National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Exemplar for Internal Achievement Standard

Technology Level 2

This exemplar supports assessment against:

Achievement Standard 91364

Demonstrate understanding of advanced concepts related to human factors in design

An annotated exemplar is an extract of student evidence, with a commentary, to explain key aspects of the standard. It assists teachers to make assessment judgements at the grade boundaries.

New Zealand Qualifications Authority

To support internal assessment

	Grade Boundary: Low Excellence
1.	For Excellence, the student needs to demonstrate comprehensive understanding of advanced concepts related to human factors in design. This involves: • discussing the relationship between anthropometric data, user preference and ergonomic fit in a product, system or environment • discussing the customisation undertaken to address user preference and obtain ergonomic fit in a product, system or environment. The student begins to discuss the relationship between anthropometric data, user preference and ergonomic fit in cutlery design (1) (2) (3). For example, the student discusses extension and flexion of the wrist, and how handle design could minimise excessive movement (2). These understandings are applied to determining the shape and dimensions for a whisk handle (4) that the student is designing. Discussions are also beginning to appear on customisation, and on utilising feedback from user trials to ensure the best appearance and shape (form versus function) (5) (6) (7). For a more secure Excellence, the student could show more evidence of discussing advantages and disadvantages of data collection methods. For example, they could discuss the implications of relying on anthropometric data tables for a predicted user group. They could also discuss the positive and negative effects of customisation and the possible need for adjustability to ensure the best fit.

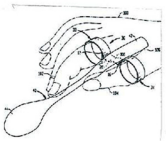
Colour

AFTER MY RESEARCH, I DECIDED TO GO WITH THE COLOURS 'PINK' AND 'WHITE'. I THINK THAT TWO COLOURS WORK WELL TOGETHER. THIS MEANS IT LOOK AESTHETICALLY APPEALING. IT WILL ENGAGE USERS AND IT LOOKS PLAYFUL. PINK AND WHITE WORK WELL TOGETHER AS IT STILL INCORPORATES 'BLOBISM'.

Material

MY FINAL DESIGN WILL BE MADE OUT OF 'HEAT RESISTANT NYLON'. AFTER RESEARCHING VARIOUS MATERIALS THIS WAS BETTER THAN THE REST IT IS BETTER THAN STAINLESS STEEL BECAUSE NYLON IS LIGHT IN WEIGHT WHEREAS METAL IS HEAVY. IT IS FAIRLY DURABLE COMPARED TO 'SILICON'. NYLON IS ALSO EASY MAINTENANCE THEREFORE IT IS EASY TO CLEAN THE MATERIAL. ALTHOUGH THE MATERIALS ARE MADE FROM CHEMICALS, THE BENEFITS OUTWEIGH THE NEGATIVES.

5



Human Factors

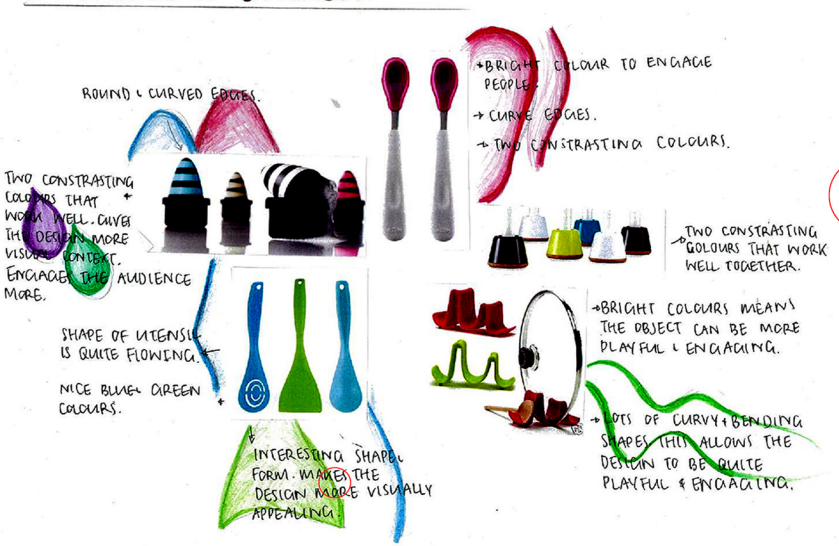
AFTER TESTING DIFFERENT MEASUREMENTS TO ENSURE MY WHISK IS FUNCTIONABLE I FOUND THE RIGHT MEASUREMENTS. THESE MEASUREMENTS ARE: LENGTH: 16MM MAX DIAMETER: 36MM

THESE MEASUREMENTS ENSURE IT FITS THE POPULATION. DUE TO VARIATIONS OF BODY SIZES, 'AVERAGE' MEASUREMENTS IS NEEDED. I ALSO USED DATA FROM THE 5TH PERCENTILE AS I NEEDED TO CONSIDER THE SMALLEST POPULATION TO ENSURE THEY CAN USE MY WHISK. I THINK CONSIDER BECAUSE MY MAIN PURPOSE OF THE WHISK IS TO BE FUNCTIONABLE AND USER FRIENDLY.

IT WONT MATTER TOO MUCH ABOUT THE WAY IT LOOKS BECAUSE SOME EVERYDAY UTENSILS AREN'T VISUALLY APPEALING BUT THEY ARE FIT FOR PURPOSE. COMFORTABILITY & SIZING IS ALSO IMPORTANT BECAUSE IN ORDER FOR SOMEONE TO BE ABLE TO USE A UTENSIL / IT MUST BE THE RIGHT SIZE AND IT MUST NOT BE DANGEROUS SO IMPORTANT MATERIALS & SHAPES NEED TO BE TAKEN INTO ACCOUNT

Comfortability and incorporating design movement "Blobism"

Features of Blobism:



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Materials:

SILICON/PLASTIC:
THIS WHISK IS MADE FROM SILICON. THE PROS ABOUT THIS MATERIAL ARE: LIGHT WEIGHT, INEXPENSIVE, DOES NOT CONDUCT ELECTRICITY. THE CONS ARE: NOT DURABLE FOR LONG PERIODS OF USE, COULD MELT IF PLACED ON HOT SURFACES NOT STRONG ENOUGH TO WHISK THINGS E.G CAKE MIX. THIS MATERIAL IS USER FRIENDLY AS IT IS LIGHT WEIGHT SO IT WONT REQUIRE A LOT OF FORCE TO USE, THEREFORE IT WONT PUT MUCH STRAIN ON THE USERS HAND.

LIGHT WEIGHT CERAMIC
THIS UTENSIL IS MADE FROM LIGHT WEIGHT CERAMIC. THE PROS ABOUT THIS MATERIAL ARE: LIGHTWEIGHT. THIS MAKES IT EASY TO CARRY & USE. LOW MAINTENANCE = EASY TO CLEAN, THE CONS: CAN BE EXPENSIVE. THIS CAN MAKE THE OVERALL PRICE OF THE UTENSIL QUITE PRICEY

STAINLESS STEEL:
PROS: EASIER MAINTENANCE, THIS MEANS ITS EASIER TO CLEAN. MATERIAL IS DURABLE. THIS MEANS IT WILL LAST FOR LONG PERIODS OF TIME
CONS: CAN CONDUCT HEAT. THIS MEANS THE HANDLE WILL GET WARM DUE TO BODY HEAT. METAL CAN BE QUITE EXPENSIVE & SO PRICES OF THE WHISK WOULD BE PRICEY.
THE WHISK IS NOT LIGHTWEIGHT. SO THIS COULD PUT PRESSURE ON THE USERS HAND & WRIST.

Incorporating 'Blobism' Into design

Materials:

HEAT RESISTANT NYLON:
THE PROS ABOUT THIS MATERIAL IS THAT: NYLON IS A FAIRLY INEXPENSIVE MATERIAL THEREFORE IT CAN BE MADE CHEAPLY WITHOUT SPENDING TOO MUCH MONEY. IT IS HEAT RESISTANT, THIS MEANS IT CAN STAND TO TEMPERATURES OF 250. NYLON WILL NOT SCRATCH THE SURFACE OF THINGS UNLIKE METAL OR SHARP WOODEN UTENSILS. THE MATERIAL IS ALSO DURABLE SO IT IS ABLE TO BE USED FOR LONG PERIODS OF TIME. THE CONS ABOUT THIS MATERIAL ARE: STICK RESISTANT THAN ANY OTHER MATERIAL. ODOM (A CHEMICAL) THAT IS FOUND IN NYLON. SOME MAY BE FOUND IN PLASTICS THAT IS USED AS UTENSILS. NYLON UTENSILS CRACK FASTER COMPARED TO STAINLESS STEEL

Colours:

FROM MY RESEARCH OF BLOBISM, I FOUND OUT THAT THE COLOURS MAINLY USED IN THE EXISTING DESIGNS WERE BRIGHT COLOURS E.G YELLOW, PINK, GREEN AND BLUE
THESE COLOURS HELP TO ENHANCE THE AESTHETICS OF THE DESIGN TO MAKE IT MORE PLAYFUL AND ENGAGING.
I PLAYED AROUND WITH SEVERAL COLOUR COMBINATIONS & COLOURS JUST BY ITSELF. I FOUND OUT THAT TWO COLOURS WORK QUITE WELL E.G RED & GREEN, THIS IS BECAUSE IT MAKES THE DESIGN MORE PLAYFUL & ENGAGING. WHEREAS IF THE DESIGN HAD ONLY 1 COLOUR E.G ALL GREEN, IT LOOKS QUITE SIMPLE BUT IT IS NOT ENGAGING.
FROM SURVEYING A RANGE OF PEOPLE, THEY THOUGHT THAT TWO COMBINATIONS OF COLOURS WAS ALSO BEST. I THINK THAT FOR MY FINAL DESIGN I WILL INCORPORATE TWO COLOURS BECAUSE THAT WAY IT WILL BECOME MORE AESTHETICALLY APPEALING AND ALSO ENGAGING. THIS WILL MAKE THE USER ENJOY USING THE WHISK & ATTRACT MORE PEOPLE.
POSSIBLE COLOURS: PINK & GREEN.
PINK WOULD WORK QUITE WELL BECAUSE IT IS BRIGHT, ENGAGING. IT WOULD APPEAL TO MORE USERS & LOOKS QUITE NEAT FOR A UTENSIL. THE COLOUR PINK WORKS WELL WITH BLOBISM TOO.

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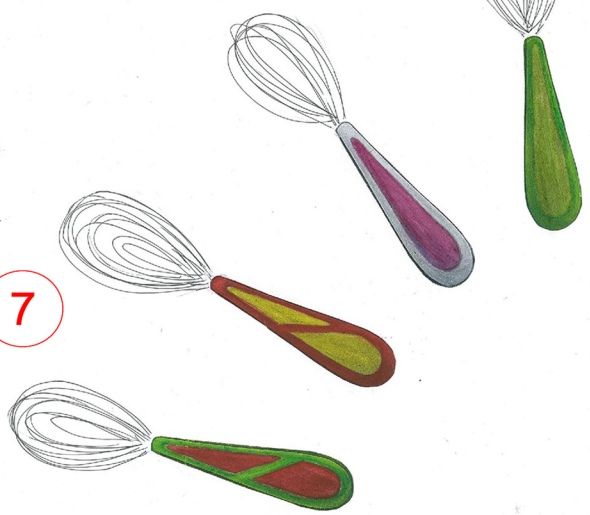


Kitchen Utensil Feedback

The utensil is comfortable and easy to hold

Strongly Agree | Agree (because the grip feels natural and the shape is different) | Neutral | Disagree | Strongly Disagree

The utensil is comfortable to use.

Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

The utensil is a good size for my hand to hold.

Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

I am able to get a good grip on my utensil.

Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

The utensil's shape and form is visually appealing

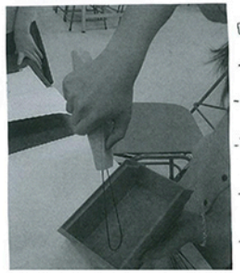
Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

Any other comments:

- SIMPLE HANDLE DESIGN
- SHAPE OF HANDLE ALLOWS HAND TO GRIP ONTO IT EASILY
- TOO LONG, SHOULD REDUCE LENGTH OF HANDLE BY 1-2 CM

1

- NICELY ROUNDED HANDLE FOR A FIRM GRIP
- EACH SECTION OF WIRE BY ITSELF THIS MAKES CLEANING EASY
- SHAPE ALSO WORKS WELL WI THE ROUND HANDLE FOR GO GRIP
- THERE ARE GAPS BETWEEN EACH LIT SECTION, THIS MEANS THAT THE FOO MIXTURE COULD GET TRAPPED IN BIN THEM.



- GOOD USE OF ABSTRACT / WEIRD SHAPES TO GENERATE IDEAS
- THERE IS A DENT ON THE SIDE OF THE HANDLE WHICH ALLOWS MY THUMB TO SIT THERE.
- 'U' SHAPED ON SIDE OF HANDLE WHICH ALLOWS MY THUMB TO HOLD IT FIRMLY
- WEIRDLY SHAPED, LOOKS BOXED. WOULD LOOK AESTHETICALLY APPEALING IF IT WERE ROUNDED

- GRIP/HANDLE STARTS BIG TO SMAL GOOD FOR HAND TO HOLD FIRM
- WEIRDLY SHAPED AT THE BOTTO

Human Factors

1. How is anthropometric data collected and translated into a meaningful format that is useful for people such as designers and architects?

As anthropometric data can be time consuming, costly and relatively cumbersome undertaking it is easier to take a sample to represent the population. A sample is a faster way to collect data as it is less time consuming. Other ways of collecting data are surveying, anthropometric books and 3D scanning. With anthropometric books, thousands of measurements are already collected so this makes data gathering easier.

2. Why are certain measurements collected to establish particular guiding ratios and where does his information come from?

Not all body measurements are necessary for a design for a particular product only certain measurements are needed.
E.g Staircase. Feet and knee measurements. Hand measurements not necessary.

3. How are guiding ratios established for one product that is to be used by diverse groups?

Sample size that best fits the population.
A variety of age and genders to best represents the whole population so people are able to get an indication of the "average" measurements.

4. What is important to know the decision making behind the sampling, measuring and the basis on which the guiding ratio has been established?

Due to the variations in individuals body sizes "averages" is data needed by a designer and it is necessary. It is impractical to design for the entire population, so it is necessary to select a segment from the middle portion. Take measurements from the 5th to 95th percentile when designing an object used by the majority of population.
Because sizes/heights vary from country to country E.g people in Asia tend to be smaller than those in developed countries. Therefore it is important when taking measurements that we need to consider the averages. Also when designing something we need to consider the maximum or minimum ratings so the product/object is suitable for the smaller/larger population. E.g Need to take into account the tallest population when designing a door.

What are two main types of grips when using hand tools and what is the difference? What grip is required for your kitchen utensils?

The power grip, where it requires relatively strong muscles in the forearm. The whole hand wraps around the handle.

The precision grip uses relatively weaker and smaller finger muscles. The item or object is held between the thumb and the index finger. The grip should not be used for tools or actions that require a lot of force.

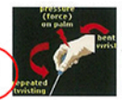
2. What are 3 main things that cause discomfort when using hand tools?

The three main things that cause discomfort when using hand tools are repeated muscle use, excessive bending. Bending of the wrist can be backwards (*extension*), forwards (*flexion*) or sideways (*deviation*)

3. What are some important things that you will need to consider the design of your kitchen utensil and how will this effect your particular utensil?

My whisk will have to be comfortable in the person's hand. Because if used for long periods I don't want it to be harming the person therefore I may consider no sharp edges around the grip.
My whisk has to durable in order for its fit for purpose. It must be able to be used for long periods of time without breaking and also it must be stainless steel otherwise it would rust. Also materials must be considered when designing a product because plastic isn't a material that is strong compared to metals such as steel.
My whisk has to be efficient. Must be easy to use in order for it to function. My whisk also needs to be safe. I don't want it to harm anyone otherwise it would not be fit for purpose. Therefore I need to consider things such as no sharp edges, no poking out poles.

4. Remember, anthropometry is about body measurements, such as body size, shape and strength. What measurements will you need to consider in the design of your kitchen utensil?



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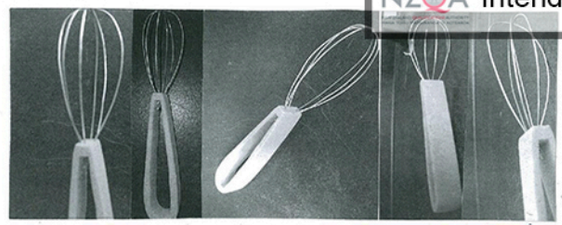
Anthropometric estimates for British adults aged 19-65 years (in mm, from Pheasant)			
Dimension	5th %ile	50th %ile	95th %ile
A Hand length	177	189	205
B Palm length	98	107	116
C Thumb length	49	54	60
D Index finger length	44	51	58
E Hand breadth	80	87	93
F Maximum grip diameter	64	72	79
	60	67	74
	70	87	95
	69	76	83
	43	52	59
	42	48	53
		MALE	FEMALE



WIDTH:
FROM LOOKING AT ANTHROPOMETRIC DATA, THE WIDTH OF THE HANDLE SHOULD BE ATLEAST 88MM, CONSIDERING THE 5TH PERCENTILE SO IT IS ABLE TO FIT THE SMALLEST POPULATION

FIFTH PERCENTILE: I WOULD BE USING DATA FROM THE 5TH PERCENTILE BECAUSE THIS MEANS I CAN TAKE INTO ACCOUNT THE SMALLEST POPULATION SO THAT THE MEASUREMENTS ARE SUITABLE FOR THE SMALLEST POPULATION. DONT NEED TO WORRY MUCH ABOUT THE 95TH PERCENTILE AS THEIR MEASUREMENTS WOULD ALREADY BE SUITABLE. E.G A WATER BOTTLE = NEED TO CONSIDER 5TH PERC ~~SO IT FITS INTO THEIR HAND~~
A DOOR = NEED TO CONSIDER 95TH PERCENTILE

POWER GRIP:
THE HANDLE OF MY WHISK REQUIRES A POWER GRIP BECAUSE THE WHOLE HAND WRAPS AROUND THE HANDLE. REQUIRES RELATIVELY STRONG MUSCLES IN THE FOREARM.
RECOMMENDED GRIP DIAMETER 48-65 MM.

