



# MATERIALS FACTSHEET

## Thermoplastics

- Made up of long chains of molecules that are tangled together and have no fixed pattern
- When heated they become soft and can be bent, pressed or formed into different shapes. As they cool they become stiff again.
- This process can be repeated many times.
- Thermoplastics have a “memory” and when reheated will try to return to their original shape. This is known as “plastic memory”
- Examples are acrylic, polyethene, polyvinyl chloride (PVC), high-impact polystyrene (HIPS), acrylonitrile-butadiene-styrene (ABS)

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## Thermosetting plastics

- These are made up from long chains of molecules that are cross linked.
- This means they have a very rigid molecular structure.
- They will soften when heated but only the first time.
- They can be shaped the first time, but then are set due to their rigid molecular structure.
- They cannot be reheated and reshaped like thermoplastics.
- Two examples are polyester resin and urea formaldehyde.

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## Acrylic

### Properties

- Good impact strength (tends not to shatter but to break into large pieces)
- Lightweight
- Good electrical insulator
- durable

### Uses

- Ornamental fish tanks
- Baths and bathroom furniture
- Car indicator covers / reflectors

### Advantages

- Can be recycled
- Excellent environmental stability
- Polishes and finishes well
- Available in numerous colours

### Disadvantages

- Relatively soft
- Scratches easily
- Poor chemical resistance

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## Polyethene

### Properties

- Tough
- Resistant to chemicals
- Soft and flexible
- Good electrical insulator

### Uses

- Drawer bottoms
- Cabinet backs
- Smoothing out uneven floors
- Lightweight internal door cladding

### Advantages

- Cheapest of all manufactured boards

### Disadvantages

- Not very strong as it has no grain

### Aesthetics

- Side very smooth and underside textured

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## Polyvinyl chloride (PVC)

### Properties

- Good chemical resistance
- Weather resistant
- Lightweight
- Good electrical insulator
- Stiff
- Hard
- Tough
- Waterproof
- Durable

### Uses

- Pipes
- Rainwater pipes and guttering
- Bottles
- Shoe soles
- Window frames and fascias
- Water beds
- Swimming pool toys
- Electrical insulation tape

### Advantages

- Can be recycled
- Relatively cheap to manufacture

### Disadvantages

- Very expensive to recycle
- Dangerous fumes given off when burnt

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## High impact polystyrene (HIPS)

### Properties

- Tough
- High impact strength
- Rigid
- Good electrical insulator

### Uses

- Food appliances
- Toys
- Cutlery
- DVD and CD cases

### Advantages

- Available in numerous colours
- Can be machined and painted
- Can be recycled

### Disadvantages

- Expensive
- Limited flexibility
- Will not biodegrade

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## Acrylonitrile-butadiene-styrene (ABS)

### Properties

- High impact strength
- Tough
- Scratch resistant
- Lightweight
- Durable
- Good resistance to chemicals

### Uses

- Kitchenware
- Camera cases
- Toys
- Car components
- Telephone cases

### Advantages

- Available in numerous colours

### Disadvantages

- Relatively expensive when compared to polystyrene



# MATERIALS FACTSHEET

## Polyester Resin

### Properties

- Good electrical insulator
- Hard
- Brittle
- Good heat and chemical resistance
- Resists UV radiation

### Uses

- Casting
- Encapsulation for biological specimens
- Boat hulls with fibreglass
- Model figures
- Adhesives
- Filler materials

### Advantages

- Can be mixed with pigments to achieve a range of colours
- Good resistance to water

### Disadvantages

- Contracts on curing
- Can cause excess heat when too much catalyst is used

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## Urea Formaldehyde

### Properties

- Stiff
- Hard
- Brittle
- Scratch resistant
- Stain resistant
- High tensile strength

### Uses

- Tableware
- Worktop laminates
- Buttons
- Electrical casings

### Advantages

- Can be coloured
- High surface hardness

### Disadvantages

- Toxic fumes given off when it cures.