Coherent Laser Machine Tools

COHERENT®

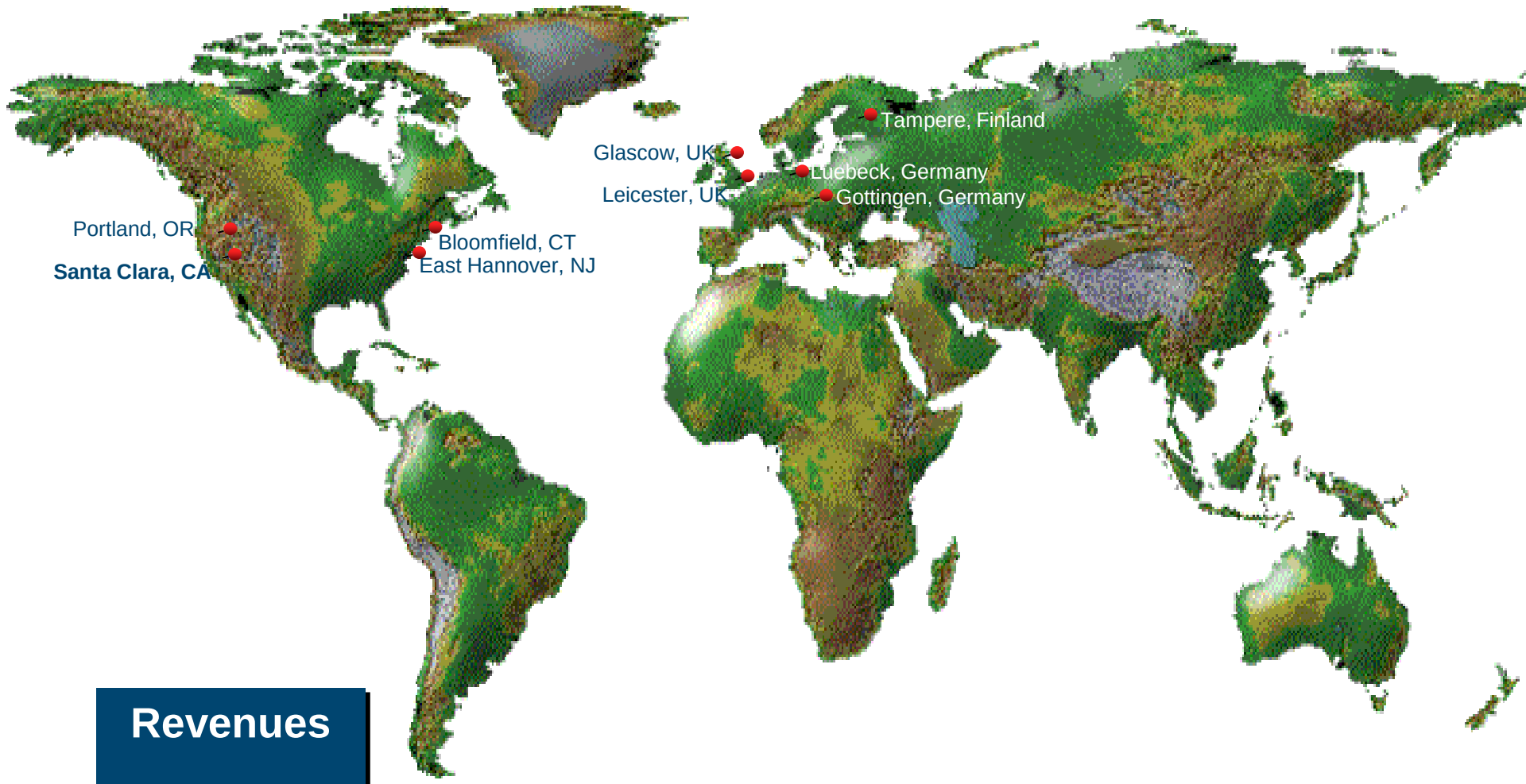
The Photonics Company

Provider of Photonics Solutions – Primarily Lasers for Commercial and Scientific Research Applications

- Founded in 1966
- Fiscal 2010 Sales $605 Million
- Fiscal 2010 Orders $696 Million
- 2.006 Employees
- Sales 34% U.S. and 66% International
- 355 Patents, 92 Pending

Note: Photonics is the Merger of Lasers, Optics and Electronics
Source: Company management as of 10/3/10.

Research & Production Facilities

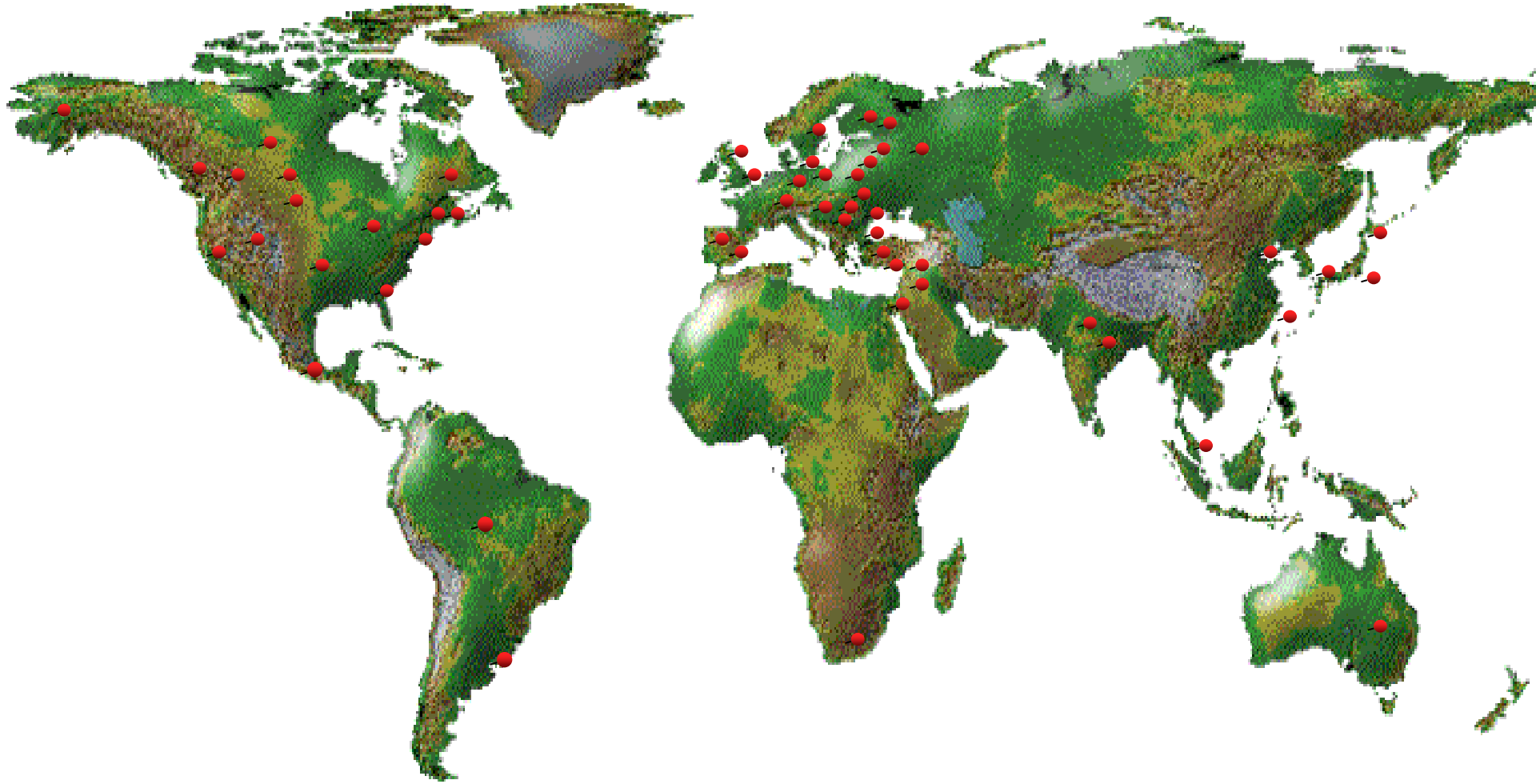


Revenues

U.S. = 33%

ROW = 67%

Sales & Service Facilities



Introducing Coherent Laser Machine Tools

LIGHTCELL

- Cost Effective Entry Level
- Powerful 150W CO2-Laser
- Simple Operation

OMNIBEAM

- Flexible Cutting System
- Up to 400W CO_2-Laser
- Automation Features

METABEAM

- Focused on Sheet Metal
- Up to 1000W CO2-Laser
- Capacitive Height Sensor

Machine and Laser Source Out of One Hand

Highest Reliability and Performance !

