

# Material Research

I am going to look at the properties of different foams, plastics and metals and see which ones are suitable for my design, I am mainly going to be looking at foams, plastics and metals because these are the materials that I am going to use for my cricket helmet design, I am not going to look at any wood type materials because they are not suitable for my material.

## Material research for faceguard

First I am going to research materials for my face guard that must be made out of metal because my questionnaire showed that more people preferred metal faceguards. The properties that I want my materials to have are:

- Hard
- Stiff
- Easily shaped
- High melting point
- High strength
- Malleable/high tensile strength
- Corrosion resistant

Name and melting point	Composition	Properties and working characteristics	Uses
Aluminium 660°C	Pure metal	High strength/ weight ratio, light, soft and ductile (FCC), work hardens in cold state, annealing necessary, difficult to join, non-toxic, good conductor of heat and electricity, corrosion resistant, polishes well.	Kitchen cooking, utensils (pans) packaging, cans, foil window frames.
Steel 1600°C	Alloys of iron and carbon. 0.15-35% carbon	Tough ductile and malleable high tensile strength, easily joined, welded, poor resistance too corrosion, cannot be hardened and tempered, good purpose material.	Nails, screws, nut and bolts girder Car bodies
Polyester resin		Stiff, hard, brittle, good heat and chemical resistance, electrical insulator, resists Ultra-violet light, good outdoors contracts on curing, takes colour well.	Casting, encapsulation, embedding, panels, boats, car bodies, chair shells, containers.

## Evaluation

From these materials that I researched, I looked at which material had the properties that my material must have, I found out that aluminium had most of the properties that my material must have such as high strength, light in weight and corrosion resistant.

Iron didn't have much of the properties I needed because it was a poor resistance to corrosion and couldn't be hardened or tempered even though it was tough ductile and malleable and had a high tensile strength.

## Shock absorbers

For my shock absorber I am going to use thick foam so when the ball hits the helmet with a powerful impact the user doesn't get hurt and doesn't feel much impact of the ball. This is going to be used for the inner side of the helmet.

## Material research for helmet (head protector and visor)

- Resists ultra violet light (visor)
- Hard
- Easily shaped
- Injection moulded

Name and melting point	Properties and working characteristics	Uses
Urea-Formaldehyde	Stiff, strong, brittle, heat resistant, good electronic insulator, wide range of light colours, adhesive (Aerolite).	(White) electrical fittings, domestic appliance parts, adhesives (wood), coating paper, textile.
Melamine- Formaldehyde	Stiff, hard, strong, brittle, scratch resistant, low water absorption, and odourless, stain resistant, resists some chemicals, wide range of colours.	Table wane, decorative laminates for work surfaces, electrical insulation, and buttons.
Polyester resin	Stiff, hard, brittle, good heat and chemical resistance, electrical insulator, resists Ultra-violet light, good outdoors contracts on curing, takes colour well.	Casting, encapsulation, embedding, panels, boats, car bodies, chair shells, containers.

## Evaluation

I researched three different types of plastics for top part of my helmet that is suppose to protect the head of the user. The first material I researched was urea-Formaldehyde, this had some of the properties that were required but it wasn't resistant to ultra-violet light which was no good because the visor must be stop the light from getting into the users eyes. The second material I researched was Melamine- Formaldehyde, this material was very similar to Urea-Formaldehyde and this also wasn't resistant to ultra violet light. Finally I looked at Polyester resin, I found out that this had all of the properties that were required, and it was also resistant to ultra violet light, hard, stiff, strong.



## My helmet is designed to withstand powerful attacks from the cricket ball

The cricket ball is very hard, a cricket ball is a red hard ball that weighs no less than 155.9g and no more than 163g, and it has a minimum measurement of 22.4cm in circumference and a maximum measurement of 22.9cm in circumference. The specifications change for women's cricket and junior cricket, becoming smaller and lighter.

In women's cricket the weight can range from 140g-151g and the circumference from 21cm-22.5cm. In junior cricket the requirement is 133g-144g and 20.5cm-22cm.

The cricket ball is made of leather with a cork core and flax seam.

There are various makes of cricket balls, some makes give you a longer shine on the ball and some have a prouder seam and some are harder wearing such as cricket balls that are made in India.

Hard cricket balls normally don't last very long they get torn and there shape is rearranged after playing with it for quite along time and also the seam will start to tear away, this is due to the ball being hit very hard by the batsman.

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	TITLE: <i>cricket helmet</i>	PAGE NUMBER: