

LEGO PACKAGING PROJECT

KNOWLEDGE ORGANISER - Y9 DESIGN & TECHNOLOGY

DESIGN BRIEF

Design and make the packaging for a LEGO® mini figure.

Key points:

- ✓ Protect and display the product
- ✓ Attract the target audience
- ✓ Clear, colourful and exciting design
- ✓ Include key symbols and information



WHAT IS PACKAGING?

Packaging is the container or wrapping used to hold, protect, display and sell a product.



Card back
(strong cardboard)

Euro slot
(for hanging)

Blister packaging
(clear plastic)

WHY USE PACKAGING?

- ✓ Protects the product from damage
- ✓ Keeps the product clean and safe
- ✓ Makes the product attractive
- ✓ Gives important information
- ✓ Helps with storage and transport
- ✓ Attracts the right audience to buy it

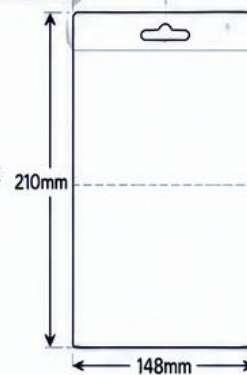
THEME DEVELOPMENT

Choose a theme for your mini figure.



DESIGN REQUIREMENTS

- ✓ Include CE mark
- ✓ Include age rating
- ✓ Include barcode
- ✓ Include BSI Kitemark or Lion Mark
- ✓ Include a logo
- ✓ Colourful, exciting design
- ✓ Fits the mini figure packaging
- ✓ Clear, neat layout



Remember!
Top half is printed.

Fold line
(half way)

PACKAGING SYMBOLS

	CE Mark Shows the product meets European safety standards.		Lion Mark Made in Britain.
	Age Rating Tells the user the suitable age range.		Barcode Used for scanning and pricing.
	BSI Kitemark Shows the product meets British safety standards.		Logo Identifies the brand.

DESIGN PROCESS

1 RESEARCH

- Theme ideas
- Look at real packaging
- Analyse designs



2 DESIGN

- 2D Design (TechSoft)
- Add symbols
- Add colour
- Create layout



3 MAKE

- Vacuum formed plastic shell + card packaging



4 EVALUATE

- Use ACCESSFM
- Identify improvements
- Consider environmental impact



SUCCESSFUL PACKAGING DESIGN...

- ✓ Is eye-catching
- ✓ Clear and easy to read
- ✓ Protects the product
- ✓ Includes all symbols
- ✓ Fits the brand and theme
- ✓ Looks professional

Think like a designer!

TOP TIPS!

- ✓ Use bold colours and clear text
- ✓ Keep the layout balanced
- ✓ Make it exciting for the user
- ✓ Include graphics and images
- ✓ Neat and accurate work
- ✓ Make sure it fits the mini figure!

QUICK CHECK

1. What is blister packaging?
2. Why do products need packaging?
3. What symbols must be included?
4. What is your chosen theme?
5. What makes a packaging design successful?



CAD • CAM • MANUFACTURING

How we design and make our LEGO® minifigure packaging



1 CAD – COMPUTER AIDED DESIGN

CAD is the use of computer software to create, develop and improve product designs.



ADVANTAGES

- ✓ Ideas can be drawn and developed quickly
- ✓ Designs can be viewed from all angles and with a range of materials
- ✓ Testing and consumer feedback can be done before costly production
- ✓ Easier to design and test a range of ideas

DISADVANTAGES

- ✗ Expensive to set up
- ✗ Needs a skilled workforce
- ✗ Difficult to keep up with changing and improving technology
- ✗ Computers can fail

EXAMPLES OF CAD SOFTWARE

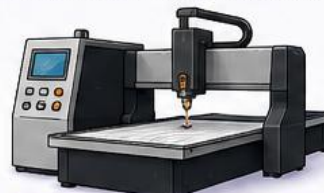
2D TechSoft
2D Design

A AutoCAD

F Fusion 360

2 CAM – COMPUTER AIDED MANUFACTURE

CAM is the use of computer technology and controlled machines to manufacture products accurately and efficiently.



