Build instruction mechanics CNC v3.2.2

Its not a perfect description of the build process, nor complete to all details, but its free of charge ;-)

Turn on your brain before cutting parts!

If there is something important unclear, send a mail to:

info@HomoFaciens.de

Please tell me EXACTLY what is missing (part number, page)!
And of course have a look at the project page:

www.homofaciens.de/technics-machines-cnc-v3-2-2_en.htm

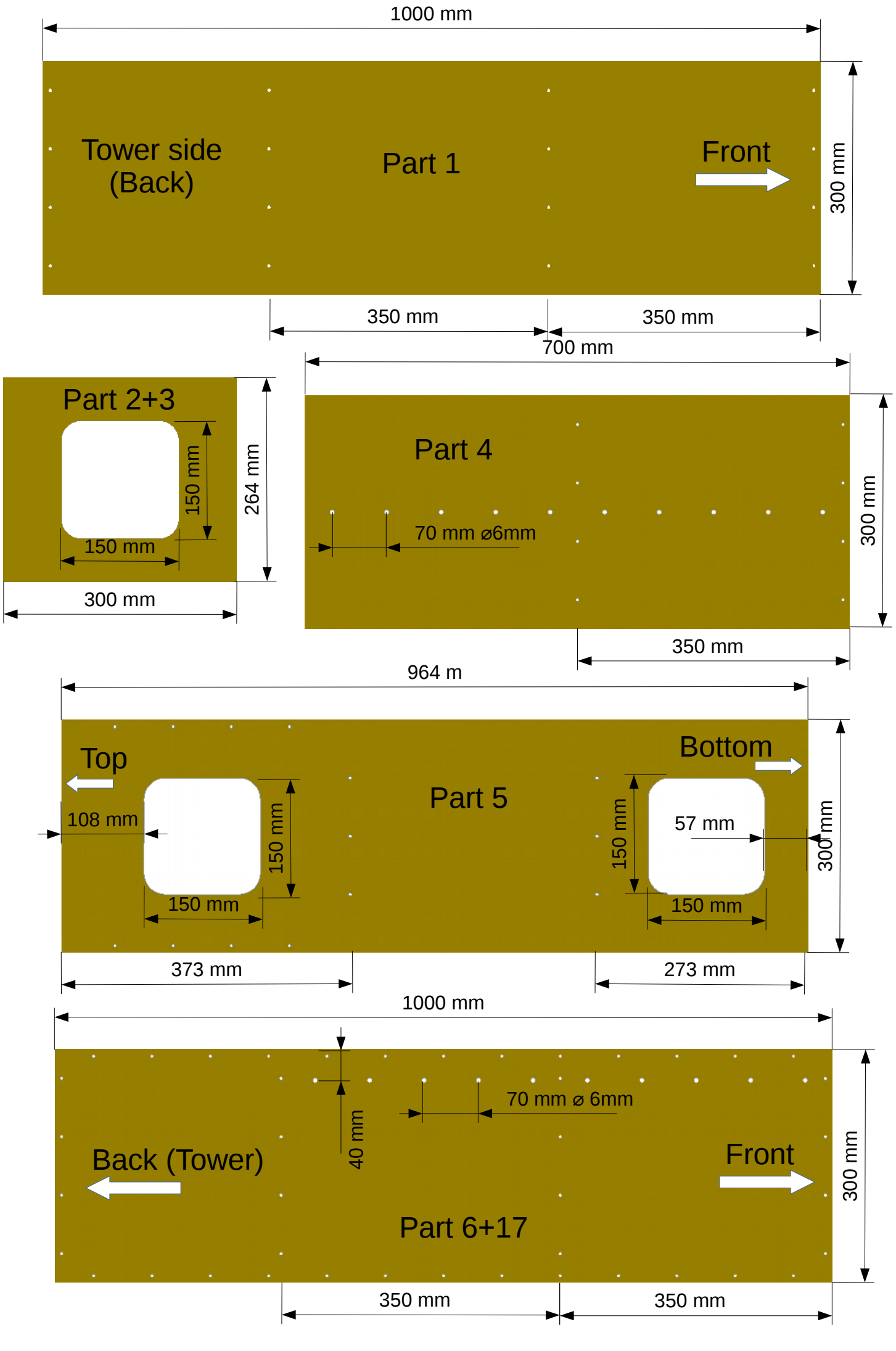
and read ALL of the documentation!

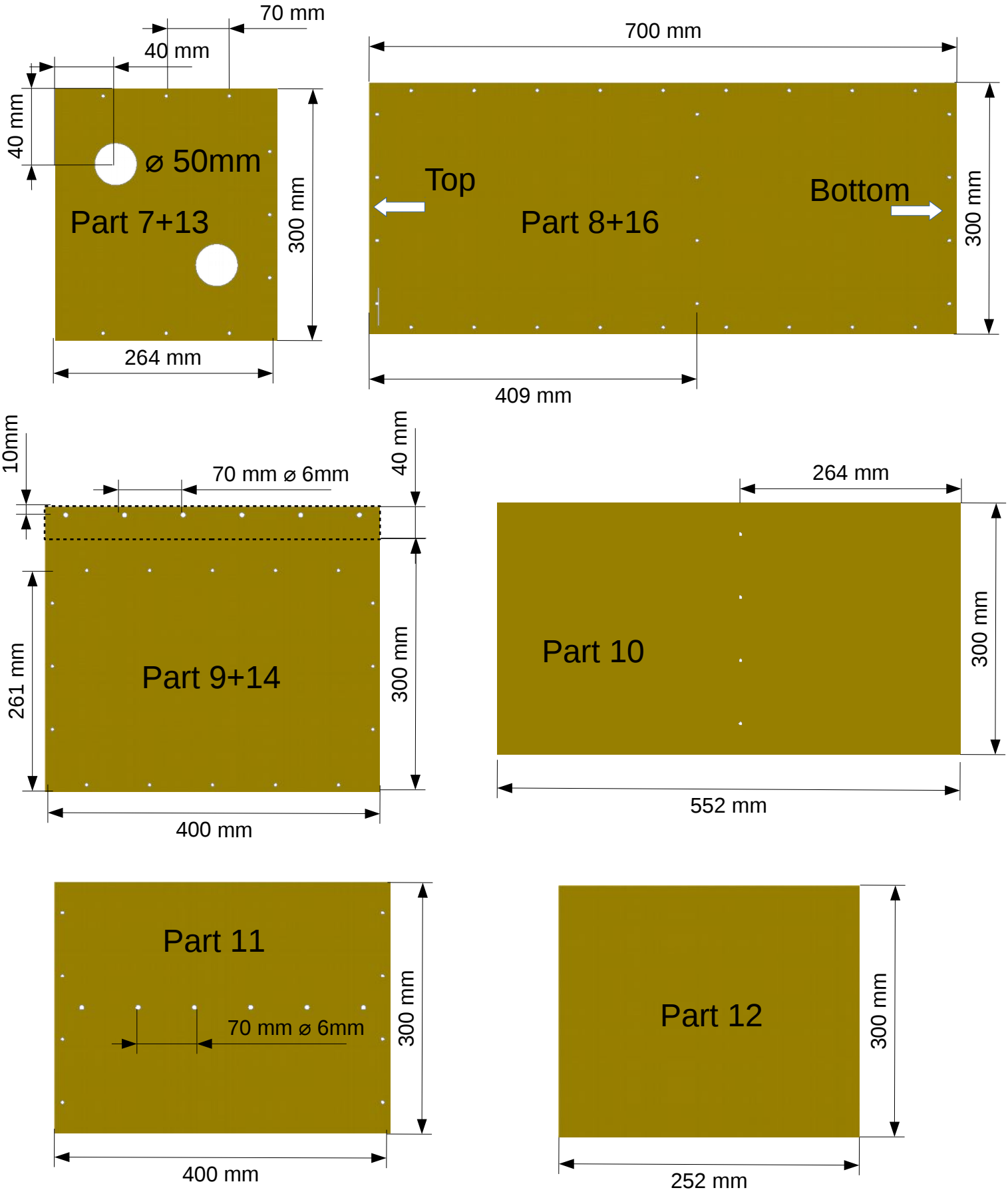
The wooden parts are cut from 18mm chipboard,
almost all parts have a width of 300mm to make cutting easy.

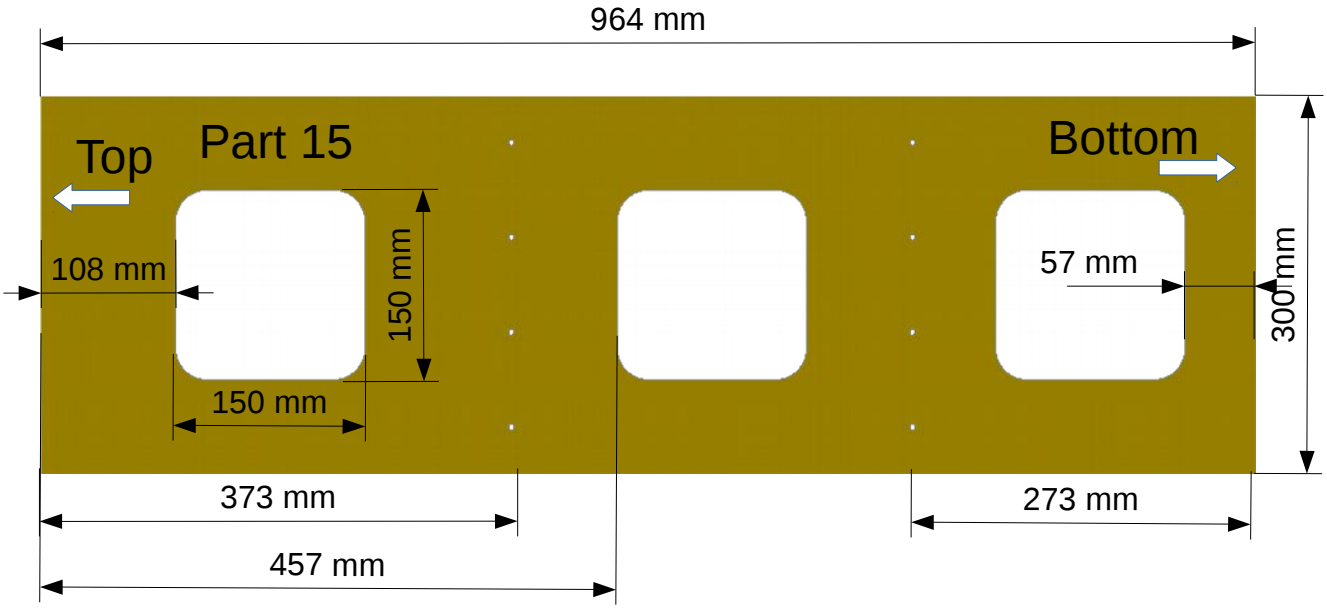
The square aluminum tubes have the dimensions
20x20mm with 2mm wall thickness.

