

## 12-Week OCR Design & Technology Revision Plan

(Aligned to the OCR A Level D&T 2017 Specification — Design Engineering)

### **Week 1 — Core Design Theory & Design Thinking**

#### **Focus:**

Iterative design process

User-centred design

Primary & secondary investigation methods

Problem identification

Needs, wants, and opportunities

#### **Exam-style questions:**

Explain how user-centred design influences the iterative design process (8 marks).

A client requests a redesign of an everyday product. Describe how you would carry out primary and secondary research to inform your design decisions (12 marks).

### **Week 2 — Materials: Properties, Types & Selection**

#### **Focus:**

Timbers, metals, polymers, composites, smart materials

Material testing

Environmental and cost considerations

#### **Exam-style questions:**

Compare the mechanical properties of mild steel and aluminium with reference to specific design applications (10 marks).

Evaluate the use of smart materials in modern consumer products (12 marks).

## **Week 3 — Manufacturing Processes & Techniques**

### **Focus:**

Industrial processes (injection moulding, casting, CNC, extrusion, etc.)

Batch, mass and one-off production

Jigs, fixtures, templates

### **Exam-style questions:**

Describe the injection moulding process and explain why it is suited to mass production (10 marks).

Discuss how jigs and fixtures improve accuracy in batch manufacturing (8 marks).

## **Week 4 — Digital Technologies & Modern Manufacturing**

### **Focus:**

CAD/CAM

Rapid prototyping (3D printing, laser cutting)

Automation, robotics, Industry 4.0

Virtual modelling and simulation

### **Exam-style questions:**

Explain how the integration of CAD/CAM enhances accuracy and consistency in product manufacture (8 marks).

Analyse the impact of automation and robotics on modern manufacturing environments (12 marks).

## **Week 5 — Forces, Motion & Mechanical Systems**

### **Focus:**

Mechanical advantage

Levers, linkages, gears, cams

Stress, strain, loading

Structural considerations

### **Exam-style questions:**

Calculate the mechanical advantage of a gear system with gears of 20 and 40 teeth, explaining your method (8 marks).

Evaluate how load and stress considerations influence material choice for a structural beam (10 marks).

## **Week 6 — Electronics & Systems (where relevant)**

Focus (Design Engineering pathway):

Input, process, output

Microcontrollers

Sensors, actuators

PCB design

### **Exam-style questions:**

Describe how a microcontroller can be programmed to control a motor and LED simultaneously (8 marks).

Analyse the advantages of using sensors in automated product systems (12 marks).

## **Week 7 — Sustainability, Environment & Social Responsibility**

### **Focus:**

Eco-design

Life cycle assessment (LCA)

Circular design philosophies

Carbon footprint, waste reduction

### **Exam-style questions:**

Explain how life cycle assessment (LCA) can be used to evaluate the environmental performance of a product (10 marks).

Discuss the responsibilities of designers in reducing environmental impacts across the full product lifecycle (12 marks).

## **Week 8 — Commercial Manufacturing & Enterprise**

### **Focus:**

Marketing and branding

Costing

Intellectual property (IP)

Quality assurance (QA) and quality control (QC)

### **Exam-style questions:**

Explain the difference between QA and QC with examples from industrial practice (8 marks).

Evaluate how branding affects the commercial success of a new product (12 marks).

## **Week 9 — Human Factors & Ergonomics**

### **Focus:**

Anthropometrics

Ergonomics

Inclusive design

Safety considerations

### **Exam-style questions:**

Describe how anthropometric data informs the design of a handheld device (10 marks).

Analyse the importance of inclusive design in modern product development (12 marks).

## **Week 10 — Prototyping, Modelling & Evaluation**

### **Focus:**

Physical modelling

Rapid prototyping

Testing, user trials

Iteration and refinement

### **Exam-style questions:**

Explain why prototypes are essential when designing complex products (8 marks).

Evaluate the benefits and limitations of rapid prototyping in early design development (12 marks).

## **Week 11 — Exam Preparation: Principles Paper**

### **Focus:**

Short-answer techniques

Extended responses

Structuring arguments using design principles

Data interpretation

**Exam-style questions:**

Analyse the data provided on material stress tests and recommend the most appropriate material for a bicycle frame (20 marks).

Discuss how cultural and social factors influence design aesthetics and commercial success (16 marks).

**Week 12 — Exam Preparation: Problem-Solving Paper**

**Focus:**

Applying knowledge to unfamiliar contexts

Justifying design decisions

Systematic problem solving

Sketching solutions under time pressure

**Exam-style questions:**

A client needs a portable device for storing small tools while climbing ladders. Develop a design proposal, justifying materials, manufacturing methods and human-factor considerations (30 marks).

Evaluate three alternative mechanisms to convert rotary motion into linear motion for an industrial application (20 marks).