BEAM – Models Overview

	LightCell	OmniBeam	MetaBeam
Engraving and Cutting	X	X	X
Z-Axis Travel > 100mm		X	X
Auto Focus		X	X
Cuts Stainless Steel up to 2mm		400W	X
Cuts Stainless Steel up to 4mm			X
Cuts Acrylic up to 30mm		X	X
Manual Gas Regulator	X		
Software Controlled Gas Gegulator		X	X
Automatic or Manual Pallet Change		O	O
High Pressure Cutting Head		O	X
Capacitive Height Sensor		O	X
Alternate Cutting Optics		O	O
Basic HMI Software	X		
Pro-Panel HMI Software		X	X
Basic Vision System	O		
Enhanced Vision System		O	O
Power Levels	150W	150W 250W 400W	400W 1000W
Purchase Price	+	++	+++

X: Standard

O: Option

Product Matrix

LightCell

Capable and Cost Efficient Cutter/Engraver

OmniBeam

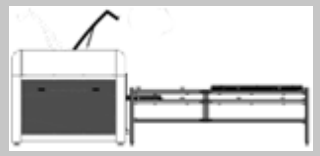
The Best General Purpose Cutting Tool

MetaBeam

Optimized for Metal Cutting

Productivity Enhancement Options

Manual dual 4'x4' pallet

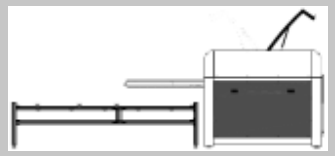


Front Load

Auto dual 4x4' pallet

Continuous Cutting

Auto 4'x8' pallet



Pallet Auto-Feeds

System Upgrades

Pro-Panel

Larger display and additional software

Machine Vision

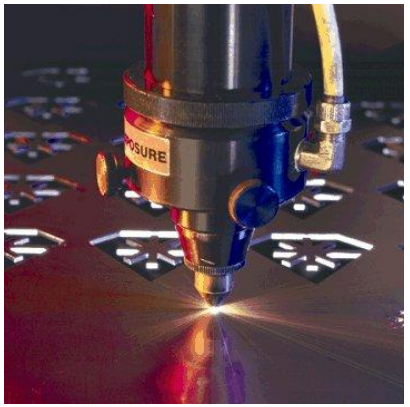
Automatic Alignment

- ***Exhaust System***
- ***Chiller Units***
- ***Bar Code Job Load***
- ***High Pressure Assist Gas Regulator***
- ***Spares***

Main Markets

Job Shops

- Processing All Kinds of Material from Metal & Plastic to Organic Materials like Leather, Textile or Wood.
- Different Lot Sizes from Single Units to Large Volume
- Need Maximum Flexibility



Universities & Laboratories

- Large Variety of Parts for Internal Use i.e. Modeling
- Demonstration & Development

Massachusetts Institute of Technology

STANFORD UNIVERSITY

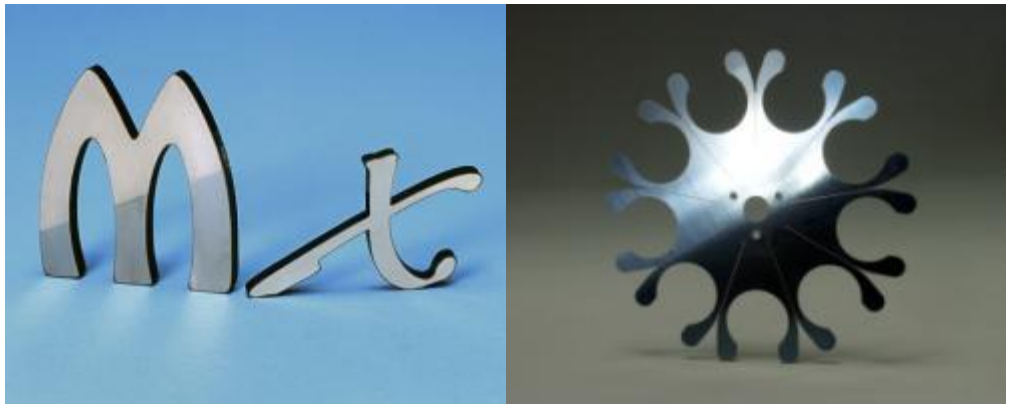
Lawrence Livermore National Laboratory

NIST National Institute of Standards and Technology
Technology Administration
U.S. Department of Commerce

Main Markets

Metal Industry

- Precision Sheet Metal



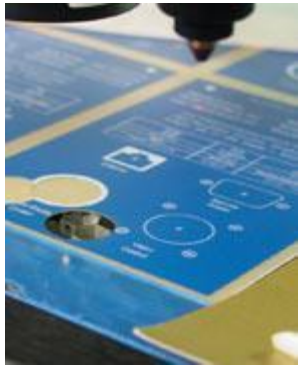
Plastics & Fabrics Fabrication

- Industrial Fabrics – Filters
- Clothing
- Aerospace – Insulation, Reflective Wraps
- Automobile Parts
- Electronics – Membrane Keyboards
- Medical Devices

Main Markets

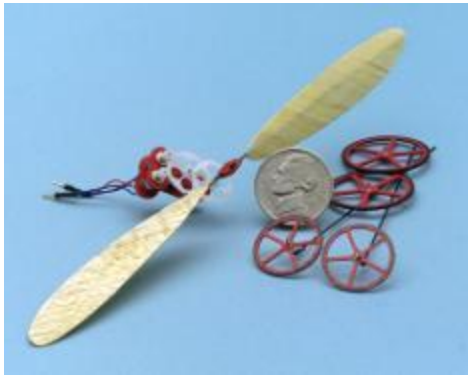
Printing & Nameplates

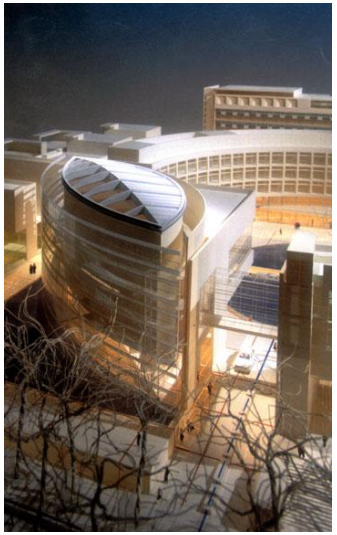
- Specialty Graphics
- Labels, Signs



Wood Industry

- Models – Architectural, Movie, Toys, etc
- Furniture





Typical Materials Processed

Organics

- **Leather, Rubber, Cork, Wax**
- **Advantages are:**
  - No Post-Processing
  - Less Material Waste
  - Tool Variability Eliminated
  - Zero Tool Load
  - Small Tool Cut Width
  - Power Control

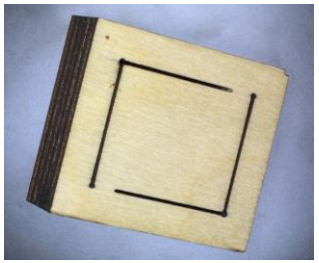
Paper

- **Cardboard, Matte Board & Paper**
- **Advantages are:**
  - Eliminate Costly Dies
  - Digital Registration System
  - Zero Tool Load
  - Small Tool Cut Width
  - Power Control
  - Tool Variability Eliminated

