

ENGINEERING AND SOCIETY



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'Engineering' and 'engineer' have become the most misused words in the English language. The importance of engineering to society is sadly not understood and not appreciated by many parts of society. The great contribution made by engineering and science to our everyday lives is taken for granted by most, certainly up to the point when something goes wrong and engineers are expected to put things right whether it is dealing with disasters, providing basic infrastructure in a war zone, or dare I say it, repairing the domestic appliances which we have all come to rely on. The challenge for the future is to bring engineers and engineering to the forefront of our strategic planning and policy making, to seek engineering advice at the beginning of these processes and not the end and to recognise that we are now more dependent on engineering to provide and maintain our basic life support systems.

Engineering is the application of science and the healthy interaction between scientists and engineers is a powerful and productive relationship. This interaction has blossomed particularly in the last 50 years and more productively in the last 30 years. The benefits to society are easily identified such

as the advances in telecommunications, the growth of the Internet Super Highway, the winning of oil from the depths of the North Sea, the major advances in medical science, and there are many more examples.

We take many day to day things for granted. When we fill our cars up with petrol do we give it a thought or wonder how the processes were engineered from geologists locating the oil field to us getting the refined product to the pumps on the garage forecourt? When we pick up the telephone and listen to a computer generated voice message or talk to someone on the other side of the world with the clarity of the person being in the next room do we have any inkling of how all this is made possible? When we watch 16 cars racing round a track for 2 hours on a Sunday afternoon do we really appreciate that behind an F1 racing team there are 250-300 engineers including materials specialists, fuel technologists, etc all at the cutting edge of their discipline? Do we understand the benefits which spin off to the wider automotive industries? When we hear of people undergoing Keyhole Surgery for what previously would have been major operations requiring long periods of convalescence do we think about the massive strides

achieved through the joint developments by engineers and medical practitioners?

The advent of computers to commonplace universal application by the mid-nineties has had the most obvious impact on society and is something recognised by all generations. Young children see the computer as an essential part of daily life and are probably the leading exponents of its power. The worldwide web was the brainchild of an engineer Sir Tim Berners Lee and has developed to a level of usage which would have been hard to comprehend at its inception. It is probably not so well appreciated that computers and software have enabled engineers to design ever more sophisticated structures, model some of the World's greatest grand schemes and develop robotics for many applications. Engineers of all disciplines are able to deliver solutions to increasingly complex problems for the benefit of Society.

Engineers are not however infallible and any perception of engineering being 'a precise science' can be dispelled by an understanding of the vulnerability which comes with continually extending boundaries. Engineers are often dealing with things which they cannot control precisely. A recent simple example is the damage to a major undersea cable which carries internet traffic between Europe and the Indian Sub Continent via the Middle East. Just before Christmas internet usage in the Middle East was severely

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affected by the damaged cable which took several days to locate and repair using a remotely operated vehicle designed by French engineers in the knowledge that such events occur. The cause of the damage was thought to be sub-sea seismic activity – another uncontrolled event which added to the engineers' challenges. The ability to rectify the problem quickly and minimise the impact puts pressure on engineers. This comes from the realisation of the importance of the loss of benefit.

Engineers must be reactive as well as proactive in order to maintain the benefits which they bring to society. In this regard, engineers are realists with a deep understanding of the parameters they work with. Their contribution in all disciplines to society is vast and whilst the engineering profession is often criticised for having too many voices which makes listening difficult for non engineers. We must remember that engineers operate in many disciplines ie structural, civil, mechanical, electrical, aeronautic, space, oil & gas and the list goes on.

The challenges facing engineers in the future will be in several areas. I single out what I call the Life Support Systems ie Energy, Water, Climate Change and Environmental Sustainability and Transport Infrastructure.

It is more than 20 years since the three-year long Public Inquiry into Sizewell B, the last Nuclear Power Station to be built in the UK, ended, and fourteen years since the plant was commissioned. It was the last major power plant to be built in the UK and we have seen a gradual shutdown of ageing Nuclear Stations which have provided 16-20% of the UK's power requirements. There have been numerous papers at

Government level with advice sought from engineering bodies which have consumed many months of work and despite the strength of advice to proceed with the building of new Nuclear capacity, we still do not have a well defined way forward. Engineers will be severely stretched in the coming months and years to maintain power supplies to the nation and industry. The need for and the adverse economic impact of Load shedding in South Africa during the last two years are now real possibilities for the UK. This could have been avoided with timeous implementation of a balanced energy policy which of course should incorporate the use of renewables. The need for a strategic Energy Policy which spans the lives of Parliaments and the need for engineering advice to the most senior level of the Civil Service on a continuing basis has never been stronger. There is no doubt that with a growing world population and the poverty experienced in parts of India, Africa and South America, there is insufficient water to go round. The challenge of water supply to the world and the investment needed must be addressed by all developed countries. Engineers are at the forefront of finding solutions and it will be engineers who will be expected to solve the worldwide problem. This challenge needs to be given prominence by all Governments who will need close advice from engineers in the coming years.

The impact of Global warming and Climate Change is a vast and complex challenge which requires all the major factors of energy consumption, investment in renewable sources of energy, waste management and disposal and a lifestyle change for most of us. There is also the need to recognise that if we are to meet a target of 20%

of energy consumption from renewable sources by 2020, then it is essential that all stakeholders are brought together to work in a collaborative and cohesive way rather than through disparate ways which are not co-ordinated. There must be a recognition that there is a cost to bear for reaching this target. The Abu Dhabi Government has commissioned the first carbon neutral city called MASDAR which is under construction. It will be a development based on the employment of renewable energy sources and will be car free in order to reduce carbon emissions. This is a bold venture which the whole world will learn from and funded by a Government which can afford it and which has a great vision. Engineers are spearheading this initiative working with the stakeholders and driving a future agenda with total government backing.

If we are to meet the targets for energy consumption, the reduction in carbon emissions and improve the quality of life for everyone, then we have to tackle probably the biggest challenge which engineers face and that is how we move masses of people every day without building more roads and without increasing car ownership. The UK Railways are now very efficient as a result of the investment during the last ten years and moving 6 million people a day into and out of London is testimony to this. On our roads however, we experience increased congestion and a dependency on road transport for widespread distribution of goods, including food. The movement of goods around the world has been made more efficient by containerisation and large ships which together with efficient ports can turn round vessels in

hours rather than days. If the population still wishes to be able to get in the motor car at any time and go any place with complete freedom, then it must recognise that there is a price to pay. The subject of road pricing has been with us for several years but in looking forward we will have to bear the cost of that freedom or we shall have to engineer solutions which will make public transport the preferred way of travelling. The extension of high speed rail lines with feeder lines and good localised transport systems eg trams, light rail, etc are not beyond realisation. Engineers have been facing this challenge for a long time but it will take on much greater significance in the coming years.

The most serious challenge for engineers is, however, to attract more young people into the engineering profession. I have tried to bring an awareness through this short paper of the contribution made by engineers to society and to the everyday lives of all of us. I have no doubt that there is a lack of awareness of the role of engineers throughout society and at the highest level of decision making in the UK. I believe that there is a need for Government not only to recognise what engineers contribute through research, collaboration with the wider scientific community and through the application of science, but to value its importance. There should be a much greater involvement of engineers at the 'top table' and for that involvement to be visible to the whole country. I have no doubt that the best young brains will then be inspired to take up a career in engineering because they see it having the same societal perception alongside the other equally important professions.