



MAZAK LASER PROCESSING MACHINES - UNPRECEDENTED PERFORMANCE

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Abstract: *This paper tries to point the fact that Mazak philosophy has always been to provide world with a means to realize higher productivity and enhanced competitiveness by developing new machines and manufacturing technologies regardless of the economic environment [1]. Yamazaki Mazak Corporation (Oguchi, Japan), is now the world's largest manufacturer of machine tools, including CNC turning centers, machining centers, and laser cutting systems. Our company's commitment to technology innovation and quality has resulted in worldwide manufacture and distribution of hundreds of types of high-productivity machines, cells and systems. With the combined strengths of Mazak's engineering, manufacturing, and commitment to continuous improvement, Mazak Optonics has become the leading supplier of CO2 laser cutting systems. For nearly twenty years, we have been at the forefront of laser technology as the industry began to accept laser processing as a viable technology. Our approach has always been one of consultation and education for our customers to help them apply laser processing to their advantage and achieve world-class competitiveness.*

Key words: *laser, advantages, CO2, 3D, advanced technology, high productivity, ultra speed, unprecedented performance.*

As laser cutting becomes established in production, the early limitations of the process are being overcome. Developments in each of the components of laser systems, along with an improved understanding of the cutting process, are increasing the scope of the technology to the point where lasers are now doing jobs that have been the province of other methods such as EDM (electrical discharge machining.)

Among nontraditional machining processes, laser cutting has experienced the most rapid growth during the last decade. Most of this has been "easy" laser cutting: low carbon steel 1/8 inch or thinner with dimensional tolerances of plus or minus 0.005 inch or more. Most laser cutting systems can accomplish this, and such work could be considered standard.

There are many directions in which the boundaries of the technology have been extended well beyond the "standard" areas. Laser cutting is, by now, sufficiently familiar that a detailed explanation is unnecessary. But in essence, lasers cut by concentrating light energy on the surface of a workpiece, heating it up so that it melts, vaporizes or decomposes.

The important variables in the process are the laser power, spot size, focal position, travel speed, and assist gas. Improvements in laser cutting technology have been achieved by modifications in each of these [2].

Current and potential users of laser cutting technologies have been inundated with opinions from laser machine builders and others about which is the "single best technology" to buy. As in most debates, the answer is "it depends."

Both flying optics and hybrid machines have been around for decades. And for good reason: they both have their place within the variety of applications encountered when laser processing metal parts.

All laser cutting machine tools consist of a laser engine outputting concentrated light at a given level of power—generally in the range of 1000W to 4000W, or higher. To deliver the laser beam to the cutting torch, the machines use a series of reflective mirrors. The beam is then further concentrated by a lens with a specific focal length for the application at hand, and combined with a nozzle for delivering assist gases at the point of cut.

Flying optics means that the laser beam delivery system is constantly in motion when cutting. The blank sheet or plate remains stationary on the worktable, while the machine provides all axes of motion for the cutting torch. This configuration has advantages in machine dynamics because large variations in workpiece weight have no impact on the moving members. Predictability of the moving mass allows generally higher speeds and acceleration rates with consistent accuracy.

By design, flying optics machines require approximately twice the number of mirrors in the laser beam delivery system. This adds complexity to the machine in terms of initial setup and in regular maintenance and alignment. Further, the mirrors have a finite life, making replacement cycles more costly.

Mirror alignment is more critical with flying optics for consistent high-quality cutting, since even a laser beam, which we tend to think of as a straight line, grows over its length through a phenomenon called "beam divergence." The machine should be capable of consistent cutting from the point nearest the laser source to the farthest point found in the work area, and this is controlled by mirror setup.

Performance characteristics are also affected by the number of mirrors required in the machine. Even the highest quality mirrors used in laser machine tools are

only 98% efficient. Therefore, in a 12-mirror flying optics machine, approximately 76% of the laser power actually reaches the material to be cut. The comparable value in a six-mirror hybrid machine would be around 88%. This is a contributing factor for ever-more-powerful (and expensive) laser engines being developed and applied to metal cutting.

In a hybrid design, the long axis (X-axis) motion is provided by the worktable carrying the sheet or plate. Shorter Y- and Z-axis travels (also A- and B-axes for a 3-D laser) are similar to flying optics machines in terms of beam delivery. This much shorter path from the laser source to cutting tip is easier to align and control, adding to reliability and quality of cut. Mazak's hybrid models actually have a constant beam length, but any hybrid is more efficient in delivering the laser beam to the cut. Higher efficiency through fewer mirrors allows the cutting of thicker materials with less laser power, meaning lower initial investment and lower operating costs.

