High Speed Lasers – How Fast Is Fast?

History Of Laser Cutting Speeds

Barriers To Higher Speeds

The Math – Why They Make Sense

Video Comparison

History Of Sheet Metal Laser Cutting

Fixed Beam

Punch Laser Combination

Hybrid

Flying Optic

Flying Optics With Direct Motors

Parallel Kinematics Linear Motors

Fixed Beam

- Stable Beam Delivery
- Easy to Operate
- Drags Sheet

Punch Laser Combination

- Fast Hole Making
- Forming Operations
- Drags Sheet
- Laser Cutting is Slow

Hybrid

- Material is stationary
- More Power Available
- High Inertia

Flying Optics

- Stationary Material
- High Acceleration
- More Beam Issues

Flying Optics With Direct Motors

- Super Fast Motion
- Higher Wattage
- High Inertia

Parallel Kinematics Linear Motor

- High Acceleration
- Low Inertia
- Great Detail Cutting

Barriers To Higher Speeds

	MOVING MASS [kg]	x	ACCELERATION [m/s²]	x	SPEED [m/s]	=	POWER REQUIRED [W]
TYPICAL LINEAR / DIRECT MOTOR MACHINE	> 300	x	30	x	2	=	**18,000**
SYNCRONO HEAD	12	x	60	x	2.5	=	**1800**
+							
SYNCRONO MACHINE	> 300	x	8	x	1.7	=	**4000**
TOTAL							**5800**

The Math

Standard Machine $500k	
Shop Rate	$ 125
Operation Costs	- $10
Ownership (7yrs 8%/ 28k hours)	- 24
Gross Margin	$ 91

High Speed Machine $700k	
Shop Rate	$ 125
Operation Costs	- $10
Ownership (7yrs 8%/ 28k hours)	- 34
Gross Margin	$ 81

- 10% $137 - $44 = $93
- 30% $162 - $44 = $118
- 50% $187 - $44 = $143

The Math

30% Increase Over Time

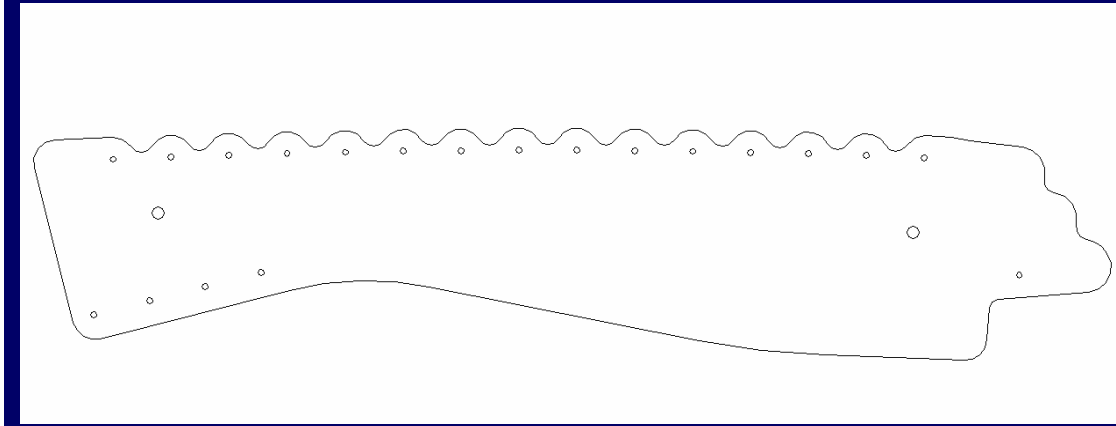
Gross Margin $118 - $91 = $27

$27 x 4,000 hrs = $108,000

$27 x 12,000 hrs = $324,000

$27 x 28,000 hrs = $756,000

CYCLE TIME COMPARISON



WORKPIECE DESCRIPTION

Material: mild steel

Thickness: 1 mm

Size: 444.57 x 95.253 mm

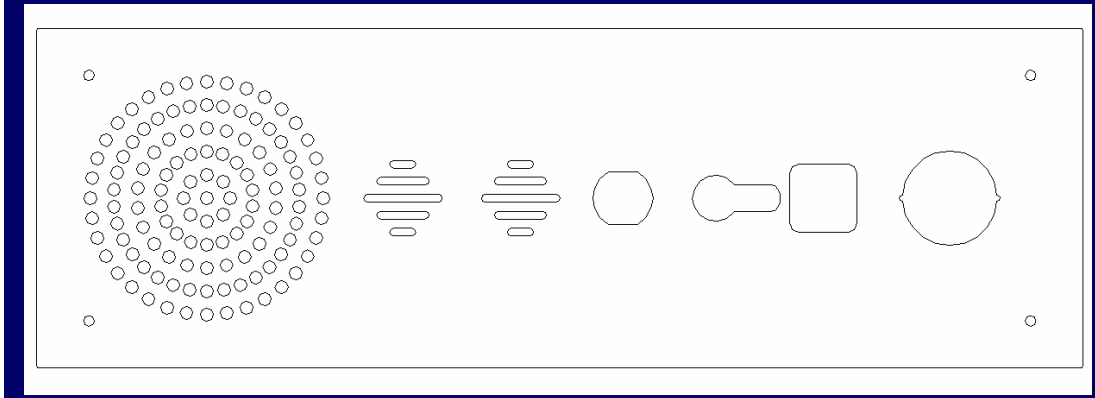
Perimeter: 1267.001 mm

Main processing:
22 small holes,
undulating contour

Machine - Cycle time - Time saved

Standard	15”
High Speed	9”

-40 %



WORKPIECE DESCRIPTION

Material: mild steel

Thickness: 1 mm

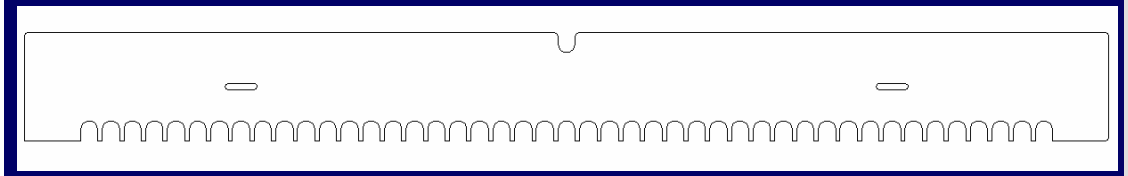
Size: 400 x 130 mm

Perimeter: 3746.079 mm

Main processing: pattern of 119 holes (5 mm Ø) and various shapes

Machine - Cycle time - Time saved

Standard	1’06”	-61 %
High Speed	26”	



WORKPIECE DESCRIPTION

Material: stainless steel

Thickness: 2 mm

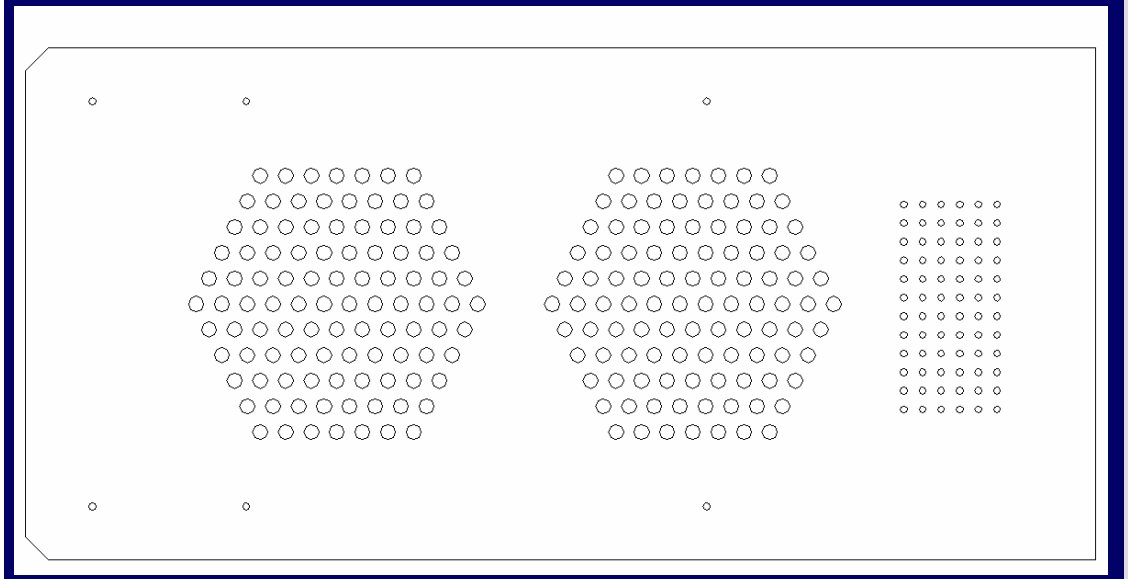
Size: 500 x 50 mm

Perimeter: 1878.611 mm

Main processing:
saw-toothed contour

Machine - Cycle time - Time saved

Standard	26”	-23 %
High Speed	20”	



