

## <u>SIL – Year 12 into 13 - DESIGN ENGINEERING</u>

## There are 2 parts to your SIL:

- 1. Exploring the key terms below (see below)
- 2. Completing your 10 design ideas (see <a href="https://thomascrosland.wixsite.com/ncb-de/copy-of-11-12-sil">https://thomascrosland.wixsite.com/ncb-de/copy-of-11-12-sil</a>)
- 1) Looking at the 9 sections we have covered this year, you need to ensure you are knowledgeable and skilled enough to succeed in your NEA <u>and</u> in your exam. To review the 9 topics you need to look through the table below and complete a paragraph of knowledge in each area. Those areas that you are unable to or struggle to make comment on are the areas you need to study further.

Ensure each of the areas are <u>explained</u>, with examples demonstrating your depth of knowledge (not those out of the textbook – use your own). Make links to other areas/ topics within the course. See the example below.

You will see this is quite a comprehensive list but it covers the entire subject content. Some of these areas you WILL include in the execution of your NEA - make note of areas you have already made reference to, but also areas that you have missed – these are the areas you will need to include.

Topic area	Explanation of topic area with examples	Links to other topics
User requirements	During the research, design and development of a product, it is key to	Ergonomics/ anthropometrics.
	consider the requirements of the user to ensure the outcome suits them.	User needs.
	Their requirements are a combination of their needs and wants and can	User wants.
	include things such as affordability, sizing, usability or aesthetics.	'Good design'
User needs		
User wants		
Economic considerations		
Market considerations		

