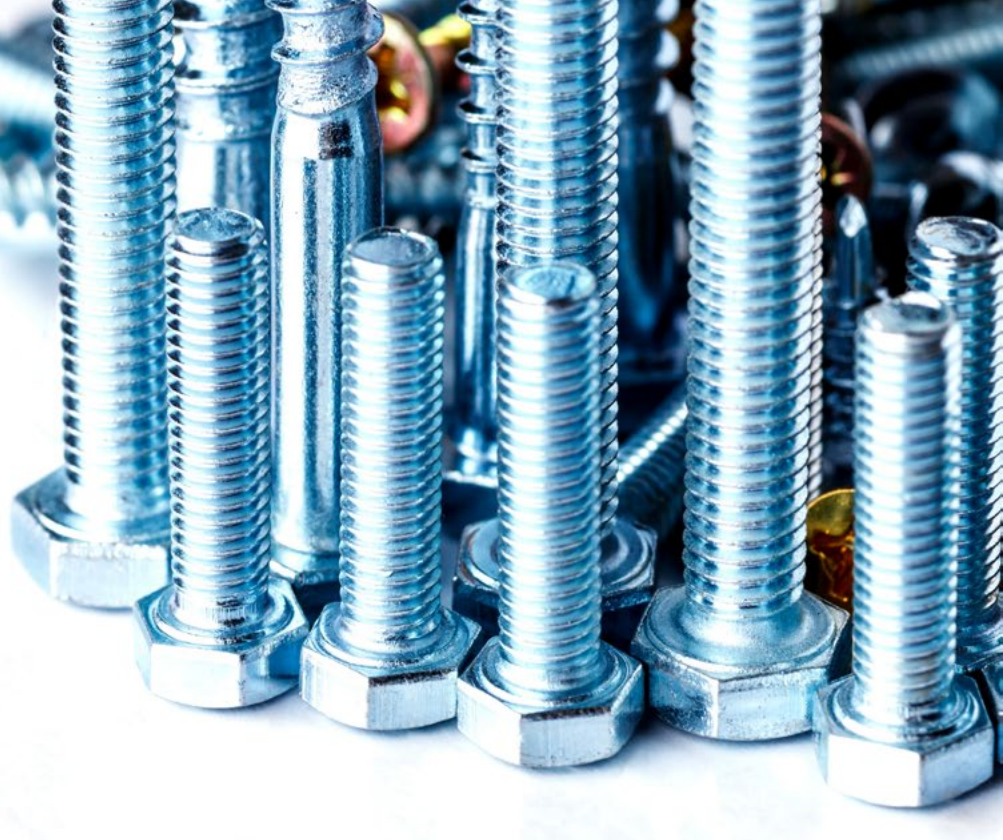




Structural Integrity of Fasteners

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Structural Integrity of Fasteners

Even the smallest of fasteners has a large impact on how well a product's components stay connected, how long that connection lasts, and how that product will ultimately perform. Strong, durable fastening solutions designed to maintain their structural integrity not only enhance the lifespan and functionality of your equipment but also help prevent operator injury and costly equipment damage or downtime.

At Associated Fastening Products, Inc., we've spent more than three decades manufacturing and distributing fastener products that solve challenges for our clients. In that time, we've developed into a trusted industry leader through our commitment to quality, service, and exceptional product selection. Our team makes high-quality standard and custom products as a full-line fastener supplier for clients in the original equipment manufacturer (OEM) market, and we can also assist you with hard-to-find and specialty products.

In this eBook, we'll discuss the many considerations for choosing a fastener to best ensure its structural integrity, and how the team at Associated Fastening Products can help.



Fasteners' Structural Integrity: Factors to Consider

Several factors impact the structural integrity of a fastener, as well as its ability to maintain it over time. The ultimate goal is to prevent fastener fatigue, fractures or cracking, and part failure.

Fastener Type and Size

To begin, you'll need to identify the ideal fastener type and size that adequately meets the demands and dimensions of your project. From screws, rivets, and bolts to nuts, pins, and clips, there are numerous fastener options from which to choose, each with its own applications and advantages. Once you've chosen your type, you'll then narrow it down by other factors like head type. For instance, screws can have a flat, oval, hex, button, socket, truss, or pan head.

Fasteners are also available in an array of standard sizes. Smaller devices and products require compact fasteners to fit in areas with limited space, whereas



heavy-duty equipment often relies on larger fasteners to withstand rugged use and maintain structural integrity. Using bolts as an example, these fasteners range from small eyeglass frame bolts to 15-pound ones for wind turbine applications. In metric sizes, bolts come in sizes of M5 to M30 with hole sizes of 5.5 to 32.0 millimeters.

Whatever your application and requirements, however, the Associated Fastening Products team can help you find the optimal standard or custom fastener type and size to suit your needs.

Fabrication Technique

The fabrication method a manufacturer uses to create and process a fastener also affects its structural integrity. Using a suboptimal fabrication technique could introduce residual stress, undesirable material characteristics, and even undetectable flaws. Using the right one, however, typically increases a fastener's allowable stress for better end results. At Associated Fastening Products, we utilize precision CNC and Swiss screw machining, metal stamping, and laser and water jet cutting to carefully craft our durable fasteners with trusted quality.