WORKPIECE DESCRIPTION

Material: mild steel

Thickness: 1 mm

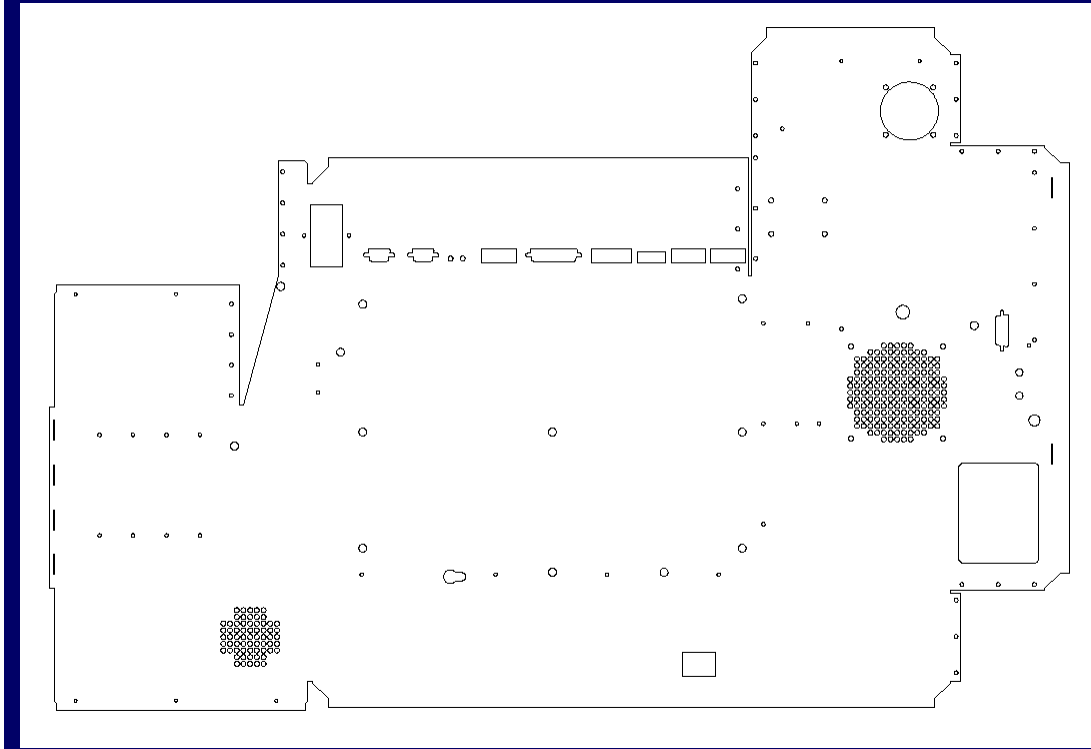
Size: 460 x 220 mm

Perimeter: 6249.169 mm

Main processing:
276 holes
(6.5 mm and 3 mm Ø)

Machine - Cycle time - Time saved

Standard	2’07”	-61 %
High Speed	50”	



