



GUIDE TO BUYING AEROSPACE WIRE AND METAL STAMPINGS

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INTRODUCTION

The aerospace industry represents a significant part of the world's economy. According to one industry report, the aerospace parts manufacturing market size was valued at \$754 billion in 2021 and is expected to grow to \$1130 billion by 2030.

High volumes of components are required for aerospace applications, but despite the large numbers, the most critical standards and requirements must be considered when purchasing these components.

Components used in aerospace applications must be developed with precision and able to meet rigorous standards for performance and reliability. These parts include aerospace wire and metal stampings that help to ensure seamless communication, reliable power distribution, and dependable electronic systems.

Specifying the right aerospace components is not a generic process. It requires a comprehensive understanding of the unique demands imposed by aerospace application environments. This guide is designed to provide readers with an overview of purchasing considerations for aerospace wire and metal stampings.

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UNDERSTANDING AEROSPACE WIRE & METAL STAMPINGS

Aerospace wire and metal stampings are integral in many critical applications within the aerospace industry. These elements play a vital role in the functionality, safety, and performance of aircraft and spacecraft.

Common Aerospace Wire Applications

Structural Support - Wire is often used to reinforce structures and provide support in various components such as control surfaces, wings, and fuselage. Wires are sometimes used to support aerodynamic fairings or coverings over specific areas of the aircraft or spacecraft. It helps distribute loads and enhance the structural integrity of the aircraft.

Seals - Seals consist of thin, flexible wires typically made of high-temperature-resistant materials. Structures allow the wires to create a dynamic seal between rotating and stationary parts, such as between turbine blades and casing. As the rotating component spins, the flexible wires of the seal make contact with its surface, creating a pathway that restricts the flow of gases or fluids. This sealing mechanism effectively reduces leakage while permitting relative motion between the components. These seals provide benefits in leakage reduction, durability, flexibility, efficiency, and maintenance.

Tethering and Safety - Wire is used for tethering purposes, securing equipment, payloads, or even personnel during missions such as spacewalks or cargo transport. It ensures safety by preventing objects from drifting or becoming detached in zero-gravity environments.

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UNDERSTANDING AEROSPACE WIRE & METAL STAMPINGS

Mechanical Linkages - Wire can be employed in mechanical linkages for controlling flight surfaces, landing gear mechanisms, and other moving parts of aircraft. These linkages transmit forces and motions from control inputs to the desired components, enabling precise maneuvering and control.

Thermal Protection - In certain aerospace applications, wire can be integrated into thermal protection systems to shield components from extreme temperatures during atmospheric re-entry or high-speed flight. These wires may be coated or embedded within heat-resistant materials to provide thermal insulation. Some temperature sensors and probes use wire elements to measure heat.

Instrumentation and Measurement - Wire can be incorporated into sensors and measurement devices for monitoring various parameters such as strain, pressure, temperature, and vibration. These sensors play a critical role in flight testing, structural health monitoring, and performance evaluation of aerospace systems.

Fastening and Securing Components - Wire is frequently used for fastening and securing components in aerospace assemblies. It may be formed into clips, ties, or latches to hold parts together securely, withstand vibrations, and maintain proper alignment under dynamic loading conditions.

Wire Mesh and Filtration - Fine wire mesh screens are used in aircraft components for filtration and protection such as preventing debris from entering critical systems. Examples include **fuel filters**, **air intake**

Wire Antennas - Aircraft communication and navigation systems rely on antennas. Wire antennas are lightweight and flexible, making them suitable for various frequencies. Examples include **VHF antennas**, **ADF antennas**, and **ELT antennas**.

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UNDERSTANDING AEROSPACE WIRE & METAL STAMPINGS

Common Aerospace Metal Stampings Applications

- **Aircraft Fuselage Panels** - These stamped panels form the structural framework of aircraft fuselages, providing lightweight yet durable support for the entire airframe.
- **Wing Components** - Various wing components, including ribs, spars, and wing skins use stampings to ensure structural integrity and aerodynamic efficiency.
- **Interior Components** - Stamped alloys can be used to develop interior components such as seat frames, overhead bins, and cabin partitions, contributing to overall weight reduction and passenger comfort.
- **Engine Components** - Stampings are used to craft engine components such as turbine blades, compressor discs, and exhaust systems due to their exceptional strength-to-weight ratio, heat resistance, and corrosion resistance.
- **Structural Components** - In spacecraft and high-performance aircraft, metal stampings are employed in structural components such as frames, bulkheads, and load-bearing members to withstand extreme environmental conditions and mechanical stresses.
- **Landing Gear Components** - Stampings, such as landing gear struts, braces, and fittings, provide the support and durability needed for aircraft landing gear systems to ensure safe takeoffs and landings.
- **Fasteners and Fittings** - Stampings are often used to develop aerospace fasteners, fittings, brackets, and connectors, providing secure attachment points for various aircraft components while resisting corrosion and fatigue.

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REQUIREMENT & SPECIFICATIONS

Safety standards are essential in the field of aerospace due to the fact that aviation and space exploration are inherently complex and high-risk in nature. Aerospace systems operate in extreme environments and are subjected to numerous challenges, such as high speeds, intense temperatures, and varying atmospheric conditions.