Typical Materials Processed

Wood

- **Plywood, Veneer, MDF, Dieboard**
  - Clean Processing
  - Less Material Waste
  - No Burning
  - Small Tool Cut Width
  - Tool Variability Eliminated
  - Zero Tool Load



Plastics

- **Acrylic, Delrin, ABS, PET, PE, PP, Olephins, Polyimide, Polycarbonate, Urethanes, Aramid, Polyester, Polystyrene, Polyurethane, Nylon**
  - Small Tool Cut Width
  - Process Improvements Like Pre-laminating Large Sheets of Materials Before Cutting
  - Zero Tool Load
  - Clean Work Environment
  - Flame Polished Parts Ready to be Shipped Right off the Table.
  - Tool Variability Eliminated

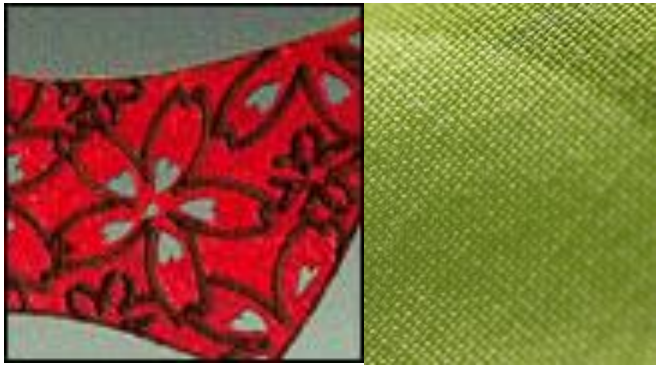
Typical Materials Processed

Composites

- **Fiberglass, Phenolic & Solid Surface Material (Corian)**
- **Advantages are:**
  - Precise Edges
  - Less Material Waste
  - Tool Variability Eliminated

Fabrics

- **Cotton, Kevlar, Polyester Fabrics & Velcro**
- **Advantages are:**
  - No Fraying
  - Tool Variability Eliminated
  - Zero Tool Load
  - Small Tool Cut Width



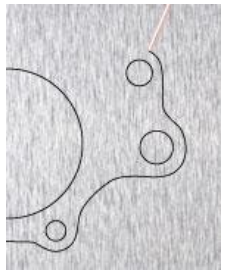
Typical Materials Processed

Flexible Circuits

- **Polyester & Polyimide (Kapton)**
- **Advantages are:**
  - Zero Tool Load
  - Small Tool Cut Width
  - Power Control

Metals

- **Alloy Steel, Aluminum Alloys, Brass, Carbon Steel, Stainless Steel, Titanium & Tool Steel**
- **Advantages are:**
  - No De-burring Required
  - Less Material Waste
  - Tool Variability Eliminated
  - Zero Tool Load
  - Small Tool Cut Width



Intricate Wood Designs Cut at Production Speeds

- Intricate Wood Parts for Architectural Models, Custom Woodworking or Inlays.
- Perfect Parts, Splinter Free and with Beautiful Edges.
- Cut From Any Type of Wood-based Materials.

Create Detailed Designs Impossible with a Router

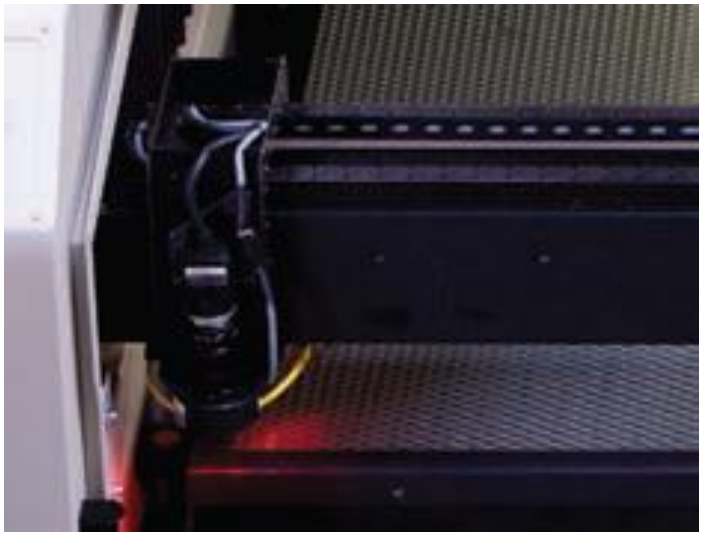
Coherent Laser Cutting Machines…

- Cut Any Shape Imaginable with Highest Flexibility
- Produce Small Kerfs of Only 0.15mm
- Cut Fine Details and Smallest Pieces with Highest Precision
- Allow to Produce Inlays Without Gaps
- Avoid Burning or Breaking
- Save Costs Due to Much Less Waste of Material

Enjoy the Benefits of a Cleaner Machine.

Coherent Laser Cutting Machines…

- Are Completely Enclosed >>> Clean, dust-free work environment
- Have High Laser Power >>> Quick Vaporization without Burning
- Use a Stream of Compressed Air >>> Virtually Dust Free Parts
- Make Masking Unnecessary >>> Huge Time Savings
- Have an Integrated Exhaust >>> Keeps Workshop Clean and Odor-free



Simple Operation

Coherent Laser Cutting Machines…

- Use Standard Illustrator or CAD Files
- Enable the Operator to Simply Load the Material, Select the File to Cut, and Start the Machine.
- Do Not Have a Complicated CNC
- Use a Wear-free, Non-Contact Tool
- Do not Need Expensive Cutting Tools
- Provide Easy Fixing of Workpieces

Crash Sensor System

Cutting Head Contains a Crash Sensor…

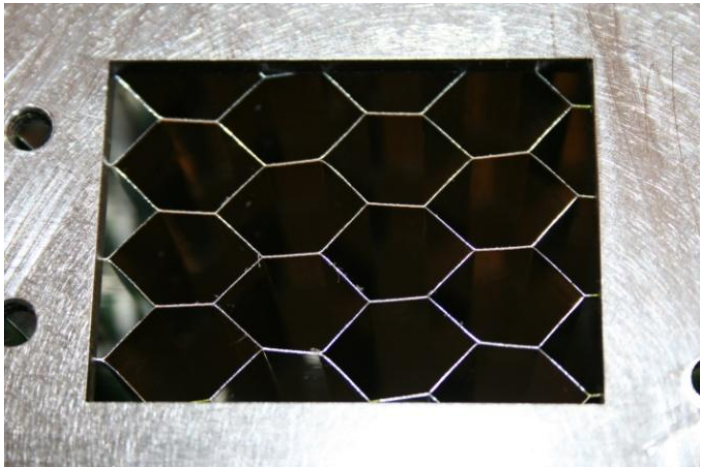
- Mounted on a Magnetic Mount, With Three Electrical Contacts
- Immediate Machine Shut Down in Case of Collision
- Protection of Cutting Head and Workpiece
- Reset the Machine by Simply Fitting the Cutting Head back into Place

Design Principles

Quality Frame

- Turn-Key Industrial Cutting Machines
- Designed and Factory Built for Precision and Reliability.
- Manufacturing Techniques Originally Developed for Aerospace Industry
- Extremely Compact and Lightweight
- Capable of Standing up to Years of Operation,

