bulletin
TICCIH
THE INTERNATIONAL COMMITTEE FOR THE CONSERVATION OF THE INDUSTRIAL HERITAGE
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Blasted out. Three cold Bessemer converters from Rolf Hohemann's international study of the conservation of iron and steel works.

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Inside:
Using the spatial database: GIS and CAD in industrial archaeology

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Conservation through re-use and adaptation

Opinion

Eusebi Casanelles
TICCIH President

In the world of the built heritage, the last few decades have seen a steady process of defining the concepts and criteria that guide interventions in those sites that we consider to be of cultural significance, and ICOMOS has ordered and codified them in an increasingly complete range of charters such as the Burra Charter on Cultural Significance or the Nara Document on Authenticity.

The same desire to define the criteria for works to historic sites has extended to our field, of the industrial heritage, and people and organisations linked with TICCIH continue to work on this. The current issue of the journal of the French industrial archaeology association CILAC, *Arquéologie Industrielle en France,* is given over to this theme. The international project 'Working Heritage' two years ago aimed to develop cases of best practice in the re-use of industrial sites, and we are holding a seminar this week in Terrassa, with Sir Neil Cossons giving the keynote address, called 'Old factories, new uses: how industrial buildings can to contribute to the local economy'.

A particular reflection on the buildings of industry is needed because there is a different range of problems associated with the industrial heritage as compared with other types of historic property. These may base their value on aesthetic or historical qualities, and the most important thing that has to be cared for is their authenticity. For the industrial heritage, authenticity is also of great importance, but our criteria for interventions have to be more flexible and not be too dogmatic, allowing for the context of the particular site. The subject needs a careful reflection which I would like TICCIH to carry forward.

The conversion or re-use of industrial buildings presents conceptual problems to the practice of restoration, based as it increasingly is today on criteria of authenticity. Obviously, when an former factory is converted into a school, offices or for private housing, it is almost impossible to maintain the authenticity of the original, even if the new work is clearly distinguishable and reversible, because some or all of the old has been transformed.

The authenticity of an industrial structure may even be hard to establish. The dynamic of production and the changes wrought by technological development mean that industrial buildings have constantly evolved, been remodelled, enlarged or their spaces converted to different ends. It may be just as valid to conserve what has arrived to us as it is to try and recover something of the original that has since been lost.

So that future generations can appreciate that a particular town or region was shaped by industrialisation, different parts of its heritage have to be conserved, so that something of the complexity of the process can be appreciated. Only a few elements of these will end up as museums. The others must be re-used or, as CILAC say in their magazine, 'reconverted'. This work is often done by organisations with little or no interest in cultural heritage.

The industrial heritage can rarely be conserved as an object for contemplation. It is evidence or documentation that explains the past to the future. Nor is it the evidence for a particular person, like the house of a famous character that one may visit, even when there may be little left that is original. Industrial heritage is evidence for new forms of production which had great social and cultural impact, changing the world and resetting the foundations on which our modern society is built. This heritage has to be understood, which means it must be comprehensible. For this we must also guard the details, the small ancillary buildings and those minor elements which transmit to people who visit or use conserved sites the sensation that this was once a centre for production.

There are examples of re-used sites around the world which we look at and wonder if anyone in the future will realise that this was an industrial building. Through its meetings and conferences, and especially our Charter that Eugene Logunov and I signed in Nizhny Tagil in 2003, and whose revision Professor Marie Nisser is currently guiding, TICCIH has a clear role: encourage the understanding of the industrial heritage so that its significance can be appreciated by everyone, and not dissipated or destroyed through misunderstanding or ignorance.

TICCIH news

TICCIH Board elections

After the election held at the General Assembly in Terni in September to renew the TICCIH Board resulted in a tied vote between two candidates, there has been a period of consultation to resolve the issue.
As a result the new TICCIH Board consists of
President: Eusebi Casanelles
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Agreement between TICCIH Greece and TICCIH

The Greek Committee of TICCIH has become the latest national association to sign a formal agreement with TICCIH. Nikos Belavilas, the President of TICCIH Greece, and Eusebi Casanelles signed the document on 22 February, 2007.
TICCIH Greece was formed in 1992 as a charitable organisation governed by the Greek Law of citizens associations with a programme to study and promote the conservation of the industrial heritage of Greece (see Olga Delignianni's article in the last TICCIH Bulletin 35), and publishes Deltio gia ti viomichaniki klironomia, the Bulletin for Industrial Heritage, every quarter.

Renew your 2007 TICCIH Membership!

If you haven't renewed your membership and paid the 2007 fee to the Secretary, this is the last Bulletin that you will receive. Invoices were sent out to everyone with the last issue of the *Bulletin* (#35) but copies can be provided if needed. Details of how to make the payment are on the TICCIH website.

TICCIH conference

A full list of all the congresses and conferences organised by or with TICCIH since 1973 is now on the TICCIH website, in the section called Documentation Centre. The list includes links to the relevant publications, some of which can still be obtained from the conference organisers. Copies of (almost) all the national reports and conference proceedings are in the TICCIH documentation centre of the library of the Museu de la Ciència i de la Tècnica de Catalunya in Terrassa, Spain.