Generalizations are dangerous, but flying optics machines lend themselves better to cutting thinner materials at high speeds. On the other hand, hybrids lend themselves to cutting thicker materials because of efficiency of beam delivery and the relatively slower cutting speeds used for thicker stock. Unless you are a high-production, dedicated shop, the reality is that most customers' applications fall across the middle of the range and they also must deal with multiple materials [3].

1. COMPARISON BETWEEN MAZAK LASER MACHINES

1.1. 2D laser cutting

Successful fabricators find that in almost all sheet metal applications, laser cutting offers unparalleled quality at high production speeds. Mazak lasers provide high precision cutting with minimal heat distortion of the metal. They easily process different materials of varying thicknesses, with a minimum of costly set up or downtime. A single Mazak laser can cut different part designs, of differing sheet thicknesses, without ever changing the machine setup. Superior edge quality, free from burrs and narrow kerfs are standard (Table 1).

Table 1

2D Laser Cutting - comparison

		HyperGear	Mark II	STX-44	HyperTurbo-X	Super Turbo-X Champion
Maximum Cutting Thickness	1" (4000w)	•	•	•	•	
	3/4" (2500w)	•	•	•		
in Mild Steel	1/2" (1500w)		•	•		
	.47"		•	•		•
Resonator	4000w	•	•	•	•	
	2500w	•	•	•		
	1500w		•	•		
Table Size	6' x 12'		•			
	5' x 10'	•			•	
	4' x 8'		•			•
	4' x 4'			•		

Table 2

2D Laser Cutting - comparison

		SpaceGear	SG-U44	FabriGear 150	FabriGear 300
Maximum Cutting	11.8" pipe				•
Thickness (tube dia.)	5.9" pipe			•	
Max Cut Thickness(sheet/pipe wall)	7/8" (4000w)	•	•	•	•
Resonator	4000w	•	•	•	•
	2500w	•	•		
	1500w	•	•	•	•
Maximum Sheet Size or Pipe Length	26' to 49'*				•
	26' to 40'*			•	
	4' x 4'		•		
	4' x 8'	•			
	5' x 10'	•			
	6' x 12'	•			

1.2. 3D laser cutting

With a multi-axis torch, Mazak Optonics 3D (6-axis) lasers process stamped, hydroformed, and spun pre-formed parts. They also perform 3D cutting of tube, including rectangular and triangular pipe as well as C, H, I and L beams, with FabriGear models ideally suited for longer lengths (Table 2).

The multi-axis torch and simultaneously controlled chuck fabricate - in one operation - precise angle cuts, weld-prep bevels and advanced, complex contours such as saddle joint cuts. The product line features a max Z-axis that ranges from 11.8" to 16.53". The 64-bit NC incorporates illustrated fill-in-the-blank screens to quickly program such complex contours and other cuts. Mazak's SPACE CAM software generates NC code from a 3D CAD drawing, imported or crafted in the system, and it performs pre-cut simulations. It also automatically generates code for a slot-and-tab workholding fixture.

2. MAZAK LASER MACHINES SERIES

2.1. The fastest laser machine in the world

2.1.1. HYPER GEAR 510 - Unprecedented Functionality - Revolutionary Performance - High Cutting Speed with High Cutting Accuracy. Mazak Optonics HYPERGEAR 2D laser offers a wide variety of automatic features that reduces operator workload, providing optimum productivity and quality. The automatic setup features allow the operator involvement machine to go from ultra-thin to thick sheet including painted galvanized sheet plate with minimum direct. Machine automatically gives predictions, warnings and restores instructions.

The HYPERGEAR features include: Torch Changer, Nozzle Changer, Nozzle Inspection, Piercing Priority - with Mazak Smart System, Constant Beam Length System, Focal Point Measurement & Adjustment, Nozzle Grinding System, Nozzle Pre-Setting, 5-Axis Full Hybrid Linear Motors, Linear Motor Control, Linear Motor Synchronized Control, Linear Motor Dust Proofing, Linear Motor Cooled Air System, New Generation Mazatrol PREview CNC.

The first CNC of this kind in the world - Ultra high-speed control reads ahead of motion PRE VIEW 640.

Yamazaki Mazak invented software technology based on a new read-ahead theory. The PreView 640, the first CNC of this kind in the world, was developed utilizing this theory.