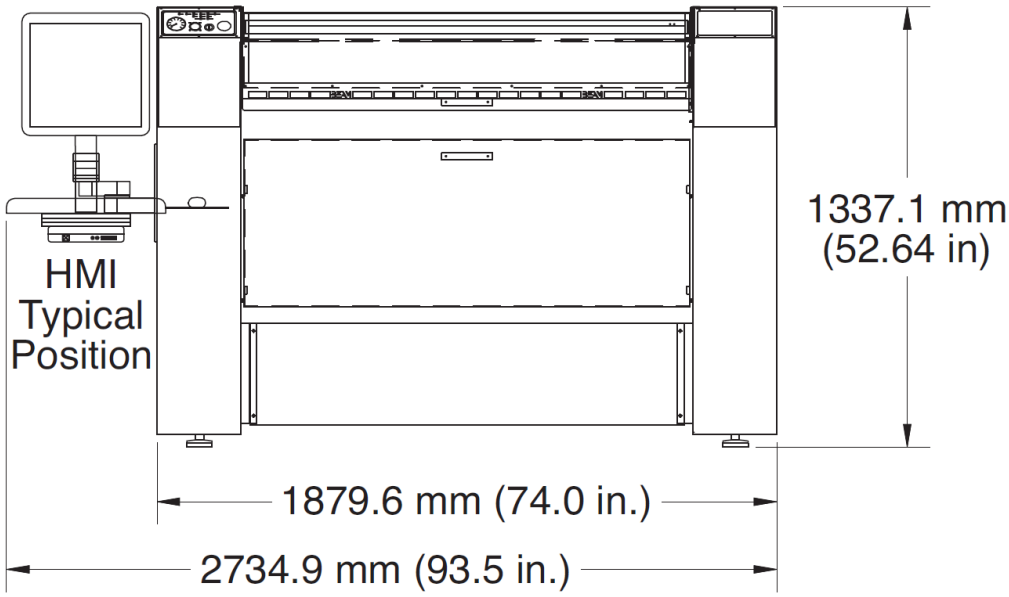
  24 Hours a Day, 7 Days a Week.



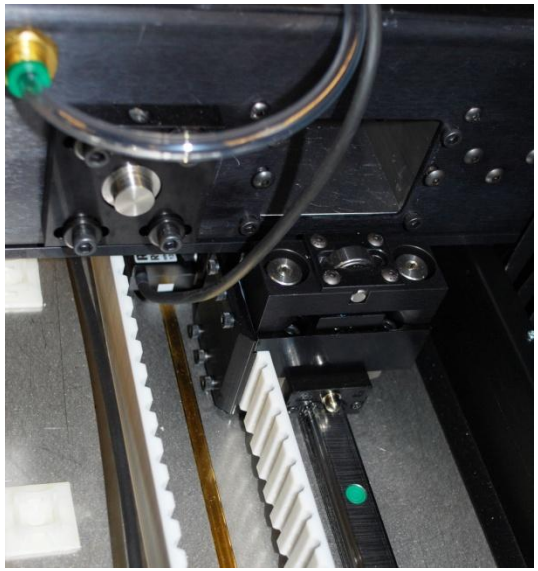
Design Principles

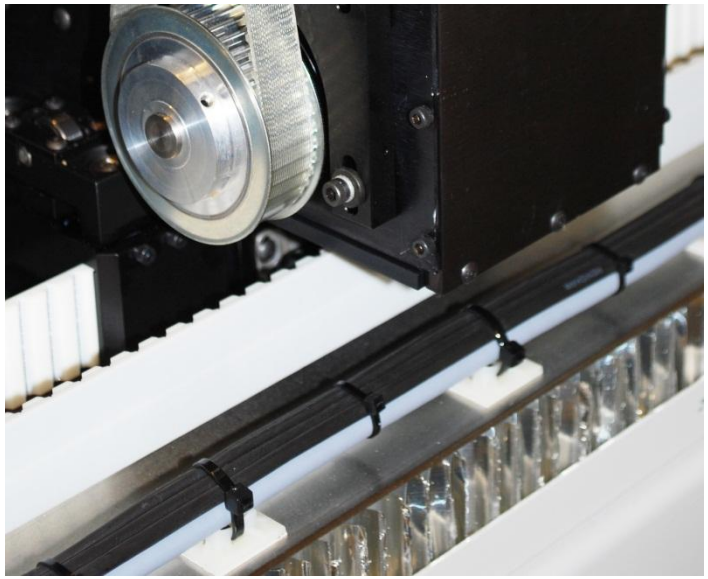
Compact Size

- Extremely Compact and Requires a Minimal Amount of Floor Space.
- Framework Made of Precisely Machined Heavy Gauge Steel and Aluminum Components.
- Rigid and Light Weight Structure (Only 700kg)
- Separate Compartments for Water-cooled Laser and Power Supplies.



Accuracy by Design

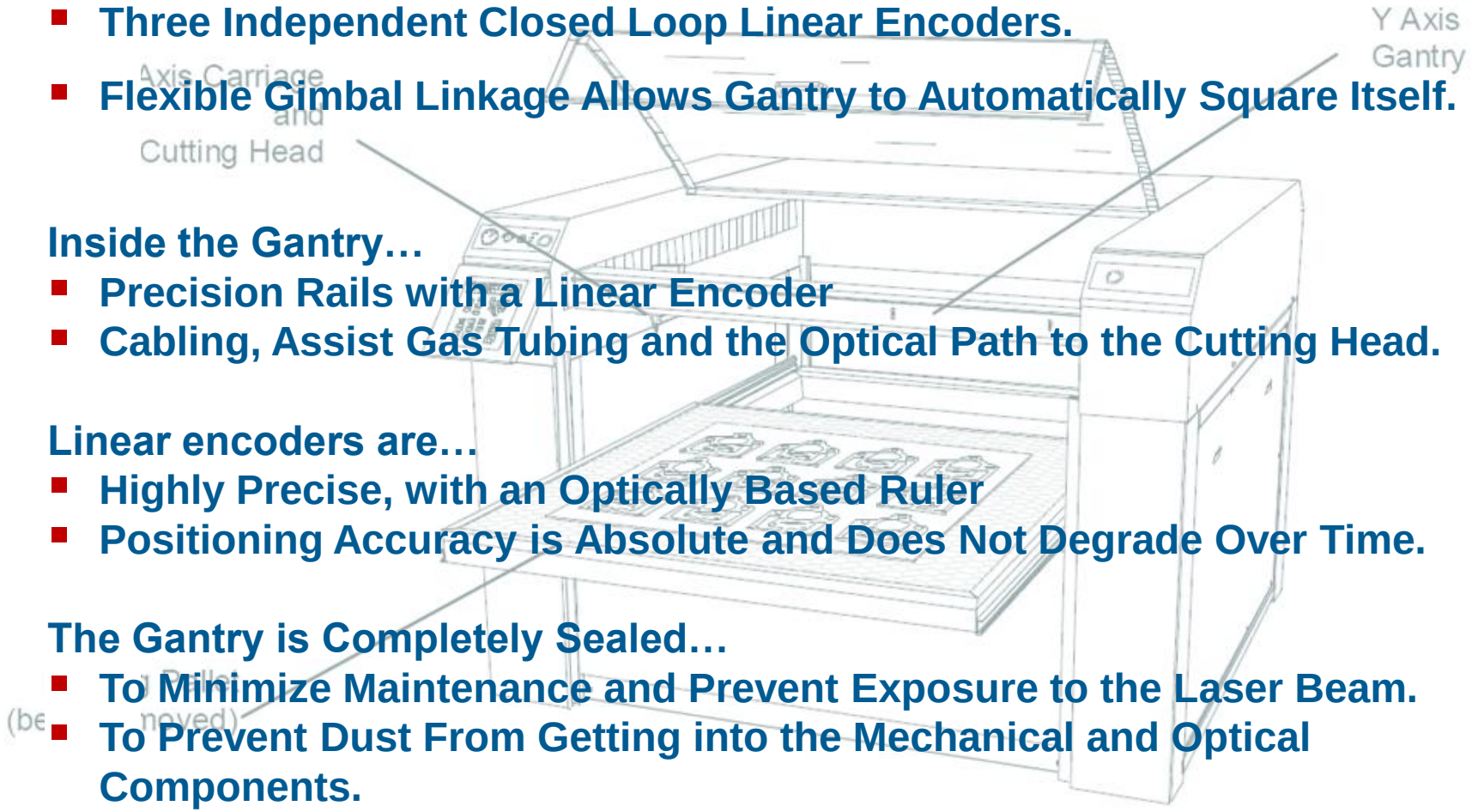




- 2µm-Step Linear, Optically Read Encoders on All Axes
- Closed Loop Brushless Servo Motors
- Precision Ground Cross Roller Bearings
- True CAD/CAM Software Enables Higher Cut Accuracy than Printer Software

Laser Gantry Design

- Two Synchronized Servomotors
- Three Independent Closed Loop Linear Encoders.
- Flexible Gimbal Linkage Allows Gantry to Automatically Square Itself.



