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Sheet metal usually refers to a thin metal plate with a thickness of 6 mm or less. Sheet metal fabrication is a cold processing process, which is commonly used for punching, bending, drawing, and forming. For sheet metal parts, the thickness is the same everywhere. Sheet metal processing belongs to the forming process, the material utilization rate is high, and the quality is light, the strength is good, and it is beneficial to electromagnetic shielding, and is widely used in automobiles, electronics, home appliances and many other industries. Mechanical engineers will inevitably use sheet metal parts when designing sheet metal products. How to join multiple sheet metal parts in an economical and reliable way? In this article, we will introduce the 6 types of sheet metal joining process that is often used in product design. Folding / Tab Joints The two pieces of sheet metal connected to each other by folding or bending tabs in the form of a buckle and a clamping slot. This assembly method is relatively simple and convenient, and can complete rapid assembly. However, the folding or tab joint operation does not guarantee full positioning and additional auxiliary positioning is required. Pulling Rivet The riveting is carried out in the hole corresponding to the two parts, and the rivet gun is used to pull the rivet to expand and deform the outer rivet sleeve, thereby fixing the two parts. This connection is simple, convenient and fast. Self-clinching The so-called self-riveting is to use the mutual deformation between the sheet metal to complete the mutual fixation. Although this method is simple, it is often used in places where it is not disassembled. Screw Joint / Fasteners Self-tapping is the use of self-tapping screws to directly tap the thread on a piece of sheet metal, so the fit is very good and can be disassembled. Pressing Rivet The pressing rivet process presses the crimp nut or screw against the sheet metal and can be mated with the corresponding outer nut or screw. Welding Joints The main purpose is to use the spot welding process to reserve a row of solder joints on the two sheet metal. Directly melt the local sheet metal material at the welding head to complete the sheet metal connection. In the above content, we introduced various joining methods of sheet metal. Finally, a table is used to summarize the advantages and disadvantages of various joining methods. Joining methods Tools used Pros Cons Folding / Tab Joints none 1. Low cost 2. Quick assembly Can not completely limit all degrees of freedom, other fixing devices are needed Pulling Rivet rivet gun 1. Easy to operate, good fluidity 2. Self-positioning 1. Need to pre-punch 2. The pull stud will have a bump 3. There is a limit to the use space of the rivet gun Self-clinching dedicated mold Self-guided, no positioning required 1. Need to do the countersinking process 2. Do not disassemble 3. The yield rate is difficult to guarantee Screw Joint / Fasteners screwdriver Low cost, detachable Limited number of disassembly Pressing Rivet dedicated equipment 1. Safe and reliable 2. Removable Higher cost Welding Joints spot welding machine 1. Simple process 2. No pre-processing required 1. Equipment complexity 2. Weak welding force, easy to remove welding 3. Unable to remove 4. Welding materials should match We use cookies on our website to give you the most relevant experience by remembering your preferences and repeat visits. By clicking “Accept All”, you consent to the use of ALL the cookies. However, you may visit “Cookie Settings” to provide a controlled consent.Cookie SettingsAccept AllManage consenterror: Content is protected !! Welding jointing is for assembling the metal products by welding the metal sheets together. Most fabricators use such a sheet metal joining technique as products with welding joints that provide durable strength and permanent structure. If a sturdy structure is required for your projects, then a welding joint is the proper solution for you to consider. Welding is a popular sheet metal joint method that is widely used, not only that, it’s also traditional that was used several hundred years ago. Most metal products fabricated in the industry apply welding joints. One of the reasons why welding is widely applied is that metal pieces with welding joints can achieve their larger sizes and not influence their properties. As welding technology has developed, it can be utilized in a variety of conditions. You might think that welding is only conducted in a damp and duck environment. What’s astonishing is that you can do this work underwater, even in outer space. Performs welding underwater to overcome the joining process that is impossible to be conducted in the water. As practices of welding are getting improved and refined, some important industries & fields, such as medical and aviation, obtain more and more benefits from welding. Welding and riveting are broadly popular joining processes to fuse two pieces of metal together and they have different applications and traits. Therefore, if you’re designing a part that you need to join them to form a complete object, it’s crucial to understand riveting vs welding comparison. This article further does justification to the definition, the pros and cons, and applications of welding and riveting that will help you get stronger and durable parts. Let’s dive into it. What is Riveting? Riveting is a semi-permanent and non-thermal joining method that involves using a mechanical fastener/rivet (a metallic part with a dome-shaped head) to join sheet metal parts. Riveting involves drilling a hole in the two sheet metal parts you want to join together and installing a rivet. Installation depends on the type of rivets you are working with, as you might have to place, drill, or punch the rivets into the hole. After installing the rivets in the hole, you have to deform the rivet’s tail. This is achievable by pounding or smashing it. Together with the shaped head, the flattened tail prevents the removal of the rivets. Types of Riveted Joints Riveted joints are made by inserting a rivet into a drilled hole in the two sheet metal parts. However, there are three main categories of riveted joints. Based