Climax Molybdenum
A Freeport-McMoRan Company

Climax Mine, Colorado

INTRODUCTION

There is a growing global demand for molybdenum, a versatile element with diverse applications in the chemical, engineering and petroleum industries. Molybdenum and its alloys are key components in chemical and metallurgical applications.

Climax Molybdenum Company, a subsidiary of Freeport-McMoRan, is the largest molybdenum producer in the world. From our early beginnings in Colorado, Climax Molybdenum has grown into a global, diversified company with downstream operations and a proven commercial presence worldwide.

1918

CLIMAX MINE BEGINS PRODUCTION

On April 2, 1918, Climax ships its first concentrate totaling 21,000 pounds with a market value of $100,000. Climax is a major contributor to the allied war effort during World War I.

GLOBAL OPERATIONS

THE MOLYBDENUM MARK | RESPONSIBLY PRODUCED MOLYBDENUM

All molybdenum producing sites of Freeport-McMoRan are Molybdenum Mark assured producers.

HENDERSON, COLORADO
Primary Mine

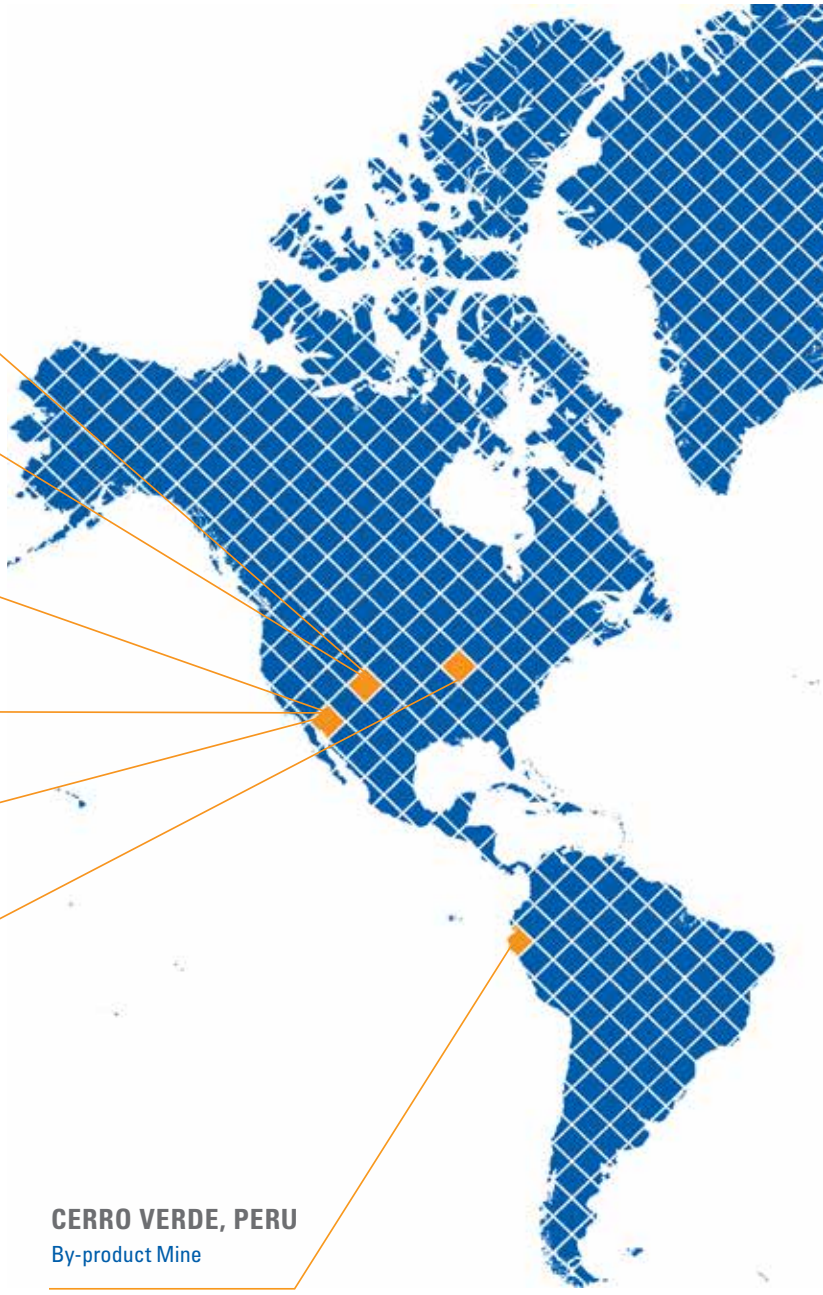
CLIMAX, COLORADO
Primary Mine

PHOENIX, ARIZONA
Global Headquarters,
Sales Office

SIERRITA, ARIZONA
By-product Mine
Roasting

BAGDAD, ARIZONA
By-product Mine
Pressure Leach

FORT MADISON, IOWA
Roasting, Chemicals



CERRO VERDE, PERU
By-product Mine

Our operations in North America and South America include both primary and by-product molybdenum mines.

We are the world's largest integrated molybdenum producer with chemical and metallurgical products manufactured at our production facilities in the United States and Europe. Our Fort Madison plant's conversion capabilities provide Climax Molybdenum with a premier source for upgraded molybdenum chemical products.

The Climax Stowmarket plant in the United Kingdom provides ferromolybdenum, and Climax Molybdenum B.V. in the Netherlands produces technical molybdic oxide, ammonium dimolybdate and pure molybdic oxide.

Serving customers worldwide, Climax Molybdenum's resources are well positioned to maintain molybdenum production rates for decades to come.

Henderson Mine, Colorado

MINING AND DOWN STREAM PRODUCTION

Climax Molybdenum operates the Henderson mine and mill in the Rocky Mountains, west of Denver. It has been in operation since 1976.

Separated by the Continental Divide, the Henderson mine and mill are connected by one of the world's longest conveyor systems, a 10-mile elevated belt that runs underneath the Continental Divide and emerges above ground for the final five miles.

Our Climax mine near Leadville, Colorado, restarted in 2012 and has a potential production capacity of 30 million pounds per year.

1945

WORLD'S LARGEST MINE

Climax becomes the world's largest underground mine.

CHEMICAL APPLICATIONS OF MOLYBDENUM

CATALYSTS

Molybdenum chemicals are used in the production of catalysts for a variety of reactions, notably hydrotreating and selective oxidation. The increasingly stringent requirements for low sulfur fuel oils, gasoline and diesel fuel make this application a particularly important use for molybdenum. Molybdenum-based catalysts also are used in the production of renewable diesel and sustainable aviation fuels (SAF).

METAL PRODUCTS

Molybdenum metal and alloys are used in a number of important end products including lamp applications, glass melting electrodes, electronic devices, medical equipment and chip lithography. The characteristics of molybdenum metal powders are determined not only by the process conditions during reduction, but also by the physical and chemical properties of the starting materials.

LUBRICANTS

The naturally occurring form of molybdenum (MoS_2) is an important solid lubricant used primarily for reduction of wear and friction and maintains good lubricating performance in tough conditions. Molybdenum complexes, soluble in petroleum oils and other organic solvents, are finding increased use as antiwear and extreme pressure additives as well as friction modifiers in lubricating oils, greases and coatings.

1957

CLIMAX MOLYBEDNUM COMPANY MERGES

Climax Molybednum Company and American Metals Company merge to become AMAX.

CHEMICAL APPLICATIONS OF MOLYBDENUM

CORROSION INHIBITION

Molybdate, usually in the form of sodium molybdate, is used as an anodic corrosion inhibitor in aqueous systems, such as cooling water treatments and automobile anti-freeze/coolant products. It is effective in inhibiting corrosion of steel, cast iron, aluminum, copper, brass, cadmium and solder, and typically is used with other corrosion inhibitors.