Nizhny Tagil review process

The project to review the TICCIH charter for industrial heritage, signed in and named after the Urals steel town of Nizhny Tagil (see the article on conserving ironworks in this issue), has been boosted by English Heritage's offer to coordinate the task through their Industrial Heritage Panel subcommittee. Made up of experts from different perspectives, it provides advice in England on the conservation issues relating to industrial sites and monuments. Sir Neil Cossons, honorary TICCIH president and chair of EH agreed with TICCIH's suggestion that the Panel review the charter and Keith Falconer, Head of Industrial Archaeology is setting up a working party. The proposal is that TICCIH will publish an illustrated version of the revised text, and is looking for partners who would be interested in collaborating in project.
The TICCIH committee in Hungary, coordinated by Prof. Györgyi Nemeth, has been the first group to submit its comments on the Charter, a document which has been used extensively there for teaching and to guide conservation work.

Migrating journals

The American SIA has announced that the first issue of its academic publication *IA, Journal of the Society for Industrial Archeology* is now available on the internet. After substantial consideration, the SIA Board approved affiliation with The History Cooperative, a consortium centred at the University of Illinois Press. Volume 30, No. 2 of IA is already online and three more issues are being added to the site. Any visitor to http://www.historycooperative.org/ can access these sample issues of IA free for the next twelve months. After this initial period, only subscribers will have access.
The exact terms of electronic subscription are not settled yet, but access will certainly not involve additional cost to existing print subscribers. In the long run, some subscribers will opt for the electronic format only, and this will provide an impetus for growth among institutional subscribers like libraries. This has been the pattern among other history journals that have moved to an online format. Initially only the current issues will be online, but back issues will gradually be added to this format.

Joint heritage recording conference, host needed

TICCIH has been in contact with representatives of CIPA, the International Committee for Architectural Photogrammetry, which is the international association for the techniques of surveying cultural monuments and sites as a support to architectural, archaeological and research. It is ICOMOS' scientific committee on recording and documenting cultural heritage.
There is a proposal to hold a joint meeting between the two international organisations, perhaps on the same lines as the seminar with ICOMOS last year, to discuss the techniques of recording industrial sites and look at the possibilities for cooperation in the future. At the moment we need an institution that is interested in this theme to offer to host the meeting. Contact the editor for further information.

New members

The new members who have joined since the beginning of the year are Ándres Armando Sánchez from Mexico; Chung Ming Huang from the CYCO University in Taiwan, who's interests include architectural and urban history; Andrew Hall from Kimberley in South Africa; Christina Mamaloukaki, who is a student member living in Paris, France; Sara Freire Oliveira, Rosa Maria de Sousa Gomes, Gamboa Ojeda, Victoria Leticia are all part of the renascent TICCIH Portugal; Carlos Blazquez Herrero is involved in water heriage in Zaragoza, Spain; Dr Iain Stuart of JCIS Consultants, a company specialising in assessment of historic industrial sites (http://jcis.net.au/) in New South Wales, Australia; and from the newly-formed TICCIH Mexico, Victoria Leticia Gamboa Ojeda, Blanca Esthela Santibáñez Tijerina, Mariano Torres Bautista, Carlos Alberto Cosgaya Medina, Iván Hernández Ibar and Nicolas Raul Castro Meza.
The Museo da Polvoro Negra in Portugal is a new corporate member.

TICCIH Officers

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Editor: James Douet, office of the President

TICCIH is the world organisation 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 £20, corporate membership £40, and student membership £10
Payment to TICCIH, Lloyds TSB Bank plc, 27 Fore Street, Redruth, Cornwall TR15 2BJ, UK; Account No: 1351659, Bank Sort Code: 30 97 00.
There is an on-line membership form on the web page.

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 four times a year and is sent to all members.If you have not received an issue, please contact the editor for a replacement. Back issues can be downloaded as a pdf file from the TICCIH web site.
Opinions expressed in the Bulletin are the authors', and do not necessarily reflect those of TICCIH.
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Using Geographic Information Systems in industrial heritage research; the example of Saint-Quentin in France

Frédéric Pillet
Chargé de l'inventaire du patrimoine industriel de l'agglomération de Saint-Quentin

■ Geographic information systems (GIS) now feature frequently amongst the tools used by geographers, town planners, development agencies and land use administrations. They are also acquiring considerable importance in the field of heritage study and management. In 2003, when the municipal authorities of Saint-Quentin in the Aisne department in northern France launched a survey of the town's industrial heritage, the GIS that the local planning department had recently acquired was adopted for this inventory operation, becoming one of its essential tools. It was not used as a mere accessory for mapping sites but as an authentic aid to research and analysis.

The former Blériot-Sauvez distillery, St Quentinoise, 1901.
Photo F. Pillet © Inventaire général, ADAGP / Communauté d'agglomération de la ville de Saint-Quentin, 2006.

Remicourt's 1887 weaving shed La Cotonniére de Sant-Quentin.
Photo F. Pillet © Inventaire général, ADAGP / Communauté d'agglomération de la ville de Saint-Quentin, 2006.

During the preliminary, 'dry' research carried out for this operation, a considerable quantity of archival papers were exploited, most of them serial sources such as land ownership registers, registers relating to the collection of trade taxes, archives of the local commercial and magistrates' courts and the town's trade almanacs and directories. From sources such as these it was possible to compile a 'table of attribution'. This takes the form of a database linked to the GIS and corresponding with geographically-referenced entities which are the town's factories, its workers' housing estates and the commercial premises of textile merchants, identified both by archival research and by enquiry in the field.