Material

Common materials for our fasteners include:

- Aluminum
- Bronze
- Steel
- Brass
- Stainless steel
- Nylon

For a fastener to perform optimally, it's important to determine the ideal material for its intended application. For example, ferritic steel and certain titanium alloys can become brittle at cold temperatures and fracture. Similarly, 316 stainless steel resists rusting and corrosion in marine environments better than 18-8 stainless, which contains 18% chromium and 8% nickel.

In general, a fastener of a more economical plastic may be sufficient for applications that won't expose it to significant vibration or wear, but you'll want to choose a more durable option if the fastener will experience rugged use or must withstand frequent opening and closing.



Environment and Application

As discussed, the right material for your fastener is tied to its application and the environment in which you'll be using it. Fasteners for exterior equipment, for instance, should be resistant to moisture and corrosion, fluctuating or extreme temperatures, and ultraviolet light. For fasteners you intend to use in concrete, alternately, they'll benefit from ruggedized threads and protective coatings for corrosion prevention.

These products may also contract or expand based on their environmental conditions, or shake loose when exposed to vibration,

creating less-than-reliable connections over the long term. Given the number of available fastener types and materials, the Associated Fastening Products team is happy to help you find the proper fastener solution for your individual project.

Load Distribution

Using a bolt and nut as an example, a load is typically concentrated on a bolt's first three — if not just its first — engaged threads. The bolt handles the majority of the load instead of it being distributed equally to the nut. Also, the surfaces of nuts and joints don't tend to be perfectly perpendicular to a thread's axis, resulting in some bending as it's unlikely a bolt will stretch uniformly. We can taper a fastener's threads or change the bolt or nut's pitch to enhance load distribution uniformity and support continued structural integrity.

To determine the load capacity of a fastener, consider factors such as:

- Tensile load
- Static and dynamic loads
- Cyclic and combined loading
- Bending and torsional shear stress
- Stress relaxation
- Pitch diameter



Thread Engagement

During a fastener's installation, its thread engagement is the degree to which two threaded parts like a bolt and nut overlap or interconnect. Using fasteners with insufficient lengths or percentages of thread engagement can lead to stripping the threads or forming a joint susceptible to weakening from open-close movement, vibrations, part stress, and shear force. Alternately, fasteners that experience

maximal thread engagement offer significantly higher joint durability and strength for superior structural integrity in your application.

Coatings

Corrosion is a real threat to the structural integrity of a fastener. It can exhibit as localized fatigue, stress, or pitting; moisture-based uniform corrosion on a part surface; or galvanic corrosion, which occurs when dissimilar metals undergo electrolyte exposure and experience a reaction. Whatever form it takes, however, corrosion negatively impacts fasteners' holding power and physical strength, increasing the chance that the fastener will fail, damage equipment, and even put employees at risk of injury.

To mitigate the risk of corrosion, we can apply specialized coatings to your fasteners to enhance their longevity and corrosion resistance, essentially forming a physical barrier between a metallic part's surface and the corrosion source. At Associated Fastening Products, we offer:

- Powder coatings
- Metal coatings
- Electroplating



Meeting Quality Standards

From a quality standards perspective, we comply with certain regulations in manufacturing our fasteners. The *Fastener Quality Act (FQA) of 1990* stipulates the following to ensure public and user safety:

Fasteners for sale in commerce may not misrepresent or falsify factors such as manufacturer specifications, strength, properties, and chemistry

Fasteners must undergo evaluation by an accredited laboratory for fastener testing and receive certification per FQA standardized methods

President George H.W. Bush signed the FQA, Public Law 101-592, on November 16, 1990. It came about after the Congressional Subcommittee on Oversight and Investigations became aware of deficiencies in fastener manufacturing standards related to quality and safety. In some cases, suppliers abroad were passing off cheaply made fasteners with fake safety certifications as high-quality parts.

Our Trusted Fastener Solutions

Serving a client base in industries ranging from agriculture to automotive, the Associated Fastening Products team specializes in precision-machined, structurally sound fastener solutions for diverse applications. The following are some of the standard fasteners that Associated Fastening Products manufactures and supplies:

- Nuts
- Washers
- Nails
- Bolts
- Studs
- Retaining pins
- Screws
- Anchors

Along with an impressive catalog of standard fastener products, we can also custom-develop them per your unique specifications for ultimate flexibility.



Quality Fasteners From Associated Fastening Products

At Associated Fastening Products, we couple our high-quality products and turnkey machining, stamping, cutting, and sourcing services with superior customer support, fostering long-term business partnerships with our clients. We offer an extensive selection of tight-tolerance fasteners, fittings, washers, O-rings, cable ties, and hardware kits at competitive prices. For your convenience, we have multiple distribution points across the United States.

Whatever type of fastener is the ideal option for your project, the Associated Fastening Products team is here to help. **Contact us** to learn more about our reliable, structurally sound fasteners and the Associated Fastening Products difference, or **request a quote** today to get started on your next project.



About Us

Associated Fastening Products, Inc. was established with the understanding that there was a need for quality, consistency and excellent customer service in the industry.

Associated Fastening Products, Inc. is an established company with a proven track record for over 30 years, in the manufacturing and distribution of both standard and special fasteners. We continue to thrive and expand our business.

We have a broad range of capabilities in the areas of machined products, cold head fasteners, nylon insert locknuts, as well as a garden variety of standards. In addition, we possess the ability to provide specialty and hard to find items. As a full line supplier we provide the OEM market with the service, quality and variety of products that has made us a leader. Our multiple distribution points throughout the USA give us additional flexibility in servicing our customers.

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