PIGMENTS

Molybdenum compounds are used in the production of molybdenum orange pigments added to paints, plastics and inks to provide a reddish hue, cleanliness and striking colors.White corrosion inhibiting pigments are used as paint primers, and other molybdenum compounds are important components in organic toners. More recent uses include incorporation into bismuth vanadate yellow and the emerging classes of rare earth molybdenum high-performance pigments.

SEMICONDUCTORS

Molybdenite as a monolayer material has excellent semiconductor properties which could surpass silicon and graphene. Molybdenum metal can be deposited in very thin layers, enhancing vertical stacking in 3D NAND memory. Molybdenum as a metal has good electrical conductivity as well as high temperature resistance. Its thermal expansion is similar to glass, thus allows it to be used in the creation of gate electrodes in MOSFETs.

1976

HENDERSON MINE PRODUCES

Henderson begins production at the rate of 10,000 tons per day via panel caving from the 8,100-foot level.

METALLURGICAL APPLICATIONS OF MOLYBDENUM

STAINLESS STEEL

Molybdenum primarily is used to improve the corrosion resistance of stainless steel in more demanding applications, such as chemical processing plants or in marine applications. The addition of molybdenum increases the pitting and crevice corrosion resistance of stainless steels in chloride containing solutions.

ALLOY STEEL & IRON

To increase hardness and wear resistance over a broad temperature spectrum, molybdenum is added to tool- and high-speed steel. It increases the strength and hardness of cast iron, as well as increases elevated temperature strength and creep resistance. In high-strength, low-alloy steels (HSLA), molybdenum improves strength and weldability.

NICKEL-BASED ALLOYS

Molybdenum is an important alloying element in high-performance nickel-based alloys. The corrosion-resistant, nickel-based alloys find extensive use in the chemical processing, pharmaceutical, oil and gas, petrochemical, and pollution-control industries.

1980

BREAKING RECORDS

Climax and Henderson mines produce a record 100 million pounds of molybdenum; employment peaks at 3,000 at Climax and at 2,000 at Henderson.

