WARWICKSHIRE Industrial Archaeology Society

WIAS

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NEWSLETTER

FROM THE CHAIRMAN

As I write these notes at the start of a new Calendar Year, the gloomy predictions that the UK is yet to reach the peak of the pandemic make uncomfortable reading. Who would have thought twelve months ago that we would be faced by such a situation?

It is no comfort to those without internet access to hear all the information about Zoom lectures and the like, and we are conscious of the need to keep all informed of what has been happening. Indeed, many categories of individual links with WIAS have developed over the past nine months – those with full internet access who utilise website facilities and Zoom lectures to the full; those with internet access who use it only occasionally; those, perhaps resident outside the area, who have recently discovered WIAS and have enjoyed access to the website and ZOOM lectures; and those without internet access who rely on printed Newsletters such as this one. This has all sorts of implications for the way we operate, as well as making the funding of our operations more complex than in the past. How would we decide on a subscription/ donation that would be suitable for all these different categories?

The primary costs for WIAS in a normal year are room hire and speaker fees. The major costs in the current climate are subscriptions of various types (website facilities, AIA, BALH) and speaker fees for Zoom meetings. At the moment these are being met from the 'reserve fund', but the Committee continues to monitor the situation.

The news of the industrial heritage sector is not a particularly encouraging one, and it is interesting to hear of the efforts of other societies. Some have completely abandoned meetings for the time being, whilst WIAS seems busier than many. Mike Neville, in the recent AIA Newsletter confirmed the rather bleak picture for the sector, although, happily, he highlighted some encouraging signs.

Of these, not least is the first tranche of grants from the Culltural Heritage Recovery Fund to industrial heritage organisations, ranging from £13,200 for the Saltaire World Heritage Education Association to £717,400 for the Arkwright Society, with three industrial heritage organisations receiving grants of over one million pounds: the Black Country Living Museum; Ironbridge Gorge Museum Trust; and the London Transport Museum.

Specific projects have also seen progress. There is news of plans to re-use two important redundant textile mills. – the Lower Dens Works In Dundee and the Barkerend Mills in Bradford, both for residential purposes. Work has commenced on redevelopment of the Horlicks Factory in Slough, a factory built in 1908 to manufacture the patented malted drink, which was sold as a solution to 'night starvation', a condition that many of us seem to have experienced during lockdown!

The project to save Britain's last bell-foundry, Taylor's in Loughborough, has taken a major step forward with the announcement of a £3.45m grant from the National Lottery Heritage Fund (NLHF). Hemingfield Colliery (part of the Elsecar Heritage Action Zone) is one of a number of industrial sites that have been given national protection as part of a raft of new and updated listings by the Department of Culture, Media and Sport on the advice of Historic England..

Oxford's Rewley Road Swing Bridge – mentioned by Liz Woolley in her December talk to WIAS - carried the railway over the Thames. It is believed to be the earliest moving railway bridge in Britain to retain its original mechanism. Thanks to the Oxford Preservation Trust, who have raised over £900,000 for the project, it is to be restored.

True to form, it was not long before Derek Billings had sent me photographs from the 1980s of the Swing Bridge, captured during one of his Tuesday sorties to venues near and far accompanied by Peter Chater and others. This is an element of lockdown that I have sorely missed. Research at home has its place, but the experience of the site visit, perhaps the odd (innocent) trespass, and the opportunity to take photographs is something I eagerly anticipate post-Lockdown.

By then, of course, we shall be able to meet up again, and the gatherings at Warwick School can continue. I do hope all will avoid the virus in the meantime, and if any of the non-internet members have ideas about how we can better keep in touch, please let me know.

PROGRAMME

14 January 2021: David Skillen
The Bentley Boys
11 February 2021: Margaret Ingham
The UK's Forgotten Transporter Bridge and the Campaign to Save It.
11 March 2021: David Fry
Eighteenth Century Coventry Silkmen: Masters of the City's Industrial Universe.

Meeting Reports

September 2020: Roger Cragg
The Dale Dyke Dam

Roger Cragg has given many talks over the years, but this was a notable first – a Zoom presentation under lockdown. Precedents that we can only hope will be temporary but likely to be with us for some time to come.