WORKPIECE DESCRIPTION

Material: mild steel

Thickness: 1 mm

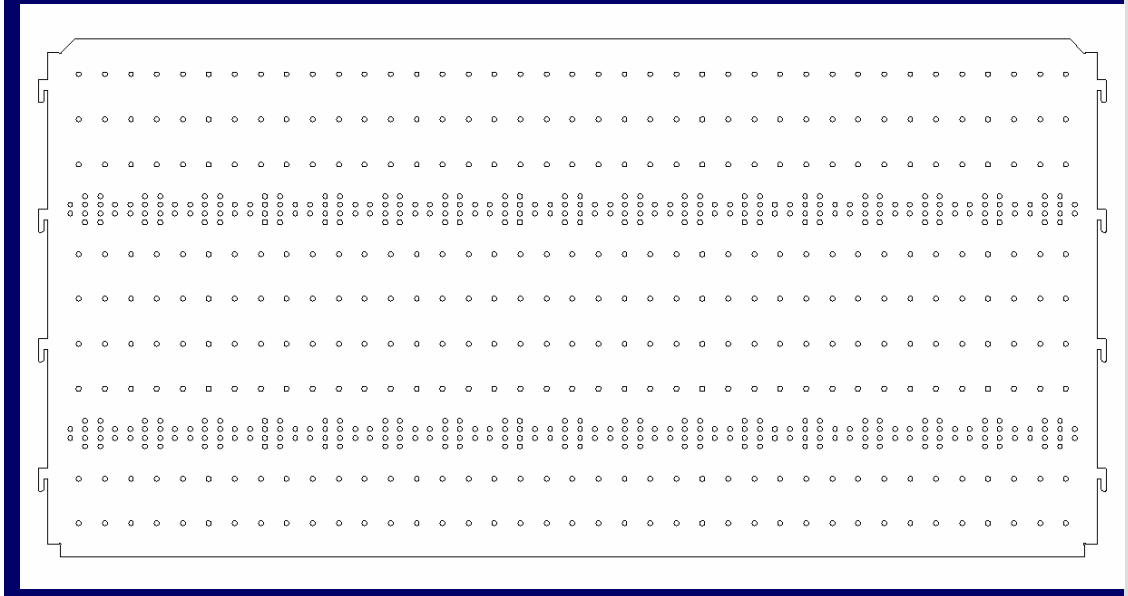
Size: 914.4 x 611.1 mm

Perimeter: 10092.99 mm

Main processing:
small holes distributed on a large area; small holes (246) patterns

Machine - Cycle time - Time saved

Standard	2’53”	-57 %
High Speed	1’15”	



WORKPIECE DESCRIPTION

Material: mild steel

Thickness: 1 mm

Size: 1232.99 x 599.822 mm

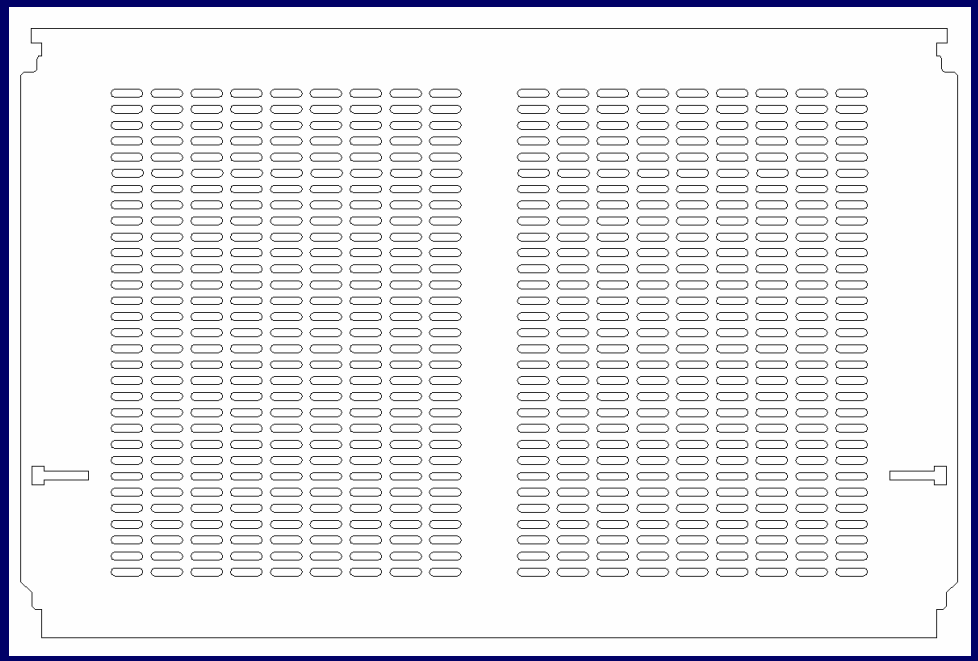
Perimeter: 18289.79 mm

Main processing: pattern of 759 holes (6 mm Ø)

Machine - Cycle time - Time saved

Standard	6’12”
High Speed	2’54”

