G.C.E. O/L Grade 11 ICT · Lesson 6

6.4 ICT in Industries: CAD, CAM, Computerised Machines and Robotics

Syllabus 15.4. Factories and builders use ICT to design and make things quickly and exactly. Architects draw buildings with **CAD**, machines cut and shape parts with **CAM**, and **robots** do heavy, dangerous or repeated work.

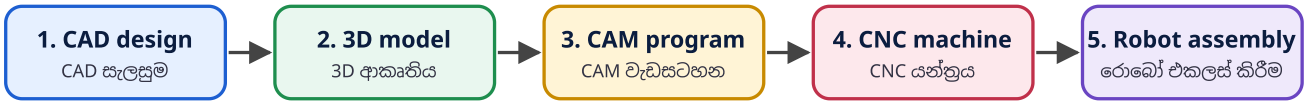
1. CAD – Computer Aided Design

CAD software helps you draw exact plans and **3D models** on a computer. **Architects** use CAD to design houses and buildings. You can turn the model, change sizes in seconds, and walk through the building before it is built. Examples: AutoCAD, SketchUp, Revit.

- Exact measurements, fewer mistakes.
- Easy to change and copy.
- 3D view shows the customer what it will look like.
- Can calculate materials and cost.

2. CAM – Computer Aided Manufacturing

CAM uses the CAD design to control **computerised machines**. A **CNC machine** (Computer Numerical Control) cuts metal, wood or plastic exactly as the program says. **3D printers** build objects layer by layer. Garment factories in Sri Lanka use computer-controlled cutting machines.



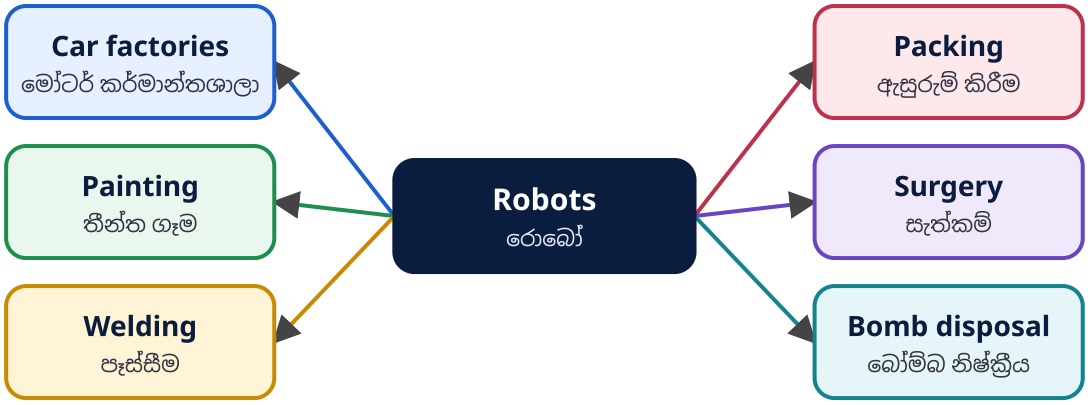
From CAD design to a finished product made by machines and robots.

> 💡 CAD is the drawing. CAM is the making. Remember: D for Design, M for Manufacturing.

3. Robotics

A **robot** is a machine controlled by a computer program that can move and do work by itself. Robots have **sensors** to sense, a **controller** (computer) to decide, and **actuators** (motors, arms, grippers) to act.

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Robots work in factories, hospitals and dangerous places.

Advantages of robots	Disadvantages of robots
Work 24 hours without tiring	High cost to buy and repair
Same high quality every time	Some workers may lose jobs
Safe in dangerous places	Cannot think like people in new situations

NEW 2026 2026: **collaborative robots (cobots)** work safely next to people, **AI** checks products with cameras for faults, and **digital twins** are computer copies of a whole factory used to test changes first. Many factories now use **3D printing** for spare parts.

Key Words

CAD – Using a computer to draw exact designs and 3D models.

CAM – Using a computer to control machines that make products.

Architect – A person who designs buildings.

3D model – A computer drawing with length, width and height that can be turned.

CNC machine – A machine that cuts material exactly by following a program.

3D printer – A machine that builds an object layer by layer.

Computerised machine – Any machine whose work is controlled by a computer.

Robot – A program-controlled machine that moves and works by itself.

Robotics – The study of designing, building and using robots.

Gripper – The hand part of a robot arm that holds things.

Cobot – A robot made to work safely beside people.

Digital twin – A computer copy of a real machine or factory.

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Sample Q&A

1. What is CAD?

> **Answer:** Computer Aided Design: using a computer to draw exact plans and 3D models.

