Bitesize Applied Manufacturing (Double Award)

Teachers Notes

The Video is 2 hours long and is divided into 3 x 40 minute sections each addressing one of the 3 units:

Unit 1 Design for Product Manufacture

Unit 2 Manufacturing Products

Unit 3 Application of Technology

The video can be shown in full but it would be advised to split it up into the three units and then sub divide it into the sections that pupils are working on. The video would also be a good resource on school intranet systems so that it can be accessed at any time by the students.

The three units cover all aspects of the course and it would be useful to show sections and write questions relating to the units towards the end of the course.

Unit 1 (40 minutes)

About the video-	The video follows a group students studying the course and engaged on an assignment to design a bag with logo to advertise a competition to find new DJ's, the clients are BBC New Talent (talent finding section of the BBC) and 1xtra (radio station aimed at the 14-21 age group). Pupils are engaged in the assignment as product designers and although they are working in this role they need to consider that a portfolio of evidence is required at the end of the project.
Top Tip	Providing a scenario to students is essential but to make it real or at least more realistic providing an element of competition can improve performance. If a real assignment is not feasible then presenting it through an outside agency can provide extra impetus and realism especially where the 'client' should be involved.

Key Words (Useful on a word wall)

Design Brief

Client

End User

Budget

Design Solution

Product Specification

Quality Control

Client Brief

To design a bag and logo to be given away as a promotional gift to raise awareness of a forthcoming event that is aimed at finding a new DJ for the 1Xtra radio station. The bag should: Carry the BBC New Talent Logo

Carry the 1Xtra Logo

Be aimed at young people and be credible

Raise awareness of the competition

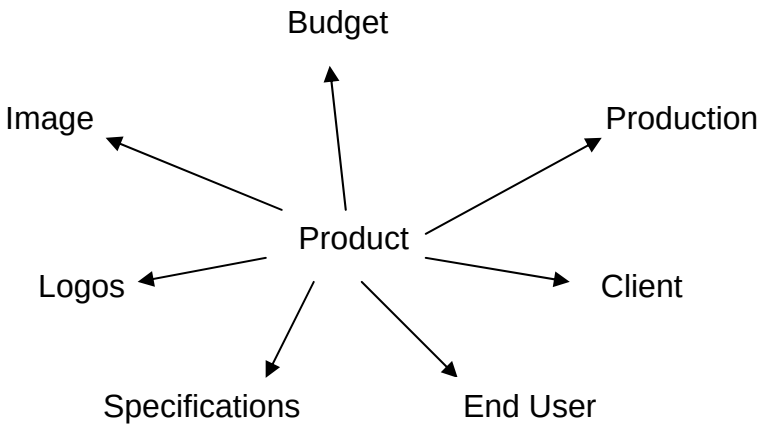
Be useable

Be cool with a WOW factor (where can I get one)

Produce 1,000 units with a budget of £2,000

Analysing the Client Brief

Evidence: Lists or quite simply in the form of a mind map which can be used later to guide research gathering



(Mind map shown here is very basic and needs adding to along with contextualising for individual assignments)

Students should be encouraged to discuss the brief analysing it thoroughly and producing a range of questions that can be used to gather further detail from the client.

Product Specification (developing the client specification)

Evidence:

- Drawings
- Statistical information
- Notes
- Samples
- Photos
- Images

Specifications should be as detailed as possible and to gain the higher grades should be justified (Statement followed by: Why?). The Product Specification should take into account all of the Client Specifications along with other factors that the designer feels is important in the final product written with an industrial production process in mind and should include:

SIZE; WEIGHT; COST; QUANTITY; TIME; QUALITY STANDARDS; AESTHETICS; CONTEXTUAL (where and how it will be used); PERFORMANCE (How will the design function, what must it do).

The Product Specification should be updated as more research is completed and reflect client feedback where appropriate.

Information gathering

Evidence:

- Photographs
- Samples
- Notes
- Visits to factories, designers
- Questionnaires
- Witness statements (to show evidence of group discussions)
- Analysis of similar products is vital preferably with live products not pictures or internet.

Developing Design Ideas

Evidence:

- Mood boards
- Sketches
- Mock ups/prototypes
- CAD/CAM
- Questionnaires/Graphs
- Gant Charts
- Production Plans
- Witness statements

A product or model is not required but many designers use them to show what the final idea will look like and many pupils do enjoy the practical side of the work. Designs should not only reflect the Product Specifications but should definitely meet the Client Brief.

