TICCIH Bulletin

THE INTERNATIONAL COMMITTEE FOR THE CONSERVATION OF THE INDUSTRIAL HERITAGE

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The new north hotel of the restored and repurposed TWA Flight Center in JFK airport, New York, Eero Saarinen's masterpiece of expressionist architecture, with a 1958 Lockheed Constellation airliner which has been salvaged and converted into a cocktail lounge. (See page 6; Image Credit: TWA Hotel/David Mitchell)

MEMBERSHIP NEWS

TICCIH PRESIDENT'S NEW YEAR MESSAGE

Dr Miles Oglethorpe

On behalf of the TICCIH Board, it gives me great pleasure to wish you a Happy New Year and also a Happy New Decade. The arrival of 2020 signals the onset of exciting times for TICCIH with a new membership system designed to attract more members and to address new geographies. With this in mind, I urge all of you to renew your TICCIH membership now by **clicking here**, and also to encourage colleagues to join and former members to renew. The new online **TICCIH Membership Directory** lets us add photos, information on our work and professional interests, present research programs or launch projects. We have much work to do, and a central plank is going to be developing a new international members' network through which we can better harness and share our expertise.

At this point, it's important to reflect on the fact that our future is based on the solid foundations laid down by my fellow Board members and predecessors, not least Stephen Hughes, who at the end of last year stepped down as Secretary General after over eight years' service. We are much indebted to him for his enthusiasm and expertise, in ensuring our compliance as a charitable organisation but also as a professional industrial

MEMBERSHIP NEWS

Miles Oglethorpe signing the agreement with TICCIH Russia, Inna Krylova and Margarita Kuzovkova

archaeologist and scholar. His promotion of our thematic studies has been particularly important, together with the positive relationship he has nurtured with our partner, ICOMOS.

A loss though he is to TICCIH, Stephen is not going far and will continue to work on industrial heritage in various guises. Meanwhile, I am delighted to be able to welcome Prof. Dr. Marion Steiner who has agreed to take on the role of Secretary General. Marion is associate professor at the Instituto de Geografía of the Pontificia Universidad Católica de Valparaíso in Chile. This brings several new opportunities, not least a greater global reach, cementing relationships between Europe and the Americas, and stronger academic ties. Indeed, Marion was able to fly the flag for the Board at the recent TICCIH Latin America congress in Guatemala (with Jose Manuel Lopes Cordeiro) and was instrumental in driving our membership reforms.

More generally, I am very grateful to all members of the Board. Without citing everyone individually, I should mention our Treasurer, David Worth, who has helped with our secretarial transition. Massimo Preite has continued to support our European projects and again worked closely this year with ICOMOS on World Heritage issues. Our three Life Presidents are also continuing to deliver invaluable guidance and support. Meanwhile, other Board members have lent support by representing us at conferences in China, Spain and Iran (special thanks to Jaime Migone Rettig). We have also been able to contribute to excellent events such as BIG STUFF in Katowice and INCUNA's outstanding annual conference in Asturias (with Florence Hachez Leroy). At the same time, we have been attempting to emulate the success of TICCIH Latin America in Europe and are signing a Memorandum of Understanding with ERIH, the European Route of Industrial Heritage, whose recent conference is reported below. Progress is also being made with the Asian Route of Industrial Heritage.

Our advocacy work has continued, with contributions to a number of controversial cases where industrial heritage has been under threat, more often than not with a successful outcome. These have included a nuclear power plant in Sweden, a famous cast-iron building in India (see Bulletin #85), an engineering works in Hungary, a shipyard in Poland, a steelworks in Germany, and, with our friends in EFAITH, a coal preparation plant in Belgium.

Perhaps the highlight of 2019 was being able to welcome Russia back into the TICCIH family. Together with Florence Hachez Leroy, I was fortunate to attend the annual Culture Summit in St Petersburg at which we signed a national agreement with TICCIH Russia. Short tours of the city provided a reminder of the enormous scale, variety and quality of industrial heritage in the Russian Federation, and I hope many TICCIH members will be able to attend the TICCIH Russia congress due to take place later this year in Nizhny Tagil, the home of our 2003 Charter. We receive notes of interest from other countries wishing to establish national committees, the most recent being Egypt and Morocco. If we are to continue to attract new blood and broaden our expertise, we need to extend our global and demographic reach, so new members such as these are vital.

Another highpoint of the year was welcoming TICCIH Saudi Arabia. It was tremendous to be able to meet colleagues in the Ministry of Culture, and with their generous support (and of Saudi Aramco), there is to be a major event in Dharan from 8-10 March focusing not only on the industrial heritage of the Kingdom, but also from many countries across the region.

One of the drivers for this event has been TICCIH's thematic study of the oil industry which will come to its conclusion at a workshop in Oil Springs, Ontario on 7-9 May, supported by Fairbank Oil Fields, (see page 24). The purpose of the event will be to assess and then celebrate the completion of the study, and to see the historic oilfield itself.

In the meantime, thematic studies other than oil are also in the pipeline, not least textiles, the strands of which are coming together at an event this year in Berlin in 23-25 April, and which should finally be woven next year in the Polish city of Lodz. Other studies are also under discussion with ICOMOS, and we look forward to receiving suggestions from our members.

One focus of our efforts this year is going to be ICOMOS, whose new Industrial Heritage Scientific Committee continues is likely to emerge at the October 2020 General Assembly in Sydney, Australia. We are working closely with our Australian colleagues Iain Stuart and the new ICOMOS Australia President Helen Lardner to ensure that there is a significant industrial heritage component in the programme. This offers us the opportunity to learn from ICOMOS, in particular its impressive Emerging Pro-

fessionals, Climate Change and Sustainable Development Goals (STG) initiatives.

For TICCIH, our next **General Assembly and congress** is going to be from 30 August to 4 September 2021 in Montreal. Preparations for this important event are continuing under the direction of Lucie Morisset. Please watch for news as the programme takes shape, and to plan ahead so that you can be there.

Finally, as we embark upon this new decade, I must acknowledge the invaluable support of two organisations without which we would not be able to function. These are my employer, Historic Environment Scotland, who continue to accommodate and resource my work as TICCIH President, and Michigan Technical University, where our secretariat is based, overseen by Daniel Schneider, with continuing invaluable input from our past President, Patrick Martin.

TICCIH HQ

NOTES ON TICCIH'S NEW MEMBERSHIP SYSTEM

Daniel Schneider, TICCIH Headquarters

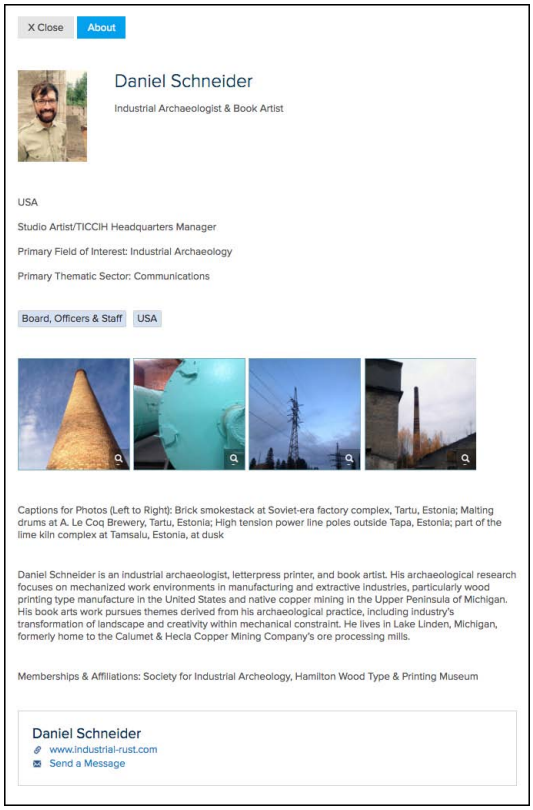
TICCIH's new online membership management system is up and running. If you haven't done so already, now is the time to go to the TICCIH web site, renew your membership for 2020, and set up your online profile.

The new system promises to help members find others with common interests, research or projects, and to be a useful tool in TICCIH's ongoing and renewed effort to maintain and grow a robust, engaged, and interconnected organizational membership.

For members, one advantage of the new system is a more streamlined, straightforward online registration and renewal process. More exciting is the new online member directory the system facilitates, which allows members to develop and share profiles detailing the nature of their work and engagement with the industrial heritage.

I have included a screen shot of my directory profile as an example. It displays my field of interest and thematic sector, a detailed description of my work, a list of my affiliations, a contact form, and a link to my web site. Members can also include links to their social media accounts and other information. The photographs currently on my profile are industrial heritage related images from Estonia, where I spent September through November of last year in an artist's residency in Tartu.

You can set up your profile at the time of your registration, or log in to your account to set it up at a later time. Most of the setup process is fairly straightforward, but I'll soon send an explanatory email to current TICCIH members to help with some of its less-intuitive aspects.



The online directory is password protected and accessible only to TICCIH members. Once you are logged in to your account you will be able to view your TICCIH colleagues' profiles. The directory is searchable by country, field of interest, and thematic sector to help you connect with members who share your interests or geography.

From my perspective here at headquarters, the new system's major advantage is it effectively replaces me with a robot with respect to member database management and some other clerical tasks, freeing time for more interesting work.

AUSTRALIA

THE ENVIRONMENTAL IMPACT OF THE AUSTRALIAN GOLDFIELDS

Dr Iain Stuart, JCIS Consultants

The recently published paperback Sludge: Disaster on Victoria's Goldfields by Professor Susan Lawrence and Peter Davies is a popular account of the findings of the research into the ecological impacts of gold mining in the State of Victoria, Australia, undertaken by the team from La Trobe University.

Students of world history will recall that after the rush to the Californian goldfields in 1849, unsuccessful 49ers returned to Australia armed with the knowhow of surface alluvial mining and empty pockets, and discovered the rich alluvial deposits in New South Wales and Victoria. This set off a period of gold rushes which included mass-migration to Australia of people from all over the world: Great Britain, Germany, USA and China, which totally dislocated the administration of both colonies. Following alluvial mining there was a longer period of exploitation of quartz reef mining and exploitation of deep leads of buried, but gold rich, alluvium. All this is covered in an entertaining and engaging history by Geoffery Blainey, The Rush that never ended: A History of Australian Mining, first published in 1964 and seldom out of print. The book is one of those classic histories, rarely surpassed for its readability and its research. Blainey's work, of course, reflects a sense of progress and development in mining which, while acknowledging its environmental impacts, is focused on the mines themselves.

For her doctoral work, Susan Lawrence looked at the archaeology of a poor man's diggings at Dolly's Creek before working on Whaling and Sealing and Urban Archaeology as well as co-authoring an overview of historical archaeology in Australia, An archaeology of Australia since 1788, with Dr Peter Davies. Their discussion on the environmental impacts of mining written in c2010 reflects the standard treatment of the topic in a broad scale overview work. Yes, there was some impact, sludge is mentioned twice, but generally the coverage is reflective of the state of overall research.

A decade later all this is overturned by a research program that began looking at water on the goldfields and then turned to where the water went after being used, which leads to the sludge question. This work is a summary of the fifteen or so papers published by Lawrence and her collaborators since 2012. Sludge: Disaster on Victoria's Goldfields draws on this research written in a popular and accessible vein to present an important part of mining history. Sludge was the colloquial word for the thick, semi-liquid slurry of sand, clay, gravel and water that discharged from the locations of

Washing sludge in a timber race at Mitta Mitta, Victoria, c. 1896 (SML Corporation)

mining operation into the catchments downstream. As they note 'Sludge is the dark side of the gold rush'. For all the wealth and its positive impact on the course of Australian history the authors demonstrate the cost and part of that cost was the impact of sludge in the environment.

Sludge was generated by various processes of mining, in particular sluicing and puddling of alluvial deposits and later hydraulic sluicing and dredging. The aim generally was to mobilise the sediment with water to extract gold. Being liquid, the sludge could be conveniently discharged downstream onto other mines, into streams until, choked with sediment, the sludge ran out from the gullies onto adjacent farmland.

Sluicing was the earliest form of gold mining and the technology was simple and inexpensive – gold panning is a form of sluicing. However, it soon developed into wooden cradles and sluice boxes. In a dry continent, water was a critical factor of production and initially lack of water was a limitation on mining. However, as Lawrence and Davies demonstrate, miners soon constructed races and dams to take water from streams to the mining areas. This in itself raised a number of concerns mostly around water rights and how these were acquired and administered. As in America, the notion of water rights was rooted in English common law rights which proved to be inadequate to deal with the issues raised by intensive mining. The law was dragged by legislation, local mining laws and precedents and the occasional fist fight into some sort of order. The colonial government also acted to construct dams and races to provide water to the Goldfields both for drinking and for mining use. Mining used water for sluicing, puddling, processing gold rich ores and, surprisingly, given the unreliability of the source, for water wheels.

All this was, so to speak, at the top end of the catchment – the water had to go somewhere once used and downhill it went with all the sediment forming the sludge problem. Firstly, the sludge choked

the creek valleys, changing the hydrology as the sludge filled the meanders and pools and then in times of flood water cut straighter channels through the sludge. Secondly, the sludge spilled out of creek beds onto the adjoining flats covering agricultural land with a thigh layer of clay-rich sediment, without the usual properties that allow soil to be cultivated. Lawrence and Davies recount the case of one Jaques Bladier who, despite building levee banks to protect his vines and orchards from the sludge coming down Epsom Creek from the mines at Bendigo, saw his 'beautiful and verdant gardens' covered in choking sludge. The authors quote what they see as an authoritative contemporary source as estimating 132,000 cubic yards of sludge were discharged into Bendigo Creek daily!

Worse still, once the sludge arrived there was little to do: it remained, and is still there. One of the illustrations in the book shows Peter Davies standing in a gully at Tarrawingee with an exposed section showing at least 1m of sludge.

