

# Metal Stamping

## Introduction

The best online resources for metal stamping are found here.

What you will learn is as follows:

- What is Metal Stamping?
- Manufacturing Stamping Tools
- Metal Stamping Design Processes
- Types Of Metal Stamping
- Advantages of Precision Metal Stamping
- Custom Metal Stamping

## Chapter One- What is Metal Stamping?

Metal stamping is a process of making iron, aluminum, copper and other sheet material deformed or fractured to a certain shape and size through punch machine and mould.

For this high-volume manufacturing requirement, metal stamping offers a quick and economical solution. Manufacturers who want stamped metal components for a project typically search for



three crucial characteristics: high quality & durability, low cost, fast turnaround time.

## Chapter Two-Manufacturing Metal Stamping Tools

[Metal stamping parts](#) is made in a number of phases. Designing and making the actual tool that will be utilized to make the product comes first.

Let's examine how this first tool is produced:

**Stock Strip Design and Layout:** The strip is designed using a designer who chooses the dimensions, tolerances, feed orientation, scrap reduction, and other factors.

Even the most complex dies may be machined from tool steel and die sets with greater precision and repeatability thanks to CNC. Hardened tool steels can be cut through using machinery like 5-axis CNC mills and wire EDM machines that have incredibly precise tolerances.

**Secondary processing:** Metal parts are heat treated to increase their strength and durability for the application. Finishing items needing precise dimensioning and good surface quality is done through grinding. A strand of electrically charged brass wire is used in wire electrical discharge machining (wire EDM) to form metal products. The most complex shapes, including minute angles and curves, can be carved with wire EDM.

## Chapter Three-Metal Stamping Design Processes

A low-cost, high-speed manufacturing process that can create a large number of identical metal components is metal stamping, also known as pressing. In addition to being undertaken in conjunction with other metal forming operations, stamping operations are suited for both short and long production runs and may include one or more of a number of highly specialized processes or techniques, such as:

- Punching
- Blanking
- Embossing
- Coining
- Bending
- Flanging



The terms "punching" and "blanking" describe the employment of a die to shape the material into particular shapes. A scrap piece of material is removed during punching operations when the punch moves into the die, thereby creating a hole in the work-piece. In contrast, blanking involves removing a work-piece from the main component and using it as the intended work-piece or blank.

By pressing the raw blank against a die that has the necessary shape or by running the material blank through a roller die, the process of embossing produces either a raised or recessed design in sheet metal.

The work-piece is stamped while sandwiched between a die and a punch or press while using the bending process known as coining. This movement results in accurate, repeatable bends because the punch point penetrates the metal. In addition to relieving internal tensions in the metal work-piece, the deep penetration prevents spring back effects.

The broad method of shaping metal into desirable shapes, such as L, U, or V-shaped profiles, is referred to as "bending." When metal is bent, a plastic deformation takes place that places stresses over the yield point but below the tensile strength. Usually, bending revolves around a single axis.

By using dies, presses, or specialized flanging equipment, flanging is the process of adding a flare or flange to a metal object.

In addition to stamping, metal stamping machines may also cast, punch, cut, and shape metal sheets. Each stamped component can be produced with great precision and repeatability using machines that can be programmed or controlled using computer numerical control (CNC). Programs for computer-aided design (CAD) and electrical discharge machining (EDM) ensure accuracy.

## Chapter Four-Types Of Metal Stamping

### Bending Stamping Parts

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The structured shape, size, precision, materials, and technical requirements of [bending parts](#) must be conformed to the requirements of the bending process. Various shapes such as the U-shaped bending and V-shaped bending, cap-shaped parts, arc-shaped parts, etc can be made through the bending process.



### **Bending Parts Design**

For the shape of simple bending stamping parts, such as V-shaped, U-shaped, L-shaped, Z-shaped, etc., we can adopt bending once-forming. For bending parts with complex shapes, it is generally necessary to adopt multiple bending forming.

As deformation will affect the shape accuracy of multi-angle bending parts, we generally bend the outer angle first and then bend the inner angle. The first bending should be set aside some reliable positioning for the next bending to ensure the first bending shape would be not destroyed by the next bending.