The attribute information included in this database is relatively cursory: industrial sector (textiles, metallurgy, foodstuffs…), the precise nature of the activity within this general sector (for textiles, for example, spinning, weaving, mechanical embroidery, bleaching…), the succeeding names of the firm, the date of its foundation or of its first attested activities, the date of closure or the last year of its manufacturing activities. These indications allow for the creation of analytical maps of the territory's overall industrial fabric. The database also comprises a field for various items of information of a social, economic or technical nature: number of workers, main industrial equipment, type of energy source… Whilst not directly useful for the mapping process, this information can be displayed, at the click of the mouse, for each geographic unit identified. Links can also be created between these units and elements recorded outside the GIS, such as digitised images, other databases or textual files.

In a classic inventory survey of the industrial heritage, as developed in France since the mid-1980s, individual files are generally drawn up for surviving sites selected for study and documentation. Consequently, much of the preliminary information gleaned from archival research cannot be properly recorded. Saint-Quentin's spinning mills may be cited to illustrate this point. Between 1804, the date of the town's first cotton spinning mill and the 1990s when the last textile factories closed down, some 53 spinning establishments have been identified, all of them with a precise geographical location in the GIS. Only 14 of these sites were then given further documentation in normalised inventory files, primarily because they leave significant architectural remains, or, in two other cases, because of their importance in the local development of the industry, even if, in these last two cases, the factory buildings had long since disappeared. The 39 other spinning works which were indexed but which did not give rise to an individual file show a different pattern of implantation. These generally small-scale works, most of which had disappeared by the middle of the 19th century, were located within the town's historic centre (intra-muros). Documentation only of the more recent and larger sites, the ones which have survived, would have confirmed the usual but erroneous historical interpretation of Saint-Quentin's industrial development, seeing spinning mills appearing only outside the city walls (demolished between 1810 and 1820).

As this example suggests, a GIS can serve as a useful analytical tool for the historian of industry. More than this, however, the research carried out by the historian can also be used by town planners concerned with the territory under study. The historical data indexed in the GIS according to geographic entities can enrich the layers of information, for example, on land ownership, on buildings, on underground service and supply networks and so forth. At times, this historical information can be of immediate technical use, for example in helping identify sites presenting potential problems of pollution. But beyond such practical considerations, the availability of information on the heritage and its inclusion in planning documents can lead to a better appreciation of the heritage (an industrial one in this case). A GIS, then, is not merely a new tool for the professional historian or heritage specialist. It is also a tool that can be shared by all those who, in different professional capacities, are concerned by the preservation, management and interpretation of our heritage.

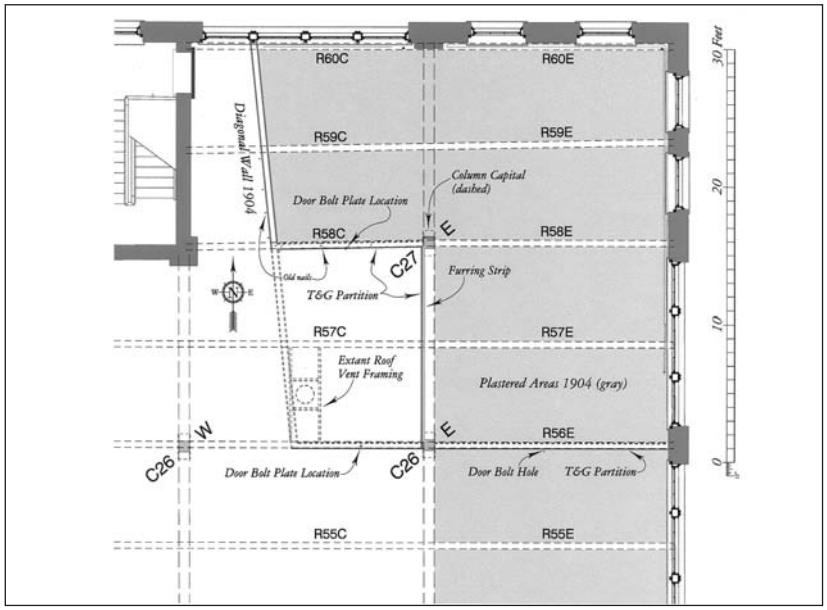
Using CAD to restore the Model T Design Room

Richard K. Anderson, Jr.
Cultural Resource Documentation Services

■ The Model T automobile was arguably the single most important road vehicle of the 20th century. Its low price and prodigious numbers (over 15,000,000) increased public demand for automobiles and paved roads, thus unleashing forces which led to the automobile-centered architecture, urban planning and transportation systems of today.

From January of 1907 to September 1908 Henry Ford and a handful of employees designed the Model T in a small suite of rooms on the north end of the Ford Motor Company's Piquette Avenue Plant in Detroit, Michigan. The first 12,000 Model Ts were

