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## CONTENTS



Zach Liollio, blacksmith, welder and machine tool restorer, standing next to the Chambersburg Mfg. Co. 1,500-pound steam hammer, which arrived new to the Nevada Northern Railway in the 1930s. Conservation of historic railway skills as well as working plant is discussed on page 17 by Geraldine Mate of the Workshops Rail Museum in Australia. Photo: Zach Liollio.

# OPINION

## MACHINE TOOL RESTORATION ON THE NEVADA NORTHERN RAILWAY

***Zachary P. Liollio***
***Blacksmith, Welder, and Steel Project Manager***

Since the summer of 2015, efforts have been underway to restore various important pieces of metalworking equipment at the **Nevada Northern Railway Museum** in Ely, Nevada, USA. The railroad continues to operate steam and diesel locomotives and is renowned for how intact its original 1905-1940s facilities are. After nearly a century of service, the shops are still used to maintain locomotives and rolling stock, speaking to 'original use'. Among the rarest of the tools in the shop are a Frank C. Cheston Rivet Heater, manufactured c. 1944, and a 1,500 lb (680 kg) steam hammer built by Chambersburg Manufacturing in the 1930s.

The methodology of working on this equipment involves as much historical research as it does skilled trade knowledge. The steam hammer had since been converted to run on compressed air. Years of water accumulation and freeze-thaw cycles meant that several pipe fittings supplying air were se-


Locomotives 40 and 93 in the roundhouse at the Nevada Northern Railway. Both steam locomotives continue to operate regularly.

verely cracked. Shop employees combined resources to mend the supply pipes by grinding, drilling, and welding cracks with Shielded Metal Arc Welding (SMAW) electrodes. This welding process is commonly known as 'stick' welding, due to the long electrodes. Once this process was complete, the hammer was inspected, and lubrication points noted. There is still some debate as to whether the heavier weight 'steam oil' is still appropriate, or if a lighter oil should be used.

The ram guides were subsequently cleaned and greased with an open gear lubricant. Manufacturer's literature, and prior training on previous hammers, provided much of the operating protocol. As the throttle was opened for the first time in decades, a rush of air could be heard inside cylinder. The ram brake was then raised, actuated through a Johnson bar, and the 1,500 lb ram rose above the bottom die. By keeping the throttle open, and moving the Johnson bar to its lowest position, you were effectively dropping the ram onto a work piece. This heavy, single blow was used to accurately deliver a lot of force. The double-acting piston will also allow for the ram to cycle, with a constant reciprocating motion. This mode allows for multiple, fast blows. As of yet, the compressor does not deliver enough air volume to allow the hammer to cycle. Work will continue on adjusting the anvil under the hammer, which is a separate piece. The anvil's original foundation is in dire need of repair to prevent it from leaning.

Much of the railroad's rolling stock is riveted, but the art of riveting has become exceedingly rare. Hot riveting was a less attractive alternative to the railroad in the 1960s, as electric welding became far more common. Still, to help retain the historic character of the equipment, riveting has once again become an option. There is one extant, functioning rivet heater in the Nevada Northern's possession, made by Frank C. Cheston Company of Newark, New Jersey. The first challenge in bringing this 70-year-old machine back to life was inspecting various electrical components with a multimeter. This machine requires 575 volts, and a short-circuit could be catastrophic. The copper contacts were cleaned using a mild-abrasive pad and a high grit sandpaper. The rivets were wire wheeled to simply remove

# OPINION

dust and dirt. If this were to be done on a large scale, the rivets could be loaded into a parts tumbler.

The heater itself works much like a spot welder: the rivet is heated through electrical resistance while being clamped between the contacts. For our test, we used some 3/4- and 7/8-inch pan head rivets found on site. These rivets are very common at the Nevada Northern. The rivet heater was turned on using a selector switch. There was then an audible hum that can commonly be associated with electrical equipment. The lower contact was depressed with a foot pedal and the rivet was inserted using a pair of tongs. With the pedal released, a spring closed the contact and sparks flew from either end of the rivet. The rivet had to be jarred and shaken before it finally began turning red hot at either end. Within 15-seconds, the rivet was white hot, though mostly at the ends. During our tests, we could not get a heated rivet with a uniform temperature. The hot rivets would then be dropped into a tray below the contacts, waiting to be used. None of our rivets were driven, though the museum is continuing to gather the necessary equipment for hot riveting.

The efforts of the Nevada Northern Railway to foster the traditional industrial trades are exciting, and will provide both a valuable preservation and a teaching tool. These two pieces of machinery, once commonplace throughout the industrialized world, will continue to be used. In the short term, their operation will be explored for repairing what the museum has. In the future, there will hopefully be seminars and classes dedicated to their understanding. This site and its collection in Ely, Nevada should be of interest to anyone interested in our industrial heritage.

Contact the author

The surviving Frank C. Cheston Co. rivet heater, manufactured in the 1940s.

# REPORT

## CANADA

### FROM INDUSTRY TO COMMUNITY: ARVIDA FACTORY TOWN

***Lucie K. Morisset, Canada Research Chair on Urban Heritage, professor at the Urban and Tourism Studies Department of the School of Management, University of Quebec in Montreal***

For nearly a half century, industrial heritage has forced us to think of heritage as something beyond historical monuments, given the absolute necessity of learning to re-use the vast structures, even neighborhoods, in question, over and above aesthetic or historic showcasing. In the wake of this movement, the conservation and transmission of the Canadian factory town of Arvida enables us to reflect on how heritage is constituted and protected when people's lives no longer follow the same pathway, and when references and a sense of belonging are built in a setting that is much more local than national, i.e. outside of the state frameworks usually brought to bear in the heritage-creation process.

In August 2016, the Canadian government issued a call for applications to update the Tentative List for World Heritage Sites in Canada, previously established in 2004. Among the applications submitted was the one prepared by the city of Saguenay, to which the former town of Arvida now belongs. This 'factory town' (ville-usine), as designated by the historian and urbanist Pierre Lavedan in 1956, was constructed


1926 plan for Arvida, Hjalmar E. Skougor and Harry B. Brainerd (City of Saguenay)

between 1925 to 1950 on the initiative of the Aluminum Company of Canada around what became the world's most important aluminum plant during the Second World War. The integrated plant produced both alumina and aluminum thanks to a hydroelectric development project, the likes of which had never until then been seen.

The model city, a veritable socio-industrial utopia, with its huge business centre, the 125 models of its 2,000 or so houses, and its community institutions, can teach us a great deal about various commonly neglected aspects of industrial heritage: housing, town planning, and working-class communities, and their interconnections with the history of planning and development. In North America, for example, but also in countries born of natural resource exploitation, from Scandinavian nations all the way to Australia, company towns, or in this case 'frontier towns' in the words of John Reps, have indeed established themselves in terms of a principle of settlement and a way of life. In Canada, home to a few hundred company towns, they have been a determining factor in the development of ideas and the imaginary with respect to territory, especially given that most of them came into being during the first half of the 20th century (as is the case for Arvida), when urban planning flourished and public authorities began to take an interest in housing and the creation of towns and cities. Experts estimate that the destiny of more than a million Canadians has been marked by company towns and they have furthermore reiterated the extent to which, since the 1970s, 'these towns [have] represented Canadian culture at its purest.'[1]

Arvida also prompts us to reflect on the ways in which we produce heritage, and on the social, economic, and cultural issues as regards its preservation and transmission.

But Arvida, which has come down to us in a state of exceptional integrity and authenticity, also prompts us to reflect on possible transformations concerning the ways in which we produce heritage, and on the social, economic, and cultural issues as regards its preservation and transmission. Arvida serves as a contrast historically in the universe of planned industrial towns by way of an affirmation, from the very moment of its conception, of its being an 'intentional monu-

[1] Lorne Tepperman, introduction to the reissued 2008 classic by Rex Lucas, Minetown, Milltown, Railtown, 1971.

View of an Arvida street in 1927 (Alcoa Archives, Library and Archives Division, John Heinz History Center, Pittsburgh)

ment' (gewollter Denkmal), and the model town also distinguishes itself in the industrial-heritage field by having escaped decommissioning. As a company town, Arvida has served as a buttress for a liberal and democratic society and has featured a multiplicity of functions from its very earliest days. And while it is true that its plant was for a time under threat of abandonment, it has undergone a massive technological overhaul in recent years, an apparent guarantee of its sustainability.

Even so, Arvida has also been affected by the evils of our post-industrial era: stripped of its identity by a municipal reorganization which in the 1970s even deprived the community of its name (and that of its founder, Arthur Vining Davis, then president of the Aluminum Company of America, parent company of the Aluminum Company of Canada), the historic company town was also affected by industrial modernization. The number of employees working in its plant, more than 10,000 during the war, was gradually reduced, and as is true for so many urban areas, Arvida's population make-up has also greatly changed. The plant and the company town are now no longer part of the vivre-ensemble, or they are less so; the knowledge and practices that punctuated common references, such as rules governing the preservation of houses registered in the property titles of the first workers, transmitted from generation to generation, have gradually been lost with the disappearance of the first Arvidians, replaced by a more mobile population characteristic of this 'age of discontinuity.'

The implementation, since the beginning of the 1990s, of a conservation and heritage-enhancement plan for Arvida has thus, first of all, targeted a renewal of common references for Arvidians, while at the same time inviting them to fully participate in the collective effort of heritage preservation. In this regard, the first inventory of the built landscape, supported by an imposing body of 2,000 or so original plans enabling a documenting of all of the town's housing, architecture, and urban planning, has integrated the habitability notion into the evaluation of its urban integrity. Especially when it comes to the houses themselves, for example, modifications that are acceptable, desirable, or to be forbidden have been identified in order to propose heritage as restorative 'good practice,' thanks to support services for owners and to municipally sponsored subsidies. A number of recognition and heritage-protection mechanisms have succeeded

one another since, including those concerning the restoration of forestry and street furniture components, parks, and public buildings, with particular attention to urban dynamics and, more recently, to tourism discovery. These heritage-related initiatives have been undertaken as much to bolster the pride of Arvidians as to encourage conservation, most notably of residential buildings: they have been incrementally incorporated into regulations, depending on social acceptability, so as to promote, year after year, the building of a common consensus.