The work blank of bending parts with asymmetric structure is prone to deviation during the bending process, we should try to adopt the technique by curving in pairs and then cutting apart. Bending times and working arrangements of bending parts must be considered comprehensively according to the complexity of workpiece shape, material performance, precision requirements, and the size of the production batch. Reasonable bending process can reduce bending times, simplify die structure, improve workpiece quality and productivity.

### **Application Of Bending Parts**

Bending is the most common processing method in the stamping industry. Its metal stamping parts are widely used in the automobile industry, electronic and electrical industry, communication fiber industry, the energy development industry, and so on. Orienson has 20 years of industry experience in stamping, adhering to the manufacturing spirit of stamping craftsmen, In strict accordance with TS16949 standards to develop new product development, quality control, lean production management, and TPM management related production

management process. We commit to meeting our customers' requirements with the best quality, welcome customers who need stamping parts to consult more details.

### Edge Bending Components

Edge rolling produced in this way can achieve a thin wall, small weight, but big stiffness and complex shape. The [edge bending sheet metal](#) surface is bright and clean with a good appearance and precise size, and the length can be adjusted as needed. Orienson can produce a variety of products with uniform wall thickness and complex section shapes according to customers' needs. Welcome customers from all walks of life to contact us.



### Edge Rolling Parts Design

For thin soft materials ( $t \leq 0.5$ )

A: When the inner diameter of the enclosed circle  $\varnothing d \leq 4.0$ , the 4-step pressure arc forming method is generally used for the enclosed circle, as shown in Figure 44-1.

B: When the inner diameter of the inner circle is  $4.0 < \varnothing d \leq 15.0$ , you can use either the 4-step arc forming style for wrapping or the mandrel forming style for wrapping

C: When the inner diameter of the inner circle  $\varnothing d > 15.0$ , the mandrel forming method is generally used.

D: If the product requires a high centroid dimension, for the inner diameter of the inner circle  $\varnothing D > 3.0$ , we recommend using the mandrel forming method because it can make the circle a little rounder.

For thick hard materials ( $t > 0.5$ )

For thick hard materials, if the 4-step pressure arc forming method is used to wrap the circle, it is generally difficult to wrap it around as the centrality is poor.

Because the material's yield strength is high, it is difficult to turn over to roll the material; And thin soft material's yield strength is low, the shape is easy to be rolled when making the formation, therefore, for thick hard material forming, we recommend to choose mandrel forming method to wrap. As shown in figure 44-2.

**Fine Blanking Parts**

Fine blanking is a kind of precision stamping processing technology developed on the basis of general blanking. Although it belongs to the separation process with general blanking, it contains the processing method with special process parameters, and the [fine blanking parts](#) produced by it also have different quality characteristics. Especially in the fine blanking and cold forming (such as bending, stretching, flanging, upset, sinkholes, piercing and squeezed, etc.) processing technology, the combination of fine blanking parts is applied to many fields, (such as automobile, motorcycle, electronic industry, etc.), which has been replaced the parts processed by blunt machining, forging, casting and powder metallurgy, and thus play its huge technical advantages and economic benefits.

**Application Of Fine Blanking Parts**

The application of the fine blanking process covers a wide range, has been widely used in daily life, such as watches, motorcycles, textile machinery, agricultural machinery, computers, household appliances, instruments and measuring tools, and other fields. Especially in the automobile industry, from the car transmission system, gearbox, seat and safety system, brake system, to door locks, glass lifters, shock absorbers, and so on. In addition, there are quite a number of casting and forging blanks, which can be used to replace the original cutting process to produce qualified parts, and the application prospect is broad.

After many years of development, Orienson has accumulated rich experience in R & D, design, and precision parts manufacturing with an experienced team, complete production & test equipment, welcome to enquire.

**Fine Blanking Parts Design**

Precision blanking is the die of a special structure, its convex and concave die edge of the material is under the action of three-dimensional compressive stress, forms a great hydrostatic pressure effect, inhibits the fracture of the material so that the material plastically shear deformation to state separation. The section of precision blanking parts is smooth and vertical to



the board surface, so this kind of blanking part is high precision.

