

# 2FORM

By Peter Moakes





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# Project Context

Since the COVID-19 outbreak of 2020, many businesses have changed their stance on working from home. This has led to more and more people to decide to work from home with the majority doing so part time and going into the office the rest of the week.

There are many benefits from working from home but without the right workspace it makes getting with tasks a lot more difficult. During lockdowns a big issue those working from home faced was a lack of effective workspaces. This meant that many had to work from their beds, sofas, coffee tables or dining tables. Working from the kitchen table being the most favourable choice also meant there was a high chance someone working from home in a crowded household would also have to share the space with a family member or roommate, this could lead to distraction and lack of focus. There is also the factor that all work must be moved when it comes time to mealtimes.

A large portion of those working from home now have limited spacing and would not be able to have a large desk in their home over a long period of time. There is also the issue of where to store their work documents when finishing work for the day or week. This is a new opportunity where design can be utilised to development a more trouble-free home working lifestyle for those struggling with these types of issues.

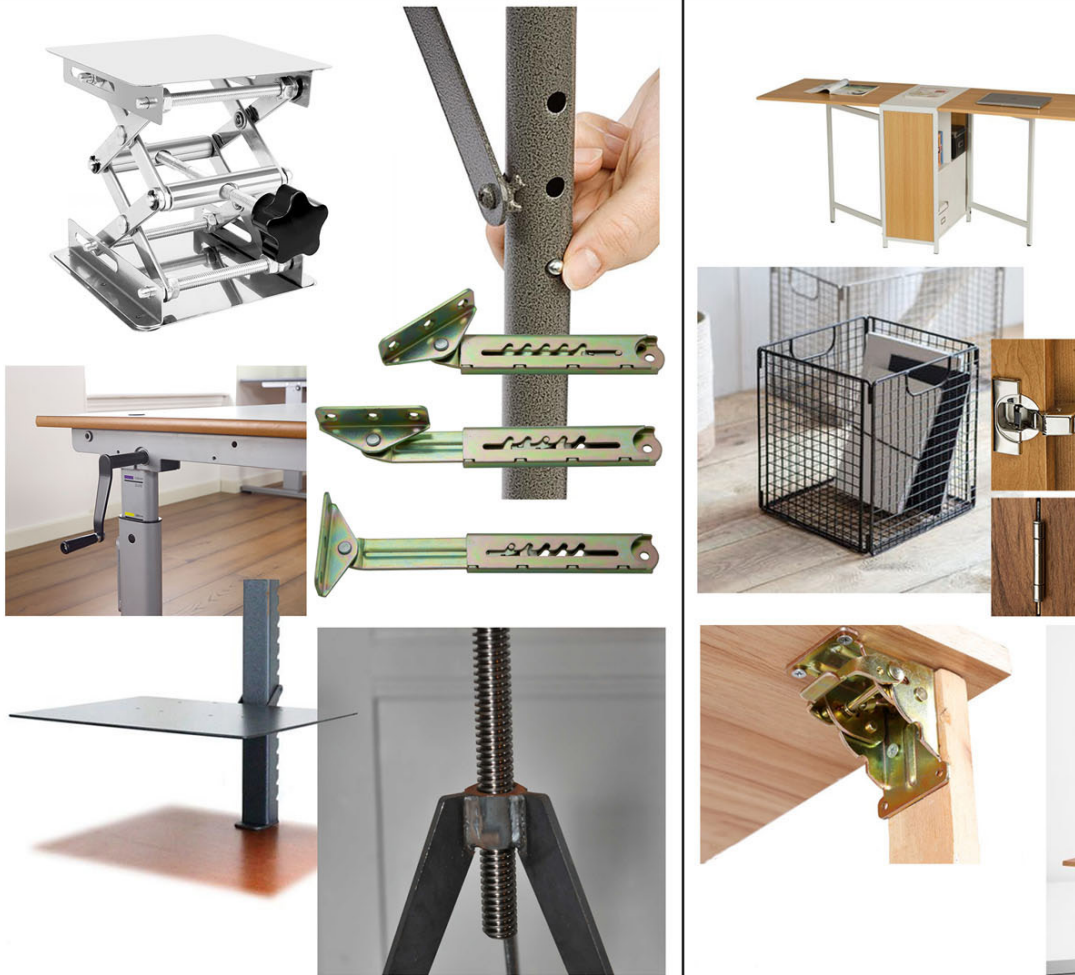




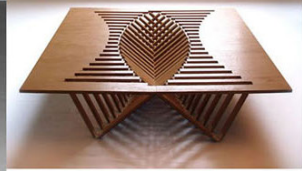
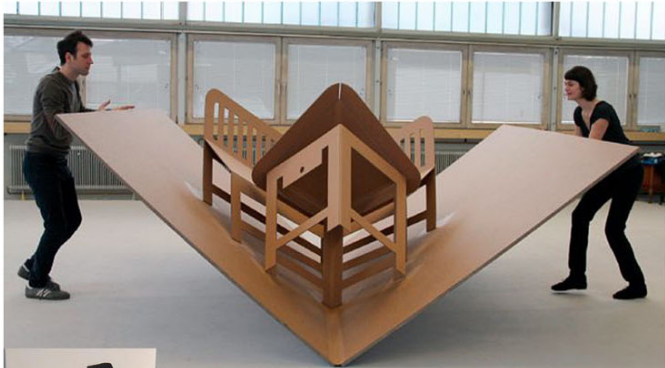


# Research Development

These three photomontage images show the start of the design process of home working. The left image investigates height adjustable mechanisms, foldable items with storage spaces for possible foldable furniture pieces with items for compact, space saving furniture ideas.



cess deciding what direction to move forward with within designs for  
nisms for dual purpose furniture ideas. The middle image looks at  
ces with storage solutions. The right image focuses on compact folding





# Target Market



## Customer

The main motivation behind the design is that it's for those who pre pandemic worked full time in an office but now wish to work from home on a part time basis due to it being dual purpose as both a desk and a shelf.

The desk will be used for home working on the days the user wishes to work from home and then will be transformed by the user back into the shelving unit to be pushed flat against a wall till it next needs to be used.

The user will also be a someone who lives in a somewhat small home as they will need the desk/shelving unit to save space, otherwise they would have room for a normal desk. There is also the added bonus of being able to store both work documents/ equipment or household objects, so these users save even more space.

The target audience is mainly for newly employed young adults who are moving into their first apartment and will therefore have limited options due to cost issues so will need to save space. Although the concept is still suitable for any part time home worker with limited space.



## Retailer

When looking at possible retailers that would be the right fit for selling this design concept, it's clear that it will need to be somewhere affordable so those with lower incomes can afford it. It will also need to be a modern design style so it can fit into most modern homes seamlessly. Therefore the most fitting place for it would be an affordable modern furniture retailer like for example IKEA, AllModern or Overstock. Although it's worth mentioning that it does not need to be a piece of flatpack furniture.



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# Design brief

To design a space saving multifunctional piece of furniture for people who work from home part time throughout the week in a small modern living space. The design must be quick and easy to transform whilst also maintaining a contemporary aesthetic. It will also need to be a design capable of mass production so it can be produced with a low cost on a large scale.



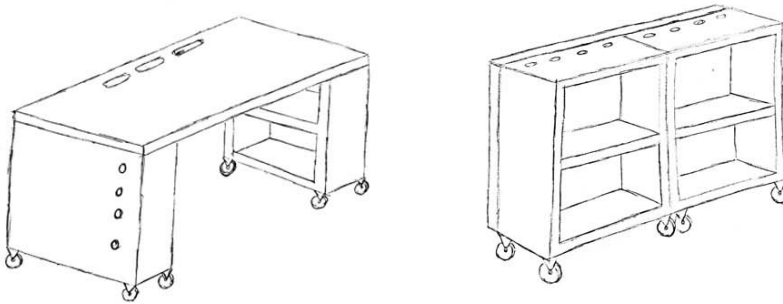




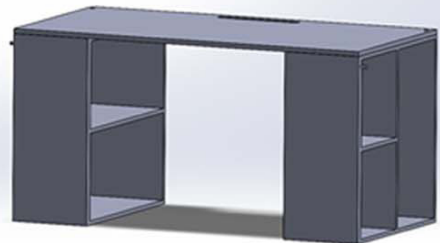
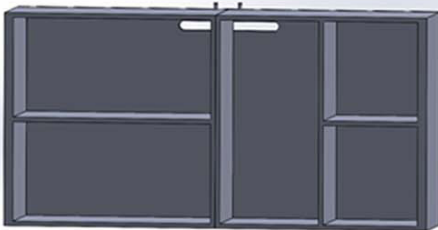
# Sketch & CAD development

From the early sketch to final SOLIDWORKS design, this shows how the design has developed and transformed from the initial sketch into the final design in the KeyShot renders.

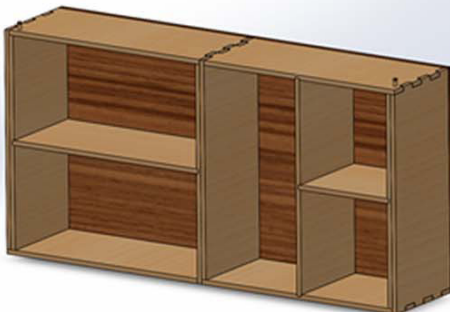
The sketches showing the basic principle



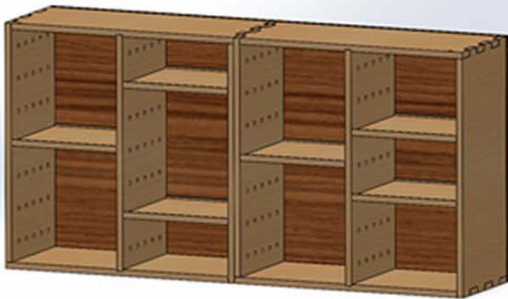
CAD designs without colour and without joints



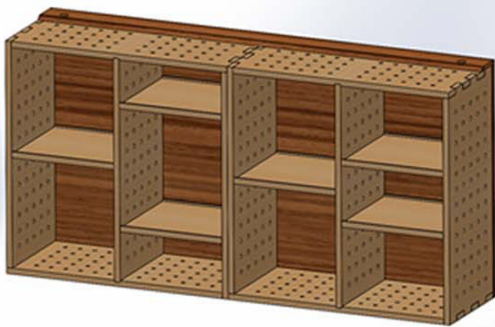
CAD designs with initial fixed pins design



First CAD design with adjustable shelves and removable pins



First CAD design with adjustable shelves and removable pins



CAD design with four pins and caster wheels



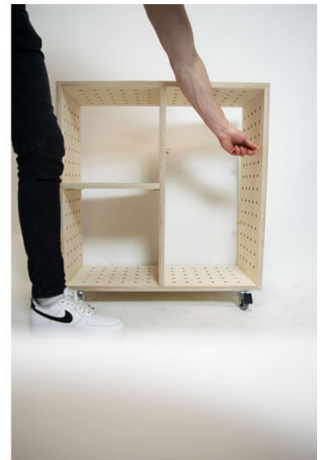
KeyShot render with plywood end grain



# Prototype Testing



In order to make sure the design worked effectively several tests had to be done. It has been tested by being used to perform tasks in its desk form such as using a laptop or reading a book to make sure the ergonomics is correct. The backboard/ tabletop handle hole had a laptop charging wire go through it to make sure it would fit and sit at the right angle. It had several items such as books, tins, and bowls placed on the shelves to test the strength and sturdiness. It has also had tests to make sure shelves are customizable by fitting the dowel pegs into different slots.

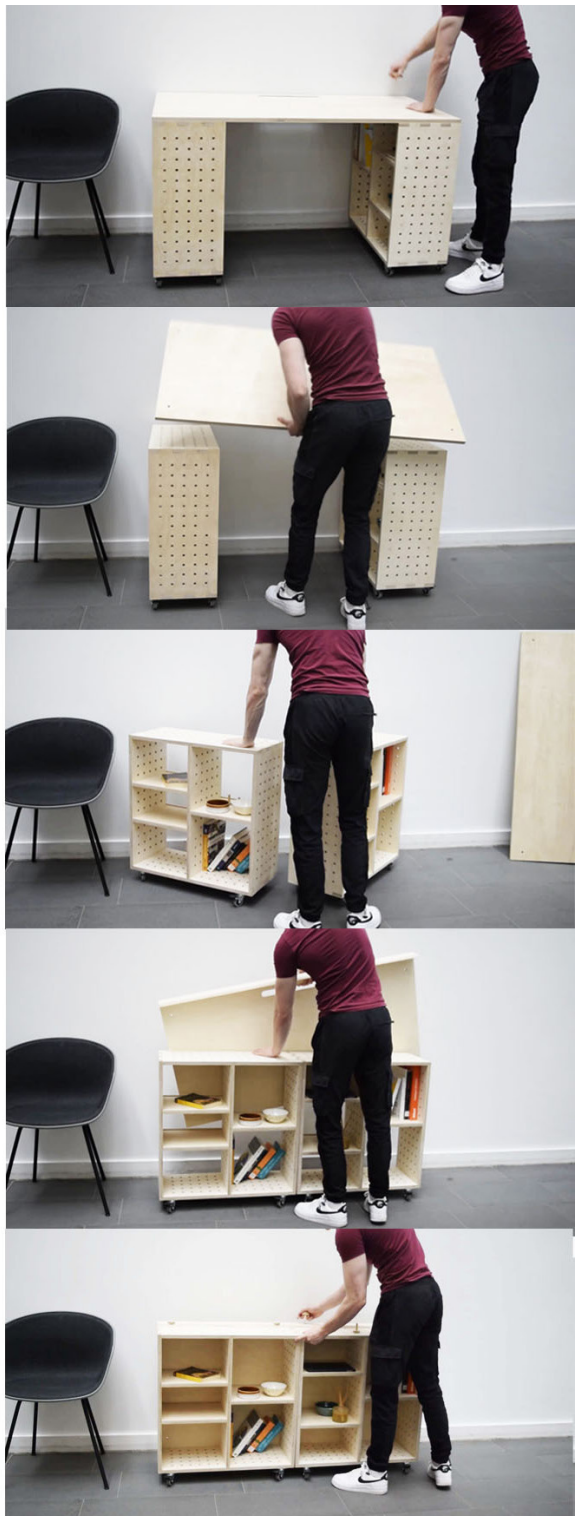




## Transformation Testing

The most important test that needed to be done was making sure that it could convert from table form to shelf form with several items on the shelves and vice versa. This also tests to make sure the casters work and the pins slide in an out nicely.

You can see from images cut from a video showing it going from desk to shelf that it worked and the same can be said about the other way around, each conversion taking around a minute. In fact all tests were successfully which shows the design must work to a good standard and is both built and designed properly.



# Final Outcome







# Specifications

## Materials

Birch Plywood, beech dowel, aluminium and rubber caster wheels

## Finishes

clear coat finish

## components include

- 1x backboard/ tabletop
- 2x square shelving units
- 6x shelves
- 8x caster wheels
- 4x pins
- 12x dowel pegs

Cost: £242

Cost of Material: £212

Cost of CNC machine: £30

Price: £350

Assembled table dimensions: 773mm x 1360mm x 692mm

Assembled shelf dimensions: 773mm x 1360mm x 318mm



# Manufacturing

## Method-Mass Production

To manufacture my shelf/ desk design, the most efficient way to do so is by using CNC machines on a mass production scale producing thousands to tens of thousands at once. This is because of the size and shape of each part and how easy they would be to produce.

The reason CNC is the best option is because many parts need to be cut out multiple times and there are also parts which have the same outline shape (2. and 3.). The only parts that can be excluded from needing to be CNC cut are 4. – the caster wheels and 6. – the dowel because they can be sourced as secondary components.

The number of parts needed to be cut in order to put together a fully functioning shelf/ desk with 6 shelves is:

Part 1. – 2 parts cut

Part 2. – 4 parts cut

Part 3. – 4 parts cut

Part 4. – 8 parts bought (secondary component)

Part 5. – 4 parts cut

Part 6. – 16 parts bought (secondary component)

Part 7. – 6 parts cut

Part 8. – 1 part cut

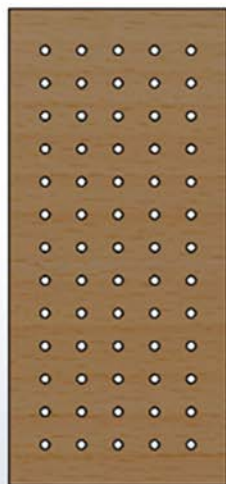
Part 9. – 1 part cut

The benefit of CNC cutting these parts is that the majority are the same thickness so they can be put on a sheet to be cut easily which means there is also low wastage making it a more environmentally friendly production method compared to others.

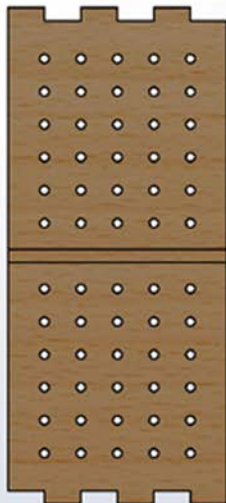
It should also be said when CNC cutting part 9. – the tabletop/ backboard piece, it will be made with a hollow chipboard inside (image below) with a ply laminate over as the test model was quite heavy to lift and move.



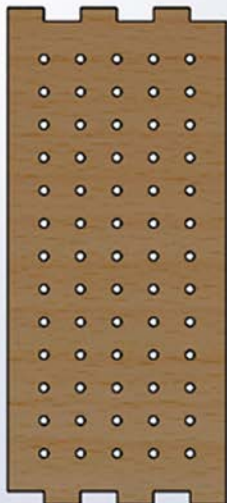
1.



2.



3.



4.



5.



6.



7.



8.



9.



# Project future

Due to the nature of the design, the holes allow for near unlimited possibilities to add to the base shape. With this in mind the best course of action for design is to first enable shelves to be sold separately so users can customize their 2 FORMs to suite their needs.

After this step it would be an interesting concept to make the base pieces with the normal 6 shelves the starting point and then bringing out new add on items over a matter of months or years. This could include angled shelves, hooks, shelves that stick out the side, half sized shelves etc... This allows for complete customization and over time they will become more and more specific which will lead to varied designs of the 2FORM that meet the users needs more and more accurately.



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