ADVANTAGES

- ✓ Fast and accurate production
- ✓ Machines can run constantly on repetitive tasks
- ✓ Good for mass / flow production lines
- ✓ Less material wastage

DISADVANTAGES

- ✗ Expensive to set up
- ✗ Needs a skilled workforce of engineers
- ✗ Downtime required for maintenance
- ✗ Computers and machines can fail

EXAMPLES OF CAM MACHINES



Laser Cutter



3D Printer



Router (CNC)



Vinyl Cutter

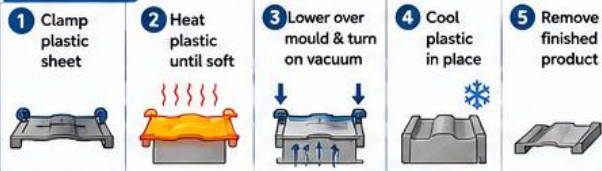


CNC Embroidery

3 VACUUM FORMING – MAKING THE PLASTIC SHELL

Vacuum forming is a process where a heated thermoplastic sheet is shaped over a mould using a vacuum.

THE PROCESS



WHAT PLASTIC IS USED?

Thermoplastics – because they soften when heated and can be reshaped many times.



GOOD MOULDS MUST INCLUDE:

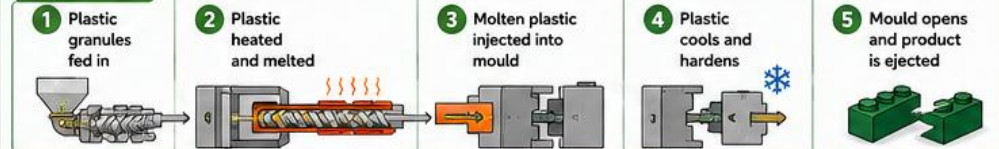
- ✓ Smooth surfaces to prevent marking
- ✓ Draft angles (3–5°) so plastic releases easily
- ✓ Rounded edges to stop tearing
- ✓ Vent holes so air can escape
- ✗ No undercuts (plastic would get stuck)



4 INJECTION MOULDING – MAKING LEGO BRICKS

Injection moulding is a process where molten plastic is injected into a mould, allowed to cool and then ejected as a finished part.

THE PROCESS



FEATURES

- ✓ High accuracy and strong, durable products
- ✓ Ideal for mass production of identical items
- ✓ Used by LEGO® – bricks are made from ABS plastic

ABS PLASTIC (used for LEGO® bricks)

- ✓ High impact resistance
- ✓ Strong and rigid
- ✓ Lightweight
- ✓ Good surface finish



5 MANUFACTURING COMPARISON

FEATURE	VACUUM FORMING	INJECTION MOULDING	KEY DIFFERENCES
What is it used for?	Making hollow shapes and shells (e.g. blister packaging)	Making solid shapes (e.g. LEGO® bricks)	Vacuum forming makes hollow products. Injection moulding makes solid products.
Process	Heats plastic sheet → moulded over → vacuum → cooled → trimmed	Plastic melted → injected into mould → cooled → ejected	Vacuum forming uses suction. Injection uses pressure.
Plastic used	Thermoplastics sheet (e.g. HIPS)	Thermoplastics granules (e.g. ABS)	Both use thermoplastics but in different forms.
Tools / Equipment	Vacuum former, mould, heater	Injection moulding machine, steel mould	Injection moulding machines are more complex.
Production	Lower cost, good for larger thin products	High speed, ideal for mass production	Injection moulding is faster for high volumes.
Product strength	Thinner and less strong	Stronger and more durable	Injection moulding gives stronger parts.
Examples	Blister packaging, food trays, clamshells	LEGO® bricks, bottle caps, containers, toys	Different products suit different processes.

REMEMBER!

- ✓ CAD = design on a computer
- ✓ CAM = make using computer controlled machines
- ✓ CAD comes **BEFORE** CAM
- ✓ Vacuum forming makes the plastic shell that holds the minifigure
- ✓ Injection moulding makes the LEGO® bricks and many other plastic products



DESIGN IT.
MAKE IT.
IMPROVE IT!