3

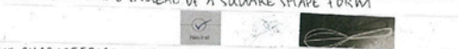
MATERIALS & TEXTURE:
THE HANDLE OF THE WHISK NEEDS TO BE A SUITABLE MATERIAL E.G PLASTIC, METAL WOULD NOT BE SUITABLE BECAUSE, THE MATERIAL IS QUITE HEAVY & METAL IS A GOOD SUBSTANCE FOR CONDUCTING HEAT & ENERGY A PLASTIC, SILICON GRIP WOULD BE SUITABLE AS IT WOULD PROVIDE MAXIMUM GRIP

EFFICIENCY:
MY WHISK NEEDS TO FIT THE SMALLEST POPULATION SO I NEED TO CONSIDER MEASUREMENTS FROM THE 5TH PERCENTILE

Evaluation

TO FIGURE OUT THE SIZE OF MY WHISK I USED ANTHROPOMETIC DATA, MODELS AND DRAWINGS. ANTHROPOMETRIC DATA WAS USED BECAUSE IT WAS LESS TIME CONSUMING, EFFICIENT AND FAST. WE COLLECTED ANTHROPOMETIC DATA ON THE INTERNET. I USED DATA FROM THE 5TH PERCENTILE BECAUSE WHEN DESIGNING UTENSILS IT IS IMPORTANT TO CONSIDER DATA OF PEOPLE FROM THE SMALLEST POPULATION TO ENSURE THEY ARE ABLE TO USE IT. I THINK ANTHROPOMETRIC DATA WAS MOST HELPFUL BECAUSE PEOPLE VARY IN ALL SHAPES & SIZES THERE 'AVERAGE' MEASUREMENTS NEED TO BE USED. ALSO CARDBOARD MODELS WERE A GOOD WAY TO COLLECT DATA. THEY WERE QUICK AND EASY TO MAKE. IT WAS GOOD AS IT SHOWED THE APPROX SHAPE IN 3D SO THEREFORE I WAS ABLE TO VISUALLY SEE IT. LEAST HELPFUL WAS SKETCHES / DRAWINGS BECAUSE I COULD NOT ENGAGE WITH THE MEASUREMENTS UNLIKE MY FOAM MODEL. FOAM MODELS WORKED WELL BECAUSE IT WAS QUICK AND EASY TO MAKE MY MODEL. IT SHOWED MY SHAPE & SIZE IN 3D SO I WAS ABLE TO FEEL IF IT WAS COMFORTABLE OR NOT. IF I HAD NOT USED A FOAM MODEL, MY MEASUREMENTS WOULD NOT HAVE BEEN SO ACCURATE AND I WOULD NOT KNOW HOW BIG OR SMALL IT IS ON PEOPLE.

I THINK THAT HUMAN FACTORS WAS MOST IMPORTANT TO ME & MAKING SURE MY UTENSIL WAS COMFORTABLE RATHER THAN THE AESTHETICS. THE MAIN PURPOSE OF A UTENSIL IS THAT IT IS ABLE TO DO ITS JOB EFFICIENTLY WITHOUT ANY HAZARDS. THE AESTHETICS MAY MAKE THE UTENSIL ENGAGING BUT IT IS NOT IMPORTANT COMPARED TO MAKING SURE IT IS COMFORTABLE SO EVERYONE CAN USE IT EFFICIENTLY. IT WAS INTERESTING TO SEE THAT AS THE AGE GROUP INCREASED, THE SIZE OF THE UTENSIL WAS EITHER 'NEUTRAL' OR 'GOOD' THEREFORE I DECIDED TO MAKE THE DIAMETER BIGGER TO ENSURE IT WAS SUITABLE FOR ALL USERS.
AT FIRST MY WHISK HAD SHARP EDGES, BUT INORDER TO ACHIEVE MAXIMUM COMFORTABILITY I HAD TO CHANGE THE FORM OF MY HANDLE. THEREFORE I MADE THE HANDLE ROUND INSTEAD OF A SQUARE SHAPE FORM



4

THE CHARACTERISTICS OF BLOBISM INCLUDE THINGS LIKE 'ENGAGING' 'PLAYFUL' 'BRIGHTLY COLOURED' 'SYMMETRICAL' 'CURVY' 'ROUND'. IN MY UTENSIL CHARACTERISTICS OF BLOBISM HAVE BEEN INCORPORATED. SOME OF THE BLOBJECTS START OFF WITH A SMALL WIDTH, THEN INCREASES. MY HANDLE OF THE WHISK HAS THIS FEATURE WHICH MAKES THE DESIGN AS A WHOLE ENGAGING. MY DESIGN IS SYMMETRICAL LENGTH WISE, THIS MAKES IT EVENLY PROPORTIONED SO IT LOOKS GOOD. I HAVE INCORPORATED TWO COLOURS INTO MY DESIGN. I DECIDED TO CHOOSE WHITE AND PINK BECAUSE THEY WORK WELL TOGETHER TO ENGAGE USERS. BLOBISM CONSISTS OF ROUND & CURVY SHAPES. I HAVE INCORPORATED THIS IN THE BOTTOM OF MY HANDLE.

I HAVE INCORPORATED THE AESTHETICS OF 'BLOBISM' WHILST STILL ENSURING THE UTENSIL IS COMFORTABLE. THE DIAMETER OF MY WHISK INCREASES FROM SMALL TO BIG. THIS MAKES THE UTENSIL LOOK AESTHETICALLY APPEALING WHICH USERS THEN WILL FIND IT ENGAGING. NOT ONLY DOES THIS FEATURE ALLOW IT TO LOOK GOOD, IT MAKES THE HANDLE MORE COMFORTABLE TO HOLD. BLOBISM CONSISTS OF ROUND AND CURVY SHAPES. I HAVE INCORPORATED THIS FEATURE BY MAKING THE HANDLE ROUND SO IT IS COMFORTABLE AS POSSIBLE.

	Grade Boundary: High Merit
2.	For Merit, the student needs to demonstrate in-depth understanding of advanced concepts related to human factors in design. This involves: • explaining how anthropometric data is gathered and ergonomic aids are used when designing a product, system or environment • explaining how customisation is undertaken to address user preference and enable the ergonomic fit of a product, system or environment. The student clearly explains how anthropometric data is gathered in general (1), and how it is gathered for hand sizes (2). They explain how this data is used to determine optimal measurements when designing cutlery (3) (4) (5). The student also explains how existing cutlery was used in user trials (ergonomic aids) to establish preference (3). The student explains how customisation of the shape of the handle was needed to gain the best shape, size and volume to meet the needs of the widest possible user group (5). To reach Excellence, the student needs to move from explaining to discussing. This might include comparing and contrasting different data gathering techniques and discussing the positive and negative effects of customisation on a target user group.

How is the data collected and translated into some meaningful format to be useful as data or an ergonomic aid?

The way that data is collected is through surveys which are then put into graphs and tables. This is easy to look at and to see trends within the data. You can find these graphs and tables in "anthropometric source"books published by the national aeronautics and space administration. The way the data is collected is from human bobby dimensions. They measure different age, shape size gendered people and the way they get their measurements is with special measuring tools.eg anthropometric tape, sliding compass and anthropometry. When the data is displayed on the graphs it helps show the most common measurements, least common and average, which makes it easy to interpret.

Why is it important to know the decision making behind the sampling, measuring and the basis on which the guiding ratio has been established?

Meaning of guiding ratio= are rules of thumb, these ratios are established by statically comparing anthropometric data of the human body.

It is important to know the decision making behind the data that you are given so that when you are making new products we make the right decisions for the population. We need to know the measurements so that we are able to select the right data for the product we are designing. We need to know the decision making behind measurements and sampling as very serious error in the data is to think that the 50%ile dimensions represents the measurements of the average size man. Showing how important it is to know the decision making behind the sampling so that mistakes like this are not made.

Why are certain measurements collected to establish particular guiding ratios and where does this information come from?

