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Industrial CNC frame 2×2 m (6×6′) with the laser module.

Posted on 30.01.2020 (15.02.2022) by George Fomitchev
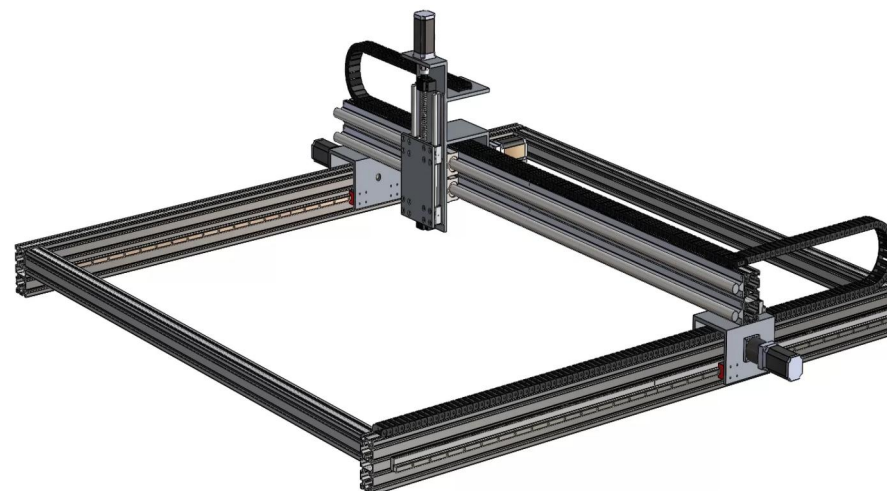
Big industrial CNC frame from Endurance lasers – custom solution #1.

A new word in the CNC industry!

We are proud to present a custom CNC frame.

- The working area is 2×2 meters (6.5×6.5 feet)
- Reliable controller by Pure logic.
- Professional laser box with drivers and controlling systems
- Ultra-high precision.
- Accuracy is 0.1 mm.
- The maximum working speed is 3000 mm/min
- can work in horizontal and vertical positions.

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We are proud of this machine and you will be more than satisfied.

Assembling of a 2x2 meter CNC frame - a detailed video

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Presentation of a machine by CEO and founder of Endurance – George I Fomitchev
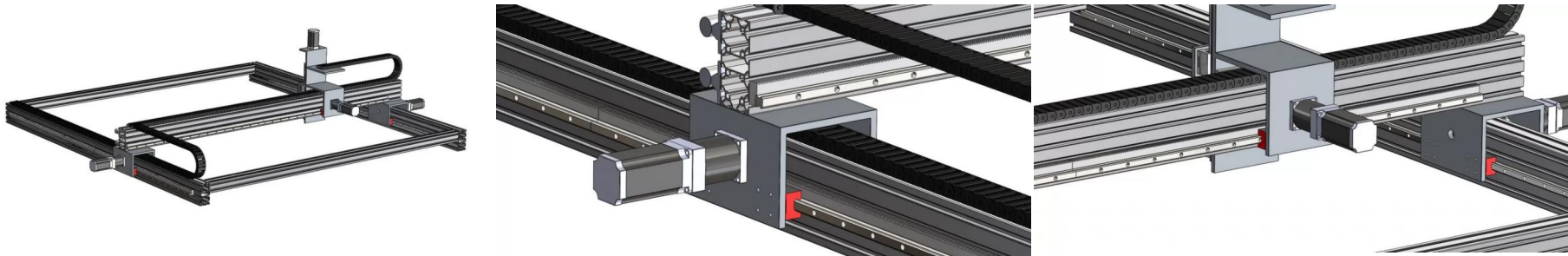
Can operate in vertical position.

Endurance CNC frame. A new word in a CNC industry. Industrial CNC solu

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3D Design of 2×2 m CNC machine.

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Sketches and drawings

Mechanical components – full list.

Name of parts	Pcs
module 1 number of teeth 30 for a 14 mm spindle long flange	3
Gearboxes	
Worm gearbox 86 mm	1
NMRV-40 1:5	2
Worm gearbox 57 mm	1
NMRV-30 (planetary) 1:5	1
Structural shapes	

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shape 60 x 60 segments 2 m	2
Shapes connectors :	
Right-angle connectors for shapes 60 x 60	6
End plates connectors	4
Aluminum sheets: 10-12 mm thick, size 200 x 300 mm	9
Runner slides :	
Section-shaped rail 15 mm – 2 m long	5
Runner blocks for runner slide 15mm / (simple flangeless) and (long flangeless)	10+2
Cylindrical rail ɸ25 segments 2 m long	2
Runner blocks for runner slide ɸ25	4
Cylindrical rail segment ɸ16 1m	1
Runner blocks for ɸ16 rail	4
Helical rack module 1 – segments 2 m long	3
Screw (helical) gear module 1 with a long flange and 30 cogs	3
Ball screw (BS) 1605 400 mm long with a screw nut	1
Ball screw mounting supports for 2 ends	1
Stepper motors	4
Name of the part for a machine 6×4 meters	
The list of parts	
— shapes 60 x 120 sections :	
2 m	2

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—–TRH15 15mm (shaped guidance rail) sections:	
2 m	4
4 m	5
1 m	1
TRH15-B / HGH15CA | flangeless carriage 15 mm	12
SBR-C20 cylindric rail sections D20mm:	
4 m	1
SBR20UU | (carriage for sBR D20mm)	4
1605-4 | (ball screw D16mm, step 5mm) — section length L-400 mm	
SFU1605-4 | 1605 (ball nut)	1
EF-12 | (floating bearing support D10mm)	1
EK-12 | (Fixating bearing support D12mm)	1
MGD16 | SFU1605 (ball nut mount)	1
1031 | 60x60 (simplified right angle connector)	14
S8S30 | (insert block, solid aluminum, groove 8) –section length 2 m	6
2027 | (Linear steel connector 160 mm, groove 8)	20
5296 | (thread insert M4x5mm)	20
5079 | (thread insert M6x8mm)	100
Г-12-У-30 | (Connecting plate L-type, 12 holes, heavy duty)	4

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shaped rail HGR15 or GHR15 L 2m — 8 pcs

Skew gear GH1-T30D14 module 1, for a spindle 14mm, 30 cogs	1
Joint 20mm, L=25mm, d1=8mm, d2=8mm, moment 3H*m	1

Electronic components – a full list

Electronic components

Spindle X (based on 6.7HxM + power margin)

Description	Model	Features
Stepper motor with an encoder	PL86H4401-D14-1K	86x140mm, 2 phases, 80kg. cm, spindle 14mm, current 5.6A, step 1.8°, 0.45 Om, 1000PPR

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Servo-stepper motor driver	PLDS880	motor or of a stepper motor … … 80V/10A/200KHz
Microswitch	XV-154-1C25	7.5A/250VAC, two-way, HP+H3, tenon 30mm, IP40
Spindle Y (based on 2HxM +power margin)		
Stepper motor with an endcoder	PL57H1404-D8-1K	(57x126mm, 2- phase, 28 kg.cm, spindle 8mm, current 4.2A, Step 1.8°, 0.7 Ом, 1000PPR)
Servo-stepper motor driver	PLDS880	Driver of a servo-stepper motor or of a stepper motor … … 80V/10A/200KHz
Microswitch	XV-154-1C25	7.5A/250VAC, two-way, HP+H3, tenon 30mm, IP40
Spindle Z (based on 0,4HxM +power margin)		
Stepper motor	PL57H56-D8	57x56mm, 12.6 kg.cm, spindle 8mm, current 2.6A, step 1.8°)
Stepper motor driver	PLD330	2-phase (4 wires) stepper motor 30V/3A/100KHz
Microswitch	XV-154-1C25	7.5A/250VAC, two-way, HP+H3, tenon 30mm, IP40

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Flexible mounting wire	1x1.5	Black
Flexible mounting wire	1x1.5	Red
Flexible mounting wire	1x0,75	Black
Flexible mounting wire	1x0,75	Red
Shielded signal cables	PVC0.2x8STP	Shielded signal, twisted-pair cable, 8 pcs.(4 pairs)*0.2mm²
Power unit		
Power unit	70B 17A	70V 17A
Power unit	24B 6,3A	24V 6,3A
Power unit	ARS-150-12	12V 12,5A
Controller		
Controller	RDC6442G	
Display	RDC6442G	

Unassembling/assembling process of 2×2 CNC frame (photo gallery)

[...]
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Building a new 2 x 2 custom machine. Technical requirements from a customer #2.

Basic Requirements of the Customer

1. Development and assembling of a laser CNC machine for engraving and obtaining photos from the camera.

2 . The CNC machine controller should work on the basis of the GRBL v 1.1 firmware (the manufacturer chooses the models of the controller, stepper motor driver and other electronics).

3. The computer and CNC controller connection is via a USB port or Ethernet, optionally (up to the manufacturer).
4. The laser CNC machine should have 3 movement axes (2X 1Y 2 different Z) and laser power, controlled by the controller with the GRBL firmware by way of performing G-code commands of the control software. The laser power is set by the G-code commands of the control program (e.g. Lightburn, LaserGBRL (open source – MIT) too) and is controlled by the CNC controller using a PWM signal.
5. The size of the CNC machine working area along X axis = 1700 mm (width of scanner), along Y axis = 2000 mm (length of scanner), along Z axis = 200 mm (hight of scanning area laser and camera)
6. The maximum size of the laser CNC machine inclusive of the stepper motors protruding beyond the frames of the machine, space intervals for the sensors and safety switches of the X axis = 2000 mm, Y axis = 2300 mm, Z axis = 500 mm.
7. To develop and install a Z2 axis for a video camera. To control the Z2 axis movement by Up and Down buttons on the control panel. A provision must be included for holder fasteners on the Z2 axis according to the customer drawings. Manufacturing and installment of the holder and camera is the customer's responsibility.
8. To run an interface USB3 cable (data interface) from the place of the smartphone camera installment on the Z2 axis to the control box plus extra 0.5m on both sides for the camera and computer connection,

https://www.sab-kabel.de/produkte/kabelkonfektion/usb30_leitung_handkonfektionierten_steckern.html

is to install

Also power supply cable S960 (07521215) 12×1.5mm2 https://www.sab-kabel.de/produkte/flexible-kabel-und-leitungen-schleppkettenleitungen/s-960.html

