Laser Cutting Tool Increases Throughput at 
Advanced Laser & Waterjet Cutting

Advanced Laser & Waterjet Cutting, Inc. located in 
Santa Clara, CA, is a job shop servicing a diverse 
range of applications, from semiconductor, medical 
and other high technology areas, through 
arhitectural, art and automotive. The company 
focusses mainly on precision cutting of both metal 
and non-metal materials, and supports prototyping 
through large production runs. The organization 
currently owns two Coherent laser cutting tools, 
and has found that these significantly expanded 
their capabilities and reduced their production 
costs.

Advanced Laser & Waterjet Cutting has utilized laser 
technology since their very inception in 1994, originally 
in the form of a large, 4 kW CO2 laser-based machine. 
Over time, the company began to look for additional, 
specialized, precision services that it could add in order 
to expand its portfolio of services, and engraving was 
one area of particular interest. But, since their existing 
4 kW laser represented substantial overkill for this 
application, the company began searching for a new, lower power laser cutting tool. This led to the purchase 
of a Coherent METABEAM 400 (based on a 400W CO2 
laser), which is capable of both engraving and cutting. Subsequently, the company added another Coherent 
cutter based on a 1 kW CO2 laser (META 10C) for even 
greater productivity and flexibility.

Coherent System Configuration and Capabilities

The Coherent laser cutting tool integrates a CO2 laser, 
CNC controller, beam delivery system, assist gas 
delivery system, drive system and laser cutting head all 
into one highly compact machine frame with a standard 
table size of 4'x4' (1.25m x 1.25m).

They are capable of cutting metals, such as stainless 
steel, mild steel, aluminum and titanium, in thicknesses 
of up to 6 mm (depending upon system power and the 
specific material), as well as wood, plastics, rubber, thin 
films, composites and other organics in thicknesses of 
up to 1.25". The system can deliver a precision of up 
to 0.001" (0.0002" repeatability), at cutting speeds up to 
2,000 inches/min.

Job instructions are supplied to the METABEAM in 
much the same way as other digital cutting systems. 
Namely, part drawings are created in SolidWorks or 
other application that produces files in DXF, DWG, 
HPGL, Gerber, JPG, BMP or TIF format. The file is 
then processed through the included CAM software 
and delivered to the HMI with process and motion 
control commands to complete the part.

Material can be rapidly loaded into the machine where 
it is held in place by a vacuum bed. Metal materials or 
thickness can be switched quickly due to a capacitive 
sensor in the Coherent system that accurately 
maintains the standoff distance from the work piece.
An optional camera system also facilitates rapid loading of material into the cutting bed. This system can identify fiducial marks on the work piece. It then uses these to perform cutting that is referenced to existing features on material regardless of its orientation in the machine. The software can even scale or rotate the cutting pattern to correct for any dimensional changes in the material from the originally specified values.

Implementation and Benefits

Advanced Laser & Waterjet Cutting utilizes these systems for cutting and etching a wide range of thin materials.

Typical examples include metal shim stock, synthetic rubber (EPDM) gaskets for high vacuum and automotive applications, fabric, acrylic, stainless steel, blued spring steel, molybdenum, titanium and even unanodized aluminum. They also regularly etch or mark anodized aluminum and other metals, as well as acrylic. In some case, the waterjet is used for rough cutting of blanks before precision processing with the Coherent system.

“The major advantage of the Coherent tool over our large laser is increased throughput,” notes Lester Gragg, President of Advanced Laser & Waterjet Cutting. “This may not be obvious to most people, because the more powerful laser generally delivers faster cutting feedrates. But, you also have to take into account the time the machine takes to move between cuts. The Coherent cutting tools have lightweight optical heads which can be moved under high acceleration. So, for jobs that involve more than just a few simple cuts, the processing time is actually much lower than we can achieve with our 4 kW laser machine.”

Another factor that helps increase throughput is the simplified job setup, enabled by the Coherent system software. Job files for Coherent’s laser cutting tools are easier to create than for their larger system, which requires very clean DXF files composed of only lines, arcs and circles. In contrast, the Coherent laser cutter has no trouble operating from simpler artwork created using applications such as Illustrator or CorelDraw, thus cutting down preparation time.
“The flexibility of the system software makes it easy for us to set up complex job parameters. For example, scribing, engraving or kiss cutting are all easy to implement on the Coherent tools,” adds Gragg.

The ease with which material can be loaded into the METABEAM further enhances rapid processing. Specifically, because material is held by a vacuum bed, it doesn’t have to be placed with any precision, and no fasteners have to be tightened. The vision system then compensates for the actual orientation of the work piece in the machine. Advanced Laser & Waterjet Cutting has found this feature particularly valuable when processing materials that have previously been silk screened. This isn’t possible on the larger laser machine, which requires the operator to precisely square the blank to the machine.

Besides increased throughput, the Coherent laser cutters are also inherently more economical to operate than a higher power laser system. One major reason for this is that they use much less assist gas than the company’s bigger system. They also use far less electricity. This turned out to be an important factor, because it allowed Advanced Laser & Waterjet Cutting to install the Coherent systems without having to make any changes to their existing electrical supply.

Gragg states, “Most of the time, if a job will physically fit into the Coherent laser tool, then it’s our first choice. We generally find it’s much faster than our larger laser system for most jobs, except for very thick materials. But, if the material is under ⅛ inch thick, then the Coherent cutters can’t beat.”

Gragg also notes that when considering the purchase of another laser cutter, he preferred the META 10C, based on a 1 kW CO2 laser, over a fiber laser-based machine. “While the fiber laser generally delivers a thinner cut width, we can generally achieve the same with our 400W machine. But, the overall capabilities of the CO2 machine are broader, and I estimate that less than 1% of the jobs we quote would benefit from processing with a fiber laser.”

In conclusion, the Coherent laser cutting tools have enabled Advanced Laser & Waterjet Cutting to expand their business, yet were easy to integrate into their shop, and required minimal operator training. They enable the company to economically cut thin metals, etch metals and plastics, and process a wide range of organic materials. This complements their prior capabilities for processing thicker metals with a higher power laser system, or using the waterjet to work other materials that don’t lend themselves to laser processing.

References