Certain measurements are collected depending on the need of the design/designer. Anthropometric data was originally produced by the armed forces this helped them produce specialized gear for the men. Also the measurements are then used and are needed when you designers are designing a product. The data comes from the population you are designing for. Eg if you are designing a children's chair you would collect the measurements from that population therefore it's comfortable for the user. Human sizes impact on the product that you are designing and design of interior spaces. There are two different basic types of dimension structural; measurements include head, torso and limbs. Functional dimensions are measurements taken in working positions or when moving /when doing a certain task of movement.

How are guiding ratios established for one product that is to be used by diverse groups?

Guiding ratios are established by using specialist tools such as spreading calipers, sliding compass which are then used to measure each person. The data is recorded in the recording forms then recorded in tables. Because they measure a whole range of different people and get different types of measurements. The measurements can then be guide lines to use for your product. Eg : if I design a kitchen utensil I need measurements to do with hands, but if designing a chair you need measurements on height of people. Therefore the information gathered can be used in a variety of ways but for different products. Like if you used measurements from the 95%ile this would be because you were designing a kitchen utensil which is for the smallest and weakest user. If you were taking measurements from the 95%ile it would be for the strongest and biggest person it would be because you were designing a door or chair for someone.

Why is it important for manufacturing companies to know how the anthropometric data was established and translated into the guiding ratios?

It's important that manufacturing companies know where the measurements and information they get, when designing something comes from. Also the manufacturing business needs to know where their information is coming from so they know who is being measured to make sure it then matches the consumers' needs. As different races may have smaller or larger features then who you are making it for. As they want their product to be able to function so that it fits the consumer. The manufacturing companies also need to know where the information comes from so they know where that the source is reliable and genuine. Eg: they need to know what the age, sex and nationality of the measurements that they get so that they know it is relevant to what they need.

How is the data used by people in the field? Eg: designers

People like architects, ergonomists and designers use the data that has been collected to help provide insight on things they need to consider when designing a new product. It is important that when designers are designing a new product it's important to use anthropometric data and common sense to help create a new suitable and functional product that suits the person that it is intended to. Depending on what the designer is designing there are different measurements they can use. They have to make sure that the measurements are for the appropriate population they are designing for and that they are accurate.

1

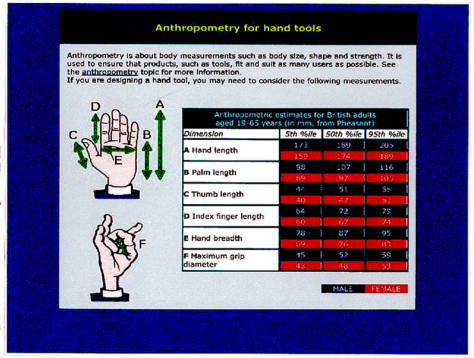
1) - POWER GRIP is used to hold a potato masher for example and you have to use strong muscles in your forearm. The way you hold power grip is by putting your whole hand around the handle.
- PRECISION GRIP /OR PINCH GRIP used to hold a pencil or pen. It uses smaller weaker finger muscles in your hand. You hold it (eg pen) between your thumb and index finger. You don't use this grip for anything that requires alot of force. The difference between the two grips is the way you hold it and how much power you put into the act. The precision grip gives you more control. Precision grip will be used for my kitchen utensil cutlery.

2) The third factor is how much force is being put into the grip this can cause discomfort and may lead to injury.
- grip needs to be good and suitable as they will be holding my cutlery for quite a while I don't want them to be uncomfortable while holding my cutlery. Also I need to think about the materials I will use as it can't be slippery, that it will fall out of their hands when picking up food and eating it.

2

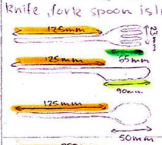
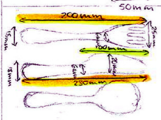
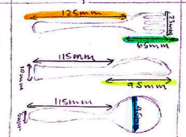
3) Things that I will need to consider are the weight of my cutlery as I want them to be easy to control & also if I make them to heavy people may get tired quickly them using them. The recommended diameter for a precision grip is 8-16mm. The diameter is something I need to consider in the making of my cutlery. As I don't want it to be to difficult to grip and hold my cutlery if the diameter is to small and I don't want the diameter to be to big. As if it is to big you will find it hard to hold. The length of my cutlery needs to be consider as I will need to think about the most comfortable length is for everyone to use. Shape is something that I need to consider as the cutlery needs to be easy and comfortable to hold when being used. The material that I use to make my cutlery needs to be consider. It needs to be strong enough for someone to hold it so that it doesn't crack or break in their hands. Texture need to be consider I don't want it to be to rough that it hurts your hand when you hold them but it can't be to smooth as then it may slip through their hands.

4) The measurements that I will need to consider are the length for my cutlery. maximum grip diameter = I will need to make sure that when you grip my cutlery it will be comfortable and suitable for everyone to use.
Hand length = I will need to consider hand length so that the proportions are right when you hold my cutlery.
Palm length = I will need to think about palm length as my cutlery needs to fit the average hand.
Thumb length = You use your thumb to help grip cutlery when you use it. So I will need to take in to consideration thumb length when thinking about the handle length of my cutlery.
Index finger length= will be a measurement that will need to be consider in the design of my cutlery. As you also use your index finger to help grip and hold the cutlery handle.



3

KITCHEN UTENSILS!

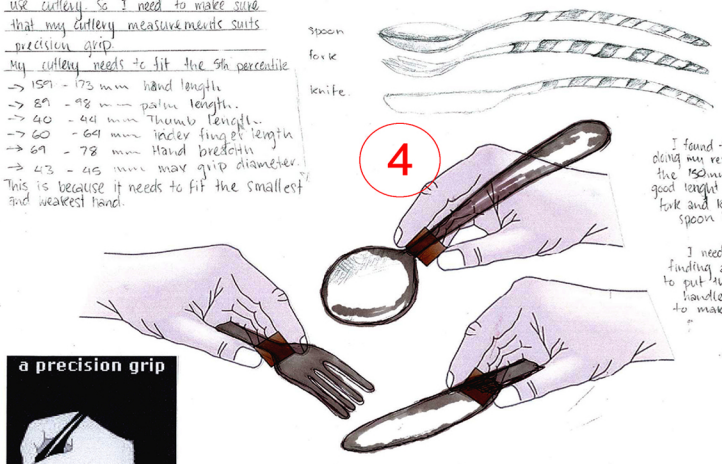
PICTURE	MEASUREMENTS	MATERIALS	OPINIONS
	All handles have a 2mm diameter. Thickness of knife ,fork spoon is 1mm 	60g stainless steel	Really like that nice minimalist design however you have to grip the handle quite tight to hold on to it.
		STAINLESS STEEL COLOUR = SILVER	Jena-she said she liked the cutlery it wasn't to heavy and had a good grip in her hand. She liked the style of the cutlery as it was simple and easy to use and it was a suitable length. Minna-she liked the depth of the spoon and good size because it fits into her mouth well. Didn't like how long the knife was. It was to long and the blade (cutting edge wasn't long enough.
		STAINLESS STEEL	
		STAINLESS STEEL	Because the fork has a really thin handle it makes it hard to use as you can't grip it that well. The spoon is a good width it is nice and big this meant you can get alot on it. The length of the knife handle is good it fits peoples hand well.

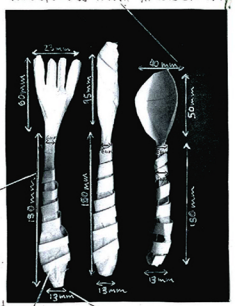
SIMILARITY'S

Handle length is around 115mm - 130 mm
The average width of a spoon from the info I have is around 45mm
The head of a fork from the info I have got is 65mm or less.
The cutting edge for a knife is 90mm - 100mm as shown in the measurements I have
The width of the fork head is around - 26mm - 25mm. The materials that all the cutlery was made out of was stainless. This then tells me it is the best material to make my cutlery out of because all those different knifes, forks, spoons are made from it.
Coming from the opinions of what people said about using these different cutlery there were some similarity's. Two different people said along the lines that the handle wasn't wide enough and then to hard to grip. Two people said that they liked their cutlery because it was a minimalist design and simple. So this tells me that I should think about designing cutlery that is simple but also style. Two different people also commented on how they both liked how their spoon was nice and wide but also still easy to fit in their mouth.

WHAT CHANGES DO I NEED TO MAKE

I found out from my research that precision grip is used when you use cutlery. So I need to make sure that my cutlery measurements suits precision grip.
My cutlery needs to fit the 5th percentile
-> 159 - 173 mm hand length
-> 89 - 98 mm palm length.
-> 40 - 46 mm Thumb length.
-> 60 - 64 mm index finger length
-> 69 - 78 mm Hand breadth
-> 43 - 45 mm max grip diameter.
This is because it needs to fit the smallest and weakest hand.