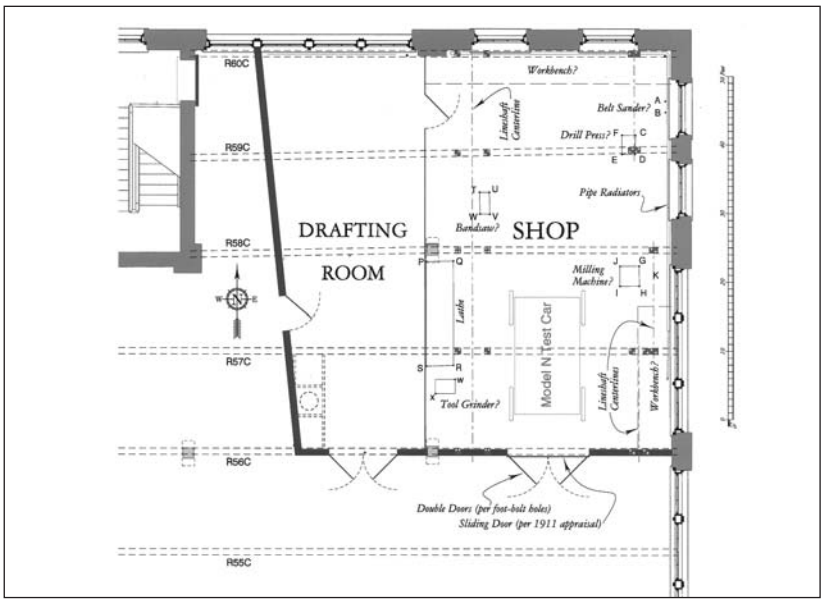
Overhead evidence for walls superimposed over door latch-hole locations in floor. Alphanumeric labels uniquely identify structural elements.



assembled here before the plant was sold in 1911, and the contents and partitions for the "Model T Design Room" were removed.

In May of 2005 I began a month of research and field work at the Piquette Plant and the Benson Ford Research Center attempting to elucidate the location and shape of the Design Room as well as the locations of principal Ford offices and drafting rooms. The building was constructed in 1904 following typical American "slow-burning" mill construction of the late 19th century. Thanks to a remarkable lack of painting and structural modifications by subsequent owners, the evidence in the building itself was much stronger than what I could distil from most available records.

Since the evidence was spatially arranged, the most useful tool for displaying, analyzing and synthesizing it was CAD. I gathered the evidence by traditional hand-sketched field notes, hand measurements, paper rubbings, and digital photography after spending considerable time studying the structure. I looked for scraps of materials left behind after walls were removed, gaps in finishes, nail and bolt holes in outer walls and ceilings, tool mounting holes in the floor, and paint ridges in various places. I also recorded the series of screw holes left behind by original "knob-and-tube" electrical insulators and wiring as well as the conclusive evidence for mechanical line-shafting used to power machine tools. The subtlety and size of most clues precluded the use of advanced digital recording tools such as 3D scanners.



Probable original layout of Model T drafting room and shop, based on surviving evidence for walls and tools.

The Piquette Plant exhibited remarkably little deterioration or settlement, consequently I was able to compare ceiling evidence for the Design Room to that in the floor with plumb bobs and strings. I plotted groups of clues in a 2D file in Bentley Systems' MicroStation CAD software, where I superimposed evidence in the ceiling and floor in a single plan view. I used digital photographs and scans of rubbings in specific places as reference files to transfer dimensions of complex features too time-consuming to hand-measure. There was no need to address data in the sides of walls and columns in CAD (using a 3D model for example), as these were relatively few and they were easily photographed and accounted for in the verbal descriptions of my report. The layering features in CAD permitted me to minutely segregate various kinds of details. Features such as nail holes, tool holes, paint ridges, latch holes, gaps, traces of finishes, and line-shaft and counter-shaft locations were represented in different colors to further distinguish among them visually.

The CAD program permitted me to display selected layers and plot them in color for report illustrations, all from a single file. CAD's accuracy versus traditional hand drafted drawings helped to cinch arguments for the locations of walls and other features, based on known structural details of the period. I attempted to make hand measurements to +/- 1/8 inch (3 mm) tolerances, making allowances for the irregularities introduced by brick walls and other features. CAD software was well able to accommodate this level of precision. All field measurements and CAD work was done within the English system of measurement (feet and inches), since this was the system in which the building and its components were designed and constructed. The complete industrial archeology report explains the details in the various illustrations displayed here.

The Piquette Avenue Plant is now owned by the Model T Automobile Heritage Complex, Inc. (T-PLEX) which displays and interprets this National Historic Landmark for its significant contributions to automotive history in the United States. The T-PLEX plans to use the industrial archeology report I produced to guide its restoration of the Model T Design Room and other spaces.

The entire 145-page report with 111 illustrations is for sale by the Model T Automotive Heritage Complex, Inc. For a copy of *Invented Here: An Industrial Archeological Investigation of the Model T Experimental Room and Associated Spaces at Henry Ford's Piquette Avenue Plant,* send a check made out to T-PLEX for US$55.00 (which includes shipping costs within the USA) to T-PLEX, 140 Edison Avenue, Detroit, MI 48202-1559. Contact Jerald Mitchell at jmitchel@med.wayne.edu.

In Volo Nel Presente: Aerial photographs and the GIS platform for documenting industrial archaeological sites

Caterina Vatteroni
Laboratorio di Archeologia dei Paesaggi e Telerilevamento(LAP&T), Università degli Studi di Siena

■ This project was undertaken to examine the potential for recording the industrial heritage in Italy using methodologies derived from the most recent English experiences in the research of industrial sites and historical landscape. It is an attempt to review a survey method that has proved quite useful for us in improving our understanding of monuments and transformations in landscape.[1]

The methodology connects the analysis and interpretation of vertical and oblique aerial photographs with the management of information through GIS. We would like to complete a study of the industrial area of Colline Metallifere between the end of 19th century and the years immediately after the end of the extractive industry period, as an example of evolution and articulation of the landscape.

