

Laser Cutting News

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ORCA

From the editor...

In this issue, we'll continue to look at the business benefits of laser cutting. In the last issue, we discussed the unique process capabilities that laser-based techniques can deliver for your production. This time, we'll get down to an analysis of the dollars and cents results that can flow to your bottom line when you invest in laser technology.

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The Return On Investment for Laser Cutting: A Case Study

At Orca, we take pride in our ability to balance business and technical aspects when we propose a solution for your application. For your business to succeed, both are important, and both must be "done right."

When compared to the alternatives, laser cutting often requires a larger initial investment. However, the recurring production costs of laser cutting are usually dramatically lower, because tooling development and maintenance costs are virtually eliminated. In this article, we'd like to show you how the costs stack up for a real-world application.

For the particular application we'll analyze in this article, laser cutting shows a bottom line advantage of more than 35%, when all of the costs are considered.

The Problem: Abrasive Patches

For this comparison, the problem we'll consider is job-lot production of relatively small shapes from an abrasive material. A number of different shapes (10 total) must be produced to meet different customer needs. The typical sizes needed have

A Note About Customer Information

Orca takes very seriously our obligation to safeguard information and about our customers' business needs.

To avoid divulging sensitive information, even about an unnamed customer, the case used for this study is *entirely fictitious*. While we consider this case to be realistic, it does not correspond to the actual requirements of any specific customer.

dimensions ranging from 3 to 6 inches (75–150 mm). Parts are cut from a continuous roll of material that is 36 inches (900 mm) in width. The photo below shows test pieces cut at Orca to assess cutting speed and quality for this kind of material. The photo includes two shapes with the front and back of the same material visible.



For this analysis, we assumed a production rate of 100,000 parts per month. Delivery lots consist of 5000 pieces of a single design, and design changeover occurs approximately 12 times per month. The planned production schedule is single shifts and 5 days, with additional shifts available as needed for overflow production or rush delivery requirements.

The Competitors: Laser vs Die Cutting

We will compare the economics of two techniques for meeting this production requirement:

Laser Cutter

For laser cutting, a dual-head X-Y gantry type cutter can meet the production speed requirements, based on actual testing with this material at Orca. The cutter produces two parts in parallel, producing 10–12 parts between material advance cycles. The cutter is continuously roll-fed, using well-proven Orca designs for this kind of production.

Continued, page 2, column 2

Orca People

Doug Donaldson, Senior Electronics Engineer

One key to successful laser cutting systems is the *electronics*. Only with accurate and responsive control of servomotors for motion, coupled with fast dynamic laser power for setting cut depth, can the system deliver the flexibility and quality of results that users need. Doug Donaldson takes the leads in integrating these capabilities into every laser cutting system that Orca delivers.



The experience and skill base that Doug brings to this task runs broad and deep. A typical system will include carefully-chosen commercial subsystems where appropriate, our own custom circuitry where technical requirements dictate, and the right firmware to “make it all fly.” A great result demands that the designer think about how the elements of the system work together, as well as how each works on its own. The result is a system that is reliable, easy to maintain, and convenient to use.

In his spare time Doug loves to spend time with his family boating in and around Washington’s many beautiful islands. He is also deeply involved in scouting activities with his sons.

Continued from page 1

Experience proves that it is possible for an operator to devote time to other tasks (including running multiple machines) while a roll is being processed.

Die Cutter

Steel-rule die cutters are one accepted approach for this kind of production problem. A die cutter can provide a full row of parts across the material in a single stroke. Although the basic die press rate substantially exceeds the requirements of this application, die exchange and setup are needed frequently (about once per day), and begin to significantly affect the total production rate. Die life is short, especially because of the abrasive quality of the material, but die sharpening and replacement is relatively inexpensive.

The Numbers: Detailed Costs

The table below shows the cost estimates for the cutting of these parts by both methods. Included are:

- Amortization of capital cost, assuming 5-year amortization period and 7.5% interest rate.
- Tooling development and maintenance costs. Steel rule die life is assumed to be 1000 impressions, with 2 resharping cycles before replacement.
- Production staffing costs (including benefits)

For the sake of simplicity, we have not included tax implications. We also have not included the price advantage that laser cutting can give you because

of better part quality and faster job turnaround. Energy costs were also included in our analysis, but are too small to be included in the results.

Results: Advantage Laser!

Laser cutting is the clear cost winner for this application. The **Zero Tooling Cost** advantage more than offsets the higher acquisition cost of the laser cutter.

The tool wear factor is especially large for this abrasives application. However, even when cutting more benign materials, the analysis shows that reduced tooling costs will often offset the higher initial cost of laser technology.

Reduced tool wear is not the only cost advantage of laser cutting. Any time that a large number of different designs are being cut, laser cutting will save money in tool development, tool storage, and tool management. The ability to respond instantly to new customer requirements can also be reflected directly on the bottom line. With laser cutting, moving to a new design is a matter of clicking on the right CAD file - a matter of a few seconds.

In summary, laser technology can be a strong cost competitor when all of your production costs are considered. We would be happy to prepare a detailed cost analysis of *your* application. Give us a chance to show you how laser cutting can put dollars on your bottom line.

	<i>Laser</i>	<i>Steel Rule Die</i>
(Acquisition Cost)	\$395,000	\$195,000
Amortization	\$102,573	\$53,140
Staffing (\$22/hour)	\$45,760	\$45,760
Tooling	\$0	\$30,000 initial \$41,750 sharpening \$67,000 replacement
Total First Year	\$148,333	\$237,650