Now with the progress of modern industry, the requirements of stamping parts quality are more and more strict, precision blanking application is very extensive.

### Deep Drawing Parts

As one of the main stamping processes, [deep drawing parts](#) are widely used. The cylindrical, rectangular, stepped, round, and square mixed drawing and other irregularly shaped thin-walled parts can be made by the deep drawing process. If it is matched with other stamping forming processes, it can produce more complex-shaped parts.

Deep drawing stamping is a special stamping method, the principle is to apply external force on the plate, strip, pipe through the press machine and the mold, then the material is deformed or separated to turn into the workpiece of the required shape and size.

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### Deep Drawing Die Design

Deep drawing stamping mold generally indicates the usage of more than ten stations to complete the processing of stamping parts, such a process reduces the equipment-processed load while improving its efficiency and accuracy. Besides, in the process of material transmission, there is no need to use the corresponding transmission device but directly placed in the mold. the advantage of this design makes the process more convenient, more accurate in controlling different positions. We focus on metal custom deep drawing part made of steel, iron, aluminum, stainless steel, etc. Our products can achieve the diameter 1.5mm and a thickness 0.1mm or more, accuracy  $\pm 0.01\text{mm}$  for different shape deep drawing.

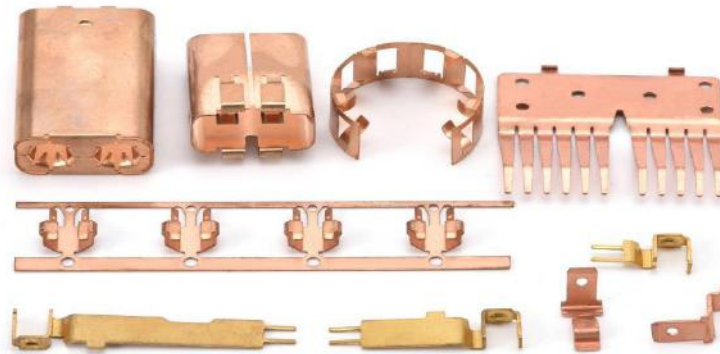
### Application of Deep Drawing Parts

Thin-wall parts with cylindrical stepped, conical, spherical, box, and other irregular shapes can be

fabricated by the deep drawing process. With flanging, bulging, flaring, shrinkage, and other stamping forming technology, we can produce very complex shape parts. Deep drawing products are widely used in: electronics, electrical appliances, sports equipment, automobiles, packaging, machinery parts, food, and other fields. Therefore, deep drawing technology occupies a very important position in the process of automobiles, aircraft, tractors, electrical appliances, instruments, electronics, and other industries.

### **Copper Stamping**

Copper is related very closely to human and non-ferrous metals, not only rich in natural resources but also has good electrical conductivity, thermal conductivity, fine properties such as ductility, corrosion resistance, abrasion resistance. [Copper stamping parts](#) are widely used in electric power, electronics, energy and petrochemical, machinery and metallurgy, transportation, light industry, new industries, and high-tech fields.



### **Application Of Copper Stamping**

Pure copper has good electrical conductivity and thermal conductivity, excellent plasticity, easy to cold & hot press processing. Widely used in electrical switches, electronic parts, air conditioning tubes, automobile connecting plates.

Brass is cheap with a golden appearance. It is commonly used in copper jewelry, construction hardware, heat exchange tubes, mercury, power cylinders, etc.

With the main addition of nickel in an alloy of copper, it becomes white copper. Medical instruments, precision instruments, clock parts, and so on are cast mainly with white copper.

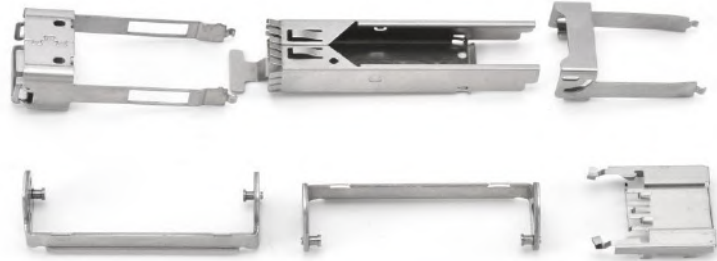
Bronze originally refers to copper-tin alloy, later is called bronze in addition to brass white copper alloys. It's widely used in a tripod, bell, bearing, gear, and other wear reduction and casting parts.

