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| Subject Area : D&T - Product Design | |
| Year Group : 11 | Unit of Work :NEA |
| Half Term : 1 | Skills :  Intro communication of ideas - Use of annotated drawings that explain detailed development or the conceptual stages of designing and help to develop, communicate, record and justify design ideas  Continue annotation - Use of annotated drawings that explain detailed development or the conceptual stages of designing and help to develop, communicate, record and justify design ideas  Hand in ideas - Intro analysis of Ideas to help them explore and develop their own ideas  Development - Students are to design and develop prototypes in response to client wants and needs.  • satisfy the requirements of the brief • respond to client wants and needs • demonstrate innovation • are functional • consider aesthetics • are potentially marketable.  Students should know and understand how to evaluate prototypes and be able to: • reflect critically, responding to feedback when evaluating their own prototypes • suggest modifications to improve them through inception and manufacture • assess if prototypes are fit for purpose.  ***Pupils must evidence this work as part of the recommended 20xA3 page portfolio*** |
| Reasons behind order of topic in this half term | |
| The order of work during the term supports the completion of the NEA portfolio and supporting practical prototype. The natural order of design, from initial design brief through to finished outcome, is followed through terms 1-4. Students are encouraged to meet target deadlines in order to produce work which showcases their true potential. | |

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| Subject Area : D&T - Product Design | |
| Year Group : 11 | Unit of Work : NEA |
| Half Term : 2 | Skills :  Development - Students are to design and develop prototypes in response to client wants and needs.  • satisfy the requirements of the brief • respond to client wants and needs • demonstrate innovation • are functional • consider aesthetics • are potentially marketable.  Students should know and understand how to evaluate prototypes and be able to: • reflect critically, responding to feedback when evaluating their own prototypes • suggest modifications to improve them through inception and manufacture • assess if prototypes are fit for purpose.  Development - continued - demonstrate use of CAD/CAM to create initial models  Development and modelling, use of CAD as communication tool  Development - developed models as a result of previous anthropometric research  Consideration of appropriate materials and components to make a prototype.  How to select and use materials and components  appropriate to the task considering:  • functional need  • cost  • availability.  Demonstrate techniques to pupils to show them how to prepare samples which can be annotated ready for use in the development section of their NEA   * Textile based materials (how to sew, pleat, gather, quilt and pipe). * Direct pupils how to select and use specialist tools and equipment, including hand tools, machinery, digital design & manufacture, appropriate for the material and/or task to complete quality outcomes. * How to use them safely to protect themselves and others from harm. * How to select and use specialist techniques and processes appropriate for the material and/or task and use them to the required level of accuracy in order to complete quality outcomes. * How to use them safely to shape, fabricate and construct a high quality prototype, including techniques such as wastage, addition, deforming and reforming.   Development - consideration of materials, and suitability  Development - consideration of joining methods, manufacturing processes  Final Design - Demonstrate specification drawings - pupils to use specification diagrams to show constructional detail or assembly  Specification/Working Drawings, using dimensions and drawn to scale  Completion of working drawings  ***Pupils must evidence this work as part of the recommended 20xA3 page portfolio***  **Preparation for the Mock examination**- pupils will be guided as to how to successfully answer the examination questions using previous work completed as a recall tool. Pupils will be supported with revision materials, including the opportunity to purchase revision guides, Q&A booklets, revision cards. Access to Focus e-Learning, GCSE Pod, BBC Bite-size.  Core Materials- Q&A work sheets to revise core materials section  Specialist Materials- Q&A worksheets |
| Reasons behind order of topic in this half term | |
| * The order of work during the term supports the completion of the NEA portfolio and supporting practical prototype. The natural order of design, from initial design brief through to finished outcome, is followed through terms 1-4. Students are encouraged to meet target deadlines in order to produce work which showcases their true potential. * Mock examination preparation is the opportunity to revise and recall from topics covered in Year 10. This is necessary in order to prepare for the formal examination. | |

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| Subject Area : D&T - Product Design | |
| Year Group : 11 | Unit of Work : NEA |
