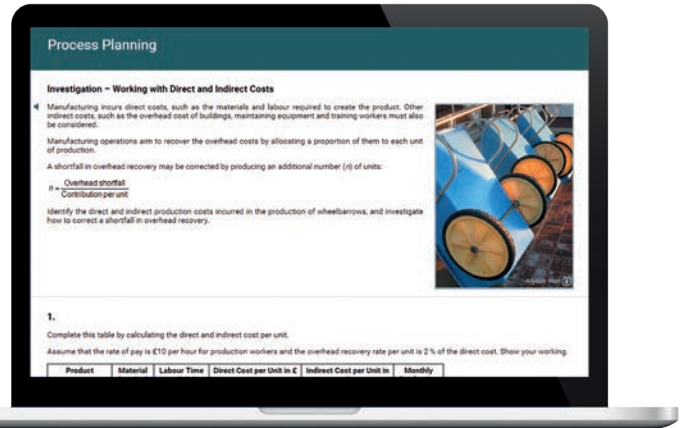


# Basic Manufacturing Technology Engineering

Learn where you want - when you want...

Online lessons that include theory presentations, exciting investigation activities and assessment quizzes.



## Basic Manufacturing Technology - Lesson Examples:



### Arc Welding

#### Mode and Power Source Selection

The arc welding process uses an electric arc from an electrode to melt and join metals. The electrode core metal should have similar properties and strength to the base metals. The electrode coating protects the weld and determines its characteristics. For each of the following welding tasks, refer to the Arc Welding Electrode Selection Chart and select a suitable electrode type, electrode size and power supply rating. Refer to the presentation on this topic if you require assistance.





#### Spiral Staircase

A spiral staircase is to be fabricated using 6 mm mild steel plate, arc welded together. The specification states:

- The weld penetration must be high to give sufficient strength.
- The spatter should be reasonably low to minimise preparation for painting.
- The finish should be very good.

Your company has three models of AC/DC power supply available, with current ratings of 120 A, 150 A and 300 A.



### Machine Tools and Terminology


Machines that carry out manufacturing processes to cut metal can use a range of tools and settings. Identify the effect of cutting radius, common types of chip and suitable material for cutting tools to answer the questions that follow. Refer to the presentation on this topic if you need help.

#### Cutting Radius

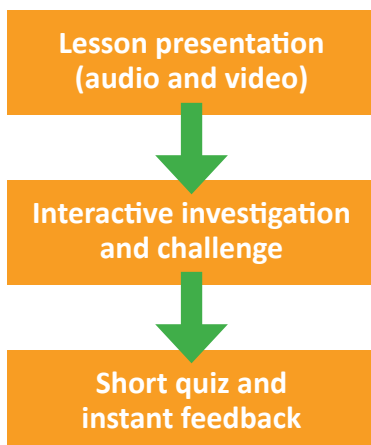
- Create a drawing that compares the effect on a work piece using two single point cutting tools, one with a small cutting radius, the other with a large cutting radius.
- State the different surface finishes that these two examples typically produce.

Show Answer Guide

#### Chip Types

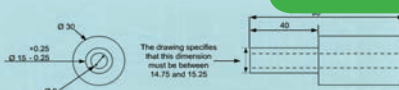


Our tried and tested online learning sequence has been successful around the world:



### Machine Tools and Terminology

#### Dimensional Accuracy



The drawing specifies that this dimension must be between 14.75 and 15.25

	Machine A	Machine B
% of components within tolerance	98.955	99.055


A machine that produces a high percentage tolerances specified is capable of high dimensional accuracy.

Factors that affect dimensional accuracy:

- Quality of the machine and the tool
- Skill of the machine setter and operator

#### Joining with Welding

1 Which of the following is a solid state welding process?



## Engineering Science

- Calculating Work, Power and Efficiency
- Energy, Work and Efficiency
- Mass and Volume Flow Rate
- Material Conversion
- Mechanical Units
- Stress Calculations in Joints
- Stress-Strain Analysis
- Torque and Power
- Transferring Mechanical Energy
- Measuring with a Caliper, Micrometer, or Dial Gauge

## Engineering Materials

- Classification of Materials
- Characteristics of Materials
- Iron and Steel
- Non-Ferrous Metals
- Polymers
- Ceramic and Sintered Materials
- Composite Materials
- Corrosion
- Materials Testing - Hardness and Non-Destructive Testing
- Materials Testing - Tensile and Impact Testing
- Interpretation of Test Results

## Engineering Drawing

- Basic Geometric Construction
- Co-ordinate Systems
- Types of View
- Drawing Standards
- Drawing Analysis
- Sectional Views
- Dimensions
- Drilling and Finishes
- Fluid Power Diagrams
- Machine Elements
- Permanent Connections
- Screws and Threaded Components
- Tolerances and Fits
- Roughness

## Joining

- Joining Procedures
- Screw Connections
- Joining with Glues
- Joining with Soldering
- Joining with Keys and Splines
- Joining with Pins, Bolts and Rivets
- Lapping
- Joining with Threads
- Forces on Threads
- Forces in Threaded Joints
- Formula and Calculation of Tightening Torque

## Manufacturing Processes

- Manufacturing Processes
- Safety and Protective Measures
- Machine Tools and Terminology
- Primary Metal Shaping Processes
- Cutting Metal
- Turning - Processes and Machines
- Determining Data for Turning
- Milling - Processes and Machines
- Determining Data for Milling
- Grinding - Processes and Machines
- Determining Data for Grinding
- Forces on the Cutting Tool
- Cutting and Angles of Cutting
- Cutting Speed for Drilling
- Bending
- Bending Operation Calculations
- Forming Procedures
- Forming Calculations
- Forming - Material Use and Scrap
- Forging
- Honing
- Erosive Manufacturing Processes
- Spark Erosion
- Hard Metal Cutting
- Finishing Processes
- Environmental Protection
- Reading Machine Diagrams

## Welding

- Joining with Welding
- Gas Welding
- Arc Welding
- Gas-Shielded Welding
- Welding Seam Profile and Electrode Requirements

## CNC Programming

- CNC and the Basics of Programming
- CNC Programming for Turning
- CNC Programming for Milling
- Multiple Axis Turning and Milling