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Design & Technology
AQA A-Level

Performance characteristics of polymer based sheet and film

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don’t spend too much time on one question

Good luck!

Q1. Which polymer-based sheet is commonly used for model making due to its lightweight and rigid structure?

A Fluted polypropylene

B Foam board

C Cellulose acetate

Q2. What key property makes fluted polypropylene suitable for outdoor signs?

A Flexibility

B Water resistance and durability

C Biodegradability

Q3. Translucent polypropylene sheets are ideal for packaging applications because they:

A Block all light transmission

B Allow partial light transmission

C Are fully transparent

Q4. Which polymer-based material is biodegradable and used for eco-friendly packaging?

A Low-density polyethylene (LDPE)

B Styrofoam

C Polylactide (PLA)

Q5. Name a specific application for the following materials **(3 marks)**

Cellulose acetate

Fluted polypropylene

Styrofoam

Q6. Styrofoam and high-density modelling foam are often used in modelling. Compare and evaluate the suitability of each material for the manufacture of a block model that represents aesthetic appearance to a potential client **(6 marks)**

Q7. Explain why foam board is a suitable material for the manufacture of an architectural model **(4 marks)**

Answers

Q1. B
Q2. B
Q3. B
Q4. C

Q5.
Cellulose acetate:

- overhead projector (OHP) transparency film
- photographic film
- transparent film on packaging.
- biodegradable cutlery

Fluted polypropylene:

- art portfolio cases
- point of sale structures
- signage – eg 'For Sale' signs, construction site signs.

Styrofoam:

- aesthetic block models
- formers for laminating and moulding
- modelling of ergonomic handles.

Q6.

Styrofoam:

- can be easily shaped with workshop tools such as rasps and surforms, allowing for the rapid manufacture of an aesthetic model
- can be sculpted using a hot wire cutter or sculpting bow, creating organic shapes or customised profiles
- can tear/shred and rip if shaped with course abrasive tools or abrasive paper reducing the quality of the surface finish
- the density of the material limits the accuracy in which a hole or recess can be created limiting the complexity of the block model
- models can be coloured to represent an aesthetic model, but cellulose paints can melt the surface of the Styrofoam, so often a Polyfilla coating is needed

- models can be quickly produced allowing for more regular feedback from a potential client.

High-density modelling foam:

- can be shaped with hand tools, but the density of the material limits how effective hand tools can be
- can be easily machined using a CNC router or lathe etc, allowing for quick and accurate manufacture from a CAD drawing
- the density of the material allows for recesses and holes to be accurately produced so features such as screens and buttons could be easily represented on the block model
- the density of the material allows the client to have a more realistic idea of the weight of product when interacting with the model
- the dense nature of the material means that a high-quality surface finish can be achieved, which can then be filled and sprayed to a standard that could represent the aesthetics of the final product to the client.

Q7.

- foam board is a lightweight rigid material that make it suitable for representing walls, roofs and other flat architectural features
- foam board can be easily cut and joined allowing for models to be manufactured without the need for expensive machinery
- foam board is usually supplied in white, making it suitable for architectural models where often decisions regarding colour and external materials are made at a subsequent time
- accurate shapes and voids can be cut out from foam board, allowing various scales of models to be accurately represented.