| Half Term : 3 | Skills :  Manufacturing Specification  Manufacture of product - scaled to ensure feasibility in time allocated.  Pupils must photograph each stage of the manufacture to create a Diary of Manufacture as homework  Manufacture of product - scaled to ensure feasibility in time allocated.  ***Pupils must evidence this work as part of the recommended 20xA3 page portfolio*** |
| Reasons behind order of topic in this half term | |
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| Subject Area : D&T - Product Design | |
| Year Group : 11 | Unit of Work : NEA |
| Half Term : 4 | Skills :  Pupils must photograph each stage of the manufacture to create a Diary of Manufacture as homework  Evaluation of product against Design Brief and Specification  Testing with client, considerations of modifications both proposed and undertaken  ***Pupils must evidence this work as part of the recommended 20xA3 page portfolio***  **REVISION FOR EXAMINATION** |
| Reasons behind order of topic in this half term | |
| * The order of work during the term supports the completion of the NEA portfolio and supporting practical prototype. * Mock examination preparation is the opportunity to revise and recall from topics covered in Year 10. This is necessary in order to prepare for the formal examination. | |

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| Subject Area : D&T - Product Design | |
| Year Group : 11 | Unit of Work : REVISION FOR EXAMINATION |
| Half Term : 5 | Skills : Revision and preparation for formal examination  Pupils will be supported with revision materials, including a second opportunity to purchase revision guides, Q&A booklets, revision cards. Focus e-Learning, GCSE Pod, BBC Bite-size.  Core Materials- Q&A work sheets to revise core materials section  Specialist Materials- Q&A worksheets  Half Term : 5  Skills :  1.1 New and emerging technologies  INDUSTRY  • The impact of new and emerging technologies on:  • the design and organisation of the workplace including automation and the use of robotics  • buildings and the place of work  • tools and equipment.  ENTERPRISE  • Enterprise based on the development of an effective business innovation:  • crowd funding  • virtual marketing and retail  • co-operatives  • fair trade.  SUSTAINABILITY  • The impact of resource consumption on the planet  • Finite  • non–finite  • disposal of waste.  PEOPLE  • How technology push/market pull affects choice.  • Changing job roles due to the emergence of new ways of working driven by technological change  CULTURE  • Changes in fashion and trends in relation to new and emergent technologies. Respecting people of different faiths and beliefs  SOCIETY  • How products are designed and made to avoid having a negative impact on others:  • design for disabled  • elderly  • different religious groups  ENVIRONMENT  • Positive and negative impacts new products have on the environment:  • continuous improvement  • efficient working  • pollution  • global warming  PRODUCTION TECHNIQUES AND SYSTEMS  • The contemporary and potential future use of:  • automation  • computer aided design (CAD)  • computer aided manufacture (CAM)  • flexible manufacturing systems (FMS)  • just in time (JIT)  • lean manufacturing  HOW THE CRITICAL EVALUATION OF NEW AND EMERGING TECHNOLOGIES INFORMS DESIGN DECISIONS?  • That it is important to consider scenarios from different perspectives and considering:  • planned obsolescence  • design for maintenance  • ethics  • the environment  Skills :  • 1.2 Energy generation and storage  FOSSIL FUELS  How power is generated from:  • coal  • gas  • oil.  Arguments for and against the selection of fossil fuels  NUCLEAR POWER  How nuclear power is generated. Arguments for and against the selection of nuclear power  RENEWABLE ENERGY  How power is generated from:  • wind  • solar  • tidal  • hydro-electrical  • biomass.  ENERGY STORAGE SYSTEMS INCLUDING BATTERIES  • Kinetic pumped storage systems  • Alkaline and re-chargeable batteries.  • 1.3 Developments in new materials  MODERN MATERIALS  Developments made through the invention of new or improved processes eg Graphene, Metal foams and Titanium.  Alterations to perform a particular function eg Coated metals, Liquid Crystal Displays (LCDs) and Nanomaterials.  SMART MATERIALS  That materials can have one or more properties that can be significantly changed in a controlled fashion by external stimuli, such as stress, temperature, moisture, or PH eg shape memory alloys, thermochromic pigments and photochromic pigments  COMPOSITE MATERIALS  That composite materials are produced by combining two or more different materials to create an enhanced material e.g. glass reinforced plastic (GRP) and carbon fibre reinforced plastic (CRP).  TECHNICAL TEXTILES  How fibres can be spun to make enhanced fabrics eg conductive fabrics, fire resistant fabrics, kevlar and microfibres incorporating micro encapsulation.  Skills :  • 1.4 Systems approach to designing  INPUTS  The use of light sensors, temperature sensors, pressure sensors and switches.  PROCESSES  The use of programming microcontrollers as counters, timers and for decision making, to provide functionality to products and processes.  OUTPUTS  The use of buzzers, speakers and lamps, to provide functionality to products and processes.  • 1.5 Mechanical devices  DIFFERENT TYPES OF MOVEMENT  The functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements.  