### **Stainless Steel Stamping**

[Stainless steel stamping](#) possesses good mechanical performance as well as high hardness, good wear-resisting performance, corrosion resistance, high temperature resistant, and so on. Under



the harsh environment, stainless steel is more resistant to corrosion than other materials, also with longer service life, and is widely applied in various fields.



### **Steel Metal Stamping**

Steel stamping materials are high-strength steel with good plasticity, heat resistance, and toughness, which can withstand the large plastic deformation at room temperature and can be cold working such as cold bending, cold drawing, and cold rolling, cold stamping. Relatively, steel prices are lower than other materials, so its application is very wide.



### **Application Of Steel Stamping**

[Steel stamping parts](#) are widely used in petrochemical, metallurgy, electronics and electrical

appliances, communication, automobile industry, medical equipment, and other fields. Orienson focuses on the stamping industry for over 20 years and can customize and process all kinds of iron stamping products and hardware stamping products.

### **Aluminum Stamping**

Aluminum alloy is the most widely used non-ferrous metal material in the industry. It has the advantages of low density, high strength, good plasticity, etc., and also has strong electrical conductivity, thermal conductivity, corrosion resistance, and solderability. The metal stamping parts made of it are indispensable and important parts in aviation, aerospace, automobile, machinery manufacturing, shipbuilding, and chemical industries.



### **Application Of Aluminum Stamping**

1. Aluminum has good plasticity and processing performance generally can be made into a variety of aluminum frames and other finished products and a variety of containers, optical instruments, and other complex shape of precision devices.
2. Aluminum has good thermal and electrical conductivity, which can be made into wire joints, rice cookers, heat exchangers, car radiators, electronic components, and so on.
3. With good low-temperature resistance, Aluminum can be made into cold storage, freezer, Antarctic vehicles, as well as oxygen, hydrogen production device.
4. With the high reflectivity of photothermal waves and good surface performance, Aluminum can be made into lighting appliances, mirrors, roof tiles, heat insulation materials for cold heaters, etc.

### **Aluminum Stamping Design**

High repair rate, high scrap rate is still the main difficult problems In the production process of [aluminum stamping parts](#) in the industry. At present, the main pain points in production focus on necking cracking and material chips. Combined with nearly twenty years of production and

maintenance experience of hundreds of types of aluminum stamping parts.

We have had many experiences and measures to solve the common problems of neck cracking and material chips in the production of aluminum stamping parts from the molds, stamping equipment, raw materials, technology, production testing.

## Chapter Five- Advantages of Precision Metal Stamping

Metal stamping parts have high strength and rigidity as well as strong applicability.

Sheet metal press parts are suitable for mass production with high production efficiency and low manufacturing cost.

The quality of stamped sheet metal parts is stable, the precision is high, and the product size consistency is good.

During the stamping process, the surface of the metal stamping material is not damaged, the surface quality is not affected, and the appearance is smooth and beautiful.

## Chapter Six - Custom Metal Stamping

Our custom metal stamping service will allow us to assist you in the design and manufacturing of your custom metal stamping parts. We manufacture complex, high-quality metalwork stampings and components for customers both domestically and internationally. Our dedication to quality paired with our extensive fabrication capabilities have earned us many customers across the aerospace, medical component, manufacturing, renewable energy, automotive and home improvement fields.



[Orienson](#), as a famous metal stamping parts factory in China, specializes in high-volume

metalwork and stampings using materials of aluminum, brass, bronze, copper, stainless steel, low and high carbon steel, etc. from thickness 0.05mm to 6mm. We can offer the service of product structure design, material selection and various functional post-processing solutions to meet customers' needs, reduce costs and increase efficiency.