Cutting speed and acceleration for each cutting point are automatically calculated from the programmed contour, predicting the optimum speed and power to go to the next cutting point. This makes it possible to achieve ultra high speed together with ultra high precision cutting.

This Machine use Mazak Laser Software as: Smart system Software, PREview and e-Soft who will be explained later in the paper [4].

2.2. High-speed & high-accuracy CO2 laser machines

2.2.1. Super Turbo X Mark II. The MARK II laser series fabricates the widest range of materials with no torch change or manual adjustment, increasing productivity.

The MARK II laser cutting system includes engineering modifications designed to significantly increase sheetmetal cutting speeds. It also greatly reduces downtime for manual adjustments and maintains tight dimensional accuracy and consistent cut quality.

The 4000W MARK II fabricates at high speeds without sacrificing flexibility. Changing from one material or thickness to another is simple and automatic. No time-consuming torch changes or manual adjustments are required to change from the thinnest sheetmetal through .750" plate (Fig. 1). This dramatically reduces your downtime. The MARK II is available with a wide range of material handling equipment including Mazak's Laser CMS, Laser FMS, Load/Unload Cell, and Pallet Shuttle.

This type of laser machine use Mazak Laser Software as: Smart system Software and PREview who will be explained later in the paper.

Super Turbo - X 48 Mark II - CNC CO2 Laser Processing Machine - Ultra high speed and high accuracy based on Mazak's integration of advanced electronic and mechanical technologies.

- Light and rigid table construction and the use of advanced vibration damping analysis technology for ultra high speed performance.

- Shock less, high gain servo technology for high cutting accuracy.

- New generation built in laser oscillator with turbo blower for high performance and low maintenance.

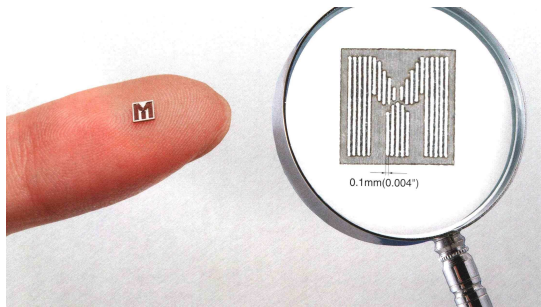


Fig. 1. Exceptional performance for a large machine.

- Exclusive constant beam length for uniform cutting performance anywhere on the machine table.

- Optional non-contact auto-focusing torch provides NC automatic change of focal point and nozzle gap for non stop cutting of different materials and thickness.

Super Turbo-X 510 Mark II – CNC CO2 Laser Processing Machine. High-speed table motion and a new generation laser oscillator are now combined with Mazak's proven rigid-machine-construction and exclusive constant-beam-length technology. Unsurpassed cutting performance is offered anywhere on the machine table due to the high speed, ball screw driven table motion combined with rigid cast frame machine construction and constant beam length technology. The Mazak Mark II series is available in a variety of laser output power and table sizes. And it is available with either the optional Pallet Changer, with a variety of Mazak FMS designs each providing users with easy unmanned operation and the highest productivity through high efficiency processing every hour of every day.

Super Turbo-X 612 Mark II – CNC CO2 Laser Processing Machine. New generation laser oscillator plus proven constant beam length delivery offer unsurpassed cutting performance anywhere on the table.

- The laser oscillator is integrated into the cast machine base for the most reliable and stable cutting.

- The laser beam is directed from the laser oscillator to the cutting torch using Mazak's exclusive constant beam length delivery system.

- The laser beam is designed for cutting a wide variety of material types and thicknesses [5].

2.2.2. Super Turbo X-44 – Designed for unsurpassed laser processing versatility. The STX-44 adds value and reduces cost by providing higher quality laser-cut edges, flexible design, and quick turnaround, consistently and cost-effectively. Non-stop processing of different materials and sheet thicknesses without changing machine set-up is provided by high-speed plus high-accuracy.

It also offers fabricators a choice of three different resonators, choosing the resonator power most efficient for their business. Fabricators who cut primarily 0.50" and thinner can take advantage of the low energy and running costs of a 1500-watt system. The 2500-watt system will easily cut mild steel to .750". Those who cut thicker gauges will want the 4000-watt system, which cuts mild steel up to 1" thick. Higher wattage systems will process thinner gauges at faster speeds.

The STX-44 occupies minimal floor space, and its Meehanite frame greatly reduces vibrations that occur with high-speed cutting. This results in consistent, superior accuracy and low maintenance requirements. A completely enclosed cutting area with an improved dust collector meets FDA Class 1 safety standards, providing a safe, clean work environment.