As opposed to what is found in most company and workers' towns, where housing is rented and often remains the property of a single owner, Arvida's houses were in fact destined, from the time they were built, to be purchased by local workers, irrespective of their ethnic origins or their social class. This component of social utopia, seminal in the sense of belonging of Arvidians and founded on personal fulfilment, has nevertheless resulted in a multitude of owners, an unusual complication when it comes to the conservation of planned industrial complexes. All things considered, it is not surprising that the much lauded initiative on the part of the municipality to protect, by way of regulation, 733 houses, in addition to several institutional ensembles, has earned it the Ordre des architectes du Québec award for its commitment to the quality of the built landscape or that the **National Trust for Canada** has also awarded the municipality and the residents of Arvida the Prince of Wales Prize for Municipal Heritage Leadership.

Such initiatives, which culminated with the Canadian government's designation of Arvida as a **National Historic Site of Canada** (2012) and by the recommendation that Arvida be declared a heritage site (2016), Quebec's highest heritage recognition and protection status, would not have come to fruition if they had not been matched by a continuous process of social participation. Since 2010, the conservation, recognition, and transmission process concerning Arvida, as well as knowledge about the company town, has been overseen by a multi-party issue table bringing together all of the area's stakeholders, including various levels of government, citizens, local merchants, and the company, now part of Rio Tinto. Furthermore, outside of various enhancement and mediation initiatives, including the rebirth of Arvida's summer festival and various indoor and outdoor exhibitions, a life story collection project entitled 'Memories of Arvida' has in particular proposed to reverse the role of residents with respect to heritage, from their regular role as users to a new role as producers, by establishing a sort of equality between the narratives of experts and inhabitants. A pilot project in a senior citizens' home has turned this theoretical proposal into an initiative to foster respect for individuals through the evoking and sharing of memories. Each Arvidian is a keeper of the community, not just of his or her own home. This is how Arvida has become a social utopia, a heritage community.

On the vast World Heritage stage Arvida, if the town makes the list, will join ranks where planned industrial towns and villages are still quite sparsely represented, but that an increasingly shared awareness

Partial view of a residential street in Arvida today (Photo by Marianne Charland)

is now enabling us to discover. This materialization of Tony Garnier's Cité Industrielle, which also recalls the Broadacre City of Frank Lloyd Wright, serves to complete the portrait etched over history by Saltaire, Crespi d'Adda, Bois-du-Luc, and Rjukan, as well as the communities of the mining area of Nord-Pas-de-Calais, Røros, Sewell, Fray Bentos, and Zollverein, to name only these examples on the World Heritage List. Arvida serves as a missing link to explain the evolution and the contribution to humanity of these heritages of industrialization, especially since, through improvements to workers' conditions, management's control of housing, and the establishing of a collective order, this Quebec community joins Brasilia and the Berlin Modernism Housing Estates as initiatives that posit and put in practice urban planning as both a social project and a work of art.

Recognition will of course add to the corpus of scientific knowledge, but this pales in importance compared to what such acknowledgement means for Arvidians. For those who experienced firsthand or remember the network of multinationals that punctuated its history, the 3,000 soldiers who roamed its streets to protect the Allies' aluminium (which changed the world, or so the story goes), the recognition of Arvida is above all a reconnecting with its history, with the global saga of the 20th century, memories of which Arvidians can lay rightful claim, above and beyond the administrative limits that erased them for a time. This is the industrial heritage that Arvidians, who fought to safeguard Arvida, protect and transmit, now calling for their community to be included on the Tentative List for World Heritage Sites in Canada. In ever increasing numbers, they are proudly restoring their home.

For more information (in English)

L. K. Morisset, **'Housing for the magic metal city. The genesis of an ideal home,'** Architecture Canada, Vol. 39, No. 1, 2014, 3-34.
L.K. Morisset, **'Non-fiction Utopia. Arvida, Cité Industrielle Made Real,'** Architecture Canada, Vol. 36, No. 1, 2011, p. 3-38.

Surviving buildings at the Minas de Corrales. The raw mineral entered the building on the left of the photo and from there went through a succession of iron 'mills' located where the brick columns are seen, all covered by a roof of sheet iron imported from England. The mills pulverized the quartz to reduce it to sand, where it was placed in large sieves or 'setting pans' where they were mixed with mercury to capture the gold. From 1898 the sand was carried to a cyanidation pool, to the left of the photo in the foreground, and the gold was separated electrolytically. Then all the material was taken to the laboratory where the gold and silver were separated from the other minerals.

# URUGUAY

## GOLD MINING HERITAGE OF CUÑAPIRÚ

***Eduardo R. Palermo, Director of the Museo del Patrimonio Regional - IDR***

The gold mines of Minas de Corrales, in the north of Uruguay, was one of the most important industrial estates in the country. The abandoned mines are now being interpreted in a project of responsible heritage tourism, creating a Gold Museum dedicated specifically to the subject and the Corrales Mine History Museum about the social and institutional issues of a locality that emerged and lived by the momentum of mining gold.

The mining plant beside the Cuñapirú stream was a scene of technological achievements unique in the region between 1860 and 1914. The discovery of gold dates from 1820, when the Portuguese rancher José Soares began exploiting the ore with enslaved people brought from Minas Gerais in Brazil. Complaints about the mines to the Uruguayan State started in 1852. Thus began a long cycle of investment and speculation that included the main economic and political actors of the Rio de la Plata as well as the capitals of France, England and the United States. Migration transformed the regional demography on the border with Rio Grande do Sul (Brazil), with a working class of Italians, Basques, French and from all the American countries.

In 1860, the Spanish engineer, Clemente Barrial Posada, began working the Santa Ernestina mine by galleries, a mode that that became generalized throughout the mining region, and in 1867 built the first hydroelectric plant in Uruguay over the Cuñapirú stream. It was destroyed by a flood in 1870.

Barrial Posada had a fundamental role in the international diffusion of the region, presenting his studies in international exhibitions in Paris in 1878 and Chicago in 1881. From 1879 and with his initiative began the involvement of great international companies, the Cía. Francesa de Minas de Oro del Uruguay being the first to set up in Santa Ernestina. Important architectural and technological works were created

The recovery of the original paintings on the walls of the main house (1880) began in 2016 with the support of the Federal University of Pelotas, Brazil.

during its period of operation (1879-1896) which are preserved today: the Cuñapirú dam-plant (1880), a railway line for compressed-air locomotives (1880) carrying ore from the mines to the crusher, and a hospital to help the workers of the mines.

The region was configured as a typical imperialist enclave incorporating the high technology production of its period, amid socio-cultural conditions typical of an extensive cattle raising area, even with pre-capitalist labor relations. The work arrangements in the mining region allowed the coexistence of labor conditions of extreme dependence on the estates - even in 1880 there were enslaved laborers - and the emergence of a mass of workers of European origin who in 1880, 1881 and 1911 staged the first worker's strikes in the country.

Architecturally there exist valuable industrial and civil constructions in Cuñapirú: the offices of the French company, grinding sheds, the remains of the railroad, the dam on the Cuñapirú, three-storey buildings for turbines and power sources, and a 15 km line of aerial wagons finished in 1901 that connects with the San Gregorio gold mine, unique in the operation of the region. The entire infrastructure was built and used between 1880 and 1945 to produce gold.

A conservation and interpretation project has been implemented since 2013 by the Intendencia de Rivera (Regional Heritage Museum) and the Mayor's Office of Corrales, with the participation of local residents and the support of specialized technicians in different areas. Thus began the general recovery of the property, with information panels with historic photos, the adaption of some properties as museums, archaeological excavation by the National Commission of Historical Heritage (2015).

**Contact the author**

# RUSSIA

## RUSSIAN INDUSTRIAL HERITAGE FIGHTS FOR RECOGNITION

***Ekaterina Khaunina and Valentina Muzychuk, Institute of Economics of the Russian Academy of Sciences, Moscow***

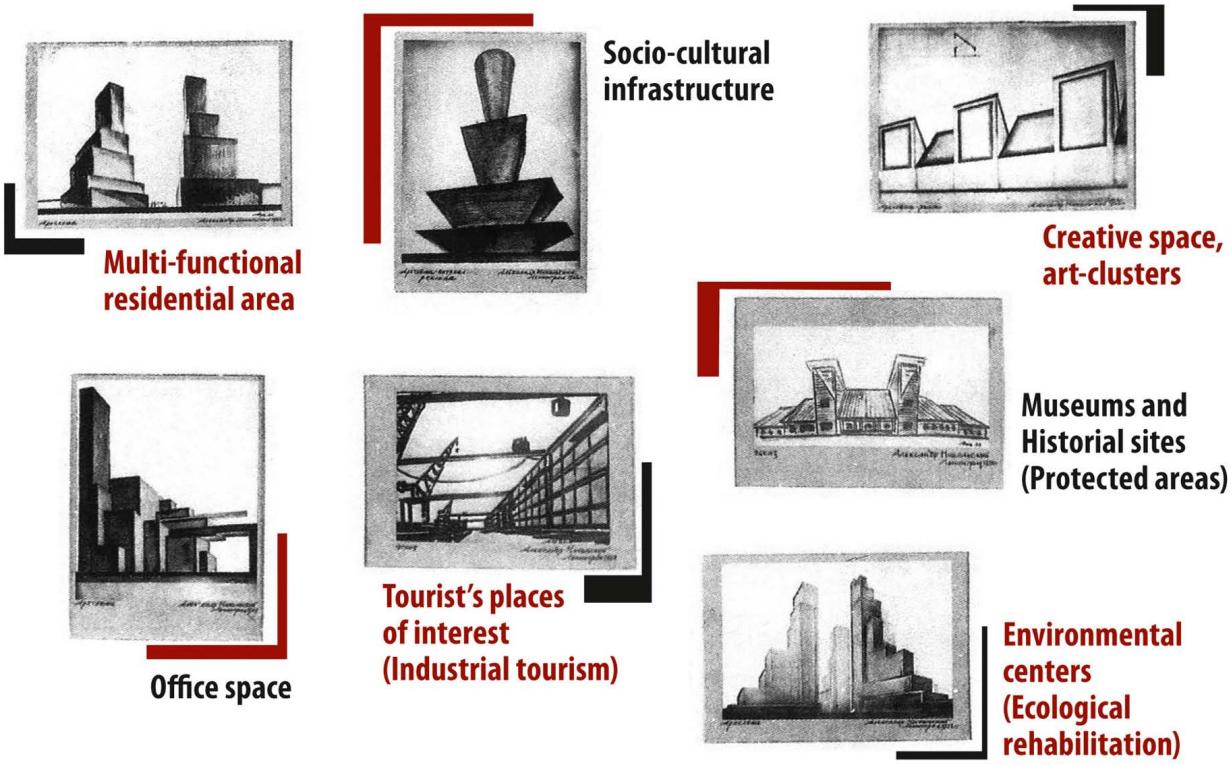
Historically and chronologically, Russia's rich industrial heritage can be divided into three main groups: the pre-revolutionary period from the beginning of the 18th century till 1917; the Avant-garde and Constructivism age from the 1920s to 1930s; and the Socialist Realism period from the mid-30s till the early 1950s. Recently, experts distinguish a fourth period of Rational Modernism from the mid-50's to the 1980s.

As in other industrialized countries, industrial heritage in Russia is represented by factories, stores, depots, hangars, and so forth. But there is also a special group of sites that reflect features of the Soviet period: socialist cities (sotsgorods), housing and industrial complexes, recreational centers for workers (clubhouses), communal houses, bath-houses and other types of building that are not found in capitalist industrial societies.

In the post-Soviet period in Russia, the attitude to cultural heritage has changed. Privatization and the redistribution of property, construction and the residential boom in the cities, huge private investments in territorial development, a lack of public finance, reduced authority of planning control and monitoring, the growing gaps between the aspirations of investors, owners, public authority, civil society, scientific and the architectural community - all these aggravate the situation. There is no difference between the original and a modern replica for the most people in Russia, and especially in the minds of the nouveau riches. The cost of land is several times higher than the value of historical buildings, so it is easier to demolish and build a new one. Preservation of cultural heritage is a long-term process, but business selects projects with a short planning horizon. Moreover, administrative and practical decisions are taken under financial pressure rather than professional interests.

It should be noted that attitudes towards the pre-revolutionary industrial heritage is more respectful and responsible. Post-revolutionary heritage, however, is undervalued: as they say, 'one hundred years is not history in the Russian mentality'. This leads to unfortunate results, with the risk of demolition, destruction, desolation and neglect. This heritage needs inventories, listing, protecting and funding.

The architecture of the Russian Avant-garde is recognized internationally as the most significant contribution to the world's cultural heritage. Nevertheless, modern private owners or developers do not




Modern uses of the industrial heritage. Image inspired by A. S. Nikolsky. Arch-Shemes (1922-1923)


Adaptive reuse of industrial heritage in Moscow and St. Petersburg (1 - Winzavod Centre for Contemporary Art; 2 - The Factory Bolshevik Museum of Russian Impressionism; 3 - Jewish Museum and Tolerance Centre; 4 - the Red October art & business cluster; 5 - The Stanislavsky Factory The Theatre Art Studio; 6 - Tkachi Creative Open Space; in the center – Moscow Gasworks, 1865)

considered this kind of industrial heritage to be of genuine value and strive to exclude it from the listed buildings. There are a lot of such improper examples in Saint-Petersburg and most of Russian regions. Furthermore, former industrial sites in Russian cities and towns have a reputation of being polluted and unattractive even though their industrial heritage has a real value.

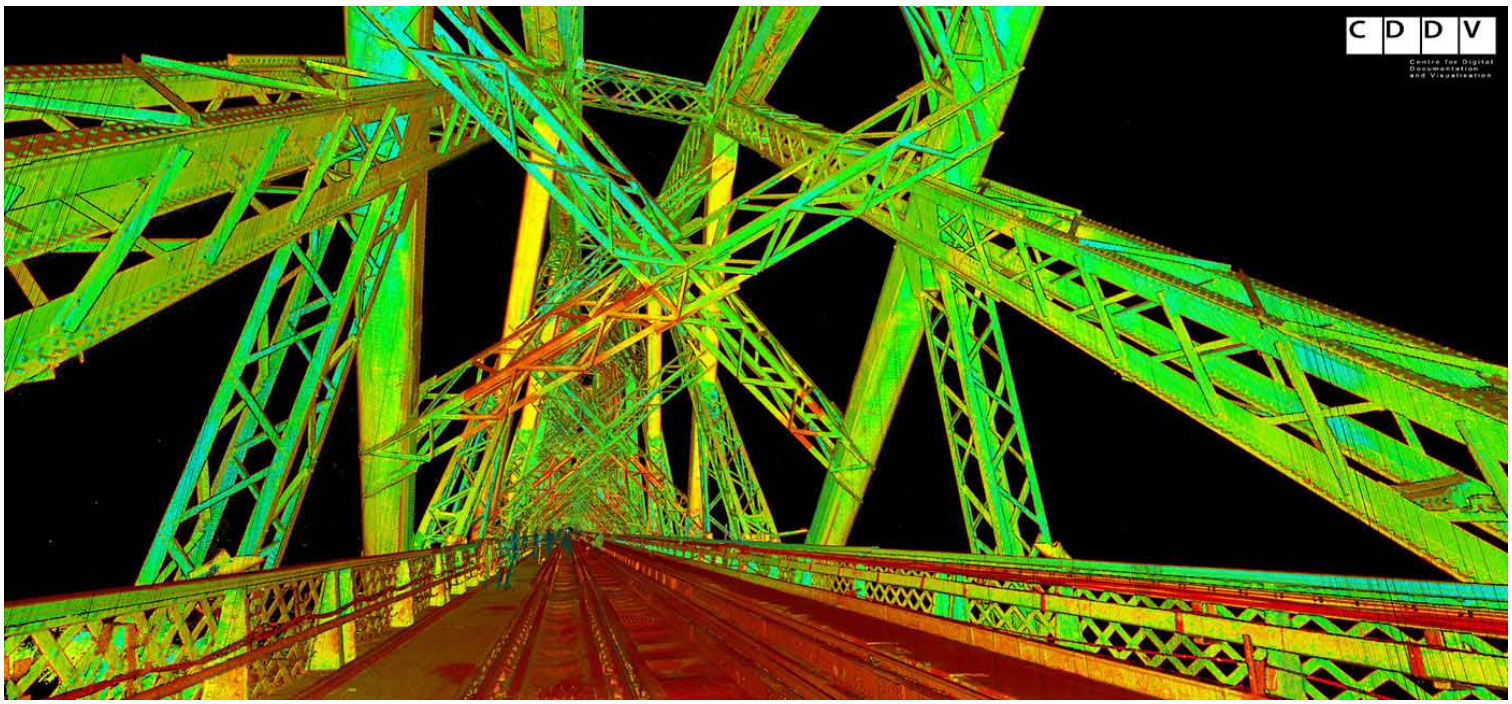
Preservation of industrial heritage matters not only because of its great cultural significance, but from the point of economic and social effects. These are the revitalization effects of industrial heritage, providing new jobs, integrated development of territories and infrastructure, valorization not only historical buildings but also of surrounding areas, reducing social tension, and engaging civil society in mainstreaming national cultural heritage.

As a rule, medium-scale businesses and local communities are key actors in preservation of cultural heritage. These ones are the weakest link in Russia. Corruption, non-enforcement of laws, distrust of the state, failure of real tax benefits, slow down the activity of small businesses in the sphere of cultural heritage. Local communities are passive because preservation of heritage, especially industrial, is not a current priority due to the lack of awareness and recognition of the issues and of course of public finance. Another reason for the current distress in the field of industrial heritage protection is the lack of an appropriate school of restoration.

Nowadays there is no well thought-out system of preservation and valorization of industrial heritage in Russia.

So while there is still no long-term strategy, separate, even socially relevant projects are being done contributing to a process of gentrification which also takes place in Russian cities. The most successful initiatives with great public resonance (all in Moscow) are the **Winzavod Centre for Contemporary Art,** a former winemaking enterprise, the **Jewish Museum and Tolerance Centre** in the Constructivist Bakhmetevsky Bus Garage, designed by K. Melnikov and V.Shukhov, **The Factory Bolshevik,** office space and the Museum of Russian Impressionism in a large perfume and confectionery factory, the successful and very attractive Red October multi-functional art-cluster, a luxury residential complex and business center in a famous

**RUSSIA, Cont'd pg. 13**




Point cloud view of The Forth Bridge at track level. The digital model is made up of 1,426 separate laser scans from different positions all over the 2.5km long structure, and comprises over 22 million points.

