

How to be Successful - A-Level Design.

Design subject lead - Mr C Wright.

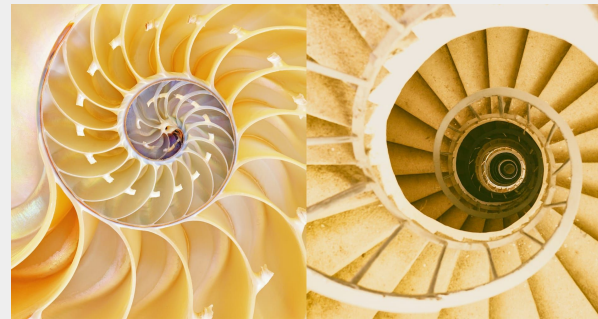
COURSE CONTENT:

*This will be a two year course comprising of -
60% PERSONAL INVESTIGATION & 40%
EXAM SET QUESTION.*

- **Year 1** is built up of **three** skill building projects.

We look at researching into, designing and making products based around - Alessi, design movements and biomimicry.

ALESSI



• *Year 2 - Personal Investigation*

This will contribute to 60% of your final overall grade.

- *You will decide on the starting point to the project and what you would like to research into and design.*
- *This will be a 'major project' and will take you from the end of year 12 to January of year 13.*
- *You will use all of the skills built up in Yr12 to complete the project.*
- *You will need to demonstrate a full understanding of the 4 assessment objectives within the project.*

Overview:

Anthropometrics is the practice of taking measurements of the human body and provide context and data that can be used by designers. Measuring for height, Anthropometrics help designers collect useful data, or hard circumferences when designing a safety helmet. Anthropometry is the branch of human sciences concerned with body measurements such as body size, shape and strength. This is used by ergonomists to ensure that products, such as seats, fit and cut as many users as possible.

Anthropometrics

Anthropometric chair measurements:

What needs to be taken into account when designing a chair?

When designing anything ergonomics and anthropometrics need to be taken into account as there are very important in order to get the product that you are making to a size and scale that one size fits all (on average), this would take use of the 5% percentile as this would be an average of the dimensions of the users that look place in the test and measurements. By making a product that fits the vast people designers are able to visit a wider range of people and a more general target market. In my project I used to take these anthropometric measurements and size into consideration in order to make my final piece as comfortable and unrestricted as possible for the end user.

What makes a seat comfortable?

Generally a seat / chair should be comfortable and unrestricted for the end user. There are a number of variables that need to be discussed before creating a chair. For example the seat height should not be so high so that your legs are left dangling! This would mean that there would be pressure on the soft tissue under your thighs. This pressure interferes with the return of blood from the lower limbs, which may cause tingling and numbness in the thighs due to pressure on blood vessels and nerves. As well, this example there are a number of clear variables and variables that need to be considered and discussed before developing a final product. This is because if the product is uncomfortable no user will want to purchase it or use for what it's worth, as a result it could become redundant. And ideas of day that are not suitable become obsolete ideas of tomorrow.

- The seat depth should allow clearance at the back of your knees in order to prevent pressure on the network of blood vessels and nerves.
- The seat back and angle should support the natural curve of your spine (in particular your lower back).
- The main weight bearing should be taken by the ischial tuberosities (the bony parts of your bottom) and the top half of the thighs.

In addition, a chair should enable you to change posture at intervals, ensuring that different groups of muscles can be used for support, and that no particular group of muscles gets tired. The consequences of poor seating area discomfort, fatigue and

Dimension in mm	Gender	5th %ile	50th %ile	95th %ile
A Sitting height	Male	700	750	800
	Female	715	760	790
B Sitting shoulder height	Male	1400	1500	1600
	Female	1305	1350	1400
C Shoulder breadth	Male	400	440	510
	Female	350	380	430
D Hip breadth	Male	470	500	550
	Female	470	490	520
E Buttock-popliteal breadth	Male	440	470	500
	Female	400	430	460
F Popliteal height	Male	475	490	510
	Female	450	460	480

Inspirational Ideas from CAD

The chair uses a round of the edge used on the top.

The bench could allow repositioned design in order to make the clearest benefit of the bench seat.

All of these designs on the left of the page are made from wood and are customizable due to their long lasting hard wood properties.

These three tables could be adapted in order to meet my design type of a seating solution.

The beautiful table has wood extract and sections of wood from a large tree with a mechanical interaction piece in the middle built up of various shapes (with natural wood).

In order to give depth and character to the piece whilst adding the tree edge sections of wood.

All ideas on this page are from the Greek Designer Skarleton. There are nature focused and take inspiration from my initial chair design page and the design specifications that are in previous pages.

Design inspiration from Tom Dixon's 'Coke' chair that I researched back in my artist network.

The organic surface made up their futuristic low backrest.

A round table in the 'Sustainable' Designers. There are featured in my secondary research and inspiration page.

Ergonomics - Chair Design

Situation for the chair:

The seating arrangement / solution doesn't yet have a specific space to place it as of yet, however later in my development I will add this into my project. This could be in a lounge or even an outdoor solution.

