

# GETTING THE ROI FROM YOUR NEW LASER SYSTEM

William E. Lawson, P.E.  
Presented at ICALEO 97

In order to successfully implement a new laser processing system in your manufacturing process the following are the main things to be kept in mind:

1. The traditional direct economic benefits of an improved process.
2. The future indirect benefits that are difficult to quantify before the new technology is implemented.
3. The proper installation and facilities as recommended by the system supplier and other users.
4. The absolute requirement to take the time to train people and change processes to utilize the new system. As they say, "Pay now or pay later."

In our experience it is normal for a company adding a new laser technology to take six months to a year to feel comfortable enough to fully utilize the technology they bought. With good planning and training before installation, most systems will be producing good parts at speed in a few weeks. However it will take much longer for your entire manufacturing process to be able to function well and know how to handle normal problems.

There are a number of papers documenting companies' experiences implementing a new laser process. A typical one is detailed in "Case study: How one Laser Fabrication Center Made the Shift to Automation," by Edmond Jarrell for the Laser Cutting & Welding Conference, May 3-5, 1994 for the Fabricators & Manufacturers Association.

Theirs was a successful implementation with the primary benefit being the "ability to handle changing customer requirements quickly" as well as the financial benefits of a great reduction in raw material cost, increases in flexibility, reduction in setup time and a great reduction in lead times. However, to quote some of the things that they would concentrate more on:

- More in-house engineering support
- More cross-functional involvement from plant personnel
- More attention to the socio-technical details earlier
- More technical discussions with in-house engineering and computer technical support personnel earlier
- Earlier and more complete training of maintenance personnel
- More involvement of the quality assurance organization
- More investigation regarding availability of service personnel

They also found that some of their other processes, such as CAD, needed to be changed and upgraded to feed information to the new system. This is typical when introducing a new procedure; changes in one process may force changes in other processes in the company.

When you are contemplating purchasing a laser system there many things to consider.

## Criteria for Selecting the Correct System

Materials to be processed  
Material thickness  
Function required

1. Cut
2. Weld
3. Drill
4. Etc.

Processing speed requirements  
Accuracy requirements  
Material impact specifications

1. Heat affected zone
2. Micro cracking
3. Recast layer
4. Kerf width
5. Etc.

Economics

1. Initial cost
2. Material savings
3. Labor savings
4. Quality effects
5. Speed increases

Service after installation

### **Key Factors for Success**

Installation requirements

1. Delivery interval
2. Quality run-off
3. Support and service

Schedule for regular preventive maintenance  
Operators who are committed, trained and stay with the job  
Early involvement of all personnel  
Strong commitment of upper management  
Enough time to get up to speed, not expecting instant miracles

## ECONOMIC CONSIDERATIONS

The justification of laser systems requires different thinking than for hard tooling.

<b>Laser System</b>
Multi-use, flexible
Capital
Strategic thinking, long range planning. Costs spread over number of parts

does not equal

does not equal

<b>Conventional Hard Tooling</b>
Single purpose
Tooling
Specific product investment. Costs only spread over volume for one part

### Tangible Costs

#### Capital Equipment

- Cost of the equipment
- Cost of freight & installation
- Cost of operator/maintenance training
- Sale of old equipment
- Tax on new equipment

#### Operating Costs of the Process

- Direct labor
- Indirect labor
- Subcontracting
- Maintenance
- Downtime for maintenance, repair and tooling
- Tooling including tooling inventory
- Power & utilities
- Materials & supplies
- Part inspection
- Scrap & rework
- Assembly costs (ie. nameplates)
- Floor space utilization
- Taxes & insurance
- Operator safety
- Machine programming

#### Inventory Changes

- Reduced inventory volume
- Reduced inventory per piece value

Reduced safety stock

**Other Impacts On Revenue**

Change in volume (increased capacity)  
Reduced lead times  
Increased quality  
New product introduction  
Manufacturing flexibility

**Intangible Savings**

**Quality and Reliability Improvements**

Reduction of rework/scrap  
Reduction in returns due to process quality  
Part inspection costs  
Risk of product recalls due to process quality  
Risk of lost business due to quality issues

**Responsiveness to Marketplace**

Shorter production cycle times  
Capability to respond more quickly to short-term changes in market demand (volume or mix)  
Increased market share/sales revenues due to reduced lead time

**Production Flexibility/Efficiency**

Elimination of secondary processes  
Reduced lead-time, piece costs and scheduling decisions  
Higher product variety of low volume goods (at lower cost)  
Higher potential for customized production  
Capability to respond to longer-term changes in product design or product mix  
Increased market share/sales revenues due to higher capacities and/or faster new product introductions  
Increased customer service/satisfaction  
Improved competitive positioning with new technologies  
Reduced floor space requirements

**Overhead Improvements**

Reduction in managerial, engineering, clerical and shop support requirements due to the elimination/reduction of non-value added activities  
Reduced safety costs, including insurance  
Value of real-time information

**Inventory Improvements (sometimes tangible)**

Cost savings of lower average inventories  
Cost savings of lower per piece costs  
Reduction of safety stock  
Reduced floor space requirements  
Lower property (inventory) tax

Reduced inventory management manpower

**Impact on Human Resources**

Increased employee morale and safety

Upgraded technical skills among employees

Increased managerial acceptance/experience with advanced automation and innovation

**TRAINING**

Laser technology is not difficult to learn, however, there usually are a large number of new things to learn and no person can expect to learn everything in a week of training. The time required to learn a new laser process varies with the complexity but is extended not only because of the amount of information but most importantly because of the relatively slow speed that humans can assimilate new information and apply it. If possible, a day of training every two weeks along with using the knowledge in between is the most efficient way to train the average person on a new technology.