Performance Requirements

- **Temperature Resistance** - Aerospace wires are used in extreme temperature conditions, from the scorching heat of atmospheric re-entry to the frigid cold of outer space.
- **Weight Considerations** - Extra weight affects fuel efficiency and overall performance. Compromises between wire thickness, material density, and the need for lightweight yet durability must be taken into account.
- **Mechanical Strength** - Many aerospace applications demand extreme mechanical strength and the utmost reliability for safe and field performance. The right selection of materials and fabrication is critical to project success.
- **Corrosion Resistance** - A reliable aerospace wire must exhibit superior corrosion resistance to maintain its integrity over extended missions and exposure to moisture and corrosive agents.

Stringent safety standards are established and enforced to mitigate risks, ensuring the reliability and performance of aerospace equipment. Compliance with these standards not only enhances operational safety, it also establishes trust among stakeholders, encourages innovation, and advances the overall progress of the aerospace industry.

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REQUIREMENT & SPECIFICATIONS

Regulatory Standards Bodies that Impact Aerospace Manufacturing

Aerospace Industry Standards (AS)

Aerospace quality standards are Aerospace ISO standards applicable to aerospace parts manufacturers, and mandatory to “prime suppliers.” The most commonly applicable aerospace ISO standards are AS 9100 D and ISO 9001:2015

Federal Aviation Administration (FAA)

Although in the US there are no FAA-approval requirements, the FAA encourages implementation of best practices programs in promoting continuous improvement and compliance with regulatory requirements and good operating practices.

Military Specifications (MIL-SPEC)

Mil-spec regulations cover a wide array of areas that impact military procurement, from materials and manufacturing processes to packaging and labeling. These guidelines establish performance, safety and compatibility criteria to assure that products meet the unique demands and performance requirements of military applications.

National and International Standards - ASTM and ISO

ASTM stands for American Society for Testing and Materials, and ISO stands for International Organization for Standardization. ASTM was established in 1898 as a voluntary association of engineers, scientists, and manufacturers who sought to improve the quality and reliability of materials. In 1947, ISO was created as a network of national standards that aimed to facilitate international trade and cooperation. Today, both organizations are a trusted authority for a broad range of topics, industries, and technologies.

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CONSIDERATIONS FOR PURCHASING

The following are some important considerations to evaluate when considering the purchase of aerospace wire and metal stampings, due to the vital role these component parts play in ensuring the safety, reliability, and performance of aerospace systems.

Material Traceability and Certification Requirements

Material traceability is essential for quality control, regulatory compliance, and risk management. Traceability ensures that materials can be traced back to their origins, including the manufacturer, production processes, and testing procedures. Certification requirements, such as those mandated by regulatory bodies, provide assurance that materials meet specified standards for performance, durability, and safety. Failing to adhere to material traceability and certification requirements can result in non-compliance issues, potential safety hazards, and legal liabilities.

Quantity and Volume Needs

In many cases, aerospace projects require precise quantities of materials to meet production schedules and operational requirements. Understanding a manufacturer's quantity and volume needs enables them to provide sufficient materials to support ongoing projects without delays or disruptions. Whether it's a large-scale manufacturing operation or a small-scale prototype project, accurately assessing production needs allows for efficient inventory management, cost optimization, and avoidance of overstock or understock situations.

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CONSIDERATIONS FOR PURCHASING

Lead Times and Delivery Schedules

In any industry, timely delivery of materials is critical to maintaining project schedules, meeting customer deadlines, and ensuring operational readiness. This is especially true for aerospace applications involving the military or other sensitive applications. Long lead times or delays in material delivery can cause costly production setbacks, project delays, and potential penalties. Evaluating lead times and delivery schedules is essential in selecting reliable suppliers capable of meeting tight deadlines and accommodating unforeseen changes or priorities in project timelines.

Pricing and Budgetary Constraints

While quality and compliance are critical in aerospace material procurement, pricing and budgetary constraints are also an important consideration. Aerospace projects often operate within strict budgetary frameworks, necessitating cost-effective sourcing strategies without compromising on quality or safety. Evaluating pricing structures, negotiating favorable terms, and conducting cost-benefit analyses help optimize budget and value without compromising on material integrity or performance.

Customization and Special Requirements

Aerospace applications may require specialized materials customized to meet specific design requirements, performance specifications, or environmental conditions. Whether it's custom alloys, unique configurations, or specialized coatings, accommodating customization and special requirements ensures that materials align precisely with project needs and performance objectives.

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CHOOSING A SUPPLIER FOR AEROSPACE WIRE AND METAL STAMPINGS

Aerospace wire and metal stampings play a pivotal role in the reliability, performance, and safety of aerospace systems. It is essential to select a supplier that understands the nuances of these materials to ensure the success of your projects while maintaining the highest standards of quality and compliance. Points to look for include:

- Certified Supplier and Manufacturer
- Industry Reputation and Track Record
- Quality Control Processes
- Application Support
- Value Added Services - Light Assembly
- Customer Service

Ken-tron Has Extensive Experience in Aerospace Applications

Balancing the unique demands of temperature extremes, weight constraints, and compliance ensures the seamless integration of aerospace wires and metal stampings into aviation and space technologies.

For expert guidance and top-quality aerospace wire and metal stampings, contact the experts at Ken-tron. Let us elevate your aerospace projects to new heights of performance and reliability.

- ISO 9001:2015
- AS 9100 Rev. D
- AS 13100 Compliant
- CAGE Code 27844
- ITAR Registered
- CAGE Code 27844
- ITAR Registered
- Rolls Royce Approved
- Pratt & Whitney Laboratory Control at Source (LCS) Approved
- Supplier to many other Tier 1 and Tier 2 Aerospace/Defense/Space/Satellite/ Missile Manufacturers

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