



**A GUIDE FOR
COMMERCIAL
CUSTOMERS**

As your trusted manufacturing partner, we understand that controlling costs without compromising quality is key to your success. Below are some tips on how you can reduce manufacturing costs when working with a machine shop like ours. Whether it's design tweaks or ordering strategies, these suggestions can make a significant impact on the final cost of your parts.

1 Order Larger Quantities

When ordering just one part, significant time and effort go into programming, setting up, tooling, and inspecting that single piece. These fixed costs apply regardless of how many parts are ordered, meaning the setup cost is absorbed by one item. Ordering more parts spreads these costs across a larger quantity, dramatically reducing the cost per part.

Tip: If you know your part usage, consider placing a blanket order for a set period of time. This can incentivize lower pricing, as it provides the machine shop with more predictability and allows for more efficient production planning.

2 Consolidate Orders for Grouped Parts

If you have several parts to be quoted, let us know if they will be ordered as a group. Typically, we quote parts individually, assuming they may not all be purchased together. However, if parts will be ordered together, we can optimize setups, fixtures, and production to reduce the overall cost. Communication here is key—if you plan to order parts together regularly, tell us upfront to maximize savings.

3 Be Flexible with Tolerances

Tighter tolerances often lead to higher costs due to the additional operations, such as grinding or polishing, required to maintain them. Tighter tolerances also demand more precise equipment, tighter process controls, and skilled labor, all of which add time and cost to the production process. In some cases, achieving certain tolerances requires more advanced environmental controls. For example, temperature and humidity must be carefully regulated during both machining and inspection to ensure material stability and dimensional accuracy. Variations in temperature and humidity can cause materials to expand or contract, making it difficult to hold tight tolerances without these controls in place.

Tip: Use tolerances that are appropriate for the part's function. Overly tight tolerances where they aren't necessary can significantly inflate costs. If a shop struggles to hold the tolerances on your drawing, consider finding one that specializes in those requirements rather than tightening tolerances to accommodate their limitations.

4

Minimize Sharp Internal Features and Deep Pockets

Sharp internal corners and deep pockets often add significant costs to machining due to the specialized tools, slower speeds, and increased risk of tool wear or breakage required to machine them effectively. Deep pockets, especially when their depth exceeds six times the diameter of the cutting tool, require multiple passes at slower speeds, leading to higher production times.

- **Deep Pockets:** Keeping the depth-to-diameter ratio at or below 6:1 is ideal for efficient machining. For example, if a pocket has a 0.250" internal corner radius, try to limit its depth to 3.0". Deeper pockets not only increase machining time but also risk tool deflection and errors in part accuracy. If deeper pockets are unavoidable, increasing the internal radii can improve tool life and reduce chatter.
- **Sharp Corners:** Machining sharp internal corners requires slower feed rates and custom tooling, which can increase the overall cost. Increasing the corner radii, even by a small amount, allows for smoother machining and reduces the likelihood of tool wear or breakage. For instance, a 0.275" radius is more machine-friendly than exactly 0.250", reducing engagement and wear on the tool.

Where possible, adjust designs to use larger internal radii or reduce the depth of pockets. These small changes can dramatically lower costs without affecting part functionality. If corners are not critical, standard drill diameters with drill points allowable below the pocket floor can be even more economical.

5

Provide Accurate 3D Models

Providing a high-quality, accurate 3D model is critical to reducing both the time and cost of manufacturing your parts. Typically, when a model is provided, we can generate the necessary machining programs directly from it, eliminating the need for us to create or modify the model, which saves time and reduces the risk of errors.

However, when no 3D model is provided or if it is inaccurate, we must generate a new model from the drawing, which adds time and potential risks for discrepancies. If there is an error in the model we generate, it can result in mistakes during production.

Tip: It's beneficial to model dimensions in the middle of the tolerance range. For instance, if a hole is specified as 0.500" +0.010"/-0.000", model it at 0.505". This allows us to use a single tool for multiple features without having to chase tolerances, which simplifies the machining process and can lower costs.

A good model also plays a role in our quoting process. Accurate models allow us to estimate cycle times more precisely by analyzing the number of features and the amount of material to be removed. If we can generate an accurate quote based on your model, we can avoid overestimating costs.

Risk of Inaccurate Models: Incorrect or incomplete models can slow down production significantly. If the model requires modifications, we may need to pause production to make adjustments, which introduces additional work and delays. Providing a clean, correct model upfront avoids these issues and helps ensure a smooth production process.

6 Communicate Tribal Knowledge and Target Pricing

Open communication is key when it comes to producing parts efficiently and cost-effectively. If you've had these parts manufactured before, there may be valuable "tribal knowledge" that isn't captured on the drawing or in the specifications. This could include insights on tolerance adjustments, non-critical features, or specific manufacturing challenges that you've encountered previously. Sharing this information with us upfront can help avoid unnecessary costs, optimize the production process, and prevent potential errors.

Example: If there are tolerances that can be relaxed or features that can be simplified based on previous runs, let us know. This can save time on machining and inspection and reduce the overall cost of the part. In an ideal situation, this feedback would be reflected in an updated drawing, but even if that's not possible, communicating this information early helps us work more efficiently.

In addition to tribal knowledge, it's also helpful to share any target prices you may have in mind. If our initial quote seems higher than expected, talk to us about it. We're happy to discuss the main cost drivers and, where feasible, adjust features or materials to better align with your budget without compromising quality.

- **Cost Drivers:** Often, the factors driving higher costs may include complex features, tight tolerances, expensive materials, or time-consuming setups. By discussing these factors with us, we can provide alternatives or suggestions for design modifications that may reduce costs.

