
Overview

This unit recognises, in addition to your technical competence as a designer, the paramount importance of health, safety and welfare requirements and environmental sustainability issues. It is about ensuring that all aspects of the production and installation design are integrated. You must understand the overall design approach, and be able to apply agreed techniques that will produce a holistic design that is coherent and consistent. It is about deciding what materials, components and systems will make up the finished product. You must have a sound knowledge of the available options, and be able to make informed choices.

This unit will challenge your technical competence. It is about producing the details of the design. It is about agreeing with stakeholders what you have done so far. You must be able to report on progress to date, justify the decisions that you have taken, and gain the trust and support of stakeholders for the next phase of the work.

It is also about identifying the hazards arising from the design, eliminating them where possible, and minimising the risks arising from the residual hazards. For the purposes of this Unit, a hazard is something with the potential to cause harm, and a risk is the likelihood of harm being caused, and the degree of its severity. The strategy for managing risk uses a hierarchy of eliminate/reduce/inform/control. You must be able to identify hazards associated with the design, eliminate them where possible, and inform people about the residual risks.

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Produce and recommend detailed design solutions in built environment design

Performance criteria

Confirm the purpose, methods and techniques for preparing detailed design solutions

You must be able to:

- P1 confirm the purpose of production and installation information and the format to be used appropriate to the project stage
- P2 identify and confirm the aspects of the overall project design which interact with each other and which require production and installation information
- P3 maintain coherence and consistency between the production and installation solutions and the overall design concept
- P4 apply agreed techniques for investigating, calculating, testing, developing and specifying production and installation solutions

Confirm and select materials, components and systems

You must be able to:

- P5 investigate the production and installation requirements which are significant to the overall design
- P6 confirm the priorities for the production and installation requirements of the agreed design relevant to the project stage
- P7 select materials, components and systems which meet the identified production and installation requirements and standards and guidance
- P8 assess whether existing design solutions which contain similar production and installation requirements might be relevant
- P9 agree the solutions which best meet the significant production and installation requirements, and keep records of them for the project team

Produce and recommend detailed design solutions

You must be able to:

- P10 identify, and confirm the technical, environmental, production and installation factors and data which will influence the production and installation solutions, and seek guidance where required
- P11 agree design parameters for selecting and producing production and installation solutions appropriate to the project stage
- P12 produce production and installation solutions by applying agreed design parameters

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- P13 record the data from calculations, investigations and analyses and pass them on for checking
- P14 check the production and installation solutions against relevant technical, environmental, production and installation factors
- P15 justify the features and benefits of the recommended production and installation solutions
- P16 provide decision makers with relevant and accurate information at the right time and agree production and installation solutions
- P17 maintain records of production and installation solutions

Make design choices to address health and safety hazards and risks

You must be able to:

- P18 collaborate with interested parties to ensure the compliance of designs with relevant health and safety regulations and legal framework
- P19 identify operations and individual activities that may give rise to hazards
- P20 identify and prioritise the hazards arising from operations and individual activities
- P21 obtain accurate information on any potential consequences resulting from the hazards
- P22 assess the hazards to identify risks on an iterative basis throughout the development process
- P23 eliminate identified hazards whilst developing and modifying production and installation solutions
- P24 reduce identified levels of risk arising from hazards that are not eliminated when developing and modifying production and installation information
- P25 identify collective and individual measures for reducing levels of risk
record in design documentation any information needed by interested parties so that they can comply with their duties under relevant health and safety regulations

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Knowledge and understanding

You need to know and understand:

Confirm the purpose, methods and techniques for preparing detailed designs

- K1 how to confirm the purpose of production and installation information and the format to be used appropriate to the project stage (application)
- K2 how to identify which aspects of the overall project design interact with each other and require production and installation information (understanding)
- K3 how to confirm which aspects of the overall project design interact with each other and require production and installation information (application)
- K4 how and why to maintain coherence and consistency between the production and installation solutions and the overall design concept (synthesis)
- K5 how to apply agreed techniques for investigating, calculating, testing, developing and specifying production and installation solutions (application)

