

How to Calculate Cost-Cutting in Laser Cutting Services

Understanding the Basics of Laser Cutting Costs

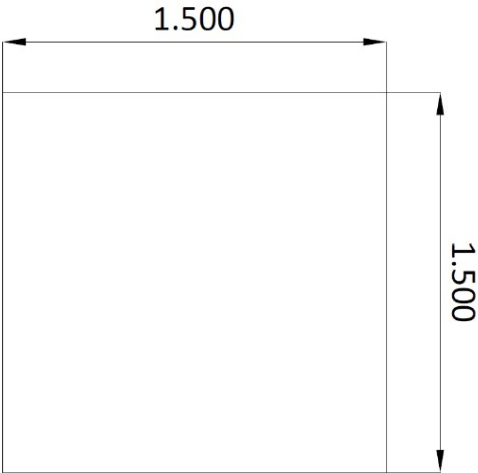
Laser cutting costs are primarily determined by the time a job takes on the laser. This time is influenced by two main factors: the type of materials being cut and their thickness. Different materials have varying levels of difficulty to cut, affecting how long the laser needs to work. Thicker materials generally take more time to cut through than thinner ones, further influencing the cost.

Key Factors in Cost Calculation

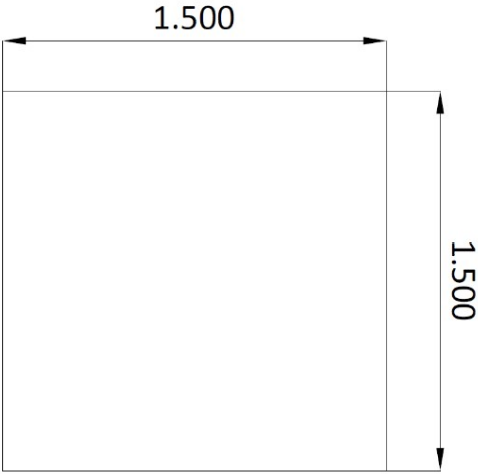
1. Material Type and Thickness:
 - Different materials, such as steel, Kapton/Cirlex, PEEK, beryllium copper, and FR4, each have unique cutting requirements.
 - Thicker materials typically require more time and energy to cut, which increases the cost.
2. Distance of Laser Cuts:
 - The total length of the cuts required for a project impacts the laser operation time.
 - More extensive cuts mean more laser time and, therefore, higher costs.
3. Quantity Needed:
 - The number of units that need to be cut affects the overall cost.
 - Larger quantities might benefit from economies of scale, reducing the per-unit cost.

How to Calculate Laser Cutting Time

Laser cutting time for example can be as quick as a few seconds or perhaps take an hour or several perhaps depending on the project's size and requirements. A part cut from 3mil thick polyimide, with simple geometry could cut in about 12 seconds at 5 parts per minute at 300 parts per hour. On the other hand, a part with the same geometry made from 20mil titanium will take 30 seconds at 2 parts per minute and 120 parts per hour. If each has an order of 1000 quantities, the laser cutting time amounts is very different. Example of this:



Fiber laser-20mil thick titanium,30seconds, 8.33 hours for 1000



UV laser-3mil thick Polyimide, 12 seconds, 3.33 hours for 1,000

The cutting time changes due to the differences in each project’s requirements. The thinner polyimide ablates rapidly and moves at a high rate. The thicker material, though the same geometry, takes more energy and requires a slower cutting rate. Additionally, the number of laser passes or cycles will be higher than the polyimide material. Since laser cutting time and cost affect each other, knowing how this time is calculated can help you anticipate laser cutting cost calculation. Several elements determine the laser cutting time, including the complexity of the design, the material thickness, and the speed and power of the laser cutter. The following factors are used in determining the cost of laser cutting and the production time required to manufacture.

- Material Type and Thickness:** Material choice and the required thickness will determine the best laser technology used. Different systems can cut the same material but will vary in cutting speed. Is the material reflective or fragile? Laser cutting speeds are adjusted accordingly for quality cut. Some laser systems cut by a series of laser passes. This is the number of times the laser runs each cycle. Harder to cut materials will require more laser passes and affect the production time.

- **Laser Technology:** Different materials will require different laser systems like Ultraviolet, Infrared or Fiber for example. Each has levels of power and capabilities that services providers determine which is best for time and cost.
- **Linear Distance:** The programmed path of the laser is measured as linear distance. This is a combination of all cut features. Designs will affect the production time and laser cutting costs per hour.
- **Tolerance and Inspection:** Inspection of parts is always part of the manufacturing process. However, if additional levels are required such as AQL or 100% inspection, this additional time will be factored into the total lead time.
- **Quantities:** A handful of R&D precision parts will indeed cut faster than a production run. Keep in mind that for mid to high level volumes, laser manufacturers will nest parts to increase efficiency per sheet and reduce set up time. This in the end results in the quantity of laser cutting costs per hour.

Additional factors also influence the overall production throughput:

- **Handling of material Pre and Post laser:** Materials can be extremely delicate and prone to damage if not handled properly. Laser operators will take additional care to keep the surface free from scratches and marring.
- **Packaging:** If the packaging requires third party systems to be used like custom trays, gel-paks, custom plastic boxes and so on. Additional time and labor will be needed.
- **Finishing:** Post laser processes will add the lead time. Finishing methods like sanding, passivation, tumbling, anodizing and powder coating are some of the post processing that may be required and extend the final production window.

Laser cutting time is a calculation of all the variables mentioned and includes the material type, quantity of parts, the linear distance of each part, to name a few. From years of gained knowledge, qualified laser service providers will review the variables and formulate the expected lead time. Laser cutting cost calculation and processing time is based on years of experience. These calculations are the foundation that production schedules are formed and executed to meet customer's demands and expectations.

Please read more at:

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