## U.K.

### 3D DOCUMENTATION OF THE FORTH BRIDGES

***Miles Oglethorpe, Historic Environment Scotland***

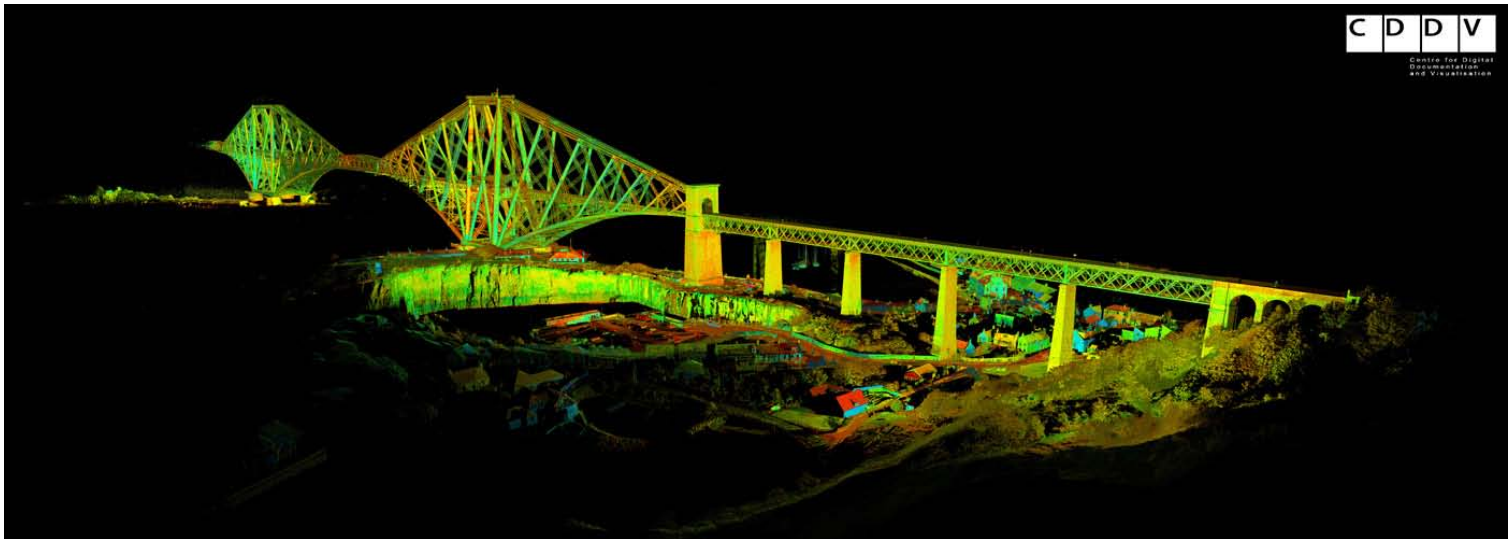
A team of surveyors from Historic Environment Scotland's Conservation Directorate and the Glasgow School of Art's School of Simulation and Visualisation has completed 3D surveys of the Forth Bridge and The Forth Road Bridge, near Edinburgh. The team, which is led by Dr Lyn Wilson of HES and operates under the Centre for Digital Documentation and Visualisation (CDDV), a partnership of the two organisations, has also documented the construction of the new Queensferry Crossing, which is due to open in the summer.

The initiative commenced with a pilot project in 2014 when initial survey work proved that it was technically possible to record the bridges, and that it was safe to do so. The survey then benefited greatly from the Scottish Ten project, also published in the TICCIH Bulletin and in particular from experience gained in Nagasaki working on the Giant Cantilever Crane in partnership with the National Congress of Industrial Heritage of Japan. This joint recording work helped provide evidence supporting the successful inscription onto UNESCO's World Heritage list of both the Forth Bridge and the Sites of Japan's Meiji Industrial Revolution in July 2015.

Funding for the main survey of The Forth Bridges has since been provided by the Scottish Government through its agency, Transport Scotland, and further resources have been set aside to develop digital educational resources to promote Science, Technology, Engineering and Mathematics (STEM) subjects in Scottish schools. As is the case in many countries, new generations of Scottish children are emerging from school with few practical skills, and there is a poor take-up of STEM subjects, especially among girls. The hope is therefore that these giant pieces of industrial heritage can inspire a new generation of young people, and that the story behind the survey will generate interest.

In the case of The Forth Bridge, the survey took over 1,400 separate scans to create a comprehensive record of the 2.5 km structure, and these have now been woven together into a single 3D model which, in the process, has generated an enormous dataset. In addition to educational applications, it will be useful to owners Network Rail's conservation and maintenance programme, acting as an exceptionally accurate baseline record from which monitoring and interpretation work will be possible. It will also be a valuable asset when developing a potential visitor experience at the Bridge itself, and online for virtual visitors.

By chance, the survey coincided with the fracture of one of the Forth Road Bridge's 'truss-end links' in December 2015, and it was therefore possible at the time to use the laser scan data in the analysis and planning of repairs to the damaged link, and for the reinforcement of the other three links, there being two at each end of the structure. As with the neighbouring railway bridge, the 3D model will be




Point-cloud image of the north end of The Forth Bridge showing two of the three double-cantilever towers and the approach viaduct linking the towers to Fife.

a useful resource both for the maintenance and conservation of the bridge, and for interpretation and education purposes. The 'A'-listed structure, the largest suspension bridge in the world outside North America when it opened in 1964, will be closed to all traffic except public transport, bicycles and pedestrians when the new crossing opens later in 2017.

In the longer term, CDDV hopes that the experience gained surveying these enormous engineering structures can help with the recording, conservation and potential restoration of other World Heritage Sites, some of which like Kathmandu, Palmyra, and most recently Nimrud have suffered severe damage as a consequence of both natural and human disasters. At the very least, it should be possible to virtually reconstruct some of the most badly damaged sites through the integration of survey data with digitised historic records. It should also be possible to digitally document other industrial World Heritage Sites, as well as candidate sites such as those already on the Tentative Lists.

**Fly-through animations** derived from the 3D models of the Forth Bridges were made available in January 2017. Meanwhile, there are ambitions to develop the three Forth Bridges as a distinct tourism destination close to Edinburgh.



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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.

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# MEXICO

## BACARDÍ AND THE ESPÍRITU SANTO TATETLA HACIENDA

***Mariano Castellanos Arenas, Benemérita Universidad Autónoma de Puebla, TICCIH México***

On June 2004, Bacardi and Co., using the argument of financial problems, fired fifty workers from its plant at La Galarza, in Izúcar de Matamoros, Puebla. Jorge Terrazas, Vicepresident of institutional relationships, declared that this was a temporary closing of the plant, since a technological restructuring was planned and new trained employees would be hired.

What will happen to the personnel, built heritage, and sugar cane heritage landscape? The rum factory keeps in its interior enormous storage tanks that have 230,000 litres capacity, as well as modern facilities for the production tasks. At the same time, the place preserves the main house of the Espíritu Santo Tatetla Hacienda, its passages, arches, patios, surveillance towers and chapel from Colonial times. The result is a combination of architecture that takes us to a Mexican viceregal past, surrounded by steel structures that take us to the future. The whole site configures a n ensemble that must be protected, managed and preserved for its historical, aesthetical, and cultural richness.

This industrial heritage site is about 65 km south from Puebla City. In 1956, Bacardí bought the building of the Espíritu Santo Tatetla Hacienda from William Jenkins, a magnate living in Mexico. The purpose was to install its fermentation and distilling plant. This transformed the whole unit into a central reference point portraying an exceptional cultural landscape.

It was recorded that the sugar cane (Saccharum oficinarum) was planted by the first time in Santa María Tatetla in the middle of the 16th century. By 1600 Don Juan Márquez de Amarillas was the owner of Espíritu Santo, one of the first sugar haciendas of the region, with a


The old Bacardí distillery at the Espíritu Santo Tatetla Hacienda.

production of 10,000 arrobas each sugar harvest. We know that this production will continue since the Atencingo sugar factory will still need it; we don't know the fate of the old hacienda and the industry facilities of the Bacardi Company.

The future is unforeseeable for this industrial heritage, one of the most significant at the Izúcar Valley. I am aware of the difficulty of transforming a private heritage into a public one. At the same time, I know that not all tangible heritage is susceptible of being transformed into museums, and that the owners' interests are hardly directed to the memory's preservation. However, I am convinced that this asset of the industrial culture may generate and strengthen a people's identity, since these are the same people who have kept it through their work and it belongs to their every-day landscape. It is crucial to consider industrial or any other heritage as a means toward a social, cultural and economical development, through an appropriate management, oriented to the improvement of people's lives.

# RUSSIA, CONTINUED

chocolate factory, the Stanislavsky Factory, which is offices, luxury apartments, a hotel, restaurant and theatre in a former textile factory, and the Tkachi Creative Open Space in St. Petersburg, an old spinning and weaving mill named Peter Anisimov.

Recently, regional authorities intend to develop domestic tourism. This requires brand-building of the sites. For some of the Russian regions, industrial heritage can boost this process, with initiatives to create museums of the selected industrial territories. The experience of other countries can be of great assistance in that regard.

In conclusion, we would like to underline that in spite of all existing problems, historical industrial heritage is more and more perceived by the society as an enduring value largely due to the civic participation activity and the efforts of the preservation movements. In Moscow and St. Petersburg it is a force to be reckoned with. In this respect we share the view that community support is very important for the ongoing effective reuse of industrial heritage sites.

Revit Model of MASP (São Paulo Art Museum) for immersive visualization in the BIM CAVE (Illustrations by D. Yenerim and G. Campagnol).

# U.S.A.

## IMMERSIVE VISUALIZATION AND INDUSTRIAL HERITAGE

***Gabriela Campagnol, Stephen Caffey, Mark J. Clayton, Kevin Glowacki, Nancy Klein, Julian Kang and Geoffrey Booth; Departments of Architecture, Landscape, and Urban Planning, Construction Science, and Visualization, and Center for Heritage Conservation, Texas A&M University***

Picture yourself approaching a now-defunct industrial heritage site that today lies on the edge of one of America's largest cities. Now imagine it bustling with activity. Perhaps you are aware that this was once a privately-owned enterprise, a flourishing company town. You recognize the architecture of the mill, the smokestacks, the worker housing and the original machinery. You walk inside the refinery and around the boilers. You know the place, but the time is different: this is not a tour of the site in the 21st century, but during the peak of its production—during the heyday of early 20th-century industrialization. Shifting seamlessly and effortlessly over a series of decades, you explore the post-industrial environment as it undergoes transformation, adapted for new uses. This comparison affords you a better understanding of place and space as evolving processes. How is this possible? You are, of course, traversing time and space through immersive visualization (IV), or virtual reality.

Since the Rome Reborn initiative led by the UCLA Virtual Reality Lab in the 1990s and 2000s, digital heritage platforms and virtual reality environments have served as laboratories within which scholars from across the disciplines can speculatively (re)engage with some of history's most expansive gestures of architectural expression. Building upon this tradition, our research, which we have named "Unreal Projects", brings together faculty and students from the Departments of Architecture, Construction Science, Landscape Architecture and Urban Planning, and Visualization to investigate the construction of 3D digital models of places too distant or from too far in the past. Our interdisciplinary team is conducting architectural, archaeological, heritage, and urban historical research through immersive visualization with a goal to enable students in university-level core curriculum courses to enhance their spatial and sensory understanding of place by accessing the virtual sites, structures and spaces generated for the project. We use Building Information Modeling Cave Automatic Visualization Environment or BIM CAVE, a computing and display system developed by Dr. Julian Kang at Texas A&M University. The system enables small groups of students to construct and navigate digital models of some of the most important, influential and distinctive monuments of the world's heritage.