Climax Mine, Colorado

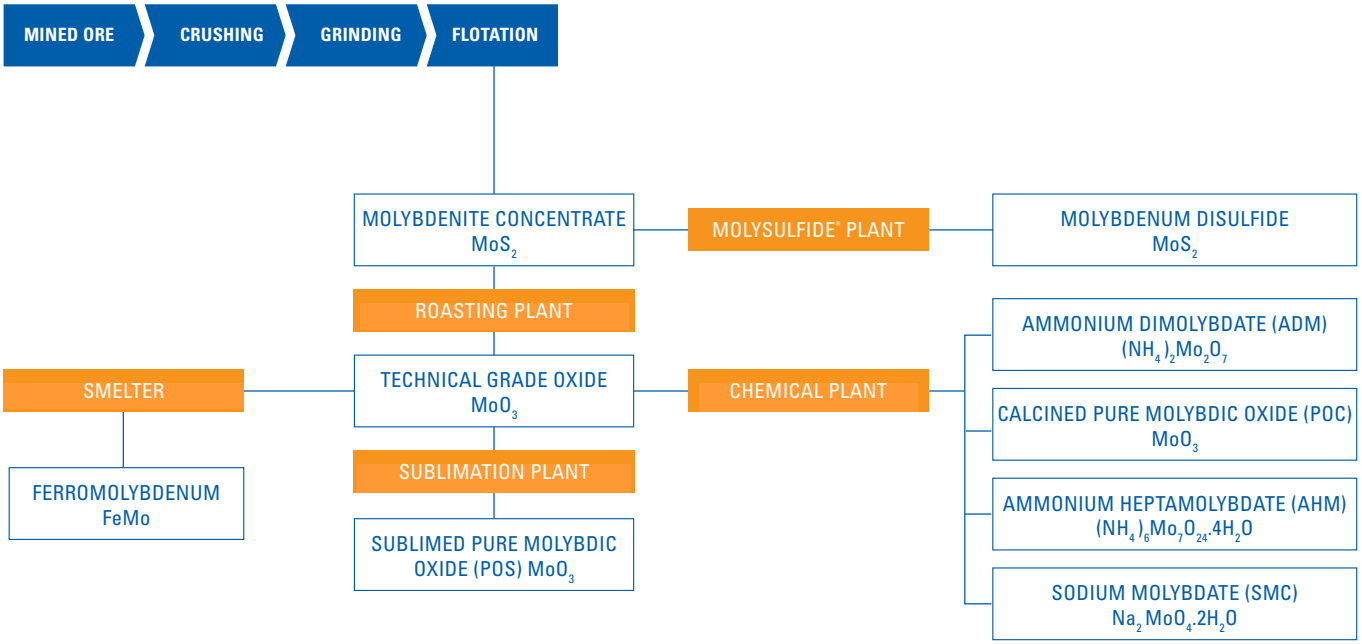
Stowmarket, United Kingdom

1993

AMAX MERGER

Cyprus Minerals and AMAX merge becoming Cyprus AMAX.