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a cable for data transfer   SD960CY (07851001) 10×0.14mm (https://www.sab-kabel.de/produkte/flexible-kabel-und-leitungen-schleppkettenleitungen/sd-960.html   ), is to install.

9. The maximum X and Y motion speed is 2000 mm/min, For both z-axis – motion speed so fast as you can make it.
10. Make provisions for X and Y home sensors, necessarily. Make provisions for the 2 z-home sensors if possible.
11. Make provisions for X, Y and z end sensors, optionally (up to the manufacturer).
12. Make provisions for safety switches at the beginning and end of the X and Y axes for safe operation of the laser CNC machine along the X and Y axes.
13. Make provisions for the panic button on the CNC laser machine frame (its location must be approved by the customer).
14. The power supply part (the power supply unit, laser control unit, CNC machine controller) should be housed in a separate box with a mechanical ventilation system to prevent overheating.
15. The control box should have a plug connection with the laser CNC machine frame and have an extra length of the wire of 1,5 m or more.
16. The power supply of the CNC laser machine is 220V 50 hz.
17. To install and connect an Endurance 15W Duos laser on the Z axis.

Additional requirements of the customer

Provide the possibility of switching off the laser power supply by the TTL external pulse. 0V – the laser is off. 5V – the laser is on.

BOM (components list)
Electonics

Power supply unit 2X 1Y	RSP-750-48	48B,15.7A,753.6W
Power supply unit Z	RS-75-24	24B,3.2A,76.8W
Power supply unit	MDR-10-24	24B,0.42A,10W\MEAN WELL
Yellow emergency shutdown station	XALK178	Emergency button 1H3
Switch	S202Z-2(S202UZ-2)	Electronic lock\Jin Tay
ON-OFF lighted toggle switch	ASW-14D (red)	(20A12VDC) SPST 3P\Jietong Switch
Fan 220V	EC1225A2HBL	120x120x25mm, подшипниккачения, 2000 об/мин\Evercoo

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Relay block	PTF08A	HHC68A-2Z (LY2)\NCR
Filter	FGF-120/M silver	Fan filter120x120 mm (metal)\Evercool
Button	KE-021	"Stop" red mushroom
Alarm lamp	XB7EV03MP	22mm 230V green (LED)
Alarm lamp	XB7EV04MP	22mm 230V red (LED)
Button SB-7	BBT40-SB7-K06	Start (green)
Contactor	ПМЛ 1160ДМ	16А 220АС УХЛ4 Б КЭАЗ 110546\КЭАЗ
Bar-type terminal	НШВИ 0.25-8	blue 0.25 mm²
Bar-type terminal	НШВИ 0.5-8	white 0.5 mm²
Bar-type terminal	НШВИ 0.75-12	gray, 0.75mm², L 12mm
Bar-type terminal	НШВИ 1.5-8	(8mm) black 1.5 mm²
Slotted ducting	40x40	L2000 RL12 G ДКС 00134RL
Slotted ducting	25x40	L2000 RL12 G ДКС 00128RL
Elastic mesh guards	15PET-6 black	diameter 4 -10,5mm
Elastic mesh guards	15PET-12 black	Diameter 10 -16mm
Elastic mesh guards	15PET-3 black	Diameter 2,5 – 5м
Power supply unit (laser +tec)	LRS-100-12	12В,8.5A,102W
Ethernet transformer	UART TO ETH	(TCP/UDP) UART
Programable controller	Arduino Uno R3	Orig
Stepper motor (2X 1Y)	ST57-100	4.2 A 2.6 Nm 3.8 mH

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Stepper motor driver (X Y)	EM705	voltage 20-70 V, current up to 7.0 A
Stepper motor driver (Z)	EM402	voltage 18-40 V, current up to 2.2 A
Inductance sensor	SN04-N	NPN, NO
End switches	SS-5GL2	End mini switch

Photo gallery

Firmware + GRBL settings

[Firmware and GRBL settings](#)

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Assembling a 2x2 meters (6x6 feet) laser engraving / cutting frame (END

Laser machine protocol test

2×2 cnc custom frame – testing protocol

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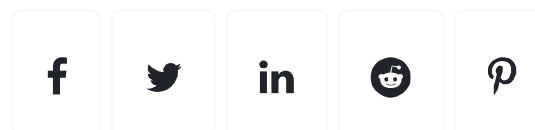
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