This type of laser machine use Mazak Laser Software as: Smart system Software and PREview who will be explained later in the paper [6].

2.2.3. HyperTurbo-X – High Cutting Speed with High Cutting Accuracy. The HyperTurbo-X is a high productivity, easy to use 2D laser that provides high precision

cutting. It is exceptionally versatile for low volume production of a wide variety of parts.

Advantages: 6-Station automatic torch/tool changer , 10-Station automatic nozzle changer, Automatic nozzle inspection, NC programmable nozzle spatter removal system , Automatic focal point position calibration , Automatic lens calibration, Mazatrol PREview

This type of laser machine use Mazak Laser Software as: Smart system Software, PREview and e-Soft who will be explained later in the paper.

2.2.4. Super Turbo-X Champion – An economical workhorse with exceptional flexibility. The new Super Turbo-X Champion marks a new era in laser design. Its modular construction incorporates the newest Mazak technology at an affordable price. You can perform continuous cutting, without changing lenses or nozzles, on different materials of varying thickness. It is a superior workhorse that can be added to an existing FMS, or easily expanded into an automated system down the road.

Non-stop cutting of different materials and thicknesses. Setups times are slashed using the latest Mazatrol PREview. PC/CNC control Solid Takumi frame for ultimate rigidity. Constant beam length for optimum cutting 4'x 8' worktable.

This type of laser machine use Mazak Laser Software as: PREview and e-Soft who will be explained later in the paper.

2.3. 2D / 3D CO2 laser machine

2.3.1. Space Gear. There's simply no compromise when it comes to SPACEGEAR. Large capacities and your choice of laser resonators allow you to fit your fabrication needs perfectly. Shops that process 1/2" or thinner steel will benefit from low operating costs of a 1500W unit. At the other end of the scale, our robust 4000W laser tackles the heavy jobs with ease.

2-D mode is for flat sheet and plate up to 144" X 72" (6' x 12' model) and 7/8" thick. Rapid traverse rates of 945 ipm make for efficient and fast cutting.

3-D mode makes use of our compact cutting head with 360° rotation in the A-axis and 135° in the B-axis to maintain a normal cutting angle to all preformed sculptured surfaces. A non-contact profiler maintains a constant stand-off distance and eliminates marring of the part. SPACEGEAR can even design and build its own part locating fixtures for Done-in-One fast turnaround.

Tubes, pipes, and structural shapes can all be processed by adding a CNC rotary chuck and supports for long workpieces. In all, six axes of continuous CNC control allow you to cut weld preps, angled features, and much more in a single setup. No three-axis laser can match this flexibility and throughput.

This type of laser machine use Mazak Laser Software as: Space CAM Software who will be explained later in the paper.

Space Gear 48 Mark II – 2 dimensional / 3 dimensional - CO2 Laser Processing Machine. Simulations 6 axis control Laser Processing Machine for worksheets and cubic workpieces. -Extremely rigid construction and the 64-bit system provide exceptional precision and high-speed performance:

- Constant beam length design provides cutting capability at any point of the machine table.

- Compact torch design minimizes workpiece interference and enables high speed corner cutting.

- The cutting for square and round pipe assembly is easily programmed by the use of the simultaneous 6 axis control.

Space Gear 510 Mark II – 2 dimensional / 3 dimensional - CO2 Laser Processing Machine. SPACE GEAR 510 Mark II was designed to process a wide variety of work pieces - both flat sheets and Cubic components. Constant beam length design together with a 64-bit CNC system ensure precise and high-speed cutting [7].

Space Gear-U44. SpaceGear-U44 is a compact and affordable all-in-one laser center. Use its triple-mode, 6-axis capabilities to expand your shop's horizons and raise yourself above the competition.

2-D mode is for flat sheet and plate cutting up to 49" square and a full 7/8" thickness using our most powerful laser resonator. Slice through steel, stainless, and aluminum more productively than ever.

3-D mode brings into play Mazak's compact cutting head with 360° A-axis and 135° B-axis CNC rotary motions to quickly cut, pierce, and trim sculptured parts. Plus, the SpaceGear-U44 can design and build its own part-nesting fixture for the fastest turnaround yet, with the SPACECAM software.

Process tubes, pipes, and structural shapes by adding a CNC rotary axis and long material loader. SpaceGear-U44 does much more than a 2D laser with rotary axis because of the added A- and B-axes angular capability. You have to see it to believe it!