PRODUCTION OF MOLYBDENUM PRODUCTS



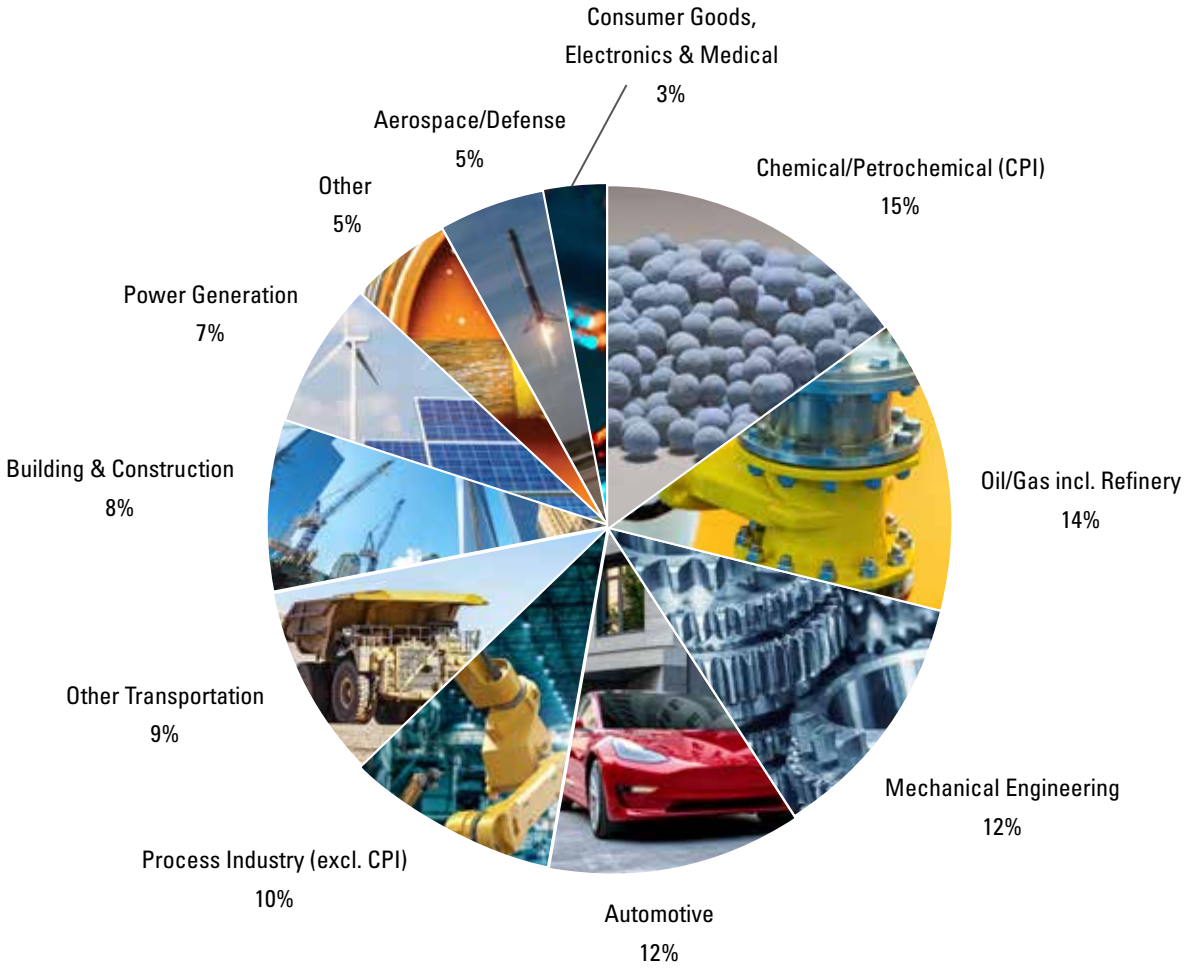
1996

HENDERSON REPLACES TRAIN

Project at Henderson commences to replace train with an underground crusher and 15-mile long conveyor system.

MARKETS

The markets for molybdenum products are diverse, and we serve both the chemical and metallurgical market segments on a global basis.



Source: International Molybdenum Association's SMR End-Use Molybdenum 2023

1999

CONVEYOR SYSTEM COMPLETE

Phelps Dodge purchases Cyprus AMAX; conversion from train haulage to conveyor system is completed.

Climax Mine, Colorado

2000

HENDERSON MODERNIZATION COMPLETE