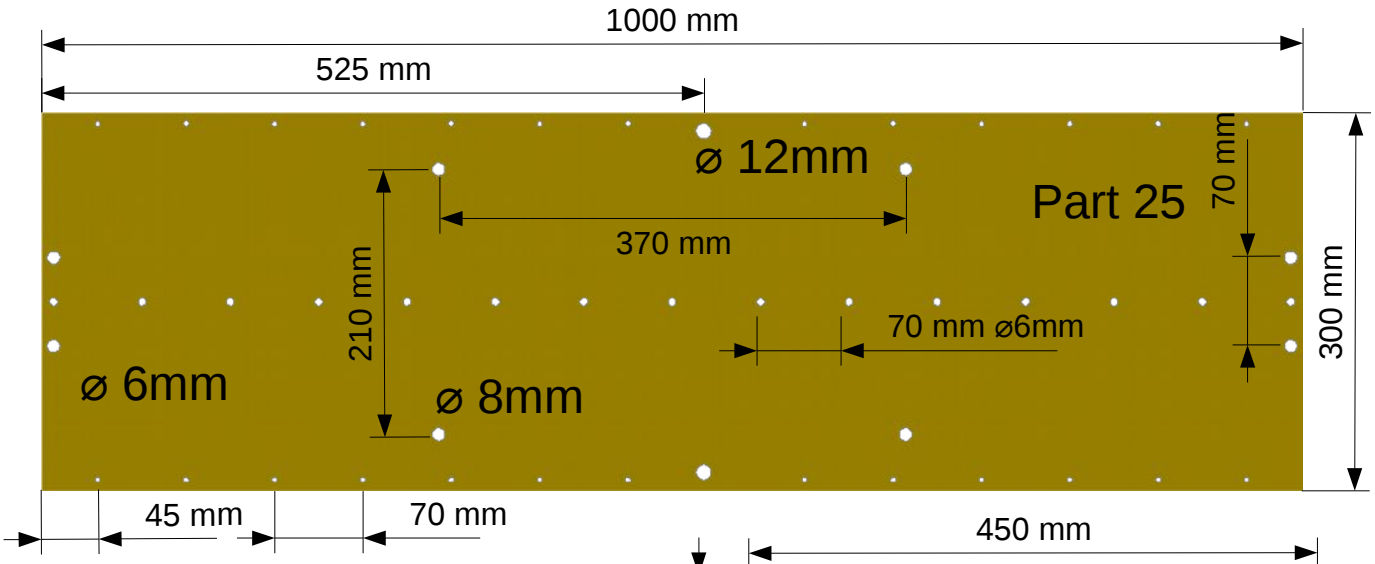
Drill holes in wood are 4mm if not labeled, standard distance is 75mm.

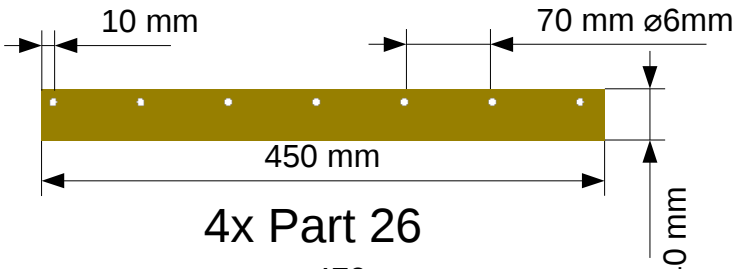
If your copy of this CNC works fine, you can think of:
- Sending me pictures or a link to a public video of your machine
- Using the donate button on my pages
(no need to do any of these, but it pushes me to do more open source machinery...)

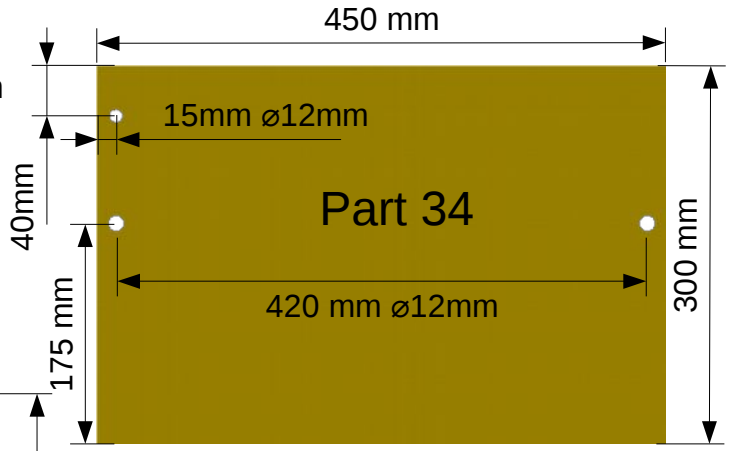

1000 mm
Tower side
(Back)
Part 1
Front
300 mm
350 mm
350 mm
700 mm
Part 2+3
150 mm
264 mm
150 mm
300 mm
Part 4
70 mm ⌀6mm
300 mm
350 mm
964 m
Top
Part 5
Bottom
108 mm
150 mm
150 mm
150 mm
57 mm
150 mm
300 mm
373 mm
273 mm
1000 mm
40 mm
70 mm ⌀ 6mm
Back (Tower)
Front
Part 6+17
300 mm
350 mm
350 mm

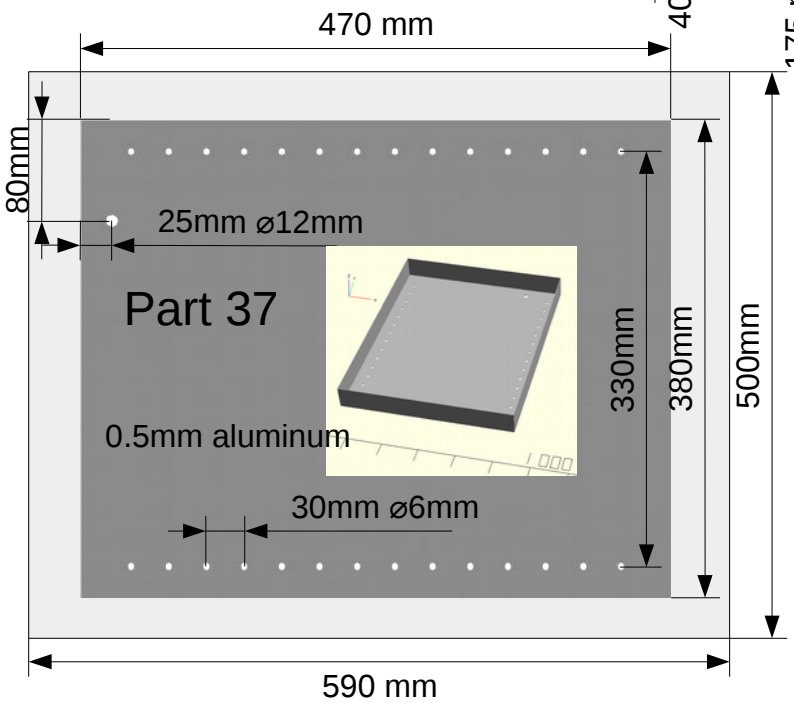

70 mm
40 mm
40 mm
⌀ 50mm
Part 7+13
300 mm
264 mm
700 mm
Top
Part 8+16
Bottom
300 mm
409 mm
10mm
70 mm ⌀ 6mm
40 mm
261 mm
Part 9+14
300 mm
400 mm
264 mm
Part 10
300 mm
552 mm
Part 11
70 mm ⌀ 6mm
300 mm
400 mm
Part 12
300 mm
252 mm

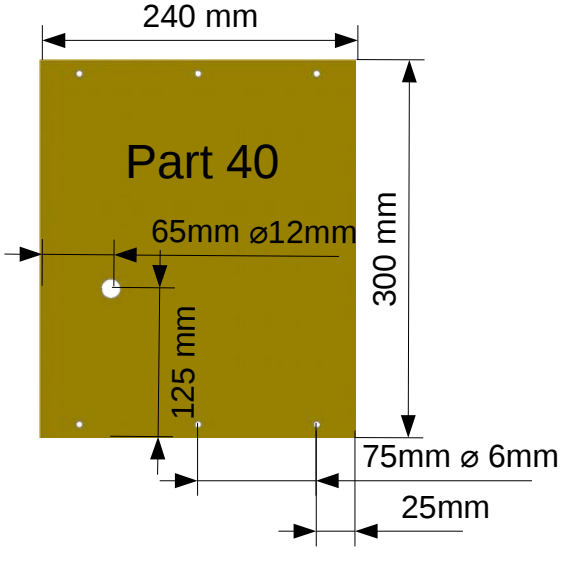

964 mm
Top
Part 15
Bottom
108 mm
150 mm
150 mm
57 mm
300 mm
373 mm
273 mm
457 mm

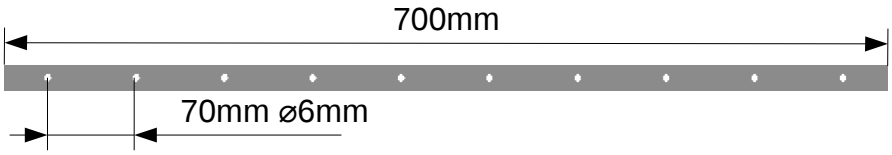

1000 mm
525 mm
ø 12mm
Part 25
70 mm
370 mm
210 mm
300 mm
70 mm ø6mm
ø 6mm
ø 8mm
45 mm
70 mm


10 mm
70 mm ø6mm
450 mm
40 mm
4x Part 26


450 mm
15mm ø12mm
40mm
Part 34
300 mm
420 mm ø12mm
175 mm

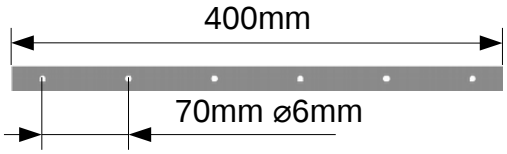

470 mm
80mm
25mm ø12mm
Part 37
0.5mm aluminum
330mm
380mm
500mm
30mm ø6mm
590 mm


240 mm
Part 40
65mm ø12mm
300 mm
125 mm
75mm ø 6mm
25mm

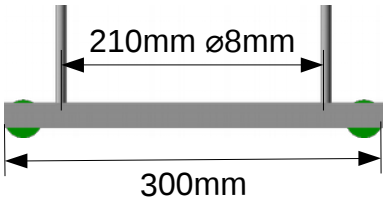


Part 18+19+20

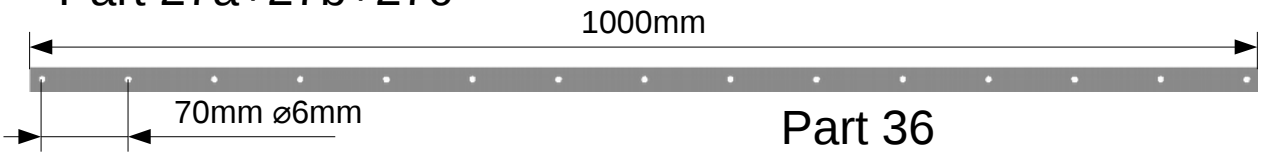
Part 21+22+23



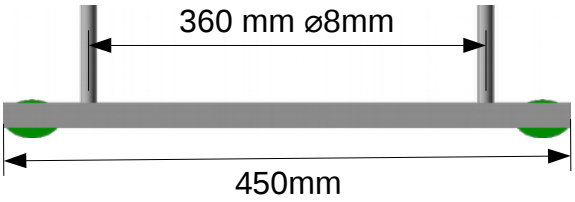
Part 30+31+33



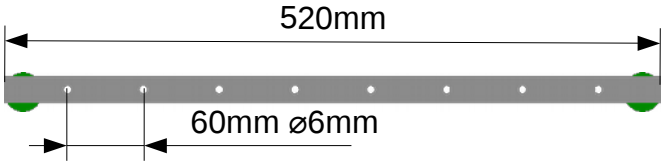
Part 27a+27b+27c

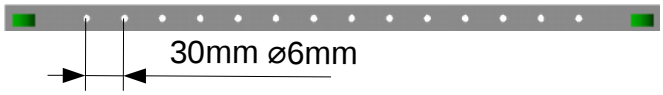


Part 36

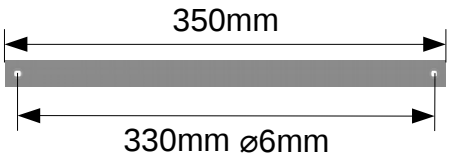