CHANGING MAGNITUDE AND DIRECTION OF FORCE  Levers:  • first order  • second order  • third order  Linkages:  • bell cranks  • push/pull  Rotary systems:  • CAMs and followers  • simple gear trains  • pulleys and belts  Skills :  • 1.6 Materials and their working properties  PAPERS AND BOARDS  Papers including:  • bleed proof  • cartridge paper  • grid  • layout paper  • tracing paper  Boards including:  • corrugated card  • duplex board  • foil lined board  • foam core board  • ink jet card  • solid white board  NATURAL AND MANUFACTURED TIMBERS  Hardwoods including:  • ash  • beech  • mahogany  • oak  • balsa  Softwoods including:  • larch  • pine  • spruce  Manufactured boards including:  • medium density fibreboard (MDF)  • plywood  • chipboard  METALS AND ALLOYS  Ferrous metals including:  • low carbon steel  • cast Iron  • high carbon/tool steel  Non ferrous metals including:  • aluminium  • copper  • tin  • zinc  Alloys including:  • brass  • stainless steel  • high speed steel  POLYMERS  Thermoforming including:  • acrylic (PMMA)  • high impact polystyrene (HIPS)  • high density polythene (HDPE)  • polypropylene (PP)  • polyvinyl chloride (PVC)  • polyethylene terephthalate (PET)  Thermosetting including:  • epoxy resin (ER)  • melamine-formaldehyde (MF)  • phenol formaldehyde (PF)  • polyester resin (PR)  • urea–formaldehyde (UF  TEXTILES  Natural fibres including:  • cotton  • wool  • silk  Synthetic fibres including:  • polyester  • polyamide (nylon)  • elastane (lycra)  Blended and mixed fibres including:  • cotton/polyester  woven including:  • plain weave  Non-woven including:  • bonded fabrics  • felted fabrics  Knitted textiles including:  • knitted fabrics  MATERIAL PROPERTIES  In relation to the main categories outlined above (not the specific materials identified), students should know and understand physical properties such as:  • absorbency (resistance to moisture)  • density  • fusibility  • electrical and thermal conductivity.  In relation to the main categories outlined above (not the specific materials identified), students should know and understand working properties such as:  • strength  • hardness  • toughness  • malleability  • ductility and elasticity.  Skills : 2 Specialist technical principles  In addition to the core technical principles, all students should develop an in-depth knowledge and understanding of the following specialist technical principles:  • selection of materials or components  • forces and stresses  • ecological and social footprint  • sources and origins  • using and working with materials  • stock forms, types and sizes  • scales of production  • specialist techniques and processes  • surface treatments and finishes  2.1 Selection of materials or components  In relation to at least one material category or system, students should be able to select materials and components considering the factors listed below  • Functionality: application of use, ease of working.  • Aesthetics: surface finish, texture and colour.  • Environmental factors: recyclable or reused materials.  • Availability: ease of sourcing and purchase.  • Cost: bulk buying.  • Social factors: social responsibility.  • Cultural factors: sensitive to cultural influences.  • Ethical factors: purchased from ethical sources such as FSC  2.2 Forces and stresses  Materials and objects can be manipulated to resist and work with forces and stresses  Tension, compression, bending, torsion and shear.  Materials can be enhanced to resist and work with forces and stresses to improve functionality  How materials can be reinforced, stiffened or made more flexible: eg lamination, bending, folding, webbing, fabric interfacing.  2.3 Ecological and social footprint  Ecological issues in the design and manufacture of products  Deforestation, mining, drilling and farming.  Mileage of product from raw material source, manufacture, distribution, user location and final disposal.  That carbon is produced during the manufacture of products.  The six Rs  Reduce  Refuse  Re-use  Repair  Recycle  Rethink.  Social issues in the design and manufacture of products  Safe working conditions; reducing oceanic/ atmospheric pollution and reducing the detrimental (negative) impact on others.  2.4 Sources and origins  Primary sources of materials and the main processes involved in converting into workable forms for at least one material area.  • Paper and board (how cellulose fibres are derived from wood and grasses and converted into paper).  • Timber based materials (Seasoning, conversion and creation of manufactured timbers).  • Metal based materials (extraction and refining).  • Polymers (refining crude oil, fractional distillation and cracking).  • Textile based materials (obtaining raw material from animal, chemical and vegetable sources, processing and spinning).  2.5 Using and working with materials  Properties of materials  Students must know and understand how different properties of materials and components are used in commercial products, how properties influence use and how properties affect performance.  Students must know and understand the physical and mechanical properties relevant to commercial  products in their chosen area as follows:  • Papers and boards (flyers/leaflets and card based food packaging).  • Timber based materials (traditional timber children’s toys and flat pack furniture).  • Metal based materials (cooking utensils and hand tools).  • Polymers (polymer seating and electrical fittings).  • Textile based materials (sportswear and furnishings).  • Electronic and mechanical systems (motor vehicles and domestic appliances).  The modification of properties for specific purposes  • Additives to prevent moisture transfer (paper and boards).  • Seasoning to reduce moisture content of timbers (timber based materials).  • Annealing to soften material to improve malleability (metal based materials).  • Stabilisers to resist UV degradation (polymers).  • Flame retardants reduce combustion and fire hazards (textile based materials).  • Photosensitive PCB board in PCB manufacture and anodizing aluminium to improve surface  hardness (electronic and mechanical systems).  How to shape and form using cutting, abrasion and addition  • Papers and boards (how to cut, crease, score, fold and perforate card).  • Timber based materials (how to cut, drill, chisel, sand and plane).  • Metal based materials (how to cut, drill, turn, mill, cast, bronze and weld).  • Polymers (how to cut, drill, cast, deform, print and weld).  • Textile based materials (how to sew, pleat, gather, quilt and pipe).  • Electronic and mechanical systems (how to cut, drill and solder).  Skills :  2.6 Stock forms, types and sizes  Commercially available types and sizes of materials and components.  Papers and boards:  • sheet, roll and ply  • sold by size eg A3, thickness, weight and colour  • standard components eg fasteners, seals and bindings  • cartridge paper and corrugated card.  Timber based materials:  • planks, boards and standard moldings  • sold by length, width, thickness and diameter  • standard components eg woodscrews, hinges, KD fittings.  Metal based materials:  • sheet, rod, bar and tube  • sold by length, width, thickness and diameter  • standard components eg rivets, machine screws, nuts, and bolts.  Polymers:  • sheet, rod, powder, granules, foam and films  • sold by length, width, gauge and diameter  • standard components eg screws, nuts and bolts, hinges.  Textile based materials:  • yarns and fabrics  • sold by roll size, width, weight and ply  • standard components eg zips, press studs, velcro.  Electrical and mechanical components:  • sold by quantity, volt and current rating  • standard components eg E12 resistor series, dual in line IC packages (DIL), microcontrollers (PIC).  2.7 Scales of production  How products are produced in different volumes.  The reasons why different manufacturing methods are used for different production volumes:  • prototype  • batch  • mass  • continuous.  2.8 Specialist techniques and processes  The use of production aids  How to use measurement/reference points,  templates, jigs and patterns where suitable.  Tools, equipment and processes  A range of tools, equipment and processes that can be used to shape, fabricate, construct and assemble  high quality prototypes, as appropriate to the materials and/or components being used including:  wastage, such as:  • die cutting  • perforation  • turning  • sawing  • milling  • drilling  • cutting and shearing  addition, such as:  • brazing  • welding  • lamination  • soldering  • 3D printing  • batik  • sewing  • bonding  • printing  deforming and reforming such as:  • vacuum forming  • creasing  • pressing  • drape forming  • bending  • folding  • blow moulding  • casting  • injection moulding  • extrusion.  How materials are cut shaped and formed to a tolerance  The manufacture to minimum and maximum measurements.  Extracting information on tolerances and using it to control quality and make a prototype.  Commercial processes  Papers and boards (offset lithography and die cutting).  • Timber based materials (routing and turning).  • Metal based materials (milling and casting).  • Polymers (injection molding and extrusion).  • Textile based materials (weaving, dying and printing).  • Electrical and mechanical systems (pick and place assembly and flow soldering).  The application and use of Quality Control to include measurable and quantitative systems used during manufacture  • Papers and boards (registration marks).  • Timber based materials (dimensional accuracy  using go/no go fixture).  • Metal based materials (dimensional accuracy using a depth stop).  • Polymers (dimensional accuracy by selecting correct laser settings).  • Textile based materials (dimensional accuracy checking a repeating print against an original  sample).  • Electrical and mechanical systems (UV exposure, developing and etching times in PCB manufacture).  2.9 Surface treatments and finishes  The preparation and application of treatments and finishes to enhance functional and aesthetic properties.  • Papers and boards (printing, embossing and UV varnishing).  • Timber based materials (painting, varnishing and tanalising).  • Metal based materials (dip coating, powder coating and galvanizing).  • Polymers (polishing, printing and vinyl decals).  • Textile based materials (printing, dyes and stain protection).  • Electronic and mechanical systems (PCB lacquering, and lubrication).  Surface treatments to inhibit corrosion and oxidation.  Reasons behind order of topic in this half term  •  Subject Area : D&T - Product Design  Year Group : 11 Unit of Work : REVISION FOR EXAMINATION  Half Term : 6 Skills : PAST PAPERS and MARK SCHEMES  EXAMINATION  Reasons behind order of topic in this half term  • |
| Reasons behind order of topic in this half term | |
| * Recall and revision for the formal GCSE examination | |