The essay question
The first year essay was written in response to the following question.

"Today’s engineers face the same challenges as those of previous generations.” Do you support this statement? If so why? If not, why not?

Essay outline
This outline forms the basis of the Engineering essay.

Introduction
stated as aims of essay

Orientation
engineering began by observing natural phenomena and applying principles

Argument
challenges facing early engineers developed in complexity
• supporting information: early engineers built structures for worship, glory of their leaders, and military - not for society’s fundamental needs

Argument
challenges facing engineers in the 15th century were different
• required to invent alternative sources of power to replace slave labour.

Argument
generations of engineers have faced the challenge of applying scientific knowledge/developments to engineering

transition introduces criterion how to evaluate and compare the challenges facing engineers - the role engineering plays in society
argument: the process of adapting to society’s needs results in new challenges

Argument/Example
example of challenge facing modern engineers, and how engineers respond to changing needs of society - responding to advances in computer technology

Argument
Since the aims of engineering should be synchronised with aims of society, challenges facing engineering constantly evolving (reinforcement of transition paragraph)

Argument
challenge facing all engineers is that they must be responsible to clients and public
Conclusion
the common challenge to engineers throughout time has been to serve
the needs of society; however, the actual nature of the challenges or
problems is different

Essay annotations
Annotations are provided in the right hand column. These annotations highlight
significant features of the essay, such as structure and how evidence for the
argument is built up and incorporated. The annotations in “text boxes” comment on
language features and referencing conventions. For further information on these
features see the relevant self access module.

<table>
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<tr>
<th>Student essay</th>
<th>Comments</th>
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<td>To determine if today’s engineers face the same challenges as those of previous generations, it is necessary to establish what challenges the engineers of previous generations faced. This will allow a comparison with the primary challenge facing modern day engineers: the impact of technology on society.</td>
<td>Essay introduction: this introduction states the aims of the essay, rather than the essay’s thesis. An alternative introduction could be: e.g. Modern day engineers face similar/quite different challenges compared to … The introduction should also include an outline of the essay’s main points.</td>
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<td>Engineering began thousands of years ago as man observed natural phenomena occurring in nature.[1] Man realised that he could adopt these natural phenomena in his everyday life by applying his discovery and knowledge to useful purposes, which would subsequently improve early man’s quality of living. Hence the first engineers were born, as they realised for example that if someone propped a log under a boulder that was too heavy to be moved by manual lifting, the boulder could be moved.</td>
<td>orientation or background to topic</td>
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<td>As civilisations developed, the challenges facing engineers became more complex. The first engineers had simple problems that were often solved simply by trial and error.[1] The common man probably performed these duties and there was no need for a profession such as engineers. However as time passed civilisations began to emerge in which there was a need for the profession of engineers. In early civilisations engineers were responsible for the executive of great works such as the pyramids. These early engineering feats were played an important role in building places of worship, buildings for leaders, and in the military.</td>
<td>topic sentence challenges facing early engineers became more complex</td>
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<td>supporting evidence early engineers played an important role in building places of worship, buildings for leaders, and in the military</td>
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Inclusive language
In paragraphs two and three the student refers to humans as man and he. While the first engineers may very well have been men, the use of the exclusive man in superstitions of man, and man’s fundamental needs is sexist and unnecessary. To use inclusive language use the plural ‘people’ and pronoun ‘they’ instead of ‘man’ and ‘he’, For example:

sexist language
as man observed
to serve the superstitions of man

inclusive language
as people/humans/humankind
observed natural …
(or) as natural phenomena were observed
(people’s/the culture’s)
to serve people’s/the culture’s superstitions
In the fifteenth century a major challenge for engineers was precipitated by the decline in slavery. Industry once powered by slave labour now required alternative and cheaper forms of power. Engineers were required to invent and construct mechanical devices that could replace slave labour. As a result, engineering made significant advancements, knowledge of which was assisted by the invention of the printing press. This facilitated increased distribution of knowledge through society, and greatly helped the wider education of the profession.