The analysis was carried out in the recently completed Parco Tecnologico Archeologico Colline Metallifere Grossetane, focused on the mining and production areas of Gavorrano, Niccioleta, Boccheggiano. Our five aims were to define the spatial historical evolution of mining activity during the 20th century, study the transformations of the landscape and the models of organization and evolution of new villages established for pyrite extraction in the areas of the Montecatini Society, examine the potential of vertical and oblique aerial photographs for recording recent monuments where there is a high percentage of woodlands, define the phases of constructing a GIS platform, and to look at the possibilities of combining different systems of analysis in landscape characterization and industrial heritage studies.

The project examined mineral extraction areas, production and residential areas and their structures; to which three levels of analysis were applied: historical cartography analysis, high-level and oblique aerial photography and field survey.

For the analysis of the territory and the objects of interest that it contains, the proposed methodology was based on multi-level visualization by using the GIS platform to read diachronically the signs that had been left on the stratified landscape.

GIS was first used to acquire and store data in digital form, and it was then georeferenced and integrated by cartographic systems. In the second phase, GIS was used to digitise and characterise data and a metric evaluation analysis was carried out on the traces of evidence.

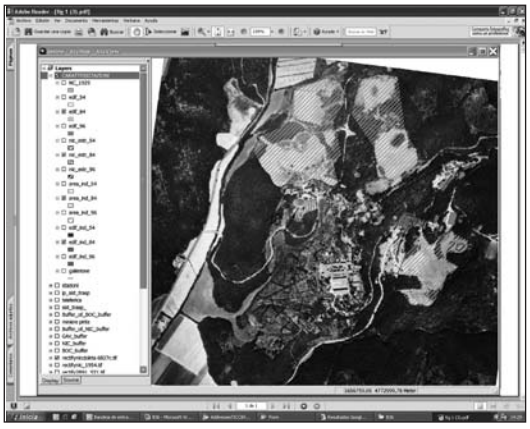
The construction of the GIS platform was a well-planned strategy as it determined the organization of the acquired data, the georeferencing of the images, the definition, the characterization and the visualization of the area and its anomalies as well as the operations of overlapping and analysis that came afterwards. In this sense, the completed GIS, with its database, cartographical elements and aerial photographs, is in itself a valuable result and at the same time constitutes the basis of further analysis

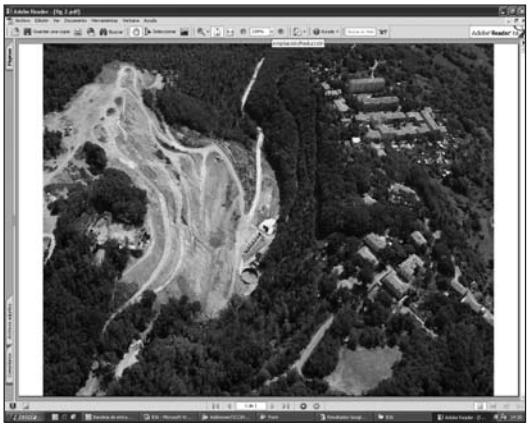
The analysis of industrial landscapeshas found that the photo interpretation is an excellent method for researching. In the preliminary phase, it allows us, to observe the entire massetana area, and subsequently it helps to define the typology and geometry of the single events analyzed. The photo interpretation process, done in the introductory phases of comparison and superimposition of available images, has allowed us to locate areas and structures and keeping an extremely low margin of error. Observing the territory from above has made possible to appreciate the periods which elapse between the various elements of the landscape and to delineate the spatial relationships between the various phenomena. The unusual point of view and size of territory allowed us to estimate the consistency and characteristics of the areas under investigation which were otherwise invisible on the ground.

The photographic interpretation permitted anomalies to be identified that could not been seen on the ground, related to the cableways system used by the Montecatini Company for the transport of pyrite to the railway station of Scarlino, where it was sent to the port of Portiglioni. In the available photograms (1954) the presence of this structure is clearly visible, while in the period afterwards they are covered up as attested to by the anomalies which were found.

Even if there was very little information about the sites initially, the aerial photographic methodology allowed us to locate structures and evaluate their current condition[2]. The images enabled us to reconstruct the industrial landscape and helped to establish a chronology and to determine the ways that the surface areas were developed in the last century, and the mineral extraction plants were later dismantled.

If developed further, this kind of analysis could be used as an excellent strategy for highlighting the main risks to industrial archaeological heritage sites, and then to establish norms for protecting them. The principle causes for the loss of and the degradation of heritage sites can be attributed to the abandonment of productive areas and in the reclamation programmes to which mineral and industrial areas are subjected under new government rules on environmental protection. These instruments could be used to protect heritage areas and compile lists of sites that are under imminent threat, to estimate how long a site might survive and to set future priorities for recording.





Up: Image from the GIS with different layers superimposed over an aerial ortofoto.
Down: Aerial view of opencast mines in the Parco Tecnologico Archeologico Colline Metallifere Grossetane, Italy.
Photos: Caterina Vatteroni

1. National Mapping Programme for England NMPE, English Heritage
2. J.Schofield in R. Bewley, W. Raczkowski (a cura di), Aerial archaeology: developing future practice, NATO Science Series I: Life and Behavioural sciences, 337, Ios Press, Amsterdam, 2002.

world wide

World

The Industrial Heritage of Modern Iron- and Steelmaking: Preservation before extinction

Rolf Hoehmann

The preservation of modern large-scale 20th-century iron-making plants in Europe has developed in an amazing way. There are protected modern blast furnace works in Portugal, Spain, Italy, France, Luxembourg and the Czech Republic as well as the well-known examples in Russia, Poland and Germany. Blast furnaces as monuments of industry seem to have become a fashion, although measures for long-term protection and conservation are still in their experimental stages.

