



Daedalus and Ikarus

Engineering and Literature

Tuesday, June 21, 2011

Dear Members of the Rio Grande Valley Chapter of the Power & Energy Society

Dear Guests.

Thank you all for this distinction which I accept as a token of the joint effort done by us since the beginning of this chapter, in April

2010. Thanks to the generosity of Alberto, Tony and Esteban, and many others.

I accept this distinction because our community must know more about our jobs. We must be able to outreach the public and explain to them the importance of engineering. We must be able to reach young men and women and convince them that the engineering profession can provide a meaningful and rewarding life. We make things work. We maintain factories and buildings running, we generate and distribute the energy needed by society, with great concern on reliability and safety. We educate and train young people for their professional life, and we all deserve recognition.

Next year, and the next, many more outstanding engineers will be commended, and these are legitimate reasons to do so.

I have chosen to speak briefly about Literature & Engineering because both disciplines are superb manifestations of human culture and progress.

Imagination is a key element of literature and engineering. First the novelist must create in his (her) mind all the elements of the work, striving to give the book the perfect balance to make it a good story. The engineer must also use the inventive mind and practical science to find the perfect combination of elements to achieve the intended task.

Imagination is also a key element in innovation, a pillar of economic development.

Let us look at Jules Verne's *The Mysterious Island*¹, first published around 1870. In that novel, engineer Cyrus Harding is the hero in the struggle for survival of five castaways and a dog, abandoned without the elements of civilization in a desert island. Soon, he had produced fire, concentrating sunrays with two glasses. Then he constructed an oven out of clay to have bricks, and later on using iron they had tools. Benjamin Franklin had defined *homo sapiens*

as that tool making animal. Later, engineer Cyrus fixed the geographic position of their remote island, measuring latitude and longitude with readymade astronomical instruments. A fascinating book for young boys and girls.

My second story comes from Greek mythology. For the ancient Greeks² Daedalus was the father of trades. Under his intelligent hands everything prospered. He was a carpenter, plumber, mason, smelter, and soldier. To escape the siege of a tyrant, Daedalus constructed Icarus's wax wings. He warned his son not to fly very high. Icarus escaped flying over the Egean Sea, but in his excitement forgot his father instructions, falling to his death when the intense heat from the sun melted the wax. Nature had checked the limits of human inventiveness.

We owe to Freeman Dyson book *Disturbing the Universe*³ this beautiful story: Daedalus prayed to the gods to be granted the gift of invention. Generous as they are, the gods decided to do so, but with one condition: once he had invented some item, humanity would bestow it forever. So we now have very good inventions, like the bicycle, and controversial inventions like plastics or fossils fuels.

How about this linguistic riddle: in the English language the origin of the word "engineering" is the engine. In the Spanish language the origin of the word "ingenieria" is ingenuity. What can we see in the mind of these great people, English and Spaniard, creators of universal languages? The great power of the first industrial revolution, and the subtle power of the human mind.

James Watt, a Scott, was the inventor of the steam engine. A practical man, aware that an invention is truly so only after achieving economic success, devised the unit now used for mechanical power: the *horse power- HP*, to explain his customers, the mine owners, how many team of horses the machine will

replace. His experiment went like this: one horse is able to raise 1 foot, a load of coal weighting 33,000 lbs, in one minute.

Working out the units we find that 1 *HP* = 746.47 kg m²/sec³ or 746.47 *Watts*. His invention had an enormous benefit to equine livestock, to say the least.

Finally, in modern times, a human invention- Bio Engineering- has intruded into the realm of the gods: man creating new forms of life, itself- something previously exclusively for gods. It is not a surprise the controversy spanned by this issue. President George W Bush prohibited funding stem cell research with federal funds. This opportunity was not disdained by this modern Daedalus with the name of Craig Venter⁴ We can read about the First Self-Replicating Synthetic Bacterial Cell, "Mycoplasma mycoides bacterium" in <http://www.jcvi.org>

Conclusion- Engineering feats produce revolutions impelling societies to higher levels of progress. Machines invented by engineers operate very well as long as they keep close to the operating point. But it can happen that stronger forces in nature push the machine out of the region for safe operation. Then disaster strikes. We are reminded year after year that many human inventions are imperfect, like all human deeds. The main task of the engineer is to make things work, for the benefit of society. For this end we must keep in mind the simple precepts of the Code of Ethics of our Society, the IEEE:

- 1- be responsible
- 2- avoid conflict of interest
- 3- be honest and realistic
- 4- reject bribery
- 5- maintain and improve our technical competence

- 6- improve your understanding of technology
- 7- acknowledge errors, seek and offer advice
- 8-treat all persons fairly
- 9- avoid injuring others and their property
- 10 -assist colleagues and coworkers

References

- 1- *Jules Verne, The Mysterious Island*. Rainbow Classics, The World Publishing Company
- 2- *Ovid, Methamorphoses* (VIII:183-235)
- 3- *Freeman Dyson, Disturbing the Universe*. Harper and Row, ISBN 0-06-011108-9
- 4- *J Craig Venter, A Life Decoded, My Genome, My Life*. Penguin Group