Generations of engineers have faced the challenge of applying scientific discoveries and knowledge to the field of engineering.[1] However, prior to the twentieth century engineering was an underdeveloped profession. The scarcity of engineers often meant a great delay between scientific discoveries and advancements, and any application of these discoveries to engineering. In the twentieth century there has been greater interaction between science and engineering, and this has greatly contributed to the boom in engineering which occurred throughout the twentieth century.

One way of evaluating the challenges facing engineers of today as opposed to the challenges previous generations of engineers faced is to consider the role engineering plays in society. This role is primarily to benefit society.[2] Generally the engineer works towards the objectives or goals of the society, so that if the society changes its objectives then the engineer must also change his or her focus. For engineering, the process of adapting to society's changing needs often results in new challenges and developments. In the past many societies' objectives were determined by their leaders or kings, or religious orientation. As a result engineering challenges were primarily building weapons, places of worship, shrines or monuments to honour their leaders. However, in the more recent past, industrialised societies have demanded electricity, cars and other labour saving devices. Increased wealth for larger sections of society has also meant that these commodities were desired in great quantities and at accessible cost. These demands were factors contributing to the technology of mass production.[2] However the repercussions of this is pollution, despoliation and unemployment.

Technology's contribution to the despoliation of the environment has slowly resulted in a re-appraisal of the natural environment and its importance. Hence the engineer of the present time faces new challenges in adapting to these changing needs of society. For the modern engineer the challenge lies in achieving a balance between the consumer demands products, scarcity of natural resources, and containing the impact of technology on the natural environment.

A specific example of a challenge facing modern engineers is the application of computer technology to engineering. Computing is now a significant component of engineering design. Initially computers were an instrument that could speed up calculations that had previously been done manually but over much longer time intervals.[3] They have now...
developed into very powerful instruments that are capable of doing complex calculations that were out of reach of normal or manual techniques due mainly to time and cost restrictions. This has opened up a host of new challenges to engineers that were previously too costly to attempt such as large scale structural analysis problems and also aerodynamic ones.

As engineers’ objectives are to be in synchronisation with the objectives and needs of society, it is to be expected that the challenges facing engineers will be constantly evolving and responding to the needs of society. If we consider engineers’ objectives from this perspective, it can be said that the objective of engineering is to develop devices which are of value to human society using scientific principles available at the time.[2] These devices are usually to fulfil the particular need of society or to invent a solution to a particular problem. Hence we can see that this has been a common challenge to all engineers throughout time. Although the specific problems have changed, the actual role or challenge for the engineer has remained the same, that being to solve or create devices to find solutions for society’s needs or objectives.

An example of a challenge for engineers which has remained the same is the requirement for engineers to be professionally responsible to their clients and to the public.[4] Australian engineers abide by a code of ethics produced for Australian engineers as a standard by the institution of engineers, Australia. If there is a breach of regulations the institution has the authority to set up a hearing. If the engineer is found guilty, this can result in expulsion or fines for the accused. Early engineers have also been held to certain professional standards. The Babylonians, who were the first recorded engineers as an actual profession, had harsh penalties for professional misconduct.

“1. If a builder build a house for a man and do not make its construction firm and the house which he has built collapse and cause the death of the owner of the house - the builder shall be put to death.

2. If it cause the death of the son of the owner of the house - they shall put to death the son of the builder.”

These standards reflect the public’s desire to have those who are supposedly skilled in building responsible for their actions just as they are today. Hence engineers in this case have had to face this challenge of professional responsibility throughout the past.

Engineers throughout time have shared similar challenges, such as the requirement of professional responsibility to the public. Engineers throughout time have also faced the challenge of responding to the needs of society. In this regard we can say that engineers today face the same challenges as those which faced previous generations of engineers. However there are challenges that engineers of different generations have had to face. These are the actual problems that the engineers
have had to solve and these generally have evolved over time much the same as man and his civilisations evolved over time as civilisations have developed.

References


Acknowledgment

This unit is from material developed for R. Woodward-Kron, E. Thomson & J Meek (2000), Academic Writing: a language based guide (CD-ROM), University of Wollongong.