Secondary research Stakeholders Qualitative observation Quartitative observation User centred design (UCD) Usability Iterative design SWOT analysis Focus groups Participatory design Feasibility analysis Trend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Throwaway society User interface Software interface Inclusive design Exclusive design Initial concept Product lifecycle Lifecycle assessment Ilequate of the support of the		
Stakeholders Qualitative observation Quantitative observation User centred design (UCD) Usability Usability Usability Usability Usability Participatory design Feasibility analysis Focus groups Feasibility analysis Frend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Productive design User interface Software interface Inclusive design Inclusive design Exclusive design Inclusive design Exclusive design Exclusive design Exclusive design Inclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Primary research	
Qualitative observation Quantitative observation User centred design (UCD) User interface Software interface Inclusive design  Coud iffecycle Inclusive design  Quantitative observation  Quantitative o	·	
Quantitative observation User centred design (UCD) Usability Iterative design SWOT analysis Focus groups Participatory design Feasibility analysis Trend forecasting Crowdfunding Venture capitalists Innovation Ergnonmics Anthropometrics Percentiles Aesthetics Throwaway society User interface Software interface Software interface Inclusive design Exclusive design Exclusive design Exclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Stakeholders	
User centred design (UCD) Usability Iterative design SWOT analysis Focus groups Participatory design Fessibility analysis Trend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Throwaway society User interface Software interface Inclusive design Exclusive design Exclusive design Exclusive design Exclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Qualitative observation	
(UCD)         Usability           Usability         (Iterative design           SWOT analysis         (Iterative design)           Focus groups         (Iterative design)           Participatory design         (Iterative design)           Feasibility analysis         (Iterative design)           Trend forecasting         (Iterative design)           Crowdfunding         (Iterative design)           Venture capitalists         (Iterative design)           Innovation         (Iterative design)           Ergonomics         (Iterative design)           Anthropometrics         (Iterative design)           Percentiles         (Iterative design)           Assthetics         (Iterative design)           Inclusive design         (Iterative design)           Exclusive design         (Iterative design)           Initial concept         (	Quantitative observation	
Usability Iterative design SWOT analysis Focus groups Participatory design Feasibility analysis Trend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Throwaway society User interface Inclusive design Exclusive design Exclusive design Exclusive design Initial concept Product lifecycle Liffecycle assessment Planned obsolescence		
Iterative design SWOT analysis Focus groups Participatory design Feasibility analysis Trend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Throwaway society User interface Software interface Inclusive design Exclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence		
SWOT analysis       60cus groups         Participatory design       60cus groups         Feasibility analysis       60cus groups         Trend forecasting       60cus groups         Crowdfunding       60cus groups         Venture capitalists       60cus groups         Innovation       60cus groups         Ergonomics       60cus groups         Anthropometrics       60cus groups         Percentiles       60cus groups         Aesthetics       60cus groups         Throwaway society       60cus groups         User interface       60cus groups         Software interface       60cus groups         Inclusive design       60cus groups         Exclusive design       60cus groups         Initial concept       70cus groups         Product lifecycle       60cus groups         Lifecycle assessment       60cus groups         Planned obsolescence       60cus groups	Usability	
Focus groups Participatory design Feasibility analysis Trend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Throwaway society User interface Software interface Inclusive design Exclusive design Exclusive design Product lifecycle Lifecycle assessment Planned obsolescence	Iterative design	
Participatory design Feasibility analysis Trend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Throwaway society User interface Software interface Inclusive design Initial concept Product lifecycle Lifecycle Lifecycle Lifecycle assessment Planned obsolescence	SWOT analysis	
Feasibility analysis Trend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Throwaway society User interface Software interface Inclusive design Exclusive design Exclusive design Product lifecycle Lifecycle assessment Planned obsolescence	Focus groups	
Trend forecasting Crowdfunding Venture capitalists Innovation Ergonomics Anthropometrics Percentiles Aesthetics Innowaway society User interface Software interface Inclusive design Intial concept Product lifecycle Lifecycle assessment Planned obsolescence		
CrowdfundingCrowdfundingVenture capitalists1Innovation2Ergonomics4Anthropometrics3Percentiles4Aesthetics5Throwaway society4User interface5Software interface6Inclusive design5Initial concept6Product lifecycle6Lifecycle assessment6Planned obsolescence6		
Venture capitalistsInnovationErgonomicsInnovationAnthropometricsInnovationPercentilesInnovationAestheticsInnovationThrowaway societyInclusive designExclusive designInnitial conceptProduct lifecycleIntitial conceptInclusive descenteInnitial conceptProduct lifecycleInnitial conceptIntifecycle assessmentInnitial conceptPlanned obsolescenceInnitial concept	Trend forecasting	
InnovationInnovationErgonomicsInthropometricsAnthropometricsInthropometricsPercentilesInthropometricsAestheticsInthropometricsUser interfaceInthropometricsSoftware interfaceInthropometricsInclusive designInthropometricsExclusive designInthropometricsInitial conceptInthropometricsProduct lifecycleInthropometricsLifecycle assessmentInthropometricsPlanned obsolescenceInthropometrics		
Ergonomics Anthropometrics Percentiles Aesthetics Throwaway society User interface Software interface Inclusive design Exclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Venture capitalists	
AnthropometricsPercentilesAestheticsThrowaway societyUser interfaceSoftware interfaceInclusive designExclusive designInitial conceptProduct lifecycleLifecycle assessmentPlanned obsolescence	Innovation	
PercentilesAestheticsThrowaway society	Ergonomics	
Aesthetics Throwaway society User interface Software interface Inclusive design Exclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Anthropometrics	
Throwaway society User interface Software interface Inclusive design Exclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Percentiles	
User interfaceSoftware interfaceSoftware interfaceInclusive designExclusive designInitial conceptProduct lifecycleInitial conceptLifecycle assessmentInitial concept	Aesthetics	
Software interface Inclusive design Exclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Throwaway society	
Inclusive design  Exclusive design  Initial concept  Product lifecycle  Lifecycle assessment  Planned obsolescence	User interface	
Exclusive design Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Software interface	
Initial concept Product lifecycle Lifecycle assessment Planned obsolescence	Inclusive design	
Product lifecycle Lifecycle assessment Planned obsolescence		
Lifecycle assessment Planned obsolescence		
Planned obsolescence		
Planned obsolescence	Lifecycle assessment	
Material properties	Material properties	

Standardised components  Printed circuit board  One off production  Batch Production  Mass Production  Continuous Production  J-I-T production  Lean manufacturing  Product disassembly  Environmental considerations
Printed circuit board One off production Batch Production Mass Production Continuous Production J-I-T production Lean manufacturing Product disassembly Environmental considerations
One off production Batch Production Mass Production Continuous Production J-I-T production Lean manufacturing Product disassembly Environmental considerations
Batch Production Mass Production Continuous Production J-I-T production Lean manufacturing Product disassembly Environmental considerations
Mass Production Continuous Production J-I-T production Lean manufacturing Product disassembly Environmental considerations
Continuous Production
J-I-T production  Lean manufacturing  Product disassembly  Environmental considerations
Lean manufacturingLean manufacturingProduct disassemblyImage: Consideration of the
Product disassembly  Environmental considerations
Environmental considerations Considerations
considerations
Social considerations Social considerations
Moral issues
Cultural issues Cultural issues
Design styles
Marketing
Branding
Marketing Mix (4Ps)
SAVE marketing approach
Inbound marketing
Outbound marketing
Standardised
components
Product evolution
Artificial intelligence
Adaptative manufacture
Subtractive manufacture
James Watt
Isambard Kingdom
Brunell Control of the Control of th
James Dyson