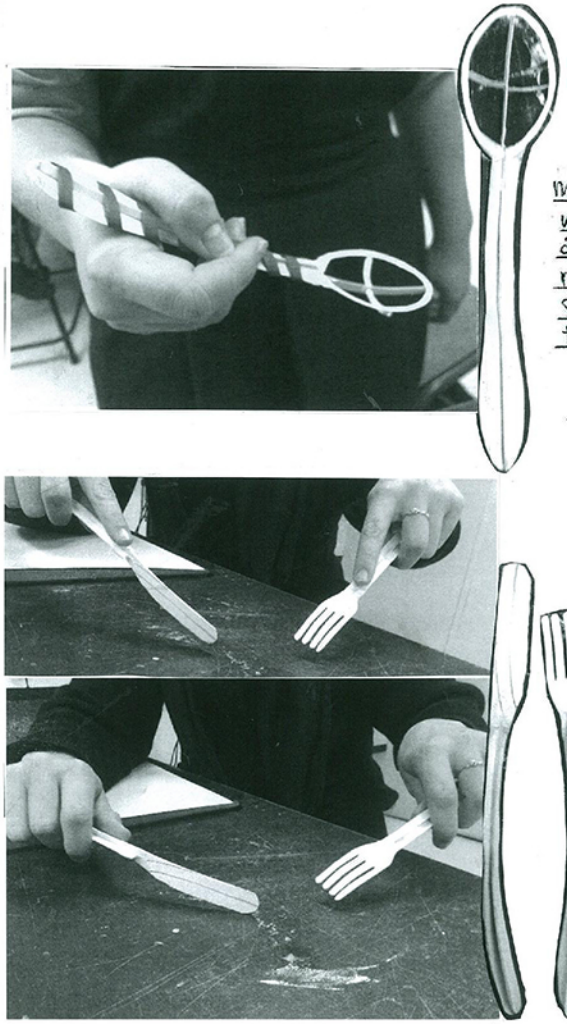
I found from doing my research the 150mm was a good lenght for the fork and knife and spoon handle

I need to look at finding a different way to put the swirls on the handles of my cutlery to make it look better

thick handle so that it easy to hold on to.

5

COMPARING ANTHROPOMETRIC DATA WITH DATA GATHERD FROM KITCHEN UTENSIL ANALYSIS!



measurements for this model were taken from anthropometric Data research says that the data should be taken as it is for the smallest & weakest users

CHANGE I STILL NEED TO MAKE:

I need to change the length of the fork head its to short this is also the length of the knife head needs to be longer this is what was suggested by people that held them.

measurements for these models were taken from my kitchen utensil analysis page.

ERGONOMIC USED:

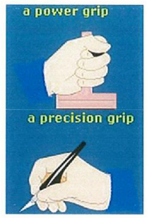
I made cardboard volume models because they were quick to make and I wanted to test & compare two different lots of measurements. I got different people to hold my different cutlery and see what measurements /dimensions they preferred and tell me what one was more comfortable to hold.

FROM MY TESTING I FOUND OUT THAT:

- Even through I took my measurements from the 5th percentile it so still a little bit to short.
- But the measurements taken from my kitchen utensil analysis page helped me get the right measurements As I just got the measure that were most common. From these measurements people said that it was more comfortable to hold because they had longer handles.
- Also I found that I have to make the head of the knife longer as it is to short.

	Grade Boundary: Low Merit
3.	For Merit, the student needs to demonstrate in-depth understanding of advanced concepts related to human factors in design. This involves: • explaining how anthropometric data is gathered and ergonomic aids are used when designing a product, system or environment • explaining how customisation is undertaken to address user preference and enable the ergonomic fit of a product, system or environment. The student explains some anthropometric data gathering techniques (1). They explain how they used anthropometric data to determine optimal handle size for the design of a vegetable peeler (2). The student explains the use of a functional model, user trials and a Likert scale (ergonomic aids) to address user preference and enable ergonomic fit, with specific reference to the design of their peeler (3) (4) (5). For a more secure Merit, the student could explain in more detail how anthropometric data is gathered, and how ergonomic aids are used when designing a product.

HUMAN FACTORS



How is anthropometric data collected and translated into a meaningful format that is useful for people such as designers and architects?

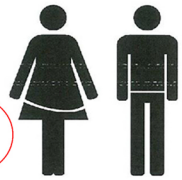
As anthropometric data can be time consuming, costly and relatively cumbersome to undertake, it is easier to take a sample to represent the population. A sample is a faster way to collect data as it is less time consuming. Another way to collect data is surveying, or anthropometric books and 3D scanning, buy using books thousands of measurements are already collected so this makes data gathering a lot easier and less time consuming.

Why are certain measurements collected to establish particular guiding rations and where does this information come from?

Not all body measurements are necessary for a design; certain measurements are needed for particular products.

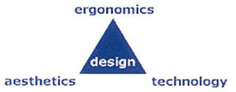
Eg. For a peeler hand and finger measurements are necessary but feet and leg measurements are not.

1



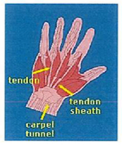
How are guiding rations established for one product that is to be used by diverse groups?

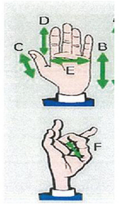
By a sample size that best fits the population. Sampling a variety of ages and genders will best fit the whole population so people are able to get an indication of the 'average' measurements needed.



What is important to know when decision making behind the sampling, measuring and the basis on which the guiding ratio has been established?

Due to the variations in individuals body sizes an average of data is needed by a designer. It is necessary for them as it is impractical to design for the entire population, with an average they can design for a segment from the middle portion. Measurements need to be taken from the 5th to the 95th percentile when designing an object that will be used by majority of the population. As there is high and size variation throughout different countries (ie. People in Asia tend to be smaller than those in highly developed countries) it is important when taking measurements that we consider the averages. The maximum and minimum values also need to be considered when designing something so the product is suitable for the smaller or larger people of the population. Eg. When designing a door the tallest in the population will need to be taken into account.





What are two main types of grips when using hand tools? What is the difference? What grip is required for your hand tool?

The first type of grip is the power grip. It requires relatively strong muscles in the forearm as the whole hand wraps around the handle of the product.

The second type of grip is the precision grip. This uses relatively weaker and smaller finger muscles as the object is held between the thumb and the index finger. This grip should not be used for tools or actions that require a lot of force.

For my peeler I will be using the power grip, as it is the most suitable grip for the type of product I am designing.

What are the 3 main things that cause discomfort when using hand tools?

3

The three main things that cause discomfort when using hand tools are: repeated muscle use which can lead to painful tendons, excessive bending which causes discomfort and restricted movement and repeated twisting. Bending of the wrist can be backwards (extension), forwards (flexion) or sideways (deviation).

What are some important things that you will need to consider when designing your kitchen utensil and how will this affect your particular utensil?

My peeler will have to be comfortable when held in the customer's hand. Because this utensil will be used for reasonable lengths of time I don't want to be causing any harm or discomfort so I will make sure I have no sharp edges or uncomfortable shapes to hold around the grip.

My peeler has to be durable in order for it to fit its purpose. It must be able to be used for long periods of time without breaking and must also be stainless steel or plastic so it does not rust. It is important to consider materials when designing a product as you want a material that is comfortable but durable so the product gets a lot of use.

My peeler also has to be efficient; it must be easy to use in order for it to function properly. I also need to consider the safety around using a peeler, I don't want to harm anyone using my product otherwise it won't be fit for purpose. Therefore when designing my product in need to consider the shape and material.

Anthropometric estimates for British adults aged 19-65 years (in mm, from Pheasant)

Dimension	5th %ile	50th %ile	95th %ile
A Hand length	173	189	205
	159	174	189
B Palm length	98	107	116
	89	97	105
C Thumb length	44	51	58
	40	47	53
D Index finger length	64	72	79
	60	67	74
E Hand breadth	78	87	95
	69	76	83
F Maximum grip diameter	45	52	59
	42	48	53

MALE FEMALE

Applying Human Factors

Anthropometric estimates for British adults aged 19-65 years (in mm, from Pheasant)

Dimension	5th %ile	50th %ile	95th %ile
A Hand length	173	189	205
	159	174	189
B Palm length	98	107	116
	89	97	105
C Thumb length	44	51	58
	40	47	53
D Index finger length	64	72	79
	60	67	74
E Hand breadth	78	87	95
	69	76	83
F Maximum grip diameter	45	52	59
	42	48	53

MALE FEMALE

2

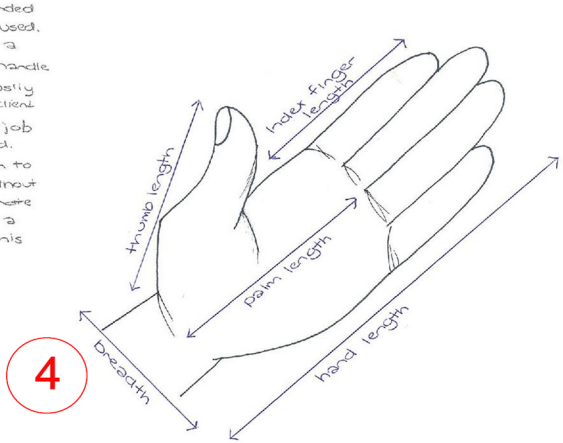
What data was used to make it the size you did?