Use of a focus group to test End User views with questionnaires presented with graphs and analysed are higher level activity.

Interim visits by the client can be good bases to set deadlines.

Client feedback

Evidence:

- Questionnaires relating to Client Brief
- Written feedback from client
- Suggestions of modifications
- Redesign/modifications with justification
- Witness statements

Client feedback can be gathered at any time in the production of ideas but must be responded to with justifiable modifications.

Feedback should be gathered and responded to before final presentation

Final Presentation to client

Evidence:

- Photographs
- Prototypes
- CAD/CAM
- Industrial Production Plans (including quality control
- Display Boards
- Power Point presentations
- Spread sheets

The final presentation can take many formats but the evidence must be in the folder.

After completion of the presentation students need to respond to any feedback and improve designs accordingly.

Again it is better to use an outside agency for the presentation and using the competitive element with prizes can be useful.

Main points to remember

- Check spellings
- Check facts
- Sometimes the best ideas are the simplest
- Use as many different methods of presentation and communication as possible
- If it isn't in the folder, you won't get credit for it!!!

Ask yourself who the client is

Manufacturer?

End user?

The person who asked you to design the product?

Unit 2 (30 minutes)

About the video- This section of the video demonstrates how varying companies respond to the demands of production providing detail of:

- Teamwork & Skills (personnel profile)
- Product Planning, Materials & Components
- Processes & Equipment
- Health & Safety, Finish and Delivery

The companies profiled in the video have been selected because they demonstrate: Single Unit; Batch and Mass Manufacture processes although it is necessary to highlight how these tags apply to the businesses because of the complexity of the products produced.

The companies include:

Stewart Webster Luxury Jewellery

Stewart Webster produces a wide range of exclusive jewellery including one off products for specific clients but also limited ranges for specific occasions.

Morgan Motor Company

Morgan Motor Company is a family run business and has manufactured quality sports cars since 1913

Dominos

Dominos service a national franchise of 380 stores supplying a wide range of products many of which are components sourced from suppliers and processed ready for delivery.

Teamwork and Skills

Stewart Webster Luxury Jewellery

- There are 23 employees who comprise of 3 designers and 7 goldsmiths each responsible for creating products, the remainder of the staff are involved in administration; sales and public relations.
- Morgan Motor Company
- Morgan cars employs 164 workers in a wide variety of roles requiring a wide range of skill levels both on the shop floor and in, management and administration roles
- The batch production of cars requires good leadership and logistical skills along with skilled workers that are committed to producing a high quality product
- The company realises that they need to train workers and has a comprehensive recruitment policy that employs apprentices

at 16 years of age training them through colleges providing qualifications and endeavours to instil a sense of ownership within the company

Dominos

- Dominos employs 250 staff who supplying a wide range of products many of which are components sourced from suppliers and processed ready for delivery
- All staff are multi skilled but most skills are low level skills, staff rotate throughout the plant which prevents boredom but also ensures good coverage in case of staff absence
- One person failing to complete tasks on time can effectively shut down the whole process

Product Planning, Materials and Processes

Stewart Webster Luxury Jewellery

- Production plans are essential to successful completion of products to a given deadline that can be between 12-16 weeks.
- Parts and materials have to be in place at the correct time and in the correct place to prevent delays.
- This requires detailed plans and detailed drawings easily understood by other members of the team.

Morgan Motor Company

- Batch production involves construction of 500 cars per year; each car takes 15 days to produce.
- Orders are received electronically from agents; each car is individually specified by customers (colour, trim etc.).
- Each car is allocated a build time and kits are prepared for each car in preparation for the build.
- The kit consists of all the parts and components required for the build and designated for each day.
- Lead times are calculated to ensure that the production plan is adhered to.

Domino

- Each store orders components for their products 3 times per week, if a store does not order it is sent a ‘ghost’ order based on previous orders. Orders are affected by seasonable changes, TV programmes and sporting activities (product aimed at 16-24 age range).
- Factory produces 60,000-90,000 dough balls per week; 6 days per week; ½ million dough balls per year.

- Suppliers are very important and all have to comply with the British Retail Consortium (BRC) to ensure quality.
- Fair trade is a major policy for the company to ensure fair pay and no child exploitation.
- Supplies are tested for weight and quality of produce.