You need to know and understand:

Confirm and select materials, components and systems

- K6 how and why to investigate the production and installation requirements which are significant to the overall design (analysis)
- K7 how to confirm the priorities for the production and installation requirements of the agreed design relevant to the project stage (application)
- K8 how and why to select materials, components and systems which meet the identified production and installation requirements and standards and guidance (evaluation)
- K9 how and why to assess whether existing design solutions which contain similar production and installation requirements might be relevant (analysis)
- K10 how and why to agree the solutions which best meet the significant production and installation requirements (evaluation)
- K11 how to keep records of solutions that best meet the significant production and installation requirements (application)

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You need to know and understand:

Produce and recommend detailed design solutions/production and installation solutions

- K12 how to identify the technical, environmental, production and installation factors and data which will influence the production and installation solutions (understanding)
- K13 how to confirm the technical, environmental, production and installation factors and data which will influence the production and installation solutions, and seek guidance where required (application)
- K14 how and why to agree design parameters for selecting and producing production and installation solutions appropriate to the project stage (evaluation)
- K15 how to produce production and installation solutions by applying the agreed design parameters (application)
- K16 how to record and pass on the data from calculations, investigations and analyses (application)
- K17 how to check the production and installation solutions against relevant factors (application)
- K18 how and why to justify the features and benefits of the recommended production and installation solutions (evaluation)
- K19 how to provide relevant and accurate information to decision makers (application)
- K20 how and why to agree production and installation solutions (evaluation)
- K21 how to maintain records of production and installation solutions (application)

You need to know and understand:

Make design choices to address health and safety hazards and risks

- K22 how and why to collaborate with interested parties to ensure the compliance of designs with relevant health and safety regulations and legal framework (synthesis)
- K23 how to identify operations and individual activities that may give rise to hazards (understanding)
- K24 how to identify as hazards arising from operations and individual activities (understanding)
- K25 how and why to prioritise the hazards arising from operations and individual activities (analysis)

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- K26 how to obtain accurate information on any potential consequences resulting from the hazards (application)
- K27 how and why to assess the hazards to identify risks on an iterative basis throughout the development process (analysis)
- K28 how to eliminate identified hazards whilst developing and modifying production and installation solutions (application)
- K29 how to reduce identified levels of risk arising from hazards that are not eliminated when developing and modifying production and installation information (application)
- K30 how to identify collective and individual measures for reducing levels of risk (understanding)
- K31 how to record in design documentation any information needed by interested parties so that they can comply with their duties under relevant health and safety regulations(application)

Additional Information

Scope/range

Confirm the purpose, methods and techniques for preparing detailed designs solutions

1. Format:

- 1.1. in writing
- 1.2. graphically
- 1.3. electronically

2. Project stages:

- 2.1. Stage 4 (Design)
- 2.2. Stage 5 (Build and Commission)

3. Aspects of the overall project design:

- 3.1. location and size
- 3.2. assembly and construction
- 3.3. components and systems
- 3.4. environmental assessment objectives

4. Maintain coherence and consistency:

- 4.1. visual performance
- 4.2. technical performance
- 4.3. operation and maintenance
- 4.4. requirements of relevant legislation and codes
- 4.5. cost
- 4.6. health and safety
- 4.7. environmental quality and sustainability
- 4.8. buildability/disassembly
- 4.9. value management
- 4.10. concurrent design and construction
- 4.11. comparison of costs of new and renewable energy systems in buildings
- 4.12. building services systems & controls
- 4.13. minimise thermal bridging and air leakage
- 4.14. minimise emissions and waste
- 4.15. water usage
- 4.16. energy use (U Value Calculations, Building Energy Assessment, Carbon Rating)
- 4.17. protect archaeological and historically valuable resources
- 4.18. carbon footprint