Again, the existing common law rights (trespass to land) were totally inadequate to prevent the damage, compensate and prevent further problems. Those affected naturally turned to their elected legislators to enact legislation to improve the situation. Lawrence and Davies document in painful detail how vested interests in mining (it's good for the State) resisted attempts to improve what most on the ground saw as a massive problem until at last legislation was established for sludge abatement. Ineffective at first but gradually gaining more powers (and skills and expertise in sludge management), but the process took 20-30 years. Hardly a great precedent for the sort of legislation and co-operation needed today to deal with environmental problems such as climate change.

I suspect the authors think so too – the book opens with a discussion of the 2015 failure of a tailings retention dam at Bento Rodriques in Brazil sending sludge throughout the valley. The work closes with a thoughtful discussion of why the sludge issue has been overlooked in mining histories and in heritage interpretation, and also discussing the broader influence that the legislative control and management of sludge has had on environmental legislation in Victoria and in the rest of Australia. Thus, this historical work is situated in the context of present environmental concerns.

The TICCIH Bulletin and industrial heritage in general has often been accused of having an overly positive, almost Whiggish, attitude toward the industrial past and its relics. Although my view is that this is generally an unfair characterisation of the discipline, you can also see in some literature how that impression can be made. Sludge is an elegant refutation of this claim. The evidence is presented and interpreted and the impact of mining on the environment is clearly demonstrated. Sludge is an example of an industrial archaeological study that addresses the impacts of industrial process on the environment.

What also needs to be emphasised is that the underlying research project Rivers of Gold from La Trobe University uses historical research, industrial archaeology, geomorphology and environmental chemistry, linked by GIS, to find out what happened to the rivers as a result of mining activity in their catchment. This is not simply a study on the desktop but a collaborative inter-disciplinary research project with extensive fieldwork. This is clearly a model of the sort of research team that is needed to look at the environmental impacts of industry.

On the theme of environmental impacts of industry, reading Sludge makes me wonder about other gold mining areas and periods as well as other mining industries (for example coal mine dumps) and what hidden histories may be found with further research into their industrial heritage.

Sludge: Disaster on Victoria's Goldfields by Susan Lawrence and Peter Davies is published by La Trobe University Press in conjunction with Black Inc, Carlton, Vic and is available through the usual online booksellers.

USA

TRANSFORMING SAARINEN'S TWA FLIGHT CENTER

Miriam Kelly, accredited conservation architect and Principal at Beyer Blinder Belle Architects & Planners LLP, New York

The TWA Flight Center, designed by Eero Saarinen & Associates for Trans World Airlines at JFK International Airport in New York, is one of the most significant examples of mid-century modern architecture. Completed in 1962, the Flight Center is a symbol of the expressive idealism of the 1960s and embodied design innovations that contributed to the development of air terminal planning and commercial air travel worldwide. Abandoned since 2002, the building has been restored and the site repurposed as an airport hotel.

New York City entered the modern age of commercial aviation in 1938 when the first passenger flight service was established at North Beach (now LaGuardia) Airport. Two years later, a 1,600-acre site for New York International (now John F Kennedy) Airport was purchased by the City and by 1948 the size of the airport had quadrupled. In 1955, a Terminal City was developed comprising a central international arrivals terminal with seven smaller terminals for individual airlines arranged around a landscaped plaza. Each airline designed its own terminal, with the opportunity to define its own corporate identity. The first completed building of Terminal City was the International Arrivals Building designed by Skidmore Owings & Merrill (SOM) in 1957. Eero Saarinen's TWA Terminal was the last of the airline terminals to be completed, marking the completion of Terminal City in 1962.

Commissioned in 1956, the TWA Flight Center was one of architect Eero Saarinen's last designs and perhaps his most revolutionary. It was his intention that the Terminal express 'the excitement of travel… as a place of movement and transition.' In its break from the orthodoxy of Modernism, the TWA Flight Center contributed to a revival of architectural expressionism in the 1960s and was one of the earliest free-form concrete buildings. Saarinen's collaboration with structural engineers, Amman and Whitney, pushed the boundaries of sculptural concrete and pioneered the development of thin-shell construction. Structurally, the Terminal is highly innovative, utilizing a system of four independent, segmental concrete lobes fully supported by only four piers forming a shell 50 ft high and 315 ft long. A dense waffle slab structure with pile foundations rests on three sub-grade post-tensioned ties. A center plate positioned in the middle of the roof is the only structural connection between the four lobes separated by skylights. Ten million pounds of concrete was required for the roof in a continuous pouring process lasting five days.

The interior of the building comprises a large vaulted space and flowing expressionist forms that are a direct extension of the exterior sculptural shell. The building is enclosed by glazed curtain walls supported from bow trusses of different lengths and angles as they follow the curve of the roof above. The east window forms a generous viewing gallery, giving passengers a panorama of the aircraft on the tarmac beyond and generating a sense of anticipation. The two flight tubes dramatically puncture the elevation through articulated sockets in the concrete piers. The flight tubes connected the main building to two satellite departure terminals from which passengers boarded the airplanes.

Saarinen also implemented a distinct 'systems approach' to carefully analyze each design problem and find a unique architectural solution. Thus, the Flight Center embodies numerous innovations that pioneered planning and technological advances in the design of air terminals and which continue to influence the design of airports. From the very form of the building- the now common 'satellite' plan where aircraft gates are clustered around structures built on the runway ramps away from the terminal-to equipment such as jetways, baggage carousels, electronically controlled doors and the huge split-flap Solari boards that automatically updated flight information, the technology of the TWA Flight Center was pioneering for its time and helped define airline terminals as we know them today.

Conceived immediately before the advent of the jet age, the TWA Flight Center was designed for smaller aircraft and became effectively obsolete within a decade of its completion. Between 1955 and 1962, the number of passengers at New York International Airport (now JFK) increased from 3.5 million to 11.5 million and when the TWA terminal closed in 2002, had increased to 30 million passengers. The terminal underwent numerous modifications in response to the rapidly changing aviation industry including the removal ofseveral important architectural features. Over the years, metal detectors and x-ray machines, entrance vestibules and baggage handling extensions were added to the building, further compromising Saarinen's design. However, the size and inflexibility of Saarinen's thin-shell concrete structure did not lend itself to adaptation and the building was abandoned in 2002 and threatened with demolition.

For the decade after its closure, Beyer Blinder Belle Architects (BBB) worked with the Port Authority to help stabilize and protect the Flight Center and advise on its redevelopment. BBB

Approach to the restored TWA Flight Center, 2019 (Photo credit: Image Credit: TWA Hotel/David Mitchell)

prepared the Historic American Buildings Survey (HABS) documentation and successfully nominated the TWA Flight Center for the U.S.'s National Register of Historic Places. In 2007 and again in 2012, the Port Authority issued formal Requests for Proposals for the development of a hotel at the TWA Flight Center site. After a nine-year search, the developer MCR/Morse Development was designated in 2015.

The restoration of Saarinen's TWA Flight Center is the cornerstone of the $265 m TWA Hotel project. Structures added to the original building after 1970 were demolished to restore the original footprint and create space for the new hotel wings. Inside the terminal, inappropriate additions were removed and Saarinen's original interiors (including theAmbassador Clubdesigned together with Florence Knoll and Charles Eames) meticulously researched and restored. Lost restaurant interiors by mid-century designers Raymond Loewy and Warren Platner were reinterpreted in new designs. New uses for the Flight Center echo the original program, comprising check-in, lounges, restaurants, retail and a new passenger gateway to JFK's Terminal 5. Interpretation exhibits presenting the history of TWA, Saarinen and the Mid-century modern design movement are featured throughout the building.

The 512-room hotel buildings are set behind the Flight Center beyond the view from inside the Flight Center, flanking the two flight tubes. The siting was made possible by removing the two 1970 baggage handling extensions from the north and south wings on the airside. The hotels are constructed of thin slab concrete and with a dark gray glass curtain wall to provide a neutral backdrop to the sculptural Flight Center in the foreground. Because the hotels are located adjacent to active taxiways, the curtain wall has been designed as a triple-glazed assembly consisting of seven layers of glass to act as an acoustic barrier. The roof of the north hotel holds a 1.3 MW co-generation plant, allowing the TWA Hotel to operate off the grid. The rooftop swimming pool and observation deck on top of the south hotel is a plane-spotters' paradise overlooking the active runways of one the world's busiest airports. Open space between the Flight Center and the hotel wings has been developed as gardens and

Interior of the TWA Flight Center looking out towards the tarmac and the restored 1958 Lockheed Constellation airliner, 2019. (Image credit: Photo Credit: TWA Hotel/David Mitchell)

The TWA Hotel, 2019 (Photo credit: Image Credit: TWA Hotel/David Mitchell)

outside seating areas.

The subterranean conference and event space is located 29 feet below the Flight Center's airside tarmac. The two-story facility contains a total of 45 meeting rooms arrayed around a 7,000 SF ballroom. A restored 1958 Lockheed Constellation airliner retrofitted as a cocktail lounge is located on the tarmac above the events center, designed to recall the original airside tarmac and completing the view from inside the Flight Center. The original flight tubes are restored to provide access from the Flight Center to the hotel and conference center, reflecting the original 1962 circulation to the departure gates. All components of the project - Flight Center, two hotel buildings and the events center - are connected via a series of underground service tunnels.

The overarching design approach for the project integrates contemporary technology and programmatic requirements while restoring the integrity of Saarinen's landmarked structure. The project totals 392,000 SF of which 129,000 SF is restored space inside the Flight Center and the remainder new construction. The TWA Hotel opened in May 2019 and, abandoned for nearly twenty years, has returned Saarinen's iconic design to public use.

The top 1955 photo shows mannequins and furniture post-test at the Apple-2 "Survival Town," in Yucca Flat.

Blast damaged aluminum dome structures and bank vault at Frenchman Flat.

USA

ARCHEOLOGY OF NUCLEAR DETONATIONS TESTING

Zachary P Liollio

2020 will be the 75th anniversary of our entry into the Atomic Age. While Alamogordo, New Mexico, was the stage for the first atomic detonation, the vast majority of the United States' continental tests through the Cold War were conducted in Nevada. What began there as a quest for understanding the power of a new super-weapon evolved into finding alternative uses. During 41 years of nuclear testing, the phenomenon of nuclear detonation was repeated 928 times in Nevada alone.

Archaeological evidence from the first decades of atomic testing remains intact at the Nevada National Security Site (NNSS). Tests were often carried out in the same select areas, and discerning artifacts from different tests can be difficult. The focus of this article will be the evident heat and blast effects on industry, infrastructure, and other civilian targets.

A former World War II bombing range encompassed hundreds of barren square miles, it was originally named the Nevada Proving Grounds in 1951. The name was to be consistent with the Pacific Proving Grounds at Eniwetok Atoll (where massive, megaton-range bombs were tested), but in 1955 the name Nevada Test Site (NTS) was formally adopted.

The Atomic Energy Commission (AEC) carried out testing and evaluation of nuclear devices, components, as well as effects on civil and military targets. The AEC eventually built a massive portfolio of projects at the NTS, some running concurrently in different areas. 1977 saw a dramatic change in the administration of the site. The AEC was absorbed by the U.S. Department of Energy (DoE), which continues its stewardship to this day. The site assumed the name Nevada National Security Site in 2010 to reflect its mission.

Due to ongoing security, public access, including photography, is restricted. No soil or material can be removed from test areas. The author received a special media clearance, and a DoE escort, to take photographs. Adjacent to Groom Lake, the site was also subject to the recent "Area 51" social media frenzy. Public tours via bus are available without cameras, cell phones, or measuring instruments.

After entering the front gate, there are miles of two-lane roads stretching into the expanse, many dating to the site's construction. After some 30 minutes of driving, Yucca Flat presents a vivid glimpse into America's atomic nightmare. A 1955 test series, called Operation Teapot, included the construction of a "Survival" or "Doom Town." It should be noted that for many tests, especially early-on, names were selected from a list of code words.

Sedan crater is 320-feet deep, with the author standing on the new observation platform.

Five houses, representing five differently-engineered structures, were built for Operation Teapot, Apple-2 (the thirteenth test shot in the series). Their distances from ground zero varied, and they were all stocked with plaster mannequins, appliances, furniture, and even bomb shelter supplies.[1] The Federal Civil Defense Administration managed portions of the test. The AEC also had an on-site weapons effects office. The test artifacts were supplied by sponsoring industries and organizations. Roughly one million dollars was invested at the time to supply the test houses and contextual materials.[2] The mannequins and clothing were sourced from Sears-Roebuck, for example. The Edison Institute also sponsored tests involving live electrical lines and apparatuses. Operation Cue is synonymous with the Apple-2 device.

Operation Teapot shot Apple-2 was detonated on May 5th, with an explosive yield of 29 kilotons of TNT. This yield was roughly twice as powerful as the Hiroshima bomb. A steel tower was used to suspend the device for the desired burst height.

Two of the five test houses still stand. Both of these homes have similar two-story floor plans and dimensions. The surviving clapboard house, at the 6,600-foot target line, was scorched on its north elevation. Test footage, captured by Rappatronic cameras, (developed in the 1940's and first used to photograph the rapidly changing matter in nuclear explosions), also reveal some roof damage as the shockwave slammed against it. Simultaneously, doors and windows were ripped from their frames. The top half of the chimney was twisted about its vertical axis, and was later stabilized with a steel bracket. Peering through a window, the concrete masonry bomb shelter remains. Upstairs is a different story as plywood sheathing has fallen away partially revealing the second-story floor joists.

1. "Operation Cue." Film. 1955.
2. "Survival Town." Film. 1955.

At 8,000 feet from ground zero, the reinforced masonry red brick structure stands stately and defiant to destruction. The most evident damage is the blown-in windows. The interior has been gutted so that no furniture remains. Despite this, finer details remain such as the wood trim around the fireplace. Like the first house, its basement still has the bomb shelter intact. Bracing has been added to assist the floor above. Its basement windows are steel, by contrast with the other surviving house, and still hold shards of glass.

