

Anthony Ray Flint, 1924–2024

OBE, PhD, FREng, FICE, FIStructE

DR TONY FLINT, known to many members for his pioneering work on steel box-girder and plated structures, as well as his huge contribution to the development of limit state design codes, has died at the age of 100. He had a life-long mission for delivering a balance between safety and economy in the world of civil engineering, which was reflected eloquently in his lecture and subsequent paper in *The Structural Engineer* entitled 'Matters of Balance' (Vol. 67, No. 10) when he was awarded the Institution's Gold Medal in 1988.

Dr Flint was a man of encyclopaedic knowledge and recall, and an engineer of enormous intellect, inspiration and influence. He attended Bradfield College from 1938 to 1941, where he was a leading light in the Shakespeare Society, before studying Aeronautical Engineering at Farnborough, with a particular interest in the design of thin-skin frames. He worked on early designs for the Vampire jet fighter and Brabazon piston-engine airliner, and he came under the influential tutelage of Sir Alfred Pugsley, following him to Bristol University to study for his PhD. He later moved to Imperial College London as a Reader in the Department of Civil Engineering. His research interests were wide ranging. Although well known for ground-breaking efforts in thin-plate buckling, his work also took him into reliability, probability and structural dynamics.

While at Imperial, he started taking private commissions from architects, notably James Cubitt and Partners, designing buildings. In 1958, he joined forces with Tony Neill to establish the practice of Flint & Neill, which became one of the most well-known and widely respected structural engineering consultancies.

In this early period, he worked on many buildings but retained a keen interest in bridge design. He was a prolific contributor to the development of codes and standards and his research work led to new plate-girder design rules in BS 153, which brought him to the attention of the bridge engineering world.

A series of disastrous structural failures over a few years then led to commissions which brought him into the limelight. First was the Clyde Transmission Towers in 1968, followed by the Emley Moor guyed mast in 1969, and then the infamous steel box-girder bridge collapses at Milford Haven and Melbourne, Australia in 1970. Each of these tragedies showed that engineering construction had advanced too far ahead of engineering understanding, and it was Flint who was summoned to drag engineering practice out of the outmoded science of working stress



Tony Flint (seated) with the former Partners of Flint & Neill (from left) David MacKenzie, John Evans, Ian Firth and Brian Smith

design and into the realm of reliability-based thinking that now underpins our modern design methods. This was pioneering work.

The bridge collapses triggered the Merrison Committee of Inquiry, for which Tony contributed his technical expertise and led the important research and development work required for improved design rules for steel bridges. This led first to the Interim Design and Workmanship Rules (IDWR), which had to be produced quickly to support the large volume of bridge construction ongoing at the time, and then to BS 5400, the first reliability-based bridge design code in 10 well-considered parts covering all aspects of bridge design. Subsequently, this led to Tony's leadership on the development of several parts of the structural Eurocodes.

Tony's expertise produced some notable and award-winning building structures, including London's National Theatre with Sir Denys Lasdun and the beautiful 'Lotus Temple' in New Delhi with Fariborz Sahba. But perhaps his greatest achievement was the strengthening of the M4 Severn Bridge in the 1980s. Coming so soon after the tragic collapses of 1970, Tony and his small team at Flint & Neill developed some truly innovative designs and construction procedures to double the capacity of the existing suspension bridge and the neighbouring cable-stayed Wye Bridge. The project received the first Supreme Award in the British Construction Industry Awards for the successful completion of this highly complex engineering challenge.

He was the recipient of many awards, including the Institution's Gold Medal, and received the OBE from the Queen in 1974. He was invited to become a Fellow of the Royal Academy of Engineering in its first years of existence, and his dedication to marrying safety and economy in his work on existing structures may be best described by his own hand when he wrote: *'It is our policy to approach [structural] assessments with the aim of avoiding or minimising any changes which can be shown to be unnecessary by the use of the best that engineering science can offer.'* This captures something of the essence of this brilliant but ever-humble engineer.

In the twilight of his career, he advised the Hong Kong Government on the design of the large bridges to the new airport, developing the design of perhaps the world's first major structural health monitoring system. One of his last assignments was investigating the well-publicised wobbles of the London Millennium Bridge and helping its designers to find the best solution.

Tony passed away on 23 October 2024 having just reached his century. As an avid cricketer, reaching this milestone was a personal satisfaction and great achievement. He is survived by his wife, Judy, his daughters, Caroline and Fiona, and several grandchildren and great grandchildren.

Ian Firth and David MacKenzie