5. Techniques:

- 5.1. data research
- 5.2. conformity with regulations
- 5.3. specialist guidance and good practice
- 5.4. relevant previous solutions and feedback
- 5.5. computer modelling
- 5.6. Building Information Modelling
- 5.7. survey and investigation
- 5.8. performance dynamic modelling

Confirm and select materials, components and systems

6. Production and installation requirements:

- 6.1. construction requirements and compatibility with site constraints
- 6.2. adaptation of existing structural elements
- 6.3. practicality, buildability and disassembly
- 6.4. standardisation and component co-ordination
- 6.5. production and installation processes, scheduling, lead-in times, construction programming/sequencing and quality control
- 6.6. expertise including experienced crafts people
- 6.7. fit and tolerances
- 6.8. production resources availability and performance
(plant/equipment/people/skills)
- 6.9. materials, components and systems availability and capability
- 6.10. strategies to address interface issues on and off-site
- 6.11. access/transportation/traffic management
- 6.12. health and safety
- 6.13. system commissioning
- 6.14. operation and maintenance information

7. Project Stage:

- 7.1. Stage 4 (Design)
- 7.2. Stage 5 (Build and Commission)

8. Standards and guidance:

- 8.1. British Standards
- 8.2. Assessment Schemes
- 8.3. codes of practice

- 8.4. BBA Certificates
- 8.5. EU Standards
- 8.6. trade and industry advisory guidance publications
- 8.7. client standards

Produce and recommend detailed design solutions

9. Technical factors:

- 9.1. structural forms
- 9.2. materials and component performance standards and fitness for purpose (form, performance, appearance, availability, sustainability, efficiency of use, component life, durability)
- 9.3. available and projected technology (including renewable energy)
- 9.4. prefabricated components and system options
- 9.5. performance, quality, operation and maintenance requirements
- 9.6. building physics (energy performance of structures, insulation, fire protection)
- 9.7. materials form, performance, appearance, availability, sustainability, efficiency of use
- 9.8. building services integration and control

10. Environmental factors:

- 10.1. local ecology
- 10.2. hydrology (tides and currents and flood risk)
- 10.3. water use
- 10.4. exposure/shelter/shading
- 10.5. heating, ventilation and cooling (solar gain, temperature range, natural ventilation, thermal and ventilation performance, thermal flows)
- 10.6. thermal properties (heat loss and SAP variables, U values, thermal bridging, air tightness)
- 10.7. daylight and illumination
- 10.8. acoustics
- 10.9. energy & natural resource use and management
- 10.10. interaction of users and buildings,
- 10.11. carbon (embodied and in-use) and carbon rating
- 10.12. resource/waste management
- 10.13. pollution risk and reduction of emissions and waste

11. Production and installation factors:

- 11.1. construction requirements and compatibility with site constraints
- 11.2. adaptation of existing structural elements
- 11.3. practicality, buildability and disassembly
- 11.4. standardisation and component co-ordination
- 11.5. production and installation processes, scheduling, lead-in times, construction programming/sequencing and quality control
- 11.6. expertise including experienced crafts people
- 11.7. fit and tolerances
- 11.8. production resources availability and performance (plant/equipment/people/skills)
- 11.9. materials, components and systems availability and capability
- 11.10. strategies to address interface issues on and off-site
- 11.11. access/transportation/traffic management
- 11.12. health and safety
- 11.13. system commissioning
- 11.14. operation and maintenance information

12. Data:

- 12.1. identified construction criteria
- 12.2. existing detailed design solutions

13. Design parameters:

- 13.1. client, user and community requirements, expectations, options and preferences
- 13.2. project type/purpose/use
- 13.3. site, location and surrounding environment
- 13.4. geology (seismology, ground movements and soil type)
- 13.5. transport and infrastructure
- 13.6. planning, urban & social integration
- 13.7. design form (architectural, structural, civil, services)
- 13.8. design quality (character/scale/aesthetics)
- 13.9. function/spatial planning (occupancy/room information/access and egress incl. DDA, security)
- 13.10. programme budget
- 13.11. cost (including whole life)