Part 35a+35b

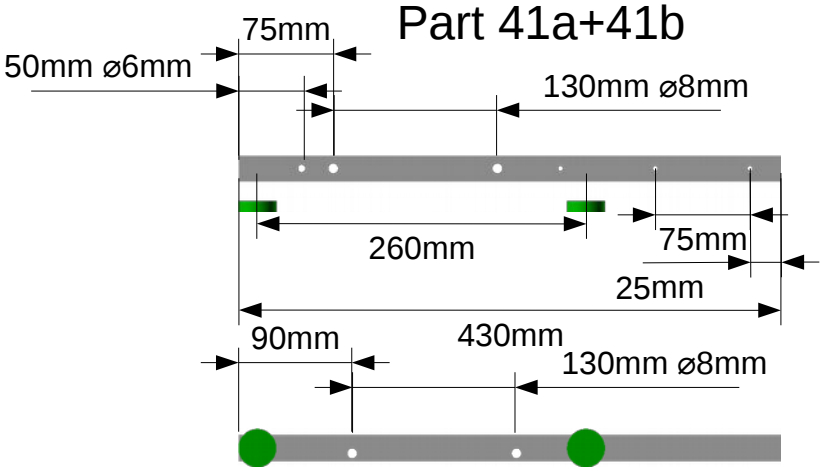




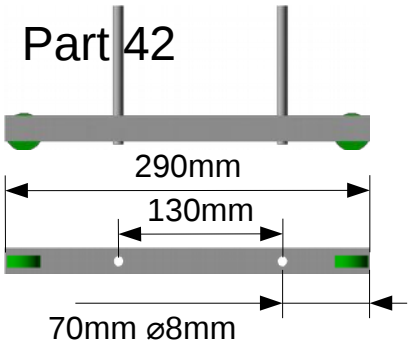
14xPart 38

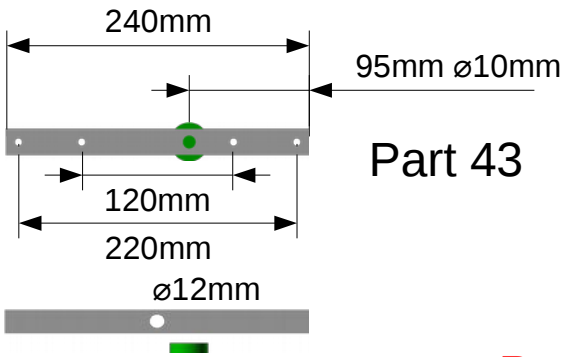


Part 41a+41b



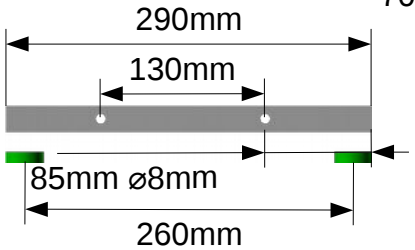
Part 42





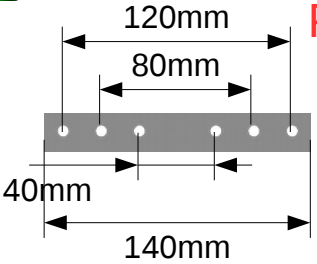
Part 43

Part 44a + 44b

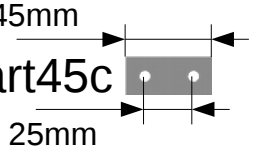


Parts 45 flat iron or aluminum 20x4mm

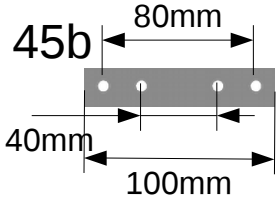
Part 45a

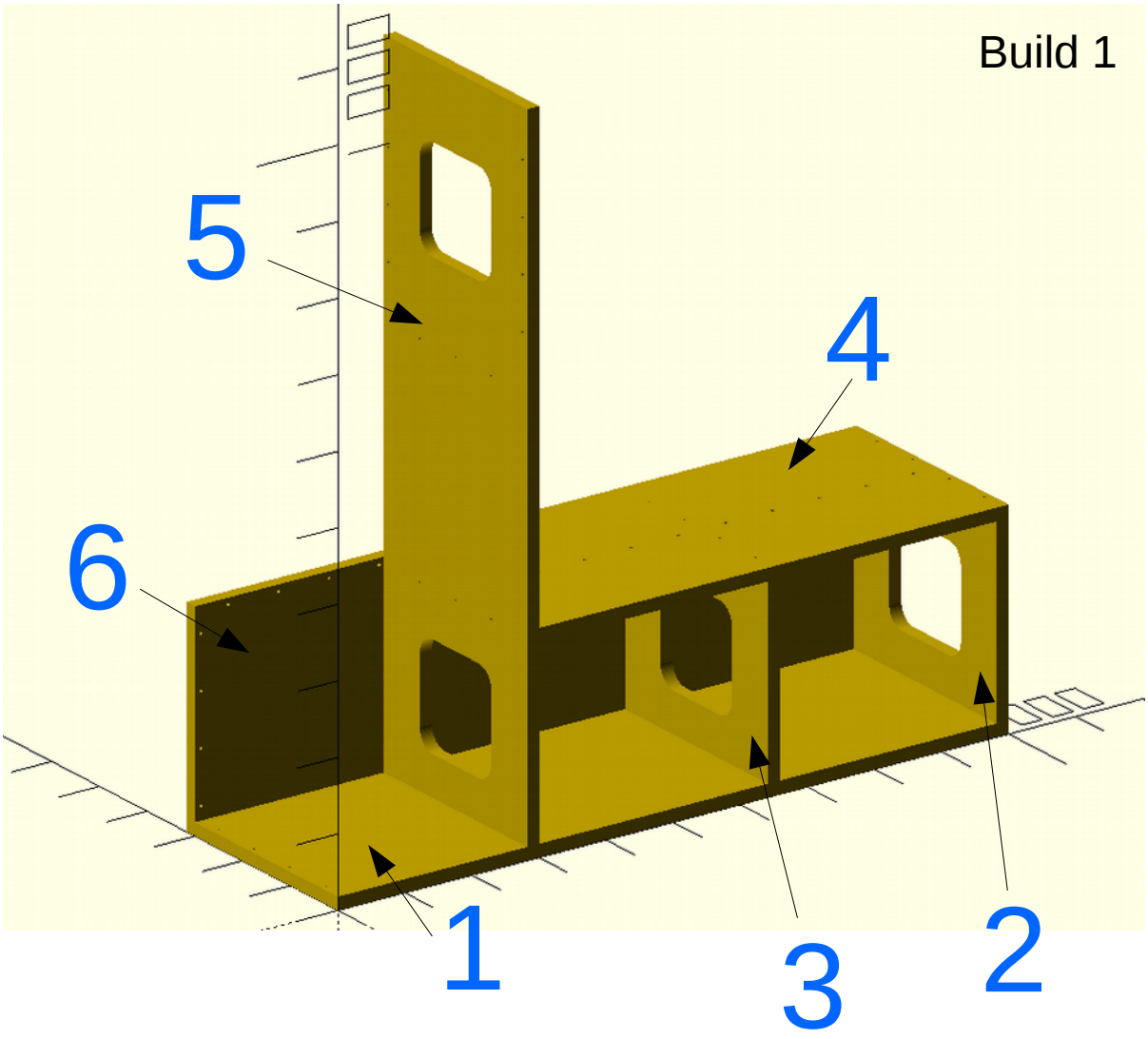


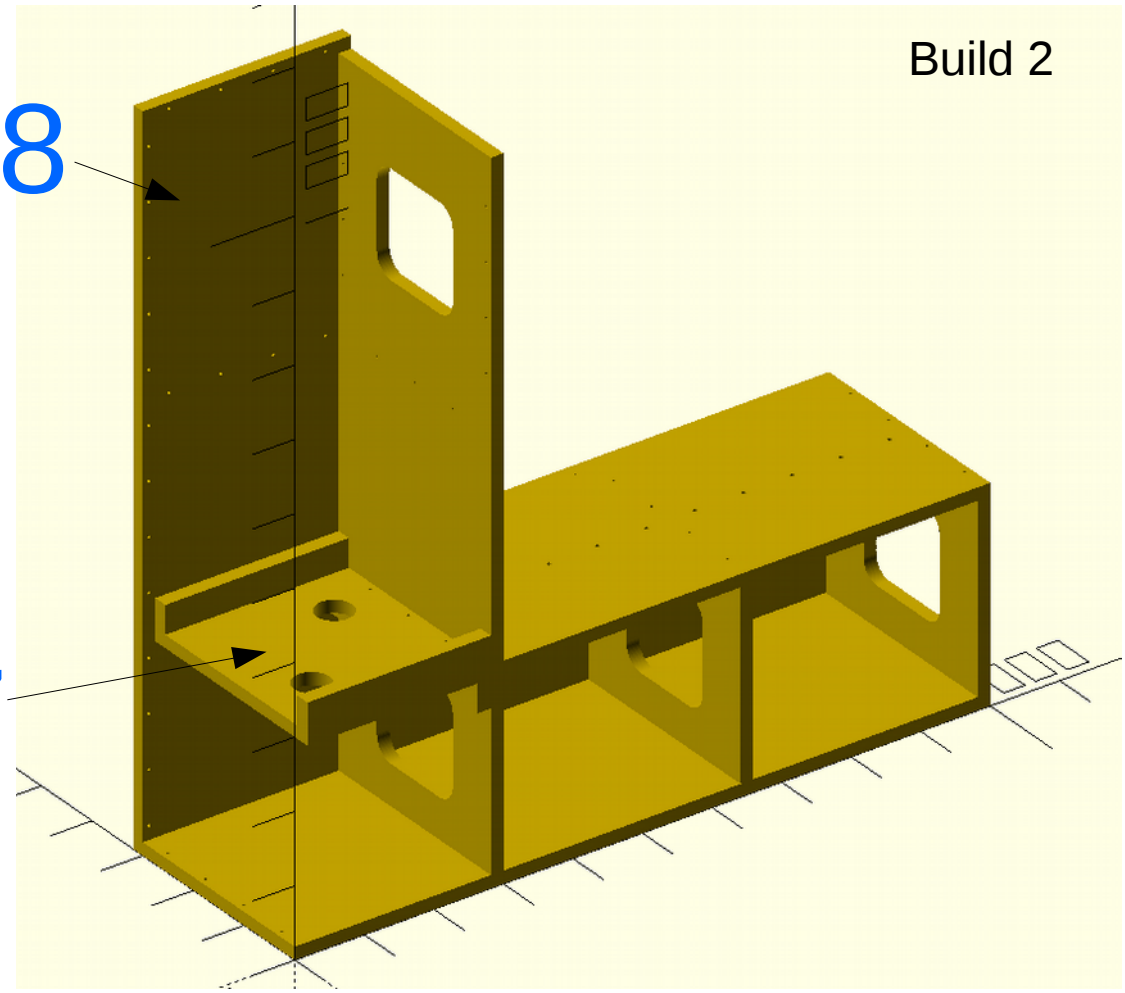
2x Part45c

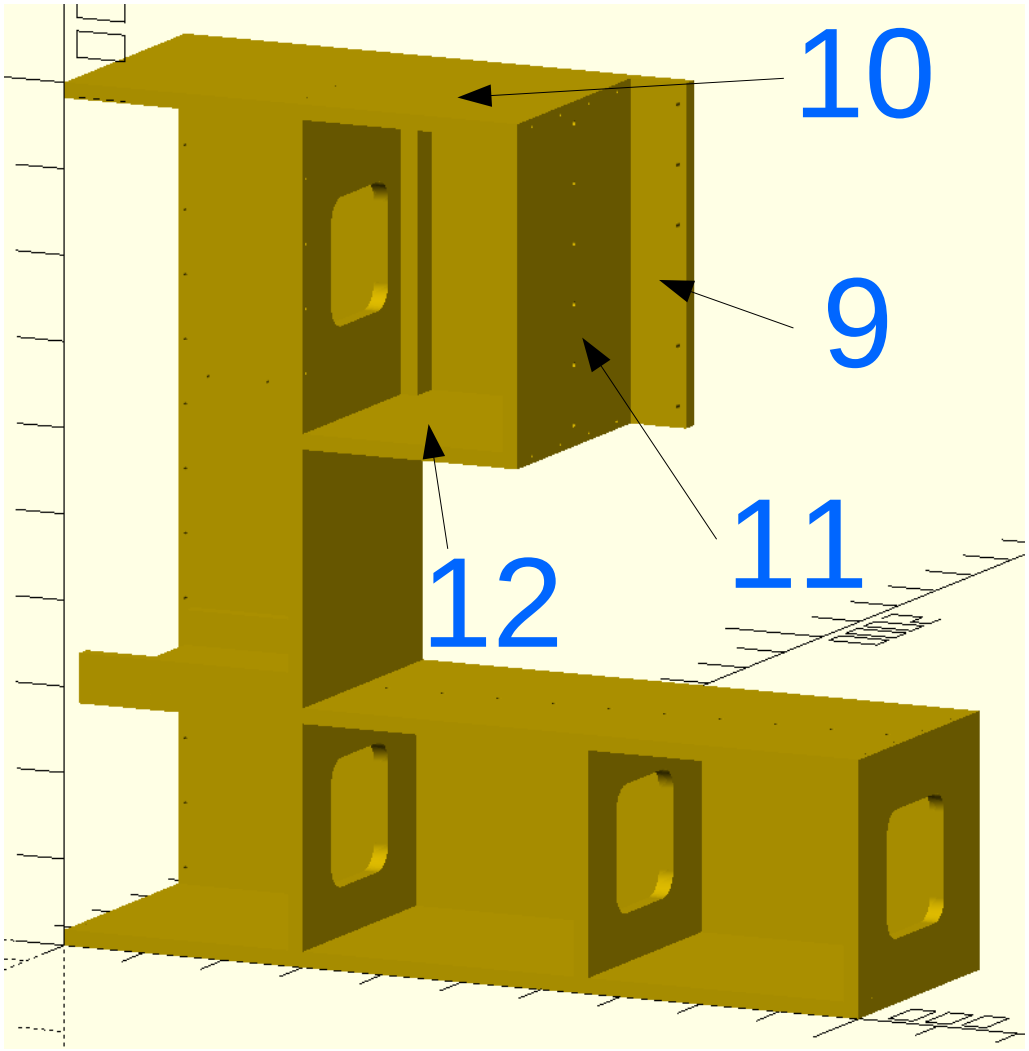


Part 45b

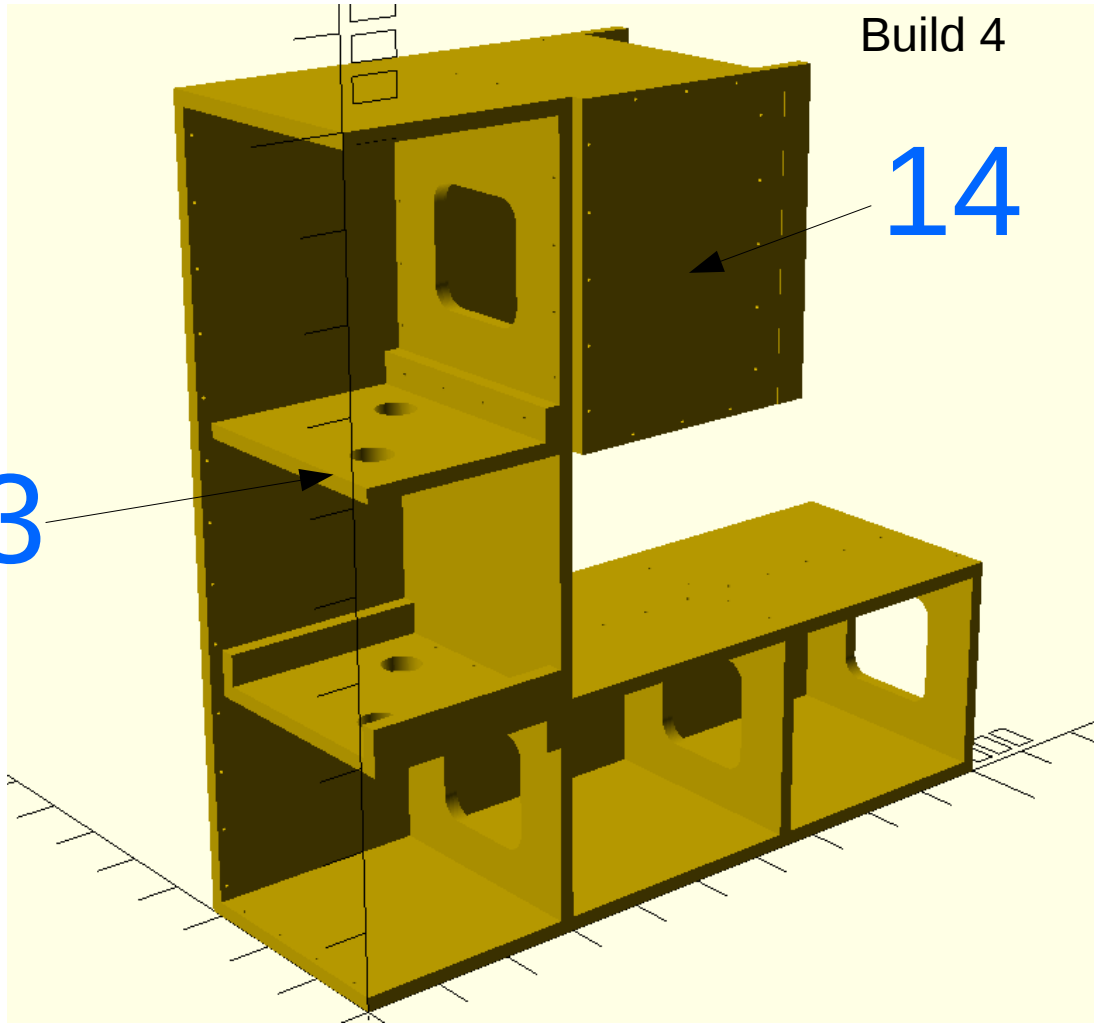



Build 1
5
4
6
1
3
2

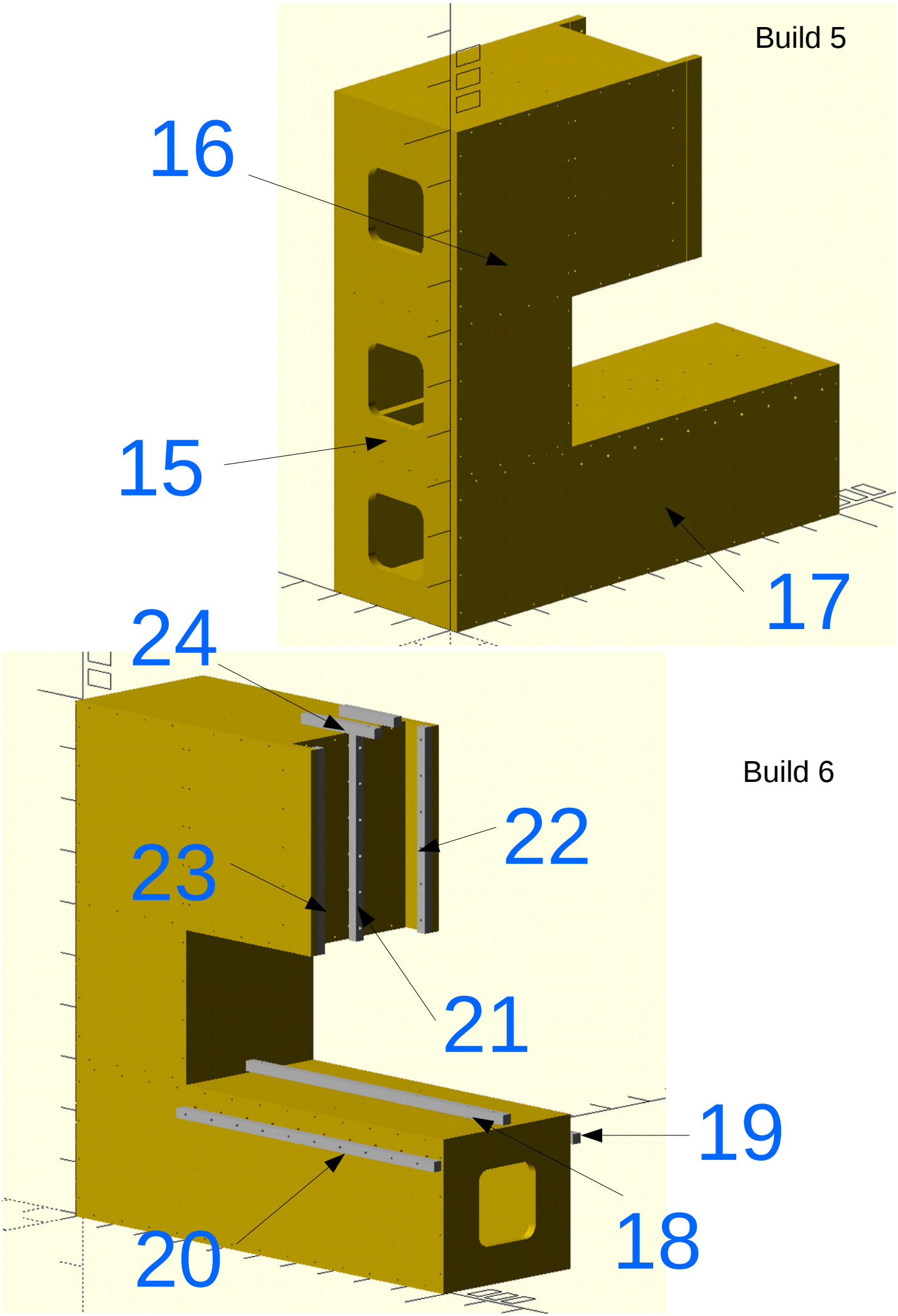

Build 2
8
7



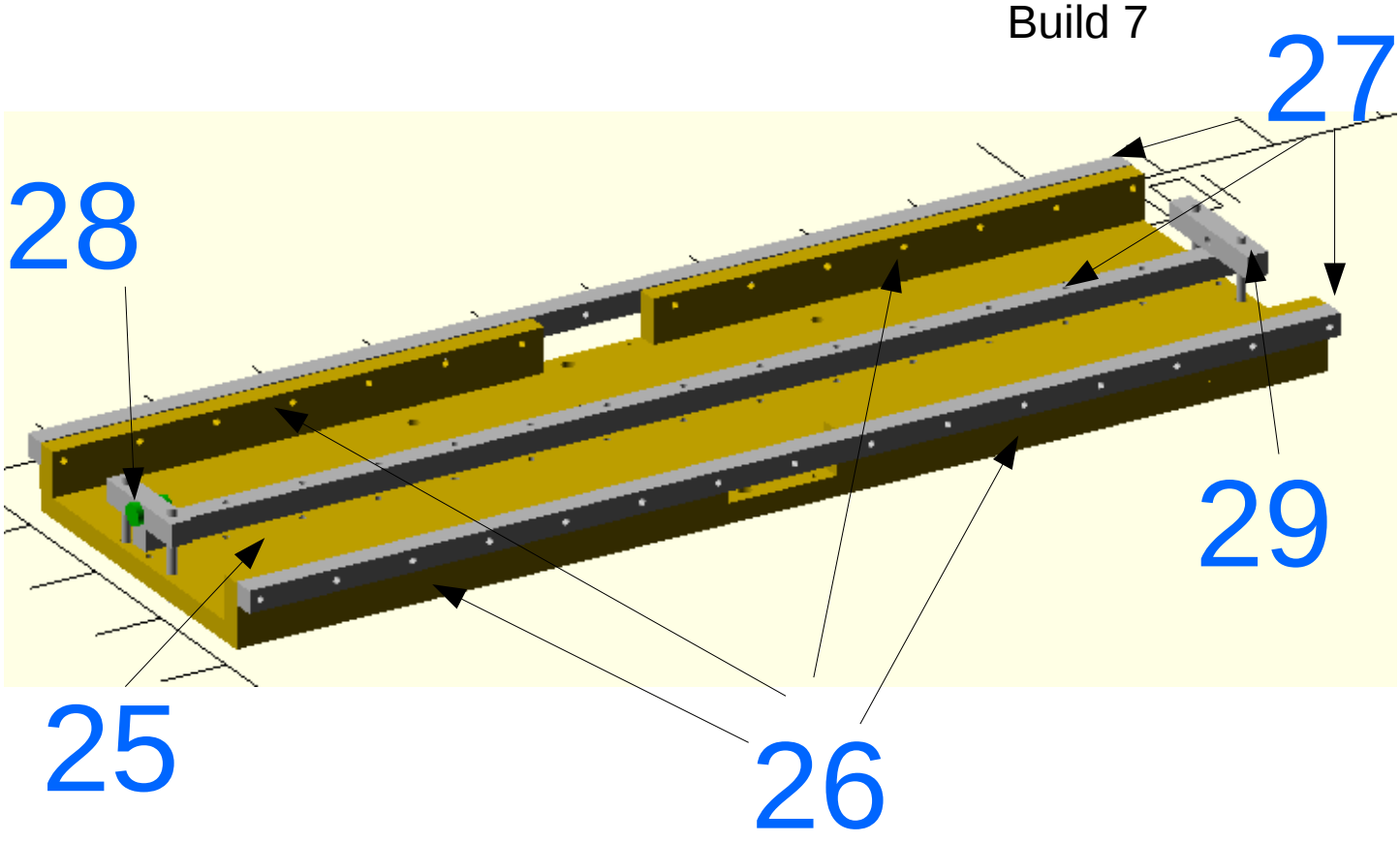
Build 3



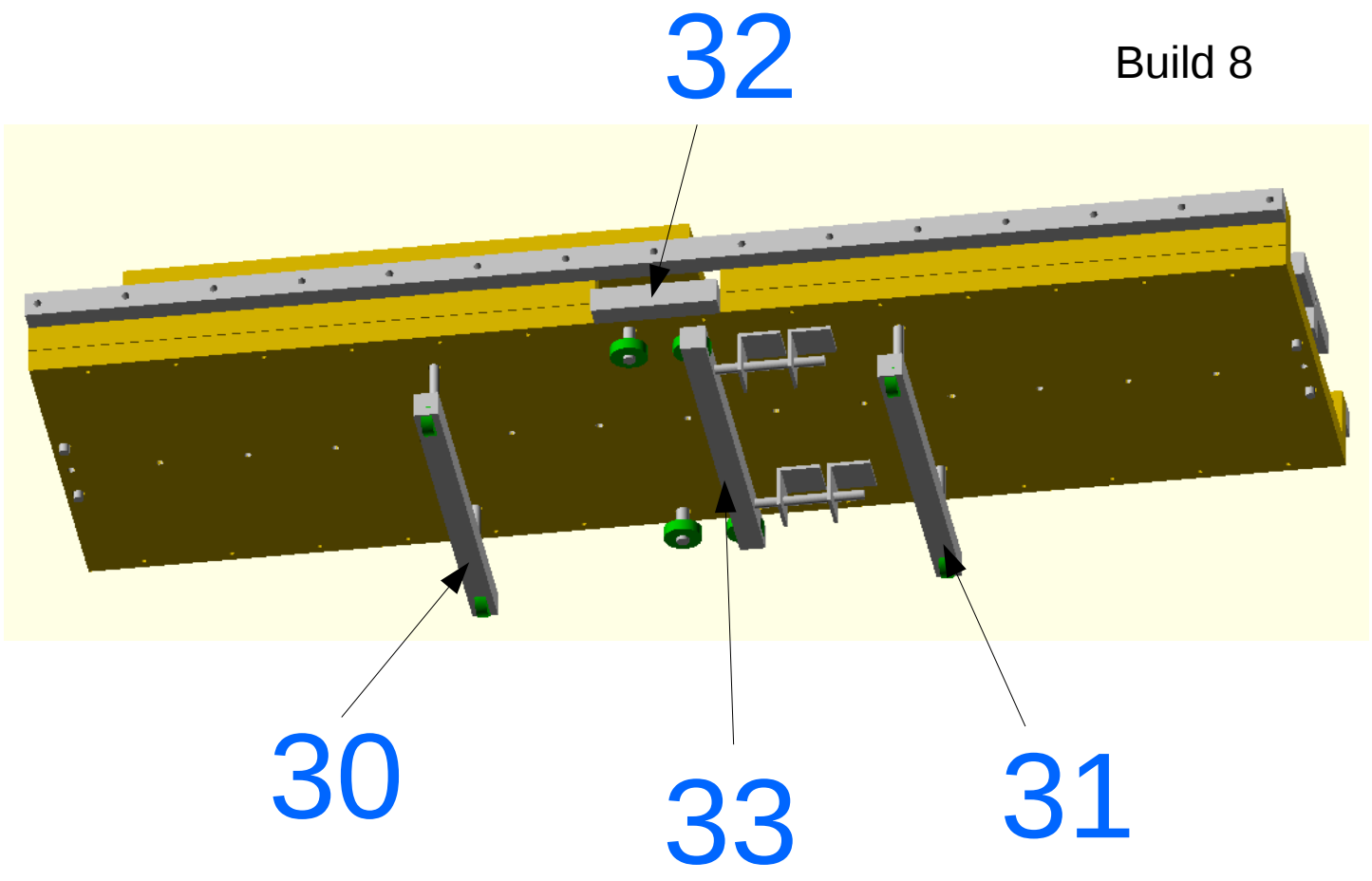
Build 4


Build 5
16
15
17
Build 6
24
22
23
21
19
18
20

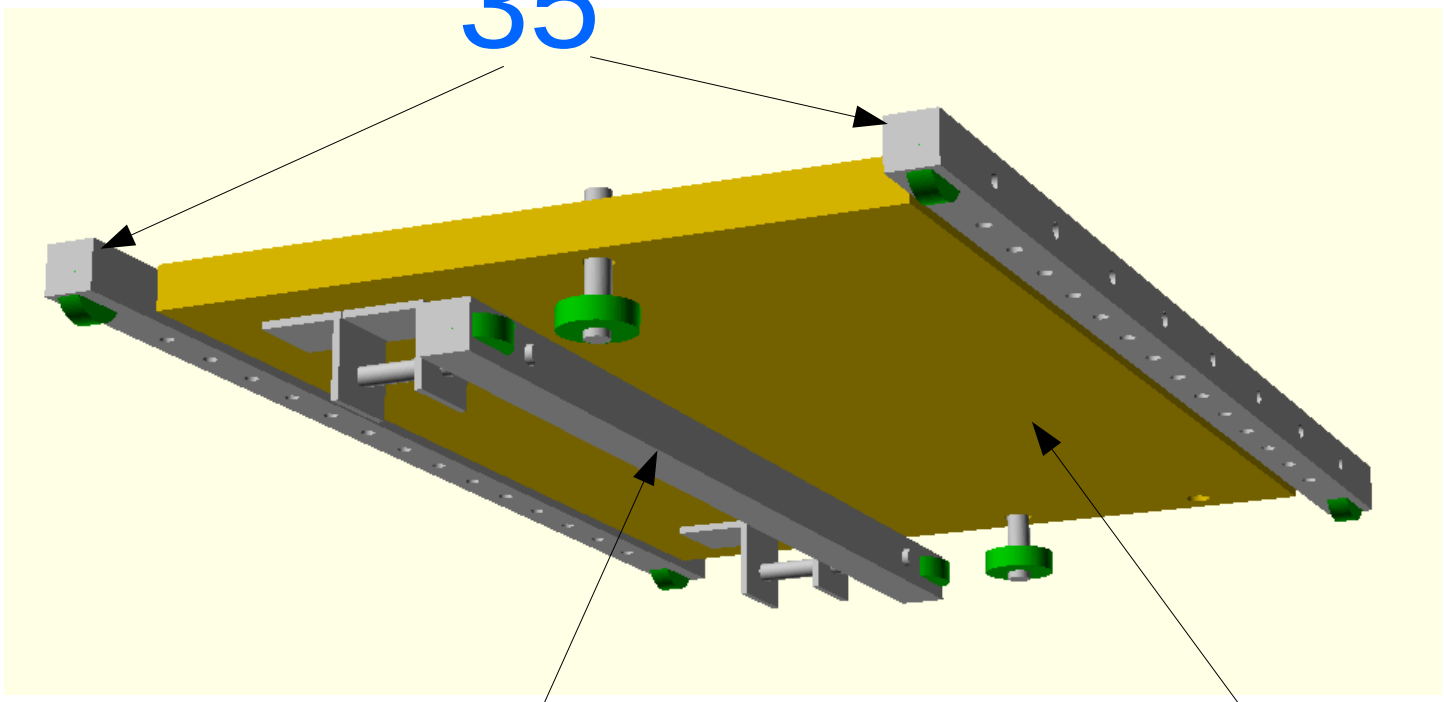
Build 7



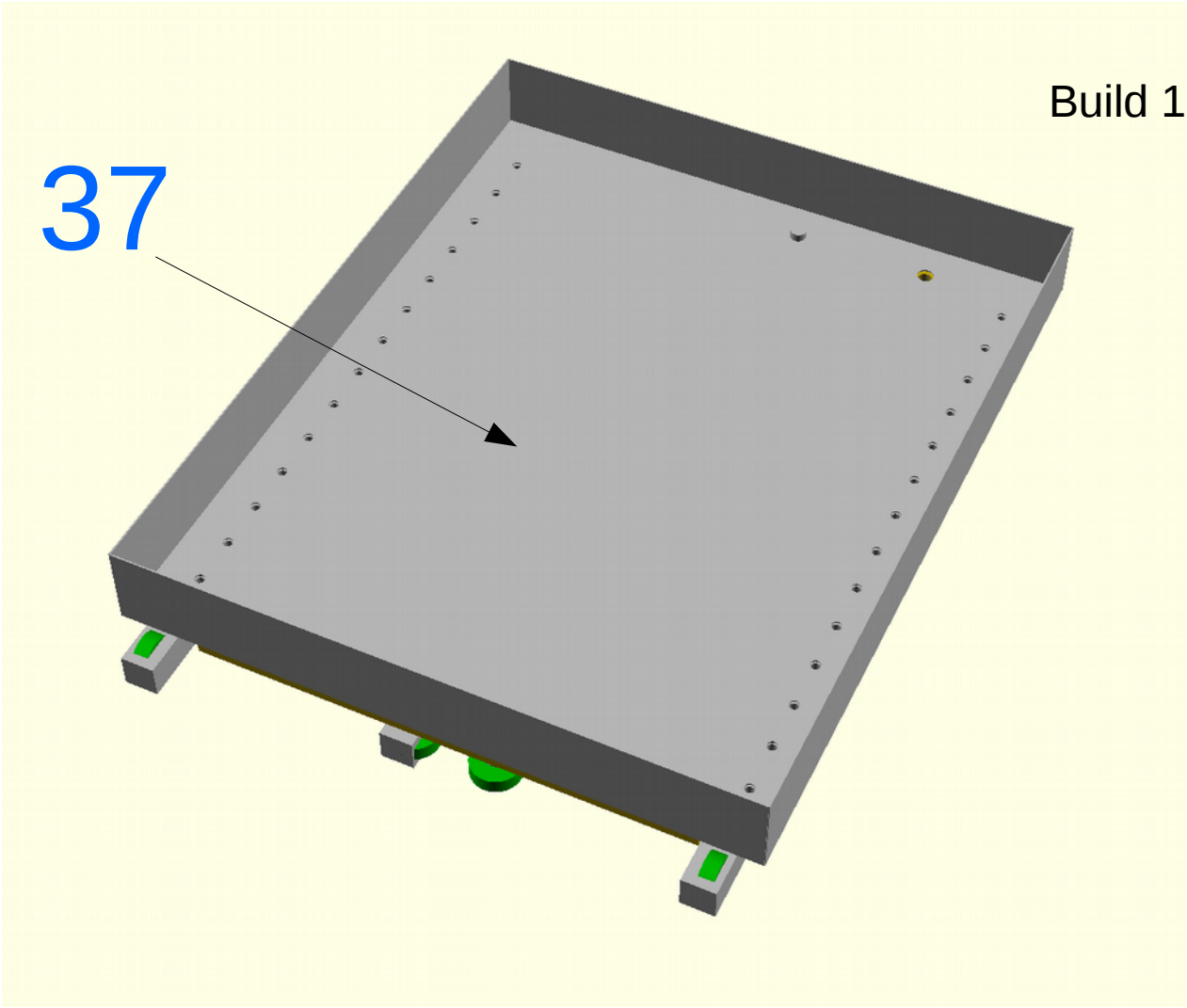
Build 8



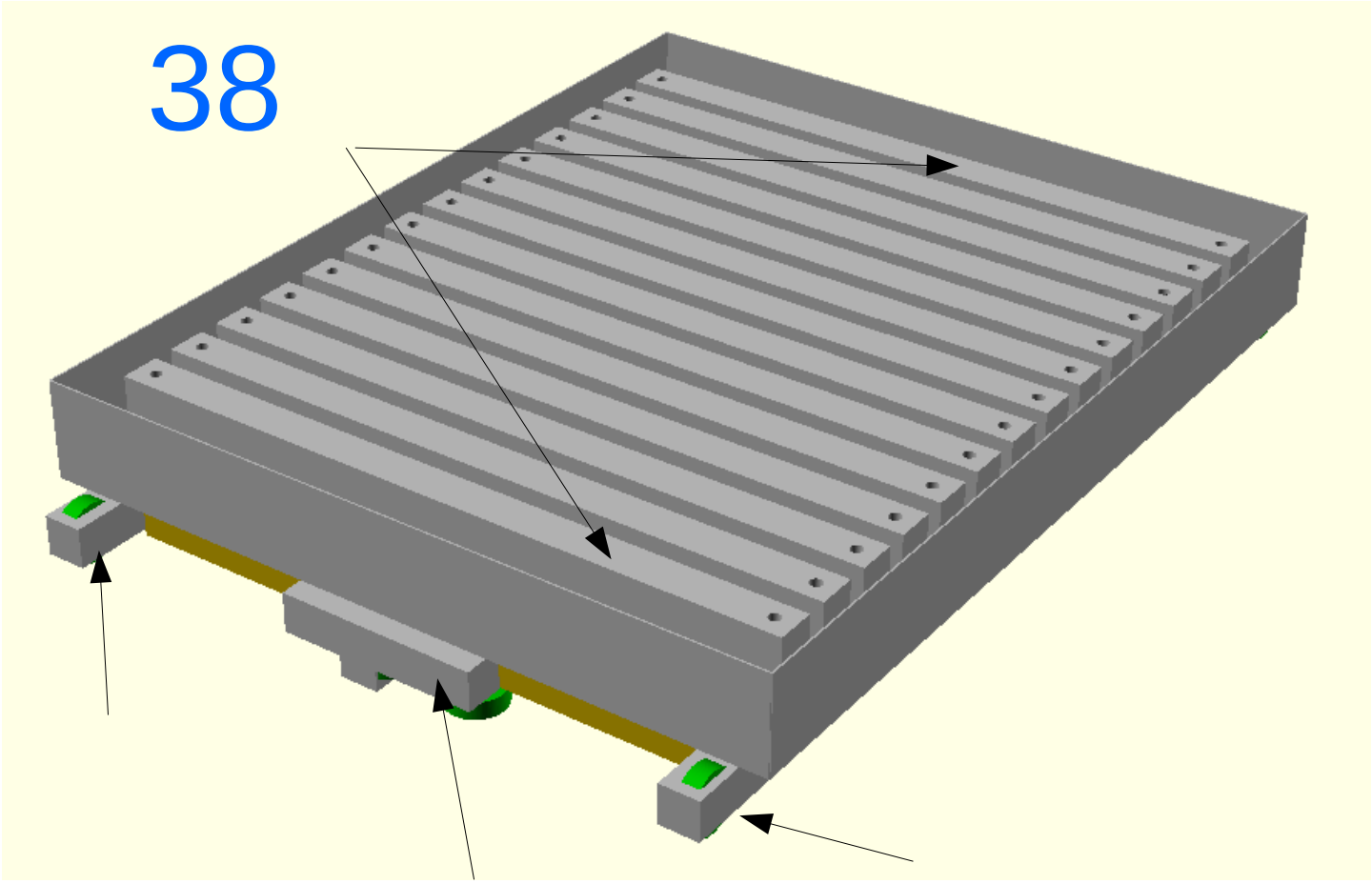
Build 9



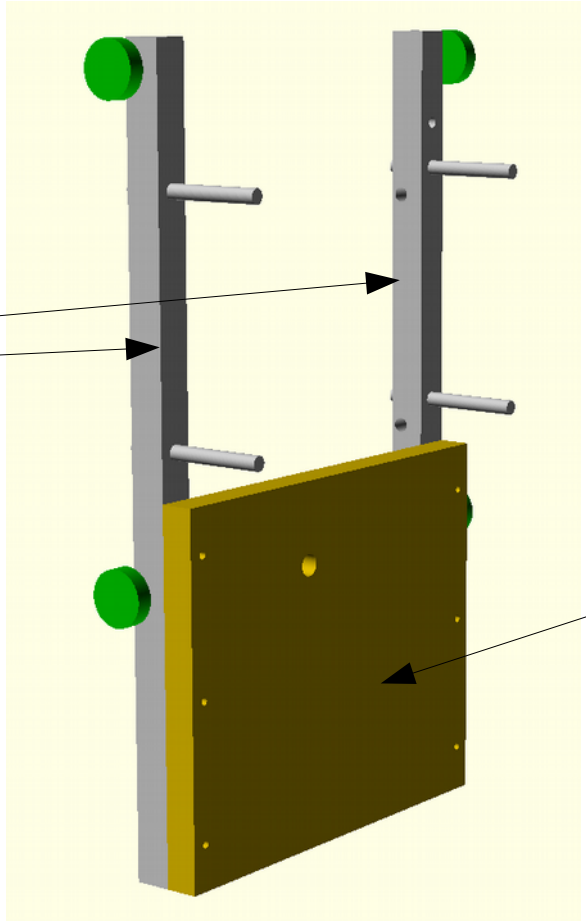
Build 10

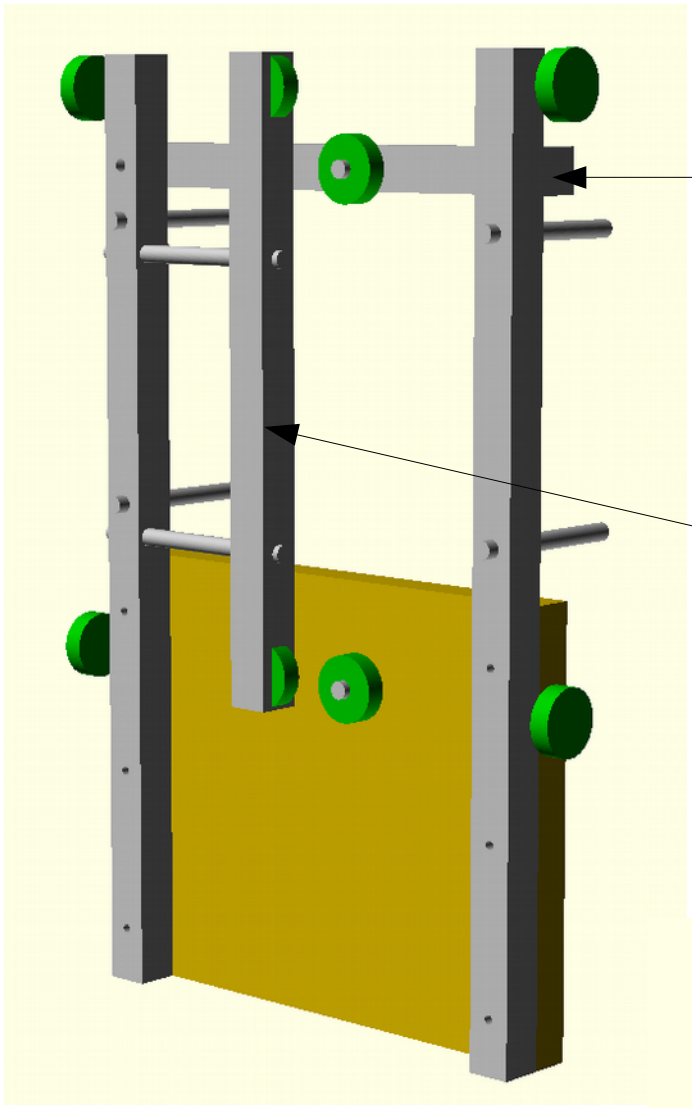


Build 11



Build 12

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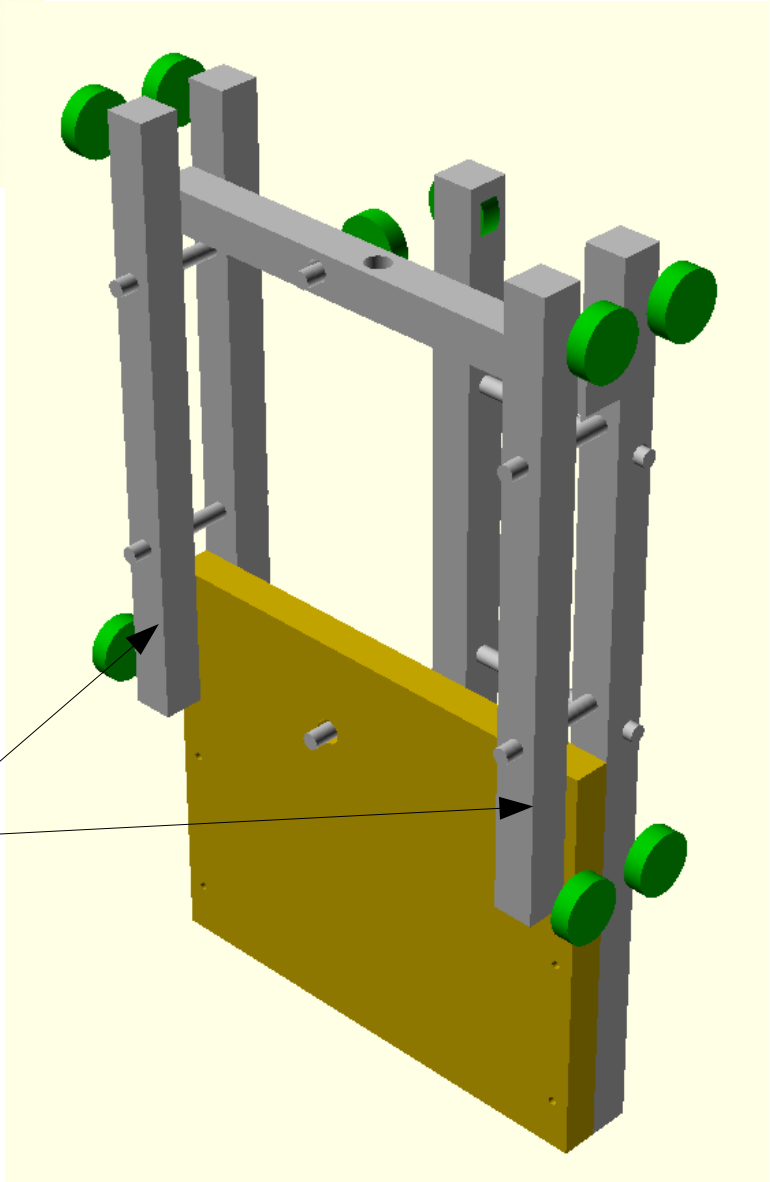
42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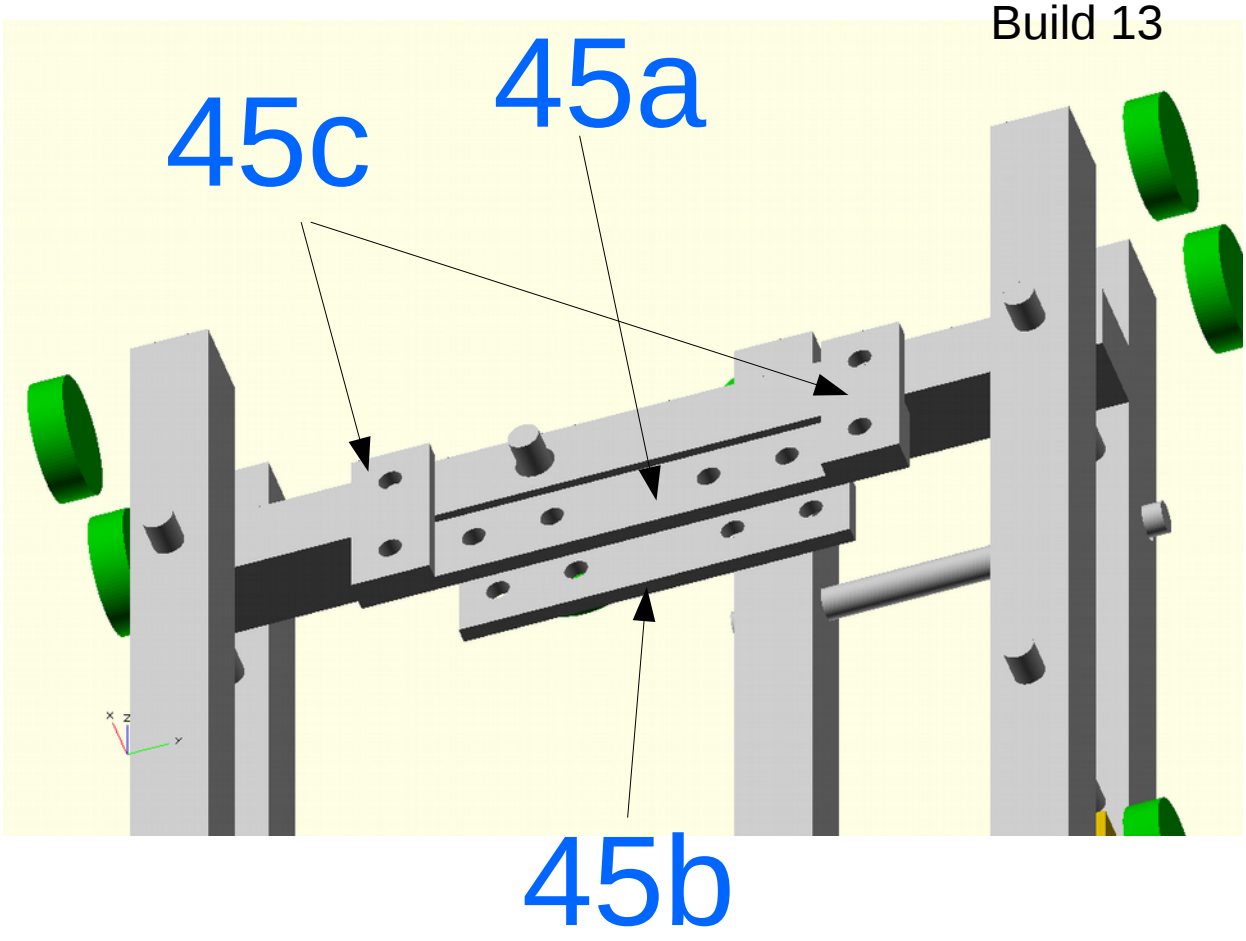

Photo 2
I have sealed the surface of the chipboard using candle wax and a hot air blower.

Photo 3
Approximately tea lights were needed in total for the mechanics.
At this side view you can see that parts 9 and 14 "widened" by 20x40mm roof battens. (Almost) all parts of the mechanics are made from 300mm chipboard stripes to make cutting easy.
Of course you can cut the two parts having a width of 340mm.

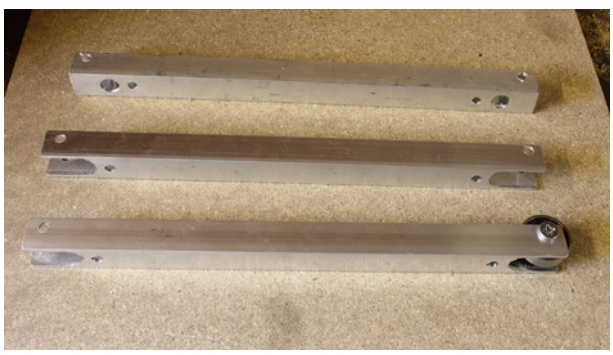

Photo 4
Some of the ball bearings are mounted at the ends of aluminum square tubes. To do so, I have drilled 12mm holes with a distance of 20mm from the edges and cut out the slots with a metal saw.
Before that i have drilled 6mm holes for the axes of the ball bearings.
The axes are at the bottom of the square tubes, not at the center.

Photo 5
The mount of the motor of the Z axis uses two gear wheels.
The motor could drive the threaded rod directly,...

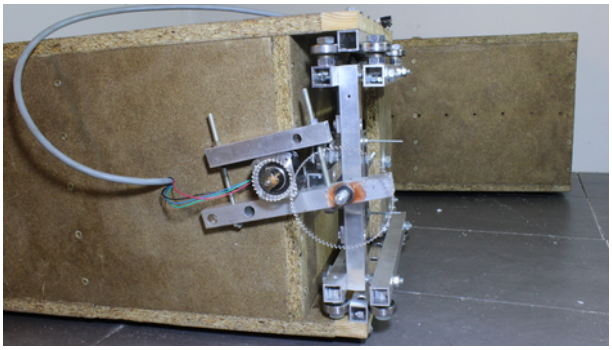

Photo 6
...however the low ceiling of my workshop doesn't allow that.

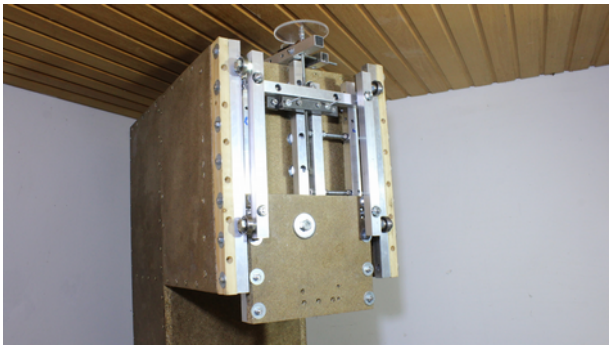

Photo 7
The guides of the Y axis.

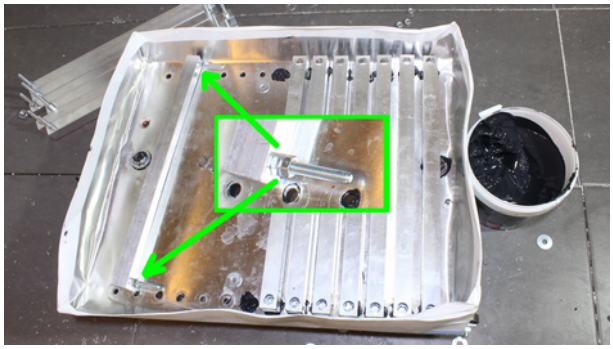

Photo 8
I have sealed all drill holes of the 0.5mm aluminum bowl
using silicone and washers. Two stacked M6 nuts are used
as spacers between the square tubes of the table and the bowl.

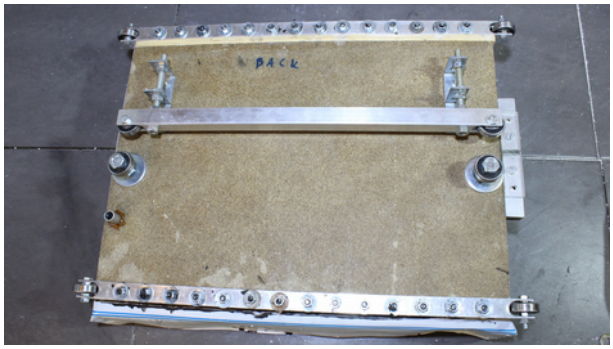

Photo 9
Bottom site of the X axis.

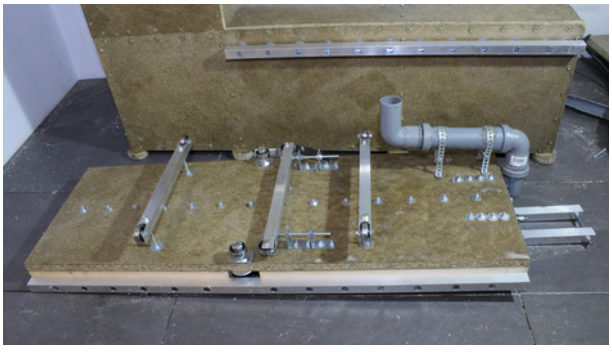

Photo 10
Bottom side of the Y axis.

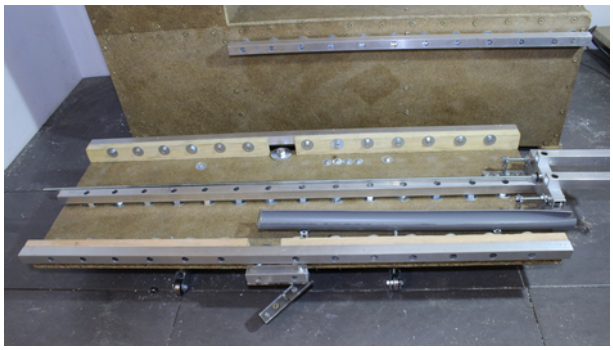

Photo 11
Top side of the Y axis.
M10 nuts are used as spacers at the center guide of the X axis.

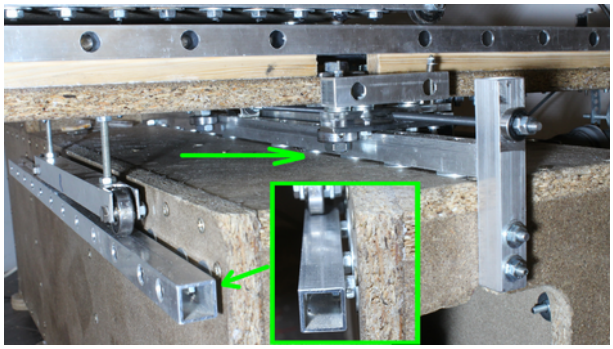

Photo 12
Two washers are used as spacers for the central guide of the X axis.
M8 nuts and washers are the spacers used at the two side guides.

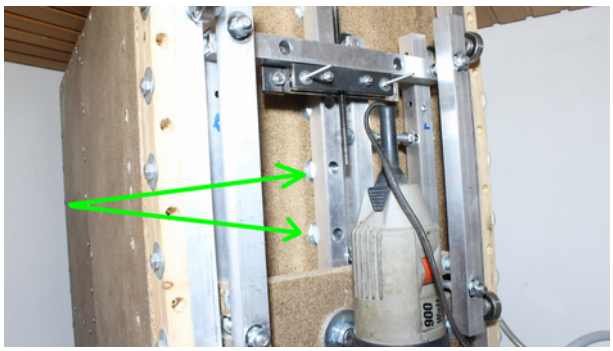

Photo 13
M10 nuts and washers are used as spacers
for the central guide of the Z axis.

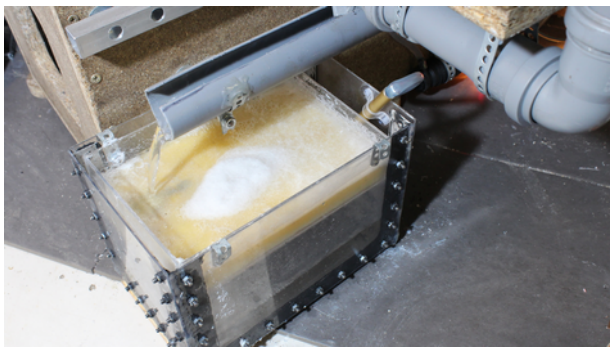

Photo 14
The reservoir of the coolant should have a capacity of at least 2L.
A piece of foam serves as filter.

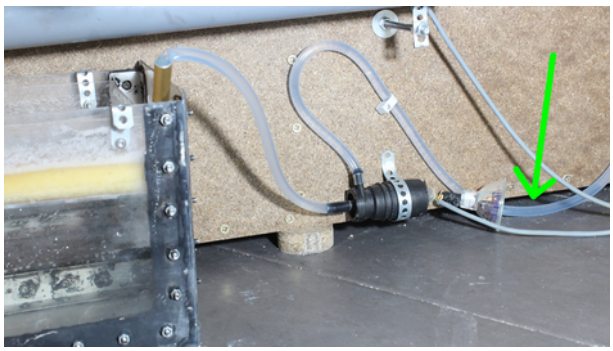

Photo 15
The pump of a winscreen washer drives the coolant flow.
It's mounted on a deep point of the frame, because pressure
difference is low at the intake side. The hose on the outtake
must make a loop going below the level of the reservoir.
Otherwise the coolant level drops below the pump whenever
it is turned off and that type of pump doesn't work when it is dry.

Photo 16
The motor of the Y axis is clamped by two pieces of wood.
In a first attempt I was using weak stepper motors with
a piece of rubber tube as connector between motor shaft
and threaded rod.

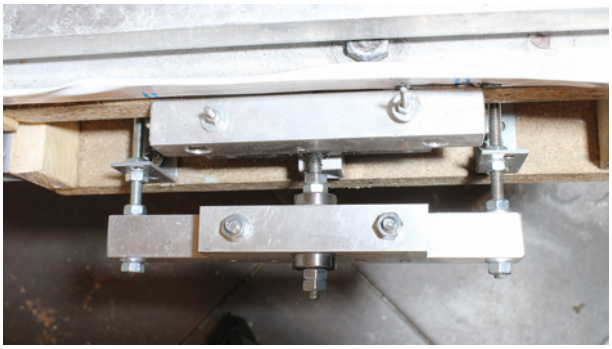

Photo 17
Mount of the X axis motor.
With the more powerful motors I am now using rubber tubes with steel enforcements, made for household water installations.
The foam keeps motor vibrations away from the frame and so reduces noise clearly.
The motors are not connected tightly to the frame, but are able to move longitudinal and at right angles to the threaded rod.
The mechanics of this CNC is designed in such a way that you don't have to cut all parts with highest precision.
The motors form the "loose" end of the threaded rods.

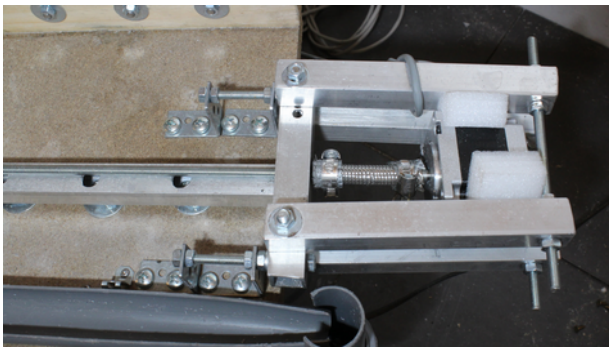

Photo 18
The fixed ends are connected with the mechanics through two ball bearings. Apply a bit of prestress to the bearings that are mounted on a square tube (x axis)...

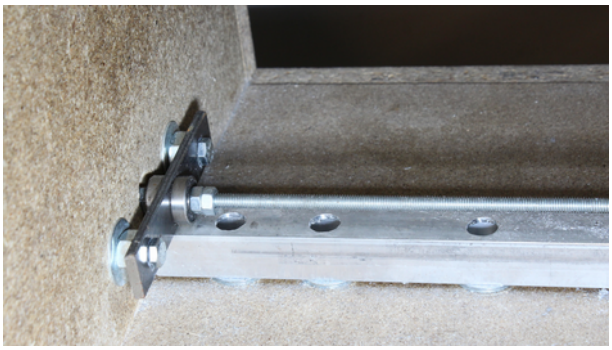

Photo 19
...or a 20x4mm flat steel bar.
Not enough prestress results in unwanted backlash, too much prestress means too high friction - its up to you to find the best balance.

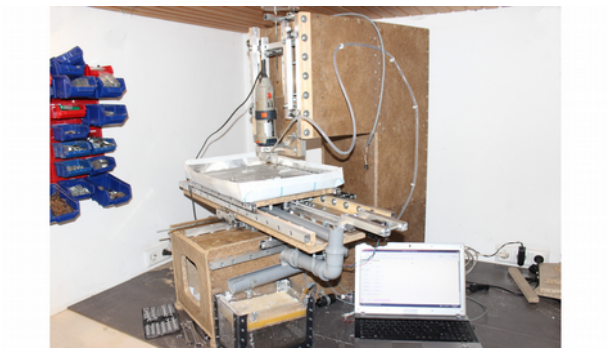

Photo 20
The frame is huge.
CNC v3.2.2 would not fit in my workshop if it was just a couple of centimeters higher.
It is also a heavy beast to move it to maker fairs...

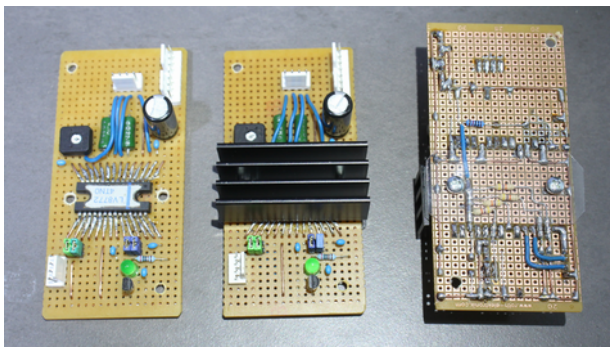

Photo 21
I am using ICs type LV8772 as motor drivers.