Following on from his earlier talk (January 2018, Members' Evening. Newsletter 63.) about two continental dam disasters, the Dale Dyke Dam failure of 1864 was in England, and the country's worst ever in terms of fatalities.

To the East of Sheffield, the Dale Dyke runs into the Loxley River and thence into the River Don flowing through the city. Eight miles away the Dale Dyke was dammed by the Sheffield Waterworks Company to form a reservoir.

An earth embankment dam with a puddled clay core, 500 feet wide at its base, 12 at its top (perhaps too narrow?) and 95 feet high, it stretched 418 yards across the valley to contain some 3.2 million cubic metres of water. There was a 64-foot spillway and two 18-inch discharge pipes laid under the dam. Significantly, the controlling valves were on the downstream ends; a design fault that would prevent inspection once the reservoir was filled. The embankment itself was formed in material, some 400,000 cubic yards, from within the reservoir site; it was porous, thus placing a undue reliance on the clay core. This core, at only 12 feet thick at the base tapering to 4 feet at the apex was perhaps too thin as well.

Construction began in 1859 with a planned completion time of 2 years but problems with ground water and the puddled clay core delayed completion by some 3 years. Not least of the problems was the need to extend the core to a depth of 60 feet to bedrock.

By Friday 11 March 1864 the reservoir was almost full with the water level only inches below the spillway. Heavy rain and melting snow had made significant contributions. On that day, John Gunson, the resident engineer, decided to visit the dam. A strong westerly wind was forecast, and he wished to check the dam although there was no suggestion that he thought there was any danger to the structure. He made an extensive tour of the works but did not walk along the top of the dam as the strong wind was blowing spray over it. He left the site at about 5.30 pm.

Shortly afterwards, at about 7.00 pm, a navvy walking along the dam noticed a horizontal crack across the outer face of the dam about 10 feet below the crest. Gunson was summoned back, arriving about 10.00 pm. In the meantime the outlet valves had been opened in order to reduce the water level but at around 30,000 gallons a minute it would have taken 16 days to empty the reservoir!

On his arrival, Gunson ordered that a gap be blasted in the spillway wall but damp gunpowder would not ignite. An inspection of the crack was carried out and it did not appear to have worsened. However, it was then noticed that water was running over the top of the dam and into the crack. This report is difficult to reconcile unless there had been some settlement of the dam crest or that the waves were particularly violent. Whatever the cause, the water rapidly eroded the dam crest and complete failure swiftly followed. The time was 11.30 pm, the worst possible time with most people in bed.

Contemporary engravings showed a gap about 300 feet wide and 80 feet deep, some 25% of the embankment, torn in the dam. The released wall of water, up to 50 feet high, rushed down the valley at a pace estimated at 30 mph carrying with it large boulders up to several tons in weight and obliterating everything in its path. Luckily, a few people living very near the dam had been warned and had left their homes for higher ground and survived although houses and farms were destroyed. Those living further down the valley, mostly in bed and asleep, had no prior warning.

Photographs showed the extent of the damage and destruction. Houses, factories and mills destroyed by the deluge in the valleys of the Dale Dyke and the Rivers Loxley and Don. By the time the water reached Sheffield the wave was still about 20 feet high and enormous damage was caused to premises along the Don and even the Midland Railway station was inundated before the flood dissipated on the East side of the city.

The final death toll is still uncertain but the official sources indicate 238 but others are slightly higher. 111 buildings were destroyed, 293 seriously damaged and 4,267 damaged or flooded. Livestock losses of 700 added to Britain's worst dam disaster.

The massive clean-up began at once as did the inquest, which was adjourned until 23 March, whilst the Government was requested to appoint an Inspector to assess the works and give evidence. An eminent Civil Engineer, Robert Rawlinson was appointed and later joined by Nathaniel Beardmore. The coroner, the Jury and later Rawlinson visited the site ahead of a two-day hearing where only five witnesses, all engineers, were called. The five were: John Leather, the designer of the dam; John Gunson, the Resident Engineer; Thomas Jackson, a local Civil and Mechanical Engineer; Rawlinson and finally Beardmore.

Hard questions were asked regarding the design and construction of the dam, especially around the puddled clay core, the twin outlet pipes and the way the main body of the dam had been laid down and compacted, or not depending on individual viewpoints. Rawlinson was particularly critical regarding the outlet pipes lying on the puddled clay, possibly leading to settlement and leakage, placing the valves downstream, lack of compaction and an inadequate spillway.