Main points to consider

- Accurate production schedule
- Lead time – time required to produce a complete product fro start to finish
- Appropriate planning reduces time and resource wasting thus increasing profits
- Extra mark are awarded if you explain actions and how they effect the production plan

Processes and Manufacturing

Stewart Webster Luxury Jewellery

- Producing one off products or limited edition products can be very time consuming, time/labour costs a great deal of money in manufacturing
- Producing a master mould is highly skilled and takes a great deal of time. It needs to be exact as any other products made from this mould will be exactly the same

Morgan Motor Company

- It takes 5,000 components in 4 stages to produce one car. Cars are hand crafted using traditional methods with a wooden substructure combined with hi-tech processes and equipment to provide a balance that is desired world wide
- Quality control is vital at each stage to ensure faults are not passed down the line, components are checked prior to installation
- Each car is individual to the client specifications, this needs to be considered at all stages of production, computers are used to test aspects of the quality control

Domino

- There are three stages to the production process: Washing equipment; Manufacturing dough; Chilled area ready for distribution
- All equipment is mechanical and computer controlled providing good quality control but requiring monitoring of the quality control

- Control requires monitoring temperature; weights and presentation each of which is critical to the production and sales of the products

Key Points to Consider

- How many processes are required to produce your product?
- What equipment is required?
- Are all members of the team assigned the appropriate tasks
- Analyse and evaluate the processes. Can they be improved? How? Why?
- Where is quality control important? Why is it necessary? How can it be done?

Health & Safety and Delivery

Stewart Webster Luxury Jewellery

- Health and safety is vital in the workplace, every person is entitled to work in a safe environment and it is the employers responsibility to ensure that workers are subjected to unnecessary risks
- Risk assessments are required at every stage of the process to ensure safe working practices
- First aiders are required on the shop floor, preferably two persons in case one is incapacitated
- Reputations are reliant upon deadlines, in the business world penalties are occurred if they are not met

Morgan Cars

- Protective equipment is vital and should be issued by the employer, risk assessments should start at the top of the head, work down the body all the way down to the soles of the shoes and even the type of flooring in the workshop
- Protective equipment may include specific facilities within the environment such as ventilation, flooring and even positions of the body whilst working

Dominos

- Hygiene is a major hazard in the food industry which requires specific clothing; temperature control; contamination of productions by foreign objects

Top Tips

- Students are expected to set up as manufacturing company consisting of at least four members

- Initial discussions should involve student strengths and weaknesses so that each member if the group is allocated a suitable role.
- Evidence in the portfolio should include a wide variety of media as demonstrated in Unit 1 with detailed production plans demonstrating how processes have evolved through practice
- Setting deadlines can be effective in ensuring deadlines are kept to, rewards and penalties can be awarded
- Risk assessments for each stage of the manufacturing process should be produced by students
- Higher level portfolios will show detailed planning; analytical and evaluative skills explaining why decisions have been made with justification

Key Words (Useful on a word wall)

Process

Materials

Components

Teamwork

Health & Safety

Production Schedule

Franchise

Unit 3

Key Tips for Success featuring:

Coca Cola

Technology in the Food Industry - Cadbury

Use of ICT – Jaguar

Technology in the car industry – Rolls Royce

Use of ICT – Set Top Boxes

Technology in the computer industry – Mesh Computers

Business profile –Barr Soft Drinks

Company profile – Technology in Publishing

Teachers guide to GCSE Manufacturing

Coca Cola

Fact file key terms:

- Just in time
- Computer Aided Design (CAD)
- Computer Aided Manufacture (CAM)
- Franchising
- Assembly
- Bespoke

Franchising/Franchises what is it?

Allowing other companies to manufacture a product/use a brand name in their product but requires strict guidelines in the use of ingredients and company reputation and involves:

- Sales
- Manufacture
- Distribution

Coca Cola produces its products utilising a Just in Time policy which means that the product is produced and distributed as required by the retailers. This prevents the need for products to be stored, saving space and money, and also increases the shelf life of the product.

