doMo

a second screen wherever you go

10 page summary

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product overview

doMo is a portable monitor is aimed at people who use their laptops to work and don't have a fixed workspace.

its dimensions and weight make it easy to transport and its kickstand allows users to place the screen in multiple positions.

one cable for power & video

doMo uses a single cable to transmit power and video, simply by connecting it to a laptop

multiple USB-C ports

its three USB-C ports enables users to place the monitor at either side of the laptop without cables getting in the way

adjustable kickstand

a built-in kickstand allows the monitor to be positioned at any angle, in either landscape or portrait orientations

no buttons

doMo will power on automatically when connected.
adjusting the screen settings can be done from the laptop

reinforced screen

a thin layer of glass protects the LCD panel from any damage that can occur when carrying it around

technical specifications

display

panel size (inch) : 13.3
aspect ratio : 16:9
display viewing area (H x V) : 293.76 x 165.24 mm
display surface : matte
backlight type : WLED
panel type : IPS
viewing angle : 85°/ 85°/ 85°/ 85°
pixel pitch : 0.179mm
resolution : 1920x1080
brightness (typ.) : 350 cd/m^2
contrast ratio (typ.) : 800:1
display colours : 262K
response time : 14/11 (typ.)(Tr/Td) ms
refresh rate : 60Hz

I/O ports

USB-C x 3

power consumption

power consumption : <9W

mechanical specs

W x H x D : 315.35 x 217 x 12.5 mm
weight : 0.97 kg

accessories

USB-C cable
USB-C to USB-A cable
padded sleeve

investigation & research

market opportunity

having a second monitor can be incredibly beneficial and help users improve their productivity.
now that many people are working from home, having a portable monitor they can take with them and easily store can make a big difference to the way they do their job.

throughout the project, similar products were analysed to get a better understanding of not only how they worked, but also look for what they were missing and things to be improved.

user insights

understanding the needs and expectations of my user group was key to developing my proposed solution.

who, where, when and why would allow me to define what my product was going to be.

who - people who work with their laptops and don't have a fixed workplace

where - anywhere - from an office, to a cafe, a train, the library or even the living room at home

when - normally will be used when working for long periods of time - if going to the library for an hour, probably won't you won't need it

why - have more space and more tabs visible - improves concentration

speaking to users and reading reviews, both by customers and magazines, was a great way of understanding what they were looking for and what current products were lacking

most people who used a second monitor used it as an auxiliary device - the main work, like for example photo editing in Photoshop, was done on the main monitor or laptop, and the second monitor was used to watch a tutorial on how to do a certain step or have a reference photo.

therefore, the second monitor did not have to have a great resolution or colour contrast. it had to be of good enough but didn't need to have high as high specs.

many users who owned a portable monitor said these were the main issues they found:

covers only allow a fixed number of positions to place the device, usually one or three. this means that most of the time the angle at which the laptop screen is at differs from the one of the monitor, making it harder to work using two displays

most displays are 15.6 inches. this makes portability harder for those users with smaller laptops

second monitors tend to be very fragile. as the LCD is not protected, it is easy for it to get damaged during travel and repairs are costly.

concept development

power & data

deciding how the monitor was going to be powered and how data would be transferred was very important. there were three main possibilities.

full wireless design

internal battery + wireless data transfer

full wired design

power + data transfer through laptop

semi wireless design

internal battery + wired data transfer

after carefully analysing and evaluating each possibility, it was decided that a wired design was the best option for my user group.

one of the main requirements of my brief was designing a monitor which was quick and easy to set up. bluetooth connections can sometimes be tricky and not as straightforward as using a cable. secondly, having a wireless connection would require a battery, which would not only make the design heavier, thicker and more expensive, but also means that the monitor needs to be charged to operate.

even though powering it from the laptop means it drains its battery, a second monitor will typically be used when working for long periods of time and therefore, the user will have a charger with them. additionally, the second usb c port can be used to power the monitor if needed.

a low power LCD display (Innolux N133HCE-GA1) was chosen to allow the laptop to power the monitor and minimise the battery consumption.