Inside the Gantry…

- Precision Rails with a Linear Encoder
- Cabling, Assist Gas Tubing and the Optical Path to the Cutting Head.

Linear encoders are…

- Highly Precise, with an Optically Based Ruler
- Positioning Accuracy is Absolute and Does Not Degrade Over Time.

The Gantry is Completely Sealed…

- To Minimize Maintenance and Prevent Exposure to the Laser Beam.
- To Prevent Dust From Getting into the Mechanical and Optical Components.

Auto Focus System

The Cutting Head With Mechanical Focus Sensor...

- Easy Detection of Material Thickness
- Automated Procedure
- Simple to Set Different Nozzle Offsets for Different Applications

Precision

Motion Control Computer

- Controls the Motors and Manages All Safety and Maintenance Functions of the Machine.

Power Control

- The System Monitors the Actual Cutting Speed and Dynamically Adjusts Laser Power as the Speed Changes. This Ensures High Quality Cuts even of Most Intricate Shapes in Critical Materials.

Accuracy / Resolution

- The Overall Accuracy of Coherent Laser Cutting Machines is +/- 25µm, with a Repeatability of +/- 5µm.
- The Width of Cut (Kerf) Can Vary Between Materials. Once the Kerf has been Established, it Can be Compensated for Using the Offset Feature in the Machine's CAD/CAM Software (Laser-Link).

Look Ahead Contouring

- "Look-Ahead" Capability Allows to Pre-Process Several Hundred Vector Points.
- Machine Will Move Smoothly Through the Points Without Stopping. Dramatically Reduce Cutting Time for Complex Curved Shapes.

Production Automation Options

Auto Pallet Shuttle

- Auto-load Dual Processing Pallets (1220mmx1220mm)
- Job Management Software

Manual Pallet Shuttle

- Manual Load Dual Pallet
- Continuous Cutting

4 x 8 Pallet

- Extended Processing Pallet 1220mmx2440mm)
- Easy Access Load Table

Machine Vision

- True Machine Vision for Registration
- Special Features Like Auto-Scaling Before Cutting.

With Virtually no Setup Time, with Multiple Pallets and Automated Operation, there can be a Dramatic Reduction in Operating Hours Compared to Traditional Cutting Machines.

Designed to Protect

Class I Safety

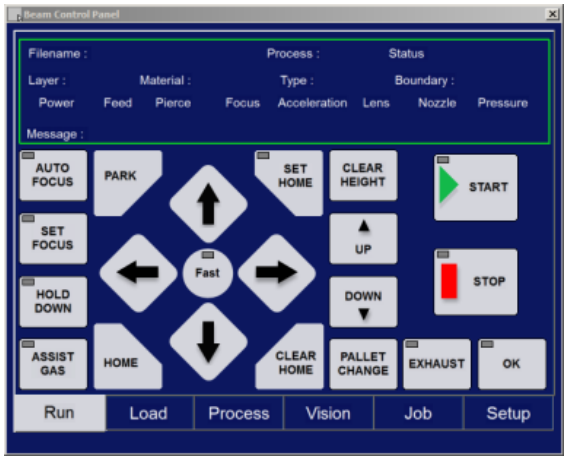
- Cutting Area Enclosed by a Steel Reinforced, Polycarbonate Safety Cover.
- Viewing of the Cutting Area While Preventing Exposure to Laser Radiation.
- All Safety Covers Interlocked.
- All Interlock Switches are Redundant.
- Safety Covers also Have Serpentine Seals to Prevent Light Leaks.

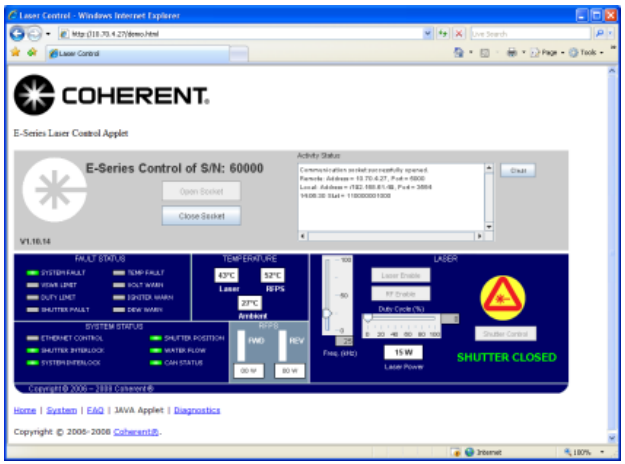
Exhaust

- Dual-Channel Exhaust System.
- Vacuum Creates Hold-down Pressure for the Material Being Cut.
- Secondary Exhaust Removes Residual Fumes and Smoke from Cutting.
- The Top Safety Cover Contains a Baffled Vent and Allows Air to Come into the Machine Without Allowing Laser Light to Escape.

Easy to Use – Intelligence Built In

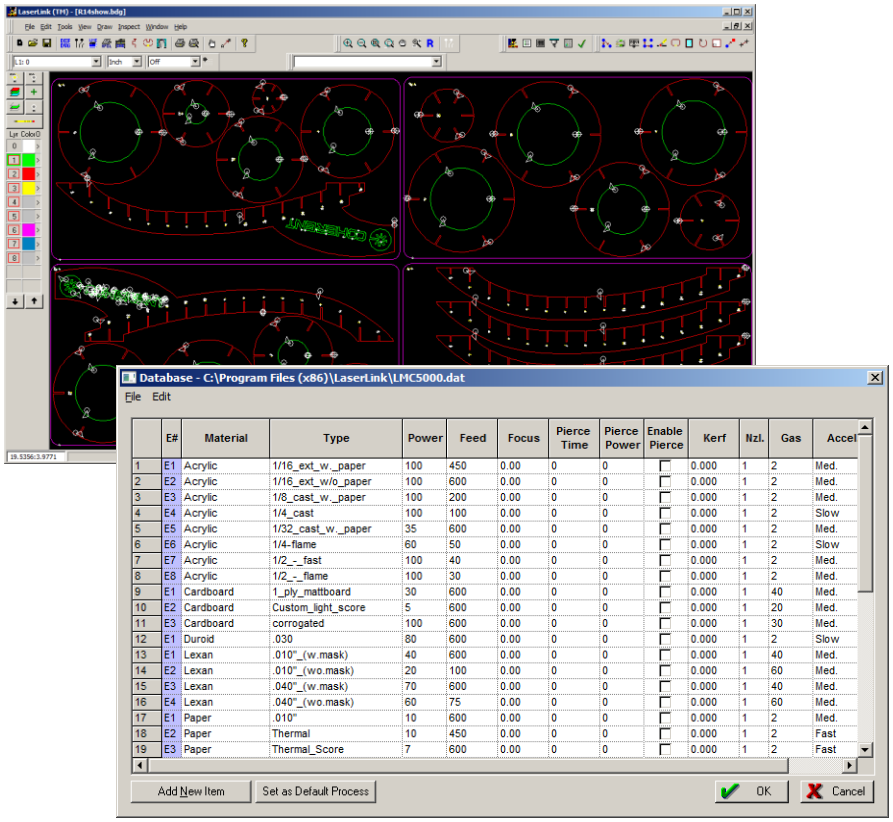
- Easy Installation of Machine (2 Hours)
- Job Management Software and System Control Software
- Direct Importing .dxf, .jpg, .hpgl, G-Code, and More File Types
- Cutting Intelligence Built in
- Material Parameter Database
- Network Integrated System Set Up (Ethernet Network)
- Control Diagnostics for 400W and 1kW Systems





Software

- Ethernet Ready Machining Workstation
- High Resolution CAD Drawings
- Built In Cutting Database.