The jury's verdict was damning, and had far reaching consequences: "We find that…in our opinion, there has not been that engineering skill and the attention to the construction of the works, which their magnitude and importance demanded; that, in our opinion, the Legislature ought to take such action as will result in a Government inspection of all works of this character; and that such inspection should be frequent, sufficient and regular…".

Rawlinson's final report to Parliament reiterated his criticisms. However, there has been no agreed answer for the dam's failure although all the factors outlined above play their part. Unfortunately for the Waterworks Company, a clause in its constitution obliged it to pay compensation as a result of its activities. It paid out £275,000 in compensation, and after rebuilding its costs amounted to £422.380. New shares and mortgages were needed and an unwelcome 25% increase in the water rate was finally agreed for a period of 25 years.

Perhaps of greatest importance was the jury's recommendation for the frequent inspection of dams and reservoirs but this was not taken up by Parliament until after a further failure in 1925 at Dolgarrog led to the Reservoirs (Safety Provisions) Act of 1930.

October 2020: Alain Foote

Industrial Archaeology Highlights of a round-the-world trip in January and February 2020.

For our second Zoom talk Alain Foote took us far from Warwickshire with glimpses of IA in far distant places seen on a round-the-world cruise enjoyed just before the Covid clamp down. Across the Atlantic to the Caribbean, through the Panama Canal, up the West coast to San Francisco and across the Pacific to New Zealand before flying home. Quite a trip to remember.

Barbados does not spring to mind for its IA but the sugar plantations needed efficient transportation and power to drive the crushing mills. The St Nicholas Abbey Heritage Railway with its museum and rum distillery uses rolling stock from many sources including locomotives restored in the UK. A ride on the footplate provided interesting video material.

The Morgan Lewis Windmill was built to drive one of the many sugar crushing mills on the island. Gifted to the Barbados NT, it remains one of the two working sugar windmills in the world. Whilst touristy now it evoked uncomfortable thoughts of the past.

Curacao is home to an unusual pontoon bridge crossing St Anna Bay. Hinged at one end while at the free end two diesel engines drive it open and shut. Now pedestrian only it is known as the swinging old lady.

The city's maritime museum is housed in an old colonial mansion and covers more than 500 years of maritime history. The eclectic collection includes models, artillery pieces and ship's figure heads.

From Curacao the transit of the Panama Canal provided much of technical interest. The electric mules running beside the canal only provide lateral control and braking in the locks, the ship's main propulsion system is used for forward motion. Again, we enjoyed some excellent and informative video footage. A large container ship using one of the new locks gave an indication of scale. Towards the Pacific exit Herman the German, a giant floating crane now used for lock gate maintenance was a long way from its original WW2 origins of U-Boat maintenance and then 50 years work in the Long Beach Navy Yard in California.

The cruise up the Western seaboard ended in a misty San Francisco where WW2 maritime history was recalled with the restored Liberty Cargo Ship, SS Jeremiah O'Brien, and the Baleo Class submarine, USS Pampanito.

The former was one of the 2,710 Liberty Ships produced by the US during the Second World War. She was built in 56 days in 1943 at the New England Shipbuilding Corporation in South Portland, Maine. She made 4 round trip convoy crossings and 11 English Channel crossings to support the invasion. Taken out of service in 1946 she was mothballed until 1979 when she was acquired for preservation. She was restored to sea going condition in time to take part in the 50th anniversary of the D Day Landings.

The Pampanito's keel was laid down in March 1943, she was in service until 1971 and turned into a museum in 1975.

Another dockside point of interest was the Pier 43 Arch leading to a decorated hoisting tower for loading and unloading rail cars on and off ferries. It was built in 1914 to serve the Belt Railroad.

Elsewhere, visitors could enjoy tours on a Mack Fire Engine, examine a steam powered 1912 motor bike or ride on an F Line Streetcar.

Even shrouded in mist, the Golden Gate Bridge has to an abiding memory of San Francisco. Until 1964, when it was overtaken by the Verrazano-Narrows Bridge, it had the longest suspension bridge main span in the world at 4,200ft.