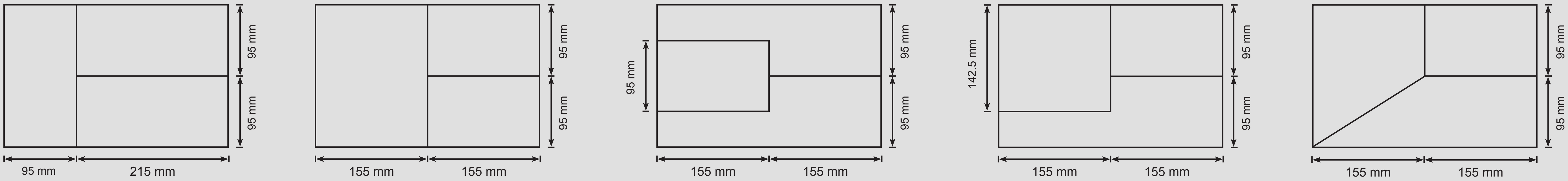
cover design

designing the cover that would prop the monitor up was also an essential part of development process. ergonomics is very important and the viewing angle of the monitor can have a serious effect on the user's health.

during the main part of the design process, multiple cover designs were generated. all aimed at having an adjustability aspect to it, instead of having a fixed position like most standard covers, to reduce the risk of eye strain and so that the user could adjust the angle of the monitor to match the laptop screen.

it wasn't until near the end when the decision was made that in fact, a cover wasn't the best solution to this problem. instead, a built-in kickstand would be a much better proposal. however, as the monitor had to be able to stand horizontally and vertically, the kickstand had to be carefully design to allow both.