On the other hand, the protection of technical processes like steel-making, either in Bessemer-, Thomas-, Siemens-Martin, Oxygen- or electric furnaces, has not developed on the same scale. Nor have the first continuous casting machines, large-format rolling mills and the remains of other related manufacturing processes been preserved as monuments of this fast changing and rapidly vanishing industry. The smaller examples of these plants are just in the last stages of their production and economic life cycle, so the protection of at least one specific example of each type becomes an urgent matter. The scale of these works and the problems of their protection and conservation however demand a coordinated European approach.

Monuments of industrial pig-iron production

The first preservation success in the iron producing industries was the well-known Sloss furnaces in Birmingham, Alabama in the USA and at Nizhny Tagil in the Urals. The two blast furnaces with related installations in Sloss are owned by the town of Birmingham and open to the public since 1983. The similar plant in Nizhny Tagil is part of the museum of the local steel complex. Lesser-known examples of early conservation are the Higashida furnace No. 1 in Yawata in Japan, dating from 1904 and restored in 1973 to become incorporated in a 'Memorial Park', and the small Starachowice furnace in Poland, now in the care of the regional conservation office. A recent surprising discovery is the Parque Fundidora in Monterrey in Mexico, which uses the site of the former pig-iron and casting plant. The blast furnace No.3 is part of this recreational park and open-air museum.

In recent years, many countries in Europe have preserved blast furnace plants as protected monuments, or plan to do so. In eastern France, one blast furnace with cowpers, blowing engine and coke batteries of the Uckange plant is under protection. The two very large blast furnaces of the Belval plant in Southern Luxemburg belong now to a state-owned fund, that is to restore them as monuments of the industrial history of Luxemburg. In Sagunto in Spain a single isolated blast furnace has been renovated for a total of 1.1 million €, the last reminder of the once important Altos Hornos Mediterraneo (Mediterranean Blast Furnaces). The only blast furnace in Portugal at Seixal, near Lisbon, was blown out in 2001. Plans for its protection as part of the ECO-Museum Seixal are in discussion. Parts of the former ILVA works in Bagnoli, at the bay of Naples, will be included in a town rehabilitation scheme, and the ore and coal staithes are already used as a public promenade.

There is an outstanding example in the Czech Republic at the Vitkovice integrated Iron Works in Ostrava/Moravia. The Hlubina coal mine, the coke plant and three blast furnaces are protected monuments and in course of renovation, which should be finished in about six years. Other parts of the large area will be used for new industrial development.

There are now fifteen large, modern industrial blast furnaces conserved in Germany, a nearly inflationary number. They have different sizes, but follow the standard pattern of the steel-clad furnace with refractory bricks and independent scaffolding for maintenance and charging stages.

There is a certain pattern in the experience of the last twenty years of saving, conservation and re-use of blast furnace plants as monuments. After the end of production there is mostly a period time of inactivity, with neglect or in the worst case cannibalisation and vandalisation of the plants. In the second stage, after political discussions and final acceptance, raising funds and development of long-term plans, serious conservation and restoration work starts. Some examples like Yawata, Sagunto and Hattingen were professionally rebuilt in a short time as monuments and museum-pieces, mostly in an 'as new' look. Other examples like Sloss, Nizhny Tagil, Völklingen, Duisburg-Meiderich and Vitkovice followed a different approach.

Step-by-step conservation and repair works were executed if and when necessary as part of a long-term program, either by jobless workers schemes or on demand by professionals. Both approaches can lead to different results; the second seems to be more sensitive to the monument and is also sometimes cheaper.

Monuments of industrial steel production

The development of modern steel production went from puddling furnaces to Bessemer and Thomas converters, Siemens-Martin furnaces, oxygen converters and electric furnaces. Nearly two thirds of the steel worldwide is now produced in oxygen-blowing processes, the other third mostly in electric furnaces using scrap iron and steel.

Very few puddling furnaces have survived. The re-erected one in Blists Hill Open Air Museum near Ironbridge can be used. Bessemer and Thomas converters might still survive in production in eastern Europe. The last chance to protect a complete Thomas plant in the west was missed as late as 1995 in Unterwellenborn in Eastern Germany. Some converters survive as isolated objects in museums or as open-air monuments. Siemens-Martin furnaces might still be producing in Eastern Europe, Russia, Ucraine and Rumania (Huneodora), but their future is of course uncertain. The Brandenburg steel works near Berlin, erected after the Second World War, consisted of an impressive line of twelve large S-M Furnaces. One of these survives in the original building and forms the center of a museum.

The modern oxygen-blowing process, developed and introduced in Linz and Donawitz in Austria since 1952 (the LD-process), replaced most earlier steel production methods. Although relatively new, little remains of the pioneering installations. The hall of the first LD-plant was dismantled in the spring of 2000, only one of the 30 ton converters was transferred to the Vienna Technical Museum. One oxygen-converter is still in place in the Bagnoli plant in Italy.