	E#	Material	Type	Power	Feed	Focus	Pierce Time	Pierce Power	Enable Pierce	Kerf	Nzl.	Gas	Accel
1	E1	Acrylic	1/16_ext_w._paper	100	450	0.00	0	0		0.000	1	2	Med.
2	E2	Acrylic	1/16_ext_w/o_paper	100	600	0.00	0	0		0.000	1	2	Med.
3	E3	Acrylic	1/8_cast_w._paper	100	200	0.00	0	0		0.000	1	2	Med.
4	E4	Acrylic	1/4_cast	100	100	0.00	0	0		0.000	1	2	Slow
5	E5	Acrylic	1/32_cast_w._paper	35	600	0.00	0	0		0.000	1	2	Med.
6	E6	Acrylic	1/4-flame	60	50	0.00	0	0		0.000	1	2	Slow
7	E7	Acrylic	1/2_-_fast	100	40	0.00	0	0		0.000	1	2	Med.
8	E8	Acrylic	1/2_-_flame	100	30	0.00	0	0		0.000	1	2	Med.
9	E1	Cardboard	1_ply_mattboard	30	600	0.00	0	0		0.000	1	40	Med.
10	E2	Cardboard	Custom_light_score	5	600	0.00	0	0		0.000	1	20	Med.
11	E3	Cardboard	corrogated	100	600	0.00	0	0		0.000	1	30	Med.
12	E1	Duroid	.030	80	600	0.00	0	0		0.000	1	2	Slow
13	E1	Lexan	.010"_(w.mask)	40	600	0.00	0	0		0.000	1	40	Med.
14	E2	Lexan	.010"_(wo.mask)	20	100	0.00	0	0		0.000	1	60	Med.
15	E3	Lexan	.040"_(w.mask)	70	600	0.00	0	0		0.000	1	40	Med.
16	E4	Lexan	.040"_(wo.mask)	60	75	0.00	0	0		0.000	1	60	Med.
17	E1	Paper	.010"	10	600	0.00	0	0		0.000	1	2	Med.
18	E2	Paper	Thermal	10	450	0.00	0	0		0.000	1	2	Fast
19	E3	Paper	Thermal_Score	7	600	0.00	0	0		0.000	1	2	Fast

LaserLink

- Offline Job Management
- Direct Import of dxf, bmp, jpg, hpgl, CNC (G-Code), and More
- Drawing Environment for Editing
- Built In Process Database
- Array or Step/Repeat
- Scaling
- Lead in/Lead out
- Kerf Compensation
- Multilayer / Multi-Process Capability
- Job Preview

Low Cost of Ownership

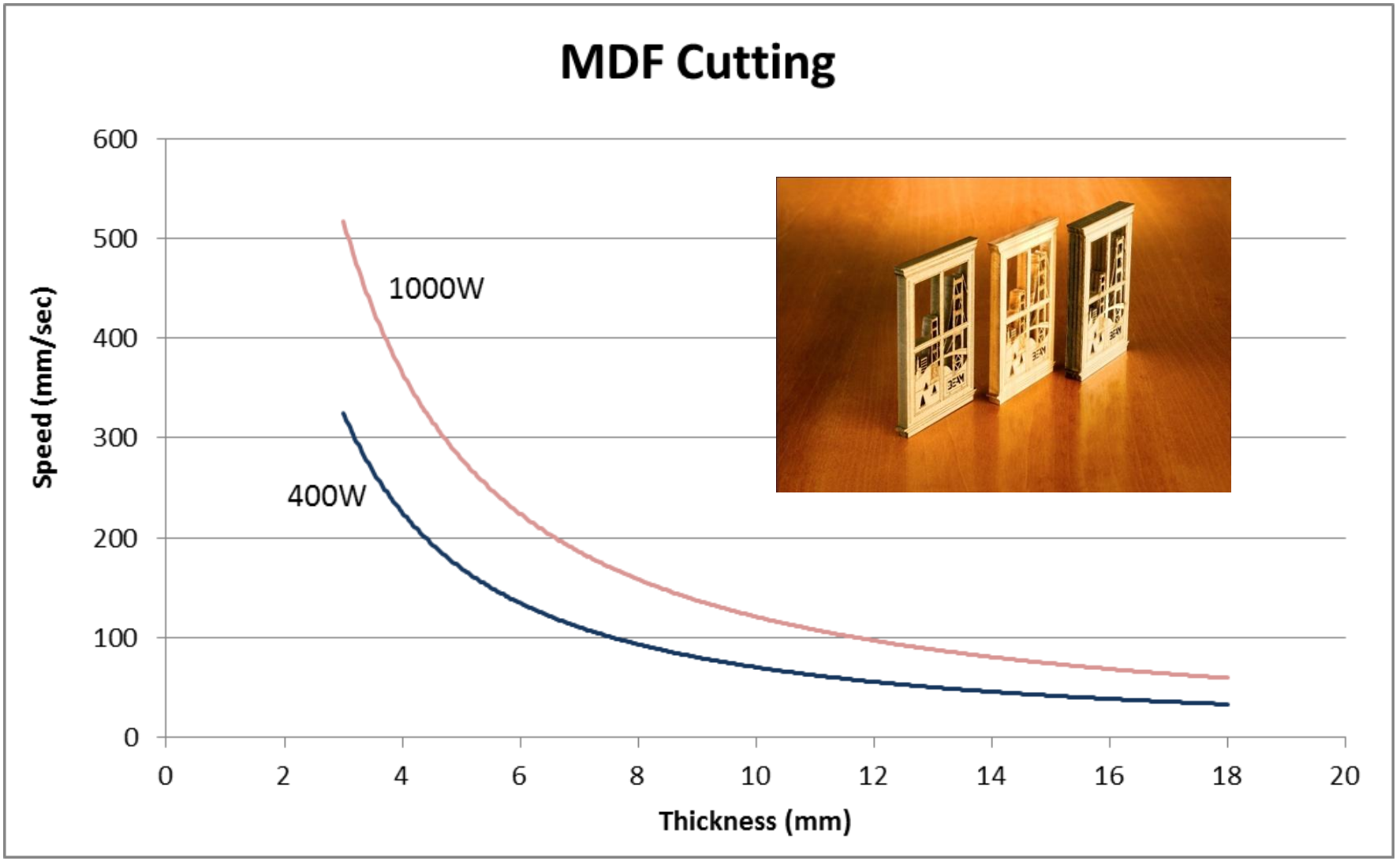
- Lower Investment Cost than Comparable Traditional Machine Tool
- Capital Expenses Lower to Allow Incremental Capacity Increase
- Smaller Footprint
- Sealed CO_2-Laser Technology Does Not Require Flowing Gas or Expensive Blower / Vacuum Pump Maintenance
- Effective Use of Laser Power Reduces Utility Cost
- High Machine Uptime Reduces Maintenance Cost
- Machine Diagnostics Enable Roadmap to Preventive Maintenance

Making Money Instantly

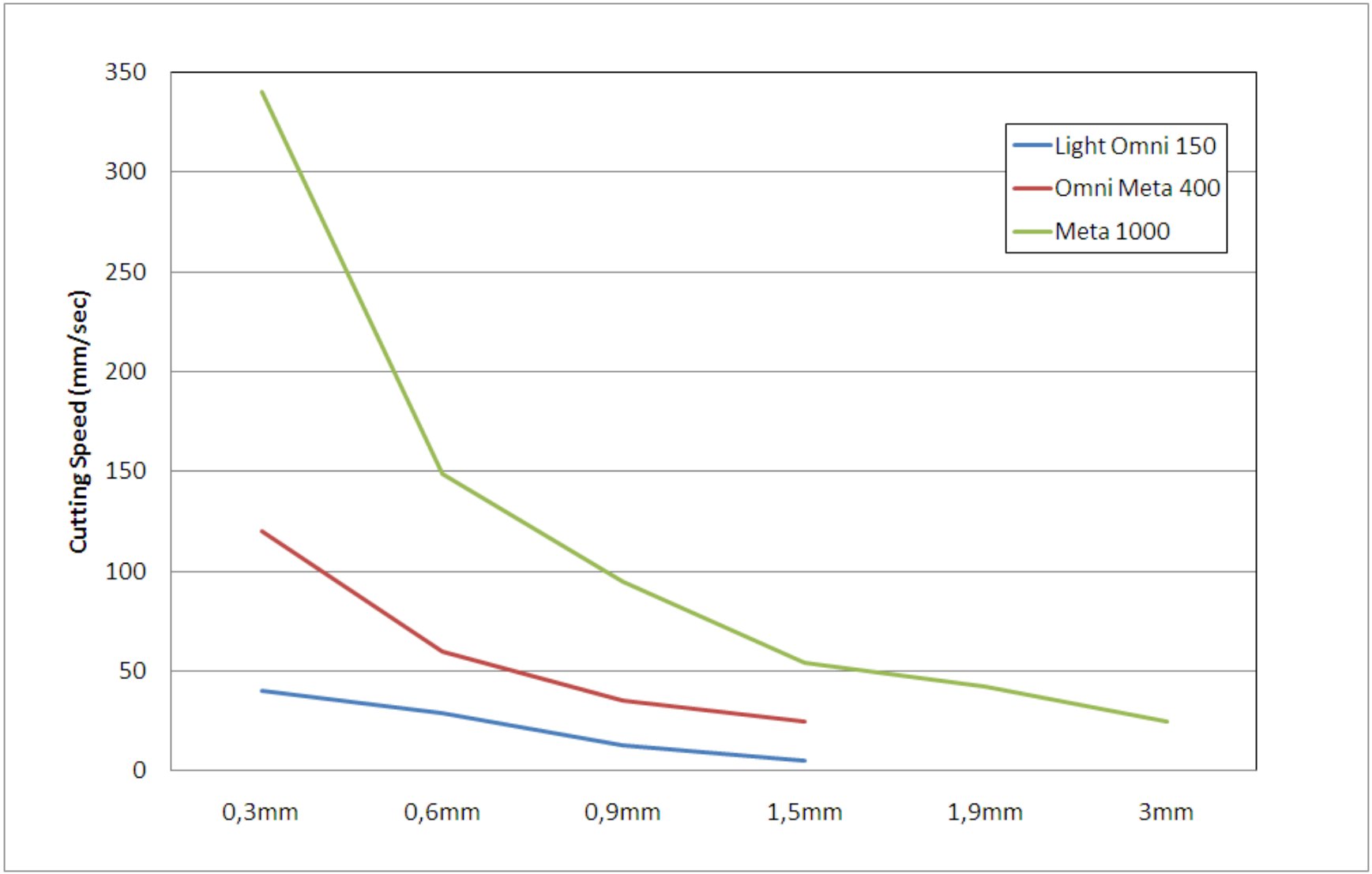
Compact	Minimum Factory Space
Accuracy by Design	Accurate Part Cutting in Less Time
Precision Power Control	Precise, Clean Parts, Wide Range of Materials
True Machine Tool	Robust Tool, Short Learning Curve
Easy to Use – Intelligence Built in	Quick Parts Production
Low Cost of Ownership	Profitability Quickly

