

**NEW**  
**SPS TITAN™**  
**Titanium Fasteners**

- *Titanium Alloy Fasteners*  
*Offering an Unprecedented*  
*Combination of Strength*  
*and Light Weight*

Larger  
Stronger  
Lighter

# SPS TITAN™ Titanium Fasteners:

SPS Technologies, Inc., a leading manufacturer of high-strength fasteners and precision components since 1903, offers a line of fasteners manufactured from new SPS TITAN™ 761 titanium alloy. This new alloy overcomes the fastener size and strength limitations associated with other titanium alloys, allowing users to capitalize on the lightweight advantages of titanium where they never could before.

## Optimized Beta-Titanium Alloy

SPS TITAN 761 titanium alloy is an optimized beta-titanium alloy, which conforms to the chemistry requirements of AMS 4958 (3Al-8V-6Cr-4Zr-4Mo). Following an exhaustive study of candidate materials, SPS chose this alloy and prescribed special processing requirements for the raw material so that the alloy meets target material property requirements.

Other titanium alloys, like Ti-6Al-4V (AMS 4967), are acceptable for fastener manufacturing. However, the size threshold for Ti-6Al-4V is 3/4". Larger parts do not meet the strength requirements of aerospace bolt specifications due to hardenability limitations.

Titanium alloys that are able to maintain full strength in larger size parts have formability, notch sensitivity and property scatter issues that limit their use for fastener production.

## SPS TITAN™ 160 Titanium Alloy Fasteners - Larger

Users forced to switch from titanium to heavier steel or CRES alloy parts because of fastener size design requirements now have a new option. SPS offers SPS TITAN 160 titanium alloy tension bolts manufactured from SPS TITAN 761 titanium alloy in sizes from 3/4" to 1-1/2" that meet existing titanium bolt specifications, including NAS 621, NAS 4004, AS 7460 and AS 7461.

These fasteners maintain 160 ksi tensile and 95 ksi shear strength properties, and exhibit excellent fatigue performance. SPS TITAN 160 titanium alloy bolts and companion nuts are available in a variety of configurations.



# Larger, Stronger, Lighter

## **SPS TITAN™ 180 Alloy Fasteners - Stronger**

Extending design versatility even further, SPS TITAN 180 alloy fasteners offer users a one-for-one replacement for high strength alloy-steel and CRES-alloy fasteners. SPS TITAN 180 alloy fasteners, manufactured from the SPS TITAN 761 alloy, step up to 180 ksi tensile and 108 ksi shear strength levels. This matches the properties of heavier fasteners, while delivering a 40% weight savings.

SPS TITAN 180 alloy bolts are available in diameters up to 1". Bolts as well as nuts are available in a variety of configurations.



## **SPS TITAN™ 160 Alloy and SPS TITAN™ 180 Alloy Fasteners**

### **Aerospace Application Advantages:**

- *High reliability*
- *Reduced weight*
- *Wide design flexibility*
- *Low inspection costs*
- *Low MRO costs*
- *Decreased life cycle costs*

### **A Note About Fatigue Strength**

Aerospace fatigue strength requirements typically call for fasteners to average 65,000 cycles when tested at R=1. "R" is the ratio of the minimum fatigue load to the maximum fatigue load. The maximum fatigue load is a percentage of the fastener's ultimate tensile strength (UTS).



● <b>Minimum Properties</b>	<b>SPS TITAN™ 160 Bolts or Fasteners</b>	<b>SPS TITAN™ 180 Bolts or Fasteners</b>
Tensile Strength	160 ksi (1103 MPa)	180 ksi (1241 MPa)
Shear Strength	95 ksi (655 MPa)	108 ksi (745 MPa)
Fatigue Strength: $\sigma_{max}$ (% of UTS) for 65,000 cycles at R=0.1	40%	38%

## The SPS Superalloy Family

SPS Technologies Aerospace Fastener Group also manufactures fastener products from these other SPS-developed superalloys.

### ● MULTIPHASE® MP35N® Superalloy:

Provides the ultimate combination of strength and corrosion resistance. The recommended temperature range is from cryogenic through 750°F.

### ● MULTIPHASE® MP159® Superalloy:

Formulated to meet the demands of turbine engine manufacturers, offers an operating temperature capability to 1100°F, while maintaining the high strength of MP35N alloy and excellent corrosion resistance.

### ● AEREX® 350 Superalloy:

Greater toughness than the MULTIPHASE alloys at cryogenic temperatures. Pushes the maximum operating temperature envelope to 1350°F. No other fastener alloy can match the combination of strength and temperature range. Corrosion oxidation and sulfidation resistance are excellent.

### ● MP98T™ Superalloy:

Offers an unmatched combination of 180 ksi tensile strength, fracture toughness and corrosion resistance for aerospace engine and airframe applications.



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