Our first case study was the BIM model of the MASP (São Paulo Art Museum) building and museum display in São Paulo, Brazil, using Autodesk Revit 2014. The initial model was developed in collaboration with graduate students, whose area of expertise are in modeling settlements by utilizing BIM technology. Drawing from the original construction documents, the building also served as case study for Dr. Kang's graduate-level class in BIM. Designed in 1957 by the Italian born Brazilian architect Lina Bo Bardi (1914-1992) the museum hovers above a 2100-square-meter belvedere on Paulista Avenue in the heart of the city. The building was registered at State of São Paulo level in 1982. It received National Heritage designation in 2003. However, these actions didn't prevent the incongruent modifications that Bo Bardi's original project has suffered over the last 15 years, including the 1996 removal of the original museum display designed by Bo Bardi. Thus, one of the Unreal Projects team's first objectives was to re-create the original museum display and offer the virtual experience of a space that, until late 2015, no longer existed. Motivations for the selection of this heritage monument as the first case study include: 1. Simple geometry and availability of the architecture and construction drawings; 2. The modifications to the original display

**BIM CAVE, Cont'd pg. 20**

# CHINA

## CONFUSION AND RE-UNDERSTANDING OF INDUSTRIAL HERITAGE

***Boying Liu, School of Architecture, Tsinghua University***

Protection of industrial heritage by the Chinese government started in April 2006, at the Wuxi Forum organized by the State Administration of Cultural Heritage. The subsequent formulation of the Wuxi Proposal (2006), Beijing Initiative (2010), Hangzhou Consensus (2012), became substantial documents and attracted wide public attention.

There are four Chinese academic organizations in the field of industrial heritage, Industrial Architectural Heritage Academic Committee of Architectural Society of China (IAHAC of ASC) (2010), Industrial Heritage Department of China History and Cultural City Committee (2013), Industrial Heritage Committee of Cultural Relics Academy China (IHC of CRAC) (2014), and the Industrial Heritage Research Society of Chinese Society for the History of Science and Technology (2015). Two important document were formulated in 2011 and 2014, the Industrial Heritage Survey Index and the Value Assessment Method of Chinese Industrial Heritage (Trial Version), which refer to heritage protection, architecture design, urban planning, history of science and technology, and other academic fields closely related to industrial heritage.

With the deepening of industrial heritage research, and in view of the present situation of research and practice at home and abroad, the recognition of industrial heritage is still controversial. The concept and connotation of industrial heritage also need to be clarified constantly, along with the re-understanding of industrial heritage.

In 2004, ICOMOS published The World Heritage List: Filling the Gaps, An Action Plan for the Future, known as the Gap Report. It expressed the global strategy whose main goal was ensuring a more representative, balanced and credible World Heritage List. The Gap Report classified items by typological framework, chronological-regional framework and thematic framework, and then analyzed the global distribution from different angles. It aimed to 'provide States Parties with a clear overview of the present situation, and likely trends in the short-to medium-term with a view to identifying under-represented categories.'

The Typological Framework Analysis in the Report listed types of heritage and established a new category of Agricultural, Industrial and Technological Properties (Figure 1).

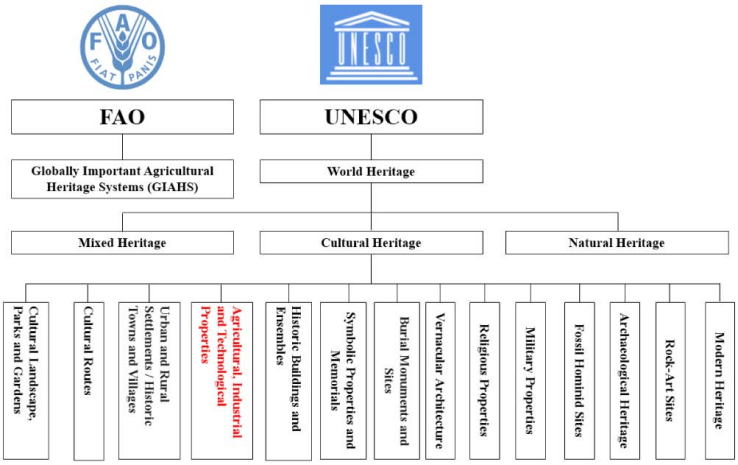



Figure 1. The typological framework of World Heritage (Source: original drawing)

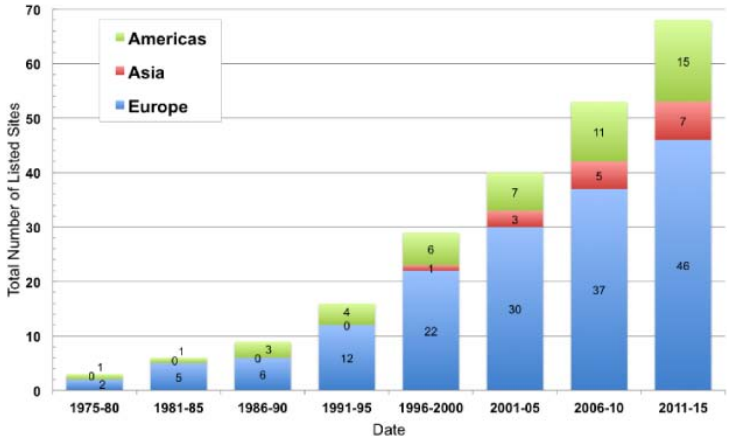



Figure 2. Industrial or engineering heritage distribution (Source: Patrick Martin drawing)

These included: field systems, vineyards, agricultural landscapes; agricultural settlements; water-management systems (dams, irrigation, etc.); mines, mining landscapes, factories; bridges, canals, railways; industrial settlements, etc. The report expanded the connotation of industrial heritage to a greater range and gave the number of agricultural, industrial and technical properties as 69, even though without providing the concrete industrial heritage program list.

Professor Patrick Martin, president of TICCIH, claimed at the seventh academic symposium on industrial heritage in China, in November 2016, that there are 68 items of 'industrial or engineering heritage' on the World Heritage List up until 2015, without providing the specific content. (Figure 2) When the author asked Professor Martin why an authoritative list in the name of TICCIH was not published, he answered that it was because of the ambiguous boundary of industrial heritage and variety of comprehension by different people. This additionally reflects the current embarrassing situation of industrial heritage.

### CONCLUSION

For research on industrial heritage, it is necessary to first pinpoint

The ceramic factories in Jingdezhen Jiangxi Province which were established in 1950-1960 and have been reused as a creative industry park and museums.

objects of study, define research boundaries and make clear the study contents. There are numerous uncertainties at present in industrial heritage research, as many distractions appeared in its type, composition, name, connotation, age, value, etc.

Science and technology are the driving forces of industrial development, particularly of the industrial heritage values. Industrial revolution is rooted in the progress of modern science; thanks to technological breakthroughs, the world-influencing industrial revolution came true and led to industrial civilization's turning point. Industrial heritage mission is to record the changes in human society.

Civilization is a result of science, technology and industry, and the drive in human society.

Social value is an external expression of industrial heritage. We are experiencing the social changes brought by the information age, which have triggered the sense of "fear and worship" similar to what we felt when the industrial revolution took place, as well as the excitement and delight we felt when television and the washing machine came into our lives.

The mission of the industrial heritage is not only to record the first step but also every important advance. Study of industrial heritage will surely embrace historical footprints and march toward a bright future!

I think TICCIH should issue the list of world industrial heritage first, and then strive for publication of the World Industrial Heritage List independently if UNESCO/ICOMOS support us.


The sectioned locomotive 1262 at the Workshops Rail Museum. Photo: Dbromage, via Wikimedia Commons.

# AUSTRALIA

## THE WORKSHOPS RAIL MUSEUM, QUEENSLAND

*Geraldine Mate is Curator of Science and Technology at The Workshops Rail Museum. The museum opened fifteen years ago to presents the social history, the technology and the narrative of rail in the Australian state of Queensland, and is also part of a catalyst investment project to develop the rail yards precinct into 'a distinctive world class heritage and tourism destination of both regional and national significance'. How does she see the role of her site and its collection, and the future for industrial museums?*

**The Workshops Rail Museum** opened with the intention of recognising the contribution of rail to the history of the state. It occupies part of the operational heritage site of the Ipswich Railway Workshops, the first railway workshops in Queensland, owned and used by the State rail authority, Queensland Rail. Being on the site of the original railway workshops allows interpretation of the heritage listed site, presented in the app and audio tour, but also through volunteer-led tours of the operating Workshops. This affords the visitor a unique opportunity to have behind-the -scenes tours of parts of the workshops, led by volunteers who work on restoration of the heritage fleet and on maintenance of operational heritage rolling stock and locomotives.

The Workshops Rail Museum falls under the umbrella of the Queensland Museum Network. We deliver high quality research and mount exhibitions that showcase the museum's collections, connecting real objects and contemporary study with communities, creating "authentic and compelling experiences and stories that inspire, enrich and empower".

They are aimed at a range of audiences, including families with children, specialist audiences interested in rail heritage and technology, cultural tourists especially in the older demographic, while also providing a destination for local residents. Information is presented visually and through AVs, soundscapes and through audio tours/apps. As well as the exhibitions we have a large object display including


Opened in 2002, The Workshops Rail Museum is located at Australia's oldest railway workshops still in operation, the Ipswich Railway Workshops.

rolling stock from Queensland's state and industrial railways and a Collections Store where objects are in storage visible to patrons. There are also regular school holiday programs that present performances, hands-on activities and special displays aimed at families. We try to give visitors a compelling and fun experience with an enhanced understanding of the railways. An integral part of that experience is the interpretation of the heritage listed site that we share with Queensland Rail.

The museum was established with exhibition zones that addressed the history of the Ipswich Railway Workshops site, the history of rail in Queensland and modern rail technology. Locomotives, carriages and wagons are presented in specific contexts that tell stories about different aspects of railways, including the movement of goods and people across the state, the stories of railway journeys, and the construction of the railways. We mount temporary exhibitions that address specific elements of rail history in Queensland that are informed by areas of audience interest; contemporary topics such as the current focus on the centenary of the First World War; important but little-known stories that come out of research such as the recent exhibition on the role of Aboriginal people, Torres Strait Islanders and Australian South Sea Islanders in the railways; and collection strengths.

Planning and design of exhibitions occurs in-house and is supported by curatorial research, with largely our own collection objects on display. Recent exhibitions have been produced to travel, allowing the content to be more widely accessed. We also take travelling exhibitions to complement our existing content.

## COLLECTING PRIORITIES: THE SOCIAL HISTORY OF THE RAILWAYS

The Workshops Rail Museum holds Queensland's largest railway heritage and cultural collection with over 60,000 items in our state collection, reserve collection and library. We also are custodians of Queensland Rail's historical documentary and photographic archive. Our main priorities for collecting are currently around the social history of rail. This includes the material culture associated with operating both railways and railway workshops - from pay tins and teapots to uniforms and tools. But we are also collecting in some more specific areas, including material related to rail workers in the First World War, objects that illustrate union membership and activities in the railways in Queensland, and the range of material culture related to tourism aspects of railways. Our most recent major acquisition was a large collection of models associated with railways across the world that particularly illustrates changing technology and design of locomotives and rolling stock, and a variety of social, economic and political contexts for rail.

The other major consideration for us is the acquisition and care of rolling stock. This is a particular challenge. We have stuck with an approach that means we do not acquire rolling stock or locomotives

Pouring casts inside the Foundry, 1943. Image Courtesy of Queensland Museum Network/Queensland Rail.

unless we are able to care for the objects and display them. This means that any acquisition has to encompass a plan (and budget) for conservation or restoration and display and interpretation. We have also steadfastly kept our trains non-operational. This is greatly aided by Queensland Rail, as our neighbour and cohabiter on the site, operating a heritage rail fleet, so our patrons also take away glimpses of the romance of steam and the railcar travel of yesteryear.

We identify three key areas of industrial heritage that are urgently in need of protecting. The first is intangible heritage – the capture through photographs, interviews, oral histories and donations of the skills of the tradesmen and the stories and associations of the site. Stories about hiding round the back of a particular machine and scratching a name in the wall, the memories of the person responsible for a particular locomotive, the fears of a first day apprentice, or the minutiae of everyday jobs, will soon be lost for an entire era of railway operation. As the premier rail heritage destination in the state, we are best placed to record this. The continued focus of Queensland Rail on care for their heritage fleet also means that, at present, heritage trades such as blacksmithing and steam-qualified boilermakers continue to be practised, albeit at a much reduced capacity.

The second area is the heritage listed buildings. In the last five years we have seen the blacksmith shop, once a source of great visitor interest, go largely out of commission. This is partly through the loss of the relevant trades people (as above) but also as 19th century machinery gradually fails 21st century safety requirements. The vacant buildings themselves also become more difficult to maintain to heritage standards.

There is an opportunity for a repurposing of parts of the site that are no longer used, with adaptive reuse of heritage buildings for culturally sympathetic activities. This is a broader challenge that is dependent on the development of 'precinct concepts' for the site as a whole that can work around an industrial operation.

Thirdly, the collection of rolling stock is a major challenge. Without 'stamp collecting' all of the variations of steam engines and diesel locos produced in Queensland over the last 150 years, there is still a need to recognise and preserve the key technological moments of change. The moment for that is now but it is a challenging financial prospect - restoration and display is not cheap and there is only so much space to be had in a museum footprint. The argument for op-

erational locos and rolling stock is for another day, but we are at a critical juncture for the preservation of a form of technology. Skilled drivers and maintainers are gradually disappearing and the appetite for operating steam and early diesel locomotives is strongly impacted by regulations. So we need to be aware of the coming threat.

### THE FUTURE FOR INDUSTRIAL MUSEUMS

Holistically there are connections in industrial heritage to many different aspects of history – the lifeways of workers (where they lived, how they travelled, what they were paid, their home circumstances, status, how they conceived of their work, etc), the everyday working life in an industrial setting, the impact of any particular industry on local (and even national) history, and the impact of a particular technology on an industry or society at large. For that reason I see an important social history future for industrial museums.

I think the challenge is balancing the in-depth understandings, the nuanced research, and the intimate technical detail with an exhibition output that engages visitors. There is no doubt that by making museums accessible, whether it's through Thomas the Tank Engine or Hands On Fun, we are hopefully forming a new generation of enthusiasts for technology, maybe with rail and its evolution, or a fascination with loud machines or behemoth furnaces. For older visitors, industrial museums continue to fuel an evocative memory of the past and a tangible, visible, physical connection to either their own lived experiences in some form of industry, or an idea(l) of a productive past.

Around Ipswich, where The Workshops Rail Museum is situated, you can't help but reflect on the myriad of industries that once flourished, including coal mining, coking furnaces, the railways, the woollen mills and the gasworks, all of which contributed to the social and economic climate of the city. But we need to be more contemporary in our approach to interpretation, and mindful of multi-vocality, ensuring that we break away from the meta-narrative of industrial pasts to recognise different experiences and views, acknowledging the roles of women, ethnic minorities, those with disabilities, and the differentials of power and status.

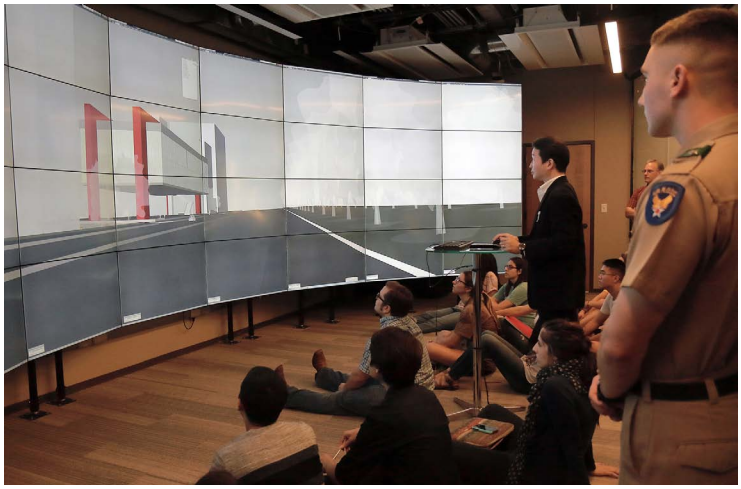
There are learnings to be had today from our understanding of how industries developed, grew and contracted in the past. These include their social, environmental, economic and technological impact. Industrial museums are ideally situated to explore these ideas, partly through their physical place, the manifestation of that knowledge, and the processes and material culture. But museums are also a focal point for remembering, and for recording memories, activities, knowledge, in situ. Industrial museums are the ideal places to bring a more detailed focus on the minutiae of industrial practice, through our clear examination of a particular industry and our access to its material culture, whether it is collection-based, technology-based or place-based.

## BIM CAVE, CONTINUED

provided an opportunity to reproduce the old interior with glass easels so that the viewers could experience the art collection through

IV; 3. Urban context and integration with the city fabric; 4. Recent protests against the possibility of closing the open public space; 5. As means of celebrating Bo Bardi's 100th birthday in the year of 2014. 6. Previous team-member research on MASP.

More specifically on industrial heritage, our team has now focused on the virtual heritage visualization of a quintessential factory town: Sugar Land, the former headquarters of Imperial Sugar, the first sugar refinery in Texas and the state's oldest extant business. This town, with an identity and a history intimately connected to the sugar industry, has been slowly losing its connection to its origins, and the industrial heart of the town is on the cusp of a large redevelopment project. If the redevelopment project fails to reflect the rich history of the people and the sugar industry, much of the history and identity of this town and its people will be lost. Digital technology has progressed to generate experiences of places and spaces that are otherwise difficult or impossible to access. We believe that IV enriches our understanding of history and culture and may offer deeper insights into the issues and practices associated with industrial heritage. The



Students "visiting" MASP (São Paulo Art Museum) at Texas A&M University's BIM CAVE. (photo by G. Booth).

results of this project can serve as both archeological documentation and as an aid to the community to help in the identification, conservation and interpretation of the industrial past.

# INTERNATIONAL

## TICCIH-ICOMOS JOINT ACTION PLAN APPROVED

***Stephen Hughes, TICCIH Secretary***

TICCIH and the International Council for Monuments & Sites (ICOMOS – advisor to UNESCO on the built World Heritage) have worked closely together for a long period. To facilitate that work a series of Memorandums of Understanding (MOUs) have been signed by the Presidents of the two bodies, the most recent at Florence in 2015 (http://ticcih.org/wp-content/uploads/2014/12/MemorandumOfUnderstandingNov102014.pdf). However, they have never previously agreed a detailed Action Plan to achieve the intentions expressed in the MOU. After discussions ranging over a year the Boards of ICOMOS and TICCIH have recently signed-off on a two-year action plan. Currently there is some discussion on the need for ICOMOS to have its own international scientific committee (ISC) on the industrial heritage so the time is opportune for TICCIH members to activate the Action Plan including the need to contribute to further industrial heritage World Heritage Studies as soon as possible.

### 1. TICCIH-ICOMOS COMMUNICATIONS DEVELOPMENT AS AGREED IN THE DRAFT ACTION PLAN FOR 2017-18

1.1 TICCIH Communications with ICOMOS Scientific Council & ICOMOS International Scientific Committees. TICCIH to provide an observer at meetings of the ICOMOS Scientific Council. TICCIH to undertake a survey of its members to see who sits on ICOMOS International & National Scientific Committees and to fill gaps in representation in appropriate international committees.

1.2 Information dissemination at appropriate events. TICCIH & ICOMOS both to ensure dissemination of information and speakers at each other's events where appropriate.

1.3 Reciprocal representation in governing bodies namely TICCIH Board & ICOMOS General Assembly. TICCIH will continue to send representatives to the ICOMOS General Assembly who will carry-on presenting papers of relevance to both organizations. ICOMOS will be asked to formalize representation on the TICCIH Board. TICCIH is prepared to name a member of its Board, also active in ICOMOS, who will be responsible for formal liaison. A liaison person will be formally appointed on each side. The result of this is that Irina Iamandescu of the TICCIH Board and ICOMOS vice-president Grellan Rourke have been selected to liaise on the implementation of the action-plan.