After crossing the Pacific, landfall was made in Auckland where the Museum of Transport and Technology (MOTAT) provided many examples of New Zealand's industrial heritage.

MOTAT is based on two sites. MOTAT 1 is centred around the site of a beam engine house that originally provided Auckland's water supply whilst MOTAT 2 (some 2km away) houses a large aviation collection and a demonstration railway. The two sites are linked by a dual gauge tramway.

The Western Springs Pumping Station was commissioned in 1879. Prior to its construction Auckland had suffered water shortages and losses from fires but enjoyed substantial benefits thereafter. The Woolf Double Compound engine was built by John Key & Sons of Kirkcaldy and the pumps served Auckland until 1910 when adequate water from the Waitakere Ranges became available.

MOTAT 1 also houses a wide and interesting collection of engines that are regularly steamed whilst outside are the heritage trams used on the link to MOTAT 2, home to the Sir Keith Park Memorial Aviation Collection. Park will be always recognised for his leadership in the Battle of Britain but his gallantry in WW1, when he won two MCs and a DFC, may be less well known.

The collection, amongst many other interesting exhibits, includes two Short flying boats, a Sunderland Mark V Flying Boat that served with NZAF and a Solent Mk IV, once used on the iconic Coral Route from Auckland to Fiji. A MkVII Lancaster, was built in 1945 but which didn't see war service, instead she passed to the French Navy as a maritime patrol aircraft.

Another railway experience was on the narrow-gauge Driving Creek line at Coromandel running through tropical rain forest to Eyefull Point with views over the coast.

Moving on to Napier, The Hawkes Bay Museum of Technology's Faraday Centre is housed in the original power station for the city's tram system. It is another remarkable collection of artefacts, including one of the English Electric Fullagar diesel engine and generator sets. Napier was also hosting an Art Deco Festival at the time with plenty of suitably restored cars to examine.

The Glenbrook Vintage Railway provided another footplate ride from Glenbrook to Waiuku and a workshop visit on the way to the Kauri Museum at Matakohe. This museum tells the story of the Kauri tree. Providing strong, straight-grained timber with few branches, it was valued for ship's masts, as a construction material and for high-end furniture. The museum contains a working replica of a sawmill plus many other mechanical items.

Finally, The Auckland War Memorial Museum, housed in a neo-classical building, has three principal collections: Documentary Heritage, Natural Sciences and Human History. Perhaps of most interest to WIAS members was the oldest extant RR Merlin engine (a sectioned model F from 1937) and a Mitsubishi 'Zero', reckoned by many as one of the most capable fighter machines flown in WW2.

Clearly, a trip to remember and a welcome relief from lockdown blues.

November 2020: John Berkeley OBE
E Crossley & Son, Aircraft Constructors of Banbury.

John Berkeley had talked briefly at an earlier meeting about the aeronautical ambitions of members of the Crossley family. In this presentation he gave the full and fascinating history of E Crossley and Son: Aircraft Constructors of Banbury.

As always with John's talks it was liberally illustrated with a wealth of contemporary photographs and punctuated by telling anecdotes.

The story began in Stockport, Greater Manchester where the Crossley Brothers (William and Francis) founded an engineering company in 1857. Two years later the world-wide manufacturing rights for the gas and oil engines invented by Otto and Langen were acquired.

Crossley prospered but their sights were set on further diversification. Crossley Motors was formed in 1906 and quickly made its mark, with high quality vehicles.

With the outbreak of the First World War, the Company was well-placed to respond to entirely new challenges. Many Crossley products saw service in just about every theatre of war. And not just cars; by 1917, Crossley Motors had been selected to establish National Aircraft Factory No.2, with contracts to build De Havilland DH.9s and DH.10s.

In 1920 Crossley Motors acquired a controlling interest in the Avro company, which was later sold to Armstrong Siddeley Motors. These encounters with aviators and aircraft had their effect on the Crossley family. William Crossley's second son Eric moved South to develop the family's farming interests in Oxfordshire and set up home at Tadmarton House, near Banbury.

His son Michael, after leaving Eton in 1930, had taken an aeronautical engineering course at the Chelsea College of Aeronautical and Automobile Engineering at Brooklands during which, at the age of 20, he obtained his Royal Aero Club certificate and worked for a while for the flying club.

The Flying Flea was a curious episode in the explosion of light aircraft design in Europe in the interwar years that captured the public imagination. In 1934 a Frenchman, Henri Mignet published a book, *'Le Sport de l'Air'* in it he claimed that *'if you can nail together a packing case, you can construct your own aeroplane'*. And he proceeded to give detailed plans and instructions to build Le Pou de Ciel or Flying Flea. Many enthusiasts on the continent and in England (where 3,000 copies of the first translation sold within weeks) began to build these tiny tandem-winged machines, including many in the Midlands.

Surely, amongst the most unlikely Flea builders were a father and son team of Old Etonians on their country estate, who could very easily have afforded to purchase their own aeroplanes and yet that is what Eric Crossley and his youngest son Michael began in 1935.

At Tadmarton House there was a row of single storey wooden buildings near to the main house and the sign on the door of one of these said it all: 'E Crossley & Son, aircraft constructors, Workshop Foreman A. Edwards'. (nothing is known about him and it may have been a tongue-in-cheek joke!.).

At nearly sixty, Eric could have been taking it easy, yet photographs show him playing an active and, quite possibly, leading part in the project. Indeed, it was in his name, rather than Michael's, that their aeroplane was eventually registered with the Air Registration Board in March 1936 as G-AEFF.

Meanwhile, following a brief career as an assistant director at Elstree Film Studios, Michael had joined the RAF on a short-service commission. Although Eric continued work on the Flea, three fatal accidents occurred early in 1936 and wind tunnel tests showed the design to be seriously flawed. Many Flea builders simply gave up and with the cancellation of its registration it had always been assumed that construction of the Crossley's aircraft had simply been abandoned like many others.

Despite the setback, Eric consoled himself with the purchase, in January 1937 of a Kronfeld Drone, a type of powered glider, and gained his Royal Aero Club certificate. Michael was determined to press ahead with another homebuilt project and, almost immediately, set to work on a project of his own, a single-seat, high-wing, all-wood cabin monoplane, presumably to be built at Tadmarton.

The first construction drawing, showing the general arrangement of the fuselage, was dated November 1936, just a few months after the official withdrawal of Permits for all Flying Fleas. The small machine was appropriately named the Crossley Tom Thumb.

After serving as aide-de-camp to the Governor of Aden, Michael returned to Britain when other more serious events arose. He re-joined 32 Squadron, flying Hurricanes in the battle for France and then the Battle of Britain. Shot down twice he totalled at least 20 'kills'.

The squadron was now officially recognised as Fighter Command's most successful unit, with 102 enemy aircraft to its credit. Michael was promoted to Squadron Leader and CO. When the unit was relocated north to be 'rested' he was the highest scoring 'ace' in Fighter Command with a DFC and DSO.

He was having a good war, highly regarded, yet with a wry, sense of humour, well shown in his diary where a printed label was completed as follows: "Full name: 32(F) Squadron. Private address: Biggin Hill. Business address: Anywhere South of the Thames. Occupation: Discouraging Nazis.".

In June 1941 Michael was posted to the British Air Commission in the USA to evaluate and test fly the North American Mustang for the RAF. Apart from the Mustang he also flew twelve other American types.

Returning to the UK he commanded various units before leaving the RAF as a Wing Commander in 1945. He and his father then decided to emigrate to South Africa and the partly completed Tom Thumb was sold to Corrie Hanbury in Coventry. Hanbury's application for some birch plywood led to enquiries as to whether he or Crossley were approved designers and had the aircraft been inspected during its construction.

Frustrated, Hanbury eventually gave the plane away and later it was gifted to the recently established Midland Aircraft Preservation Society where it was misidentified as an ABC Robin. This was an understandable mistake, there were many similarities. The only Robin built (and later scrapped) was at Brooklands when Michael was studying there. It had a striking colour scheme and there would have been ample opportunity for detailed examination.

John also wondered whether Michael might have flown the Crossley-built Flea from the private aerodrome at Tadmarton. It would have been a great temptation.

It is also to be hoped that someone will complete his little aeroplane, one of the oldest surviving home-designed and homebuilt ultralight aeroplanes in Britain. That would be a fitting tribute to an outstanding airman and the Tom Thumb would remain the sole product of Banbury's aircraft industry.