Monuments of rolling mills

Information about older rolling mills is scarce but complete examples preserved in

The Maxhuette plant in Sulzbach-Rosenberg, Bavaria, Germany

Higashida blast furnace in Yawata, Japan

situ are very rare. Again, Blists Hill features a relocated small working mill beneath the puddling furnace. Parts like frames and rolls are collected in several industrial museums all over Europe, for example Fond de Gras in Luxemburg, Gyöngyös in Hungary and in Sweden. Three old rolling mill streets are still in use in Völklingen, dating partly from the beginning of the 20th century.

Many early rolling mills were driven by extremely powerful steam engines, and many of these are preserved or relocated to different sites. Two are still working in Völklingen, one a double-compound three-cylinder engine with a maximum output of 14.200 hp and the other a double-compound two-cylinder machine with 8.300 hp. Until 2002, Maxhütte in Sulzbach used two double-compound two-cylinder engines from 1911 and 1913 with a maximum output of 14.660 hp, still in their original place.

Monuments of raw iron production, especially blast furnaces, are spread all over Europe. Curiously neither England nor Sweden, once the most important iron-producing countries in Europe, possess industrial-size or complete blast furnace monuments. Germany has the largest number and probably now the most experience in the conservation and renovation of blast furnaces plants.

The missing elements in a complete documentation of the iron and steel industry are steel production, with its various methods, and the adjoining processes like casting and rolling of slabs, profiles and sheets. A survey of the existing plants of historical interest has yet to be carried out.

Even in wealthier countries like Germany, conservation and protection of important examples is not always possible. Maxhuette could be the ideal example of the linear presentation of the whole process, beginning with raw iron production in a blast furnace followed by mixing the iron in a 1,200 ton mixer, reducing it to steel in three modified oxygen-bottom-blowing converters, pouring into a continuous caster and rolling of rails and profiles in a mill, driven by steam engines from 1911, all on a very compact, small site. But problems with the owners, political and economic difficulties leave the protection of this site uncertain.

Exchanging experiences in the documentation, evaluation and conservation of large industrial monuments should develop further. After the opening of the eastern European countries, more information about their once-secretive industries must be collected and published. Any corrections and further information are always welcome!

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Publications

Scottish iron structures.
Guide for practitioners 5

Technical Conservation, Research and Education Group, Historic Scotland, Tom Swailes, Edinburgh, 2006
ISBN: 1904966 12 8

A new book aims to address problems often associated with iron in buildings. Commissioned by Historic Scotland, written by an engineer for engineers and for others dealing with the conservation of iron structures, it gives advice on structural calculations, repair and strengthening methods. The history and aesthetics of iron in Scotland is discussed as well as such structural engineering matters as stiffness, strength, robustness, fire-resistance, and durability. Attention is paid to the conservation and repair of decorative or 'architectural' ironwork, in which Scotland has a world-wide reputation. The intention is to base assurances on the capabilities of the material on solid engineering expertise.

In 1993 a public local inquiry was held into a proposed reconstruction of Carron Bridge in Moray, in the north of Scotland. The outcome was that the proposal to erect a new steel arched bridge and fix to it the outer cast iron ribs of the original bridge of 1863 was dropped. Instead the ironwork of the existing bridge has been refurbished at less cost and now carries full traffic loadings on a narrow road frequented by whisky lorries.

The positive experience at Carron Bridge contrasted with the questions placed by engineers and insurers over the use of cast iron in fireproof textile mills, warehouses and similar buildings in Scotland. This led Historic Scotland to commission a "Practitioners' Guide" on the conservation of iron structures. The author is Tom Swailes of UMIST (University of Manchester Institute of Science and Technology). Mark Watson and Audrey Dakin of Historic Scotland contributed parts of the text and guided the fieldwork in 1999-2000. The opportunity was taken to investigate the structures of textile mills about to be converted, of dock buildings, sugar refineries, a conservatory and the effects of some fortuitous fires. More recent repair projects, assisted by Historic Scotland and Heritage Lottery Fund, have tackled the iron structures at Perth Water Works and the Kibble Glass houses, Glasgow and a new website promotes the history of Scottish Architectural iron: www.scottishironwork.org

Few modern construction professionals are familiar with cast and wrought iron, though their mid-nineteenth century counterparts would have known the character of these materials very well. In terms of its mechanical properties, wrought iron is strong and ductile, very similar to modern mild steel. It is less uniform than steel but has advantages over it in terms of its workability at the blacksmith's forge and resistance to corrosion. Cast iron is strong in compression but relatively brittle and weak in tension. It is not forgeable, but it can be cast into intricate shapes, resists rust and is extremely durable.

Iron is to be found in the facades and within the floors of many Scottish public and commercial buildings. Glasgow in particular has several fine iron facades with innovative iron frames and floor systems behind, contemporary with the many iron buildings in New York City. The McConnel patent iron structural system in the most famous of these, Gardner's Warehouse, 1856, was very nearly lost when it was adapted to a pub due to engineers' initial uncertainty as to its performance. A second opinion from conservation engineers averted its destruction.

The aim in conservation of a building is to maintain its cultural significance. Conservation actions should not distort the evidence in the fabric. This principle, applied to the conservation of ironwork, favours repair (say through cold metal stitching or resin-bonded reinforcement) rather than its replacement with new castings. Sometimes replacement of iron elements will be unavoidable – for example, of structural ironwork to ensure structural integrity or of decorative ironwork where retention and repair of the existing fabric (with clamps etc) would compromise the overall aesthetic result.