Design Brief:

This design will be attractive, reupposed and inspired by nature. It will have the ability to function as a seating solution and will be able to support the weight of the average person.

Design Factors and Function:

Primary Function - comfortable seating support
Secondary Function - aesthetically pleasing and nature inspired

Manufacture and Durability:

Strong form / structure, cheap methods, and durable to last for years of use. Must meet the brief.

Appearance:

This seating solution will suit the environment it's placed in. Whilst being attractive in its colour and finish - should look interesting and excite the user.

Strength and Weight:

The form of this piece should be able to support the weight of the average person and shouldn't be heavy as it will need to be moved from the workshop into its place of use with ease as suffering injury from moving your design project is not ideal. As a result some parts may be hollowed out in order to ease weight for the overall piece.

Environment:

This piece should be inline with the rest of the project with the theme of nature and reupposed. In theory this piece must include these elements in order to be able to flow with the rest of the project.

Safety:

This piece should refer and adhere to UK safety standards (for example being rigid and being able to take the weight of an average person etc) as well as being made of sustainable materials that meet these standards and overall functionality.

Ergonomics and Anthropometrics:

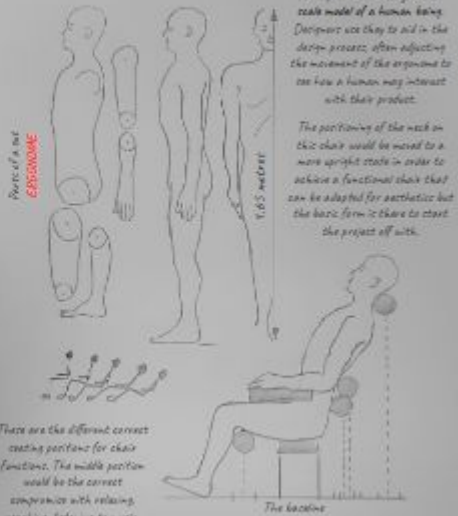
On the right of the page is an ergonomics example seating position that I have experimented with. I have drawn out the middle seating portion in order to show the main points of a chair, as an example for future reference if I needed a reference for my final piece of my investigation.

Other Factors of Influence:

The materials utilised need to meet the ideal of nature, reupposed and must meet one of these themes within the brief of the final piece that will be made. I also need to consider:

- Efficiency
- Compatibility
- Quality
- Posture
- Size
- Texture
- Frame Construction
- Balance
- Style
- Flexibility
- Reliability
- Costs

The average height of a person has been used here.



These are the different correct seating portions for chair functions. The middle portion would be the correct compromise with relaxing, watching TV and eating.

EXEMPLAR WORK.

COMPONENT 2 – Externally Set Assignment

(This makes up 40% of the overall grade)

- *You will start by looking into three or four of the externally set briefs from the exam board and mind mapping each one until you have a wide range of starting points to work with.*
- *You will then produce a similar portfolio to the one previously produced in Year 13 but in a shorter amount of time.*
- *Use of students time is an absolute key to the success of this element of the course.*
- *You will have three full days of school at the end of the project to complete all work. (15 hours) - I recommend that you plan to finish off making diaries and evaluations for this stage of the project.*

Experimentation into Parametric Chairs

What is parametric design? Plus examples: According to the internet a parametric design is a process based on algorithmic thinking that enables the expression of parameters and rules that, together, define, create and clarify the relationship between design intent and design response. Below are some examples of this:



Making process of my first prototype chair. I started this taking the beautiful curvature that I have seen in my projects and in nature to fix and distilling them in my parametric chair form. For example, I took inspiration from the tree, I had photographed, the golden ratio, and the Superstar in the Gardens by the Bay.



The laser cutter was used to professionally cut out all of the parts for the parametric chair - by using the laser cutter all pieces were precise and there was little room for error.



On the left is an image of the laser cutter interface that used 3D design. Although that is an image of the second prototype with the arm rests on it.



My initial idea for this chair was to have the two separate curves alternating.

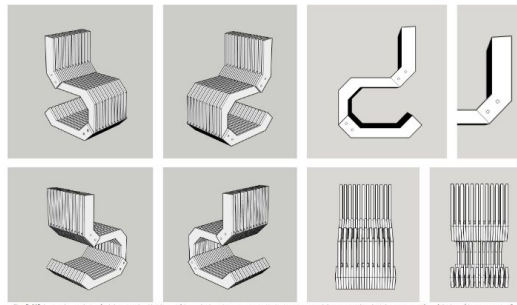


As this is the first prototype, I did the angles and whole design by eye - as a result of this it is only done by what I thought was correct. This will be altered for my next prototype. We shall use the Pi.

Upon review a few alterations are needed. This includes changing the angle of the back support, shortening the depth of the chair (so the seat legs aren't hanging over the edge) and adding in arm rests to make the form look more like a chair and more comfortable too.

In the next slide I will make these alterations and create a prototype with what is listed above.

