not magnetic, no zinc, not tin-plated, think about space, corrosion?,
Rivets
Screws

Must withstand space -
vacuum, thermal cycling, charged particle radiation, ultraviolet radiation, and in some environments, plasma effects and atomic oxygen

pressures below 10−4 Pa (10−6 Torr) - look for outgassing and offgassing

Thermal cycling temperatures are dependent on the spacecraft component thermo-optical properties, i.e. solar absorptance (αs), or how much solar energy the material absorbs, and infrared emittance (εIR) - Watch for cracking, crazing, delamination, and other mechanical problems, especially differences in thermal expansion

Charged particle radiation, along with ultraviolet radiation can cause cross-linking (hardening) and chain scission (weakening) of polymers (ONLY problem with polymers, optics, and electronics?)

Atomic Oxygen (AO) is found between 100 and 1,000 km altitude. AO oxidizes metals, especially silver and osmium. AO reacts strongly with any material containing carbon, nitrogen, sulfur, and hydrogen bonds of 5 eV bond energy or less

- If the failure of the part would result a catastrophic failure nondestructive evaluation methods for flaw or crack detection include eddy current, fluorescent penetrant, magnetic particle, radiography, and ultrasonics.

I think that we should only consider using metals because of the problems associated with non-metals (outgassing, charged-particle radiation, lifetime) that are prevalent with these materials

Structural Materials

- Strength-to-weight ratio
- Loads must be considered (Static ad dynamic)
- thermal performance
- corrosion protection
- Manufacturability
- Cost

High strength alloys of aluminum, titanium, and stainless steel?

austenitic stainless steels are more resistant to stress corrosion cracking than ferritic and duplex stainless steels - austentitic steels tend to be non-magnetic

Aluminum-lithium alloys have 10% or more weight savings over standard aerospace aluminum alloys

Reminder: For non-metallic materials, atomic oxygen erosion may be a concern if used in low Earth orbit

Titanium Alloys:
TI 3AL-2.5V -
Data sheet
TB2 (Ti-5Mo-5V-8Cr-3Al) -
Data sheet
TB8 (Ti–15Mo–3Al–2.7 Nb–0.25Si) -
Data sheet
TC4 (Ti-6Al-4V) -
Data sheet
~~TC6 (Ti-6Al-2.5Mo-1.5Cr -0.5Fe-0.3Si) -~~
https://www.titaniuminfogroup.com/analysis-of-titanium-alloy-materials-for-aerospace-fasteners.html

Cherry Aerospace E-Z Bucks
https://www.carpentertechnology.com/parts-and-components
https://www.valbruna-stainless-steel.com/applications/aerospace-defense/fasteners-rivets#:~:text=Aerospace%20and%20Defense&text=TI%2DGR5%20is%20the%20most,and%20toughness%20are%20mandatory%20requirements.

Austenitic Stainless Steel:
Nitronic 50 -
Data sheet
Nitronic 60 -
Data sheet

https://www.beststainless.com/aerospace.html#:~:text=Nitronic%2050%20%26%20Nitronic%2060%3A%20Nitronic,components%20like%20bushings%20and%20bearings.
https://boltport.com/products/nitronic-50-fasteners/

HOWEVER

"The potential difference between galvanic couples shall not exceed 0.25 V"

Table 1—Compatible Couples in Seawater

GROUP NUMBER	METALLURGICAL CATEGORY	EMF (V)	ANODIC INDEX (0.01 V)	COMPATIBLE COUPLES[1]
0	Inorganic carbon (carbon fibers, graphite, graphene, etc.)[2]	+0.30	0	
1	Gold, solid or plated; gold-platinum alloys; wrought platinum	+0.15	15	
2	Rhodium plated on silver-plated copper	+0.05	25	
3	Silver, solid or plated; high silver alloys	0	30	
4	Nickel, solid or plated; Monel® metal; high nickel-copper alloys; Titanium and Titanium alloys, Inconel® alloys, Hastelloy® C276	-0.15	45	
5	Copper, solid or plated; low brasses or bronzes; silver solder; high copper-nickel alloys; nickel-chromium alloys; austenitic corrosion-resistant steels	-0.20	50	
6	Commercial yellow brasses and bronzes	-0.25	55	
7	High brasses and bronzes; naval brass; Muntz metal	-0.30	60	
8	18 percent chromium type corrosion-resistant steels	-0.35	65	
9	Chromium plated; tin plated; 12 percent chromium-type corrosion-resistant steels	-0.45	75	
10	Tin plate; terneplate; tin-lead solder	-0.50	80	
11	Lead, solid or plated; high lead alloys	-0.55	85	
12	Aluminum; wrought alloys of the 2000 series	-0.60	90	
13	Iron, wrought, gray, or malleable; plain carbon and low-alloy steels; Armco® iron	-0.70	100	
14	Aluminum, wrought alloys other than 2000 series aluminum; cast alloys of the silicon type	-0.75	105	
15	Aluminum, cast alloys other than silicon type; cadmium, plated and chromated	-0.80	110	
16	Hot-dip zinc plate; galvanized steel	-1.05	135	
17	Zinc, wrought; zinc-base die-casting alloys; zinc, plated	-1.10	140	
18	Magnesium and magnesium-base alloys, cast or wrought	-1.60	190	

https://standards.nasa.gov/sites/default/files/standards/NASA/A/2022-01-11-NASA-STD-6012A-Approved.pdf

BECAUSE WE ARE ANODIZING THE ALUMINUM (if it is anodized when in contact with the screws!?!?) GALVANIC CORROSION IS NOT A PROBLEM!
https://www.metalfinishingsltd.co.uk/articles/prevent-galvanic-corrosion-anodising/

Then we should use Grade 5 Titanium because it is stronger, more heat resistant, and more available than other options.
If non-anodized surface is in contact with the screws maybe nitronic 50? Or I keep looking.

Grade 5 Titanium Screws:
https://www.mcmaster.com/products/grade-5-titanium-screws/
https://www.acerracing.com/collections/titanium-screws?page=2&srsltid=AfmBOoq9-zVxyp-V9jykzej2z8gKtzmz3WnEQ7hmwh5LAI4GKAeAjZxe

Request a quote:
https://www.extreme-bolt.com/titanium-grade-5-fasteners-flanges.html?srsltid=AfmBOopybcMmbHCIjn8qkVexxcNp0bMNrM-4OHw8z0lZm-ja1BImuNMG
https://www.kdfasteners.com/titanium-grade-5-socket-cap-screws.html

Recommendation:

https://accu-components.com/us/metric-cap-head-screws/652611-SSCF-M2-10-TI5
It should be okay that it is a socket head rather than a phillips

- Head length is 0.28mm longer