Smarter ways to make

Unit 1 · New and emerging technologies · matches the "Smarter ways to make" lesson slides (about 60 minutes)

Teacher notes for someone teaching this lesson without a Design and Technology background, including a cover or supply teacher standing in for the usual class teacher.

IF YOU ONLY DO ONE THING (RUSHED COVER LESSON)

If you only do one thing: make sure every pupil can say what "CAD" means in their own words before the lesson ends. Computer-aided design: creating and testing designs on screen. Ask two or three pupils to explain it back to you - do not just ask "does that make sense?".

Key facts in plain language

These are the facts this lesson depends on. They are written in plain English, not subject jargon, so you can say them in your own words while you teach.

CAD:
Computer-aided design: creating and testing designs on screen.

CAM:
Computer-aided manufacture: making parts with computer-controlled machines.

Additive:
Building a part up layer by layer, such as 3D printing.

Subtractive:
Removing material from a block, such as milling or laser cutting.

FMS:
Flexible manufacturing system: machines that switch quickly between products.

JIT:
Just-in-time: parts arrive just as they are needed.

Common misconceptions

Drawn from the wrong answers pupils pick in this lesson's own question bank, paired with the explanation that is already written for the right answer.

Pupils may think: "CNC milling" is correct.
Why it is wrong: the correct answer is "3D printing". 3D printing builds the part up layer by layer. The others remove material, so they are subtractive.

Pupils may think: "Designers no longer need any drawing skills" is correct.
Why it is wrong: the correct answer is "Designs can be tested before anything is made". A CAD model acts as a virtual prototype, so fit, strength and appearance can be checked first.

Pupils may think: "Large amounts of money are tied up in stock" is correct.
Why it is wrong: the correct answer is "A late delivery can stop the whole line". With little stock held, one delayed delivery can halt production.

Pupils may think: "Recycling" is correct.
Why it is wrong: the correct answer is "Over-production". The seven wastes are transport, inventory, motion, waiting, over-production, over-processing and defects.

Pupils may think: "Continuous production" is correct.
Why it is wrong: the correct answer is "Flexible manufacturing system". An FMS can be reprogrammed quickly to make small, varied batches or one-offs.

Talking points to follow the slide deck

The slide deck for this lesson follows the usual DT Classroom shape: a retrieval starter, then each key term below in turn, worked examples, exam-style practice, then an exit ticket. Use these lines as you reach each part - they are the same facts as above, just phrased as something you can say out loud.

When the deck reaches "CAD": say — Computer-aided design: creating and testing designs on screen. Ask: "can someone give me an example?"

When the deck reaches "CAM": say — Computer-aided manufacture: making parts with computer-controlled machines. Ask: "can someone give me an example?"

When the deck reaches "Additive": say — Building a part up layer by layer, such as 3D printing. Ask: "can someone give me an example?"

When the deck reaches "Subtractive": say — Removing material from a block, such as milling or laser cutting. Ask: "can someone give me an example?"

When the deck reaches "FMS": say — Flexible manufacturing system: machines that switch quickly between products. Ask: "can someone give me an example?"

When the deck reaches "JIT": say — Just-in-time: parts arrive just as they are needed. Ask: "can someone give me an example?"

Worked answers to this lesson's questions

The same question bank used for this lesson's knowledge organiser self-check and worksheet exam practice. Use this page as the answer key, or cover the right-hand explanation and hand out the questions as a silent task (see the cover lesson box below).

1. Which is an additive process?

a) CNC milling, b) Laser cutting, c) Turning on a lathe, d) 3D printing

Answer: d) 3D printing. 3D printing builds the part up layer by layer. The others remove material, so they are subtractive.

2. Which is an advantage of CAD?

a) Designs can be tested before anything is made, b) Designers no longer need any drawing skills, c) The software is cheap and needs no training, d) Products can be made without any machines

Answer: a) Designs can be tested before anything is made. A CAD model acts as a virtual prototype, so fit, strength and appearance can be checked first.

3. What is the main risk of just-in-time production?

a) Large amounts of money are tied up in stock, b) A late delivery can stop the whole line, c) Warehouses fill up with unsold products, d) Parts go out of date while in storage

Answer: b) A late delivery can stop the whole line. With little stock held, one delayed delivery can halt production.

4. Which of these is one of the seven wastes in lean manufacturing?

a) Recycling, b) Quality control, c) Over-production, d) Staff training

Answer: c) Over-production. The seven wastes are transport, inventory, motion, waiting, over-production, over-processing and defects.

5. A trainer company makes personalised pairs, each one different. Which system suits it best?

a) Continuous production, b) Mass production of standard pairs, c) Just-in-time, d) Flexible manufacturing system

Answer: d) Flexible manufacturing system. An FMS can be reprogrammed quickly to make small, varied batches or one-offs.

READY-TO-RUN COVER LESSON

Project the existing lesson slides as normal; read the key facts and talking points above before the lesson starts.

Low-prep silent task (needs no workshop tools or machinery): write or display the numbered questions above without the "Answer:" line, and have pupils answer them in silence on paper. Mark from the answers above at the end, or next lesson.

If the lesson plan calls for tools, machinery, heat or anything hands-on, do not run that part as a non-specialist cover teacher - set the silent task above instead and leave the practical for the subject teacher. See the general workshop safety guide in the Teachers hub.