Blast effects and virtual abandonment have taken tolls on the interiors. Joists show signs of sagging behind broken and chipped gypsum board. While the concrete block basements look almost untouched, floor joists haven been shored to prevent an inevitable collapse. Cables, which once transmitted test data, still snake their way from the houses and into the fine sand. Perhaps most striking are the shutter dogs, which still protrude from the damaged siding.

The Apple-2 houses have thus become synonymous with Armageddon. Test films illustrating the hellish destruction continue to provide a haunting pictorial record in incredible detail. The imagery is so powerful that these same houses have permeated into popular culture, from movies to video games. Now silent and parched by the sun, they serve as monuments to what the Cold War could have been.

In the adjacent Frenchman Flat, testing focused primarily on military effects. Near the Encore and Grable tests ground zeroes (1953) stands a riveted steel railroad bridge and concrete piers. Erected by Army construction engineers, this bridge was to be typical of railroad design. Perhaps most striking today are the center-most beams and horizontal bracing. The heat and blast damage appear as if it was shaped by a blacksmith. Clip angles were sheared nearly at the k-area. What really defines this relic, besides seeming to defy physics, is that the bridge still spans between two piers. Travelling west, seven more piers remain. It is unclear how much damage to them can be attributed to atomic testing. Frenchman Flat reached its pinnacle of nuclear detonations in the mid- to late-1950s.

Extant in the blast-swept plane are curious, dome-shaped structures. Many of these are of reinforced concrete ranging in thickness between 2 and 8 inches. Aluminum structures (½-to-1-inch wall thickness) of a similar geometry were flattened and torn asunder by the blast. These mock shelters tested new designs for survivability and blast pressures. While some of the domes remain intact, others were peeled back like eggshells revealing a twisted mass of rebar. Built by American Machine and Foundry Company, they were subjected to the Priscilla test (1957).

A lone bank vault stands in the middle ground, its east and west elevations bristling with bent rebar. Designed by Mosler Safe Company of San Francisco, it too was part of the Priscilla test. This structure is stout; the rebar being used appears to be size number 9 or 10. Evidence of the vault door being torch-cut can be seen. Some debris litters the interior, which is now open to the environment. The purpose of this relic was to test the survivability of currency and vital records in a nuclear war.

Above-ground testing posed many security issues, especially as regards observers. In January 1956, John Malch witnessed a test in Area 11d (near Frenchman Flat). He was on sentry duty, just after midnight, in Camp Irwin, California. Despite the distance, a fireball flare briefly illuminated the black horizon. Upon reporting the strange occurrence, he was ordered to keep the incident secret and strike all written record of it. Pre-dawn shots were sometimes visible from several states away.

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TICCIH is the world organization for industrial archaeology promoting conservation, research, recording and education in all aspects of industrial heritage. It holds a triennial conference and organises interim conferences on particular themes. Individual membership is $30 (USD), corporate membership $65, and student membership. $15

There is an online membership form on www.ticcih.org

The **TICCIH Bulletin** welcomes news, comment and (shortish) articles from anyone who has something they want to say related to our field. The Bulletin is the only international newsletter dedicated to industrial archaeology and the conservation of the heritage of industrialisation. The TICCIH Bulletin is published online to members four times a year.

Back issues can be downloaded as a pdf file from the TICCIH web site, www.ticcih.org

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Melody Carothers has lived near Las Vegas since 1956. She likewise experienced the testing first-hand, as shockwaves once rocked the surrounding area. Damage claims were not uncommon across the state for shattered windows and cracked ceilings. Melody also recalled her brother-in-law Johnny's close call, "The ground moved like a great wave. His work truck, and the nearby hut, moved up-and-down, like they were riding an ocean wave. The ground shook so violently that it knocked his buddy down…[Then] the telephone and electrical wires danced between the poles. That was the tell-tale sign that the shockwave had arrived." Johnny Carothers was an International Brotherhood of Electrical Workers member and electrician at the Nevada Test Site. Melody's husband was nearly knocked from the scaffolding of the Aladdin Hotel in Las Vegas. An early morning test surprised him one workday.

The last above-ground test at the NTS was conducted in 1962 (Operation Sunbeam, Little Feller). Atmospheric testing came to a permanent end with the Limited Test Ban Treaty in 1963. However, underground testing had commenced in the late 1950s. New technology was also tested to counter the Soviet Union's advances in rocketry, which was reciprocated with ever-more powerful weapons.

Despite heightening tensions, a peaceful use for nuclear technology was also sought, leading to the Plowshare Program. The name itself is a Biblical reference; turning swords into plowshares. Plowshare's purpose was to redirect the explosive force of a nuclear blast into earth moving. The scope of test shot Sedan was canal construction. The 104-kiloton device was buried 600-feet underground. Milliseconds after zero hour, 6.6-million cubic-yards of soil would be heaved skyward, and scattered throughout the desert floor.

Today, the crater is as intimidating as it ever was. Stanchions from the tower used to lower the device underground are still in-place, though partially destroyed by the explosion. A new platform was fabricated to replace the older wooden platform. The historic structure, built just days after the blast with dimensional lumber, is now conserved as contextually important to Sedan crater. The new viewing platform even includes interpretive signage with a brief history, and data about the device and its resulting radiation. A relatively small amount of radiation exists on the crater lip today.

Research and development of nuclear excavation was relatively short-lived. While manageable in terms of off-site radiation, Sedan remained 'hot' for days after detonation. The Soviet Union would later conduct a practical test in extinguishing an actual oil well fire, but this concept was also shelved.

The Downwinders (communities and individuals exposed to nuclear radiation) who populate the sprawling country of rural Arizona, Nevada, Utah, and other surrounding states, saw a disproportionate increase in cancer rates during this era. Due to high-altitude wind patterns, a 1953 atmospheric test also deposited appreciable fallout on Troy, New York and its vicinity.

The second article in this series will focus more on the animal and human interaction with the Nevada Test Site.

GERMANY

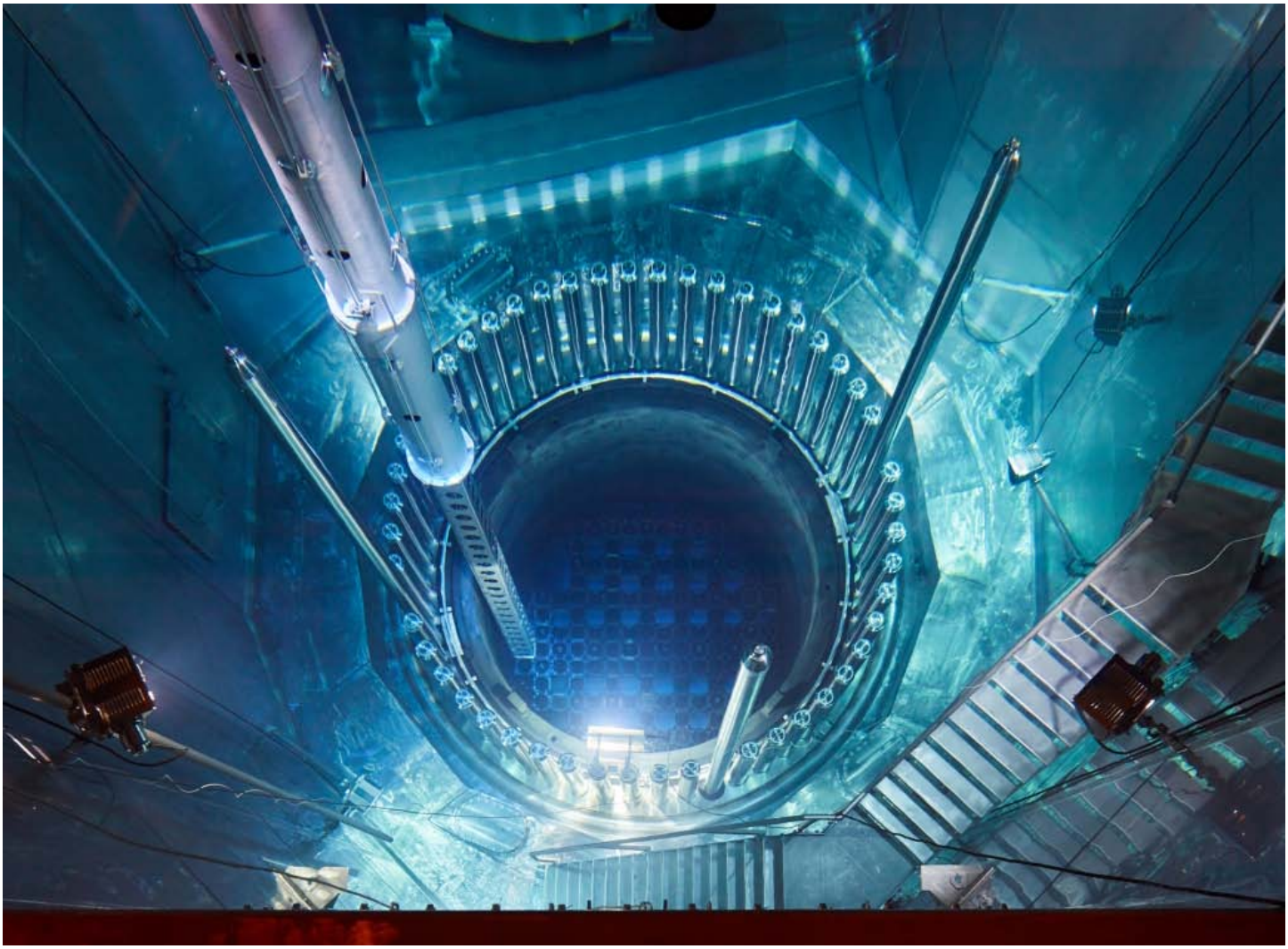
GOODBYE TO THE NUCLEAR POWER PLANT

Sonja Meßling

Bernhard Ludewig photographs nuclear reactors. His pictures from inside power plants offer an insight into an unknown world. In his current book, The Nuclear Dream, The Hidden World of Atomic Energy, the Berlin-based photographer documents the architectural heritage of nuclear energy in Germany.

Ludewig presents a comprehensive photographic documentation of Germany's nuclear history, from the construction of the first plants up to their demolition. Wherever possible, the photographer captures all aspects that are still visible. The photographs show the characteristic work processes. But Ludewig also pursues an aesthetic goal and captures the dimensions and geometry of the inaccessable facilities. It was in 2012 that he visited the first nuclear power plant. Access to the Grafenrheinfeld station south of Schweinfurt was made possible through personal contacts. Only three years later, the plant ended operations. By the end of 2022, nuclear power plants will be history in Germany.

When the country started nuclear energy in 1955, euphoria for the new power source was at first great. The technology was developed at three research centres in Karlsruhe, Jülich and Geesthacht near Hamburg. Small-scale facilities were used to test what later was to be implemented in large power plants. In 1957, the Munich research reactor in Garching became the first reactor in Germany to go into operation. It served as a neutron source for research. The reactor was shut down in 2000; the shell, designed



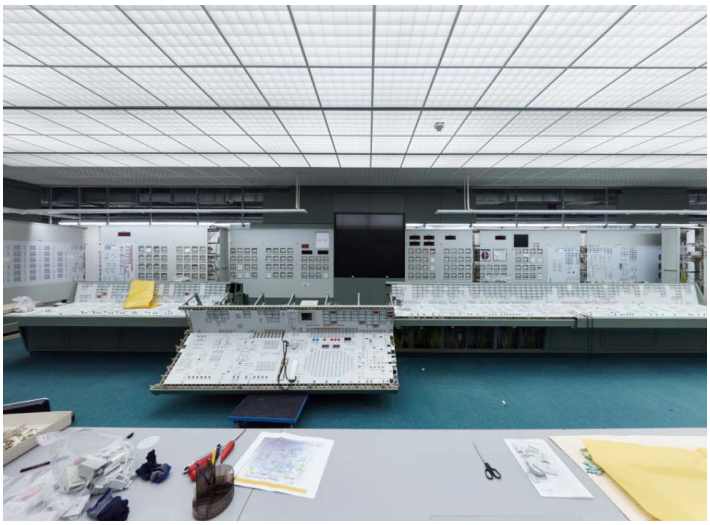
Refuelling at Gösgen nuclear power plant in Switzerland in 2018.

by the architect Gerhard Weber, is a protected building and will be preserved. The inside of the so-called ‚atomic egg' is being gutted, under to the Technical University of Munich.

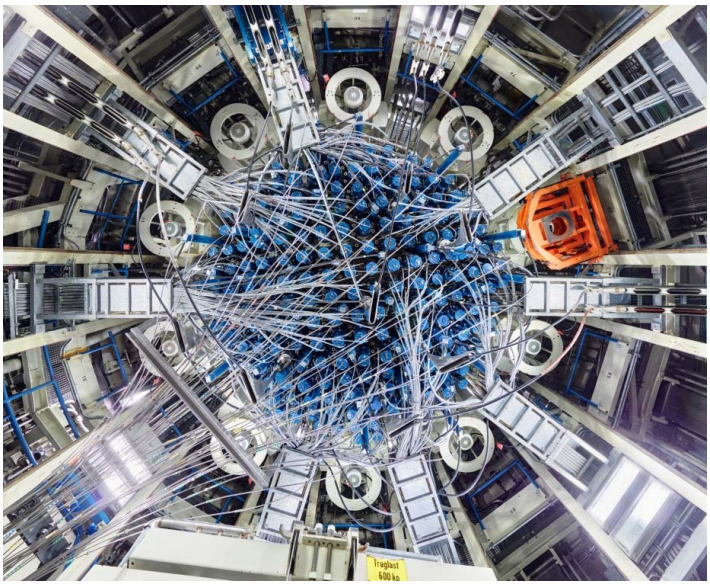
In a reactor, uranium or plutonium is split in a nuclear chain reaction. During the process, energy is released in the form of heat, which is used to boil water. The steam drives a turbine, which in turn drives an attached generator to produce electricity. Two types of power plant have been built in Germany: boiling water reactors (BWR) and pressurised water reactors (PWR). In a BWR, steam is generated directly in the reactor and fed to the turbine, whereas in a PWR, the water is under higher pressure and remains liquid. The energy is transferred via a steam generator to water in a second circuit, which drives the turbine. As a result, radioactively contaminated water remains in the reactor building and does not reach the turbine building.

