1500 Polco Street
Indianapolis, IN 46222
USA

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Telephone: +1.317.240.2500
Fax: +1.317.240.2255

www.praxairsurfacetechnologies.com
info@praxair.com