-53 %



WORKPIECE DESCRIPTION

Material: mild steel

Thickness: 1 mm

Size: 294.2 x 190.75 mm

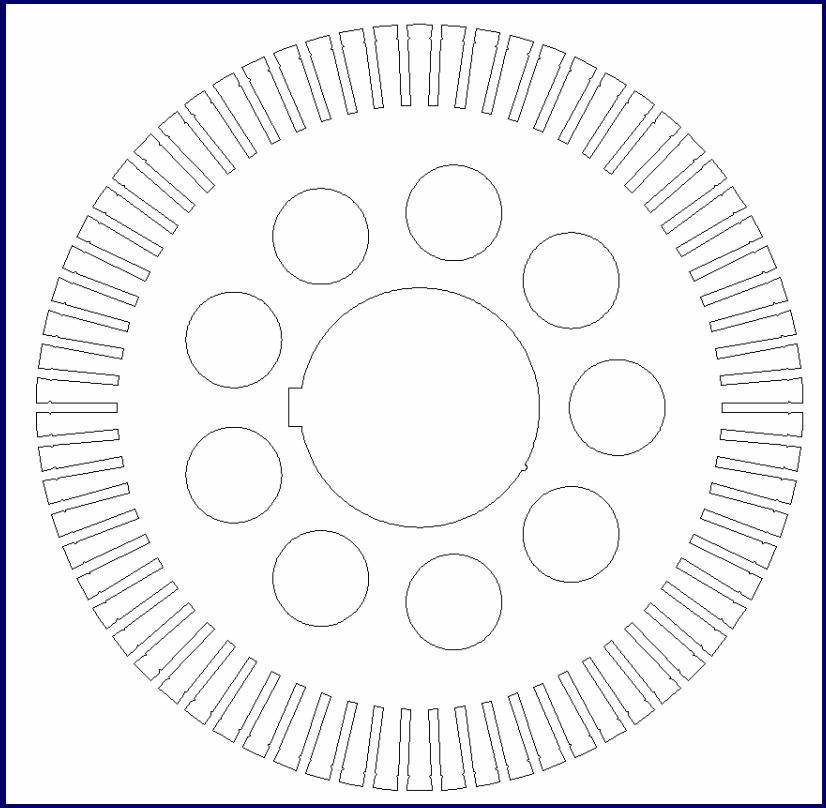
Perimeter: 13823.31 mm

Main processing:
pattern of 558 slots

Machine - Cycle time - Time saved

Standard	5’20”
High Speed	3’04”

-42 %



WORKPIECE DESCRIPTION

Material: mild steel

Thickness: 1 mm

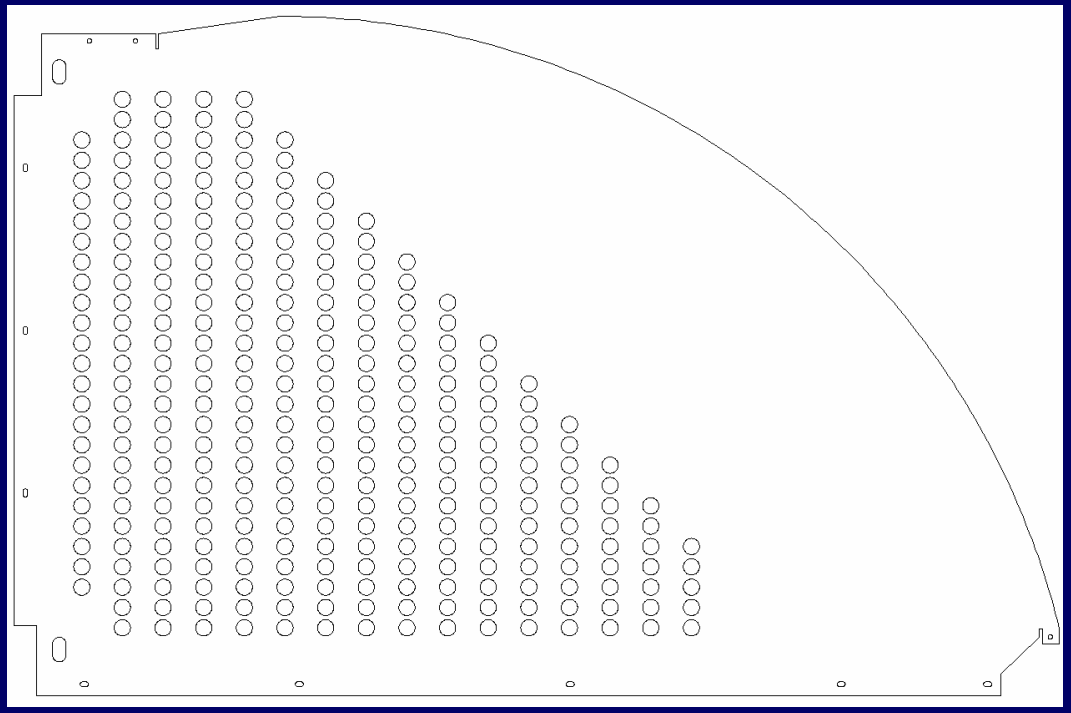
Size: 650 x 650 mm

Perimeter: 11644.740 mm

Main processing:
saw-toothed contour
10 big holes

Machine - Cycle time - Time saved

Standard	85”	-27 %
High Speed	62”	



WORKPIECE DESCRIPTION

Material: aluminium

Thickness: 2 mm

Size: 771.6 x 501.2 mm

Perimeter: 24515.33 mm

Main processing:
pattern of 300 holes, 12 mm Ø

Machine - Cycle time - Time saved

Standard	4’24”	-29 %
High Speed	3’16”	