on Rivets Placement There are two types of riveted joints based on the placement: Lap Joint: You can create a lap joint by overlapping the two sheet metal parts and installing a rivet on the overlapped portion. Lap joints can be single or double, depending on the number of rivets you use. Butt Joint: You can create a butt joint by butting up two components together (hence the name butt joints) and using additional material (a cover plate or strap) to bridge them either on one side or both sides. You then rivet the cover plate. Based on Number of Cover Plates Cover plates are materials you place on the workpieces to hold them such that you can drill through them. This category of riveted joints is for butt joints. Single Strap Butt Joint: To form a single strap butt joint, place the main plates against each other without overlapping. Then place a cover plate on one side of the main plate and rivet it. Double Strap Butt Joint: This is like the single strap butt joint. The only difference is that the two sides have a cover plate. Use two cover plates placed at the opposite side of the two sheet metal parts and rivet each cover plate. Based on Arrangement of the Rivets This category focuses on the arrangement of the rivets you used in joining the sheet metal parts. There are two types: Chain Riveted Joint: To form the chain riveted joints, ensure that rows of rivets are exactly opposite each other and in straight lines. Zig Zag Riveted Joint: Unlike the chain strap butt joint, the Zig Zag Riveted Joint’s rows of rivets don’t complement each other. Pros and Cons of Riveting Riveting is a popular joining method in most sheet metal fabrication services. However, it has its pros and cons. Pros Riveting is a non-heat metal joining methodMore suitable for dissimilar and non-ferrous metal parts.Flexible designIt is more efficient and reliableIt is easy to perform quality inspectionDisassembling does not lead to damaged riveted parts Cons High overall costIncrease in overall weightRiveted joints create more noise.Corrosion can occur in the riveted area leading to an increase in maintenance costDue to holes, plates become weak What is Welding? Welding is a thermal process used in joining two similar or dissimilar metal parts. It is a permanent process that involves aligning the metal, melting the metal parts, and cooling them to allow the parts to form rigid joints. There are many welding processes you can use to join two sheet metal parts together. Here are the popular methods: SMAW or stick welding is a welding technique that involves using a flux-coated electrode connected to a power source to weld the sheet metal parts. The molten electrode fills the space between the two sheet metal parts to be joined. The flux melts together with the electrode but forms gas and slag, which protect the molten electrode and the electric arc. Stick welding is a simple, portable, and inexpensive method suitable for welding ferrous materials such as low and high alloy steels, carbon steels, cast iron, and nickel alloy. · Gas Tungsten Arc Welding (GTAW) Also known as TIG (tungsten inert gas) welding, GTAW is suitable for ferrous or nonferrous metals such as stainless steel, aluminum, and titanium. It involves using a tungsten electrode to melt the workpiece, creating a liquid pool that joins them on solidification. TIG welding does not use flux, and it requires great precision. However, it produces strong and quality welded joints. This technique is the most common welding technique used in welding many materials. Also known as MIG (Metal Inert Gas) welding, GMAW is a semi-automatic or fully automatic method that uses a continuous solid wire electrode (similar to the workpieces) to weld the workpieces together. It is also accompanied by a shielding gas that protects them from contaminants. Unlike other methods, it produces no slap and is continuous. · Flux-cored Arc Welding (FCAW) Flux-cored arc welding (FCAW) is an outdoor welding process suitable for working with thick and contaminated materials of cast iron, stainless steel, carbon steel, high-nickel alloys, and low-alloy steel origin. It involves using a continuous hollow wire electrode with a flux compound. It also produces slag, which must be removed to give the welded part a better and cleaner look. Types of Welded Joints Welded joints are made by inserting a rivet into the drilled holes of the two sheet metal parts. Common welded joints include: Butt Joint Welding: Butt joint welding is the most common and straightforward type of welded joint. It involves placing the metals welded together in the same plane before welding. Lap Welding Joints: Lap welding joints are modified butt joints formed by overlapping the sheet metals and welding them together on one or both sides. They are the most suitable welded joints for sheet metals with different thicknesses. Tee Joint Welding: Tee welding joints are made by placing the two materials intersect at a 90° angle. One sheet metal part is placed at the center of the other sheet metal part to form a T-shape (hence the name Tee welding joints). Corner Joint Welding: Corner joints are similar to Tee welded joints, although the location of the metal is at the corner. This leads to the formation of an L-shape. Pros and Cons of Welding Welding is the more popular method when looking at rivets vs welding comparison. However, welding has its pros and cons. Pros Welded joints are solidSuitable for similar and dissimilar materialsThey are better aesthetically due to forming a smooth appearanceThere are a variety of shapes and directions to work Cons They have brittle joints with less fatigue strengthAdditional stress due to distortionSkilled operatives are required, which may drive up labor costRequires electricity which may drive up the operational cost Differences Between Welding and Riveting Both welding and riveting have advantages and disadvantages and are suitable for many products. However, a single difference between riveting and welding can determine the type of product each method is applicable for. Here are some differences between both methods and how to choose the right one. · Materials The two joining processes are suitable for similar and dissimilar materials. However, riveting is the better