	1
Product lifecycle stages	
Unique selling point	
(USP)	
Social Media Marketing	
eWOM	
Blue sky thinking	
Incremental innovation	
Social footprint	
Ecological footprint	
Natural materials	
Synthetic materials	
Metals (ferrous, non-	
ferrous and alloy)	
Timbers (hardwood and	
softwood)	
Manufactured boards	
Polymers (thermo and	
thermo setting)	
Biopolymers	
Smart materials (think	
xxxxxx chromic)	
Modern materials	
Composite materials	
Papers and boards	
Fabrics/ textiles	
Energy sources	
Circular economy	
Linear economy	
Internet of things (IoT)	
The EU Renewable	
Energy Directive	
FSC	

Deforestation	
Scales of production	
System compatibility	
Machinery maintenance	
End of life support	
Environmental impact of	
materials	
Greenhouse effect	
Sustainability	
Fairtrade	
Globalisation	
Optimisation	
Eco-materials Eco-materials	
Stock size	
Material selection	
Intellectual property	
Registered designs	
Trademarks	
Copyright	
Design rights	
Patents	
Voltage	
Current	
Annotation	
Generative design	
Flowcharts	
Opinion tree	
System diagram	
Tolerance	
CAD	
CAM	
CAE	

Т	
Project management	
Gantt Chart	
Critical path analysis	
Functional performance	
Costs	
Cost vs performance	
Material characteristics	
vs material properties	
The 6 R's	
Standardised tests	
Geotextiles	
Force extension graph	
Super alloys	
High performance alloys	
Nano materials	
Shape memory alloys	
Shape memory polymers	
Density	
Tensile strength	
Strength-to-weight	
Hardness	
Durability	
Thermal conductivity	
Electrical conductivity	
Corrosion resistance	
Stiffness	
Elasticity	
Plasticity	
Impact resistance	
(toughness)	
Brittleness	
Malleability	

Ductility	
Machinability	
Compressive strength	
Tensile strength	
Structural integrity	
Sacrificial parts	
Triangulation	
Material protection	
Shape shifting materials	
Viscosity	
Magnetorheological fluid	
Microcontroller	
Actuator	
Digital signal	
Analogue signal	
Input device	
Output device	
Basic Machine Principal	
Motion types	
Levers	
Compound levers	
Linkages	
Gears	
Compound gears	
Chain and sprocket	
Belt and pulley	
Cams	
Screw threads	
Bearings	
Efficiency	
Mass	
Weight	

Static forces	
Dynamic forces	
Youngs Modulus	
Resistors	
Inputs	
Battery capacity	
Sensors	
Outputs	
MOSFETs	
Open electronic systems	
Closed electronic systems	
Pneumatics	
Rapid prototyping	
Wastage/ subtractive	
manufacture	
Jig	
Template	
Additive manufacture	
Knock down fittings	
Metal Casting methods	
Sheet metal processes	
Metal joining	
Timber joining	
Polymer joining	
Tolerance	
CNC production	
Measuring instruments	
Polymer forming	
methods	
Design for Manufacture	
and Assembly (DFMA)	

Quick response manufacturing (QRM)  Lead time  Fully automated manufacture  Direct digital manufacturing (DDM)  Computerised stock control  Repetitive flow production  Total quality
Lead time  Fully automated manufacture  Direct digital manufacturing (DDM)  Computerised stock control  Repetitive flow production
Fully automated manufacture  Direct digital manufacturing (DDM)  Computerised stock control  Repetitive flow production
manufacture  Direct digital manufacturing (DDM)  Computerised stock control  Repetitive flow production
Direct digital manufacturing (DDM)  Computerised stock control  Repetitive flow production
manufacturing (DDM)  Computerised stock control  Repetitive flow production
Computerised stock control  Repetitive flow production
control  Repetitive flow production
Repetitive flow production
production
,
Total quality
Total quality
management (TQM)
Quality Control
Quality Assurance
British Standards (BSI)
European Standards (CE)
Commercial viability
Design fixation
Destructive testing
Non-destructive testing
COSHH (2002)
PPE
Risk Assessment
Health and Safety at
Work act (1974)
Consumer Rights Act
(2015)
Trade Descriptions Act
(1968)
Consumer Protection Act
(1978)