

Engineering Roles

Civil Engineer

Structural Engineer

Mechanical Engineer

Electrical Engineer

Chemical Engineer

Civil Engineer Role

Overview

As a contracting engineer you'll use your professional expertise to organise human and material resources on site, and ensure that the project runs to time and budget and is safe to work on. Although more commonly done by a consulting engineer, a contracting engineer will occasionally put together a design and build a team themselves.

Responsibilities

liaise and work jointly with the design team (consulting engineers) to implement refinements;
negotiate modifications with architects and consulting engineers;
deal skilfully with a diverse range of people including clients, architects, other engineering professionals, sub-contractors and members of the public;
take responsibility for health and safety on site;
make judgements and solve problems;
supervise construction;
deal with the logistics of supplies;
schedule work;
provide appropriate plans for construction;
monitor the provision of materials;
liaise with, and direct, the sub-contractors employed on the project;
ensure quality of workmanship;
find solutions to overcome unforeseen construction difficulties;
schedule and adjust each stage of the project to meet time and budget targets;
deal with any complaints from local people experiencing disruption due to building works.



Skills

You will need to show:

- technical competence;
- excellent numeracy and IT skills;
- strong communication and teamworking skills;
- the ability to supervise and lead others;
- the capability to work to budgets and deadlines;
- an understanding of relevant building and health and safety legislation;
- a creative approach to problem solving;
- a flexible approach.

Structural Engineer Role

Overview

Structural engineers design structures to withstand stresses and pressures imposed through environmental conditions and human use. They ensure buildings and other structures do not deflect, rotate, vibrate excessively or collapse and that they remain stable and secure throughout their use. They also examine existing buildings and structures to test if they are structurally sound and still fit for purpose.

Working in close partnership with architects and other professional engineers they help to design most structures, including houses, hospitals, office blocks, bridges, oil rigs, ships and aircraft. It is the structural engineer's responsibility to choose the appropriate materials, such as concrete, steel, timber and masonry, to meet design specifications and they are often involved in inspecting the work and advising contractors.

Responsibilities

- analyse configurations of the basic structural components of a building or other structure;
- calculate the pressures, stresses and strains that each component, such as a beam or lintel, will experience from other parts of the structure due to human use or environmental pressures such as weather or earthquakes;
- consider the strength of various materials, e.g. timber, concrete, steel and brick, to see how their inclusion may necessitate a change of structural design;
- liaise with other designers, including architects, to agree on safe designs and their fit with the aesthetic concept of the construction;
- examine structures at risk of collapse and advising how to improve their structural integrity, such as recommending removal or repair of defective parts or rebuilding the entire structure;
- make drawings, specifications and computer models of structures for building contractors;
- work with geotechnical engineers to investigate ground conditions and analyse results of soil sample and in-situ tests;
- liaise with construction contractors to ensure that newly erected buildings are structurally sound;
- apply expert knowledge of the forces that act on various structures;
- use computers and computer-aided design (CAD) technology for simulation purposes.



Skills

- good analytical and problem-solving skills;
- strong mathematical ability;
- computer literacy;
- a grasp of physics;
- three-dimensional conceptual skills;
- excellent oral and written communication skills;
- diagrammatic skills;
- the ability to teamwork;
- attention to detail;
- the ability to liaise well with professionals from other disciplines;
- an interest in the design and structure of buildings.

Mechanical Engineer Role

Overview

Mechanical engineers provide efficient solutions to the development of processes and products, ranging from small component designs to extremely large plant, machinery or vehicles.

They can work on all stages of a product, from research and development to design and manufacture, through to installation and final commissioning.