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- 13.12.development timetable
- 13.13.risk assessment and mitigation
- 13.14.cost planning (including life cycle cost) and value management
- 13.15.procurement
- 13.16.in-use performance
- 13.17.environmental quality and sustainability
- 13.18.environmental assessment/certification schemes
- 13.19.protection of archaeological, architectural, cultural and historically valuable resources (significance/status)
- 13.20.statutory, regulatory and legal constraints
- 13.21.standards and codes of practice
- 13.22.health and safety
- 13.23.form, function, materials, components and systems
- 13.24.loose fit design - for flexibility/adaptability/deconstruction/disassembly
- 13.25.buildability
- 13.26.operation and maintenance

14. Project Stage:

- 14.1. Stage 4 (Design)
- 14.2. Stage 5 (Build and Commission)

15. Calculations:

- 15.1. manual
- 15.2. computer aided

16. Investigations:

- 16.1. data research
- 16.2. survey
- 16.3. conformity with regulations
- 16.4. specialist guidance and good practice
- 16.5. relevant previous solutions and feedback
- 16.6. computer/simulation modelling
- 16.7. calculation
- 16.8. Building Information Modelling
- 16.9. computer aided analysis

17. Justify - by using:

- 17.1. sketches
- 17.2. drawings
- 17.3. physical models
- 17.4. computer models
- 17.5. diagrams
- 17.6. calculations
- 17.7. written reports
- 17.8. cost estimates
- 17.9. programming
- 17.10. specifications
- 17.11. outline approvals from regulatory authorities

Make design choices to address health and safety hazards and risks

18. Interested parties:

- 18.1. clients
- 18.2. CDM
- 18.3. HSE
- 18.4. other designers
- 18.5. project and construction managers
- 18.6. contractors and specialist contractors
- 18.7. operators and maintainers

19. Relevant health and safety regulations and legal framework:

- 19.1. CDM regulations and Approved Codes of Practice
- 19.2. current health, safety and welfare regulations
- 19.3. Construction and Building Regulations
- 19.4. civil law and criminal law
- 19.5. duty of care

20. Operations and individual activities:

- 20.1. survey and investigation
- 20.2. construction phase
- 20.3. operation and maintenance
- 20.4. altering
- 20.5. demolition/disassembly
- 20.6. commissioning and decommissioning

21. Hazards:

- 21.1. falls from height
- 21.2. slips, trips and falls
- 21.3. hit by falling or moving objects
- 21.4. manual handling
- 21.5. health issues
- 21.6. power sources
- 21.7. hazardous substances
- 21.8. trapped by something collapsing or overturning
- 21.9. confined spaces
- 21.10. fire
- 21.11. obstructions
- 21.12. moving vehicles
- 21.13. public access

22. Potential consequences:

- 22.1. injury
- 22.2. causing ill health
- 22.3. fatality
- 22.4. damaging property
- 22.5. adversely affecting the natural and built environment
- 22.6. contravening legislative requirements
- 22.7. litigation and prosecution
- 22.8. working conditions and circumstances
- 22.9. buildability

23. Assess:

- 23.1. likelihood of occurrence
- 23.2. severity of harm incurred

24. Risks:

- 24.1. high
- 24.2. medium
- 24.3. low

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25. Develop and modify:

- 25.1. analysis
- 25.2. identifying interactions
- 25.3. calculation
- 25.4. testing
- 25.5. selecting materials, components and systems detailing and specifying consideration of costs and benefits (including whole life costing)
- 25.6. identifying project requirements
- 25.7. planning investigation
- 25.8. verifying competence and resources analysis
- 25.9. identifying interactions assessing buildability

26. Measures:

- 26.1. eliminate
- 26.2. reduce
- 26.3. inform
- 26.4. control

27. Design documentation:

- 27.1. drawings
- 27.2. specifications
- 27.3. calculations
- 27.4. Health and safety plans and files

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