2. How do architects use CAD?

> **Answer:** To draw building plans, make 3D models, change designs quickly and show customers a walk-through.

3. What is CAM?

> **Answer:** Computer Aided Manufacturing: computers control machines that make products from CAD designs.

4. What does a CNC machine do?

> **Answer:** It cuts or shapes metal, wood or plastic exactly as its program says.

5. Name the three main parts of a robot.

> **Answer:** Sensors, a controller (computer) and actuators such as motors and grippers.

6. Give one advantage and one disadvantage of robots.

> **Answer:** Advantage: work 24 hours with the same quality. Disadvantage: high cost or job loss.

MCQ

1. An architect draws a 3D house plan on a computer. This uses

A. CAD
B. LMS
C. MIS
D. CAM

2. A machine cuts metal parts by following a program from the design. This is

A. telemedicine
B. CAM
C. e-learning
D. CAD

3. CNC stands for

A. Central Network Computer
B. Control Number Card
C. Computer Numerical Control
D. Computer New Code

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4. Which builds an object layer by layer?

A. plotter
B. scanner
C. 3D printer
D. laser printer

5. Which job is BEST for a robot?

A. comforting a sad child
B. judging a court case
C. writing a new poem
D. welding car bodies all day

6. The part of a robot that senses the world is the

A. motor
B. gripper
C. sensor
D. battery

7. A disadvantage of robots in factories is

A. they get tired quickly
B. they cannot work at night
C. quality changes every hour
D. some workers may lose jobs

8. A robot built to work safely beside people is a

A. cobot
B. drone
C. chatbot
D. router

9. Which term means: “Using a computer to draw exact designs and 3D models”?

A. 3D printer
B. CAD
C. 3D model
D. Robotics

10. Which term means: “Using a computer to control machines that make products”?

A. CAM
B. CNC machine
C. Gripper
D. Computerised machine

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11. Which term means: “A person who designs buildings”?

A. 3D printer
B. Robot
C. Cobot
D. Architect

12. Which term means: “A computer drawing with length, width and height that can be turned”?

A. Digital twin
B. Computerised machine
C. 3D model
D. Robotics

13. Which term means: “A machine that cuts material exactly by following a program”?

A. CNC machine
B. Gripper
C. Robot
D. CAD

14. Which term means: “A machine that builds an object layer by layer”?

A. CAM
B. 3D printer
C. Cobot
D. Robotics

15. Which term means: “Any machine whose work is controlled by a computer”?

A. Architect
B. Computerised machine
C. Gripper
D. Digital twin

Structured Questions

1. Explain CAD and give two advantages for an architect. *(3 marks)*

> Using a computer to draw designs and 3D models (1); exact measurements (1); easy to change or show a 3D view (1)

2. Give the difference between CAD and CAM. *(2 marks)*

> CAD is for designing (1); CAM is for making with computer-controlled machines (1)

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3. Name two computerised machines used in manufacturing and say what each does. *(4 marks)*

> CNC machine; cuts material exactly; 3D printer; builds objects layer by layer (1 each)

4. Name the three parts of a robot and give one place where robots are used. *(4 marks)*

> Sensors; controller; actuators; e.g. car factory or surgery (1 each)

5. Give two advantages and one disadvantage of using robots. *(3 marks)*

> Work 24 hours (1); same quality or safe in danger (1); high cost or job loss (1)

Summary

- CAD = computer aided design (drawing).
- Architects use CAD for plans and 3D models.
- CAM = computer aided manufacturing (making).
- CNC machines cut exactly; 3D printers build in layers.
- Robot = sensors + controller + actuators.
- Robots suit heavy, dangerous, repeated work.
- Robots cost a lot and can replace some jobs.
- 2026: cobots, AI quality checks, digital twins.

MCQ answer key – 6.4

1. **A** – Design = CAD.
2. **B** – Making by computer = CAM.
3. **C** – CNC machines follow numbers in a program.
4. **C** – 3D printers add layers.
5. **D** – Robots suit repeated, dangerous work.
6. **C** – Sensors give input.
7. **D** – Robots replace some manual jobs.
8. **A** – Cobot = collaborative robot.
9. **B** – CAD – Using a computer to draw exact designs and 3D models.
10. **A** – CAM – Using a computer to control machines that make products.
11. **D** – Architect – A person who designs buildings.
12. **C** – 3D model – A computer drawing with length, width and height that can be turned.
13. **A** – CNC machine – A machine that cuts material exactly by following a program.
14. **B** – 3D printer – A machine that builds an object layer by layer.
15. **B** – Computerised machine – Any machine whose work is controlled by a computer.

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