



# Milkcrate Shelving

SLQ Wiki Fabrication Lab 2024/06/02 11:28

# Milkcrate Shelving

An interpretation of the basic ikea shelves for storing cubic items (ie milkcrates). This is a parametric design made in autodesk Fusion360.

## Getting Parametric

So what parameters do we need to think about before we start?

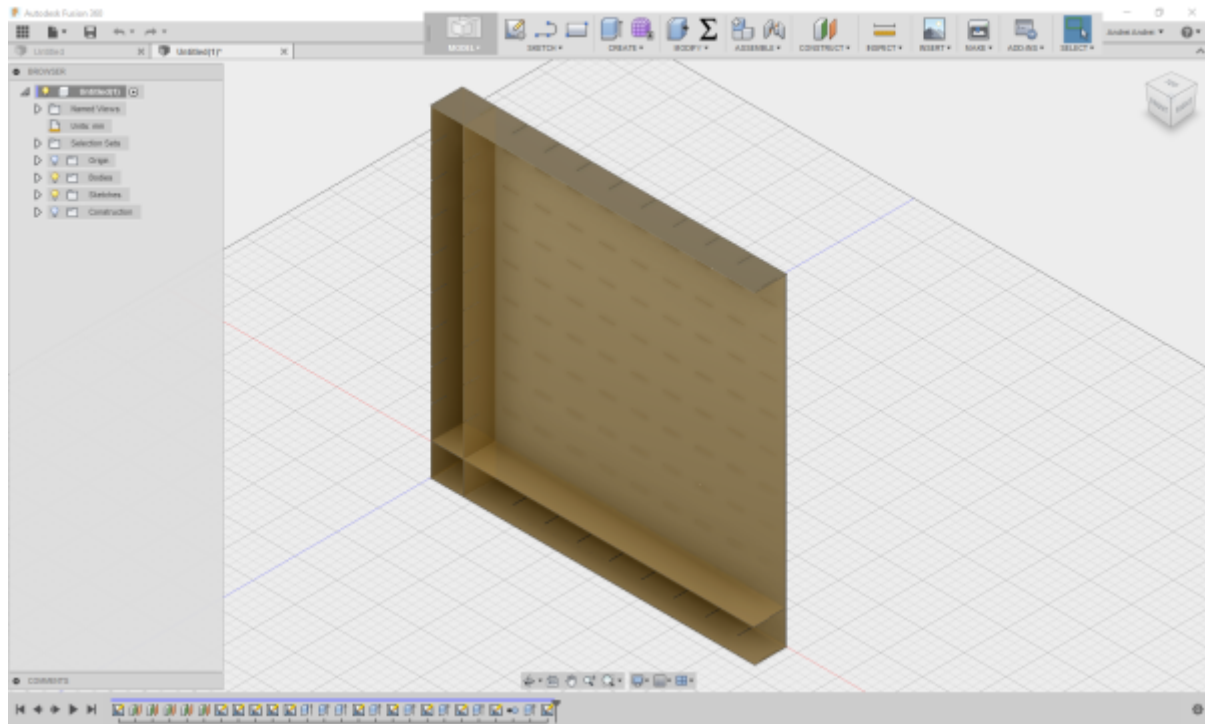
- crate = crate dimension - this is a cube measured in mm.
- shelves = number of shelves (dimensionless) - this is used to calculate the height in mm.
- Compartments = number of compartments (dimensionless) - this is used to calculate the width in mm.
- thickness = the material sheet thickness in mm.
- tool thickness (tool)

Once you enter these parameters the model will calculate the largest router bit size based on your material thickness that can be used and display it as the **toolmax** parameter. Then you can set your tool diameter. This can go as small as .5mm which is useful for the lasercutter.

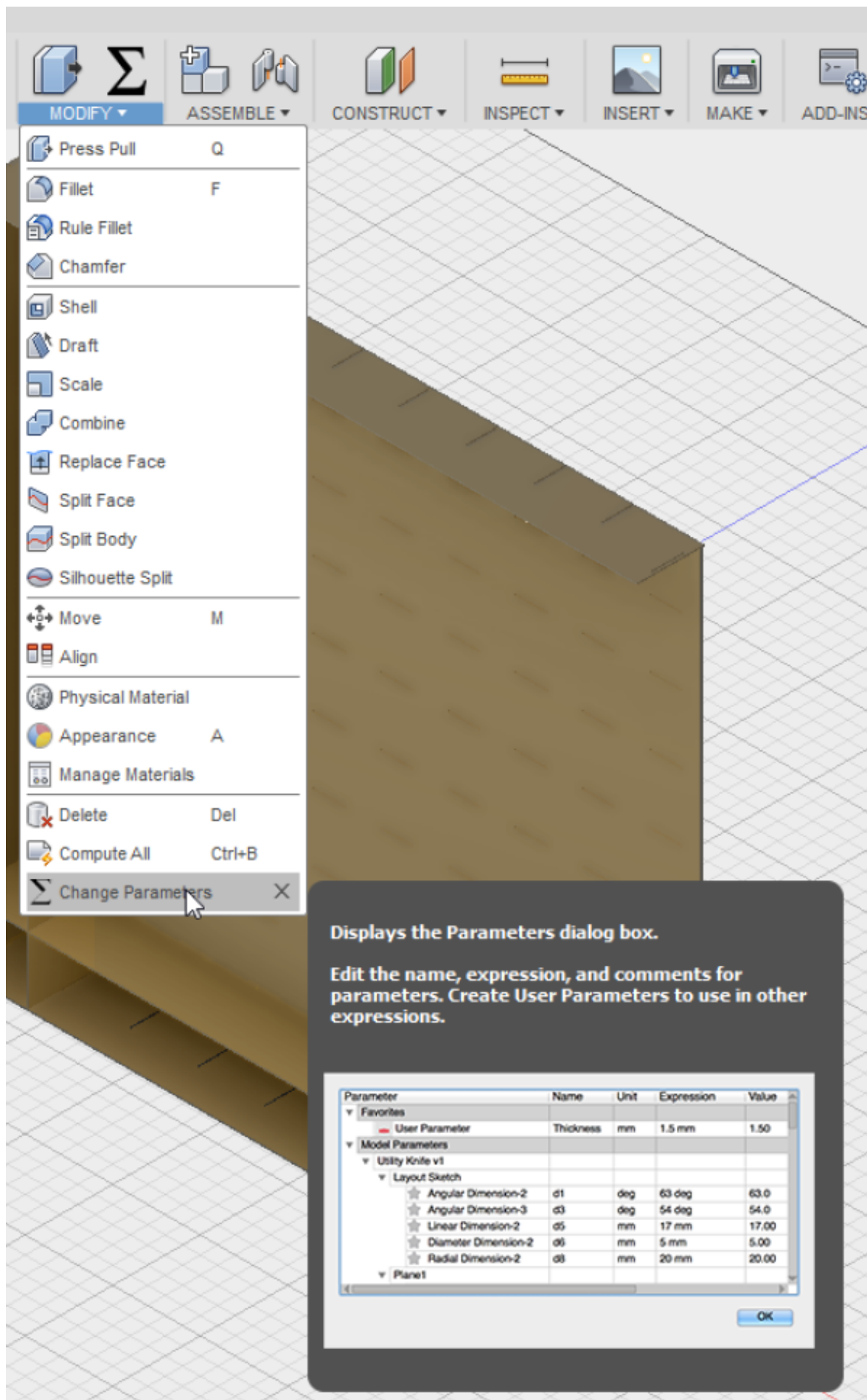
Lets make a smaller set of shelves on the [multicam M-2412](#)

## Fusion360

Grab this [file](#) and open it in Fusion360.



Now go to the modify menu and select change parameters



The screenshot shows the SolidWorks software interface with the 'MODIFY' menu open. The 'Change Parameters' option is highlighted at the bottom of the menu. A callout box provides information about the Parameters dialog box.

**Displays the Parameters dialog box.**

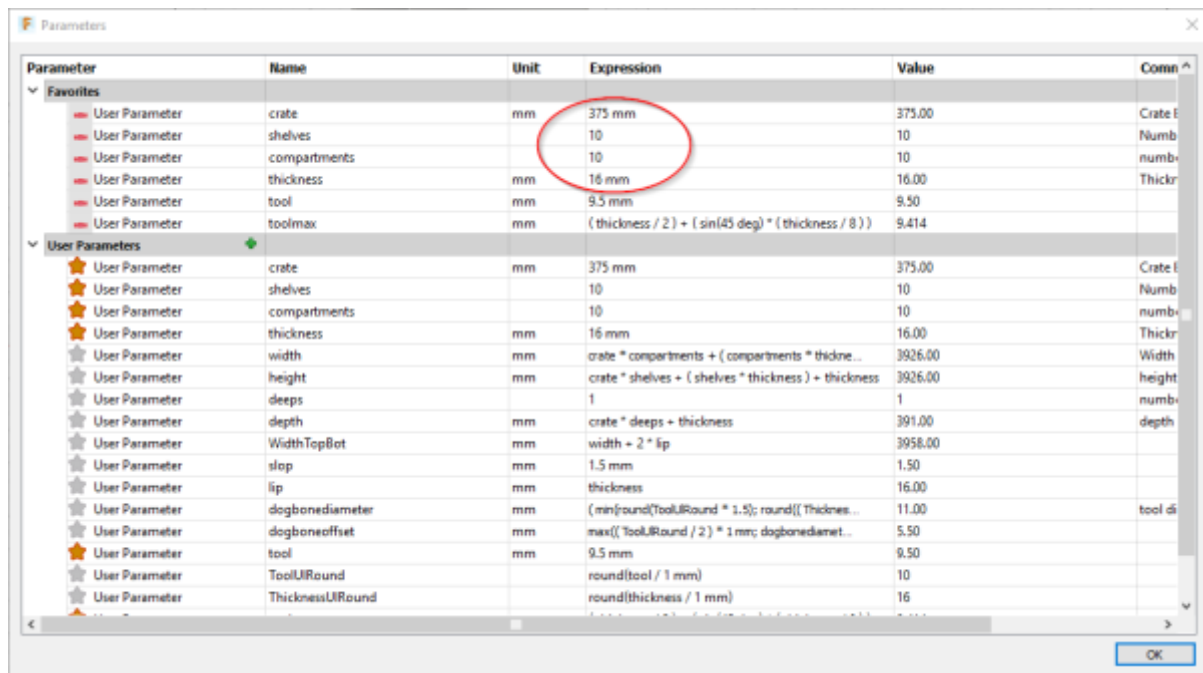
**Edit the name, expression, and comments for parameters. Create User Parameters to use in other expressions.**

The Parameters dialog box is shown below, displaying a table of parameters:

Parameter	Name	Unit	Expression	Value
▼ Favorites				
User Parameter	Thickness	mm	1.5 mm	1.50
▼ Model Parameters				
▼ Utility Knife v1				
▼ Layout Sketch				
Angular Dimension-2	d1	deg	63 deg	63.0
Angular Dimension-3	d3	deg	54 deg	54.0
Linear Dimension-2	d5	mm	17 mm	17.00
Diameter Dimension-2	d6	mm	5 mm	5.00
Radial Dimension-2	d8	mm	20 mm	20.00
▼ Plane1				

OK

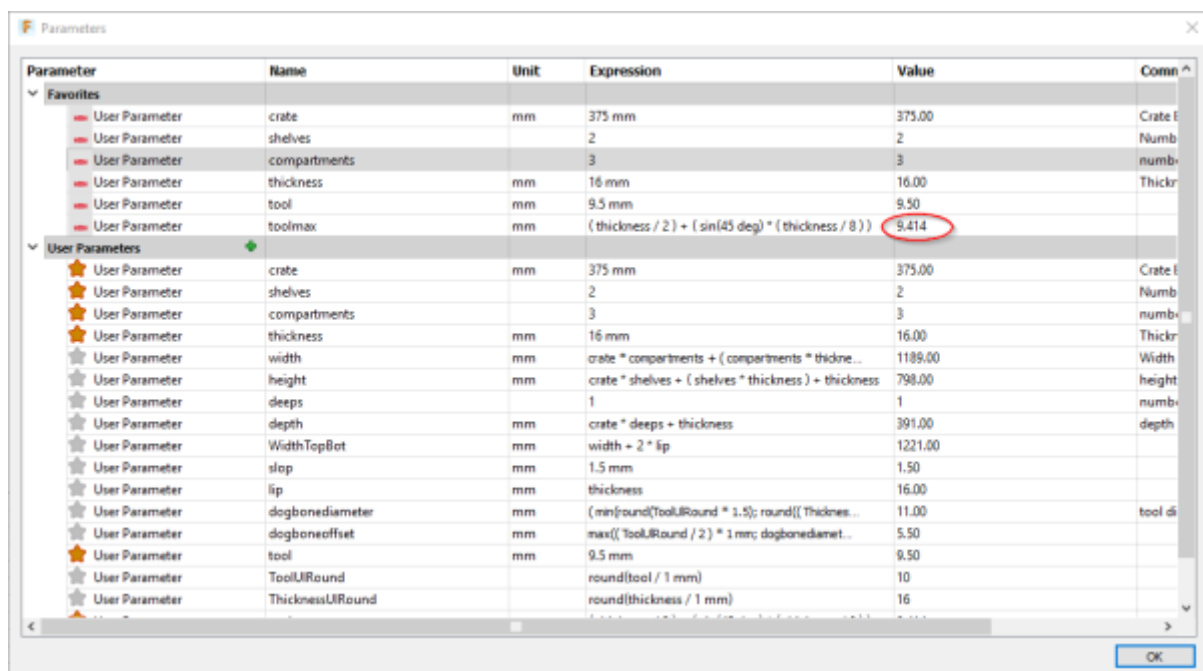
Here you can adjust the build to your needs. You should only change the expression field in these favourite parameters. I've modified it to fit on a sheet of mdf 2000 x 900 x 16. With 2 shelves, 3 compartments, 16mm thickness and a crate of 375 mm.



Parameter	Name	Unit	Expression	Value	Comm
★ User Parameter	crate	mm	375 mm	375.00	Crate l
★ User Parameter	shelves		10	10	Numb
★ User Parameter	compartments		10	10	numb
★ User Parameter	thickness	mm	16 mm	16.00	Thickr
★ User Parameter	tool	mm	9.5 mm	9.50	
★ User Parameter	toolmax	mm	$(thickness / 2) + (\sin(45 \text{ deg}) * (thickness / 8))$	9.414	

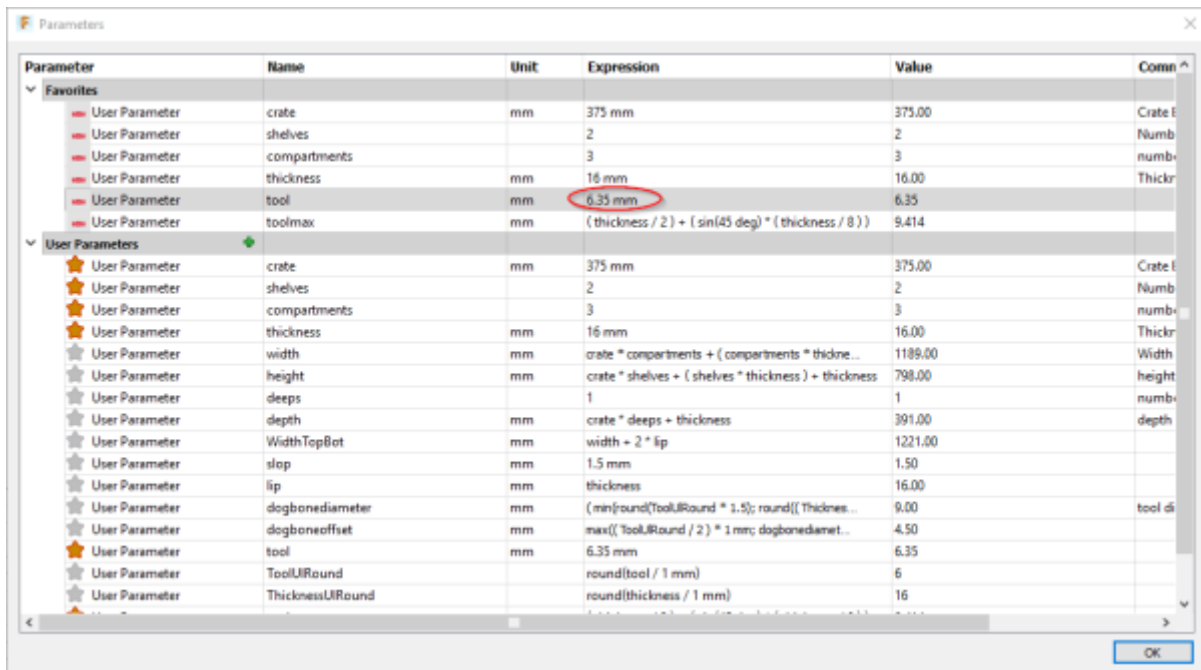
Check out the toolmax parameter value. It suggests I can get away with a tool up to 9.5mm (round it to the nearest .5 mm)

- toolmax - this is calculated based on the thickness of your material, round it to the nearest .5 of a mm. For example the biggest tool you can use with 16mm material is 9.41mm (9.5mm)



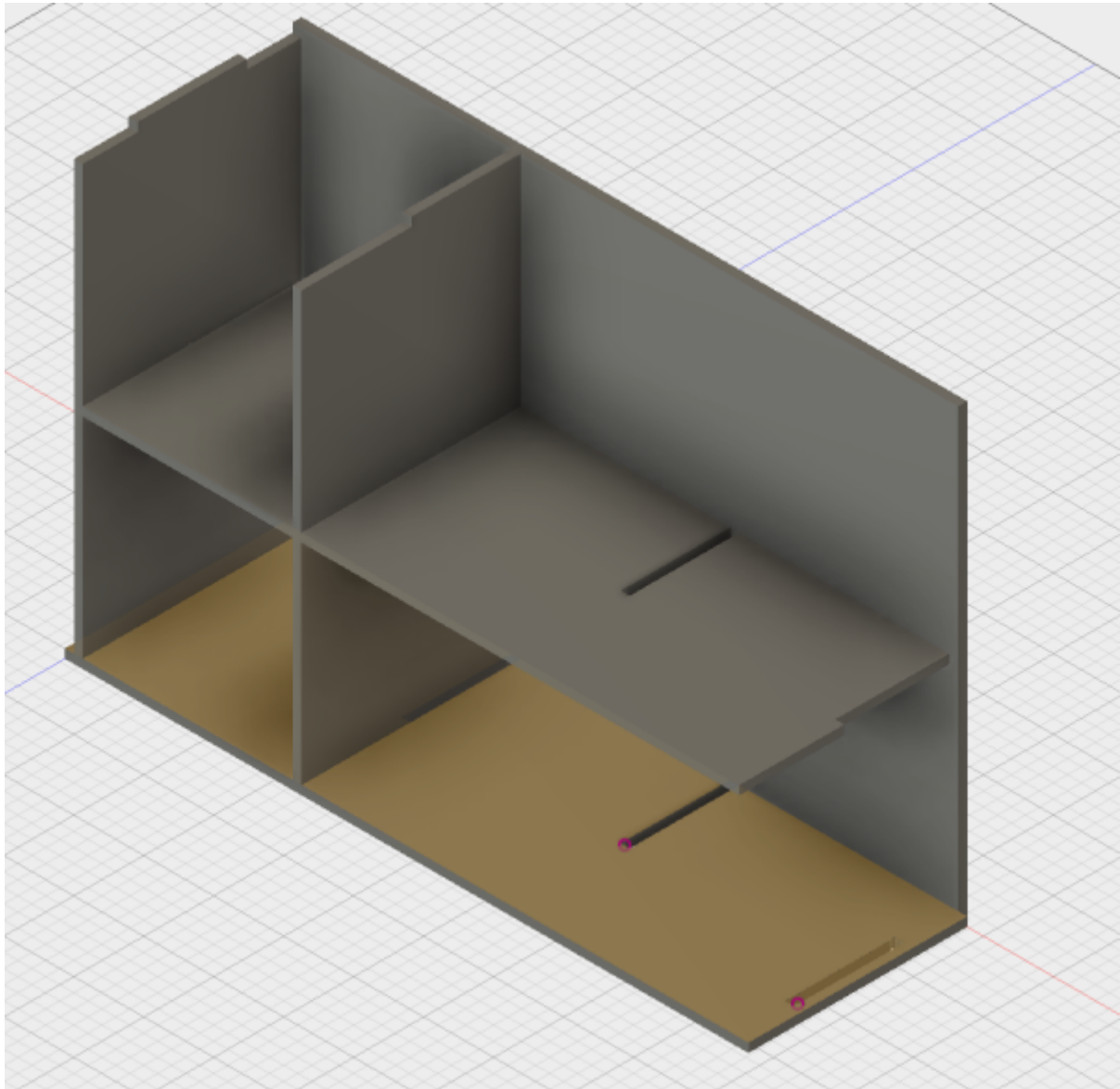
Parameter	Name	Unit	Expression	Value	Comm
★ User Parameter	crate	mm	375 mm	375.00	Crate l
★ User Parameter	shelves		2	2	Numb
★ User Parameter	compartments		3	3	numb
★ User Parameter	thickness	mm	16 mm	16.00	Thickr
★ User Parameter	tool	mm	9.5 mm	9.50	
★ User Parameter	toolmax	mm	$(thickness / 2) + (\sin(45 \text{ deg}) * (thickness / 8))$	9.414	

In this case I'm going to use a 6.35mm tool for a nicer finish.



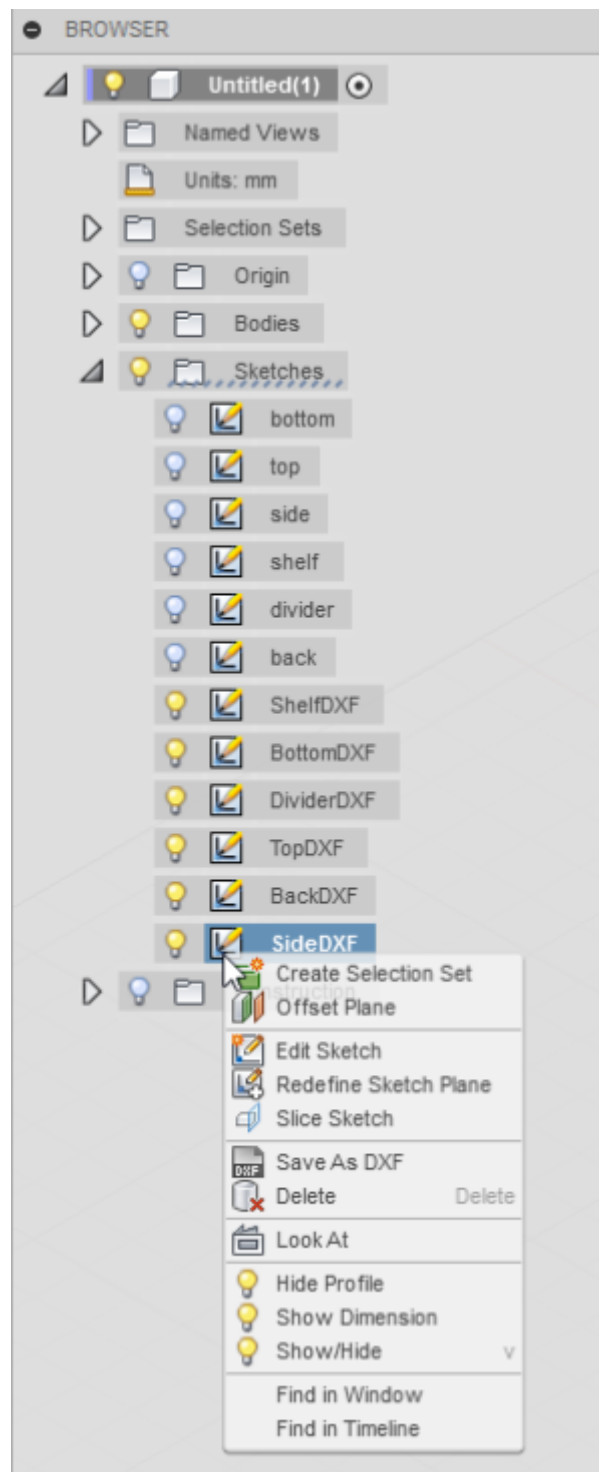
Parameter	Name	Unit	Expression	Value	Comm
▼ Favorites					
User Parameter	crate	mm	375 mm	375.00	Crate l
User Parameter	shelves		2	2	Numb
User Parameter	compartments		3	3	numb
User Parameter	thickness	mm	16 mm	16.00	Thickr
User Parameter	tool	mm	6.35 mm	6.35	
User Parameter	toolmax	mm	$(thickness / 2) + (\sin(45 \text{ deg}) * (thickness / 8))$	9.414	
▼ User Parameters					
★ User Parameter	crate	mm	375 mm	375.00	Crate l
★ User Parameter	shelves		2	2	Numb
★ User Parameter	compartments		3	3	numb
★ User Parameter	thickness	mm	16 mm	16.00	Thickr
★ User Parameter	width	mm	$crate * compartments + (compartments * thickne...$	1189.00	Width
★ User Parameter	height	mm	$crate * shelves + (shelves * thickness) + thickness$	798.00	height
★ User Parameter	deeps		1	1	numb
★ User Parameter	depth	mm	$crate * deeps + thickness$	391.00	depth
★ User Parameter	WidthTopBot	mm	$width + 2 * lip$	1221.00	
★ User Parameter	slop	mm	1.5 mm	1.50	
★ User Parameter	lip	mm	thickness	16.00	
★ User Parameter	dogbonediameter	mm	$(\min(\text{round}(\text{ToolUIRound} * 1.5); \text{round}((\text{Thicknes}...$	9.00	tool di
★ User Parameter	dogboneoffset	mm	$\max((\text{ToolUIRound} / 2) * 1 \text{ mm}; \text{dogbonediamet}...$	4.50	
★ User Parameter	tool	mm	6.35 mm	6.35	
★ User Parameter	ToolUIRound		$\text{round}(\text{tool} / 1 \text{ mm})$	6	
★ User Parameter	ThicknessUIRound		$\text{round}(\text{thickness} / 1 \text{ mm})$	16	

Now close the parameter window and check out your model. Looks a bit more reasonable now?



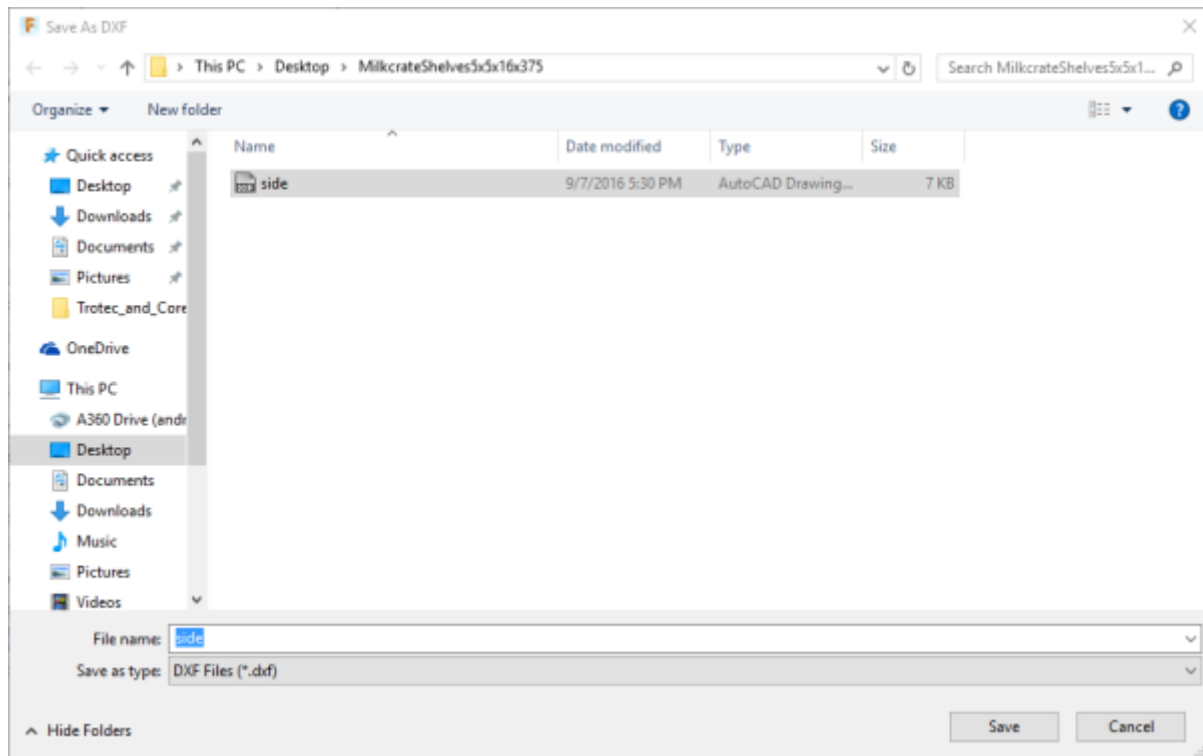
Now we need to export our DXFs for cutting, which we do from a 2D sketch. <sup>1)</sup> The Sketches we want to export are called (partname)DXF. I'm going to export the SideDXF first by right clicking and selecting export to DXF.





Then save it with a nice name..





Now repeat for all the other sketches named DXF and you are done!!

## Cutting on The Edge CNC router

To cut on the CNC router you first need to be inducted and make a booking.

1)

To make the sketches neat for export I've gone through and extruded bodies from the original sketches then created new sketches on the extruded faces. This gets rid of the construction lines...