Top 5 Ways to Cut Machining Costs
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Finding ways to cut your company’s costs improves overall profits. If your company requires machining services, learning how to cut machining costs may offer significant savings. Even small changes to your part design may help your company cut costs. Use the following ideas when designing parts to ensure your company benefits from the lowest price possible for machined parts.

1 | Reduce Machining Time

2 | Use the Right CNC Machine for Your Part Design

3 | Minimize Wall Thickness

4 | Reduce/Eliminate Small Features

5 | Eliminate Text from Part Design
Reduce Machining Time

Anything you can do to reduce machining time will result in big savings. The more time it takes to machine a part, the more you can expect to pay for that part. Find small ways to reduce machining time and reap the benefits.

Part Design and Requirements Affect Costs

Various aspects of part design and part requirements affect your final cost. From tolerances to undercuts, making simple changes in your design may reduce time and result in lower costs. Here are several aspects of part design to consider:

**Tolerances** significantly affect your final costs, especially if you go with tight tolerances that may be difficult to measure or machine. In general, looser tolerances result in parts that are less expensive to machine. If small tolerances are required, even a small change in tolerance can reduce costs. For example, according to Pro CNC Inc., “When working with smaller tolerances, a small difference can be vastly easier - 0.0015” is 50% more tolerance to work with than .001“…that extra .0005” might make the difference between hitting your parts cost budget or not.”

**Hole Depth** also affects final costs, especially when using threaded holes. Avoid going with threaded holes that are deeper than you really need, which simply wastes money and could result in a broken tap.

**Undercuts** can be expensive since a custom ground tool must be used to create them. Cutting feeds also move slowly, which increases the cost of the part. Consider discussing undercut requirements with your machining shop to ensure your undercut is as cost-effective as possible.

**Overhangs and Radii** affect machining time as well, and radii come into play on any parts that have vertical inside corners. The smaller the radius, the longer it takes to machine a part. ProtoLabs suggests designing parts with “sharp inside vertical corners to reduce additional milling time,” which should also help cut costs.
2 | Use the Right CNC Machine for Your Part Design

While the design of your parts will affect final costs, the machine used for your parts will also impact the price you pay. Choosing the wrong CNC machine for your part design could result in significant, unnecessary costs. Understand what CNC machines are available, what they offer, and how they work to make the best decision.

5-Axis vs. 3-Axis Machines
Both 5-axis and 3-axis CNC machines are available, but many manufacturers are turning to 5-axis machines because of their accuracy and ability to save money. With a 3-axis machine, only three axes of movement are available, which is fine for parts that only require machining on a single side. However, multi-sided parts require multiple setups and refixturing when using a 3-axis machine. This increases production time and the final cost. With 5-axis machines, one part can be machined in a single setup because of the additional axes of motion. AtYourService notes a 5-axis machine, “reduces overall machining times, and also reduces stacking error.”

CNC Lathe vs. CNC Milling Machine
Companies also may choose between CNC lathes and CNC milling machines. Both machines offer specific benefits and are useful in different situations. CNC lathes place materials on a chuck, rotating the materials while cutting with a stationary cutting tool. A CNC milling machine is more like a drill press than a stationary cutting tool and use rotating cutters, making it possible to take end and side loads.

Compare Different Machines
Comparing different CNC machines and the way they work can help you choose the right machine for your product. CNC machines include the following:

- CNC lathes use a stationary cutting tool to cut solid materials.
- CNC milling machines use mobile cutting tools, and they come with electrical sensors to ensure safe cutting, mechanisms designed for auto-feeding, and built-in tool changers.
- CNC routers come with 3, 4, 5 and 6 axes and are designed to cut complex shapes. They are often used on plastic and sheet metal.
- CNC laser cutters use lasers to cut parts, specifically working well on materials like wood, metal and plastic.
- CNC plasma cutters use plasma torches to cut two-dimensional profile shapes and are generally used on sheet metal.
3 | Minimize Wall Thickness

Wall thickness also plays a part in the final cost of machining parts. Minimizing wall thickness can save money, but it’s important to avoid a wall thickness that is too thin.

**How Wall Thickness Affects Costs**

The wall thickness of your parts can affect your final costs in a couple of different ways. Unlike the process of injection molding, CNC machining doesn’t require wall thickness to be uniform and thin. Unless weight is a major factor, thick solid sections are more stable and less costly to machine. A wall that’s not thick enough may increase costs since extremely thin walls may not hold up during the manufacturing process. Protolabs.com notes, “Walls thinner than 0.02 in normally do not survive the machining process, and there’s no guarantee that the wall will behave properly.” If the wall doesn’t survive, the result can be a significant increase in costs, particularly if working on expensive materials.
4 | Reduce/Eliminate Small Features

Reduce, or even eliminate, small features on your parts design. Unless the small features are integral to the function of the part, they are simply costing you more money. It takes more time to mill small features, and more machine time results in higher costs to you. If the small features are deep, they become even more difficult to produce, and increased difficulty and production time will cost even more.

5 | Eliminate Text from Part Design

Lastly, eliminate text from your part design whenever possible. In some cases, text may be necessary, and if you must have text on your parts, it is cheaper to go with raised text on your final product.

How Text Affects Final Costs

Adding text to your parts influences your final costs in several ways. First, if you choose to go with recessed text on your parts, you’ll pay more because it is expensive and extremely time-consuming to machine tiny text. The materials used may also affect the cost of adding text to your part design. Engraving text on cheaper materials will cost less, but if you decide to have text engraved on expensive materials, even a single mistake could prove costly. It’s simply best to avoid text whenever possible.

Of course, you should never compromise the integrity of your parts by taking shortcuts. Never eliminate items critical to your part’s design to save money. However, in most cases, companies miss easy ways to cut machining costs, which affects their bottom line.
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