PLASTICS & MATERIALS

Choosing the right material for LEGO® packaging



1 TYPES OF PLASTICS

THERMOPLASTICS

(Thermoforming plastics)

Soften when heated and can be reshaped many times.



- ✓ Can be reheated and reshaped
- ✓ Suitable for vacuum forming and injection moulding
- ✓ Recyclable (often)
- ✓ Examples: HIPS, ABS, PET, Acrylic

VS

THERMOSETTING PLASTICS

(Thermosetting plastics)

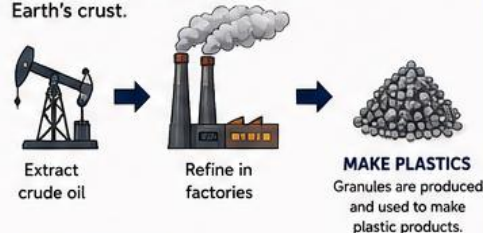
Once heated and set, they cannot be reheated or reshaped.



- ✓ Set permanently when heated
- ✓ Hard, rigid and heat resistant
- ✓ Not suitable for vacuum forming
- ✓ Examples: Melamine, Epoxy resin, Bakelite

PLASTICS ORIGINS

Most plastics are made from crude oil which is found deep within the Earth's crust.



PLASTIC FORMS

GRANULES



SHEETS



MOULDED PRODUCTS



2 COMMON PLASTICS USED

PLASTIC	PROPERTIES	COMMON USES	RECYCLABLE?
HIPS High Impact Polystyrene 	• Tough and strong • Good impact resistance • Lightweight • Easy to vacuum form • Good surface finish	• Blister packaging • Food containers • CD cases • Toy packaging	 HIPS
ABS 	• High impact resistance • Strong and rigid • Durable • Good surface finish • Easy to mould	• LEGO® bricks • Toys • Electronics • Car parts	 ABS
PET Polyethylene Terephthalate 	• Transparent • Lightweight • Strong • Waterproof • Good chemical resistance	• Drink bottles • Food containers • Packaging trays • Clamshells	 PET

3 MATERIAL PROPERTIES

Properties describe the characteristics of a material and help designers choose the best material for a product.

STRONG



Able to hold heavy loads without breaking.

TOUGH



Able to absorb impacts without cracking or breaking.

FLEXIBLE



Can bend or twist without snapping.

RIGID



Stiff and keeps its shape.

LIGHTWEIGHT



Low in weight and easy to carry.

WATERPROOF



Does not let water pass through it.

TRANSPARENT



Clear so you can see through it.

DURABLE



Long-lasting and resistant to wear and damage.

RECYCLABLE



Can be processed and used again to make new products.

HEAT RESISTANT



Can withstand heat without melting or changing shape.

4 CHOOSING THE RIGHT MATERIAL

When choosing a material, designers consider:



Function
Does it do the job needed?



User
Is it safe and suitable for the user?



Cost
Is it affordable to make?



Environment
Can it be recycled or reused?



Manufacture
Can it be made using the right process?

EXAMPLE - LEGO® PACKAGING

The blister (clear plastic shell) is usually made from HIPS.

- ✓ Strong and tough – protects the minifigure from damage.
- ✓ Clear – so the customer can see the product.
- ✓ Lightweight – cheap to transport.
- ✓ Easy to vacuum form – perfect for blister packaging.
- ✓ Can be recycled – better for the environment.



REMEMBER: The best material is the one that meets the needs of the product, the user and the environment.

? QUICK CHECK

1. What is the difference between thermoplastics and thermosetting plastics?
2. Which plastic is used to make LEGO® bricks and why?
3. What are three properties that make a plastic suitable for packaging?
4. Why is HIPS used for blister packaging?
5. What factors should a designer consider when choosing a material?



KEY WORDS

Thermoplastic – a plastic that can be reheated and reshaped.

Thermosetting – a plastic that cannot be reheated or reshaped once set.

Properties – characteristics of a material.

HIPS – High Impact Polystyrene.

ABS – Acrylonitrile Butadiene Styrene.

PET – Polyethylene Terephthalate.





EVALUATION & SUSTAINABILITY

Design better. Make responsibly. Improve always.