Starting in 1971, the Kahl nuclear power plant in Bavaria, a boiling water reactor, was Germany's first commercial nuclear plant to supply electricity to the public grid. Further power plants and research facilities followed. But the initial popularity of the technology waned. Protests started to grow, especially in the 1970s. When the first construction site of a power plant was occupied in February 1975 in Whyl, this was still a special case. Accidents and the catastrophes in Chernobyl, Ukraine, in 1986 and in Fukushima, Japan, in 2011, fueled the protest and triggered the decision to withdraw from nuclear power.

Some 23 power plants with a total of 33 units generated energy for the German electricity grid. In addition, there are numerous facilities for training and research, as well as plants that were never commissioned. By now, nuclear power has been almost phased out. The last German nuclear power plant is scheduled to be shut down in 2022. This will be followed by the lengthy and cumber-



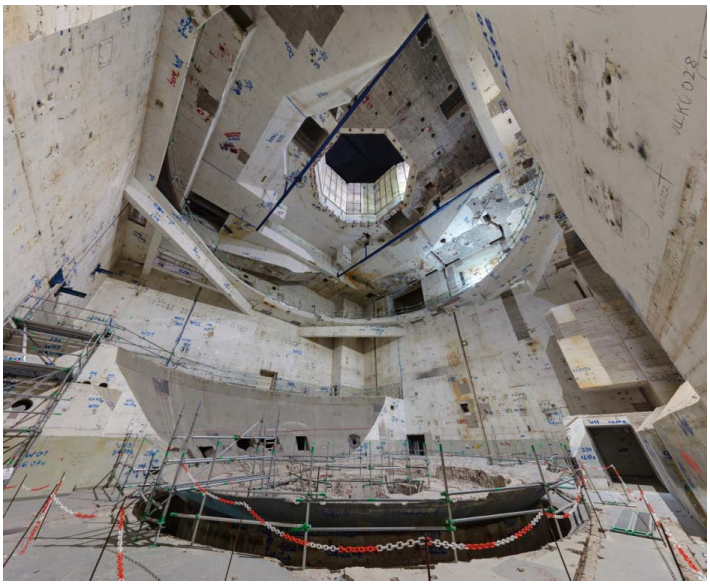
For training purposes there is an identical copy for every control room. In 2017 this boiling water reactor control room was demolished at the simulator centre in Essen.



The Krümmel nuclear power plant near Hamburg ended operation in 2011. The photo shows the control rod drives and was taken in 2017.

some process of demolishing the plants and the safe storage of radioactive materials.

Ludewig photographs the construction, operation and demolition of the various types of power plants in Germany, especially those built by Kraftwerk Union AG (KWU, founded by Siemens and AEG). He also captures the path of uranium and places of research, i.e. the West German research centres and their reactor prototypes. By now, Ludewig has visited almost all relevant facilities. His documentation includes almost 60 sites, most of them in Germany. Only a few places remained closed to the photographer. For his work in the highly secured installations, Ludewig got a security clearance and even became an official radiation protection officer. The result is a 400-page illustrated book, which has now been published in a German and English edition.

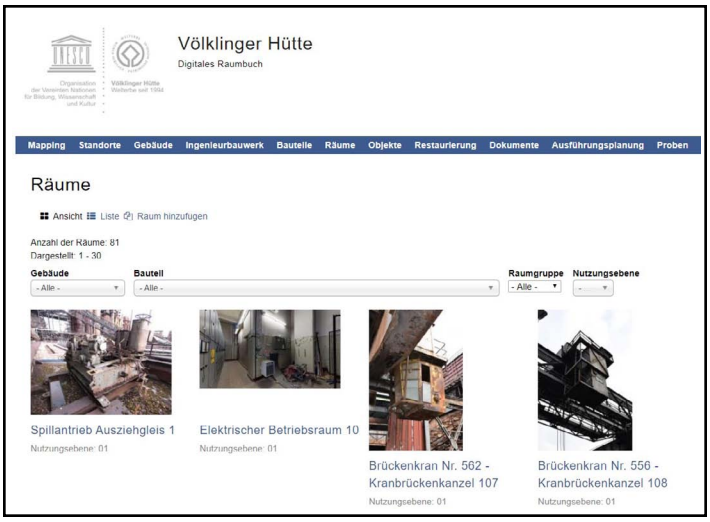


The Würgassen nuclear power plant in East Westphalia was dismantled after decommissioning in 1994. Even after 17 years of demolition, some remnants of the containment are still visible (here in 2017).

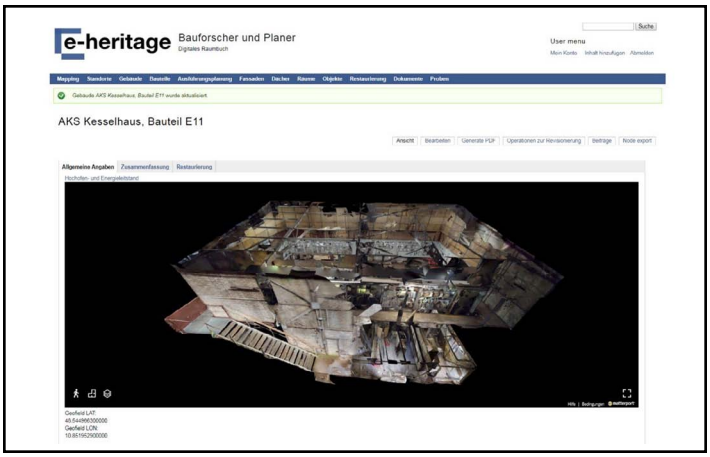
Bernhard Ludewig is a biochemist by training and originally intended to go into scientific research. He has been working as a photographer from Berlin for twelve years. He is particularly interested in documenting technical utopias, an interest which was sparked by his photographic portrait of the Moscow metro.

The Nuclear Dream. 420 pages, 316 full-page pictures, Hardcover, 98€ plus shipping
info@bernhard-ludewig.de, **http://bernhard-ludewig.de**

This article first appeared in *Industriekultur* 4.18, and is reprinted with thanks to the editors.



Listing of rooms in World Heritage Site Voelklinger-Huette



3D model embedded into e-heritage as a 'dollshouse' view.

E-HERITAGE WEB APP FOR DOCUMENTATION

Kornelius Götz, conservation Industrial Heritage consultant, and Sofia Vargas-Koch, Master Architect, Drupal Consultant

Reports are part of the everyday tasks in the documentation of industrial heritage. Microsoft's Word is often used for this purpose and digital photos are inserted into it. The result is printed or saved as a PDF document. This is simple but has decisive disadvantages.

Now it is time for an alternative, the development of a web application. Unlike classic word processing programs, web applications are not installed on the local computer at home. The data processing takes place on a web server. The results of the data processing are transferred to the user's local computer where they can be viewed and evaluated.

The web application 'e-heritage' was developed especially for documenting Industrial Heritage. Two things were very important: First, users with different levels of experience should be able to start working immediately. Secondly, everything should be intuitive to use. E-heritage was programmed with the open source software Drupal, which is used worldwide.

To start e-heritage, open **https://e-heritage.eu/en/content/test-e-heritage-planner-30-days** in your web browser. Any browser can be used. The site is available in three languages: German, English and Spanish. After logging in, documentation can be started directly by clicking on "add content".

For each project there are different templates for buildings, rooms, inventory, damage and diagnosis and for the documentation of conservation. The templates serve as a checklist for the creation of the inventory and damage recording and are derived from two European standards BS EN 16095:2012 and BS EN 16096:2012 (see below).

In addition to texts and images, scans of former resources, PDF documents, drawings, plans, videos and sound files, GIS information and zip files can all be integrated into the recording templates.

Once everything is uploaded and saved, the documentation is permanently available in the cloud. Loss or damage to your own computer can no longer affect the documentation. The data is available around the clock and periodic backups of the data are performed in the background.

Beside security, the cloud also offers other advantages. Different users at different locations can work together in one project. At the same time, everyone has access to the same level of information, which is particularly important for large projects with many different participants.

3D models and e-heritage

Three-dimensional virtual tours are currently changing everything. Google Street View, for example, is one of the most popular apps among others. Industrial Heritage is often very complex, with many rooms full of inventory. Spaces are often so small and cramped or so overcrowded that a photograph cannot show everything. With a three-dimensional camera, the heritage can be captured very easily and quickly on site and can be explored by a virtual tour at home.

The decisive factor here is that the technology is easy to use,

which is now fulfilled, for example, by the scanner system from Matterport ©. The operation is as simple as with a conventional digital camera and the costs are also moderate. In contrast to a digital photo, however, a real 3D model with floor plan, virtual tour with high-resolution pictures and a 3D view (dollhouse) is created.

In e-heritage, the 3D models from Matterport © are integrated just as easily as a photo. The decisive difference is of course the great clarity. Furthermore, these models can be measured on screen with an accuracy of a few centimetres.

Oral History

In the context of industrial heritage there are very often still experts available who used to work here in the past. These experts have invaluable detailed knowledge which should also be documented and preserved for future generations.

This is easily possible: today every smart phone has an app for recording videos. Digital cameras provide the same service in higher quality. That's why e-heritage offers the possibility to insert videos. Furthermore, the videos can be linked to the 3D model. Ideally the expert stands at his former workplace and explains who he is and what he has done there, pointing to the inventory while the video is being recorded.

Large scale example: Voelklinger Huette

The web application e-heritage is in use for recording the inventory and conservation planning at this World Heritage Site the since the beginning of 2018. In this project, 81 rooms in 53 buildings have been recorded and linked to over 600 individual objects. In addition, 19 central locations have been captured using 3D models and linked to e-heritage. The specifications were created directly from e-heritage via export files. Currently the conservation services are carried out on site. The documentation of the conservation as well as the process of procurement is done online by e-heritage.

A comparison with similarly large projects from the past shows that planning and documentation of a project is more accurate and clearer and is much faster than with the conventional methods.

- In conclusion, we can say that e-heritage offers these advantages:
- easy recording of information;
- the checklist in the templates follows EN 16095:2012 and EN 16096:2012;
- upload of many data formats;
- highly vivid through integration of 3D models and videos;
- data security and cooperation of different participants at different locations;
- information can be imported and exported via exchange formats;
- runs on mobile devices such as smartphone, tablet or notebook.

Quoted standards: Conservation of cultural property — Condition recording for movable cultural heritage, BS EN 16095:2012. Conservation of cultural property — Condition survey and report of built cultural heritage, BS EN 16096:2012.

Contact the authors: **Kornelius Götz** and **Sofia Vargas-Koch**. **https://e-heritage.eu/**

INDIA

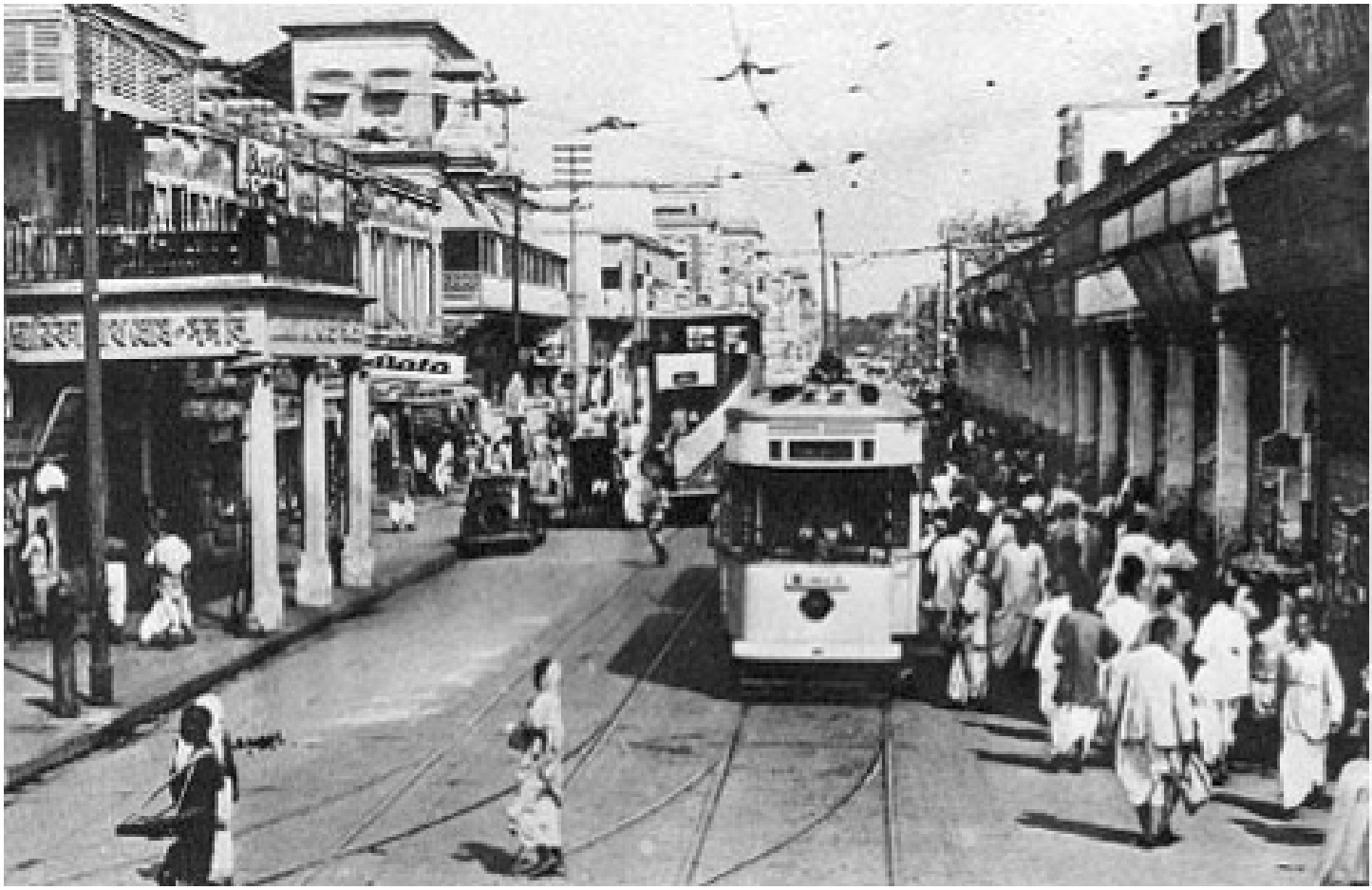
THE LEGACY OF KOLKATA TRAMS

Deepesh Sangtani and Syed Mohammad Hamza Abdullah

The introduction of railways into the formation of Kolkata as a compact industrial city plays a pivotal role in understanding the legacy of trams in the erstwhile British capital of India. The industrial revolution overwhelmingly altered the urban fabric of many cities, including Kolkata. And the availability of raw materials and agricultural resources facilitated the establishment of ports and factories, the transportation of which would require an efficient transit system.

