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Accessible Controllers

Inspired by Industry · Scalextric

THE BIG PROJECT PICTURE

- You are designing a **Scalextric-style controller** that is easier and more comfortable for a wider range of users.
- You will investigate real controllers — comfort, grip, weight, button placement.
- You will measure hands (**anthropometrics**) and design with the data.
- You will sketch ideas, model them in foam, then make a final model in timber and plastic.
- You will test against an accessibility specification and improve using feedback.

Accessibility is for everyone: it means designing for different hand sizes, strengths, needs and abilities — not just one 'typical' user.

KS3 D&T CURRICULUM LINKS

In this project you are learning to:

- Research real users and their needs
- Develop creative design ideas
- Communicate with sketches and models
- Select suitable materials and tools
- Understand material properties
- Make prototypes safely and accurately
- Test and evaluate against a specification
- Consider impact on people and society

THE DESIGN THINKING CYCLE — YOUR PROJECT JOURNEY

1. EMPATHISE →	2. DEFINE →	3. IDEATE →	4. PROTOTYPE →	5. TEST
Understand different users and the problems controllers cause them.	Decide what your controller must do — build your specification from hand data.	Sketch different controller ideas and annotate the accessibility features.	Make a foam model, then a final model in timber and plastic.	Check comfort, grip, button reach and accessibility with real users.

Iteration: if a test shows a problem, go back a stage, improve, test again. Designers never get it right first time.

KEY VOCABULARY

Key term	Simple meaning	Project link
Accessibility	How easily people with different needs can use a product	The goal: a controller more people can use
Inclusive design	Designing so as many people as possible can use it	Guides grip shape, button size, layout
Ergonomics	Designing products to be comfortable and easy to use	Shapes your grip and button positions
Anthropometrics	Using human body measurements to design	You measure hands and design to fit
Mean average	Add all values ÷ number of values	Turns class hand data into one design size
Prototype	An early model made to test ideas	Your foam model and final model
Low-fidelity model	A quick, cheap, rough test model	Foam model — test size and grip fast
Specification	Measurable points a design must meet	Your accessibility spec — used in testing
Iteration	Improving a design by repeating the cycle	Foam model → feedback → better final model
Feedback	What users say and do when testing	Peer testing tells you what to improve
Annotation	Notes explaining a sketch	Explains features — not just labels
Rendering	Shading/colour to make sketches look 3D and real	Shows form and materials clearly
Grip	How the hand holds the controller	Must suit big, small, left and right hands
Reach	How far fingers/thumb stretch to a control	Buttons must sit within the shortest reach

ANALYSING EXISTING CONTROLLERS — WHAT TO LOOK AT

- **Aesthetics** — does it look appealing? Do colours/contrast help?
- **Comfort & grip** — how does it feel in different hands?
- **Weight & materials** — too heavy? What is it made from?
- **Button placement** — can everything be reached easily?
- **Accessibility** — who would find this hard to use, and why?

FOAM MODELLING — TEST IDEAS FAST

- High-density foam is quick and cheap — perfect for testing size, grip and button positions before timber.
- Mark out with a template → cut the outline (coping saw) → shape (sanding block) → add slots and button holes (Stanley knife).
- Test it in your hand constantly while shaping — the model answers one question: does this fit?

ERGONOMICS & ANTHROPOMETRICS

Ergonomics = designing products to be comfortable and easy to use.
Anthropometrics = using human body measurements to make design decisions.

Measurement	Why it matters
Hand length	Sets overall controller size
Hand width	Sets grip width
Grip diameter	Makes the handle comfortable to hold
Finger reach	Places buttons and triggers within reach

Mean average = add all measurements ÷ number of measurements
e.g. 70 + 75 + 80 + 75 = 300 → 300 ÷ 4 = 75 mm. Designers use the mean so the product fits most users — then check the smallest and largest too.

DESIGNING & SKETCHING

- **2D sketch:** fast flat views to plan layout.
- **3D sketch:** isometric/perspective to show form.
- **Crating:** draw a light 3D box, shape your controller inside it — keeps proportions right.
- **Rendering:** shading + texture to show curves and materials.
- **Annotation:** notes that explain your thinking.

Good annotations explain…

- What the feature does and why it helps the user
- Materials — and why they suit the job
- Size — linked to your hand data
- Comfort and grip shape
- Button placement (within shortest reach)
- Improvements for the next version

Label = names a part. Annotation = explains it.

MATERIALS, TOOLS & SAFETY

Material / tool	Used for	Safety / quality tip
High-density foam	Low-fidelity prototype modelling	Cut on a mat, away from your hand; sand one way for a smooth finish
Coping saw	Cutting curves in foam and thin timber	Clamp work; fingers clear of the blade line; steady strokes
Stanley knife	Slots, trigger recesses, button holes	Mat down, blade away from body, fingers behind blade, retract after use
Sanding block	Smoothing and shaping foam and timber	Work coarse → fine grit for the best finish
Tenon saw	Straight cuts in timber	Use a bench hook; mark out with rule and set square first
Pillar drill	Accurate holes for buttons/fixings	Goggles, hair tied back, work clamped, guard down, permission first
Belt sander	Fast shaping of timber edges	Goggles on; fingers well away; never sand tiny parts on it
Timber (pine/MDF)	Main body of the final controller	Mask on when sanding MDF; choose knot-free pieces
Plastic / acrylic	Buttons, details, customisation	File and sand cut edges — they are sharp; polish for a pro finish
Glue / screws / fixings	Joining the multi-part assembly	Dry-fit before gluing; hot glue burns — take care

TESTING YOUR PROTOTYPE

Test against your accessibility specification, with real users:

- **Comfort** — no ache or strain when held
- **Grip** — secure for large/small, left/right hands
- **Button reach** — every control reached without shifting grip
- **Ease of use** — usable first time, no instructions
- **Size** — matches your class mean measurements
- **Safety** — smooth, rounded edges; no trap points
- **User feedback** — record what testers say AND do

Be honest: a fault you find and explain gains marks. "It looks nice" is not an evaluation.

ACCESS FM — EVALUATION

A — Aesthetics	Does it look appealing? Does contrast help find controls?
C — Cost	Affordable to make? Material wasted?
C — Customer/User	Does it work for users with different needs?
E — Environment	Could materials be reduced, reused, recycled?
S — Size	Does it match your anthropometric data?
S — Safety	Rounded edges? No splinters or traps?
F — Function	Does every control actually work?
M — Materials	Right material in the right place, for a reason?

QUICK RETRIEVAL — ANSWER FROM MEMORY, THEN CHECK

1. What does ergonomics mean?
2. What is anthropometrics?
3. Why do designers use the mean average of hand measurements?
4. What is a low-fidelity prototype, and what is yours made from?
5. What should good annotations explain?
6. Give two safety rules for the Stanley knife.
7. Which two machines need goggles?
8. Why must buttons sit within the shortest finger reach in your data?
9. Why is user feedback more useful than your own opinion?
10. What does the second S in ACCESS FM stand for, and what does it check?