

## MANAGING MAINTENANCE FOR LASER CUTTING MACHINES

A commitment to maintaining this equipment can reduce its total cost of ownership

By Claudio Schutz

Successful maintenance is not about fixing things. It's about *not* having to fix things.

Unfortunately, not all metal fabricating operations understand that. They are afraid to interrupt production because if the machine is not running, it is not making money. Of course, since proper maintenance is often ignored in these job shops under delivery pressure, any downtime that occurs is typically unplanned. If pushed beyond its limits, the equipment won't keep up.

This lack of commitment to proper maintenance extends to a laser cutting machine, which can cost over \$1 million in some instances. The relentless push for uptime above all else is a recipe for disaster.

This approach to shop floor activities is shortsighted. After all, it's the unexpected downtime to repair a laser cutting machine that really throws a production schedule for a loop. Scheduled downtime for maintenance, however, maximizes laser cutting availability and reduces the need for expensive replacement parts and service time. Proper maintenance helps to reduce the overall cost of parts produced.

### Learning the Lifetime Costs

Most fabricators aren't thinking about long-term maintenance costs when they are looking to invest in a laser cutting machine. They engage in a simple apples-to-apples comparison. For example, a fabricating company might estimate that a laser will cost \$20,000 per year to operate, taking into account electricity, gases, and some consumables. But a complete picture of what it really costs to own the machine should include all replacement parts and service call costs.

A study that examined the lifetime costs of 25 laser cutting machines of different brands and models really drives home the idea of cost of ownership. The original purchase price of each machine was about \$750,000, but the annual maintenance costs per year varied, usually between 2 and 3 percent of the initial investment. The maintenance costs typically increased with the age of the machine.

In some instances, that annual maintenance cost represented almost \$250,000 over a 10-year period. Isn't this something that a business would want to keep under control and minimize if it could?

These eight steps can help a fabricator better manage its maintenance for laser cutting machines and help to reduce the lifetime costs for operating that equipment.

### 1. MAKE SMART DECISIONS ABOUT SPARE PARTS AND MRO INVENTORY

Fabricators aren't interested in keeping a lot of inventory of any kind, whether it be raw sheet metal stock or replacement parts for equipment. But some machinery, such as a laser cutter, is an integral part of the

fabricating mix for a shop. That's why fabricators need to make smart decisions on which spare parts to keep.

Service-level agreements with the machine tool builder or a third party are a great way to manage spare-part inventory. This arrangement allows a fabricator to perhaps maintain a small collection of critical parts, but steer clear of stocking expensive parts that might be damaged or misplaced. An RF tube for a laser cutting machine is a good example. This is a critical part for a CO<sub>2</sub> laser; it is relatively expensive and fails every two to three years. Unless a fabricator has many machines, it likely does not want to keep one in stock.

The fabricator then has two options to minimize the risk of downtime caused by not carrying that critical spare part in its own inventory. One is to ensure that its supplier stocks the part locally and for immediate delivery, guaranteeing uptime within the required and agreed-upon service level. A second option is to implement measures to monitor parameters that will predict failure of the part in time, so it can be ordered neither too early nor too late.

Take, for example, a remote-monitoring system, which has been used not only in lasers but also in radio transmission stations. This noninvasive remote-monitoring system connected to an output port of the generator reads parameters regularly, detects anomalies, and predicts potential performance issues, allowing fabricators to order parts in time to prevent downtime.

A fabricator should lean on its purchasing team to determine if a service-level agreement makes sense and what key spare parts should be kept in the shop.

To help in this decision-making, purchasing agents need to know more than the part number. They need to know which are critical parts, who makes them, where they are made, and what alternatives may exist should they be needed. This information needs to be kept updated. During a machine breakdown, purchasing agents simply don't have enough time to begin this level of information-gathering and can't expect to make buying decisions that weigh overall price with effectiveness.

Purchasing agents also require a system to keep track of these details. It could be as simple as a spreadsheet or as elaborate as a module of an enterprise resource planning software package. (The latter provides a fabricator with powerful reporting and analytical capabilities.) No matter which method the company chooses, it should use the data to make informed decisions and trigger corrective actions.

### 2. KEEP THE KEY CUSTOMERS IN MIND

It's no secret that a few major customers often drive a metal fabricator's profitability. As a result, those customers require consistent and quality service.

Metal fabricators can avoid production disasters and bottlenecks with some exhaustive planning. They should identify critical production equipment necessary to produce the fabricated products for those key customers. In some instances, fabricators might even want to identify and

tag the critical equipment clearly.