Over one million hours worked without a lost time accident. Highest yield ever.

2007

PHELPS DODGE ACQUISITION

Freeport-McMoRan acquires Phelps Dodge and announces restart of Climax.

2000 2007

LEADING THE WORLD OF MOLY INTO THE FUTURE

At Climax Molybdenum, we mine metals and produce products for the future. With growth in demand for our products, we continue to explore opportunities to provide more molybdenum to the world while respecting our sustainable priorities and maintaining safe operations.

2012

CLIMAX OPERATIONS START

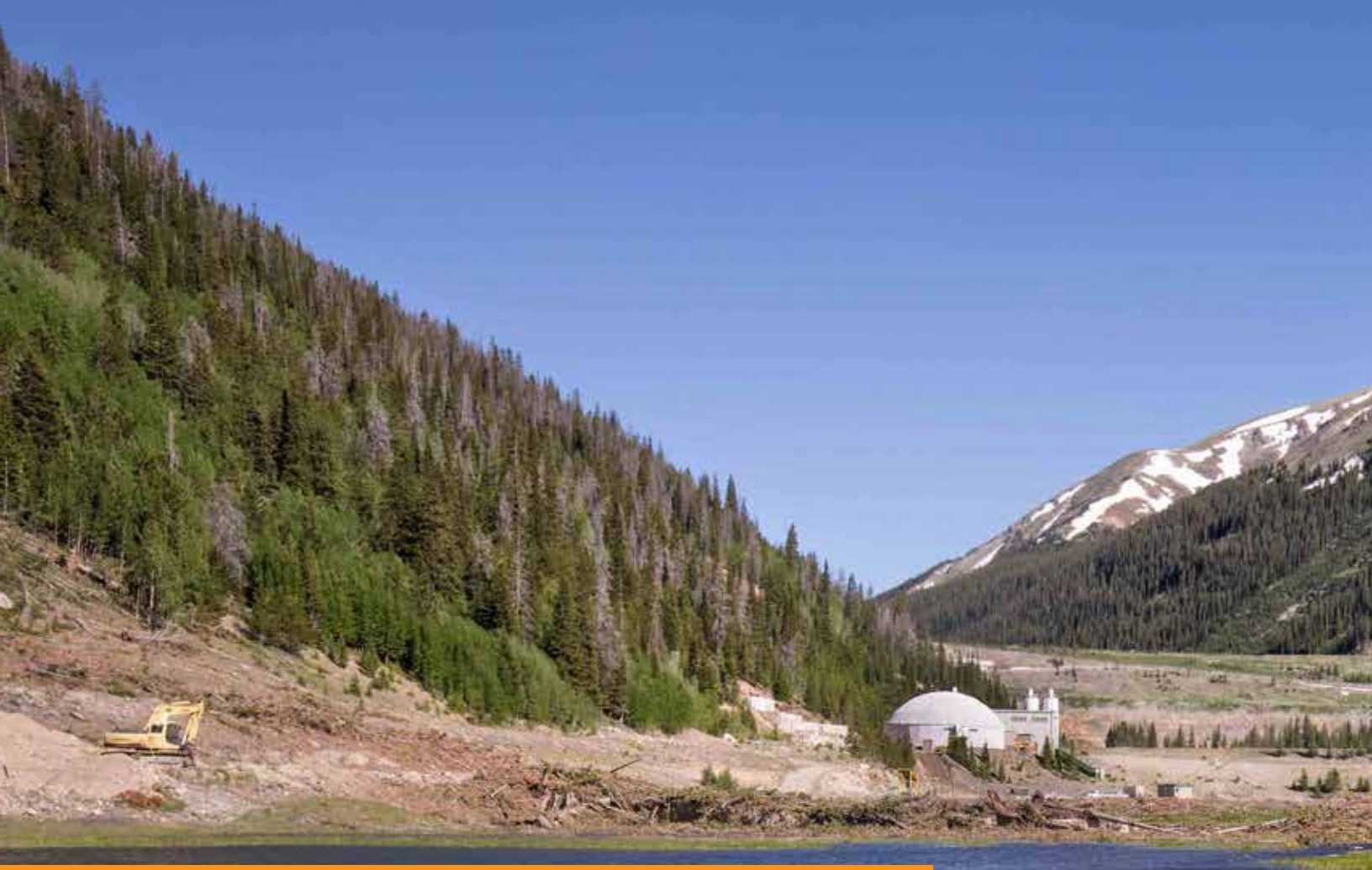
Commercial operation starts at Climax with first shipment of molybdenum in May.

2018

CLIMAX'S 100TH ANNIVERSARY

Climax Molybdenum has provided high-quality products that meet a diversity of needs, wherever our customers are located.

2012 2018



RECENT AWARDS AND RECOGNITION

2023

THE MOLYBDENUM MARK

The first primary molybdenum miner to achieve the Molybdenum Mark demonstrates leadership in sustainability and responsible production practices.

ROYAL SOCIETY FOR THE PREVENTION OF ACCIDENTS (ROSPA)

Climax Stowmarket operations receives the prestigious Royal Society For The Prevention Of Accidents (ROSPA) gold award for 10 consecutive years - the top honor for safety performance.

AMERICAN CHEMISTRY COUNCIL RESPONSIBLE CARE®

Climax Fort Madison operations receives American Chemistry Council Responsible Care® award for commitment to a culture of process safety throughout chemical facility processing operations, management systems and leadership.

2023

SUSTAINABLE DEVELOPMENT

Climax Molybdenum is committed to sustainable development, combining social and environmental responsibility with economic growth. We aim to minimize environmental impacts by implementing strategies based on valid data and sound science, and we work to maintain a safe workplace by having a solid framework for managing risk and meeting compliance obligations.

URAD Water Treatment facility at the Henderson Mine


HENDERSON
MINE
CLIMAX MOLYBDENUM CO.

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PRODUCTS

CHEMICAL PRODUCTS
Ammonium Dimolybdate
Ammonium Heptamolybdate
Calcined Pure Molybdic Oxide
Sublimed Pure Molybdic Oxide
Sodium Molybdate
Molybdenum Disulfide

METALLURGICAL PRODUCTS
Ferromolybdenum
Technical Molybdenum Oxide
- Powder
- Carbon Free Briquettes

OTHER
Ammonium Perrhenate
Rhenium Pellets

LOCATIONS AND CONTACTS

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Cover photo: The I-74 bridge, officially known as the Iowa-Illinois Memorial Bridge. The bridge uses both 2205 (2.5 - 3.5% Molybdenum) and 2507 (4% Molybdenum) duplex stainless steel for strength, longevity, and corrosion resistance.

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