3D CAD Prototype of my Final Design



The 3D CAD renders show what my chair parts should look like once completed - with its unique organic and natural-inspired forms curving throughout the structure and form of the design. This was created in SolidWorks to my own final. This image shows them of all different angles of the design, the bottom that makes them the chair from the back side, you will see from behind that the curves you get on the chair will look more connected and together. The only major difference between the CAD, drawing and my final piece is the color and material choice - my chair piece will be made of a light wood to represent wood and holding it together.

Part Assembly

Master Part Assembly List						
Part Name	Number of Parts	Length	Width	Height	Material	Notes
Back	2	210mm	60mm	100mm	Planned	
Seat	1	140mm	60mm	100mm	Planned	Finished set
Chair	2	160mm	60mm	100mm	Planned	
Chair	1	160mm	60mm	100mm	Planned	
Chair	1	160mm	60mm	100mm	Planned	
Chair	1	60mm	60mm	100mm	Planned	

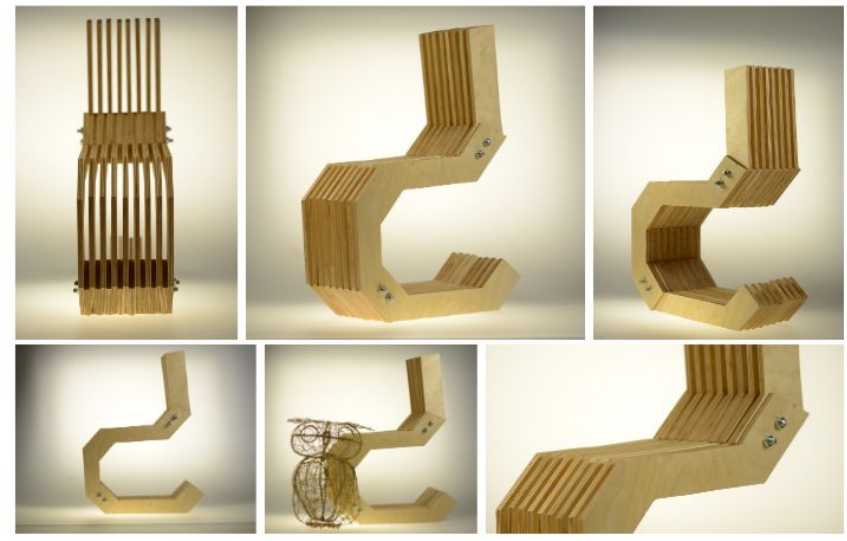


Photos of my own chair. I finished the next assembly of the chair to see how it would be. I found that when added that the red did not work already. I thought I did it but I realized that the wrong parts should not be used in a different way.

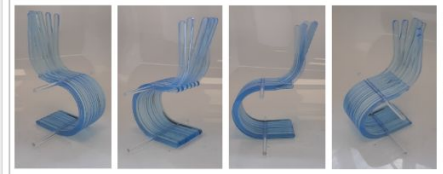


As this I have seen when I put it to the next assembly by myself and that the red did not work already. I thought I did it but I realized that the wrong parts should not be used in a different way.

Final Pictures



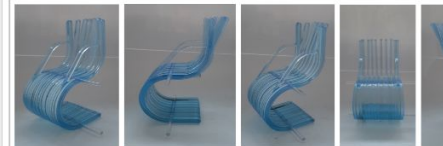
Parametric Chairs Prototype 2



Peer Assessment:
This section includes the thoughts of other students in my class.

Henry:
"I enjoy the curve that you have tried to add into the back of the design as this would make it more comfortable for the user. This would add to the list of functions for the chair as well as either flat or only a slight decline in angle between each internal edge."

Matthew:
"I like how you made adjustments to the structure of the back support. I also enjoy the colour that you have used in this prototype as it adds another level of depth to the piece - almost an entirely new aspect to a similar prototype design."



The design above we shall call P2. This was created in 3D design and I utilized my knowledge from the first prototype and altered both the height and depth in order to make a more perpendicular design. However this will be put to the test in the next slide where I test both P2 and P3 against the use of ergonomics and the final prototype 1 & 2.

The design above we shall call P3 for easy recognizing. This idea is an adaptation of P2 just with added width due to the arm rests and added C shapes that I added into the design. I wish to try this over all other prototypes so far however I will need to complete an ergonomic test first in order to see how it compares to the human body and proper functional use. Although I like this design I believe I will have to change it for my final product as it is not an efficient shape and would end up wasting a lot of material - as a result I will need to experiment with other shapes/techniques.

EXEMPLAR WORK.

How to succeed in A-Level design.



- You really do need to use your time well.
- Keep up to date with all course work elements.
- **Do not** underestimate how long things take to produce.
- You get a full 9 hours of lessons over 2 weeks, plus you should be spending at least the same again at home working on your coursework.
- Make sure all of the 4 objectives are fully covered in both the personal investigation and the exam set project.

How to succeed in A-Level design.



- Make sure you have a full understanding of the mark scheme and how the projects are marked.
- Time plan, time plan, time plan!!!
- Use your PLC documents to track progress.
- Use 1:1 time with your teacher to plan the next stages for development work.
- Do not bury your head if you feel lost with anything.