The maintenance team should always make this equipment its priority. Also, the purchasing team should have backup plans to find needed spare parts or alternative production plans that may call for outsourcing fabricating activities.

This by no means is a recommendation to ignore noncritical equipment. It's just a call to focus maintenance efforts on the core shop floor technology, which probably includes laser cutting machines, to maintain the highest level of service to all customers.

### 3. STUDY THE AVAILABLE OPTIONS

The purchasing team needs to be aware that new and lower-cost designs sometimes can be better than OEM parts on that 5- to 10-year-old machine. The traditional thought is always to replace a part with one exactly like the original, but that may not necessarily be the best choice.

For example, new low-absorption lenses and new bellows, both with improved performance characteristics and designed for longer spans of usage, often outperform older standard equipment parts that were conceived with the original machine design.

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### 4. ESTABLISH PURCHASING GUIDELINES

Spare parts is a big business. The global aftermarket for industrial equipment is valued at more than \$150 billion.

To ensure that a purchasing department is making wise decisions and not just contributing to the growth of the aftermarket business, a fabricator should establish buying guidelines. The final decision should not be based on price alone.

Guidelines should cover product quality, speed of delivery, technical support, and the supplier's reputation. It is also helpful to have someone with the technical qualifications to oversee purchases involving complex parts.

### 5. CONSIDER EXTENDED WARRANTIES

Preventive maintenance contracts and extended warranties are a common part of our everyday lives. They provide peace of mind for consumers and additional business for the party selling them.

Some fabricators may want that insurance, especially those that question their own preventive maintenance efforts. Others may choose to invest in their own personnel and programs.

If a fabricator pursues a maintenance contract or extended warranty, the purchasing department should have a complete understanding of what is covered. Does the contract cover maintenance and parts? Is a discount provided on any needed replacement part? How much more does an emergency service call cost without a contract in place? What are the limits of the contract?

### 6. FOLLOW RECOMMENDED MAINTENANCE

The laser cutting machine builder provides a recommended maintenance schedule, and every fabricator should follow it to ensure maximum performance over the machine's lifetime. Taking shortcuts only increases the potential for problems and unplanned downtime.

The maintenance team also should keep a logbook, where they can record maintenance activity and keep track of production variables. Over time maintenance personnel can troubleshoot possible machine

performance problems based on certain conditions that they may have witnessed and noted in the past.

The maintenance team should automate this monitoring if possible. Some high-performing fabricating operations connect capital equipment to their network and measure open electrical connectors to monitor certain conditions. They can then compare those numbers to expected machine performance values or against maintenance intervals over time and develop a predictive maintenance tool in the process.

In addition, the maintenance team needs to ensure the production environment is suitable for state-of-the-art fabricating technology. Water has to be of a high quality, and the temperature and moisture level in the shop have to be correct. The compressed air and gas lines have to be free of leaks or contaminants, and the power supply has to be stable.

**Company management should consider incentives, which can be nonmonetary, that prioritize maintenance activities instead of compromise them.**

### 7. TRAIN MAINTENANCE PERSONNEL

Training personnel is an investment that will pay off in reduced expenditures related to parts and service.

Trained maintenance technicians can prove to be effective troubleshooters, eliminating the need to make expensive service calls. When they are unable to diagnose the problem, these trained individuals are extremely useful in working with remote parties that can pinpoint the problem via the Internet or over the phone and then make the correction themselves, again eliminating a service call.

Trustworthy maintenance technicians also can pave the way for others to follow in their footsteps. They can document procedures that others with less experience can follow and learn successful work habits. They may prove useful in producing a skills matrix that gives the front office an idea of just what skills and talents make for a "qualified" maintenance technician.

### 8. ENGAGE THE TEAM

An engaged team has more on their mind than simply clocking in and clocking out. They ask the questions and take the actions that eliminate waste on the shop floor and, ultimately, provide better service to the fabricator's customers.

The maintenance team needs to be made aware of what key performance indicators (KPIs) are tracked. These KPIs can cover time spent on improvements of equipment or procedures, elimination of root causes, elimination of waste, and effectiveness of planned maintenance. Effective communication about KPIs can be accomplished with a visual board on the shop floor. Management needs to entice feedback from the maintenance team and include them in continuous improvement tasks.

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There is no one-size-fits-all solution to properly manage maintenance in laser fabrication shops. But some of these maintenance lessons learned from successful fabricators certainly result in a more consistent, reliable, and cost-effective operation. And last but not least, they will yield a higher residual value of the machines in the long run. **FAB**

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