Choose the power to fit your customers' requirements. Fabricators' business that is .5" and thinner can benefit from low running costs of a 1500W unit. A 2500W resonator is available for medium-heavy work - leading up to our powerhouse 4000W unit for maximum thickness and higher speeds on thinner metals.

This type of laser machine use Mazak Laser Software as: Space CAM Software who will be explained later in the paper [8].

2.4. 3D laser machine for long materials

2.4.1. FabriGear 150/300. The FABRIGEAR 150 & FABRIGEAR 300 laser cuts small-to-medium size, thin or thick-walled tube and pipe respectively larger size tube and pipe, whether round, square, rectangular, or triangular. In addition, it can completely process I and H-beams, C-channel, angle iron, and additional user-defined shapes.

6-axis laser cutting means you can cut at any desired angle for weld prep, plus achieve the highest accuracy for easy fit-up of assemblies - all in a single program cycle. Moreover, FABRIGEAR'S program-controlled loading, workholding, and unloading make it a super-efficient fabrication cell requiring a minimum of labor input.

With standard length capacity of 26", FABRIGEAR accommodates standard mill lengths. And an extra-long model is available to handle materials up to 40' for FABRIGEAR 150 respectively 49' for FABRIGEAR 300 in length. Please refer to FABRIGEAR 150 for smaller

diameter capacities and FABRIGEAR 300 for larger diameter capacities.

The FG CAM programming software is easy to use with illustrated fill-in-the-blank screens for quickly generating NC code. It performs dynamic nesting and has over 70 pre-programmed cutting parameters for you to choose from. In addition, fabricators can store their own "best practices" and frequently used setups for even faster programming [9].

3. LASER SOFTWARE

3.1. Smart System

FUNCTIONS: 2D CAD function, 2D IGES input/output, 2D DXF input/output, 2D laser processing, 3D sheet metal modeling, Nesting, Program simulation, 3D SAT input.

MAZAK SMART SYSTEM is the PC based CAD/CAM system that enables you to eliminate numerous, traditional, non-productive steps in sheet metal processing and go to actual production quicker than ever before. It will allow you to create accurate drawings while at the same time viewing the geometry of your products—no matter what your experience level is. You will be able to automatically process work for the production floor without highly skilled operators.

2D and 3D CAD The powerful 2D cad system incorporates compatibility with IGES, DXF, and DWG formats. 2D unfolding, 2D parametric function, and macro function are just some of the powerful utilities built into the system. The 3D cad system includes functions such as solid modeling from 3D-view drawing, 3D parametric, and 3D data import.

CAM SYSTEM Random nesting, optimized nesting, and sort nesting are just three of the nesting functions available to you. You can save the conditions of lead-ins and micro-joints in the Technique Database. The Auto-processing function lets you select processes such as corner looping, etching, piercing, and other common processes automatically.

NETWORK INTEGRATION and FMS You can expand your network as needed easily as the system is pc based. You can download an NC program from the SMART SYSTEM directly to a machine. To be totally responsive to today's market, you can combine several Mazak laser machines with a SMART SYSTEM to create a Flexible Manufacturing System.

MAZAK SMART SYSTEM JR. The PC-based CAD/CAM system with all the features of the full Mazak Smart System with the exception of the 3D features. Only the 2D features are used in Mazak Smart System Jr.

3.2. Mazatrol PREview

Mazak's Mazatrol PREview CNC drives the laser machine through powerful 64-bit processor technology and a unique, "look-ahead" capability. Many CNC controls simply execute one command at a time, causing excess heat build-up at corners and radii, rough directional transitions, and other quality issues. PREview reads ahead through several commands, predicting problem areas such as tight corners and intricate shapes, and adjusting the cutting parameters for each shape for top-quality cutting at the lowest possible cycle time.

- The Mazatrol PREview CNC is the first of its kind, developed specifically for high-speed laser cutting.

- Conventional CNCs simply react to commands as it reads them, meaning that higher speeds generally equate to lower accuracy. For laser processing, this approach also causes problems of accuracy of holes and round corners, too much concentration of heat in square corners, and burning of coated or galvanized steel, to name a few.

- Mazak has invented a software technology in PREview based on a new, read-ahead philosophy. This concept has been successfully integrated into the CNC that automatically calculates cutting speed and acceleration for every programmed contour, predicting the optimum speed and power to reach the next cutting shape. This next-generation control makes it possible to achieve ultra high speed with ultra-precision cutting and greatly reduce heat build up.

