



How to Join Two Shafts: 4 Methods

Introduction

A shaft coupling is a mechanical tool whose primary role is to connect two shafts. The transmission of torque and power to motors, compressors, pumps, turbines, conveyors, generators, as well as other mechanical systems relies heavily on shaft couplings. Based on the alignment accuracy of the system and the required torque, couplings can be defined as rigid or flexible.

Rigid couplings are appropriate when shafts are fully aligned. If there is any misalignment of shafts, a flexible coupling must be used. This EBook will focus on the different styles and options for rigid couplings. Rigid couplings are available in straight-through bores (both shafts are the same size) and stepped bores (shafts are different sizes). Common compatibility problems, such as variations in shaft length or size, can be resolved using shaft adapters to resize shafts. Measurement system compatibility issues can be resolved with inch-metric couplings when connecting two incompatible shafts. Custom couplings can accommodate unique shaft connection configurations that standard products cannot.

What To Do If There Are Two Different Shaft Sizes

Differences in shaft size is a common issue and is simple to solve. For instance, you may have standard shafts with different I.D.'s or shafts of different shapes and sizes. Rigid shaft couplings can align shafts properly by mating shafts of either equal or unequal diameters while retaining adequate torque transfer and avoiding backlash. Note that using the wrong rigid coupling can result in vibration dampening and poor shock absorption.



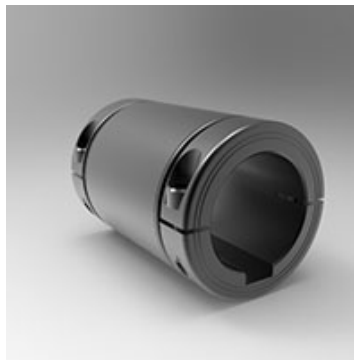
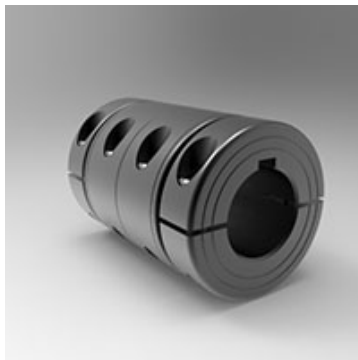
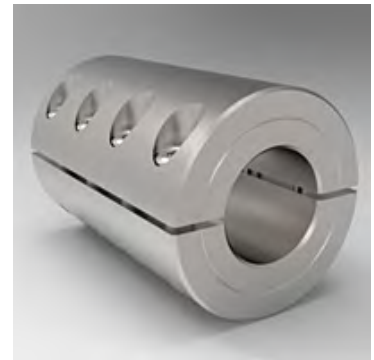
With different types of rigid couplings available, it is essential to make the right choice. Below are some factors you should consider when selecting rigid couplings:

- Maximum speed (RPM)
- Torque transmission rating
- Inertia
- Stiffness
- Potential misalignments
- Ability to soften vibration and absorb shock
- Environmental conditions
- Available shaft mountings
- Applications
- Cost

Solutions From Stafford

Stafford offers rigid shaft couplings and adapters designed to connect and/or lengthen shafts of various sizes and designs. Our shaft adapters and couplings are made of high-quality steel, brass, aluminum, and stainless steel. Our products offer many mating possibilities as they are available in a range of configurations, including:

- **One-Piece Couplings:** Ideal for connecting two shafts with no backlash. They feature smooth bores to protect the shaft from damage. Available in low-profile, heavy-duty, and high-strength styles. Straight-through and stepped bore configurations are available.
- **Two-Piece Couplings:** Available in two pieces for easy assembly and adjustment, this coupling is available in stepped or straight-through bores. Ideal for when both ends of the shaft are not accessible.
- **Three-Piece Couplings:** Functions by keeping one shaft in place as the other adjusts or changes. These couplings are available in steel and stainless steel and come with smooth bores to prevent shaft damage.
- **Precision Sleeve Couplings:** These couplings maintain an extremely close tolerance (0.001 T.I.R.) shaft-to-coupling fit. Ideal for ground shafts, this product features no backlash and no axial motion.





When is A Close Tolerance Fit Necessary?

Precision-machined shafts require couplings with a close tolerance fit. Thanks to their solid core, precision sleeve couplings provide precise alignment while supporting shafts and maintaining concentricity.