Consequently, railways, waterways, and tramways were introduced in the city by the British. The first horse-driven tramcar ran on 24th February 1873 between Sealdah and Armenian Ghat Street, but it was disbanded shortly after. Seven years later, trams as public transport on the streets of Kolkata were institutionalized through the formation of Calcutta Tramways Company or CTC. It was in 1902 when two of the first electric trams were introduced by the CTC originating between Esplanade and Khidderpore, and Esplanade and Kalighat stations.

Post-independence, Indian megacities continued to employ tramcars on their roads, but not all of them could forebear the increas-



Trams on the streets in British Kolkata

ing traffic volume on their roads for long. Today, while cities like Chennai, Mumbai, and Delhi have succumbed to the increasing motorized vehicular pressure, trams continue to be functional, although in a bare minimum capacity in Kolkata, making themselves one of the oldest public transport systems in Asia.

Trams as an industrial heritage

The low-fared trams were successful in adapting to the exigencies of public life in Kolkata. The early morning trains would cater to the small-scale businesses, as vegetable and fish vendors would catch a train from the suburbs to the city. The morning trains would cater to the office-goers and school students wanting to save some extra bucks, while the peak hours would be dominated by people travelling to the central business district and back.
The public life of Kolkata had been accommodating of trams. Their smooth running across the hustle-bustle would render the commuters mesmerized by the city while gently faring down its streets. Tram-commute would also facilitate social interactions, and movies, politics, sports, literature and other fragments of the popular culture of the city would be discussed in between the journeys. However, now the city has yielded to the ever-increasing vehicular traffic and congestion on its roads.

Short-sighted mismanagement

The tram network in Kolkata has traditionally been catering to the CBD areas comprising Esplanade, BBD Bagh, Park Street, Dalhousie Square and Burra Bazaar. The newer commercial centres like the Salt Lake and New Town, which have been attracting business, investment and a major chunk of the sprawling urban population, have not been provided with tram connectivity.

With the advent of Kolkata Metro rail in 1980, trams had to suffer a setback. While most of the upcoming growth centres had been provided with metro connectivity, the trams were seen as an obstruction in the way of the 'world-class' development. As a result, trams have been excluded from the public sightline in these new growth centres. The upcoming generations commute to these centres through metro trains, taxis, and private vehicle, while the age-old trams have been left along with the bygone glory of the central business district of Kolkata.

Trams lines used to ply separately, but as the city grew, they were merged with the traffic, causing mayhem on the narrow roads. Increasing vehicles, public buses and famous 'yellow taxis' would leave little right-of-way for tram tracks on streets of the central Kolkata. Given the derelict infrastructure of trams, the city is willing to overlook a piece of its heritage, which appears to have failed to repurpose itself completely, as the liveability requirements of Kolkata change.

Are Trams Feasible in Kolkata?

Kolkata's dense planning compliments an active public life, reduces travel distances and promotes walkability. Interestingly, 60% of all trips in the city are generated within a distance of 3-4 km. As a feasible alternative, trams can efficiently move 18,000 people per hour along well-defined corridors, which is a higher capacity compared to the bus service in Kolkata.

Trams are an environment-friendly alternative to conventional public transport. Electric trams emit no hazardous pollutants and their low noise and vibration help in maintaining a healthy environment. Their point-to-point connectivity and hop-in-hop-out facilities can significantly reduce travel time and stress, and promote walkability. Passenger comfort is also superior to buses due to controlled acceleration and braking. Trams require narrower right of way than buses, thereby saving valuable street space in the narrow streets of Kolkata.

Kolkata has always been a city with a love for culture and community life and trams have been integral to its heritage and public life. With services like the 'Kolkata Heritage Tram Tour', passing innumerable heritage buildings and places of Kolkata, the tram system

A tram repurposed as a 'café museum'

is lending itself as a unique service for the people of Kolkata to rediscover their city and its impeccable built heritage.

And despite the trams being on the verge of obsolescence, the citizens, especially the youth, remain conscious of their heritage and make efforts for its revival. They are striving to append youth culture to trams through initiatives like 'Tram Tales' where the trams depots are repurposed as congregational and festive spaces. Trams are also being used as 'cafe-museums' at the Esplanade depot, and their footfall is encouraging the stakeholders to come up with similar concepts at other depots in the city.

CHINA

ARTIST-LED REGENERATION IN BEIJING

Juan Manuel Cano Sanchiz, Dongdong Wang and Lifang Lei, Institute for Cultural Heritage and History of Science and Technology, University of Science and Technology, Beijing

Dashanzi, in the northeast of Beijing, is an area which is key to understanding both the heritage of recent industrialisation and the strategies for activating and reusing industrial heritage in the People's Republic of China. Here, the 718 Joint Factory was once the largest complex in Asia for manufacturing military electronic equipment. Today, part of this macro-industrial estate has been repurposed into the 798 Art Zone and the 751 Design Park. Together, they make up one of the most popular and active creative districts in China, a meeting point in the international Chaoyang district for a wide range of professionals and amateurs related to art, design, fashion, image and communication.

The 718 Joint Factory was established in the early 1950s with the assistance of the German Democratic Republic. As a matter of fact, the complex was designed in Dessau under a strong influence of the Bauhaus, whose main lines and style are recognisable in several buildings. Many of the components of the first Chinese satellite and atomic bomb were produced here, which evidences to what extent this industrial settlement embodied national sig-

Bauhaus' style sheds, empty (left) or filled (right) with galleries and shops. The painted words on the right photo are original Chairman Mao Zedong's quotations to encourage industrial workers.

nificance. In 1964, 718 was divided into six factories to operate independently, which were named 706, 707, 718, 751, 797 and 798. Out of them, 798 was the largest.

In the 1980s, a series of economic and industrial reforms changed the landscape of many cities in China, especially the largest ones. Several military factories were reconstituted as civil state-owned industries at the same time that the economic system of the country evolved in the general framework of the Reform and Opening-Up policies. Economical, urban and ecological reasons propelled the relocation of many manufacturing sites out of the city centres, which liberated enormous spaces. This context affected 798, but activity there remained more or less stable until the 1990s, when production faced strong competition from abroad and from south-east China. Plans were developed then to convert the area into a redesigned electronics production and commercial centre, but the initiative did not have the expected results.

In this general context, 798 experienced dramatic changes in occupation and functionality. Many buildings were abandoned and the space soon deteriorated. When the shadows of demolition were growing over the complex in the 1990s, a group of artists started to move to the old factories and sheds, which offered large and diaphanous spaces for art workshops, an appealing architectonic atmosphere, and cheap rents. The first generation of 798 artists modified the landscape following a harmonious integration among the old industrial aesthetics of the original facilities and the modern designs of their extensions and refurbishments. This spontaneous occupation of derelict industrial buildings by artists occurred at the same time in Shanghai, and in fact constitutes one of the foundation stones of industrial heritage protection in China.

In 2005, the Beijing local administration recognised 798 as a heritage site under the category of modern architecture. One year later, 798 was officially acknowledged as a district for cultural and creative industries. In the context of the 2008 Beijing Olympics, 798 became a symbol of Chinese cultural openness, attracting more artists, galleries, companies and visitors. The old industrial complex filled up with art galleries and centres, design firms' offices, shops, restaurants and bars. 798 turned to be a major force

in the renovation of the cultural scene and the creative industries in Beijing. However, after setting up the art district, the role of the artists themselves in the transformation and occupation of 798 was minimised by international galleries and companies. In the 2010s, 798 has lost part of its original and genuine artistic atmosphere. Following a familiar course, gentrification has transformed the place into a touristic destination and a consumption site. Higher rents made many artists move out to cheaper areas, while the new empty premises were taken by more cafes, boutiques and high-profile galleries.

As we can see, 798 is an excellent example of the transformation of industrial landscapes and economies into post-industrial ones. In 798, this transformation has been the result of the interventions of different actors, including artists, the public administrators, the owners of the factories, the media, the local community and tourists. Sadly, a lot of information was lost during the several phases of reconversion, since no archaeological recording preceded the repurposing works (a common problem in China).

Attached to 798 Art Zone, and without any clear boundaries between them, 751 D-Park constitutes a different and complementary experience in the protection and reuse of industrial heritage in Beijing. Erected in the early 1970s and expanded in the following decades, the gas works of 751 was one of the largest in Beijing. It closed in 2003, following a general restructuring in the city's industrial network. Four years later, the municipal government decided to transform 751 into a fashion and design park.

751 D-Park comprises a number of original gas facilities that now offer new services. Several open public squares articulate the space, including Train Square, Furnace Square, and Power Square. The Train Square, a place for leisure activities, occupies the former railway station of the complex. The main piece in the square is the steam locomotive Upstream 0309, which was built in the 1970s and transported the coal and crude oil used to produce gas. The locomotive, presented as a piece of sculpture and turned into a monument, eclipses the surroundings, where there are other railway structures, vehicles and infrastructures. The Furnace Square keeps to a great extent their original industrial aspect and equipment, which is not an obstacle to host a wide range of recreational and creative activities, such as exhibitions, launching of products, weddings, and concerts. Finally, the Power Square is a spacious open space preserving many industrial facilities related to gas, including equipment for treatment, a cracking furnace, coolers, chimneys and the pipes network. To the south of this square, Gearing Spaces also counts on interesting preserved and protected infrastructures such as a tank for mechanical filtering. Power Square is nowadays an important scene for the cultural and creative industries established in the art district.

Other original facilities integrating 751 D-Park include the 79 Tank which was the first spiral gasometer of large scale (150,000 m3, its remains occupy an area of 3,500 m2) and low pressure built in Beijing. Abandoned in 1997, the tank reopened in 2013 as a multifunctional space for international brands' fairs and launches of new products, as well as several kinds of shows. Fortunately, the new uses of this infrastructure have not deleted the rust or other features of its original industrial nature. On the other hand, it is a venue for exhibitions, markets and forums located in a former gas purification plant from the 1990s. After losing industrial functionality in 2003, architects Xianneng Lin and Zhida Lin refurbished the plant in 2010 combining the needs of the new uses with the industrial atmosphere of the place.

798 Art Zone and 751 D-Park are magnificent examples of a common practice in China: the conversion of extensive industrial complexes into art zones and creative or cultural parks. Many cases can be found in other cities, including Redtory in Guangzhou, M50 in Shanghai, or 1895 Cultural & Creative Industrial Park in Nantong. 798 was the first industrial complex to be transformed into a big-scale creative hub and became a successful model that was followed by many other cities. Furthermore, 798 Art Zone and 751 D-Park bear strong interest in other ways, as outstanding (and not very common) examples of socialist industrial heritage from the second half of the 20th century, as well as models of integral planning covering heritage preservation, creation of jobs, education and urban development.

The place actually works well, as it is demonstrated by the high number of people and activities received and hosted every day. However, from a historical point of view, there is not much about industrialisation and industrial processes that these places tell their visitors. As we have already said, the lack of recording during the transformation of the complex resulted in an important loss of data. Furthermore, the panels that provide information on the original characteristics and uses of the different parts of the complex are scarce, especially in 798. As a result, the transfer of knowledge and the preservation of the memory of the industrial culture is limited.

In short, although 798 Art Zone and 751 D-Park are brilliant examples of the redesign and revitalisation of depressed industrial areas, and while their achievements from the social and economic points of view are evident, from the industrial heritage angle the place has little power to let the present post-industrial society learn from the past industrial one.

This report is a result of the project A new vision of science and technology and cultural research (技与文化研究的新视野), which is funded by the Fundamental Research Funds for the Central Universities (ref.: FRF-BR-18-006B), P.R. China.

Wingfield Station was on the North Midland Railway and formed part of a notable sequence of picturesque buildings in the tradition of lodge or gate-keeper's cottages on country estates.

UK

WINGFIELD RAILWAY STATION RESCUED

Barry Joyce, Derbyshire Historic Buildings Trust

One of the UK's most important 'at risk' historic industrial buildings, Wingfield Station in Derbyshire, is to be rescued as a result of concerted action by the Derbyshire Historic Buildings Trust (DHBT), Amber Valley Borough Council (AVBC), Historic England and The National Heritage Lottery Fund, together with grants from The Architectural Heritage Fund and The Pilgrim Trust.

Wingfield Station was built in 1839-40, to a design by Francis Thompson, as part of the North Midland Railway. The route from Derby to Chesterfield and onwards to Rotherham and Leeds was surveyed by George Stephenson in 1835. The Act of Parliament for the construction of the 72 mile line was obtained in 1836. Linked at Derby to the Birmingham & Derby Junction Railway and the Midland Counties Railway, it was to form part of a route from London to Yorkshire and the North East.