### 2. CO-OPERATION IN RESEARCH & DEVELOPMENT OF IMPROVED APPROACHES TO THE WORLD HERITAGE CONVENTION

2.1 Continue Thematic Studies consistent with 'Filling the Gaps in the World Heritage List.' Given below is a strategic overview on how 'Filling the Gaps on the Industrial Heritage World Heritage List' can be taken forward in a staged annual program using the appropriate expertise available through TICCIH and appropriate partnerships.

2.2 Identify Experts for Desk Reviews & Missions with potentially significant industrial heritage. TICCIH will continue to provide lists & contact details of experts appropriate to the World Heritage Nominations submitted when given an adequate time to consult the expert members available.

2.3 Parties will co-operate on the development of theory & conservation principles in industrial heritage as defined in the Dublin Principles. Both parties are participating in the development of a twentieth-century heritage framework co-ordinated by the Getty Institute to which the Dublin Policies will be applied.

As noted in paragraph 2.1 above the action plan includes a strategic overview on how 'Filling the Gaps on the Industrial Heritage World Heritage List' can be taken forward in a staged annual program using the appropriate expertise available through TICCIH and appropriate partnerships.

Staged Programme for the Resumption of ICOMOS-TICCIH World Heritage Studies on the Industrial & Technical Heritage in 2017

The ICOMOS Global Strategy & the Filling the Gaps Study identified the Industrial Heritage as being under-represented on the World Heritage List.

The Board has agreed to resume a structured programme of ICOMOS-TICCIH World Heritage Studies and its Secretary, Stephen Hughes, and the TICCIH Editor James Douet, have been charged with developing a detailed programme in collaboration with ICOMOS.

Between 1996 and 2004 four industrial World Heritage Studies were produced by TICCIH in co-operation with ICOMOS: on Canals, Bridges, Industrial Settlements and Collieries and, according to international feedback these have considerably facilitated inscriptions in those categories.

Documents have already been prepared analysing the full-range of sectional studies required and from that, and an awareness of where international work is on-going the following studies are likely to be proposed as part of an initial two-year programme.

I. The Hydro-electric Industry: this would contribute substantially to the Twentieth-century study and a series of international meetings and consultations are already way as part of the TICCIH Hydro-electric Special Interest Group's Study;

II. The Textile Industry: one of the main industries of the eighteenth & nineteenth-century industrial revolution. A draft World Heritage Study has already been prepared as a result of successive international meetings of the TICCIH Special Interest Section on Textiles and this study is due to be finalised during a further international meeting.;

III. The Copper Smelting Industry: another key industry of the Industrial Revolution. It has been possible to obtain funding from the Leverhulme Trust for a series of international meetings across three continents and a draft study will be further refined by consultation with further experts in TICCIH;

IV. The Iron & Steel Smelting Industry: one of the two most central industries of the Industrial Revolution. Some initial funding is likely to be available in Germany and a wider consultation within TICCIH will take place.

V. The Copper-mining Industry: An initial study will cover this large-scale industry from the Bronze-Age and Medieval periods and into the early twentieth-century.

VI. The International Slate & Building-stone industry: Two initial international conferences have taken place with representatives of the world's three largest national producers and a further study was approved by the TICCIH Mines section.

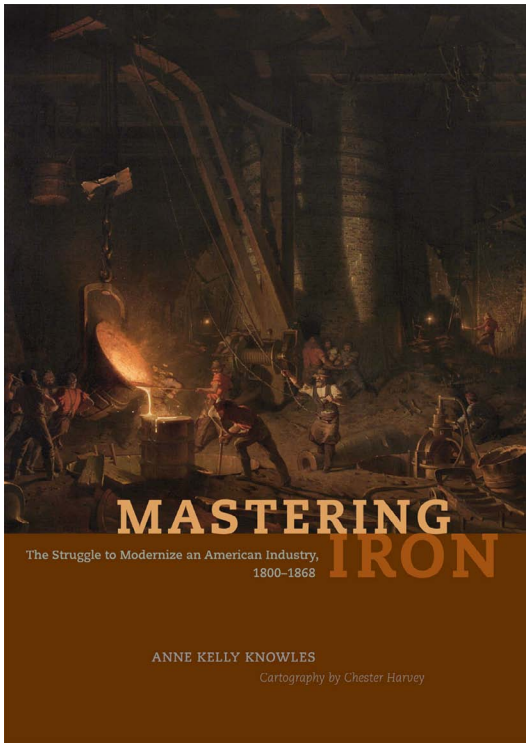
VII. The Water-supply Industry: An industry critical to nineteenth and twentieth-century industrialisation and where an international study is beginning, led by the TICCIH Editor James Douet.

Members of the TICCIH Board have agreed to be involved with the taking forward of further studies although any members of TICCIH are welcome to email the TICCIH Secretary at **secretary@ticcih.org** if they wish to lead, or be involved in, further studies. A template and procedural methodology are available for circulation. Professor Hsiao-Wei Lin is likely to lead on a study of the tea industry. Salt landscapes and settlements associated with the extraction of salt; agro-industrial processing and industrial landscapes have also been suggested as priority topics to be studied. Twentieth-century industries such as the automative or aeronautics industries may have to wait until the Getty 20th century heritage framework study is completed in 6-8 months.

This is an initial series of resumed studies. One-two of these can be finalised by TICCIH and passed to ICOMOS in 2017. Obviously work will initially concentrate where there is funding available for international consultation using the TICCIH and other networks. Further progress on a fully comprehensive set of studies will be at least partly dependent on the availability of further funding although the TICCIH Board has decided that for the next three years some core funding will be made available for this purpose.

# PUBLICATIONS RECEIVED

## U.S.A.




***Mastering Iron: The Struggle to Modernize an American Industry, 1800-1868***

Anne Kelly Knowles. Chicago: University of Chicago Press, 2013. 334pp. 78 illustrations (66 in color), tables, references, index.

$45.00 HB / $7.00–36.00 eBook.

ISBN: 9780226448596 (HB)/
9780226448619 (eBook).

*Mastering Iron* sets out to examine the shift in America from widespread charcoal iron industry in the early Republic to concentrated mineral coal iron production by the time of the Civil War. Author Anne Kelly Knowles claims that this is not just a geographically informed examination of American iron—it most certainly is that—but is in fact an exposition of HGIS: historical geographic information systems. She even includes a short appendix introducing the concept to the reader. With the advent of computational analysis of large databases—in this case, Lesley's Iron Manufacturer's Guide—she claims to be doing a substantially different kind of history than has hitherto been done, or, indeed, has even been possible.

Knowles takes as her framing document J.P. Lesley's Iron Manufacturer's Guide (1859), that provides a wealth of information on the iron industry on the eve of the conflict: descriptions and data on hundreds of furnaces, rolling mills, and forges across the country; details of when they were built, rebuilt, modernized, and what types of fuel and blast they used; and the products they made. This wealth of data then allows Knowles to investigate numerous individual ironworks to characterize the growth and development of American iron. To characterize this development is difficult, but she puts it nicely when she says, "The trajectory of every US iron region's development was influenced by its resource endowments and topography, potential for transportation improvements, proximity to centers of population, and access to skilled labor" (p. 181).

The opening two chapters explore the overall growth and spread of ironmaking in the nineteenth century. Her core third and fourth chapters investigate, respectively, two iron towns that tried but failed to replicate the Welsh success with anthracite coal for producing iron (Farrandsville, PA and Lonaconing, MD), and then two firms that ultimately succeeded in bringing integrated ironworks to antebellum America (Lehigh Crane Iron Co. and the Trenton Iron Co.). In both these chapters she nicely elucidates how imported technical expertise merged with American capital, but then ran headlong into the difficulties of geography and transportation (and in one case, social unrest) that foretold the failure of both ironworks. In the final section, Knowles discusses how the Civil War affected iron production. The massive surge of demand in both North and South, coupled with the differential infrastructure and Northern depredations of the Confederacy allows her to investigate how labor and materiel crises were handled in the South. Her conclusion hints at the massive changes that overtook the U.S. iron industry after the Civil War: Bessemer steel, vertical integration and consolidation, and the awakening awareness of labor, but that is the story for another book.

This one is not explicitly about surviving heritage as much as the valuable insight of how the geography and chronology of American ironmaking shaped its ultimate legacy. Such contemplations are worth abstracting to any industrial heritage in any area of the world. Knowles has also made it a point to visit many of the furnaces, forges, and mill sites about which she writes in order to understand their relationship to the landscape and surrounding communities, most of which only exist because of their industrial beginnings. To that end, one useful concept she develops for thinking about the spatial remains of industry is the distinctions among types of iron settlements: plantations, hamlets, and villages. Each demonstrates a distinct relationship between the industrial plant, the landscape, and the domestic and therefore social spheres of the settlement.

Knowles' valuable book is an excellent addition of scholarly literature on iron production and has clearly been deeply informed by historical scholarship in geography; the history of science as well as the history of technology; science, technology, and society (STS); and economic history. Like any survey of an industry across the country, readers with deep knowledge of specific ironworks will inevitably find their sites shorted, but that makes this book all the more important as a scaffolding into which future historians and geographers of

iron production in America will need to situate their localized work.

I must admit, however, that though her HGIS dataset has clearly influenced her story and helped generate a number of her maps, the vast bulk of the book relies on impressive archival research that looks for all the world like routine historical scholarship. That is, the book seems to owe much more to the 'H' of archival sources and the 'G' of a general awareness of the geography of iron in America than it does to the promise of computer-mediated 'IS' that holds the promise of deep data analysis. Though her appeal to GIS is laudable, this excellent could have largely been undertaken without it – or at the very least it should be noted that the sorts of impressive analysis that HGIS has offered to numerous historical investigations do not really appear in this study. Knowles has previously published much more data-intensive analyses of American ironworks that crucially rely on HGIS (see especially her and R.G. Healey's article "Geography, Timing, and Technology: A GIS-Based Analysis of Pennsylvania's Iron Industry, 1825-1875," in The Journal of Economic History 66.3 [2006]: 608-634), but this larger book is surprisingly less reliant upon, or at least explicit about, such methods. Moreover, the "Lesley HGIS" database mentioned in her appendix seems to no longer be available on her faculty webpage.

This is in no way to criticize her story, however: she has written what will be one of the benchmarks of scholarship in the history of antebellum iron in America, and it shall sit proudly alongside Robert Gordon's American Iron 1607–1900 (1996) and Tom Misa's A Nation of Steel: the making of modern America, 1865–1925 (1997).