Solutions From Stafford

Stafford's Precision Sleeve Coupling includes a solid core that gives a close tolerance shaft-to-coupling fit on ground shafting (0.001 T.I.R.). It features a standard keyway. The coupling also has the Accu-Clamp™ design that includes self-centering and clamping collars on both ends.

As a result, these couplings provide optimal alignment of shafts with no backlash. Below are the different precision coupling types available at Stafford:

- **Precision Sleeve One-Piece Couplings with Keyways:** Made from premium-grade steel construction, this one-piece rigid precision coupling is easy to use, has a standard keyway, and prevents marring.
- **Precision Sleeve Two-Piece Couplings with Keyways:** This product comes in two pieces for easy assembly and adjustment.
- **Precision Flange Couplings:** These flange couplings facilitate component mounting, including motors, gears, brake assemblies, etc. They feature three through holes and three tapped holes.

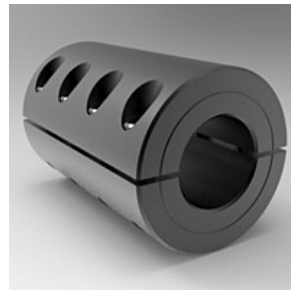
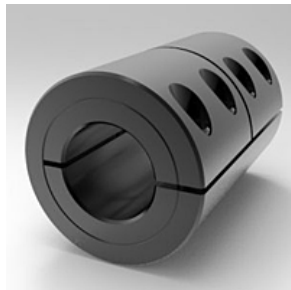
What Can I Use to Connect an Inch Shaft and a Metric Shaft?

Inch-to-metric couplings are those with an inch size on one bore end and a metric-size bore on the other end. As a result, they offer a simple and fast solution to a common shaft incompatibility.

Solutions From Stafford

Stafford Manufacturing offers inch-metric conversion couplings in a complete range of standard sizes. If needed, it is possible to include keyways on these products. Below is a list of the available inch-metric coupling types available at Stafford:

- **Inch-Metric Couplings One-Piece:** Ideal for aligned shafts, this one-piece inch-metric coupling connects two shafts to make one. Made of high-quality steel construction, these couplings have high clamping power and are non-marring.
- **Inch-Metric Couplings Two-Piece:** This product is available in two separate pieces to facilitate the most convenient assembly and adjustment. It is non-marring, easy to adjust and has high clamping power.





When is a Shaft Adapter Necessary?

Shaft adapters, also known as bore reducers, enable the adjustment of shaft diameters. They feature a clamp-style connector that fastens to the shaft's end, connecting shafts with incompatible bores. Instead of performing a full drive shaft replacement, which is complex, costly, and sometimes unnecessary, a shaft adapter can be the ideal solution if the only issue is incorrect shaft sizes.

Compared to a complete shaft replacement, shaft adapters are a far more affordable solution to your shaft compatibility problems. They allow connections when:

- It is impossible to use a traditional coupling to link the shafts successfully.
- A coupling cannot accommodate the variation in shaft diameter.
- Replacing a shaft is not advised due to price or other factors (such as poor transmission of motion or power).

Due to their stiff and sturdy construction consisting of steel, stainless steel, brass, and aluminum, they provide excellent clamping power in various power transmission applications. Shaft adapters come in various sizes and styles, including step-up adaptors (to make shafts larger) and step-down adaptors (to make shafts smaller). Some factors to consider when choosing a shaft adapter include the following:

- Does the shaft need to be sized up or down?
- Coupling style (one-piece, two-piece, three-piece)
- Torque

Solutions From Stafford

At Stafford, we provide shaft adapters that serve as a method to change the shaft diameter when making a connection between two shafts. They can also work as an extension to an existing shaft. Our robust shaft adapters are available in standard keyed and keyless variants and are attached with a clamping style end to prevent shaft damage. We offer our shaft adapters in step-up or step-down configurations, including:

- **Step-Down Shaft Adapters:** Ideal for making shaft diameters smaller, the step-down shaft adapters eliminate the need to replace a shaft fully. They are fully machinable to alter configuration or size conveniently.
- **Step-Down Shaft Adapters with Keyways:** These shaft adapters come with keyways that provide an increased torque capacity.
- **Step-Up Shaft Adapters:** Ideal for use when making shaft size larger, this coupling is fully machinable to users needs.
- **Step-Up Shaft Adapters with Keyways:** These adapters make shafts bigger and come with keyways to enhance torque capacity.
- **Machinable Shaft Adapter Max with Keyways:** Ideal for modifying shaft configuration to include threaded, square, or hex, and other unique components like drive slots, press fits, pulleys, and many others. This product is fully adjustable to extend, step-up, and step-down shafts.
- **Machinable Shaft Adapter Max:** Modifies shaft configuration to include several components and shapes.