kickstand design

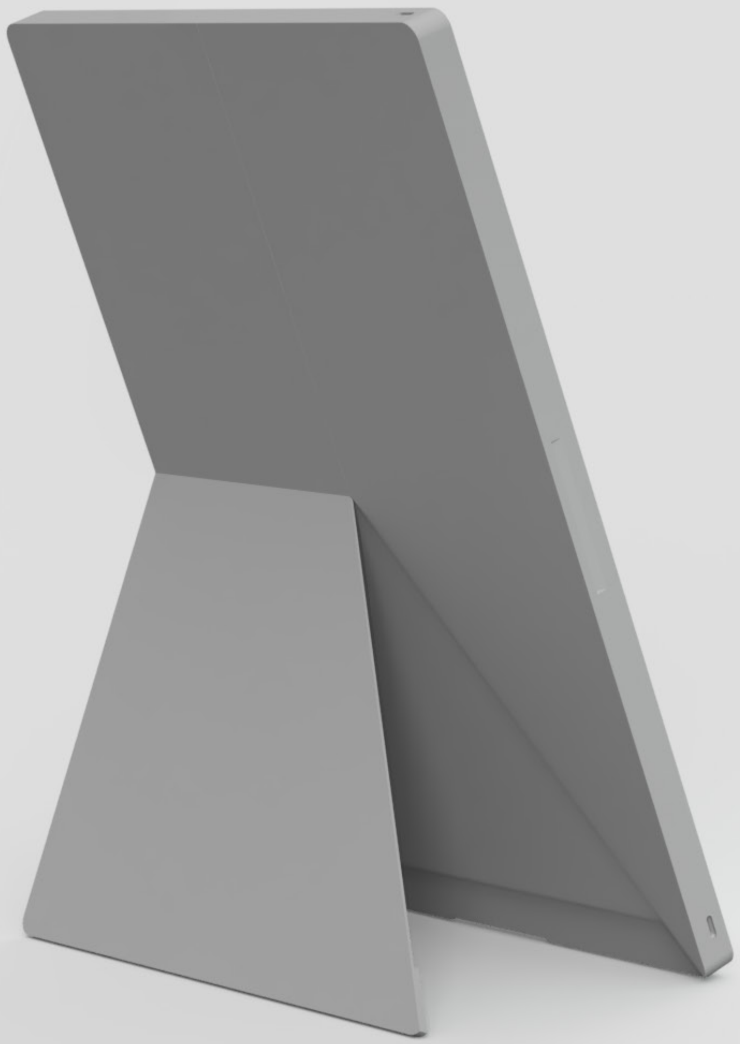


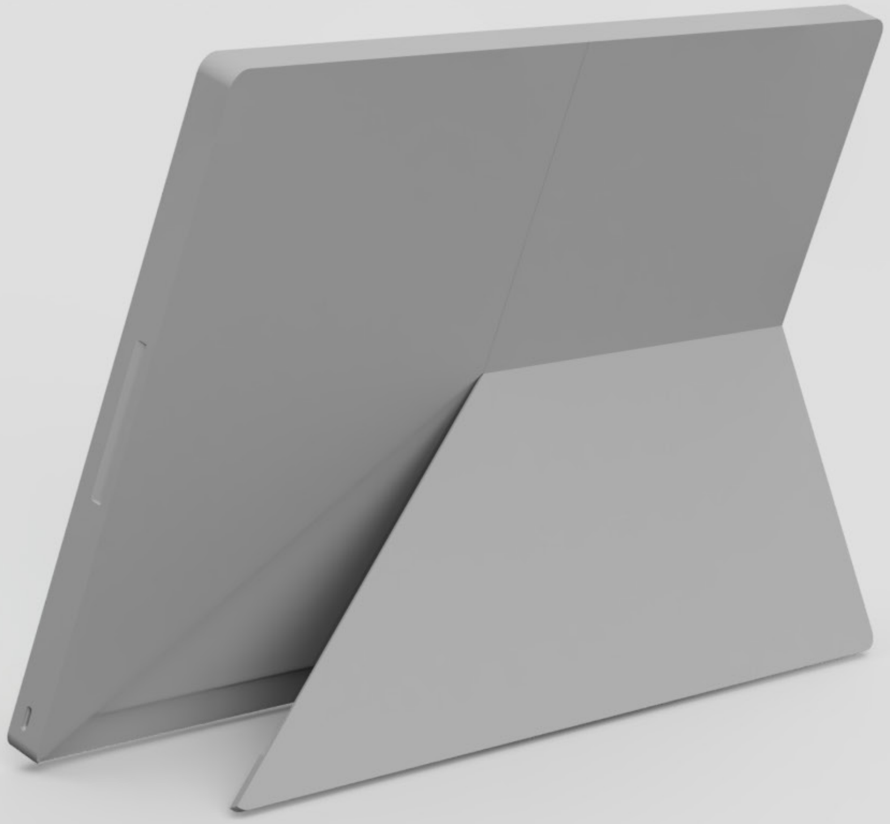
the stability of the initial design (top left) was the main concern during the development phase. this initial design was pivoting from quite low when in portrait and it seemed like it would not require a lot of force for it to fall.

multiple kickstand designs were generated with the aim of improving the stability of the device.

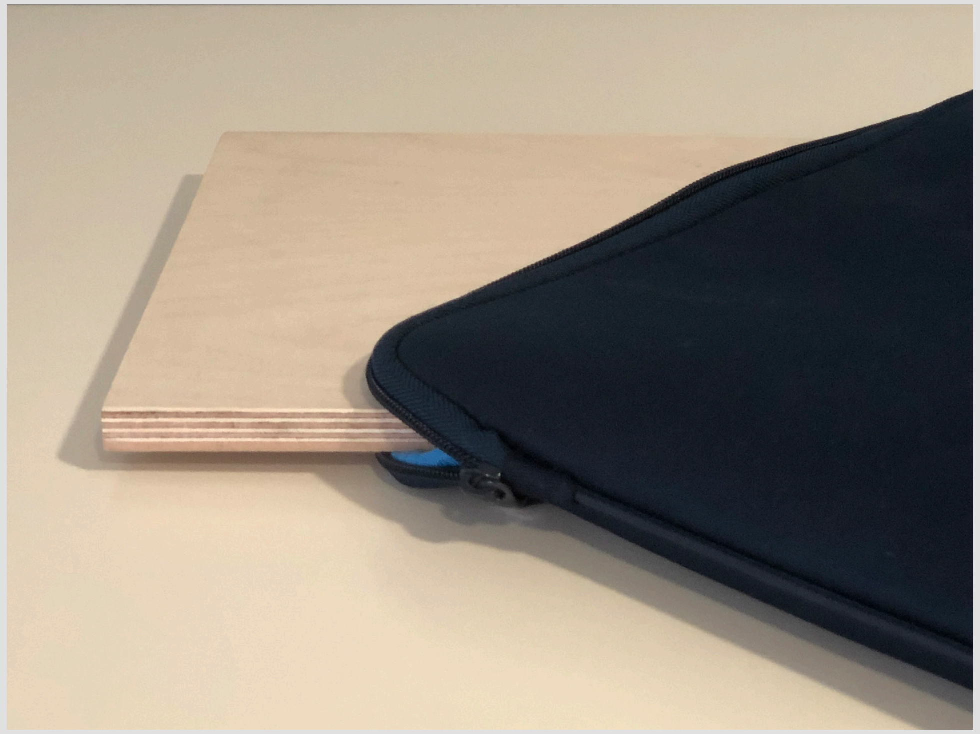
the designs above are the main ones which were evaluated and tested using simulations.

the results of these simulations showed that this kickstand design (top right) was able to withstand the highest force before toppling over. therefore, this design was chosen.

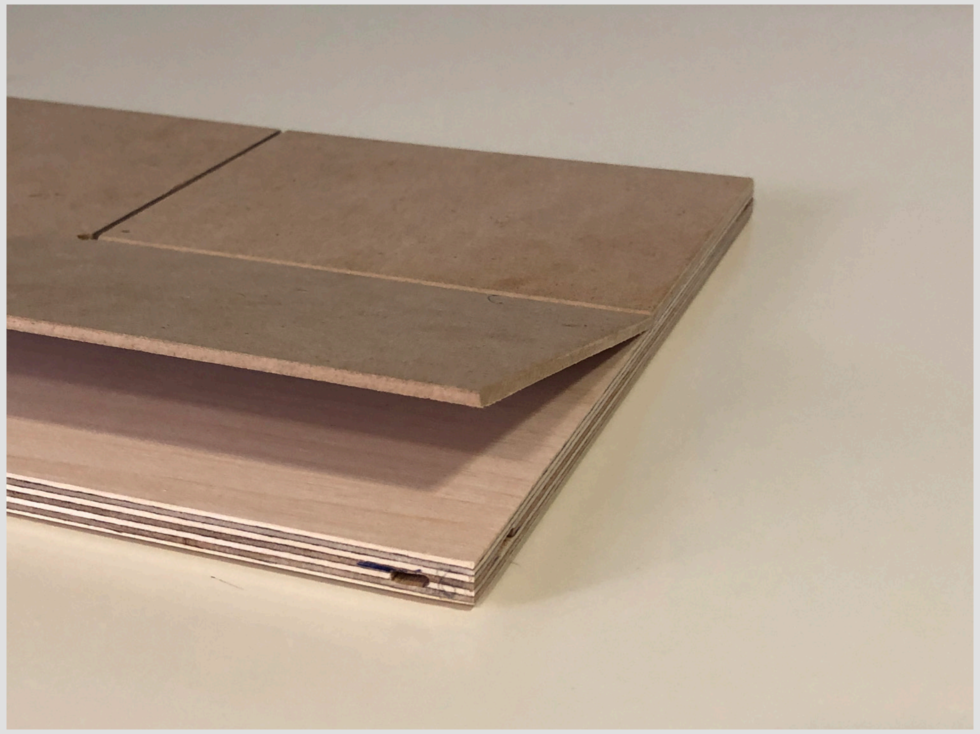




user journey



1. Remove laptop from sleeve



2. Adjust kickstand angle

3. Position the monitor

4. Connect cable to monitor

5. Connect cable to laptop

6. Monitor will automatically power on

key features

Left USB-C port (1) connection

Right USB-C port (2) connection

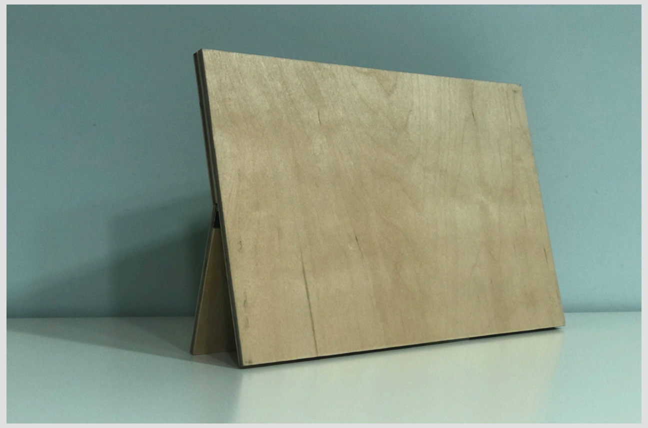
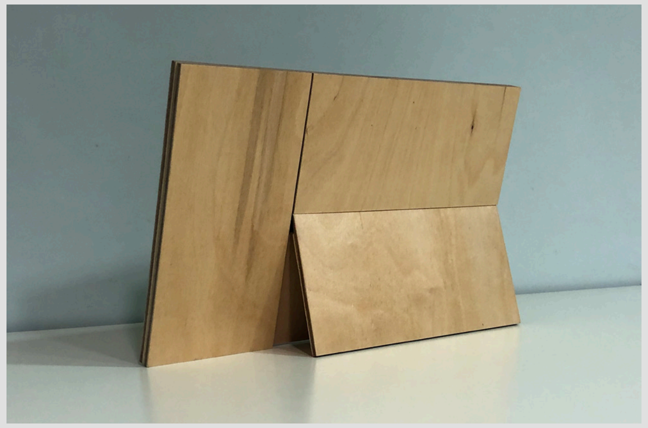
Bottom USB-C port (3) connection

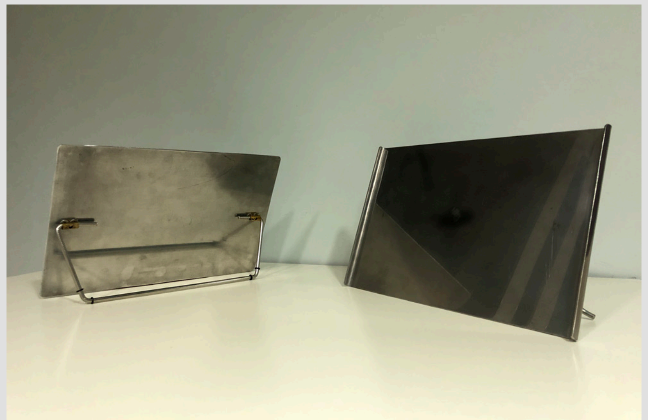
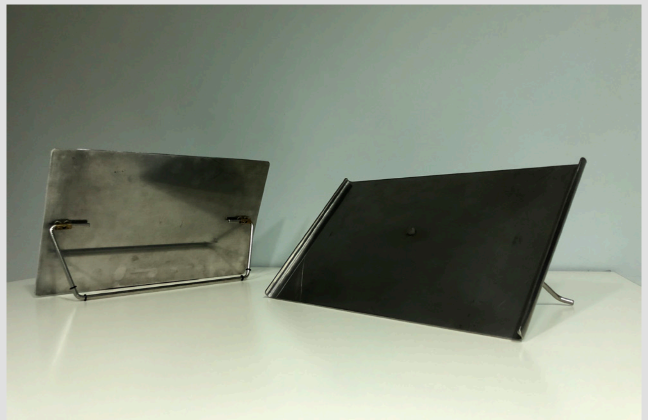
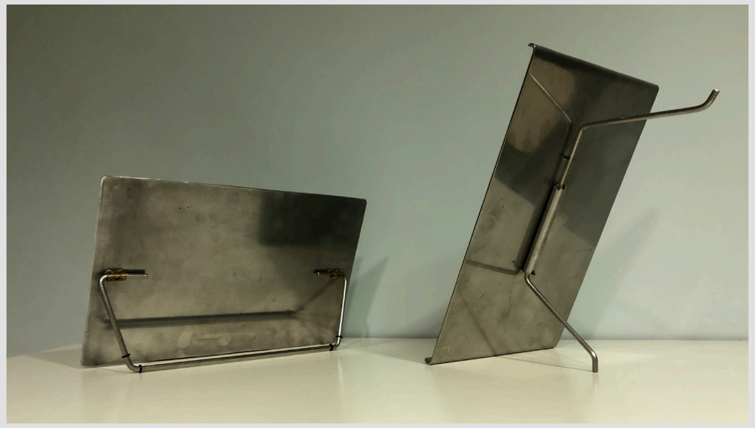
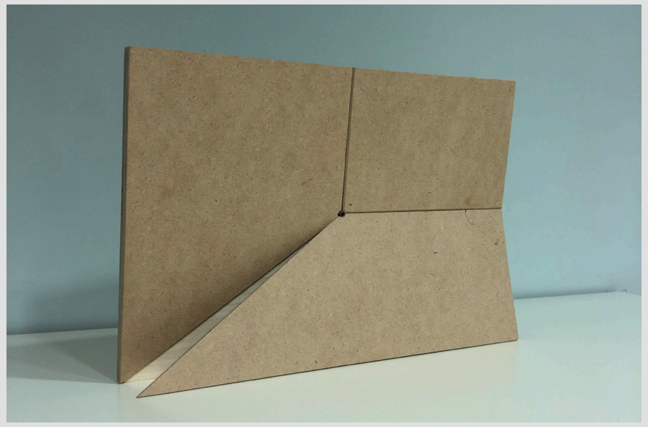
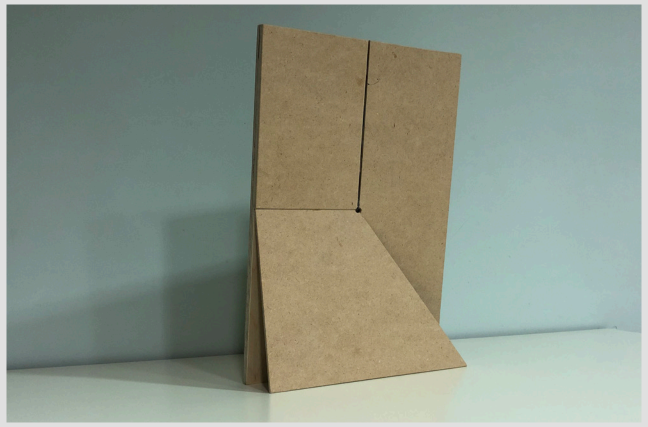
Angle adjustablity. Kickstand can open in any angle from 0 to 90

prototyping






prototyping was a fundamental part of the design development.

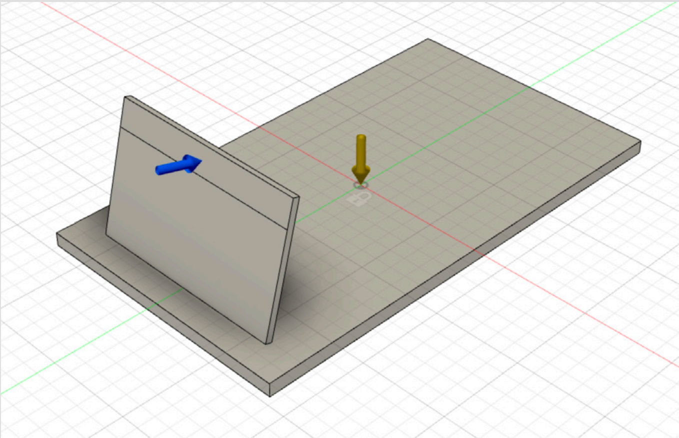
cardboard models allowed a quick, easy and cheap way of prototyping various designs and get a general idea of how they would look and their dimensions.

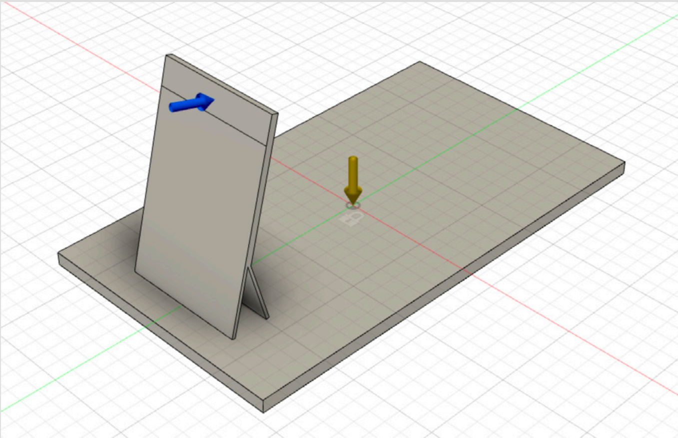
however, cardboard is very light and most models fell under its own weight. to get a better sense of stability, heavier materials like wood or metal had to be used.

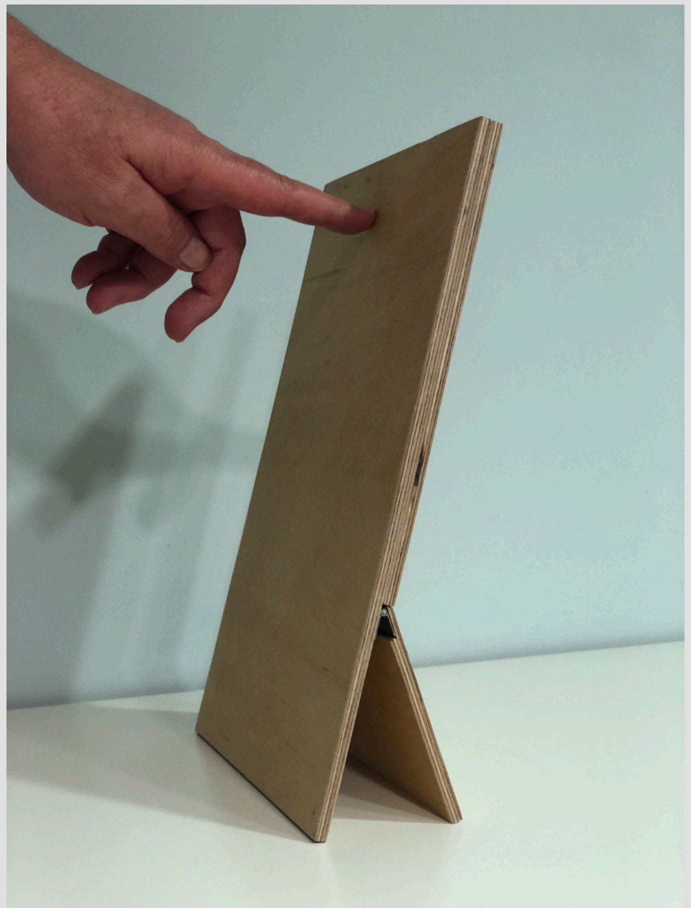
the first wooden prototype showed that the initial design was unstable and had to be redesigned. two steel prototypes were made based on different designs, both of which were discarded in the end.

the final design was prototyped using wood once again as it was easier to make compared to steel. it proved to be a lot more stable than the initial design, as the simulations had predicted. the usb-c ports were included in this prototype to have a better understanding of the user journey.

simulations







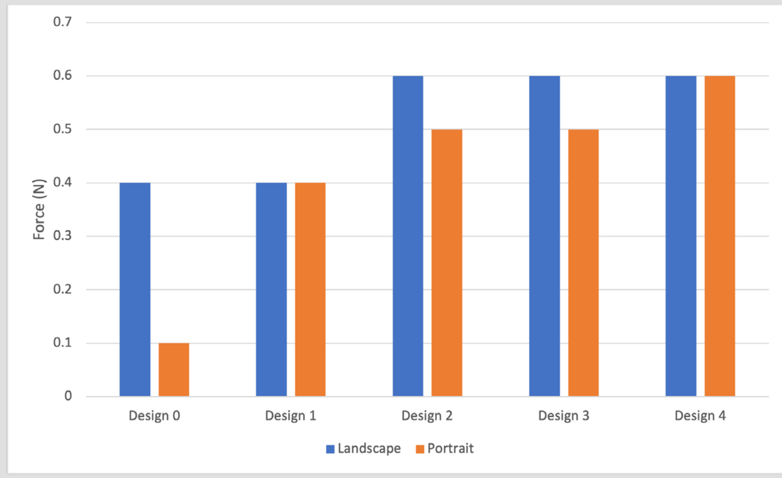
simulations were used to test the stability of each design without having to physically prototype each one. furthermore, they allowed a comparison between the designs as the results showed which one was able to withstand a higher load before toppling over. the graph below shows the maximum load before collapse.

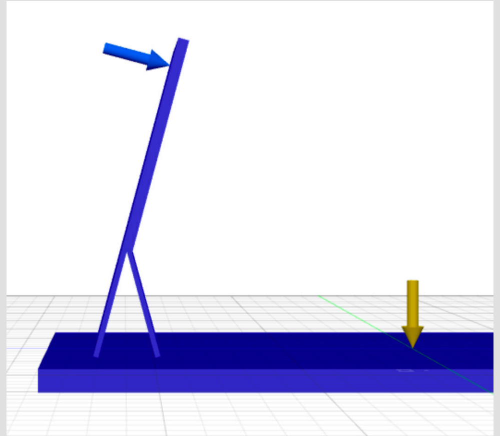
the simulation environment had to be carefully created to ensure that the results were accurate. an initial simulation was carried out to match the behaviour of the first wooden prototype when a small force was applied at the top. the model should maintain position in landscape but should fall in portrait.

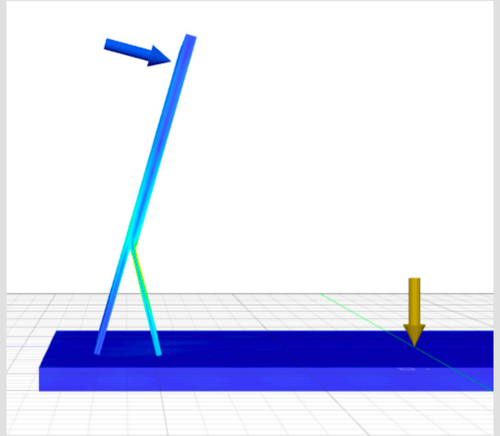
once this was achieved, a load criterion was established. this load criterion was the minimum force a design should withstand for it to be considered stable.

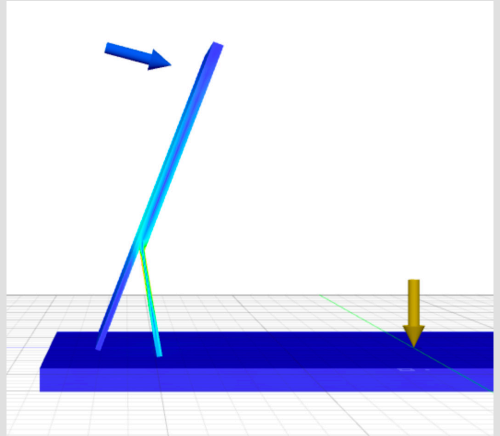
the other designs could then be tested and analysed.

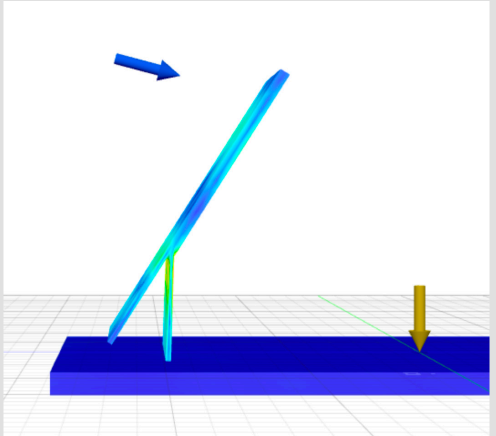
the final design was chosen as a result of these simulations.

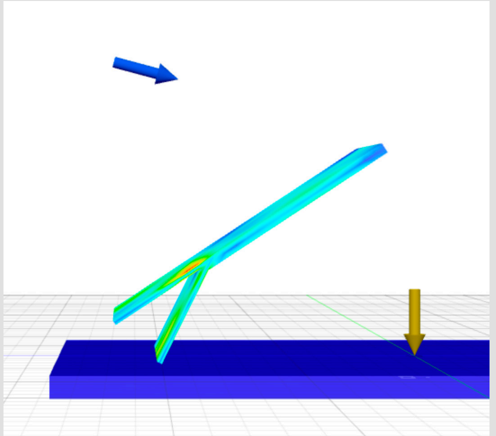


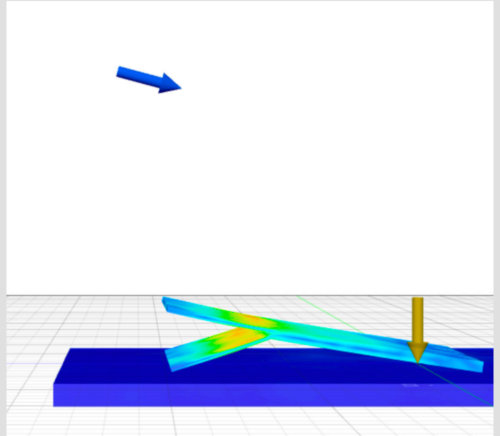




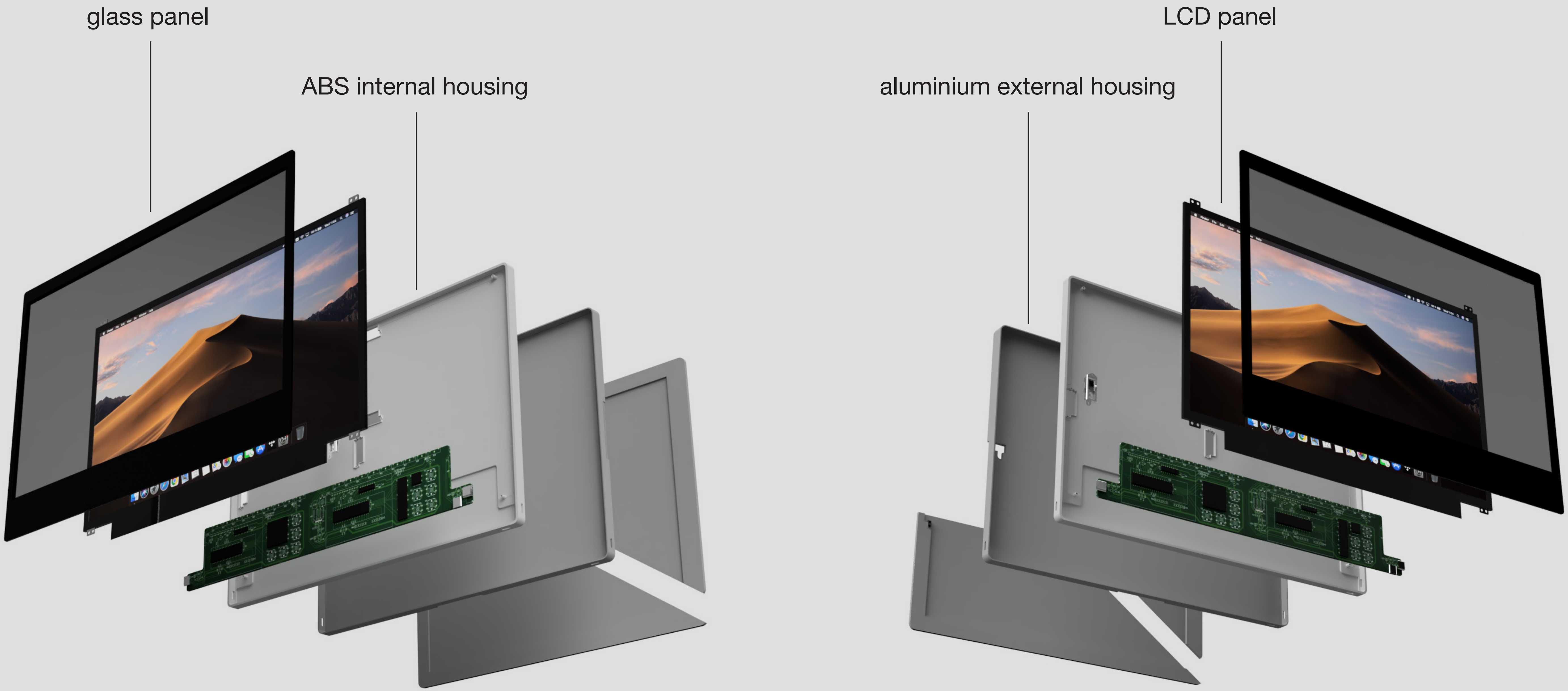








components


glass panel
ABS internal housing
aluminium external housing
LCD panel