***— Steven A. Walton***
***Michigan Technological University***

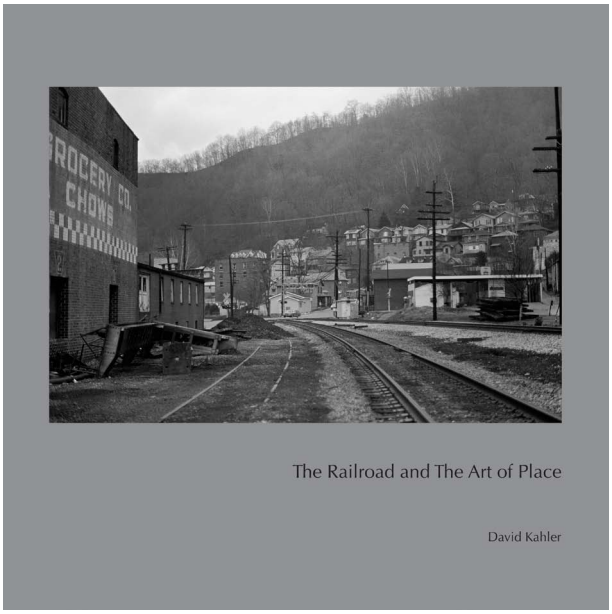
## U.S.A.

*The Railroad and the Art of Place* by photographer David Kahler (b. 1937) is a handsome volume of black and white photographs that show the deeply rooted historical, geographical, and economic relationship between the railroad and the places it traverses. This may be particularly seen in the stark landscapes of the West Virginia's coal country, a sometimes desolate region particularly suited to the sharp contrasts of black and white photography. Kahler provides a valuable record of an industrial landscape being rapidly "reshaped rapidly by political and market forces," recognizing that the "narrow two-land highways, mine runs, mine tipples, and modest miners' housing" that supported the "coal mining machine" were rapidly disappearing.

Although he took his first industrial photographs in 1951 when he was in his mid-teens the artist, now eighty years old, began in earnest to explore the landscape of coal in 1992. Fascinated by Leo Marx's classic The Machine in the Garden, first published in 1964, Kahler discovered the harsh railroad landscapes of West Virginia with "its endless network of steel rails."

Kahler's grandfather lived in Harrisburg and worked for fifty years as a brakeman for the Reading Railroad, and their relationship gave the artist a strong personal connection to the subject. He majored in architecture in college, and established his practice in Milwaukee. Not until 1992 was he able to return to his early industrial interests beginning a five-year project photographing the Norfolk Southern Railway's routes that is the core of this monograph. Fascinated by the "remnants of railroads and industrial detritus that contribute to the art of place found in the American landscape," he was determined to make a record of the region.

While his photographs of the Norfolk Southern Railway inevitably bring to mind the striking images of O. Winston Link (1914-2001),




***The Railroad and the Art of Place***

David Kahler, with additional essays by Jeff Brouws and Scott Lothes. Madison, Wis.: Center for Railroad Photography & Art, 2016. 152 pages. 108 black and white illustrations.

$60 HB.

ISBN: 978-0-692-74877-0

Kahler was not interested in the drama of Link's carefully staged night scenes of steam locomotives, though the two photographers share a strong sense of the significance of local subjects in which their best work was solidly grounded.

Kahler began his photographic journey in Williamson, West Virginia, "the most prominent railhead along the Pocahontas Division of the Northern Southern Railway." The rumbling "slow-moving coal trains" measured the landscape of the region, connecting innumerable small towns for whose residents coal was a way of life; when the coal industry declined, so did the economic base of these towns. His camera captured in the "desecrated wilderness" of what Kahler describes as a triad of "man, machine and his garden," though the human figure is mostly present by implication. He emphasizes the palpable sense of loss in these once active landscapes of enterprise by shooting during the winter months or on overcast days.

Two essays position Kahler's work within a broader intellectual context. Jeff Brouws commences "An Edenic Return No Longer Possible" with a photograph shot by Margaret Post Wolcott in 1938 near Scotts Run, West Virginia. She recorded "a gray, rural tableau ringed by low hills and tinges with a sooty presence" that was typical of coal towns throughout the region. Made for the Farm Security Administration, Wolcott's image reveals the appreciation of the particularity of place that has resonates so strongly with Kahler's vision. The "railroad environment" thus "interacts with human agency" favoring "an affinity for detritus and decay without nostalgic overlay." The landscape remains one of "quiet poverty," and whatever wealth the extractive industries and the railroad has generated for its owners, the harsh reality is that it never transferred to the level of ordinary people. Kahler provides a visual requiem to coal towns, their residents, and the railroad that connected them.

In his essay, "West Virginia and the Railroad," Scott Lothes observes that "the railroad has defined West Virginia like few other places." Notable lines included the Norfolk and Western Railway, the Baltimore and Ohio Railroad, the Chesapeake and Ohio Railway, and the Norfolk Southern (there are still 2000 miles of active rail lines in the state). With the discovery of "vast coal reserves," the industry grew hand in hand with the railways, who constructed "a vast network of branches into the coalfields."

The quality of the illustrations is high, though extending some images over the spine was an unfortunate design decision that lessens the full impact of several of his images, which otherwise provide an invaluable record of an industry whose physical presence on the landscape has been irrevocably altered. While Kahler's photographs document coal sites in the United States, his is a story that has played out in small towns throughout the world.

***— Betsy Fahlman***
***Arizona State University***

# CONFERENCE REPORTS

## FRANCE

### INDUSTRIAL HERITAGE, BETWEEN REFLECTION AND ACTION

### COLLOQUIUM IN TRIBUTE TO PROFESSOR LOUIS BERGERON

In December 2016, the French association CILAC organised a workshop dedicated to the work and memory of Louis Bergeron, who was, among many other things, a past TICCIH president. The goal was to understand Louis's influence during his career, in France, in other countries, and in international organisations. Humberto Morales Moreno emphasized his action for the creation of the ecomuseum in Mexico, Guido Vanderhulst for the industrial heritage in Belgium, and Massimo Preite for that in Italy. Maria-Teresa Pontois talked about his TICCIH presidency, and Michel Cotte about Louis's action at UNESCO.

A session was dedicated to the community of actors he helped establish in France, of associations and researchers: Serge Benoit, Gérard Emptoz, Gracia Dorel-Ferré, Bernard André recalled the beginning of industrial heritage in France with Louis, from different angles;

Poster from colloquium in tribute to Professor Louis Bergeron

# CONFERENCE REPORTS

Françoise Picot talked about his influence in the birth of the association APIC; Marie Patou told about her relationship with Louis as an expert for the UNESCO mining project in North Pas-de-Calais.

The fourth session tried to show how the ideas of Louis Bergeron continue to nourish our thoughts. Jean-Louis Kerouanton talked about his own experience as vice-president of Nantes University with the conversion project of a former factory. Pascale Nachez evoked the city of Mulhouse. Xavier Louis explained the example of Liege with a methodology in industrial archaeology, and Nicolas Pierrot raised the question of the industrial heritage in Paris.

Florence Hachez-Leroy, the President of CILAC, concluded the workshop and emphasized how Louis Bergeron's thinking was rich and always relevant, especially with respect to the new issues that constantly emerge in the industrial heritage. The public appreciated the international perspective of Louis's action that is really essential and not as well known as the tangible action of TICCIH at UNESCO and national levels.

# COMING SOON

## INTERNATIONAL

### CONFERENCES AND CONGRESSES

### 2017

**U.K.**
Inaugural Early Engines Conference
11-13 May, The Ironworks, Elsecar, Yorkshire
www.earlyengines.org

**U.S.A.**
Society for Industrial Archeology 46th Annual Conference
18-21 May, Houston, Texas
www.sia-web.org

**U.K.**
IHBC Annual School 2017: Historic Transport Infrastructure - the backbone of civilisation
22-25 June, Manchester
http://manchester2017.ihbc.org.uk

**U.K.**
BRIDGE: The Heritage of Connecting Places and Cultures
6-10 July 2017, Ironbridge Gorge World Heritage Site, Shropshire
www.bridgeconference.com

**BRAZIL**
ICOHTEC 44th annual symposium, part of the 25th International Congress of the History of Science and Technology
23-29 July, Rio de Janeiro
www.icohtec.org

# COMING SOON

## DENMARK
ERIH Annual Conference: Industrial Tourism: Linking the past with the present and future
20-22 September, Copenhagen
www.erih.net

## U.S.A.
Our Inland Waterways: Agents of Transformation
World Canals Conference concerning the operation and maintenance of canal structures and vessels, community and economic development catalyzed by inland waterways, preservation and interpretation, and environmental issues.
Study tours will follow the Erie, Oswego, and Cayuga-Seneca canals.
24-28 September, Syracuse, New York
http://wcc2017syracuse.com

## SPAIN
XIX Jornadas Internacionales de Patrimonio Industrial. Criss-crossing heritage, urban landscapes, industrial production and contemporary culture. CfP until 20 July,
27 - 30 September, Gijón.
http://ncuna.es

## FRANCE
The industrial heritage in the UK, Mutations, Conversions and Representations. CfP.
10 October, 2017, University of Rennes 2, Rennes
https://indusheritage17.sciencesconf.org

## MEXICO
IV TICCIH Mexico International Conference. CfP. Agro-Industrial Heritage, Background, Challenges and Relevance
18-21 October, 2017, Mérida, Yucatán, México.
Further information: seminarioticcihmexico@gmail.com

## MOROCCO
ICOM-CIMUSET Conference: Technical heritage and Cultural Identity.
5-8 December, Rabat
www.cnrst.ma

## INDIA
ICOMOS 19th Triennial General Assembly and Annual Advisory Committee Meeting,
International Scientific Symposium on Heritage & Democracy (working title)
11-15 December, Delhi
www.icomos.org

# 2018

## CHILE
XVII TICCIH Congress, the first in Latin America.
9-12 September: visits
13-15 September: Congress, Universidad Central de Chile, Santiago.
16 September: Closure and visit to Sewell Copper mining town World Heritage Site
http://patrimonioindustrial.cl