- Currently available on the HyperGear, Hyper Turbo-X, the Super Turbo-X Mark II, the Super Turbo-X 44, and The Super Turbo-X Champion.

- Intelligent control system for all-axes linear motors.

3.3. e-Soft

Mazak e-Soft utilizes information technology to support factory operations and maximize "green light" time. Mazak e-Soft is an exclusive software package that gathers, stores, and distributes vital information for factory staff and management to act on in real time. On the factory floor or in your remote "command center," you maintain control over your laser processing with e-Soft. Its many functions maximize "green light" time, making your operations more productive and profitable! Available for the HyperGear, the Hyper Turbo-X, the Super Turbo-X Champion, and any Mazak Optronics Laser Cutting System with PREview installed.

e-Soft Features:

e-Checking: Function provides the current status of items required periodic maintenance such as charging filters, charging oil, etc. It provides predictions and notification when maintenance is called for.

e-Monitor: Capability monitors machine operating parameters and generates appropriate alarms. It provides focused troubleshooting advice to minimize downtime and service intervention.

e-Manual: Features complete resident manuals for machine operation. Information about any item is easily accessed through a simple search function.

e-Scheduler: Controls the process start time, finish time, and delivery information of each job in real time. It allows you to prioritize jobs in the queue and schedule them to satisfy customer and productivity demands.

e-Nesting: Optional e-Nesting function allows re-nesting urgent parts into existing production schedules for the quickest possible customer response.

e-Technical Help: is a searchable library of helpful information. Cutting conditions, programming techniques and much more are always available right at the machine.

3.4. SpaceCAM

FUNCTIONS: 3D IGES input, 3D laser processing of formed tubing or stamped parts, Program simulation, Nozzle interference check, Fixture nesting, 3D VDA-FS

input, 3D Parasolid input, Fixture data creation & NC code generation.

SPACECAM 3D CAM-PC based system will allow you to process more 3D parts by drastically reducing the typical preparation time needed to cut a part.

Program automatically from 3D CAD data. You can import 3D IGES, parametric solid, and VDA-FS data and SPACECAM will process tool paths automatically or manually if desired.

Check for torch position and interference before cutting a part. The built in interference check function will help you prevent collisions between the torch and the part before they happen. You can use the interactive display to modify the torch position at any point along the cut path.

Automatic fixture making from 3D data. Eliminates the need for manual fixture design and construction. CAD data is automatically used to generate shapes of fixtures. Assembly fitting allowances of the fixture are also automatically set. You simply assemble the fixture parts on the table by matching the coordinates on the fixtures with the corresponding point on the base plate.

3.5. FG CAD/CAM

FUNCTIONS: 2D CAD function, 2D IGES input, 2D DXF input, 3D pipe design menus, 3D IGES input, Nesting Program simulation, 3D laser processing of tube or structural shapes for the rotary axis, Nozzle interference check, 3D Parasolid input.

FG-CAD/CAM is a PC based system for tube & pipe processing will process the most complex pipe shapes in a fraction of the time traditionally used. 3D modeling enables you to produce tighter fitting, more accurate pipe joints.

Advantages:

Easy Data Input for Structural Steel and Pipe Countouring and Piercing. Nine standard pipe and structural steel cross sections are included in the program menu to match the part you are processing quickly and easily. Thirty cutting conditions are available for each application designated under a material type and thickness. Additionally, cutting strategy files can be accessed to allow for specialized piercing or cutting techniques to be automatically applied.

Shape materials automatically from imported data.

You can import IGES, DWG or DXF data and FG-CAD/CAM will create a 3D material shape from an arbitrary 2D shape.

Flexible application of cutouts and nesting function FG-CAD/CAM allows the user the flexibility to apply any cutout onto the part utilizing full axis movement for

beveled processing or as a cutout applied perpendicular to the surface of the part for 2D processing of the cut. The nesting function allows you to combine various parts together on a common stick length for continuous processing in a single NC program.

Check for torch position and interference before cutting a part. The built in interference check function will help you prevent collisions between the torch and the part before they happen. You can use the interactive display to modify the torch position at any point along the cut path. Easy to use CAM functions include profiling On/Off, micro-joint addition, lead-in type change, and others.

The decision of hybrid designs versus flying optics is, therefore, only a part of the equation. To obtain the optimum performance and throughput from an investment in laser technology, factors like material mix, thickness range, lot size, appropriate levels of automation, and minimizing setup time remain important. All of these factors should be evaluated by qualified application engineers, such as the engineering staff at Mazak Optonics, to maximize return on investment in laser technology [3].

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