

The Ultimate Guide to Faqs: Stretch Forming Aluminum Sheet

Detail Introduction :

Stretch forming is a form of metalworking that stretches aluminum from its original (or heat-treated) condition to create a part with a greater length than its original length. The ultimate guide to FAQs about stretch forming aluminum sheets will tell you all about this process, the machines used in it, and how the stretch forming process works.

1. What Aluminum Sheet Gauge is Best for Stretch Forming?
2. Does the Aluminum Sheet Have to Be Preheated Before Stretch Forming?
3. Can Aluminum Sheet Be Machined After Stretch Forming?
4. What Kind of Bend Radius and Minimum Flange Height Can I Get with Stretch Forming?
5. Is There a Range for How Thick the Aluminum Sheet Can Be in a Stretch Form Machine?

1. What Aluminum Sheet Gauge is Best for Stretch Forming?



What Aluminum Sheet Gauge is Best for Stretch Forming?

Aluminum sheet thickness is important to stretch forming success. The wrong gauge of aluminum can cause failures that can range from torn edges to popping and cracking. This article will explore the relationship between aluminum sheet thickness and stretch forming.

What is Stretch Forming?

Stretch forming is a manufacturing process that uses a stretch press to form sheet metal into three-dimensional shapes. Generally, the stretch press mechanism stretches the sheet metal along its length, pulling it over an open die that creates the desired profile. While the process can be used for many metals, it is most commonly used with lighter materials such as aluminum and steel alloys.

Why Does Aluminum Sheet Thickness Matter?

Aluminum is a relatively soft material and, therefore, very malleable. Whether you are using a brake or a stretch press, success depends on your ability to control the shape of your product without damaging its structure. The best way to control your product's shape during stretch forming is by working with the right aluminum thickness.

If you choose to thin an aluminum alloy, your part may tear or crack as you stretch it over the die. If you choose too thick an alloy, your part may be difficult to work with, resulting in inconsistent quality across your production run.

In the stretch forming industry, choosing an aluminum sheet gauge is one of the most important decisions. When selecting aluminum sheet gauges, some factors include the material's thickness, strength, and durability.

There are many different types of aluminum sheet gauges on the market. However, the best aluminum sheet gauges for stretch forming comprise high-quality materials with lower yield strength.

Aluminum Sheet Gauge Defined

An aluminum sheet gauge is a measurement that determines the thickness of an aluminum piece or structure. Aluminum sheet gauges typically range from 0.016 to 0.249, but some can be upwards of 0.5 in thickness. The most common aluminum alloys used for stretch forming are 1100-O, 3003-H14, 5052-H32, and 6061-T6.

2. Does the Aluminum Sheet Have to Be Preheated Before Stretch Forming?

Our first question is, why do you think the aluminum sheet needs to be preheated? The most common reason for preheating is to avoid surface tears and fractures during forming. If this is the reason for your proposed preheat, then you need a couple of things:

1. A sheet gauge less than 0.060 in. (1.5mm)
2. A 90-degree bend radius no tighter than twice the material thickness

If either of these factors is not true, you are likely to have edge cracking even with a preheat. This is because the metal at the inside bend radius will undergo more deformation than the outside radius and therefore overstretch, causing tearing and cracking.

To check this out, try experimentally forming some sample parts with various bend radii and different amounts of preheating.

Starting with a part with an inside bend radius no smaller than twice the material thickness, begin stretching without any preheating. If there is no tearing or cracking, you are good to go without a preheat. If you do get tearing or cracking, increase the inside bend radius until there is no tearing or cracking without a preheat. If that doesn't work, begin experimenting with small amounts of preheating.

The conventional method of stretch forming involves preheating the aluminum sheet to a temperature of 300 to 400 degrees F.

The hot sheet is then placed on a stretch forming block, and the punch and die are closed, stretching the sheet to form it.

There are a few reasons for preheating:

Preheating softens the aluminum so that it is easier to form.

An even temperature across the entire length of the material helps prevent part distortion due to uneven heating or cooling during forming.

Preheating can reduce cracking or tearing in some materials by reducing spring back after forming or reducing internal stresses.

However, there are valid reasons for not preheating when stretch forming aluminum. These include:

A: There are valid reasons for not preheating when stretch forming aluminum.

An aluminum sheet is not a good thermal conductor, so the internal temperature of the sheet may be quite different from that of the external surface. The use of induction heating technology may result in higher material temperatures near the surface than at the core.

The outer surface of the aluminum may be oxidized, and therefore heat will not readily penetrate the material. In some cases, it may be necessary to remove this oxide layer with a suitable cleaning agent or mechanical sanding before heating can begin. This does not apply to aluminum alloys that form a thin oxide film adherent to the material surface.

When aluminum is heated, it undergoes a volume expansion of about 2 percent, but it only contracts by about 0.2 percent when it cools. The net expansion can distort finished parts. This can be avoided by using an alternate heating and cooling cycle where the net effect is zero (a work hardening cycle).

3. Can Aluminum Sheet Be Machined After Stretch Forming?



3. Can Aluminum Sheet Be Machined After Stretch Forming?

Yes. An aluminum sheet can be machined after stretch forming, but we recommend that you allow the part to stabilize for 1-2 weeks to relieve stresses in the material.

The machining requirements will depend on your design specifications, but you should remember that lower alloy aluminum has better machining characteristics than higher alloy aluminum. You may also want to consider heat treating your blank before it is formed and then machining.

If you have questions about the capabilities of our stretch forming process or would like to know more about how we can help with your project, contact us today to request a quote.

4. What Kind of Bend Radius and Minimum Flange Height Can I Get with Stretch Forming?

Any 1:1 ratio of bend radius to stock thickness can be formed.

We routinely form parts with a 1/2" bend radius and hold 0.005"-0.010" minimum flange height on 0.064" aluminum material. If the part geometry is such that it requires more tension than the standard 15%, we can stretch up to 30% of the original material length.

5. Is There a Range for How Thick the Aluminum Sheet Can Be in a Stretch Form Machine?

The standard range is .020" to .125", but we can do thicker. The machine's press comes with a 12" stroke, and it has a maximum press force of 60 US tons. Another limitation is the maximum part height, which is 10".

The thing to remember with stretch forming is that many pieces and processes are required to start. Fortunately, there's a lot less risk with stretch-forming aluminum than with steel. While you'll still have some expenses initially, you'll probably recoup your initial capital spent in no time once you've acquired enough clients. We hope this ultimate guide to stretch-forming aluminum sheets has answered any questions you might have had.

recommend reading:

The Ultimate Guide to Faqs: China CNC Machining Company