Most industries rely on a form of mechanical systems and mechanical engineering is thought to be one of the most diverse of all engineering disciplines. Due to this, there are employment opportunities in a wide range of sectors, including:

Manufacturing; Power; Construction; Medical

Responsibilities

designing and implementing cost-effective equipment modifications to help improve safety and reliability;

developing a project specification with colleagues, often including those from other engineering disciplines;

developing, testing and evaluating theoretical designs;

discussing and solving complex problems with manufacturing departments, sub-contractors, suppliers and customers;

making sure a product can be made reliably and will perform consistently in specified operating environments;

managing projects using engineering principles and techniques;

planning and designing new production processes;

producing details of specifications and outline designs;

recommending modifications following prototype test results;

using research, analytical, conceptual and planning skills, particularly mathematical modelling and computer-aided design;

considering the implications of issues such as cost, safety and time constraints;

working with other professionals, within and outside the engineering sector;

monitoring and commissioning plant and systems.



Skills

a high level of technical and scientific knowledge and the ability to apply this knowledge to practical problems;

good oral communication skills and confidence in dealing with a wide range of people, including clients, contractors, designers, directors and plant operators;

precise and concise written communication skills;

the ability to work well within a team;

IT skills, particularly computer-aided design;

creative ability;

the ability to work under pressure;

organisational skills, such as time and resource planning.

Electrical Engineer Role

Overview

Electrical engineers design, develop and maintain electrical control systems and components to required specifications. Their work focuses on: economy; quality; reliability; safety; sustainability.

The electrical equipment that they design and manufacture is used across many sectors, including: the building industry and services, including lighting, heating and ventilation; transportation and transport networks; manufacturing and construction; production and distribution of power.

Electrical engineers are involved in projects from the concept and detail of the design, through to implementation, testing and handover. They may be involved in maintenance programmes. As well as having technical knowledge, electrical engineers need to be able to project manage and multitask. They also need to have commercial awareness. Additional attributes, such as team leadership or management skills, are required as careers progress.

Responsibilities

- identifying customer requirements;
- designing systems and products;
- reading design specifications and technical drawings;
- researching suitable solutions and estimating costs and timescales;
- making models and prototypes of products using three-dimensional design software;
- working to British (BS), European (EN) and other standards;
- liaising with others in the design team;
- communicating with clients and contractors;
- attending meetings on site;
- designing and conducting tests;
- recording, analysing and interpreting test data;
- proposing modifications and retesting products;
- qualifying the final product or system;
- servicing and maintaining equipment;
- preparing product documentation, writing reports and giving presentations;
- monitoring a product in use to improve on future design.



Skills

- commercial awareness;
- oral and written communication skills;
- an enthusiasm for your subject and up-to-date sector knowledge;
- planning and organisational skills, such as time and resource allocation;
- the ability to work in a multidisciplinary team.

A second language could be useful when applying to international companies

Chemical Engineer Role

Overview

A chemical engineer designs and develops the processes that make a diverse range of products. Their work focuses on changing the chemical, biochemical and physical state of a substance to turn it into something else, for example making plastic from oil.

They understand how to alter raw materials into required products while taking into consideration health and safety and cost issues.

They work in a variety of industries including:

oil and gas; pharmaceuticals; energy; water treatment; food and drink; plastics; toiletries.

Modern chemical engineering is also concerned with pioneering valuable new materials and techniques, such as nanotechnology, fuel cells and biomedical engineering

Responsibilities

working closely with process chemists and control engineers to ensure the process plant is set up to provide maximum output levels and efficient running of the production facility;

designing plant and equipment configuration so that they can be readily adapted to suit the product range and the process technologies involved, taking environmental and economic aspects into account;

setting up scale-up and scale-down processes including appropriate changes to equipment design and configuration;

assessing options for plant expansion or reconfiguration by developing and testing process simulation models;

designing, installing and commissioning new production plants, including monitoring developments and troubleshooting;

optimising production by analysing processes and compiling de-bottleneck studies; researching new products from trial through to commercialisation and improving product lines;

ensuring that potential safety issues related to the project operator, the environment, the process and the product are considered at all stages.



Skills

an understanding of engineering principles and mathematics;

an aptitude for and interest in chemistry;

project management skills;

resource management skills;

oral and written communication skills;

analytical and problem-solving ability;

the ability to work as part of a team;

the capacity to motivate and lead a team;

strong IT skills;

a careful and methodical approach with good attention to detail;

commercial and business awareness;

creativity and innovation.