method if you want to join dissimilar materials. Unlike welding, it does not consider the melting point of the sheet metal parts – an essential part of welding. · Speed This is a significant difference between riveting and welding. Compared to riveting, welding has a higher production efficiency. It is an automated process, ideal for joining different metal parts. Riveting, on the other hand, requires several processes, which include hole drilling, fastening, and flattening of rivets. · Cost In terms of overall cost, riveting is a more costly method than welding. Even though the rivets have low prices, the total cost of riveting is more. This occurs due to the accumulation of material, operational, and labor costs. · Strength Welding produces a permanent and rigid joint that is stronger than riveted joints. Consequently, they are ideal for joining metals used in making rigid frames. The strength of the joints is a huge difference. Therefore, welding is the better method in products that require such properties. · Safety Both methods are safe to a certain extent. However, because most welding processes are automated, welding is safer. Another angle would be to consider the use of heat, and here, riveting is the safer choice. · Applications Riveting is used in the aircraft industry, bridge building, shipbuilding, and consumer product manufacturing. Welding is suitable for making components in the electrical industry, aerospace industry, and defense industry. Is Welding Better than Riveting? The better sheet metal parts joining method depends on what you want. Therefore, instead of looking for a better method, understand the factors that come to play in both methods. Therefore, it is better to go with the question “when to choose to weld or rivet.” When to Choose Welding Below are a few conditions you should consider when choosing to weld. – Weight Sensitivity If you are trying to make a product and are sensitive based on weight, welding is the better option. Unlike riveting, it does not increase the product’s final weight to the extent of riveting as no other materials are added when joining the sheet metal together. – Efficiency If you value efficiency, welding is also the better joining method to consider. The processes involved are mostly automated, making it faster and easier to join two metals together. Also, there is no need for drilling, making fasteners, etc. – Aesthetics Welding is the more aesthetically pleasing method as it produces a smooth surface after post-processing. This is unlike riveting, where many people see the bulging of the rivet as aesthetically unappealing. – Strength of the Joint Welding leads to a permanent and rigid joint that is stronger than riveted joints. Welded joints are strong, durable, and rigid frames. Therefore, they are the better method for making products with strength and rigidity. – Different Shapes Welding is the more suitable method when working with different shapes. Unlike riveting, you can join together cylindrical metal parts using any of the processes listed above. When to Choose Riveting Even though welding is the more popular method, some situations would require you to use riveting. Below are a few conditions for choosing riveting over welding in sheet metal fabrication. – Types of Materials When working with dissimilar materials with different melting points, welding might not be the best method since sheet metal fabricators have to consider the melting point. However, riveting is the better method as you only need to drill the material and attach the rivet or fastener. – Heat Requirement For materials that do not require heat, riveting is the better method. For example, aluminum is not stable thermally, and joining several aluminum sheet metal parts using high heat is mostly not advisable. Therefore, rivets are more suitable for aluminum products, as seen in kitchen utensils. – Disassembling Riveted products can be disassembled without damage to each part. Therefore, the joining method is suitable for parts that need a further quality inspection or parts that are constantly replaced due to corrosion. This is unlike welding, where the joints are permanent, making it one of the significant advantages of riveting over spot welding in some products. – Flexible Design In terms of flexibility, only the top percentile can introduce flexibility when welding. Riveting is the better method for working a product without losing structural integrity. Conclusion There are many sheet metal joining methods for your sheet metal parts. However, the most popular methods are welding and riveting. Both have different processes, advantages, and disadvantages. Consequently, choosing might be a challenge. While this article introduced the difference between both methods, you may need an expert to advise you on the better method for your project. Therefore, if you have questions surrounding choosing or using welding vs. riveting, you can contact us at RapidDirect and we will give you professional advice. Moreover, we are a professional sheet metal fabrication service famous for quality and production efficiency at a competitive price. We’re committed to creating the highest quality prototypes and parts with precision manufacturing processes and a dedicated workforce. To get your project started, just upload your design file and get a quote and DFM analysis within hours. Start Your Sheet Metal Project FAQs Is riveting permanent or temporary? Riveting is a semi-permanent joining method used for sheet metal parts. It is semi-permanent because you can unfasten and remove the rivet. This makes riveting the better method for making products that require quality inspection and parts that need constant replacement. Which technique gives higher strength, riveting or welding? Welding has a higher strength than riveting. Due to the thermal process, welded joints become more rigid and strong. Therefore, welding is more applicable in making products that require high strength and durability. Is riveting cheaper than riveting? Generally, riveting is more costly than welding. Even though the rivets used has a low price, the accumulation of cost, e.g., material and labor, increases the overall cost.

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