Technology in the Food Industry - Cadbury

- Cadbury's utilise a wide range of ICT facilities in the process of producing and marketing its products.
- CAD packages to produce 3 'D' photo realistic images
- In testing designs with focus groups the images are far more realistic than prototypes
- Generates feedback from retailers with little outlay
- Easy and quick to make changes to designs and cost effective in accessing further feedback
- Incorporates materials technology in packaging utilising flowrap packaging and replaces foil and band
- Replace processes with modern machinery monitored by computers previously undertaken by hand, processes are faster and the workforce has been cut by 50%
- All manufacturing is completed undercover and quality control is monitored by computer systems

Key Points

- CAD designs
- Fully automated production lines
- A wide variety of technologies utilised throughput the process
- Quality Control ensures a quality product

Use of ICT – Jaguar

- Advanced computer systems employed to produce safe virtual reality environments for testing
- Virtual crash testing to emulate real tests reducing the cost of builds and time
- Alterations to designs can be produced cost and time effectively before real tests are conducted
- Real tests are monitored by computer systems so that data can be analysed more effectively
- Design packages used to enhance sketches and produce more detail
- Much more accuracy and in the right hands much quicker
- Quick and direct links with engineers
- Rapid prototyping CAM systems producing 3'D' realisations and tooling systems

- Systems analysis of production techniques simulating plant management, evaluating the direct effect of changes in production

Technology in the car industry – Rolls Royce

- Robots are utilised widely throughout the Hi-Tech factory to monitor production, construct and finish cars
- Robots are far more accurate, don't require breaks, can work 24/7 and rarely have a day off sick
- Material Replenishment Process (MRP) is monitored by computer systems which run the stock control ensuring that all the parts required for the assembly process are in stock and that the correct components are in the correct part of the plant at the correct time

Key Points

- Recognise how ICT is used for the benefit of the product
- How does technology influence the manufacturing process
- Higher levels requires knowledge of why it is used not just where it is used and showing knowledge of the role of technology in the design and manufacture process
- Show an understanding of the social and moral implications of using technology in industry

Use of ICT – Set Top Boxes (DAEWOO)

- Use of ICT for research
- Questionnaire data is input into data bases to make data analysis quicker and more efficient
- Data bases make it easy to find specific information at the click of a button, when analysing thousands or even millions of items of information this is infinitely quicker than by hand
- Output of information is flexible and a wide variety of media can be utilised

Manufacturing

- Use in stock control – Bill materials
- CAD & CAM – consistently higher quality
- Quality control – Increase customer satisfaction
- Cost – Machines are expensive but speed and reliability offset the initial outlay

Technology in the computer industry – Mesh Computers

- 60% of sales are generated by web orders
- Customers are able to design their own computers which is accessible 24/7 releasing staffing requirements and increases profits
- Very little retail space is required again reducing costs
- Hi Tech security systems with limited access are incorporated to prevent fraud and data protection of personnel details
- Information is available to sales; manufacturing and despatch departments with limited access to customers to follow production and delivery

Key Points

- What type of technologies are employed and why?
- How does it affect the speed of delivery?
- How design is affected and how customers can influence this?
- How it reduces the amount of stock required?
- Why is ICT important?

Business profile –Barr Soft Drinks

- How can computers systems assist in marketing?
- Companies use questionnaires to gather information, this information is inputted into computers for easy analyses
- EPOS data electronically records where products are purchased and can also identify the profile of the persons purchasing the product
- All production lines are fully automated reducing the need for staff
- Production runs 24 hours/day 5 days/week there is down time to change types of bottles; drink and labels
- Automatic guided vehicles are employed to transport pallets
- Set up costs are high but running costs are very low in comparison to high labour intensity factories

Key Points:

- Why is marketing important?
- How is information gathered?
- How is the information analysed?
- What is done with the information once it has been analysed?

Company profile – Technology in Publishing (Closer Design)

- Reader feedback is important and is reflected in the design of the magazine
- Stories are gathered from sources all around the world all electronically sent to the head office
- Due to new technologies in printing the processing time for manufacturing the hard copy of the magazine has been reduced therefore the deadlines for stories has become later making them more current
- The printing process runs from Thursday through until Monday when the magazines are dispatched, this classifies the manufacturing as batch production
- 3 different CAD packages are used to design the page layout
- The magazine is sent electronically to the printers using a process called WAMNET which enable vast amounts of data to be sent securely in seconds

Key Points

- Understand how the application of technology has transformed the printing industry
- It is important to understand how manufactures choose the quality and type of paper used and the implications of this to cost and delivery
- Don't just describe the process, explain why the decisions for manufacture have been made