Great designers think about people and the planet!

1 PLASTIC PROBLEMS

Why plastic waste is a problem...



POLLUTION

Plastic ends up in landfill, rivers and oceans.



HARM TO WILDLIFE

Animals can get caught in plastic or eat it by mistake.



MICROPLASTICS

Tiny plastic pieces can end up in the food chain.



FOSSIL FUELS

Most plastics are made from non-renewable crude oil.



LONG LASTING

Plastic can take hundreds of years to break down.

2 SOLUTIONS – WHAT CAN WE DO?



REDUCE

Use less plastic. Only use what we need.



REUSE

Use products again and again. (e.g. refillable bottles, bags)



RECYCLE

Sort plastics properly so they can be processed and used again.



CHOOSE BETTER

Use recyclable or recycled materials where possible.



DESIGN SMART

Design products that use less material and are easier to recycle or separate.



EDUCATE

Raise awareness and encourage responsible choices.



Small changes by lots of people = BIG impact!



4 AI IN DESIGN – FRIEND OR FOE?



ADVANTAGES

- Generates lots of ideas quickly
- Helps with inspiration and creativity
- Speeds up the design process
- Can test different variations
- Improves efficiency

DISADVANTAGES

- Ideas may be unrealistic
- Can be inaccurate or unreliable
- May lack human creativity and empathy
- Ethical and copyright concerns
- Over-reliance can reduce skills



THINK! The best designers use it to support their ideas, not replace their own thinking and creativity.

KEY WORDS

Sustainability – designing to reduce harm to the environment and conserve resources.

Evaluate – to judge something by looking at the positives and negatives.

Improvement – making changes to make something better.

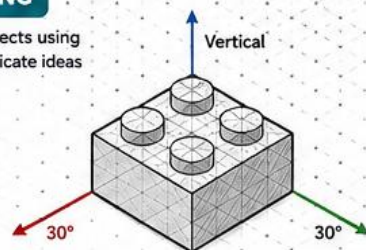
Iteration – making small changes and testing again.

5 ISOMETRIC DRAWING

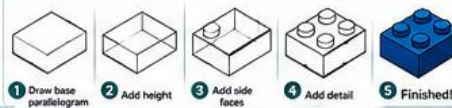
Isometric drawing shows 3D objects using 30° angles. It is used to communicate ideas clearly and professionally.

RULES

- All vertical lines stay vertical.
- Horizontal lines are drawn at 30°.
- Keep lines light and construction neat.
- Use a ruler and pencil.



EXAMPLE – LEGO BRICK



DESIGNER TIP

Think about:

People (user needs)

Planet (environment)

Profit (cost & value)

That's the triple bottom line!



QUICK CHECK

- Why is plastic waste a problem?
- Give three solutions to reduce plastic waste.
- What does each letter of ACCESSFM mean?
- What are two advantages of using AI in design?
- What is isometric drawing used for?

REMEMBER!

Great products are:
Useful, Attractive,
Sustainable and
Well Designed!



3 ACCESS FM – HOW TO EVALUATE YOUR PRODUCT



AESTHETICS

How does it look?
Is it attractive and appealing?



COST

How much does it cost to make?
Is it value for money?



CUSTOMER

Who is it for?
Does it meet their needs?



ENVIRONMENT

What impact does it have?
Is it sustainable?



SIZE

Is the size appropriate for the product and packaging?



SAFETY

Is it safe to use and transport?
Does it include safety info?



FUNCTION

Does it do the job well?
Is it practical and easy to use?



MATERIALS

Are the materials suitable?
Are they strong and appropriate?



6 FINAL EVALUATION – WHAT COULD BE BETTER?

Use these prompts to help you suggest improvements.



Design

Could it be more eye-catching?
Would different colours or images help?



Function

Could it be easier to open or use?
Does it protect the product well?



Materials

Could better materials reduce environmental impact?
Could recycled or recyclable materials be used?



Cost

Can it be made more cheaply without losing quality?
Can less material be used?



Customer

Does it fully meet the needs of the target user?
Would they prefer something different?



Manufacture

Can it be made more efficiently?
Is the process suitable for mass production?



Good designers always look for ways to improve!