Obituary

Professor Sir Alan Harris 1916–2000

Professor Sir Alan Harris, who died on 26th December 2000, aged 84, was one of the most influential figures in the development of prestressed concrete, and arguably the key player in spreading the ideas outside the French-speaking world. After the Second World War he worked with Freyssinet, first in France, then in the USA, and finally in London. He later went into private practice and became Professor of Concrete Structures at Imperial College.

Born 8th July 1916 in Plymouth, Alan grew up in London where he worked for local authorities while studying for his engineering degree in the evening at Northampton Polytechnic, (now City University).

1940–1946 provided him with six years experience

in the Royal Engineers and he said he ‘would not have missed a moment of it’, despite having volunteered, so he claimed, for the Parachute Regiment. He served as an officer in a Port Construction and Repair Company, landing at Port-en-Bessin in Normandy on D-Day + 1. He was officer in command of diving on Mulberry B at Arromanches, working from a small fleet of French fishing boats, as a result of which he was awarded the Croix de Guerre. Later moves were to Ostend, where he met Magnel who told him about prestressed concrete for the first time, and thence to the Rhine before demob with the rank of Major in 1946. Subsequently he joined the Royal Engineers in the Territorial Army where he attained the rank of Colonel.

He persuaded Freyssinet to give him a job after the war, and worked on many of the reconstruction schemes that followed, most notably the five bridges over the Marne (Luzancy had just been completed when he joined), the prestressed runway at Orly, harbour works at Le Havre and Brest, and more mundane (but economically important) elements such as flooring joists and railway sleepers. His relationship with Freyssinet reminds one of an apprentice and his master where the young man learns the skills and principles which he can take forward himself.

In 1949 Alan returned to the UK following the death of Mautner who had been Chief Engineer of the Prestressed Concrete Company, Freyssinet’s subsidiary. The UK requirement was not for bridges but for industrial buildings, many of which had been destroyed in the war. There were severe shortages of all materials, more especially of steel, and Alan’s clarity of thought about structural systems, combined with prestressed concrete’s savings in both concrete and steel, meant that he was much in demand.

Many designs were produced in-house, but to develop the market he taught courses at the C & CA and the firm worked with many designers who came to them with ideas. Amongst the most notable of these were

long span hanger roofs at Heathrow Airport built with thin segmental plate girders. These were close to their buckling limit when being lifted, which was duly taken into account by a typically simple calculation.

Sadly, these hangers have recently been demolished when they should have been listed. Harris also developed the Intergrid system for school buildings, where triangulated grid components, small enough to be handled, were prestressed together with external tendons.

While working for PSC, he collaborated with Guyon on the analysis of indeterminate prestressed beams, where the problems of parasitic moments had to be resolved. Together they carried out tests in association with W. S. Atkins. Alan translated many French texts into English, including Guyon's books and several publications of Freyssinet.

In 1955 Alan went into private practice, being joined by his brother John and James Sutherland to establish the firm of Harris & Sutherland, where he remained Senior Partner until his retirement in July 1981. The firm worked on many innovative structures, including prestressed concrete trusses for hanger roofs at Gatwick Airport, the compression struts of which have very little steel, prestressed concrete pressure vessels for nuclear reactors at Oldbury, Hinkley Point B and Hunterston B power stations, and the hyperbolic paraboloid roof at the Commonwealth Institute in London.

As the material supply improved, economy of material became less important than simplicity of construction. Notable later structures included Coquet Bridge north of Newcastle, where all the tendons were concentrated in the flanges so the webs could be made from thin precast plates.

Alan had always taken a keen interest in education, not just to spread the word about prestressed concrete. He published widely and was an accomplished speaker, both at formal lectures and at after-dinner engagements. He took as much care with his stories as he did with his structures; carefully put together and crafted with the minimum of material, but to full effect. He could speak equally well to engineers or those with no scientific background.

He was actively involved with the Master's Course in Concrete Structures at Imperial College, which had been set up by A. L. L. Baker in 1948 to give advanced training to engineers who had missed much of their education because of the war. As a member of its advisory committee, Alan was on the selection panel to find Baker's successor; rumour has it that with none of the candidates finding favour with the panel, he became an interviewee, and left the meeting as the new Professor of Concrete Structures. He was responsible for ensuring that the course remained successful, and that it continued to keep its link to practical design as well as ensuring a solid grounding in theory. He remained a senior partner at H&S while at Imperial.

The ideas did not stop, even after retirement. He had always thought of prestressing as a principle, of which prestressed concrete was but one example. The perceived brittleness of ceramics could be overcome by the application of prestress and he knew that aircraft engines are limited by the temperatures in the hottest blades. Higher temperatures would be possible if they could be made from ceramics prestressed, as in a cart-wheel, by means of an external tension element away from the heat. The arrangement would also ensure that any failure of the turbine blade would cause the blades to exit through the jet exhaust which was a safer form of failure than if the blades flew radially. To demonstrate the system to aeronautical engineers not conversant with prestressing he built a small beam from bathroom tiles, prestressed with tensioned bicycle cables. Despite its ability to recover after deflecting alarmingly when loaded, the aeronautical engineers remained resolutely unconvinced. He spoke with feeling; 'Usually the demarcation lines between engineering disciplines have been too strong to permit of communication'.

He served on the boards of many organizations and was a keen supporter of the Institution of Structural Engineers of which he was President in 1978/9; he was awarded their Gold Medal in 1984. He was also Vice-President of the Institution of Civil Engineers and had been founder of the British Board of Agrément. He received the Michael Korn Award from the Prestressed Concrete Institute of the USA.

He was awarded the CBE in 1968, and was knighted in 1980 for services to the engineering profession. For promoting closer relationships between the profession in France and Britain he was awarded the Ordre du Mérite in France in 1975. Alan was always proud of the 'French Civils' and particularly the visits to notable structures arranged to be near equally notable French vineyards.

Harris will not become a household name, largely because few of his structures are monumental public buildings or bridges. His contribution though has been to his profession. There must be many engineers who remember discussions with him, which would invariably lead to 'Now look here, old boy' (irrespective of age); the cigar would be put in the mouth, out of the way; his hand would reach into his jacket pocket for his pen (always a fountain pen, never a pencil), and the nearest piece of paper would be covered with clear sketches. The conversation would usually end with 'and it would only need to be a few inches thick'. Alan's ability to visualize the way the forces acted in a structure, combined with the freedom to alter those forces by the skilful use of prestressing, was one of the keys to his success.

Alan is survived by his wife Mathé and their two sons.

CHRIS BURGOYNE