I used Anthropometric data, taken from the table on the left which I applied to figure out the correct sizing and shape of my design. I looked at the anthropometric estimates for British adults aged between 19-65 and used data from the 5th percentile as I would need to consider the smallest average in the population for my peeler. The measurements I used for my peeler was 130mm for the length around the handle and 60mm for the height of it. When making this decision I made sure I still incorporated the Bauhaus design while making a comfortable shape with smooth edges for my clients to be able to easily use.

Psychological Sensory:

After getting potential clients to test the functional purposes of my peeler, I was able to get feedback on the shape and size of my design. People said it was nice and comfortable to hold as the shape was rounded suitably to fit into the palm and be easily held or used. Even though the design is quite geometrical and has a sharply influenced shape, the rounded curve on the handle allows it to be comfortable for use as the hand can easily wrap around the handle. This feature also allows the client to hold the peeler in multiple ways, depending on the job it is being used for or the shape of the clients' hand. This is important as I want majority of the population to be able to easily and comfortably use my design without any pain or issues. From my feedback I was able to note that multiple clients suggested a thinner handle to get a better grip and hold. I will be sure to incorporate this in my final design.

I made a simple cardboard model of my design because it wasn't time consuming to make as there was no need to glue or stitch anything together. It was also useful as it showed the basic shape and structure of my model but still allowed it to be altered or changed if needed. It was also easily held so the client could feel the shape and general size of the form before giving feedback.



4

The blade part of the peeler is 9mm tall by 60mm long. I worked out these measurements by getting an average of fruit/vegetable sizes, therefore making it more user friendly as all fruit/vegetables will be able to be peeled.

5

Likert Scale

- Psychometric scale used for research
- Respondents specify their level of agreement or disagreement on a scale for a series statements
- Therefore the range captures the intensity of their feelings for a given range

Is the utensil comfortable and easy to hold?

After surveying a range of potential clients all of them agreed that my design was comfortable and easy to hold. This response tells me that I will not have to make any changes to my design to make it more comfortable and easy to hold eg. rounder, smoother.

Is the utensil comfortable to use?

Everyone surveyed agreed that my design was comfortable to use. This is very important as a key factor in designing a kitchen utensil is for it to be easily used for excessive amounts of time without causing any rubbing, pain, strain or discomfort. This response means I will not have to change anything major to affect the comfort around my design.

Is the size in relation to ability to be held accurate?

I found out through my survey that my utensil was of a reasonable size for most clients hand shapes. However people with larger hands found that the internal height could be slightly bigger, allowing people to get a better grip as more fingers will be able to fit around the handle. I need to keep in mind that when designing a product, data from the 5th percentile must be taken into account as the portion of the population who have smaller hands need to be considered. From this I asked the younger people surveyed on their opinion and gave them another slimmer model. This allowed them to compare both designs and decide what measurements felt best. This testing allowed me to come to the conclusion that I will need to make my model thinner in order to suit majority of the population. By changing this the safety of my model will increase as peoples fingers will be further away from the blade, therefore helping to prevent unnecessary accidents.

Am I able to get a good grip on the utensil?

All my surveyed participants agreed that a good grip could be easily found with my design. This was because it was shaped nicely to fit inside the palm without causing any discomfort. They also stated that it was versatile as it has the ability to be held in many different ways. this makes it more publically appealing as people of all hand shapes and sizes will be able to find a way to easily use this utensil and get a comfortable grip on it. The grip on a peeler is vital as your hands need to be able to wrap around the handle before the purpose is fulfilled. The grip will be dependant on the material my design is made from.

Is the utensils shape and form visually appealing?

My utensil is visually appealing. This means I won't have to make any changes to the shape of my peeler. I was able to come to this conclusion through my survey in which all of my potential clients ticked 'agree'. I also has some additional comments informing me on how the shape of my design was well liked for its simplicity and geometrically influenced style.

Kitchen Utensil Feedback early teens

The utensil is comfortable and easy to hold

Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

The utensil is comfortable to use.

Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

The utensil is a good size for my hand to hold.

Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

I am able to get a good grip on the utensil.

Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

The utensil's shape and form is visually appealing

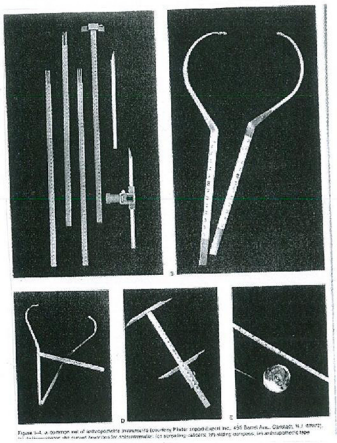
Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

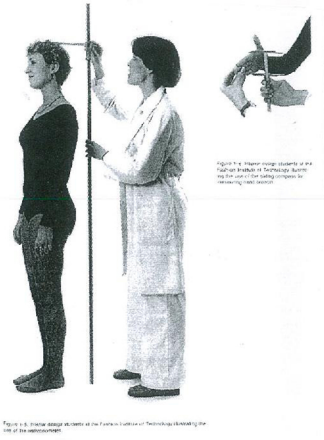
Any other comments:

It was very comfortable to hold, but possibly make the utensil slimmer since my fingers could get easily caught in the blade.

	Grade Boundary: High Achieved
4.	For Achieved, the student needs to demonstrate understanding of advanced concepts related to human factors in design. This involves: • explaining how statistics and probability are used to establish guiding ratios for anthropometric data and how this and ergonomic aids are used • explaining how customisation allows for user preference and enables ergonomic fit. The student explains how data can be gathered by measuring the human body to establish ranges and guides for an optimal handle size and fit (1). The student researches the precision grip and explains how this is used as an ergonomic aid to determine handle design and shape. The student explains how customising the handle of a vegetable peeler makes it safer and more comfortable for a range of users (3) (4). This includes considering grip, muscle use, the finished surface, materials and size (2). To reach Merit, the student could show more evidence of explaining how ergonomic aids (e.g. user trials, tests, prototyping) are used when designing a product such as a peeler.

① Anthropometric is used to collect data by a wide range of surveys. A survey was made of 100000 American troops; this was one of the first studies to include measurements other than height and weight. The purpose of this study was to be a guide in designing clothes.
Now days they do a 3d scan to get the measurements instead of using the old fashioned tools in the picture above.





③ Areas under a normal curve are most people dimensions in a normally distributed group. A small number of measurements appear at either end of the scale. But most are grouped within the middle portion.

1

Kroemer, Thomson, Engineering Anthropometry Methods, 1975, p. 194.

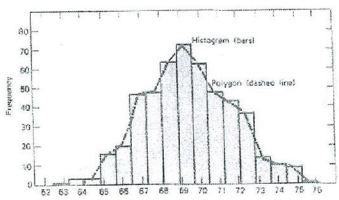


Figure 1-12. Example of a frequency histogram and polygon. From Roebuck, Kroemer, Thomson, Engineering Anthropometry Methods, 1975, p. 195.

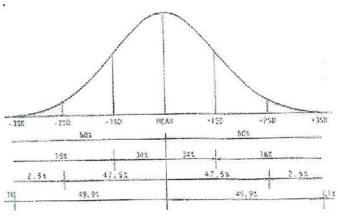
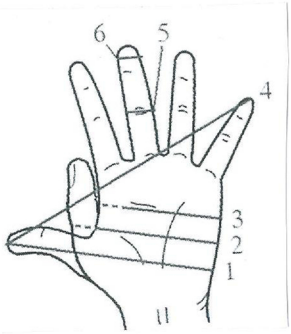


Figure 1-13. Example of areas under a normal curve. Most human dimensions, in a normally distributed group, follow the bell-shaped configuration. A small number of measurements appear at either end of the scale, but most are grouped within the middle portion. Drawing adapted from NASA, Anthropometric Source Book, vol. 1

② A wide range of measurements are collected through a big population so that designers are able to find an average when designing something for a specific group of people.
It can be the average of a group but also designers can look at the people that are higher or lower up the scale.
The information comes from the surveys taken before.



④ This is important as the hand sizes have to fit the smallest hand and the biggest hand it needs to be ideal for everybody. The guiding ratio helps us to find out the measurements of the smallest and biggest size of every part of the body in our case hand size. To see what needs to be accomplished to design a peeler or whisk that will comfortably fit every person.

BEGINNING TO UNDERSTAND HUMAN FACTORS
PART 2: Specific things that need to be considered when designing hand tool /utensils

1. What are the two main types of grip when using hand tools and what is the difference? What grip is required for your kitchen utensil?

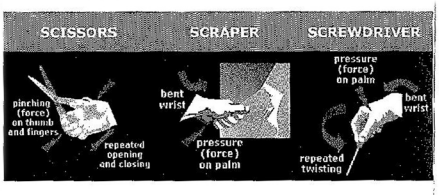
There are two main types of grip that you normally use:
A power grip - used to hold a hammer, for example, which uses relatively strong muscles in the forearm. Your whole hand wraps around the handle.
A precision grip (or a pinch grip) - used to hold a nail or a pencil, which uses smaller and weaker finger muscles. The item is held between your thumb and index finger. This grip should not be used for tools or actions that require force.

2

The grip I will need for my utensil would be the precision grip as it is suitable for a peeler.

2. What are the 3 main things that cause discomfort when using hand tools? How could this effect the design of your utensil?

The two things that make our hands and wrists uncomfortable are repeated muscle use, which can lead to painful tendons, and excessive bending, which causes discomfort and restricted movement. Bending of the wrist can be backwards (extension), forwards (flexion) or sideways (deviation). The third factor that can cause discomfort and may lead to injury is the amount of effort or force needed to grip a handle or use a tool.



These factors could affect the design of my utensil as it may cause excessive bending to the wrist when peeling hard to peel objects such as chestnuts.

3. What are some important things you will need to consider in the design of your kitchen utensil and how will this affect your particular utensil?

Indentations
Finger ridges or indentations along the handle are not recommended. If you have particularly small or large hands, you may find that the grip is uncomfortable because your fingers are spread too wide to allow a good grip, or the ridges in the handle lie uncomfortably among your fingers. Finger indentations also encourage your hand to stay in one position and this might not be suitable for all tasks.

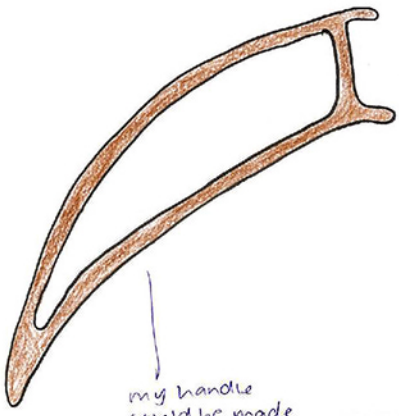
Material
The material of the handle should be a poor conductor of heat and electricity, and should be non-porous so that it will not soak up and retain oil or other liquids

Length
The length of a handle should be at least 100mm, so that the end of the handle does not finish in the palm of your hand. Ideally, the handle should be up to 130mm, so that the palm of even the largest hand is cleared and there is less risk of the handle doing damage by compression of the soft palm tissues.

These things will affect my utensil as I need to make my utensil suitable for left and right handed people this is important when thinking of indentations. I will also need to think about the sizing of peoples hand my utensil needs to suit the biggest hands to the smallest hands this is why length is a factor for my utensil.

I will also need to take into account the surrounding in which my utensil will be in. It will need to be dishwasher safe and be safe around things in a kitchen environment this will be something I will need to think about with the material I will use.

4. Remember, anthropometry is about body measurements, such as body size, shape and strength. What measurements you will need to consider in the design of your kitchen utensil? Include a visual diagram and different percentiles.



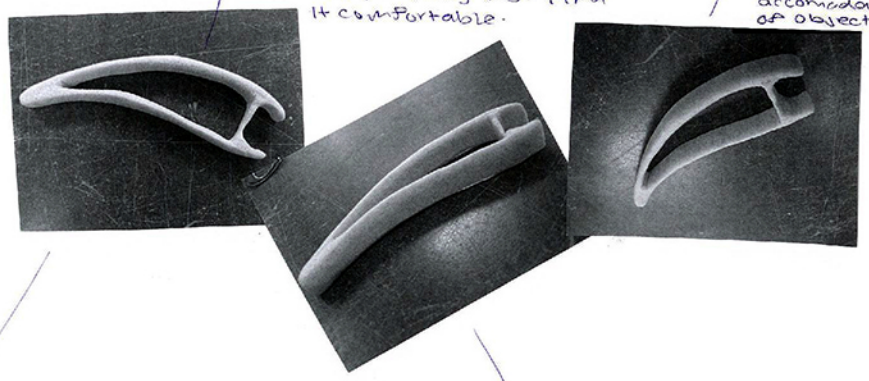
material that has natural grip so there is no need for indentations as they do not suit every hand size.

my handle could be made with wood as it is a safe material in a kitchen environment.

3

indentations
to make my peeler suitble for everyhand size I need to make the sides thicker as it is to thin and bendy so smaller or bigger may not find it comfortable.

width
the width of my peeler must be 5-6 cms to accomodate for peeling a variety of objects.



Material

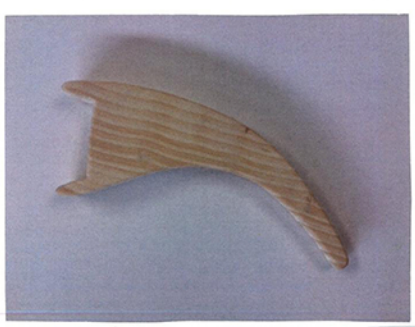
the material of the handle should be a poor conductor of heat and electricity so it doesnt cause uncomfort or harm to the user.

length
the length of my objects should be 173 mm to fit the smallest hand size and to make sure all users can handle the peeler comfortably.

EVALUATION

To create my final utencil I used all steps I had to find the correct hand size so all people could use my utencil, to get this information I used the Anthropometric Data this helped me to find the suitble grip which was precision grip as this was what is best suited for my peeler. By researching Human factors I found the information needed to perfect my utencil which were Indentations, Material and length. these factors all helped me to create my final product. I also had to relate my utencils design to the Design Movement, Art Noveau This was difficult for me as it was hard to design my utencil to this movement. To related the utencil with Art Noveau I used Materials such as wood as they are a natural Material this relates to Art Noveau as this is what the Design Movement is about using Natural and earthy patterns, materials and elements. This was also incorporated in my utencil as I used only curved corners and no sharp objects. The look of the utencil is more important to me as it is the main focus of the Design Movement. I could improve my utencil by adding grip which would add comfort to my utencil.

4



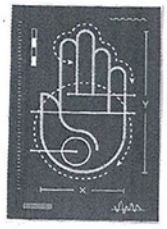
	Grade Boundary: Low Achieved
5.	For Achieved, the student needs to demonstrate understanding of advanced concepts related to human factors in design. This involves: • explaining how statistics and probability are used to establish guiding ratios for anthropometric data and how this and ergonomic aids are used • explaining how customisation allows for user preference and enables ergonomic fit. The student shows some evidence of explaining how different data sets are established from anthropometric measurements and how these determine percentile ranges (1). The student shows research of the precision grip (ergonomic aid) and how this relates to handle design is also explained (1). The prototyping and tests explain how customisation of handle design can allow for comfort and aesthetic appeal (2) (3). Trialling different handle shape possibilities (2) and prototyping (3) is undertaken in the process of customising for user preference and ergonomic fit. For a more secure Achieved, the student's explanation could include more about percentile ranges and how they are used to establish guiding ratios. The link between user groups, ergonomic fit and the customisation of a product should also be explained more clearly.

Human factors

Part one

1. How is anthropometric data collected and translated into a meaningful format that is useful for people such as designers and architects?

When anthropometric data is collected by designers, the data would focus more on particular populations (depending on what is going to be made). The data is collected from children and/or adults. When merging multiple data sets, for anthropometry make sure they share common features, for example units of measurements, the physical condition or age of the subjects measured, etc. You also need to pay attention to the terminology for specific measurements so the data is accurate. The data can be presented chronologically and geographically. Averages of the data evolve over time because of migration, changes in diet, mortality, and other reasons. Data collected in a place or region which is over 50 years old may not apply to a later population in a different location so it may not be beneficial.



2. Why are certain measurements collected to establish particular guiding ratios and where does this information come from?

Measurements of the hand are important because I will need to know the size of my utensil so that people can use the utensil. The measurements of these can be collected from books, websites and existing products.

3. How are guiding ratios established for one product that is to be used by diverse groups?

Guiding ratios of different products are established by the different sizes of width and length, the different hand sizes and this is used for different groups for the 5th percentile, the 50th percentile and the 95th percentile.

4. Why is it important to know the decision making behind the sampling, measuring and the basis on which the guiding ratio has been established?

It is important because if someone with the smallest hand can use the kitchen utensil then a person with the biggest hand will be able to use the kitchen utensil as well.