Product ROI in Typically Less than 1 Year

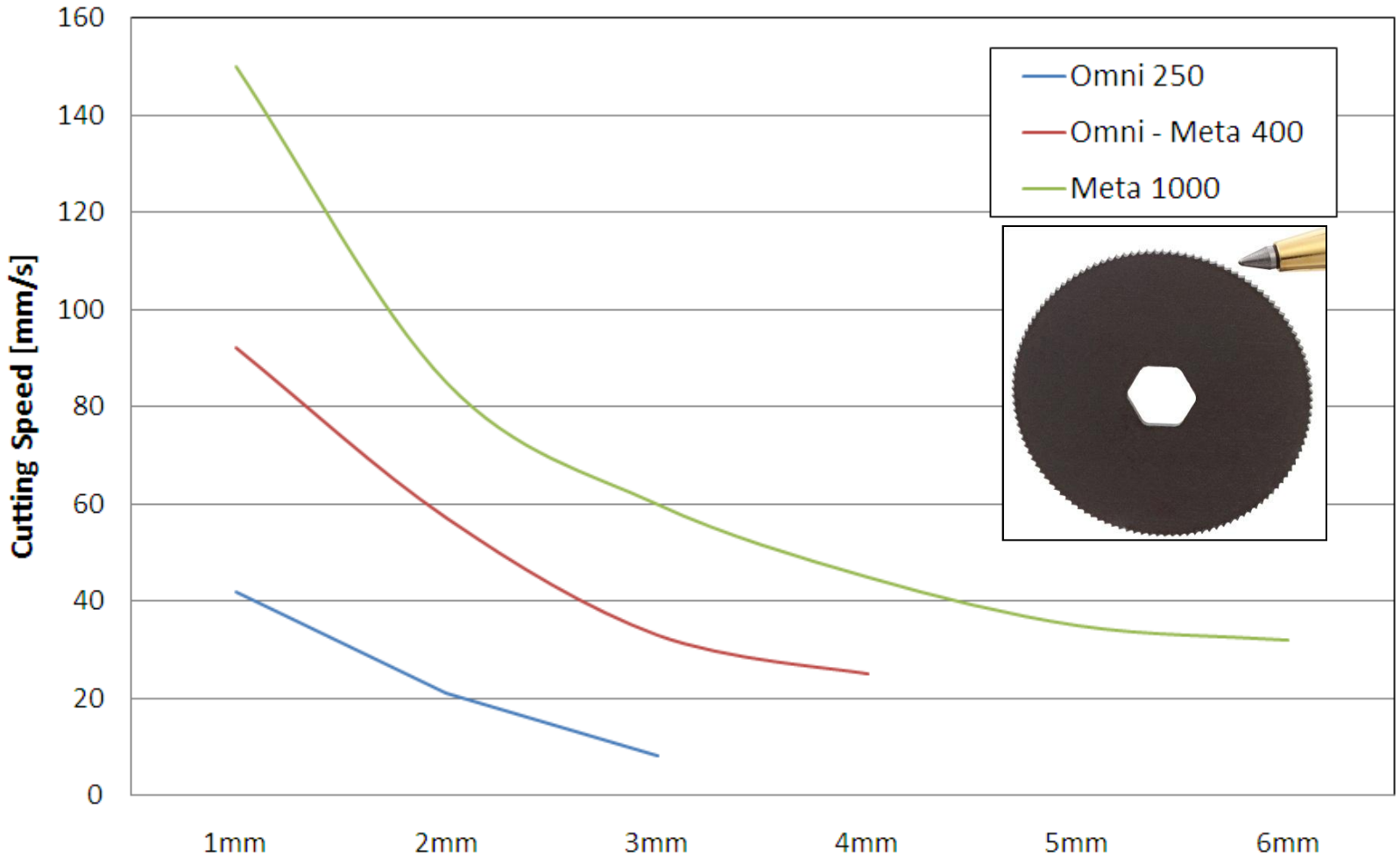
Machine Capabilities MDF



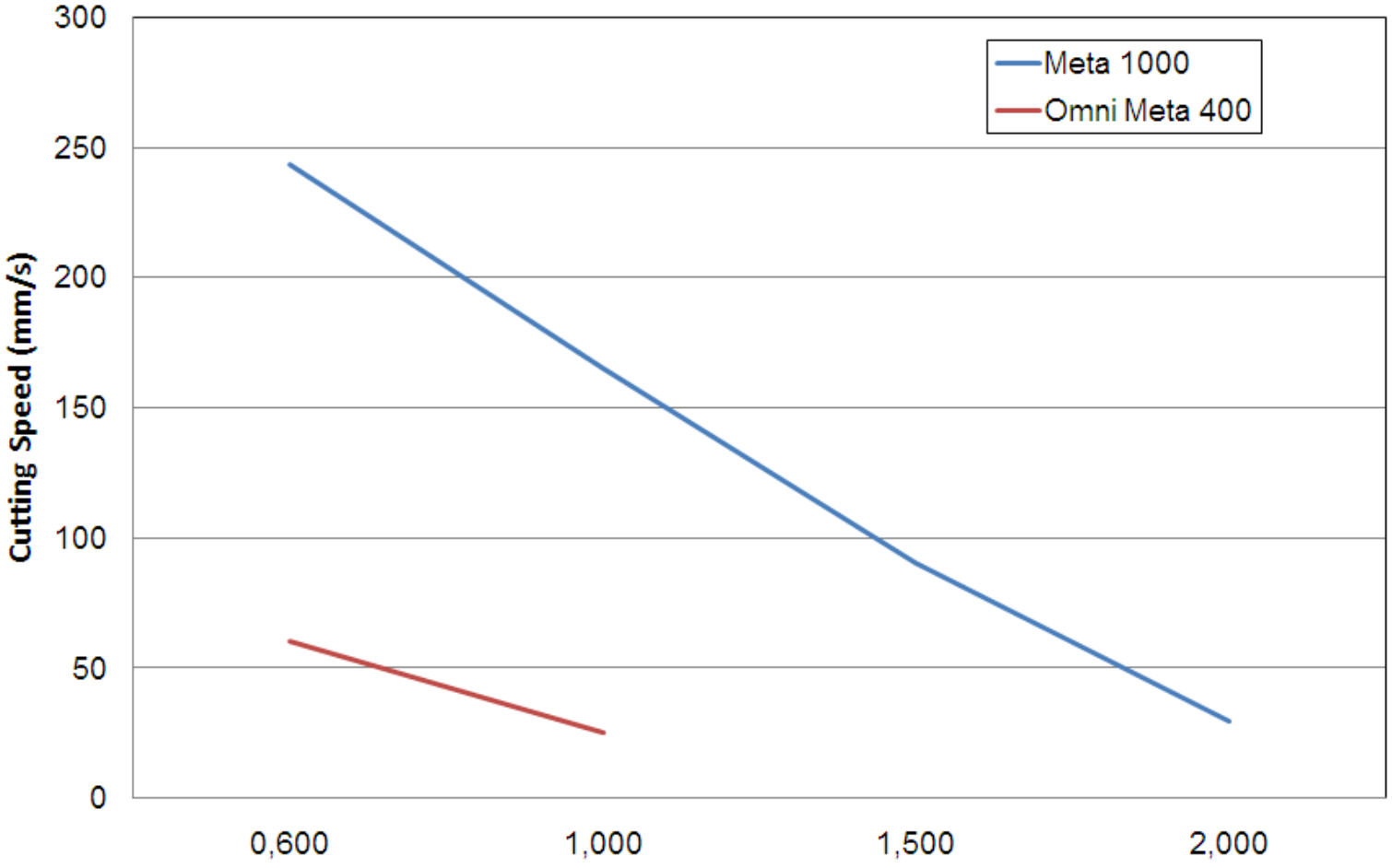
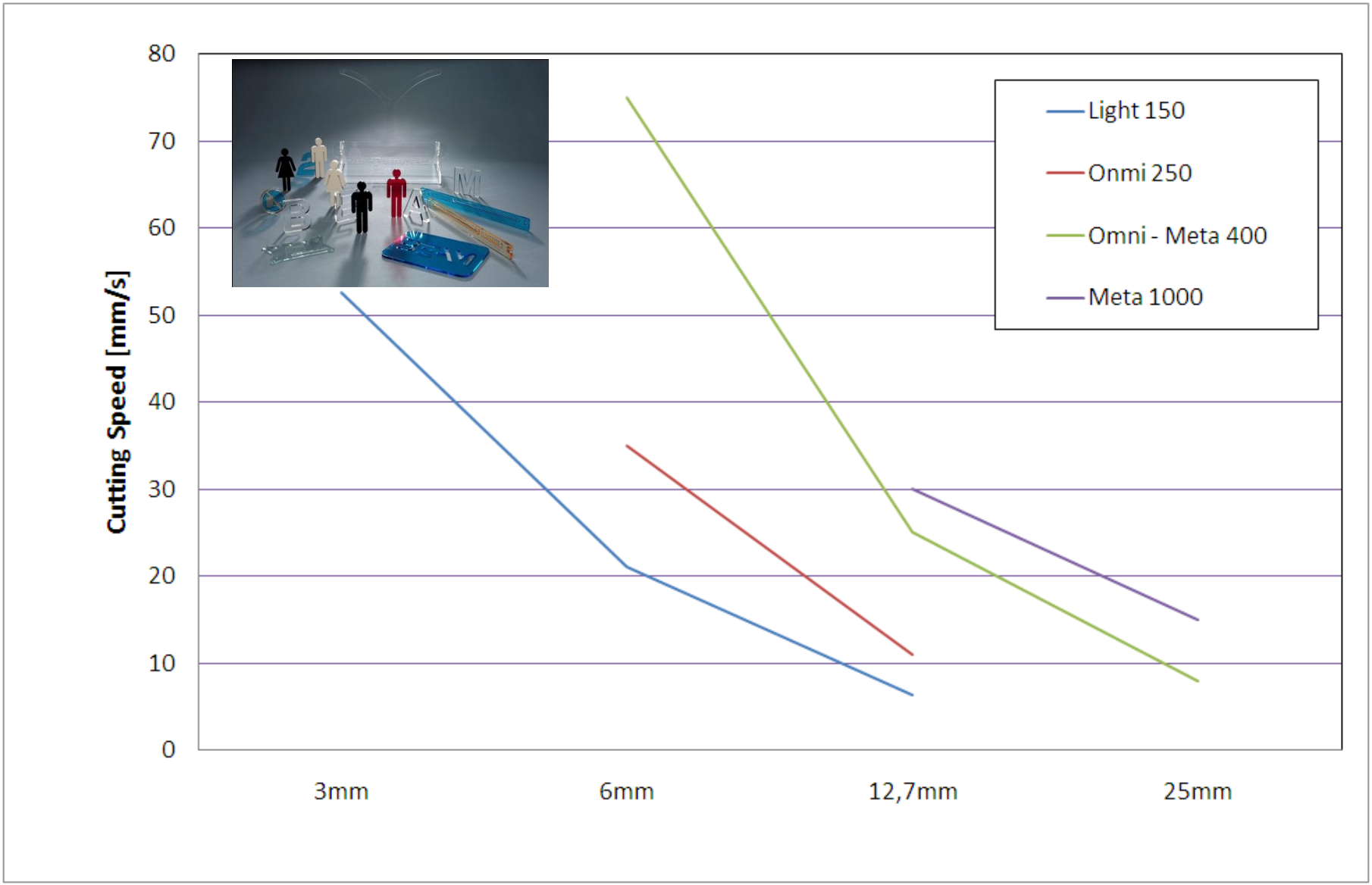
Machine Capabilities Stainless Steel



Machine Capabilities Mild Steel



Machine Capabilities Aluminum



Machine Capabilities Acrylic