I Can't Find The Right Coupling: — What Should I Do?

What if you have uncommon shaft sizes, unique shaft diameter combinations, or other special shaft configurations, and typical shaft rigid couplings and adapters are not working for you? Then the ideal solution may be a custom shaft coupling. You can find custom couplings and adapters for:

- Adjusting bores with special sizes, threadings, or keyways
- Making surface modifications to exterior diameters
- Increasing holding power by making adjustments for extra heavy-duty function
- Accessing circumferential keyways to manage axial shift
- Connecting shafts with different shapes
- Catering to customer's surface finishing or material requirements
- Accommodating duty, length, configuration, and other requirements

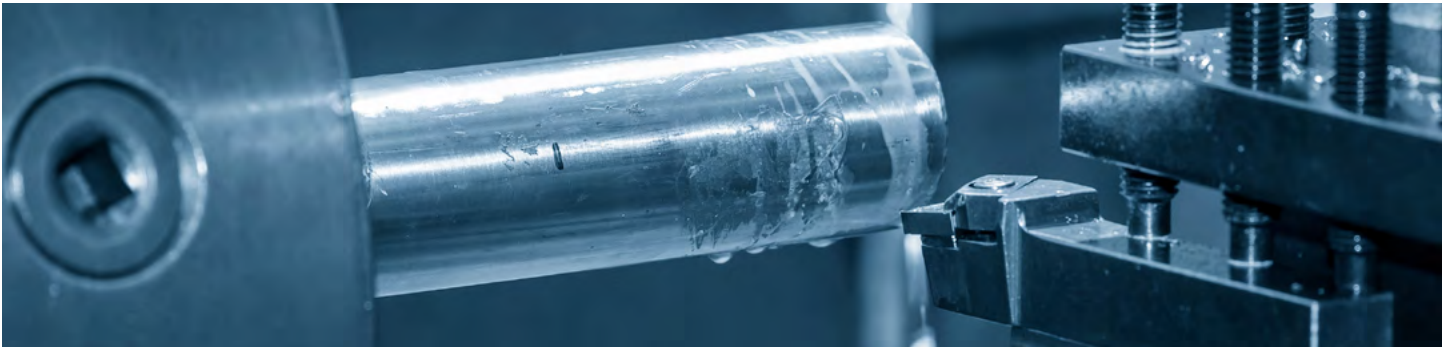




Advantages of Custom Solutions From Stafford

Stafford Manufacturing has years of experience and expertise in designing and *manufacturing custom* products. Customers can design custom coupling tools that meet their needs using our [rigid shaft coupling configurator tool](#). All you need to do is provide design specifications depending on your requirements.

It is also worth noting that our Shaft Adapter Max is fully machinable and is available with and without keyways. This coupling can be machined by the user and can step-up, step-down, or extend shafts as needed.



Partner With Stafford

Stafford Manufacturing takes great pride in its vast selection of standard shaft couplings, adapters, and other related components. We are dedicated to providing customers with world-class components and customer service through our cutting-edge designs, massive product list, and customization tools. For more information on our standard and customizable products, *get in touch with us* immediately or *request a quote* estimate for your next project.



About Stafford

Stafford Manufacturing Corp. is a manufacturer and distributor of shaft collars, rigid shaft couplings and specialty mechanical components used in power transmission, motion control, automation, and other OEM and MRO applications in both industrial and consumer products.

Now in our fifth decade of operation, and with over 4000 standard products, Stafford has earned a reputation as the go-to resource for custom manufactured shaft collars and rigid couplings. Whether it's a standard, modified, or fully custom product, Stafford has the resources and experience to turn it into a finished part quickly and easily.

[Contact us](#) today or [request a quote](#) to start the production of your new custom part. We respond to RFQs within 24 hours or less.

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