Adherence to the best practice advice given in the book should, we hope, offer confidence in dealing with these and other historic structures. Scottish iron structures is obtainable from:
http://www.historic-scotland.gov.uk/index/shop/range_detail.htm?RangeID=41&MainRangeID=1

events

TICCIH Conferences

More conference infomation at **www.mnactec.com/ticcih/news.htm**

Romania

5th international conference and workshop on industrial archaeology
April 17-22, 2007

The industrial heritage of Romania as well as scientific activity in the field. Study visits to the industrial region of Caras Severin and around Bucharest, especially mining sites that are about to close. Contact: Irina Iamandescu, irina.iamandescu@cultura.ro, irina_iamandescu@yahoo.com

Poland

Industrial Heritage for the Future, TICCIH Intermediate Conference
Warsaw, 27-29 April, 2007
Call for papers

This conference is devoted to the strategy of the post-industrial as well as post-military heritage and its role in regional economic develop-ment. Pre-conference tour – Ostró-da-Elbląg Canal. Post-conference tour – textile route Łódź, Żyrardów. Contact: Dr Julian Kolodziej TICCIH Poland, ticcih@wp.pl

France

1st International Conference on the Agricultural and Food Heritage
Reims, 3-5 May, 2007
Call for papers

Already many papers have already been proposed for this meeting, organised by APIC (Association pour le Patrimoine Industriel de Champagne-Ardenne) at the Centre Régional de Documentation Pédagogique (CRDP). It aims to set up a food industry section within TICCIH, analysing the situation at the international level and determining which are the most important sites in existence today. The inscription leaflet will be sent out in January and posted on the TICCIH webpage. Contact gracia.dorel-ferre@wanadoo.fr

III meeting of the TICCIH Textile Section
Sedan and Mouzon, 31 May-2 June, 2007
Call for papers

The task set by the organizers is to propose a list of the 100 most important industrial textile sites in the world. It will include the presentation of the final version of TICCIH's thematic study of textile mills. Contact. Alain Renard, 2 rue Saint Denis, 08210 – Mouzon (France), +33 3 24267448, ticcih07@gmail.com

Mexico

1st International Seminar of TICCIH Mexico: Uses for the mining industry heritage. New alternatives for a great past
Pachuca, 16-19 May

Organised by TICCIH México and dealing with plans for saving and re-using the mining heritage. English and Spanish. T + F (771) 7150976 y 7151833, ahmm@prodigy.net.mx, ahmm_mahb@prodigy.net.mx

France and Switzerland

The International Industrial Heritage of Electricity
Divonne-Les-Bains (France) and Geneva (Switzerland), June 7-9, 2007

Seminar in French and English (simultaneous translation) with visits to local heritage sites. One of the aims is to establish a TICCIH Section for electricity and energy. Contact: George Leskens LeskensG@aol.com or the TICCIH website.

Argentina

5th Latin American Colloquium for the rescue and preservation of the industrial heritage
Buenos Aires, *18 - 20 September, 2007.* Call for papers

The Argentine Committee for Industrial Heritage (COAPI) was formed in 2005 and includes the Argentine TICCIH Committee. The main themes are conservation, research, tourism and the interpretation of industrial heritage, and there will be tours to sites of interest after the meeting. Proposals for papers should be received by the organisers before 15 March, 2007. Contact: Jorge D. Tartarini, ticciharg@yahoo.com or Museo_Patrimonio@aysa.com.ar

Croatia

III international conference on IH: 'Rijeka, historical traffic crossroad between Mediterranean and Europe'
Rijeka, *October, 2007.*
Call for papers

General topics on industrial heritage preservation, transport and the local shipbuilding heritage. Info: www.protorpedo-rijeka.org

World Conferences

Netherlands

12th International Symposium on Molinology
Putten, 2 – 10 June 2007

The programme includes invited lectures and presentations contributed by participants, excursions, mill activities, etc. It will be preceded and followed by separate short mill tours. The Netherlands has many types of working mills and a very rich mill heritage dating back to late medieval times. Conference site: www.timsmills.info/tims2007/index.html

Germany

Big Stuff 2007: the preservation of large industrial heritage objects
Bochum and Hattingen, September 11-14, 2007
Call for papers

Following the very successful BigStuff 2004 in Australia, a sequel - BigStuff 2007- will be given in the Ruhr Basin (Ruhrgebiet), a classic, highly-industrialized coal and steel region in Germany. The organizer is the German Mining Museum (Deutsches Bergbau Museum), Bochum in partnership with the Westphalian Museum of Industry (Westfälisches Industriemuseum), Dortmund. Contact: bigstuff07@bergbaumuseum.de, www.bigstuff07.net

Czech Republic

Industrial Heritage as a Force for Sustainable Development
Prague, Kladno and Liberec, September 19-20, 2007

The Research Centre for Industrial Heritage in cooperation with the Czech National Committee of ICOMOS, the National Technical Museum and the Technical Monuments Committee of the Czech Chamber of Certified Engineers and the National Heritage Institute.
Part of the commemoration of the 300th anniversary of the founding of the Czech Technical University in Prague. Info: Dr Benjamin Fragner. fragner@vc.cvut.cz

Websites

Institute for the history of aluminium

http://www.histalu.org

The *Institut pour l'histoire de l'aluminium* is a non-profit organisation founded in France in 1986 to make collections on the history of aluminium more readily available and to promote the conservation of its heritage. This nicely-designed web site, in French and English, provides resources for historians in the field of aluminium production including archives, bibliographies, an image library, notice of research posts in Europe and Canada and a history of aluminium.