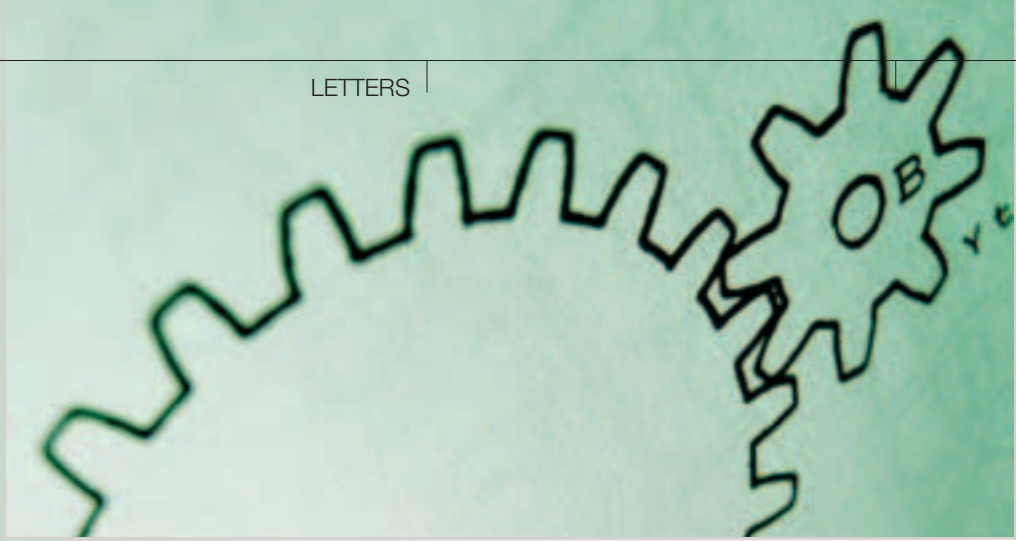
Letters



The nature of engineering

Dear Sir

Marine propulsion, the grand piano, photovoltaic cells, intellectual property, sports engineering, government policies: the contents of *Ingenia* Issue 12 surely prove that we need both Benaim's art and Hawley's science and also engineers of both complexions.

But how many Fellows suspect, as I do, that they themselves might not have gained adequate A levels in science and mathematics to enter the best universities today? How many aspiring engineers today have time for art and the humanities?

Yours faithfully

John Bartlett FREng

Nature again

Dear Sir

The letter from Sir Edward Parkes in Issue 12 of *Ingenia* sets out the 'The nature of engineering' with the same clarity of thought that he demonstrated when he taught me as an undergraduate in the mid-1950s. I have tried to make the same point in a number of places and in a text book which I published a couple of years ago.

The lecture earlier this year by Mr Robert Benain on engineering architecture set out a case for some combination of the two professions, but at an individual level this seems to be an unrealisable objective. My son, in looking to a career involving the solution of social and environmental needs through a joint architectural and engineering route, has found that in most universities there is virtually a wall between architecture and engineering. No doubt this is driven by the failure of the two professions to meet. A few universities offer an architectural option, notably Nottingham, whose course then offers exemption from Part I of the RIBA examinations.

I would be happy to support The Academy in furthering the pursuit of the perception of engineering as a creative activity.

Yours faithfully

John Hicks FREng

Sustainable development and the Club of Rome

Dear Sir

In the recent discussion on sustainable growth in your columns, some correspondents have invoked a common mythology of the 1972 Club of Rome Report. In honour of the MIT systems engineers who built the underlying model, it might be worth recalling what the text actually said in the original Limits to Growth report.

First the authors were at pains on almost every page to emphasise that the World 2 model was being used to expose qualitative and not quantitative system behaviour of the world economy. That is self-evident just from the size of the model employed – it would take up less than 50 rows of an Excel 2000 spreadsheet! Secondly they set out explicitly to model the behaviour of a particular system where positive feedbacks created exponential growth in the two key consumption variables (population and physical capital stock) while drawing down a finite resource. A whole chapter is devoted to explaining the voracious appetite of such exponential doubling. Their actual prediction (p126) was 'under the assumption of no major change in the present (i.e. 1972) system, population and industrial growth will certainly stop within the next century [i.e. this one!] at the latest'. The key qualitative conclusion from the model was that because of lags in the system it would not reach this end point smoothly but overshoot and then undershoot. Resource prices would become too high for investment to cover depreciation of the exponentially growing capital stock (p125) and the system collapses. As it happens this boom/crash phenomenon never occurred in the model's output before the first quarter of our new century (e.g. Figure 35), so, despite our efforts to date, the jury is arguably still out on the prediction!

There is a 'no resource constraint' run of the model in the report (Figure 40), where it is now pollution not lack of resources (sounds familiar?) that invokes a similar, if slightly later, disruption some time in our century. One reason why the Club of Rome is sometimes cast as a doom-monger-already-proved-wrong may be that two years after the report was published the world suffered its first oil crisis. The consequences of monopoly power then got confused in the public mind with that of resource depletion.

Yours faithfully

David Fisk FREng