

Engineering for success

Five tips to use dimensioning and tolerance in the design stage. By **Rodney Floding***



1. Die Design – Aluminium extruded tolerances are affected by multiple extrusion factors, including press size, billet temperature, extrusion speed, and die shape and type, among several operations. Keep dimensioning formats simple by using the traditional primary, secondary and tertiary datum whenever possible. 3. Bending Extrusions – Alexandria Industries' and outside diameters, tolerances, or deviations, critical surface areas and mechanical strength.

In today's fast-paced manufacturing industry, it can be difficult to set aside time to define tolerances for a new aluminium extruded component design. Pressed for time, OEM design engineers often default to title block tolerances. This might save a little time, but it risks adding unnecessary cost to the part due to poor fit and function.

On the other hand, a print filled with too many tight tolerances may cause extruders to not quote the part or excessively price a part that has tighter tolerances than needed for its function.

Below are five tips to help manufacturers successfully engineer proper dimensioning and tolerance when designing aluminium components. These tips can help achieve optimal manufacturability and keep costs competitive.

1. Choose the critical dimensions

Adding tight tolerances on non-critical dimensions is a major source of hidden costs. Many times manufacturers will

include tighter tolerances that do not affect the form, fit or function of the final product. These tight tolerance features can result in requests for print deviations, longer setups, reruns, costly die trials, unnecessary tooling alterations—all of which can lead to costly, late or rush deliveries, and ultimately price increases.

Manufacturers can reduce those costs by identifying only the critical product dimensions, which can then reduce setup and inspection time. Some dimensions may not require tolerances at all—just a visual inspection to ensure a part has its intended shape.

2. Understand which tolerances are achievable

Once manufacturers have identified the most critical product dimensions, their next step is to understand which tolerances are achievable based on the specific manufacturing process.

Tolerances are affected by multiple extrusion factors, including press size,

billet temperature, extrusion speed, die shape and type, cooling time, amount of post-stretch, air temperature, and multiple die copies, just to name a few. This is why having discussions with your aluminium extruder in the design/quoting stage to agree on tight tolerance features is important.

To help manufacturers, the Aluminum Association developed industry standard tolerances for extruded products. These tolerances try to encompass most of the variables in the extrusion process. While you should use the Standards Book as a guide, know that it cannot cover every possibility of design creation. Having discussions with your extruder in the design/quoting stage is key to mutual tolerance agreement and establishing tolerance hierarchy.

Manufacturers can use these standards – as well as the information showing how differences in features or size can affect tolerances – as a reference guide when designing a product. Some extruders can

*Manager, Quick Response Office Cell, Alexandria Industries