- **Flexibility:** We are always open to revisiting pricing when you're willing to explore alternative solutions. For example, changing material, adjusting finishes, or consolidating production runs can all reduce costs. Let's work together to find a solution that meets your requirements while keeping costs manageable.

7 Ensure Proper Part Numbers and Revisions

Clear part numbers and revision levels are essential for tracking and managing parts effectively, from quoting to production. Without this information, it becomes challenging to ensure consistency, potentially leading to costly errors or delays.

Tip: Always provide up-to-date part numbers and revisions on your drawings. This ensures that all parties are working from the correct specifications and that any changes are accurately reflected in production.

8 Use GD&T Correctly

Geometric Dimensioning and Tolerancing (GD&T) ensures uniformity and consistency in your drawings, but it must be used correctly. Poorly applied GD&T can create confusion and result in costly communication, delays, or even part rejections.

Tip: Proper use of GD&T helps clarify design intent and ensures that tolerances reflect the actual function of the part. It's better to leave GD&T off entirely than to apply it incorrectly.

9 Use Standard Material Sizes Where Possible

One of the easiest ways to reduce costs in the manufacturing process is by designing parts that utilize standard stock material sizes. Custom material sizes often require extra machining, which not only increases material waste but also adds time to the production process. By specifying dimensions that match commonly available stock sizes, you can minimize both material and labor costs.

- **Stock Thickness and Widths:** If your design allows for flexibility in material thickness or width, take advantage of standard plate or bar stock dimensions. For example, if your part's thickness is called out as 0.500" ± 0.005" with a tight flatness or parallelism callout, it may require machining down from a thicker piece of stock. However, if a standard 0.500" stock thickness is acceptable for your application, you can avoid additional machining steps, which will save both time and money. Be sure to note on your drawing if stock material is acceptable or make the thickness dimension a reference dimension.

10 Provide Adequate Lead Time

Allowing adequate lead time for your order helps us schedule your job efficiently and reduces the likelihood of incurring overtime or expedited shipping fees. Planning ahead also gives us the flexibility to optimize material procurement and machine scheduling, reducing overall costs.

11 Specify Waterjet Cutting Finish and Nesting

When requesting parts to be cut using waterjet technology, it's essential to specify the type of cut quality you need for the final product. Waterjet cutting offers several levels of finish, and selecting the appropriate one for your needs can help manage costs.

- **Cut Quality:** Waterjet cutting typically ranges from Quality 1 (separation cut) to Quality 5 (ultra-fine finish). If your part will undergo additional machining afterward, a rough separation cut (Quality 1) is usually the most cost-effective option. This type of cut is fast and economical but leaves a rougher edge. On the other hand, if the waterjet is providing the final surface finish, a fine cut (Quality 4) is appropriate for most applications, offering a smooth finish that usually meets surface finish requirements without additional processing. Ultra-fine cuts (Quality 5) are rarely necessary and increase the cost significantly due to the slower cutting speed and tighter precision.
- **Nesting Parts:** When quoting multiple parts for waterjet cutting, consider nesting them together on the same sheet. Nesting is the process of arranging multiple parts to maximize material use and reduce waste. By nesting parts, we can reduce material waste and minimize the overall cutting time. If you can provide a pre-nested design, it helps save us programming time further lowering your costs. When you nest parts, maintain a spacing of approximately 0.200" between parts to account for the kerf (material removed by the waterjet, typically about 0.030"). This spacing ensures clean cuts between parts and minimizes potential rework.

- **Quote Grouping:** Keep in mind that we usually quote parts individually, as we don't assume we'll win the entire batch in a quote. However, if you want to have all parts cut from a single sheet and quoted as one nested job, be sure to specify that upfront. This allows us to optimize material use and provide a lower quote overall, instead of quoting each part separately, which could lead to higher costs.
- **Material Considerations:** Waterjet cutting works well on a wide range of materials, including metals, plastics, and composites, but the material type and thickness can also influence the cut quality and cost. Thicker materials or hard-to-machine alloys may require higher water pressure and longer cutting times, affecting the final price.

COMPARISON OF WATERJET CUT QUALITIES

1" THICK STAINLESS STEEL



SEPARATION CUT
100% SPEED

ROUGH CUT
80% SPEED

MEDIUM CUT
60% SPEED

FINE CUT
40% SPEED

ULTRA FINE CUT
20% SPEED

12 Supply Your Own Materials or Outside Services

We prioritize transparency and fair pricing in all of our services. The markups applied to materials and outside services are in place to cover the administrative effort involved in coordinating with suppliers, as well as to absorb any risks associated with those suppliers. This approach not only ensures the smooth handling of these processes but also saves time and adds convenience for our customers.


However, if you have established relationships with trusted suppliers who can provide quality materials or services, you may be able to reduce costs by leveraging those connections. In such cases, you would be alleviating the associated risks from us. If this is an option you would like to explore, please let us know at the time of quoting, and we can focus solely on providing the machining services.

At **Indus Precision**, we believe that reducing costs doesn't mean compromising on quality. By working closely with our team and following the tips outlined in this guide, you can significantly lower your machining costs while still receiving high-quality parts that meet your exact specifications. Whether it's adjusting tolerances, optimizing part designs, or improving communication, small changes can lead to big savings. Our goal is to support you in finding the best solutions for your project while maintaining the highest standards of precision and reliability. Together, we can drive success and deliver exceptional value.

Ready to take the next step in optimizing your machining processes? Let us help you achieve cost-effective, high-quality manufacturing solutions. Contact us today to discuss your next project, request a quote, or learn more about how Indus Precision can be your trusted manufacturing partner.

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We look forward to working with you and helping you achieve your production goals!