



Rubber to Metal Bonding Guide

From small vibration dampeners to large body pads for trucks, there are plenty of applications that need quality rubber to metal bonded parts. It's essential to invest in quality parts that are built to last, but there are several factors that can impact the performance of the part in your unique application(s).

Every application is different, so you'll need to gather some information before you turn to a supply partner like Timco Rubber Products. This guide is designed to help you understand how rubber to metal parts are made and what you need to know to invest in the right parts for your needs.





How Rubber is Bonded to Metal Inserts

It's a common misconception that all it takes is some adhesive to bond rubber to a metal insert. While some form of adhesive is involved, the process of creating an indestructible bond requires rubber to be molded directly on to the metal substrate.

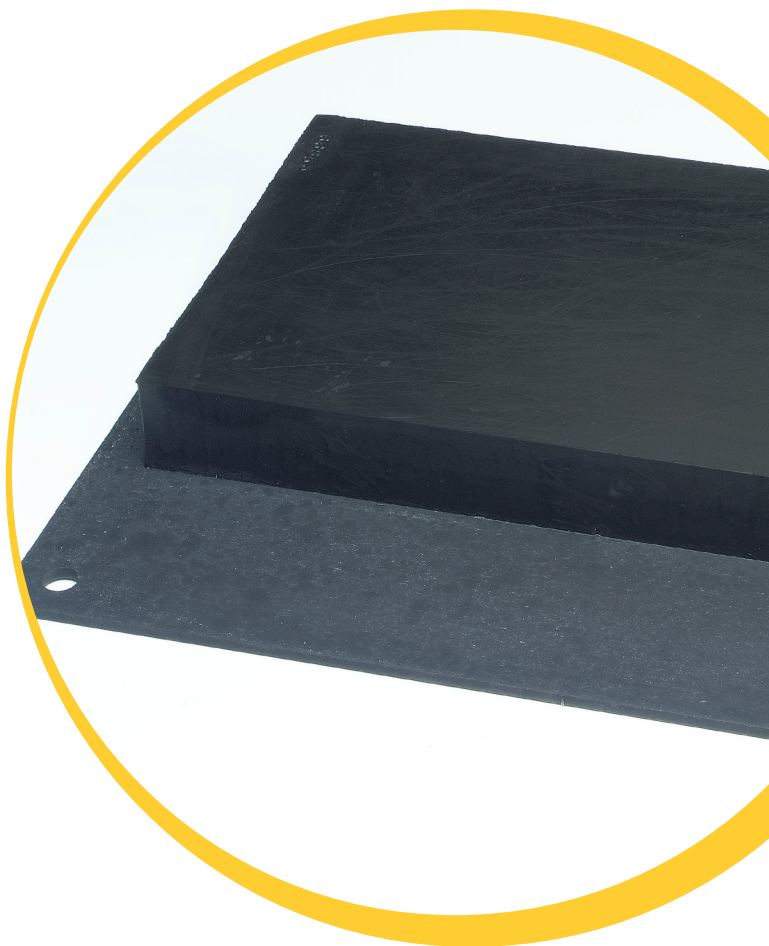
The process starts with a mold in the shape of the final part. These molds are filled with raw rubber material and placed under both heat and pressure to create the part. The main difference with rubber to metal bonded parts is that the mold also contains a metal insert. Before the mold is closed and put into its curing cycle, the insert is pre-treated with a special type of heat-activated adhesive. Once the raw rubber fills the mold, the ensuing heat and pressure create the part and also bonds the rubber to the metal insert.

What Impacts the Rubber to Metal Bonding Process

There is no one-size-fits-all solution when it comes to rubber to metal bonded parts. Every application is different, and it's important to invest in the right parts for your exact performance requirements and budget. To do that, you'll need to consider the following criteria:

- Rubber material selection
- Metal inserts

Once completed, rubber to metal bonded parts can undergo destructive testing to ensure the integrity of the bond. The way that suppliers determine a good bond is by testing which fails first – the rubber or the bond. If the bond fails first, it's a failed part. If the rubber tears, then the rubber to metal bonding process was a success.



Rubber Material Selection

In order to invest in the perfect rubber to metal bonded parts, you need to have the right rubber material for the job. Each rubber compound has specific benefits and drawbacks that impact your ideal performance and budget, so it’s critical to figure out which one is right for your needs. In general, the following rubber compounds are used to bond with metal inserts.

- EPDM
 - Silicone
 - Natural rubber
 - Neoprene
- Nitrile
 - SBR (Synthetic rubber)
 - FKM (Viton)

The best way to start the material selection process is to identify which performance capabilities and environmental factors will make or break the success of your part. Once you have those criteria in mind, you can start to narrow down your search to materials that match your requirements. The following chart can give you a general idea of which rubbers are better suited for some applications than others.

Material	Temperature Range (High/Low)	Oil Resistance	Aging / Weathering	Abrasion / Tear Resistance	Compression Set	Durometer (Hardness)
EPDM	350°F / -60°F	Poor	Excellent	Good/Fair	Good	30-90 Shore A
Silicone	480°F / -150°F	Fair to Poor	Excellent	Poor	Good	30-90 Shore A
Natural Rubber	175°F / -60°F	Poor	Poor	Excellent	Excellent	40-90 Shore A
Neoprene	250°F / -50°F	Fair	Good	Excellent/Good	Good	30-90 Shore A
Nitrile	250°F / -40°F	Good to Excellent	Poor	Excellent/Good	Good	20-95 Shore A
SBR	225°F / -50°F	Poor	Poor	Fair	Good	30-100 Shore A
FKM	600°F / -10°F	Excellent	Excellent	Good	Good	40-90 Shore A



Metal Inserts

The final criteria should come as no surprise – the metal inserts. You can't bond rubber to metal without metal, so you and your rubber parts supplier will need to evaluate both the inserts themselves and who will supply them.

As with rubber, there are different metals you can use for your parts. You'll need to work with your supplier to determine whether a specific metal is suitable for the bonding process. In general, rubber can be bonded to steel, brass, and other types of metal inserts. However, there are certain metals, such as soft aluminum, that can pose problems. The best way to solve this problem is to bring up metal options early and test them if necessary.

The question over who will supply the metal inserts will be brought up during the initial discovery process. Typically, the business in need of rubber to metal bonding will provide the inserts. If you need the rubber parts supplier to supply them, make sure to address that early in the process so that they can find a manufacturer and quote it for you.

Quality Rubber to Metal Bonded Parts for Your Business

Like any other custom parts, there are plenty of possibilities when bonding rubber to metal. With this breakdown on what it takes to create rubber to metal bonded parts, you're one step closer to investing in the right parts you're your applications. The next step is to work with a supplier who can give you exactly what you and your units need.

When you're ready to invest in the best, most-cost-effective parts, Timco Rubber can help. We've supplied high-quality, high-performing rubber products since 1956 and can supply your business with the best parts for your applications and budget.

Ready to start the process?

Head to timcorubber.com to learn more or call 1-800-969-6242 to talk to one of our experts about your needs.