Teachers Top Tips

Funding	-	Local schools can network and share resources and good practice
Sector	-	Evaluate the experience and enthusiasm of staff and the nature of the local manufacturing industries A wide variety of products and indeed sectors can be studied over the period of the course and then a decision as to which sector is entered for the exam can be made
A* advice	-	Don't make the product too complicated, ensure that all students can access it but also ensure that advanced

		skills activities can be undertaken for pupils able to attain the highest of grades
		Students can be entered for Unit 2 twice, why not do some preliminary work in Year 10 and enter then for Unit three in June Year 10, what have you got to lose?
Progression	-	Try to visit manufacturing companies and colleges of FE that offer progression to inspire student to apply themselves and provide a target to aim for
Learning styles	-	Negotiate with pupils how they would like to provide evidence and provide choice as to the products being manufactured, this will instil an element of ownership within the students resulting in more enjoyment of the subject matter in addition to attainment of higher grades

Cross Curricular Subjects

This section outlines briefly which other subjects relate to the various sections in the video. For more detailed notes access the full teacher's notes section for each Unit

Subjects that are reflected in the whole video:

- GCSE Business studies
- Applied GCSE in Business
- GCSE ICT
- Applied GCSE ICT
- GNVQ ICT
- GCSE Electronics
- Design and Technology: Resistant Materials
  Graphic Products
  Food Technology
  Electronics
  Systems and Control
  Textiles
  Graphics
- Work Related Learning
- Aspects of Citizenship

Unit 1 - Business (all); Resistant Materials; Textiles; Graphics; Systems & Control; Work related learning; ICT (limited).

This section follows a group of students provided with a real design brief and shows how they research; develop and present a product.

- Working with a design brief
- Research and analysis
- Production of detailed and justifiable specifications
- Production of initial ideas
- Development of ideas
- Consulting with clients
- Production of prototypes and mock-ups
- Presenting ideas

Unit 2 - Business (all); Resistant Materials; Textiles; Systems & Control; Work related learning; ICT (all); Food Technology.

This section features: Stuart Webster Jewellery; Morgan Cars and Dominos Pizza.

It profiles the companies which are involved in one off (exclusive); batch and mass production following the manufacturing processes and requirements of the various products from start to finish providing examples of:

- Staff and client profiles
- Manufacturing processes

- Industrial practices
- Reliance on teamwork
- Production planning
- Use of components in manufacture
- Fair-trade
- Quality control
- Use of modern and traditional technologies
- Health & Safety at work
- Importance of meeting deadlines

Unit 3 - GCSE Business studies; Applied GCSE in Business; GCSE ICT; Applied GCSE ICT; GNVQ ICT; GCSE Electronics; Work Related Learning; Aspects of Citizenship;
Design and Technology: Resistant Materials
Graphic Products
Food Technology
Electronics
Systems and Control
Textiles
Graphics

This section profiles a number of companies focusing on how ICT is employed in all aspects of manufacturing outlining the Who's? What's? When's? Where's? and How's? of manufacturing.

Coca Cola

- Demographics
- Advertising and Marketing
- Franchising
- Production and supply
- Environmental issues
- Use of ICT in production and administration

Cadbury's

- Computer Aided Design/Computer Aided Manufacturer
- Brand marketing
- Product development
- Market research
- New materials and processing in packaging
- Efficiency in manufacture
- Social/moral issues of employment
- Quality control

Jaguar

- Use of ICT in design & production
- Virtual reality Health & Safety
- Data analysis
- Computer simulations
- 3’D’ CAD
- Rapid prototyping
- Production simulation and modelling

Rolls Royce

- Multi national businesses
- Robots in manufacturing
- Stock control
- CAM
- Quality control
- Markets

Daewoo

- Marketing-focus groups
- Data analysis
- CAD/CAM
- ICT quality control

Mesh Computers

- Use of components in manufacture
- Use of web sites in sales
- Consequences of using web sales
- Retail costs
- ICT systems & stock control
- ICT security & product tracking
- Data protection

Irn Bru & Tizer

- Marketing, Who? What? Why?
- Advertising media and focus audiences
- Data collection and analysis
- Environmental issues relating to manufacture
- Robots in manufacturing
- Set up/running costs

Closer Magazine

- Use of ICT in communications
- CAD in magazine production
- Product image
- Printing processes
- Material requirements and processing
- Distribution