

# Haynes International Aerospace Alloys



For more than 100 years, we have been a leader in the development, manufacturing, and distribution of high-performance alloys for mission-critical applications.

We are proud of our extensive aerospace history that dates back to early aero engines. Today, our products are used in parts for almost every commercial airplane, in many military aircraft, as well as aboard vehicles exploring the frontiers of space. We are committed to delivering the highest quality products, solutions, and service that the aerospace industry demands.

## **HAYNES® 25 alloy**

HAYNES® 25 alloy is a cobalt-chromium-tungsten-nickel alloy that offers excellent strength, good oxidation resistance to 1800°F (980°C), very good sulfidation resistance and relatively good resistance to wear and galling. These properties which make it suitable for a number of components in established military and commercial gas turbine engines. Another area of significant usage is as a bearing material.

## **HASTELLOY® X alloy**

HASTELLOY® X alloy is a nickel-chromium-iron-molybdenum alloy that has been in service in aerospace applications for over 60 years. The alloy offers very good balance of high-temperature strength, oxidation resistance, and fabricability. This alloy is widely used for aircraft and industrial gas turbine engine fabricated combustor and exhaust components, such as transition ducts, combustor cans, spray bars and flame holders, afterburners, and tailpipes.

## **HAYNES® 188 alloy**

HAYNES® 188 alloy is a cobalt-nickel-chromium-tungsten alloy that offers excellent high-temperature strength and superior oxidation resistance up to 2000°F (1095°C) and thermal stability. This alloy is used extensively in demanding military and civil aircraft gas turbine engine combustors, transition ducts, and after-burner components.

## **HAYNES® 214® alloy**

HAYNES® 214® alloy is a nickel-chromium-aluminum-iron alloy developed to provide the optimum high-temperature oxidation resistance for a wrought material, while at the same time allowing for conventional forming and joining. This alloy offers outstanding oxidation resistance to 2300°F (1260°C) and is used in demanding, specialized gas turbine parts, such as honeycomb seals combustor splash plates and other static oxidation-limited parts.

## **HAYNES® 230® alloy**

HAYNES® 230® alloy is a nickel-chromium-tungsten-molybdenum alloy that offers the best combination of high-temperature strength, resistance to oxidizing environments up to 2100°F (1149°C) for prolonged exposures, excellent long-term thermal stability, and fabricability of any major high-temperature alloy. It is used for combustion cans, transition ducts, flame holders, thermocouple sheaths, and other important gas turbine components.

## **HAYNES® 242® alloy**

HAYNES® 242® alloy is an age-hardenable, nickel-molybdenum-chromium alloy which derives its strength from a long-range ordering reaction upon aging. This alloy offers excellent strength to 1300°F (705°C), low thermal expansion characteristics, good oxidation resistance up to 1500°F (815°C), excellent low-cycle fatigue properties, very good thermal stability, and fabricability. It is used in gas turbine seal rings, containment structures, and high-strength fasteners.

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## HAYNES® 282® alloy

HAYNES® 282® alloy is a new, wrought, gamma-prime strengthened superalloy developed for high-temperature structural applications, especially those in aero and land-based gas turbine engines. It possesses a unique combination of creep strength, thermal stability, weldability, and fabricability not found in currently available commercial alloys. This new alloy has excellent creep strength in the temperature range of 1200 to 1700°F (649° to 927°C), surpassing that of Waspaloy alloy and approaching that of R-41 alloy. The features of this alloy make it suitable for critical gas turbine applications, such as sheet fabrications, forged rings and cases, exhaust and nozzle structures, and other hot-gas-path components.

## HAYNES® 244® alloy

HAYNES® 244® alloy is a new, age-hardenable, nickel-molybdenum-chromium-tungsten alloy with an extended operating temperature range to 1400°F (760°C). This alloy offers improved yield strength and creep-rupture strength, versus HAYNES® 242® alloy, as well as a lower thermal expansion. Additionally, the alloy has excellent low-cycle fatigue and good oxidation resistance. The higher strength and lower thermal expansion provides better dimensional control, sealing, and containment characteristics for aero engine designers.

## HAYNES® 233™ alloy

Haynes International, Inc. is pleased to announce the development of HAYNES® 233™ alloy. This alloy is expected to have exceptional oxidation resistance coupled with superior creep strength at temperatures up to 2100°F (1149°C), or higher - a combination of properties never before achieved in a readily fabricable alloy. Potential applications include hot gas components in aerospace and industrial gas turbines. Material for trial evaluation are available in several product forms.

## HAYNES® Ti-3Al-2.5V alloy

HAYNES® Ti-3Al-2.5V alloy was developed for aircraft hydraulic and fuel systems transmission lines, primarily because of its high strength-to-weight ratio. This ratio proves to be a major advantage when used for hydraulic tubing lines to provide required strength levels, but more importantly, reducing weight by as much as 43% when compared to stainless steel.

### Approvals:

BAE Systems  
Cessna  
General Electric  
ITP  
Pratt & Whitney  
Rolls-Royce  
Siemens  
Snecma Moteurs/Groupe SAFRAN  
Spirit Aero Systems

### Accreditations:

AS9100C  
ISO9001:2008  
ISO14001:2004  
ISO50001:2011  
OSHAS 18001:2007  
AD2000-Merkblatt W 0  
Nadcap  
European PED97/23/EC



We offer service centers and sales offices worldwide. Our service centers' capabilities extend from specialized cutting to supplying parts cut to specific drawings and specifications, which reduce your labor time and material waste. We can be a partner in your entire material management system. We are continuously expanding our capabilities to increase your operation's efficiency and shorten your cycle time. Our highly trained staff and technicians are dedicated to providing solutions that exceed your expectations.

Whether you need on-demand delivery of finished goods, end-use technical support or a partner with a global presence, Haynes International provides value far beyond the alloys themselves.