

Acceptance speech on Induction to the Scottish Engineering Hall of Fame

James Watt Dinner, 5th October 2018

Thank you, Gordon,

It would not be an exaggeration to say that I was quite surprised when I was informed about being inducted into the Scottish Engineering Hall of Fame, for design of bridges and principally for the Concept and Reference design of the Queensferry Crossing. I am a graduate of the West Pakistan University of Engineering and Technology, and first came to UK in January 1964 as a 21-year-old, and hitch-hiked, with my elder brother across Scotland in June of that year. I still remember taking the ferry from North Queensferry before the suspension bridge was opened, and admiring the two fantastic bridges, and wishing that I could have been the designer of the new suspension bridge. To be standing here 54 years later and being honoured with the induction is something I could never have imagined at that time.

I would however not be here today, had it not been for four persons of whom three are gracing this event with their presence tonight. The first is Sir Duncan Michael. Duncan is an inductee of the Hall of Fame and former chairman of Arup. Duncan has always been a great supporter of Arup Bridges, and alerted me in 2006, when I was working on Stonecutters Bridge in Hong Kong, that the Forth Replacement Crossing was coming alive again. Some of you may recall, that back in 1992 serious consideration was given to having an additional road bridge, but luckily it was shelved at that time. Luckily, I say, because had it been built at that time, it would have been a suspension bridge, as cable stay bridge technology had not progressed sufficiently, and the longest cable stayed span was 450m.

The second person is Brian Veitch. Brian is a former director of Arup Scotland, and in 2007 we plotted together, and I do mean plotted, how Arup could get involved in the new crossing. Arup did not have an extensive track record of civil engineering in Scotland, and we knew that we would have to join up with a consultant who had the required Scottish track record. We identified that Jacobs, formerly the famous Scottish consultant Babbie Shaw and Morton, would be a perfect fit. Brian arranged to meet them. At the meeting, Alan Seywright of Jacobs, who unfortunately is unable to attend tonight, saw that a Jacobs Arup JV would be a perfect fit, and this is the team that has worked closely with Transport Scotland in delivering the new crossing.

The fourth person is Lawrence Shackman of Transport Scotland. In 2006, before Transport Scotland invited bids for the consultancy for the bridge, we made presentations to Lawrence and his colleagues in Transport Scotland, on Arup capability. At that time the Stonecutters Bridge in Hong Kong with a world record span of 1018m for cable stay bridges, for which Arup are the designers, was being constructed. I like to think that this may have had some influence in Transport Scotland appointing Jacobs - Arup and thank you for that.

No bridge however is designed by a single person, and in true Arup collegiate fashion, it has been a great team effort. Some of my colleagues for the design and construction supervision, Sarah Breen, Richard Hornby, Oliver Riches, Paul Baralos, Kevin Brunton and Alistair Chisholm are here tonight and I thank them for their contribution.

Regarding the design of the bridge itself, we had to design a 21st century bridge that would be a harmonious neighbour to the two existing bridges, in the fantastic setting of the world heritage site. Nature fortunately has given us Beamer Rock in the estuary, which allowed a tower to be sited on it, and permit the use of a 3-tower cable stay bridge. This gives a wonderful symmetry with the 19th century railway bridge with its 3 cantilevers, and the 2-tower suspension bridge of the 20th century in between. In order not to visually dominate the other 2 bridges, we needed slim and not too tall towers. To achieve slim towers and address the engineering requirement of restraining the centre tower from excessive deflections due to uneven span loading, the stay cables are crossed at mid-span. This is the first time this technique has been used on a large bridge of this scale. For any bridge that breaks new ground, one needs a knowledgeable and enlightened client. I still recall John Howison, the Transport Scotland project director at that time, and Lawrence Shackman quizzing me on whether crossed cables had been used for a bridge at this scale, and I had to give the honest answer and say no. But John and Lawrence kept faith with us, and had it not been for them, we may not have the bridge that we have now. Thank you, Lawrence and Transport Scotland.

Thanks are also due to the contractor, the JV of Morrison Construction, Hochtief, Dragados and American Bridge and their construction design consultant, the JV of Ramboll, Leonhardt Andra und Partner, Gifford and Grontmij for making the reference design into a reality.

It is worth noting that three of the construction JV partners for Queensferry Crossing were from other countries. It is good to have international collaboration, and this is going to be the norm as particular national expertise can be brought together for delivering a project. However, I am concerned that there is less and less presence of British contractors in the international construction market for large bridges, which is currently dominated by Chinese, Korean and Spanish contractors. Contractors tend to use consultants from their home countries, and whilst British consultants, because of their design flair and ingenuity, are managing to work for international contractors, the market is getting increasingly competitive and difficult for British consultants. In places like China and Korea, universities, contractors and consultants tend to work together, and they are undertaking fundamental research into very long span bridges, both in terms of design and construction materials and techniques. If we are to hold our own in the international market place, it is vital that British contractors are in the international market and use the expertise of British academia and consultants, who I believe have a lot to offer. I am aware that this does require some risk taking, but I hope that representatives of contractors who are here tonight will seriously give this some consideration. As a designer I would say we need you.

There is also another trend which is of concern. As more and more projects are being acquired under the design and build route, the designer is being considered as a commodity, almost as an afterthought, and treated as a sub-contractor, and not recognised for its intellectual contribution. Consultants given adequate time and fees can deliver efficient and cost-effective designs, that not only can save money for contractors and employers but can also deliver designs that are universally liked by the general public. Design fees are a miniscule proportion of the whole cost of a project and the bottom line approach should not be taken by employers and contractors.

But enough of the pleas. Let me lastly thank my wife Moira, who is a Scot and hails from Whitburn in West Lothian. She has been unable to attend tonight, as she has had a back operation last Friday. However, she is represented by my daughter Aliyah. Moira has accompanied me to a number of countries, giving unstinting support to enable me to set up Arup bridge design groups and design and build bridges. I consider her an honorary Arupian and also believe Moira being a Scot, allows me to become an honorary Scotsman and being inducted into the Scottish Hall of Fame, which along with Elijah McCoy will add to the multi-cultural nature of the Hall of Fame.

Thank you.

Naeem Hussain