1

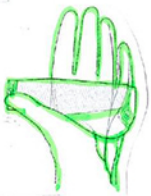
Part Two

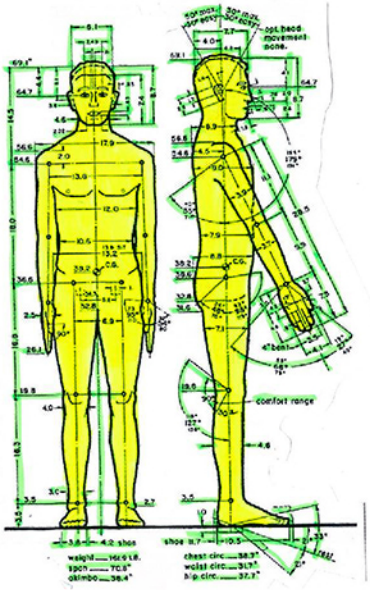
1. What are the two main grips when using hand tools and what is the difference? What grip is required for your kitchen utensil?

The two main grips when using hand tools are the 'power' grip and the 'precision' grip. Power grip is used to hold a hammer, for example, which uses relatively strong muscles in the forearm. Your whole hand wraps around the handle.

A precision grip (or a pinch grip) is used to hold a nail or a pencil, which uses smaller and weaker finger muscles. The item is held between your thumb and index finger. This grip should not be used for tools or actions that require force.

The grip that is required for my kitchen utensil would be the 'power' grip because it uses stronger hand movement in the forearms when using the utensil.





2. What are the three main things that cause discomfort when using hand tools? How could this affect this design of your utensil?

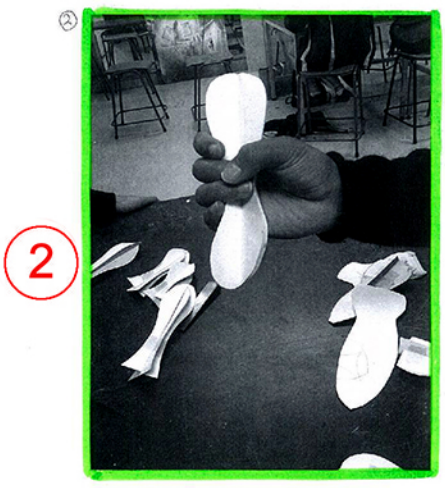
The wrong size i.e. too big or too small, doesn't have good grip, too thick or too thin. These three things can affect the design of the kitchen utensil because if it's not comfortable the use of this utensil wouldn't aid in anyway and it would be hard to work with. I know two things that make hands and wrists uncomfortable- repeated muscle use, which can lead to painful tendons, and excessive bleeding, which causes discomfort and restrict movement. The third factor that can cause discomfort and may lead to injury is the amount of effort or force needed to grip a handle or use a tool.

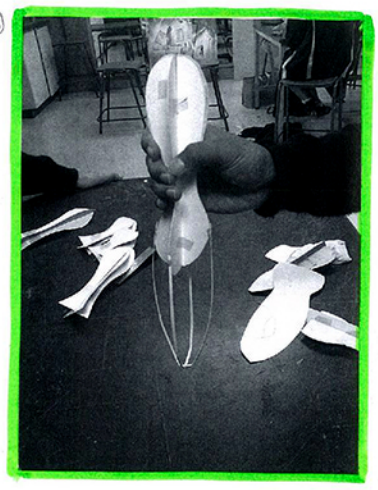
3. What are some important things that you will need to consider in the design of your kitchen utensil and how will this affect your particular utensil?

You will need to have the correct size and the correct measurements for the average person to be able to use it effectively. The design utensil needs to be comfortable to hold and use for people to use so they can use it properly.

4. Remember, anthropometry is about body measurements such as body size, shape, and strength. What measurements will you need to consider in the design of your kitchen utensil? Include a visual diagram and the different percentiles.

You will need hand measurements from the palm to the fingertips, the width of the hand, and you will also need the average hand measurements of people.





Photos

– lines of Plywood, create Pattern and movement.

lines of the plywood make the whisk look visually appealing.

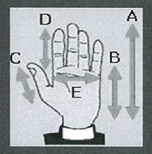
- curved shape makes the whisk comfortable to use. Also can be linked to the characteristics of art noveau.

3

The whisk being used in a bowl.

	Grade Boundary: High Not Achieved
6.	For Achieved, the student needs to demonstrate understanding of advanced concepts related to human factors in design. This involves: • explaining how statistics and probability are used to establish guiding ratios for anthropometric data and how this and ergonomic aids are used • explaining how customisation allows for user preference and enables ergonomic fit. The student explains how they will use anthropometric estimates of hand dimensions for British adults in the design of salad servers (1). They also used the results of functional modelling to help determine grip, size etc (2) (3). To reach Achieved, the student could explain in more detail how the design of a product can be optimised for user preference and ergonomic fit through the analysis of anthropometric data and the use of ergonomic aids, and how this would affect adjustability of a product or an optimised one size fits all product.

1



Anthropometric estimates for British adults aged 19-65 years (in mm, from Pheasant)

Dimension	5th %ile	50th %ile	95th %ile
A Hand length	173	189	205
	159	174	189
B Palm length	98	107	116
	89	97	105
C Thumb length	44	51	58
	40	47	53
D Index finger length	64	72	79
	60	67	74
E Hand breadth	78	87	95
	69	76	83
F Maximum grip diameter	45	52	59
	43	48	53

MALE FEMALE

The measurments that I will need to consider are the weakest in the 5th% because if they can use it anyone will be able to. I will need to consider measurement F because my handle can be no bigger than that. I will also need to consider measurement E because that will be the minimunlength that my handle can be.

For my utensil there is a lot of wrist movement and this can be uncomfortable. To make sure that the utensil doesn't need to be used for a long period of time I would have to make the spoons rather large this means more salad is being picked up at one time. I wiould also have to make sure the material I use isn't too slippery that way not to much force has to be oput into the grip. Ridges would help with this issue.

Important things that I will need to consider in my design are the diameter and thickness of the handles. This helps with not only strenght of the utensil but grip. Something else to consider in relation to grip is ridges so the hands have something to hold onto rather than a stright cylinder. I have to look at length which I will determine from other utensils from the information I have gathered. I will have to consider the weight as I know that the user will only use one hand for each server. The materials will be something to considc rand this will be in relation to weight and shape as in whjether I will be able to achieve the shape I want using the certain material.

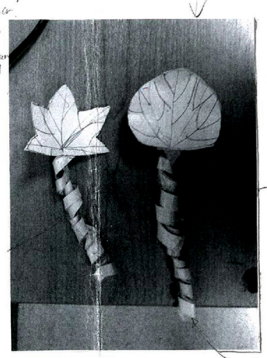
For the salad server I thought that it was a cross over of both grips because the user will need power for scooping but precision for locating object. For this to work I will needn ridges in the handle to make the movements controled and stop the hand from slipping and for power the width of the handle should be a certain thickness.

2

Power grips.

I want to make sure the handle isn't to small and therefore has to be grasped to tightly causing cramp I also don't want it too big and therefore some people are unable to hold it. The measurement I have is for maximum grip between thumb and forefinger I want to also consider thumb and smallest finger. My maximum diameter is 43mm. I think I will like to use a 20mm diameter of my handle.

To make my shape I have decided plastic is the best option. There have been comments about plastic being slippery therefore the ridges will be incorporated. Plastic is the material I will need to achieve the shape and detail in leaves that I want aesthetically.



The shape of the leaves is like a traditional spoon and that will make the aesthetics also practical.

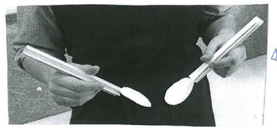
I'm going to make the handles 170mm long and 15mm thick. This is so the persons hands can grip the servers comfortably and without much effort.

I have found that the leaves shall have to be fairly large so excessive use is not needed and the job can be done quicky. Through the data gathered I believe an average breadth of 60mm shall be appropriate I would like a 15mm depth as well for a lot of salad to be picked up at one time.

The grip will be easy because it uses ridges meaning it will compensate for the mentioned slippery plastic. This will decrease amount of force needed in grip.

The use of plastic will also help with the weight issue as plastic is rather light.

Comparing Antropometric Data with Data Collected from Kitchen Utensil Analysis



Changes I made

at started with a 2cm by 17cm handle and was told it was too thin and short. I then tried a 3cm by 24cm handle and was told the length was good by the handle was "like holding a broom" so I went to 2.5cm by 24cm to be told it was still too thick and when I tryed the 2cm width again I was told it was alright.

3

Ergonomic Aids used

- I used cardboard volume models so people could give my their opinion on handle length and width.
- I asked for people to hold the handle and tell me about comfort

From my testing I founds

- That 2cm was a good width and 24cm was a good length.
- I did not find that anthropometric data helped me much as I was only able to establish maximums and minimums I had to discover comfort through many tests.
- I was also given the idea to put a hook on the end of the salad servers so it may hang off a bowl. After playing around with the idea I decided the minor gains were out weighed by the aesthetic costs.