George Stephenson was joined by his son Robert as joint Chief Engineer on the project in 1837. George relinquished his railway projects in 1839 so he could concentrate on his mineral and mining interests. It was his son Robert who saw the North Midland through to its completion in 1840. It is not known how Robert met Francis Thompson, who was working in Canada until 1837,

but Robert asked him to design 24 stations along the line from Derby to Leeds. These formed a notable sequence of picturesque buildings in the tradition of lodge or gate-keeper's cottages on country estates. Wingfield is the only station of this group to survive.

Francis Thompson commissioned the artist Samuel Russell to produce a series of lithographs of some of the stations, including Wingfield. The station was also reproduced by J. C. Loudon in a supplement to his influential Encyclopaedia of Cottage, Farm and Villa Architecture (1842) where it was slightly amended as a suitable model for a suburban villa.

Following more than 30 years of concern over the deteriorating condition of the station AVBC compulsorily purchased the grade II* listed building, and on 10 December the DHBT took over the ownership. It is rare in Britain for a local planning authority to take the extreme action of compulsory purchase, and it is a reflection of the acknowledged cultural importance of the station buildings that it has happened. Development funding of £137,000 has been awarded to DHBT by The National Lottery Heritage Fund to start the restoration project, and an application for a further grant to enable the substantive work to be undertaken is now being developed.

Although the railway line is still very much an important part of the UK rail network, Wingfield Station was closed in 1967 and the platform removed. Tragically, the two station buildings got into an advanced state of disrepair over the years following the station's closure, and the work needed to bring them back to a sound condition will have to be extensive. The project is complicated by close proximity of the buildings to the active main line track.
As part of the restoration project, research is to be undertaken into the Station's role in relation to the neighbouring collieries, iron foundry, and farms.

For more information on the restoration project please contact **Peter Milner,** Trustee Project Lead, or **Lucy Godfrey**, Project Co-ordinator.

IRAN

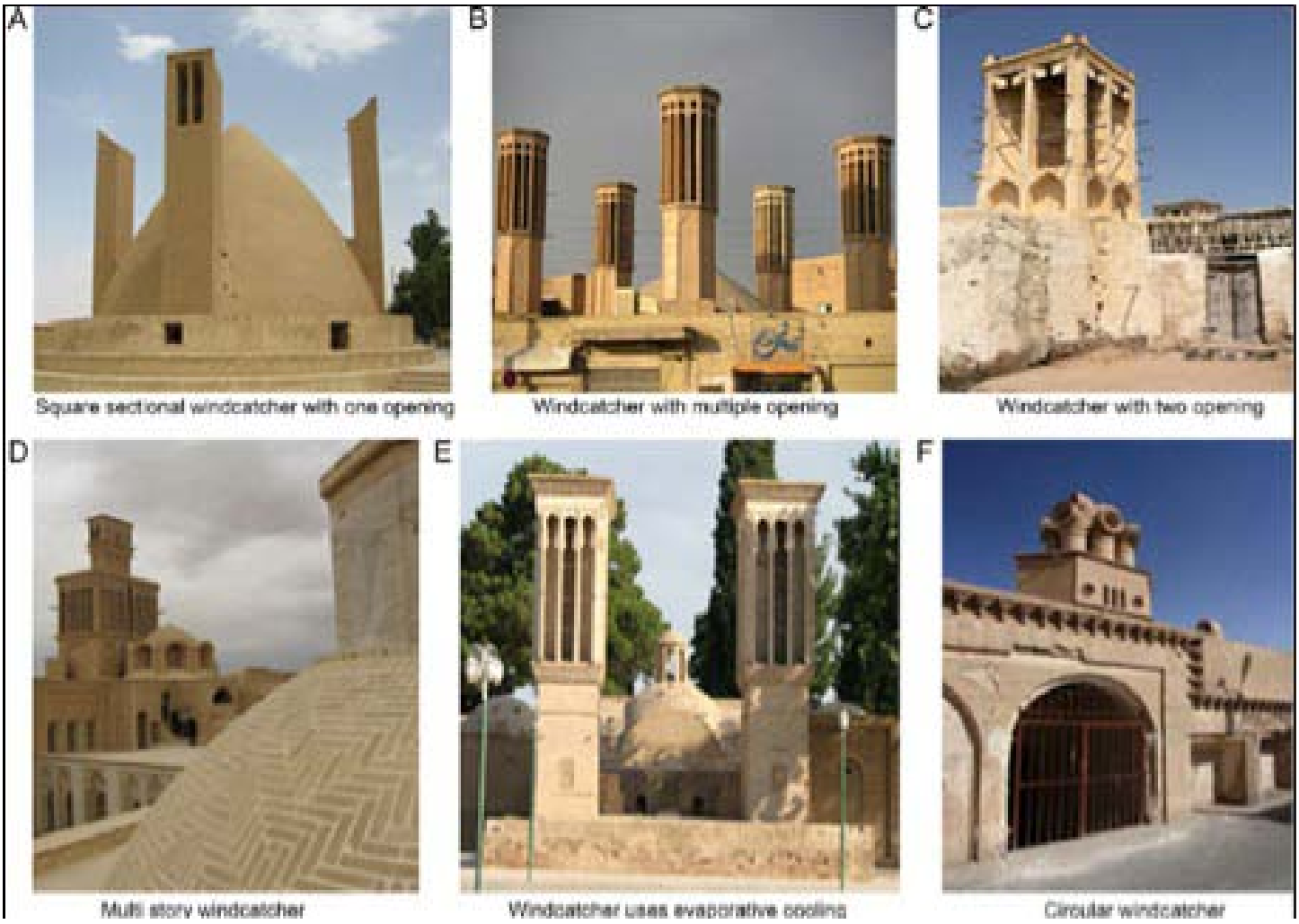
THE WIND CATCHER: ENVIRONMENTAL ENGINEERING

Professor Pirouz Hanachi, Sara Taymourtash and Samaneh Samavati, University of Tehran

World War I had just come to an end when Iran entered a completely different phase of development. The First Pahlavi period (1920-1940) can be recognized as the building block of industrial architecture in Iran. Thanks to the reforms that took place at this period, people's lifestyles underwent dramatic changes and the traditional fabric of cities was transformed by industrial development. Soon the ritual atmosphere gave way to a useful relationship, and the concept of modernization obsessed the public across the country. The particular historical atmosphere in which Iran was driven towards industrialization not only influenced the social and cultural context but also dramatically transformed all aspects of architecture, including urban fabrics, government buildings and private houses. The industrial age made people think of industrial elements even in their homes. Badgir-e-Chopoghi, the Pipe-type wind catcher, is one of the monuments that can be traced to this period.

The owner of the building was a physician who was inspired by the ship smokestack and built this wind-catcher. The building actually represents a blend of architecture and industry. It is said that on his way back from a voyage, the physician was amazed by the perfect air conditioning of his cabin and finally found that it has something to do with the specific architecture of the smokestack. Inspired by the idea, he considered building a wind catcher with the same structure as the smokestack in his hometown so that he could store medications in his house. Today, this wind catcher is known as the symbol of Sirjan city. Sirjan's Pipe-type wind catcher is the only one that is architecturally different from all the other wind catchers all over the world. This wind catcher is made up of turrets that stand higher than other parts of the house and is characterized by some elbow-shaped pipes that are geometrically interconnected and conduct wind into the house from different directions. The outer surface of the wind catcher tubes is beautifully decorated with small hexagon-shaped bricks (Bahadorinejad and Dehghani, 2008).

Wind catchers are structurally recognized as Iranian engineering masterpieces that play an important role in natural and energy-free ventilation and cooling of indoor spaces. The tower and hollow openings built on the roof of the house serve as conduits directing outdoor wind into the indoor spaces and suctioning indoor air into the outdoor spaces in order to provide thermal comfort. Air circulation in wind catchers can primarily be attributed to the force of gravity which is achieved naturally without any electrical device. Depending on the wind speed and direction, different types of wind catchers have been designed.



Different forms of wind catchers in Iran (Saadatian et al, 2012)

The shortest Iranian windbreaker is about 2 m from the roof surface and the tallest one about 93 m high. Wind catchers are also designed with different cross-sections and their dimensions vary between 0.6 to 1 m2. Although wind catchers are commonly designed with rectangular cross-section, they sometimes come with square and octagonal cross-sections. As for direction, wind catchers can be classified into unidirectional, bidirectional, tri-directional, quad-directional, polyhedral and pipe-type. The materials often used to build wind catchers include raw clay, brick, plaster and wood. In traditional Iranian architecture, wind catchers were mostly built in central and southern cities with arid climates and their vertical wind conduits and channels shaped the urban landscape.

In Iran, buildings were constructed according to the dominant climates and environmental conditions for many centuries. The existence of different climates in Iran has directly affected the traditional architecture of different regions. Industrial architecture is, in some cases, representative of the impacts of traditional Iranian architecture. Sirjan's Pipe-type wind catcher was registered in the list of Iran's national monuments in 2002.

Diba, K. (1976). *Industrial Architecture of Iran.* Contemporary Art Museum Press: Tehran.

FORTHCOMING EVENTS

TICCIH OIL HERITAGE SEMINAR, ONTARIO, CANADA, 7-9 MAY, 2020

James Douet

The TICCIH comparative thematic study into the industrial heritage of petroleum production is nearly complete, and the report (**downloadable from the TICCIH website**) will be presented for discussion at a seminar in Ontario, Canada, on 7-9 May, 2020. The study puts forward criteria to help identify and evaluate the legacy of oil production, based on a historical summary of the industry extending back into pre-history and forward to the 1980s. In this way, it aims to help identify the most significant historic infrastructure around the world, that which is rare and special, as well as plant or sites which are representative or characteristic of different periods of the industry. Notable case studies of ten different types of site from around the world provide examples for comparison.

Some of the conclusions may provoke argument. The oil industry has generated an immense historiography, proportionate to its overwhelming influence on how the world has developed since modern production took off in the 1860s. But only a minute fraction – to use a relevant metaphor – has been to indentify and conserve its heritage.

The scope of the study has been another area of debate. The 'petroleumscape' concept, how petroleum extraction, refining, transformation, and consumption has shaped the entire built environment, has provided an intellectual framework, and the seminar will be opened by Professor Carola Hein of TU Delft University whose work has been central to this area of research.

Industrial archaeologists are professionally wary of sites which claim to be the 'first' of anything. Oil production offers a striking example of this tendency, notably 'the first drilled oil well'. Antarctica may be the only continent without a contender. Oil historian Dr Francesco Gerali will give the second keynote address to provide some guidance through the conflicting claims and help contextualise the industry's extension across the globe. Melissa Mann, site administrator at the Drake Well Museum in Pennsylvania and Wendy Shearer, author of the local Oil Heritage District Conservation Study, will also present their perspectives.

The meeting will be hosted by Fairbank Oil Fields and has the support of ICOMOS Canada. The following day participants will have a tour of the Oil Springs National Historic Site and the Oil Museum of Canada. Although the numbers are restricted to 30 there are still a few places, so anyone with a particular interest in coming to the seminar should write to: **editor@ticcih.org**

INDUSTRIAL HERITAGE AS A SOURCE OF SOCIAL EMPOWERMENT AND ECONOMIC REVITALIZATION

Postgraduate Summer Course, Central European University (CEU), Budapest, Hungary, 6 July - 15 July, 2020

Central and Eastern Europe has a legacy of industrial sites and buildings. The course will focus on the potential of industrial heritage to be a transformative influence in the post-industrial regions. It aims to bridge an industrial past, through a deindustrialized present, towards an economically and socially sustainable future. It is based on the recognition that there is a gap between heritage specialist focusing on heritage assets on one side, and policymakers and developers focusing on social and economic development on the other. The way to bridge this gap is using heritage as a resource for development, which, at the same time, secures the sustainability of heritage. Heritage is considered as a lever of economic growth and social renewal in post-industrial landscapes.

Through this course, you will learn how an industrial site can be converted into a social and economic resource. The multidisciplinary faculty includes practitioners and academics, featuring researchers, policy experts, spatial planners, managers, cultural actors, and artists. The course offers a unique opportunity to discuss your own project and ideas with the top-level experts in the field. The course will look at tangible and intangible heritage – landscapes, buildings, industrial equipment and artefacts, practices, knowledge, and social structures – linked to industrial areas. It will address the question of how cultural heritage can change the cultural identity of a region promoting an optimistic future.

The course is funded by CEU enabling participation at a low, subsidized tuition cost. A limited number of tuition waivers will be offered on a competitive basis.

First application deadline: February 14, 2020.

Information

DEVELOPING THE TOURISM OFFER: ERIH CONFERENCE, BERLIN

Dr Peter Wakelin, Independent Writer, Curator and Consultant

Attracting visitors is among the key concerns of anyone who opens industrial heritage sites to the public. Almost without exception, sites draw visitors not as single attractions in isolation but as part of regional tourism networks that offer multiple services and reasons for choosing a location. The annual conference of the European Route of Industrial Heritage (ERIH) in October examined how industrial heritage tourism can relate to the wider tourism offer.

This conference, ERIH's 15th, was an opportunity to celebrate 20 years since the network was established in 1999. It now comprises 1,850 sites extending to every European country. In May 2019 it officially became a Cultural Route under the Council of Europe. This status is welcome recognition at the highest level of industrial heritage as a key part of the cultural heritage. It also creates important opportunities for industrial heritage specialists to learn from other networks.

Around 90 participants from 19 countries came together in Berlin under the banner of ERIH to share experience of cross-marketing strategies. The event was jointly hosted by the outstanding German Technical Museum and the Berlin Center of Industrial Heritage. The city is an instructive case of developing industrial heritage tourism as part of a capital city's tourism offer. Visits to Berlin have grown rapidly in recent years and some attractions, such as the Reichstag and Museum Island, regularly experience pressure of numbers. Alongside these, the important industrial heritage of Berlin has created opportunities to spread visitor benefits more widely, with the help of the Visit Berlin organisation and the Route der Industriekultur Berlin.

