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STEERING COMMITTEE FOR URBAN POLICIES AND THE ARCHITECTURAL HERITAGE (CDUP)



Activity 18.6.1

INDUSTRIAL HERITAGE

Study by Mr. Manfred WEHDORN
Vienna

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# REPORT ON THE SITUATION OF THE BUILT TECHNICAL AND INDUSTRIAL HERITAGE IN EUROPE

## PART 1: THE NORTHERN COUNTRIES

Study for the Council of Europe,
prepared by
Mr Manfred Wehdorn, Vienna

CONTENTS:

## 1. PREFACE: SCOPE, METHODS AND AIMS OF THE REPORT

This survey on the main policies carried out by the European states with regard to the protection of the technical and industrial heritage was prepared by order of the Council of Europe between July and December 1983. The study takes into particular account the problems of the northern countries of Europe while a similar study for the southern countries was worked out by Mr José Antonio Fernandez-Ordonez of Madrid. By an adequate co-ordination the two consultants divided the member states of the European Council as follows:

| Northern Countries: | Southern Countries: |
|---|---|
| Austria | Cyprus |
| Belgium | France |
| Denmark | Greece |
| