Andrew Marsh
Portfolio 2008

Project 1: Aerodynamic Umbrella

In a group, design and make a device for rain protection focusing on aeordynamics.

Deciding who we were designing the umbrella for at the start of the project allowed us to have clearer aims, and also helped the group to work toward the same goals.

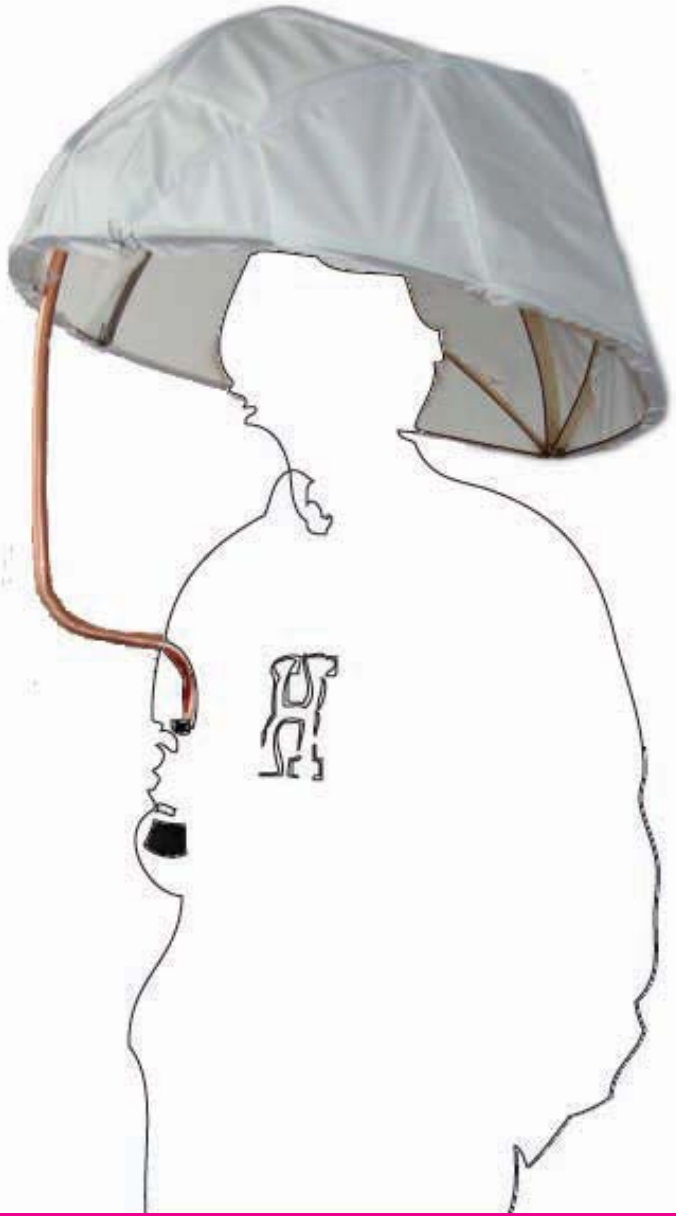
Analysis

What is wrong with the existing umbrella?

Blows inside out
Breaks often
Easy to forget
Difficult to hold
Doesnt dry easily
Handle is in the centre, where it is dryest
Unstable
Can hit other people

Features:

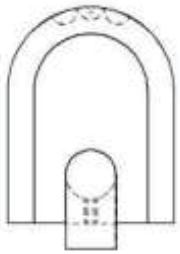
+Aerodynamic shape
+Light weight
+Rotates into wind to lower wind resistance
+Tilts into strong wind to protect face from rain
+Vents in fabric allow air through in high winds, lowering wind resistance
+Plywood struts allow flexure
+Hardwood mechanisms
+Polypropolene end hinges
+Ripstop fabric
+Simple to fold out
+Carry bag keeps user dry when carrying

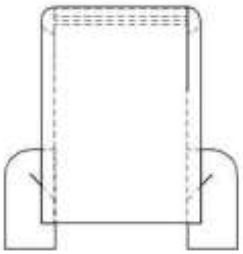


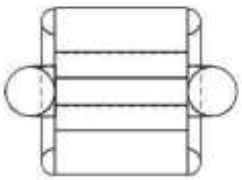
Design solution

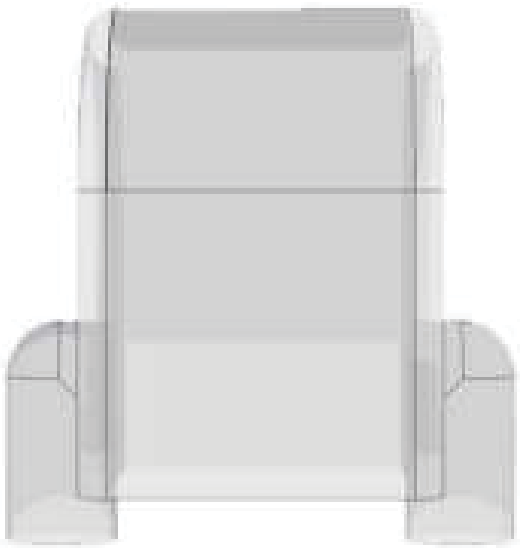
Features:

Inflateable
Low cost
Folds up to very small size
Recylable
Accepts varios printing methods
Quick to blow up

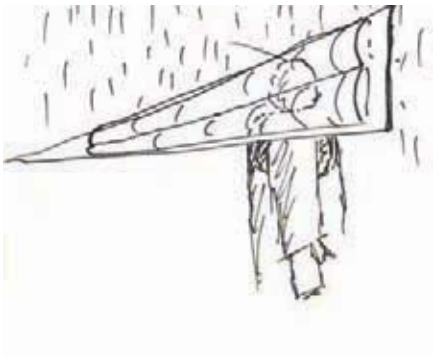


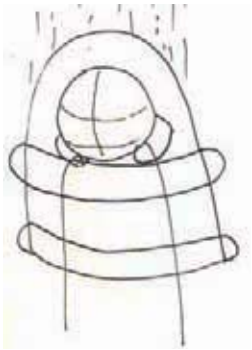






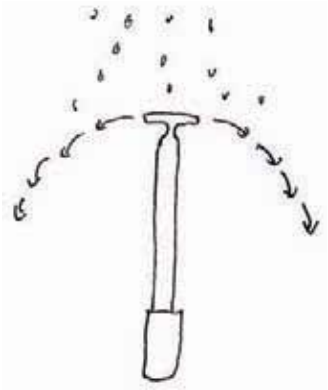
Design solution

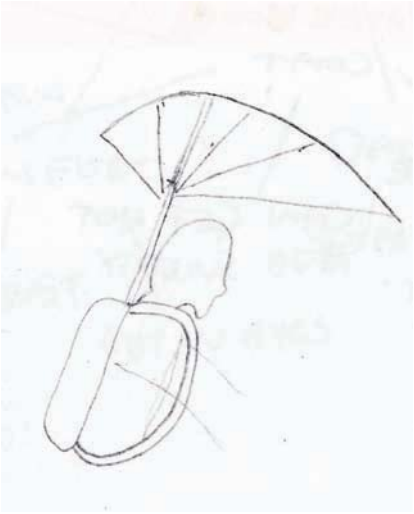


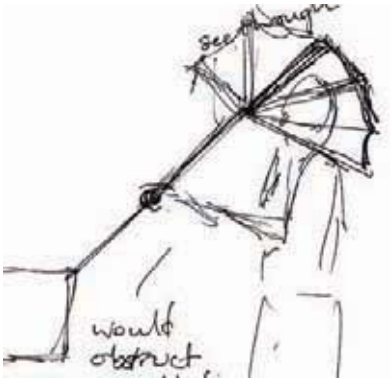


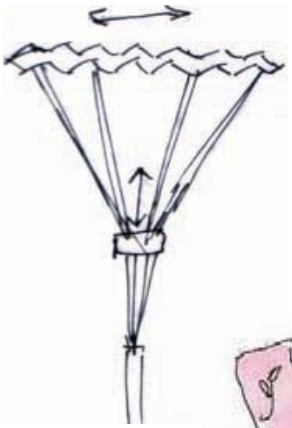
Adding ribs to the inflateable added strength and saved time and effort when blowing up. The final product would be easy to produce with ultra high frequency welding.

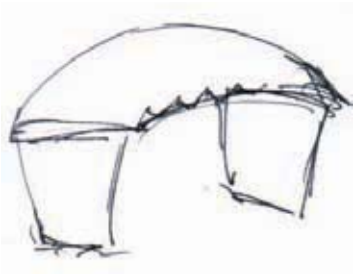
Inflateable development











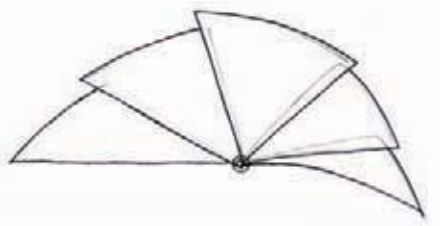
Concept drawings

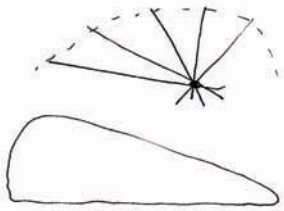
A large number of existing products were part of the initial research stage of the project. We looked at many forms of protection from weather and how these are percieved by users in terms of fashion. We also studied the methods existing umbreallas use to resist wind. Identifying the pros and cons of these products helped us to optimise our own designs.

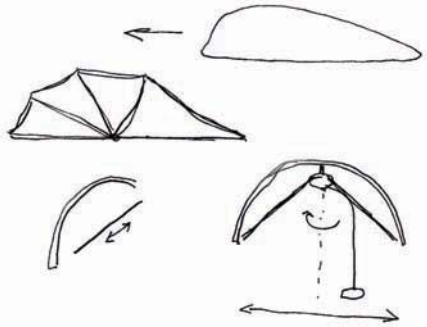
Research

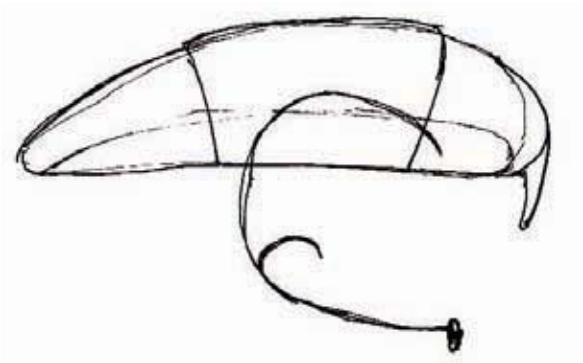
Wind tunnel testing of an existing umbrella informed not only the shape of our design, but also the materials and the way in which it would be held.

Research

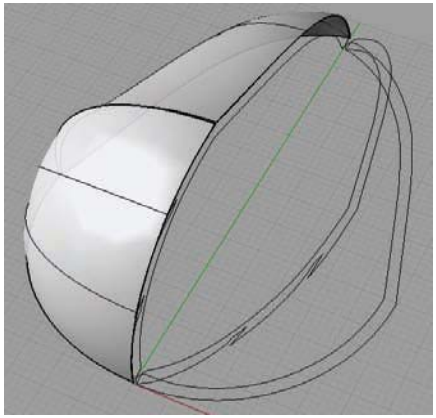




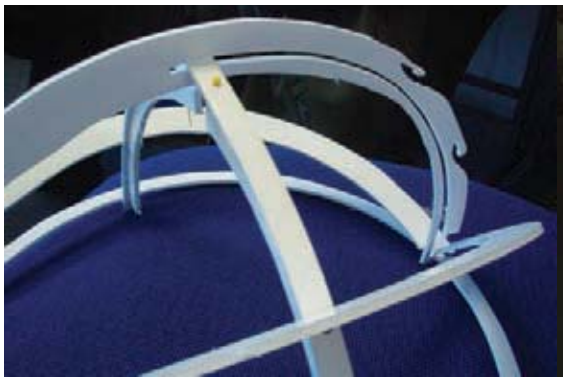




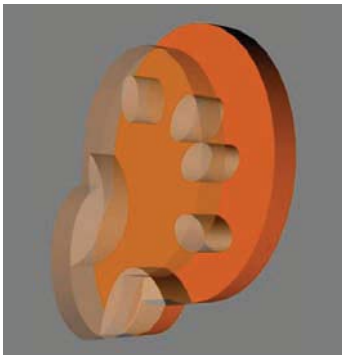
Concept development



After the first prototype was wind tunnel tested, the design developed to have hinges at the front and back instead of at the sides. A white ripstop fabric was chosen for the canopy with a white mesh for the vents.



Modelling



Mechanism development

Project 2:
Nightclub Seating

Design and make a new seating system for the Rythmn Factory nightclub

Research Methods

Mapping
Shadowing
Survey
Interviews
Analysing existing solutions
Research into club culture

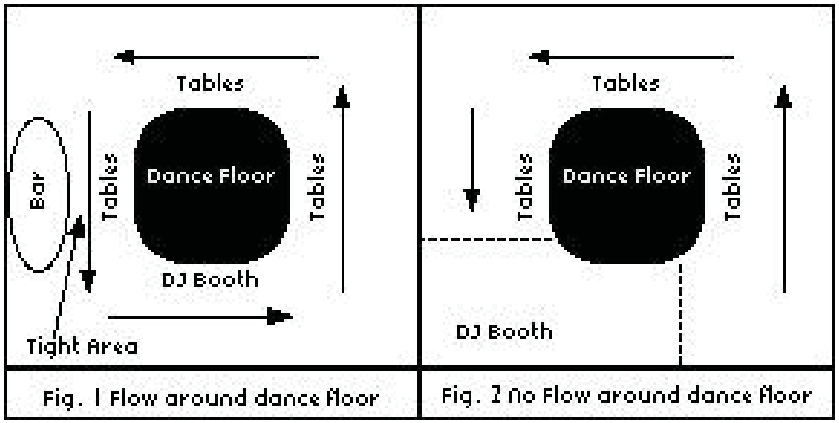
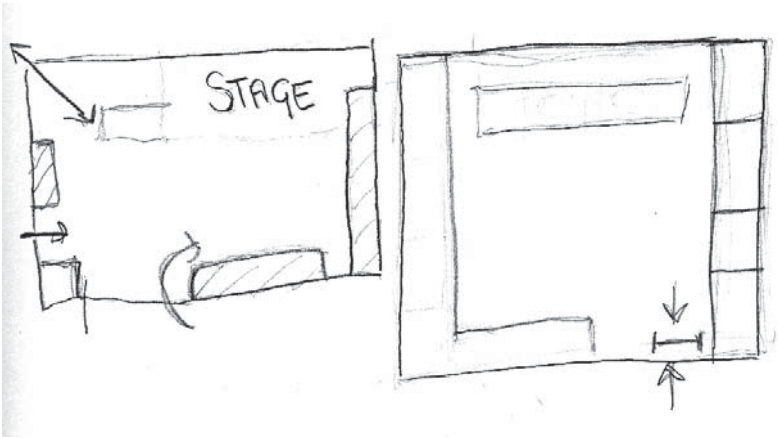


Fig. 1 Flow around dance floor

Fig. 2 no flow around dance floor

+In a busy club, flow is a big safety issue.
+Flow has a large effect on the atmosphere of a club.
+"Tightpoints" are sometimes created on purpose by club designers to force people to run into one another.
+Tightpoints usually occur around the bar, toilets, smoking area and dancefloor.
+Seating is one element that can be used to regulate the flow in a club



Mapping

Loud music and bright lights in a dark atmosphere combine to disorientate people when in a club. Forgetting about time can help to make people stay in a club longer. The interior and furnishings are an important part of creating and maintainging this atmoshphere. For example a club can be made to feel warmer or cooler depending on someones distance from the floor when seating, as well as factors such as ceiling height.
In a nightclub, social boundries are often streched. A chair can become a dancefloor.

Shadowing

An interview with the manager of the Rythmn Factory club helped to reinforce some of the insights gained during shadowing. The main points gained from the interviews were:

The club's main aim is to make money. This is achieved by promotions, reputation and most importantly for this project getting people to stay as long as possible once inside and therefore buying more drinks. this is achieved by creating and maintaining a good atmosphere as well as making people feel comfortable.

Maintainance and ease of use of furniture and fittings when the club is closed are important.

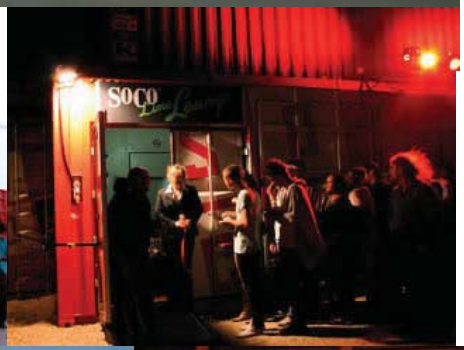
As well as obvious uses, Furniture is used to divide areas of space, e.g. dancefloor and seating area.

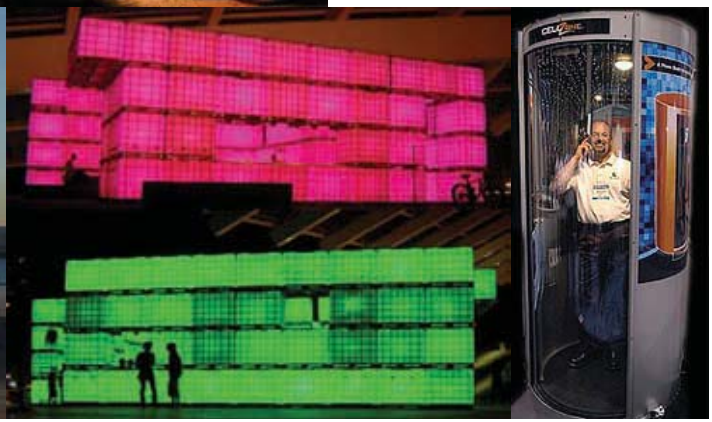
In the rhythm factory, the furniture should not appear to impose. Therefore the design should be aesthetically simple.

Finding a reliable furniture supplier is difficult and this has led to a 'mismatch' in seating in the Rhythm Factory.

Storage and movement of the current seating system can be a problem.

Interview





Research into new trends in club culture included a sound proof phone booth, portable club made out of old shipping containers, and a sustainable dance floor.

This helped me to better future proof the design by understanding upcoming trends.

Current trends

The seating must:

Be easy to clean
Be strong and durable
Impose a division of space
Have simple aesthetics
Provide a reasonable level of comfort
Allow for different layout combinations
One person should be able
to change the layout
Not move easily once in place

Features:

Wall mounted backrest
Softwoord frame
Leatherette seat
Sprayed MDF pannels
Firm foam seat
Powder coated steel
locking mechanism

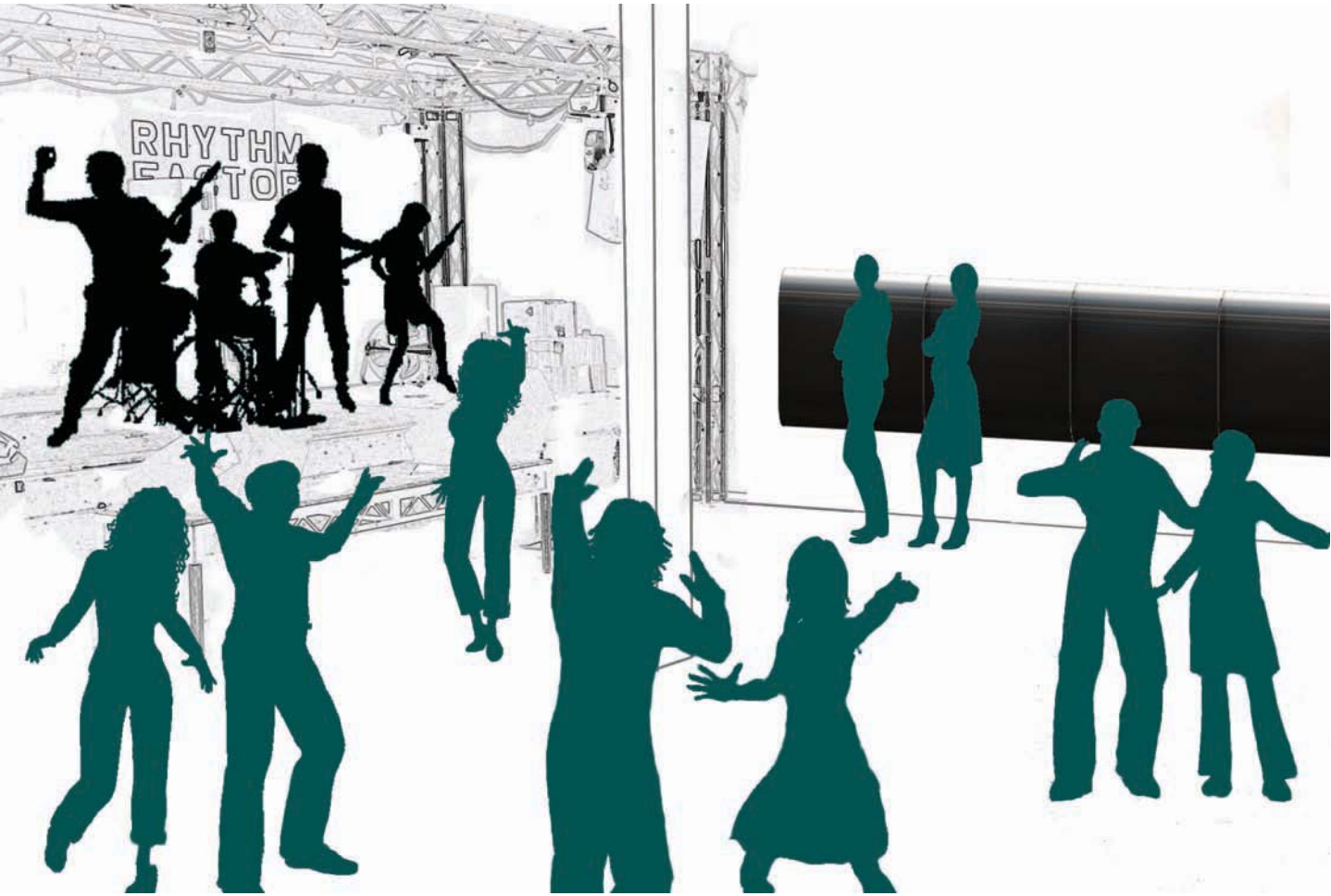
Advantages:

Easier to move around
Backrests to lean on when max capacity is needed
Takes up less space per person seated
Many seating arrangements possible
Durable
Easy to clean
Easy to stack, takes up little space in storage
Lower cost

Design Solution

Scale models

Visualisations



Visualisations

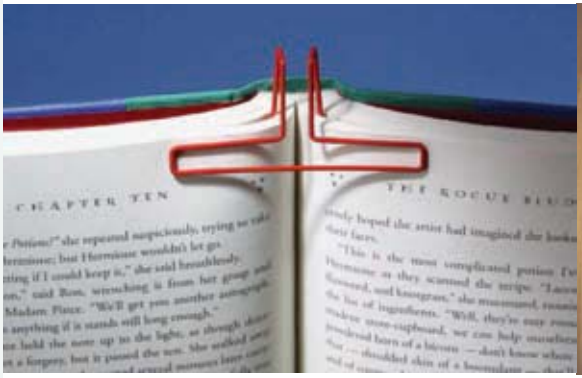
3D Rendering

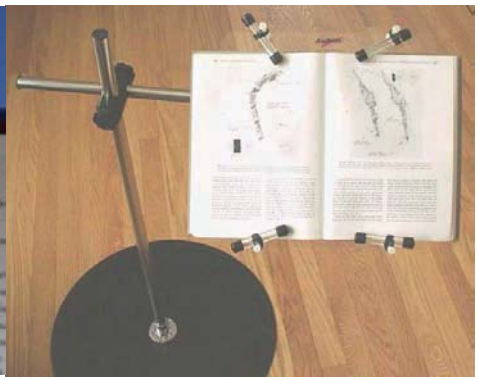
Full scale model

Project 3:
Book Holder

Design and make a device which facillitates hands free reading

Study of existing book holders showed that there were problems with their design. They would be too expensive, too large, not functional, difficult to use, unable to hold a range of book sizes or aesthetically unappealing.

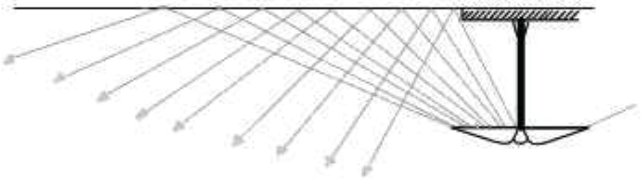


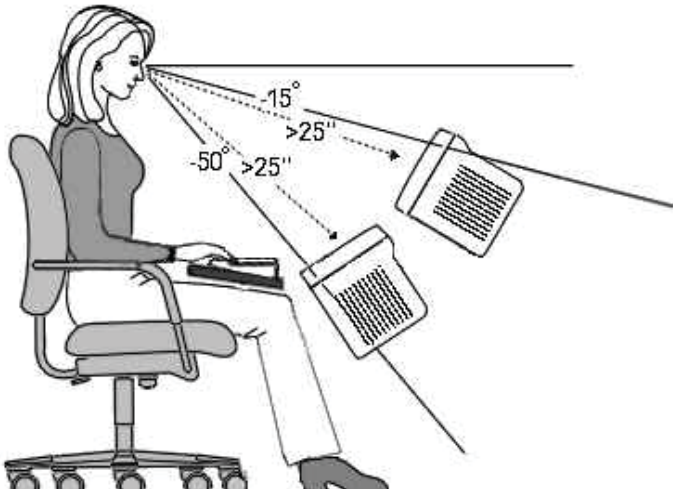


Research

Allows handsfree reading
Low cost
Small size
Functions with a range of book sizes
Allows for easy page turning
Can be used in a number of household or workplace situations

Specification



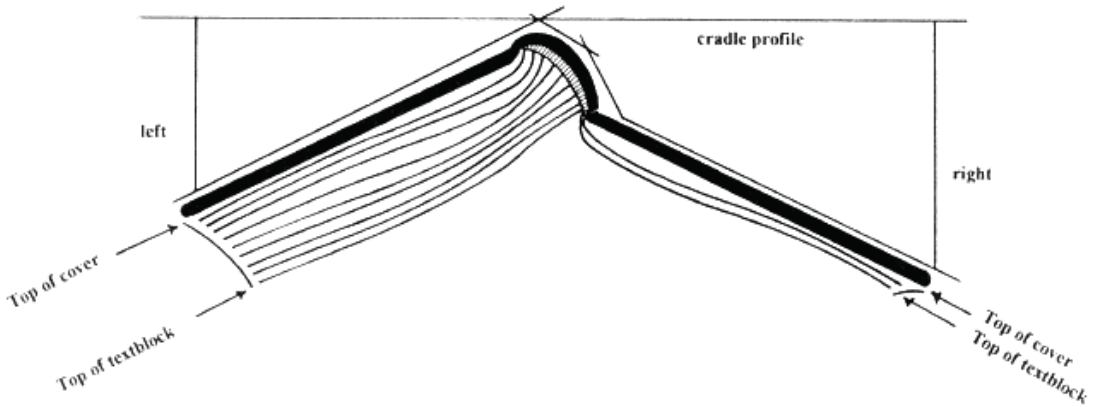


Optimal reading angle requires book to be perpendicular to line of sight.

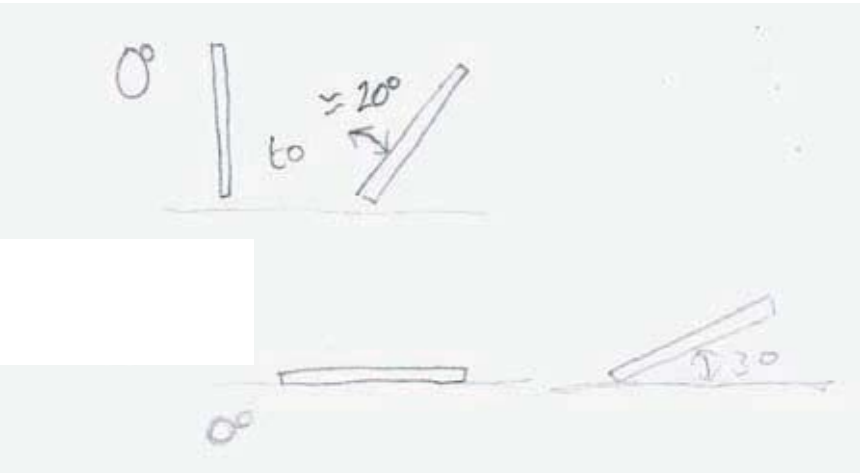
Studies show people tend to read books at an average of 45-63°.

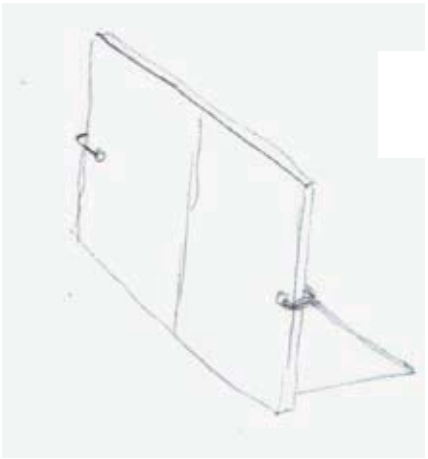
A lower reading angle requires less head tilt and is therefore more comfortable over longer periods of time.

Opening of book is ideally 0° but can be up to 60° without discomfort.

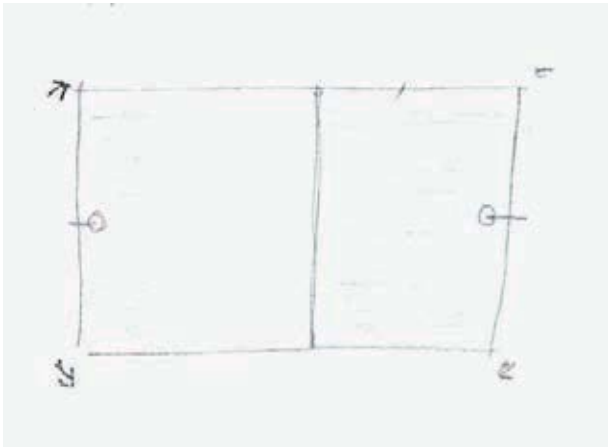


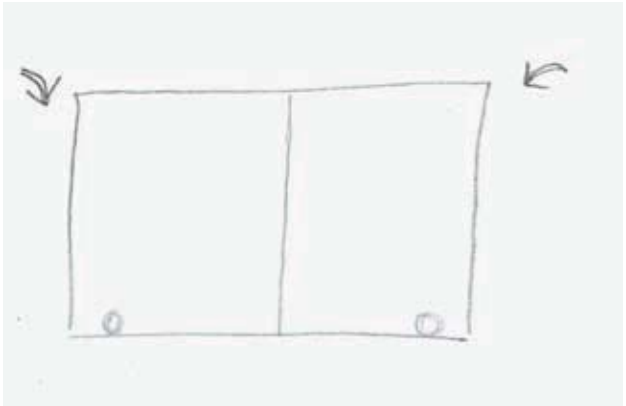
Ergonomics





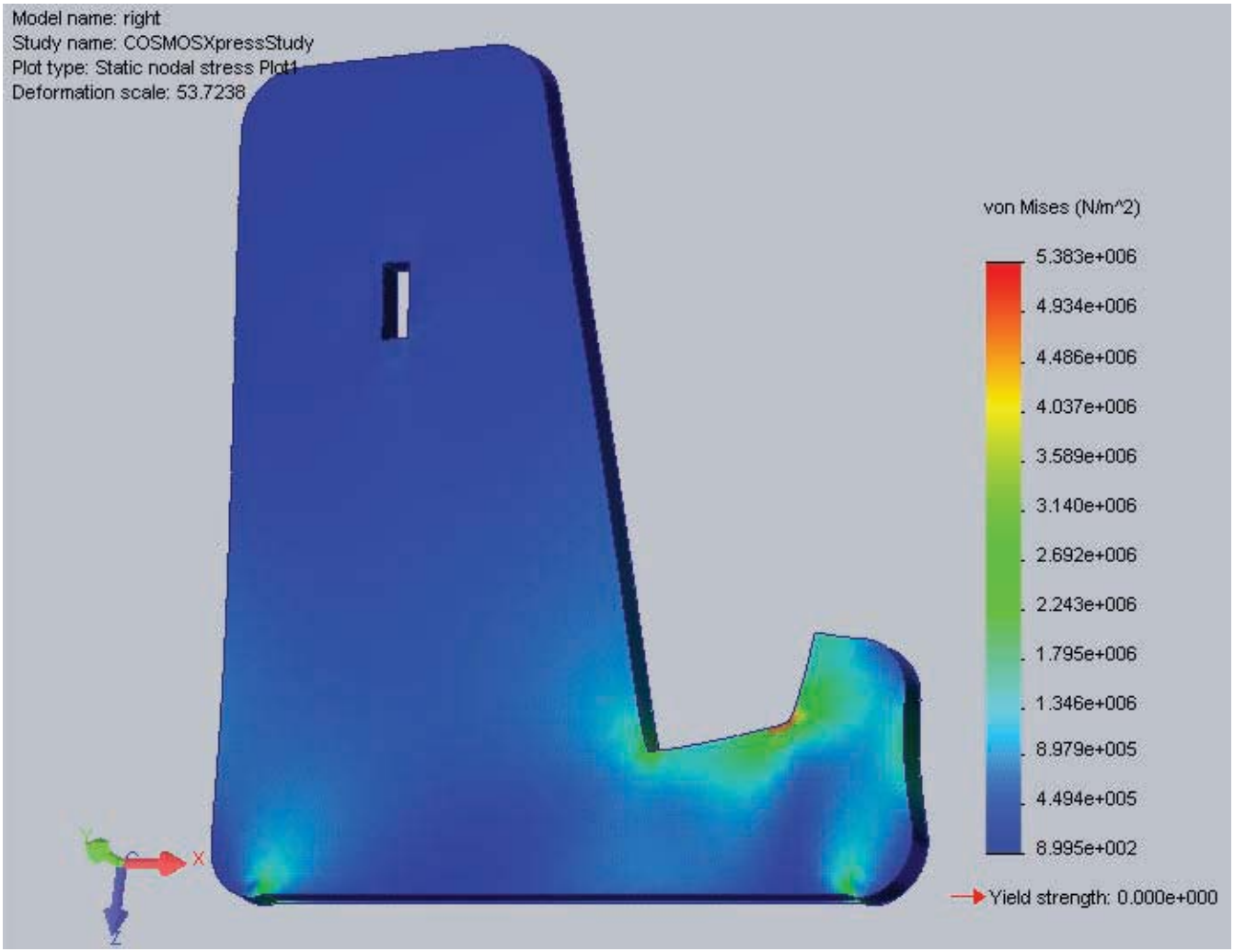
In order to the minimum amount of material I set about finding the way to hold open a book with as little force as possible. This was holding the pages at the furthest point from the spine, in the middle of the page. However having the book held in this way would restrict the number of book sizes that could be held.



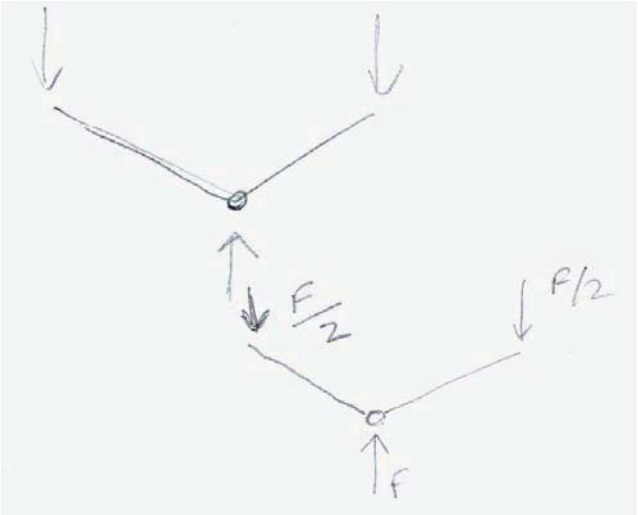


Development

Models

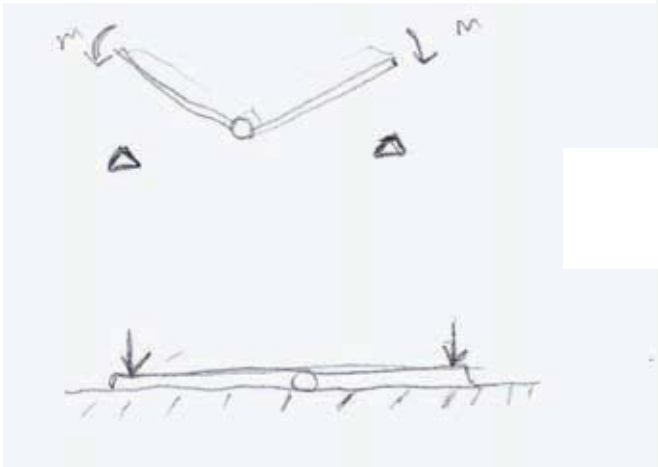


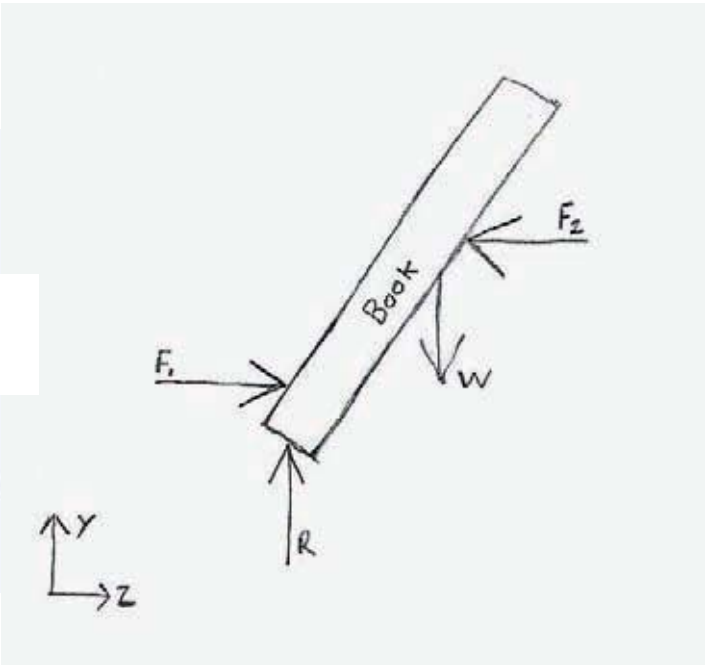
Stress Analysis



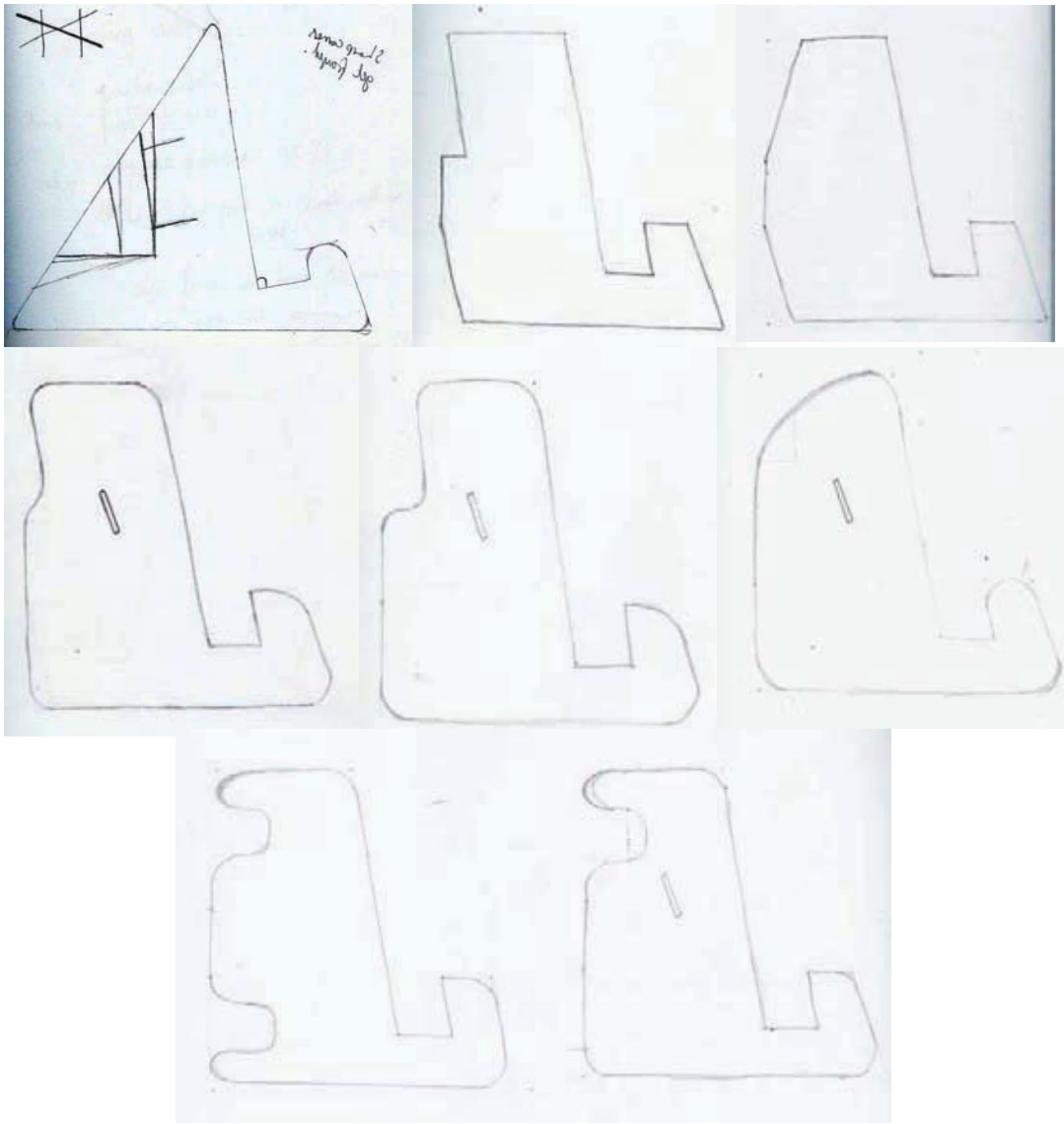
A rough analysis of the moments acting on the book in the top and side planes proved very helpful in optimising the dimensions and layout of the final design.

It showed that different books would act in different ways. Large books would exert greater force on the back of the shape, whereas smaller books would pull in on the pages, due to the tension in the spine.

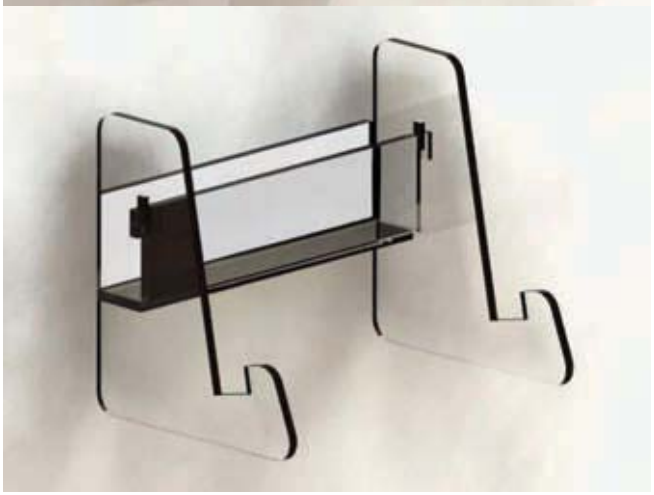


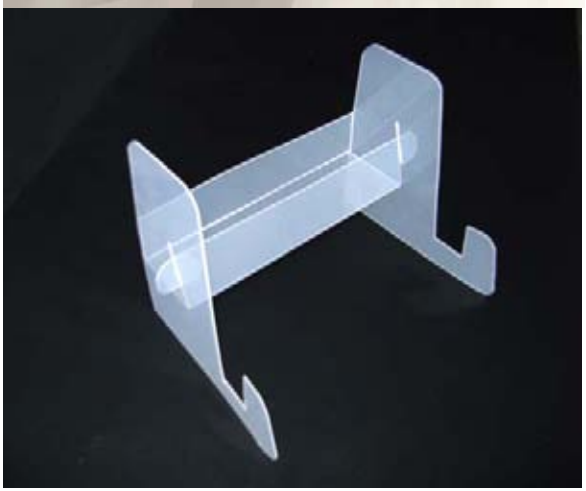


Moment Analysis



Shape development





Materials selction

Extruded polypropylene sheet.

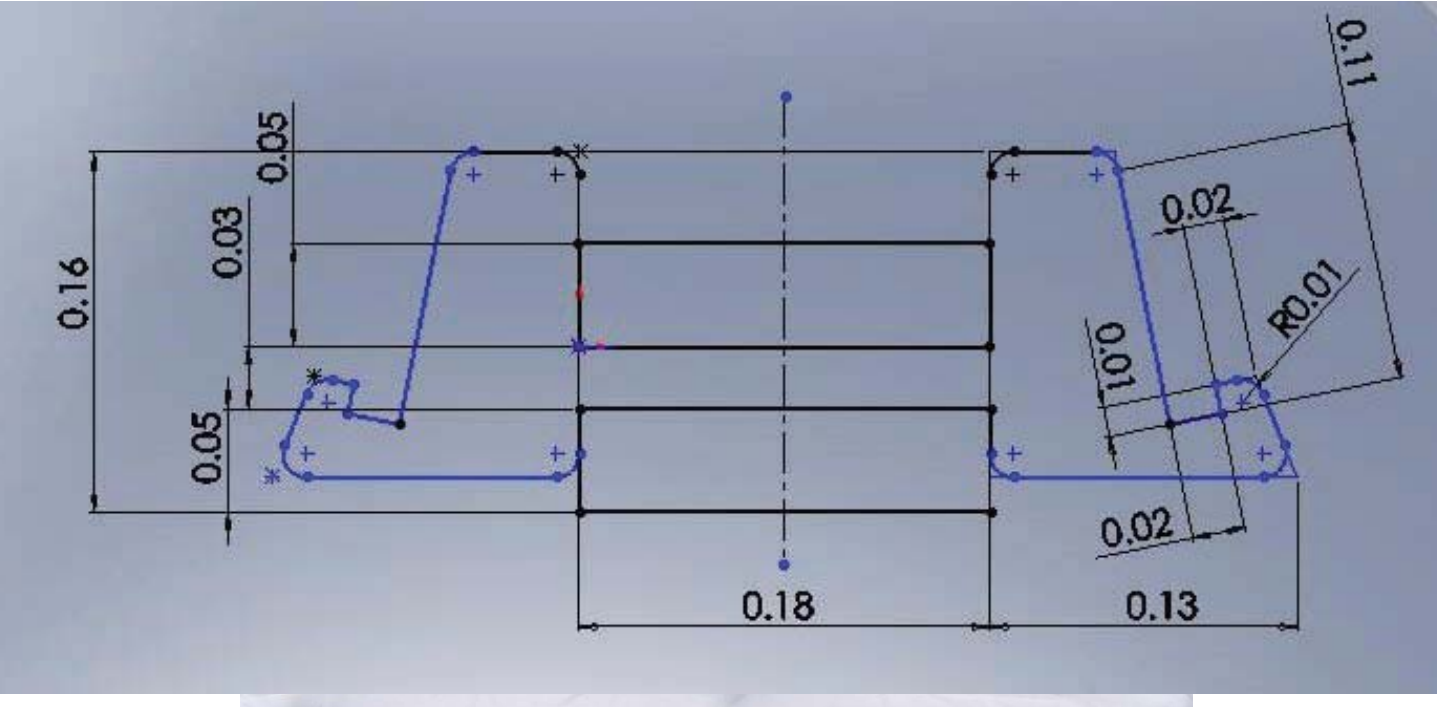
Fluted construction provides high strength to weight ratio.

3mm Correx weighs just 350gsm.

Readily accepts screen printing.

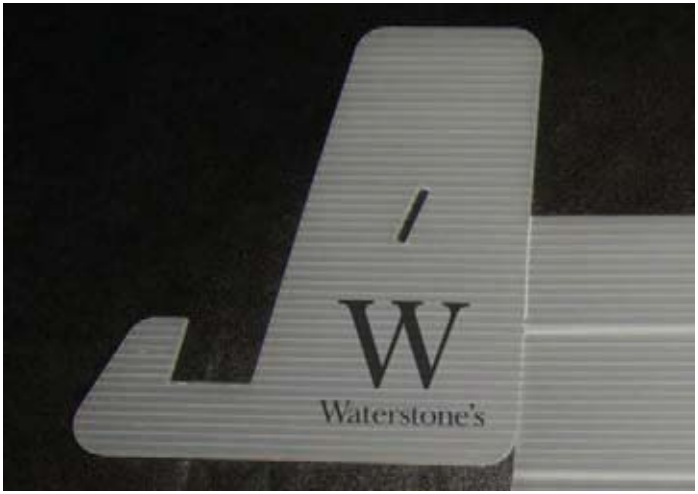
100% Recyclable

Correx



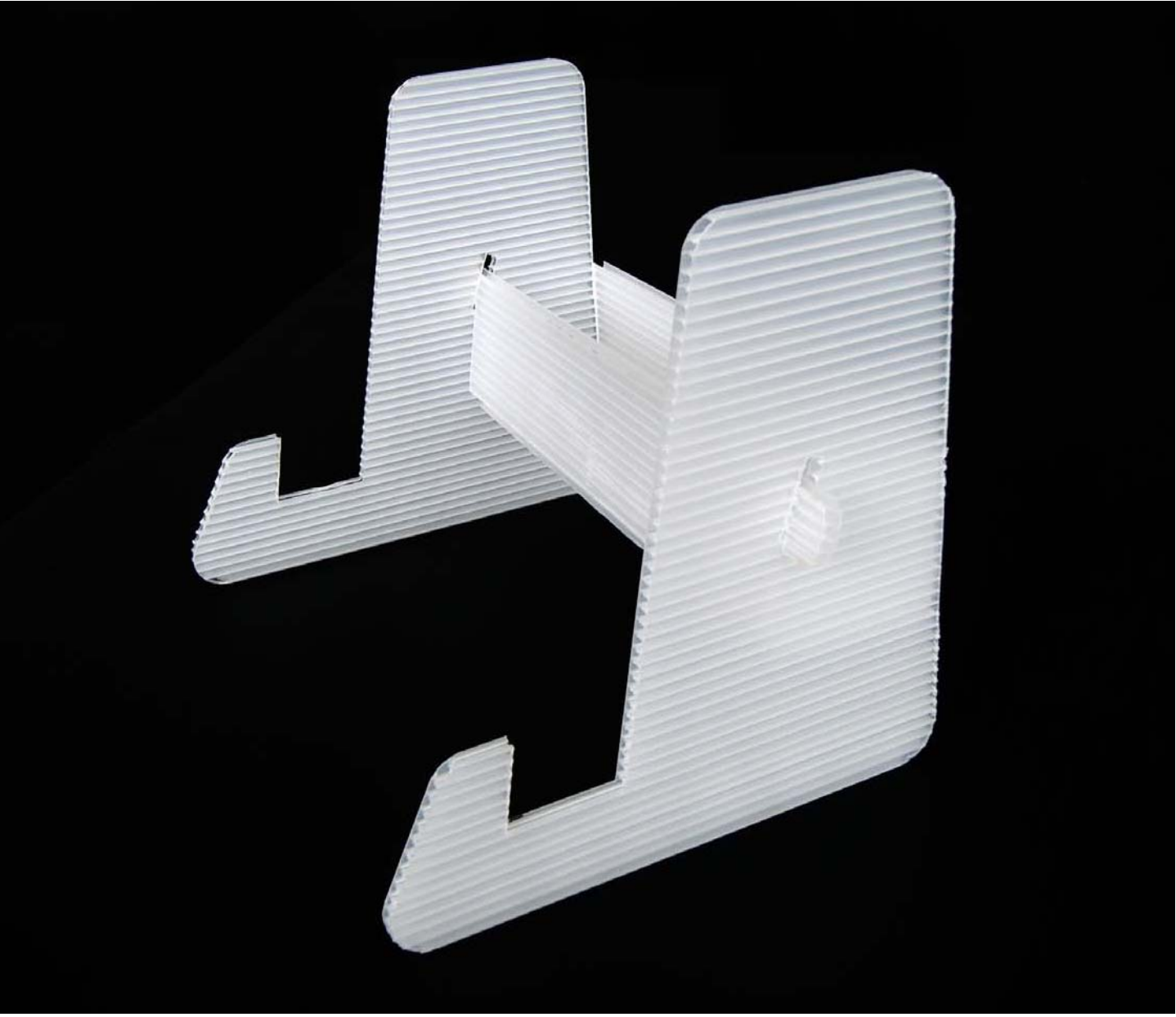
Laser cutting


WORLD BOOK
DAY


W
Waterstone's


BORDERS


Harry Potter



Fianl prototype