Papers, workshop sessions, visits and discussions gave opportunities to share good practice across Europe, looking at projects in Berlin and Germany as well as many other countries. ERIH Vice-President Adam Hajduga introduced some of the current collaborative work by ERIH, partly funded as a Creative Europe project. This has included external marketing and promotion of the message of European industrial heritage, the expansion of resources on the ERIH website and work with the European Academy of Industrial Heritage. A particular success has been twinning of sites to exchange expertise and learning – a process that one partner described as having developed 'from arranged marriage to real love'.

As John Rodger identified in introducing the theme, 730 million international visitors arrive in European countries each year but only 11 per cent of visitors to industrial sites are international. This suggests that there is still considerable room for growth. Linkage to interests outside the industrial heritage sector has been used successfully to broaden audiences, for example combing industrial heritage with visitors' interests in visual art, river cruises, film locations and opportunities to buy products. An interesting example of route development was the Radrevier.Ruhr project that is building a safe cycling network of 1,200km through the Ruhr combining natural heritage, industrial culture, landscape and accommodation. Other papers gave a variety of insights. One explored the opportunities for organisation of high-value private tours to rarely accessible sites. Another looked at lessons learned about expanding audiences through collaboration with other providers, specifically of specialist climbing tours and of regional itineraries. The last formal presentation considered opportunities for industrial heritage to complement established tourism provision in popular areas of outstanding natural beauty.

ERIH President Meinrad Maria Grewenig, ERIH Secretary General Christiane Baum and Director of the European Institute of Cultural Routes Stephano Dominioni celebrate certification of ERIH as a Cultural Route of the Council of Europe. Photo: ERIH, Lea Gleisberg

The ERIH conference workshops offered opportunities for discussion about three subjects:

- successful tourism products and offers
- cooperation with Destination Management Organisations (DMOs) and tour operators
- tourism marketing for regional networks and routes

One of the issues raised repeatedly in discussion was the divergent approaches often taken by industrial heritage sites on the one hand and tourism organisations on the other. Each sector tends to have different views of target groups, interpretative top-

CONFERENCE REPORTS

ERIH conference delegates from 19 countries at the German Technical Museum, Berlin. Photo: ERIH, Lea Gleisberg

ics and unique selling points. There is therefore a need for better communication to share understanding of the scope and potential for industrial heritage. Recommendations developed in the workshops included seeking to link tourism products to major cultural events and cooperating more deeply to create exciting stories and experiences. It was felt that collaboration between industrial museums and operational industries offered particular potential to enhance the experience for visitors– a theme explored at a previous ERIH conference at Porto, Portugal, in 2016.

Another recurring theme in discussion was the need for good market research to aid the design of tourism products, particularly by enabling sites to target promising audience groups and understand their needs and expectations. ERIH can offer important opportunities for sites to be promoted to the travel industry more vigorously through regional routes. A workshop exclusively for regional route coordinators is anticipated at the next ERIH annual conference – the sixteenth– which takes place in Belgium on 7-9 October at the Ghent Museum of Industry.

The Berlin conference programme and presentations together with other resources are available on **www.erih.net.**

INDUSTRIAL ARCHAEOLOGY AND HERITAGE, THEORETICAL ARCHAEOLOGY GROUP CONFERENCE

Hilary Orange, Hanna Steyne and Mike Nevell

The session's broad aim was to explore the place and value of multi- and interdisciplinary research, which has been gaining traction in recent years. Studies of industrial archaeology and heritage have long utilised interdisciplinary methods and perspectives, being concerned with various kinds of evidence, both material and immaterial. Industrial pasts and legacies, whether conceptualised as archaeology and heritage or not, are also of growing interest to other disciplines; including economic and oral history, sociology, geography, environmental humanities, photography and art, amongst others. Questions posed in the Call for Papers were:

- What relationships are currently being forged and why, and in what ways do different perspectives coalesce or clash, and why?
- How are multi- and inter disciplinary approaches being incorporated, while maintaining communication with a 'home' discipline?
- Are there any anxieties over politics, disciplinary histories,

identity, funding, career paths, acceptance, and recognition?
- What are perceived as typical and unconventional forms of practice?

The TAG session attracted speakers from around the world, from researchers at different stages in their careers including ECRs and established researchers, demonstrating a depth of interest in the area.

João Luís Sequeira (Universidade do Minho, Portugal) started the session with a discussion on interdisciplinary approaches to traces of human presence left in factories in Portugal after they have ceased production. In his paper Humanizing Industrial Archaeology, João suggests that archaeology can, inadvertently, relegate some human traces to the background in favour of structures, operating chains, processes, architecture, machines, tools and so on. He argued that some human traces, such as feelings and emotions, can be difficult to find through archaeological methods. Hanna Steyne (University of Manchester) then illustrated the ways in which a wider variety of stories of Thames-side industrialisation can be told using alternative approaches to historical source material. In her paper, the Industrialisation of Thames Water Management in the 19th Century from many, multi- and inter-disciplinary perspectives, she moved beyond purely industrial archaeological or historical narratives to understand how the embankment of the River Thames in London between 1865 and 1900 took place against a backdrop of industrialisation and modernisation of the city as well as complexities and realities of lived experiences.

Moving to the Global South, Susan Lawrence (La Trobe University, Melbourne, Australia) presented on the Rivers of Gold project [see Report on page 4] and considered mining legacies from the perspectives of archaeology, science and art. This paper was multi-authored, drawing on the work of the project team including researchers from UK and Australia (Peter Davies and Jodi Turnbull, Archaeology, La Trobe University, Melbourne, Australia; Jude Macklin and Mark Macklin, Geography, Lincoln University, Lincoln, UK; Ian Rutherfurd and James Grove, Geography, University of Melbourne and Ewen Silvester, La Trobe University, Albury-Wodonga, Australia).

Rivers of Gold is a multi-disciplinary project that integrates approaches from archaeology, geomorphology and environmental chemistry in order to locate and understand the ongoing impacts of historic gold mining on Victorian rivers. It juxtaposes conventional scientific approaches with place-based art practice. During the project, there have been art exhibitions, drama, in addition to soil sampling, chemical analysis, and archival research, but no excavation or even conventional site survey and recording has taken place. In such a diverse and extensive project, the authors discussed the role of archaeology and the extent to which an archaeological perspective mattered.

Interdisciplinary approaches to studying industrial cultures aim to draw in evidence from beyond the familiar historical sources.

Coralie Ascheson (Arup) continued the creative theme in her paper The Iron Bridge in Mixed Media, An artistic reflection on interdisciplinary research. During Coralie's research at Ironbridge Gorge, she considered how the values of an industrial World Heritage Sites are communicated to tourists and carried out a mixture of fieldwork through four disciplinary lenses: ethnographic, geographic, digital humanities and contemporary archaeological fieldwork. The valley is, of course, famous amongst enthusiasts for being the birthplace of the Industrial Revolution, but she argued that that is not necessarily the story that the million or so tourists who visit each year encounter. In this participatory paper, she reflected on the contributions and challenges that these four disciplinary lenses brought to her study.

The final two papers in the session both assessed the implications of archaeological work on their respective areas of study. Ronan O'Donnell (Durham University) considered the role and implica-

tions of industrial archaeology of the 20th century for organisational or management theory, focusing on four factories built on the Team Valley Trading Estate, UK, between 1938 and 1939. In his paper, The Archaeology of 20th Century Factory Management, he presented archaeological survey work that identified elements of planning for efficiency of movement and process both in the offices and the factory floor. Similarly, division of labour between workers of different status and gender were also evident. The final paper in the session presented by Helen L Loney and Andrew W Hoaen (University of Worcester) concerned the combining of archaeological analysis with historical and art historical records. Their paper, Garbology and the Archaeology of Industry: Field Walking in the Hinterlands of Royal Worcester Porcelain, focused on the city of Worcester. The city had no central rubbish collection before the 20th century and the industrial waste from the porcelain factories was bought by farmers to use as hardcore and was spread on fields. By systematic fieldwalking in the fields around Worcester the authors have been able to recover material which dates from all stages of the operations of the porcelain factories and they have been able to infer cohorts of factory workers otherwise invisible in the art historical record. Helen and Andrew discussed the reconstruction of elements of the industrial past, including factory development and organization.

Broadly speaking, the papers in this session spoke on knowledge production, discussing how new bodies of knowledge and practice are formed and reflecting on the necessities and challenges of adopting new approaches. The session was well-attended, and a lively discussion followed the six papers that focused largely on issues around funding (how to get it) and collaboration (how to successfully do it). We are keen to continue the conversation going (through, for example further conference sessions) and we would like to hear from others with interests in industrial heritage and archaeology and inter /multi-disciplinary work. We extend our thanks to the speakers and to those who contributed to the session.

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CHINA

THE 10TH CHINA INDUSTRIAL HERITAGE ACADEMIC CONFERENCE, OCTOBER 26-28, 2019, ZHENGZHOU, CHINA

Dr Meng Fanlei, Lecturer in Beijing University of Civil Engineering and Architecture

Zhengzhou is a famous historical city with a profound industrial culture. The conference was arranged in the former site of Zhengzhou No. 2 Grinding Wheel Factory, which is one of the eighth batch of national key cultural heritage protection units. The theme of the conference was Forge Ahead and Create Brilliance - The Development Course, Great Achievement, Memory and Heritage of New China's Industrial Construction, with more than 200 experts and scholars conducted a three-day discussion on this topic.

The opening ceremony was presided over by Tsinghua University's professor Liu Boying, the board member and national representative of TICCIH, president of the Industrial Heritage Committee of the China Cultural Relics Academy, secretary general of the Academic Committee of the Industrial Architectural Heritage of The Architecture Society of China, director of the Industrial Heritage Department of the Chinese Historical and Cultural City Committee.

The conference collected 97 papers and 45 scholars made academic reports, comprehensively demonstrating the achievements and historical memory of the industrial development of New China from the perspective of the development history and memory of New China's industry, the development of new China's industry and urban construction, the value assessment and composition of the industrial heritage of New China, the 156 project and industrial heritage, the third-line construction and industrial heritage and so on. At the same time, the latest research results in the field of industrial heritage at home and abroad were exchanged and discussed, and fruitful results were achieved.

This was the first time to hold the conference in the national key cultural heritage protection unit, which indicates that China's industrial heritage research work is developing from survey of resources and discovery of heritage to scientific protection and activation, from pure academic research to the combination of art, humanities and society, economy and environment, to a deeper and broader dimension. Experts and scholars also visited the important industrial heritages such as Zhengzhou No.2 Grinding Wheel Factory, Luoyang Soviet-style factory buildings, the First Tractor Factory Industrial Park, Luoyang mining machinery factory, as well as the Dongfanghong Agricultural Museum, and have a deep feel on the great achievements of new China's industrial construction and the initiating spirit of hard struggle.

Prof. Liu Boying giving a speech during the conference.

2019 is the 70th anniversary of the founding of People's Republic of China. Not only did China's industrial construction achieve brilliant developments, but also the research on industrial heritage made fruitful achievements. In 2006, the 1st Session China Industry Heritage Academic Seminar was held in Wuxi, Jiang Su province, a group of scholars have realized that China's industrial heritage has its own unique values. In 2010, Industrial Architectural Heritage Academic Committee (IAHAC) was officially established, and became the first national academic organization specializing in industrial heritage in China, after that, more and more committees for industrial heritage research has been set up in China. In the past 10 years, the academic research and engineering practice of China's industrial heritage have developed rapidly. A number of cities such as Beijing, Shanghai, Chongqing and Xi'an have successively completed a comprehensive survey of industrial heritage and the value recognition of industrial heritage. Industrial heritage has become an important part of national key cultural heritage protection units.

China Industry Heritage Academic Conference was the most influential academic exchange platform for industrial heritage in China, which was jointly organized by China Cultural Relics Academy, Architecture Society of China and Historical and Cultural City Committee of China. The conference is held once a year and it is now ten years old. China's industrial heritage research has expanded from the field of architecture to sociology, history, science, technology, archaeology, art, environmental protection and many other fields. The research topics involved with urban development, urban renewal, regional industries, industrial city and other aspects. After ten years of accumulation, China's industrial heritage has been comprehensively, deeply and systematically studied.

Main entrance of the First Tractor Factory Industrial Park of China, a building characterized by national forms and socialist content.

China's modern industrial development has achieved two historic leaps, process from scratch, and the process from weak to strong, and it has made outstanding contributions to promoting global industrialization. The continuous and in-depth study of China's industrial heritage will help to further enrich the value system of global industrial heritage and reveal the significance of the ancient Eastern civilization in the context of modern industrialization.

The conference was hosted by the Industrial Heritage Committee of the China Cultural Relics Academy, the 20th Century Architectural Heritage Committee of the China Cultural Relics Academy, the Academic Committee of the Industrial Architectural Heritage of The Architecture Society of China, the Committee of Architectural Planning and Post Evaluation of The Architecture Society of China, the Historical and Cultural City Committee of the Chinese Society for Urban Studies, and the School of Architecture of Tsinghua University.

Contact the author

Inside the Museum of the Tonglushan Copper Mine.

CHINA

INDUSTRIAL HERITAGE PROTECTION AND ENHANCEMENT FORUM, HUANGSHI HUBEI PROVINCE

Dr Arq Jaime Migone Rettig, Presidente TICCIH Chile / TICCIH Board Member

This meeting was organized by the International Council on Monuments and Sites and the Municipality of Huangshi on 3-6 November 2019, with the aim of drawing on the opinions of international experts to manage and develop the application of several industrial sites to UNESCO World Heritage. The five sites that will be proposed to World Heritage by the Chinese authorities are:

- Tonglushan Ancient Cooper Mine Relics: archaeological remains of the copper mining site, more than 2,000 years old and with a remarkable degree of conservation, today converted into a site museum
- The site of Han-yeh-ping Iron and Coal Company: China's first and largest iron and steel industry since the early 1800s
- The site of the East Open Pit of Daye Iron Mine: a mountain excavated at a depth of more than 80 meters and the largest in Asia.
- The former Huaxin Cement Plant: in its time a revolutionary cement industry with a production associated with the port on the Yangtze River, for distribution throughout China.
- The Huanshi Textile machinery Factory: an area of more than 20,000 square meters of warehouses and industrial buildings

The participants at the seminar.

dedicated to textile production and a site preserved by the municipal authorities of Huangshi in memory of their workers.

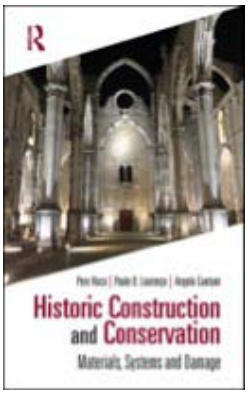
The sites were visited by the experts during the seminars. I presented the World Heritage Sites in Chile with an industrial nature, specifically the Sewell Mining Camp and the former saltpetre site of Humberstone and Santa Laura in the Atacama Desert. Emphasis was placed on the definition of UNESCO criteria for both sites and the management systems with which these heritage sites organize their self-financing and their relationship with cultural tourism. I also presented the example of the Chuquicamata Mining Camp, associated with the copper mine of the same name, whose management plan was developed by a multidisciplinary team for the management and protection of the heritage site.

A poem by Chilean poet Pablo Neruda, Nobel Prize Literature 1971, points out the importance of the past and culture, as the essence of the human being, for its reflection.

DO NOT BLAME ANYONE:
… Do not forget that the cause of your present
It's your past as well as the cause of your
Future will be your present… (fragment).

The conclusions and recommendations of the international experts pointed out, basically, that in a first stage all the related institutions with interest in the heritage should be called into multidisciplinary groups, to document and collect the greatest amount of historical and field information on all the sites. This first step will illustrate all the themes of interest to the industrial heritage, marking priorities and the steps to follow. Undoubtedly, this will be a long path of development in which the participants offer their future collaboration to achieve the objective of their inclusion in the UNESCO World Heritage list.

PUBLICATIONS RECEIVED



Pere Roca, Paulo B. Lourenço, Angelo Gaetani, *Historic Construction and Conservation: Materials, Systems and Damage* (Routledge, 2019)

366 Pages
$70.00 USD, as eBook $63.00 USD

Review by Günter Dinhobl, TICCIH Austria

Conservation of historic constructions is an ongoing issue. This title is published with the ambitious target to provide 'a modern approach to the meaning of a heritage structure and its conservation'. It is of general interest, in particular on the broad range of issues discussed on conservation, materials, structural elements, sizing rules and limit analysis of masonry arches, but also on damage and collapse mechanisms.

This broad range requires a team who are specialists in different fields. The highly experienced trio of authors, from Spain, Portugal and Italy, bring together a wide range of expertise in building engineering, heritage and restoration. And they also let in their experience from their lecturing activities in the International Masters in Structural Analysis of Monuments and Historical Constructions (SAHC), which was co-funded by the European Union Erasmus+ Programme from 2007 to 2017; nowadays, hundreds of graduates come from around 70 countries from all over the world. All of this leads to the extensive illustrated volume that is divided into six chapters and numerous sub-chapters.

The first chapter 'Modern understanding of conservation and of heritage structures' contains discussions and actual positions on cultural values, authenticity, heritage management and conservation criteria. About half is dedicated to the ICOMOS-ISCARSAH recommendations, quite important on an international level, but which everyone can find in the web, and summarizes the ISCARSAH-guidelines. Overall a fine, quick and internationally-aligned overview of the basics of heritage and conservation.

Next comes an overview of the history of conservation, which astonishingly starts around 1200 BCE in Abu Simbel. Beside such a wide point of view it gives some examples of types of restoration theory, passes the time between and after the Second World War and finishes with open issues in conservation. It is a theory-driven chapter, but easy to read for an overview of the coming of conservation demands.

The third chapter 'construction materials and main structural elements', is structured on one hand by 'masonry' (which contains different materials and also elements like walls or columns) and on the other hand by the materials timber and metals. Remembering the complexity of buildings, its elements and its material, finally it is the reader who has to structure all the knowledge to attain a consistent view of materials and elements. Although 'glass' is quite important for nearly all the buildings in here, it is strange that it did not get any attention – probably because it is not a static essential material, but a structural material for historic construction.

'Vaulted structures in history and modern structural solutions' starts with the reduction to the static issue of an arch and all of the following is developed from that simple principle, either bridges or buildings with vaults and domes. It includes the evolution of architectural elements, and finishes with a section on arch bridges, which is of high interest for industrial heritage. Like other sections, beside a short introduction in the structural principles and static issues, numerous examples of buildings all over the world are given, including the building time, architect / engineer, technical data, and small images, like in a stamp catalogue.

In the fifth chapter, the 'ancient sizing rules and limit analysis of masonry arches' are discussed and compiled to give an insight in the planning process of arches as basic elements. Historical approaches are shown, starting in antiquity and coming up to the 19th century; finally to a large extent, the limit analysis is presented exemplified by masonry arch and vaulted structures. Vector addition and polygon of force are also shown to introduce the basics for understanding of the thrust line or graphic kinematic analysis of an arch. It is like a very quick field trip in structural engineering, and some readers might question the significance of it. Correctly, because this is not of importance in this detailed manner in the following chapter, or on the other hand, the linking to the preceding chapter is missing. In a general perspective, this chapter looks like a success story from 'rules of the thumb' to research and systematic approach, which terminates in limit analysis. But unfortunately it is not pointed out that 'rule of the thumb' is nothing else than proven experience potted in rules and standards by oral tradition instead of calculation and printed formulas - or nowadays algorithm apps with black-box characteristics.

The last substantial chapter gives insights in 'damage and collapse mechanisms in masonry buildings'. These are distinguished by causes which cover load, structural alterations, settlements, but also weathering and natural disasters (which are not the same as

PUBLICATIONS RECEIVED

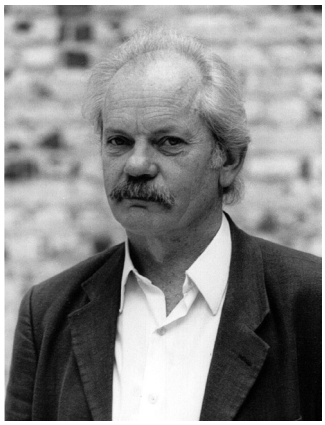
earthquakes, a separate category), chemical and biological agents, and fires, with a very recent reference to Notre-Dame de Paris.

The final 'conclusions' is a summary of all the issues addressed in the book. It is quite short and the reader probably expects more like an overall 'lessons learned' than a simple summary.

Nevertheless, the mindful reader identifies some debateable statements. For instance, section 1.4.2. past and modern 'understanding/approaches to heritage structures' are compared by an example of an outward movement of arch springing: while in the past numerous reinforcements were added to stabilize a building, in the modern example one monitoring measurement – of course computerized and digitized to illustrate modernity – and one added tie as a small measure, including an ongoing monitoring measurement, is presented as sufficient. Such a view seems positivistic, simplifies and ignores temporalities; in past times they monitored displacements of buildings – not digitized but noted in drawings or written sources, which sometimes still exist and attest excellent observation and monitoring even hundreds of years ago – and realized the best when and where it was really necessary. In short, also in the past they used 'modern' approaches, but with the technology available at that time.

This is a quick but very informative overview in the very broad range of heritage, conservation, materials and damage possibilities of buildings. It is a useful publication for students but also a quick insight for both engineers and conservationist to learn from each other. And so do all interested persons of industrial heritage.

OBITUARY



GUIDO VANDERHULST

Patrick Viaene, TICCIH Belgium, Heritage Conservation Studies University of Antwerp

Guido Vanderhulst passed away on November 16, 2019. He was 79 and well known within TICCIH as a former Board member and as director between 1976 and 2006 of LA FONDERIE - Brussels Museum of Labour and Industry.

Without the lifelong dedication of Guido Vanderhulst for the conservation and sustainable re-use of the industrial heritage, Brussels would offer us nowadays a very different image: the world-renowned Tour & Taxis compound would be, without Guido's actions, no more than a huge car park or hypermarket! Only after many years of civil actions by 'Tour & Taxis 21', lead by Guido Vanderhulst, fighting against the indifference of the public authorities and the dubious proposals by real estate developers (see Music City below), things began to change during the last years of the century.

The same is true for the heroic campaigns of Guido Vanderhulst as director of La Fonderie and member of the Royal Commission of Monuments and Sites in order to protect for example the remaining three buildings of the legendary Wielemans-Ceuppens brewery, and saving in 1987-1988 also a part of the technical infrastructure. Since fifteen years, the main building is successfully re-used as WIEL's , the outstanding contemporary arts centre of the Brussels region, and another brewery building became BRAZZ, space for education and social activities for the local communities, public library, meeting and exhibitions rooms.

I first met Guido Vanderhulst in 1984 during my research related to the MIAT-exhibition and inventory-publication Industrial Archaeology in Belgium. Guido was preparing at that time the exhibition and book Brussels, a Canal, Factories and People, presented in 1986 in the Royal Warehouse Tour & Taxis. It was empty and endangered in order to realize the huge building project Music-City under which only a part of the façades of the Royal Warehouse would remain. It is important to remember that until 1989Brussels wasn't an autonomous Belgian region: industrial heritage conservation was simply not existing in this 'paradise for office towers developers and real estate operators' (dixit Guido), destroying more of the Brussels heritage in the post-war period than during the two World Wars.

OBITUARY

Crucial was Guido's role in the pioneering work of LA FONDERIE, changing this dark image, re-using the old (partly derelict, partly restored) premises of the former foundry Compagnie des Bronzes (premises taken over by the Communauté Française de Belgique), coaching more than 500 guided tours (industrial heritage tourism-project Brussels, the Roots of a Region), revealing Brussels' industrial and social history and heritage by boat, by bus and walks), organising exhibitions, publishing an outstanding magazine (Les Cahiers de la Fonderie).

Above all, Guido Vanderhulst had the gift of clear communication and his (literally) strong voice in the press and media. Don't forget Guido lived during his youth in Central-Africa and had a religious vacation within the order of the Jesuits, in which the spoken message and the Latin notion retorica was important. He soon went out of religious occupations to work in the social field, after his installation in Brussels. He founded a socialist union branch for catering workers and the former sociology student became a social worker in the former industrial district of Saint-Jans-Molenbee.

From social work to social and industrial heritage was only a small step: from 1976 onwards, Guido Vanderhulst focussed on industrial heritage. Guido was in his later life very critical of so-called academic research and the ivory tower mentality of several researchers in universities. In Guido's controversial opinion, industrial heritage conservation is in the first place for what he called the restitution of this heritage to the working class, to the workers, as principal 'generators' of our industrial, technical and social heritage. It was not accidental that Guido was never wearing a hat, but always a cap.

The years 1988 to 1990 were also the intensive preparation period of TICCIH's 7th International Conference on the Conservation of Industrial Heritage, held in September 1990 in Brussels and other places in Belgium, with Guido Vanderhulst as chairman, inviting industrial heritage experts, not only of all Belgian universities, but also of regional and local industrial heritage museums and fieldwork associations. As Secretary of 7th ICCIH I remember the first TICCIH president, Marie Nisser, visiting La Fonderie during the conference-preparations, very impressed by the work of Guido and his team and also, two years later, by the transactions Industry, Men and Landscape, for the first time including colour illustrations, a 'floppy-disc' and successfully sold in regular bookshops in and outside Brussels.

During the last decade of his directorship in La Fonderie (1996-2006) and from 2008 on within his new association Bruxelles Fabriques-Brussel Fabriek, Guido Vanderhulst was president of the Brussels Museum Council and vice-president of Patrimoine Industriel Wallonie-Bruxelles (PIWB). Considered as a workaholic by relatives of his age, Guido coached during the last years of his life the partial conservation and restoration of the legendary Warehouse Godin, the oldest industrial structure (1819-1826) remaining in the Brussels region. Together with skilled workers of different age and ethnic background, he restored the steam engine, the unique cooling installations De La Vergne (Refrigerating Machine Company New-York, 1894) and other equipment of Wielemans-Ceuppens; further he introduced the sustainable reuse of Brewery Atlas (as social workshops, recycling centre and social housing project) and the Flour Mill Moulaert, since 2016 known as business and cultural center COOP, in Anderlecht, and was still working until his last days on many other industrial heritage projects in his beloved Brussels region.

For all these efforts and realisations: THANK YOU, GUIDO!

COMING SOON

2020

BRAZIL
5th International Congress of Railway History and Heritage (Railways Section TICCIH meeting), and the 4th Journey of Young Researchers in Railway History and Heritage (Portuguese, Spanish and English)
March 25-26 and 27, in Campinas, Sao Paulo
Information

GERMANY
Cities and Historic Textile Complexes: Typology, Good Practice, and Global Perspectives for Conservation
23-25 April, TICCIH Textiles Section, Humboldt Universität, Berlin

MEXICO
Congreso Internacional sobre Patrimonio Industrial. Compartiendo el Presente, Divulgando el Futuro.
6-8 May, Monterrey, Nuevo León
Information:cpatrimonioindustrial@gmail.com
Facebook: @cipindustrial

CANADA
Experts' workshop and presentation of the TICCIH Thematic Report on petroleum heritage.
7-9 May, Oil Fields, Ontario
Contact the Editor

USA
Society for Industrial Archeology 49th Annual Conference
28-31 May, Bethlehem, Pennsylvania
Information

GERMANY
World Conference of Public History
18-22 August, Freie Universität Berlin.

2021

CANADA
TICCIH Montreal 2021: Industrial Heritage Reloaded. New Territories, Changing Culturescapes
30 August - 4 September, Montreal
Information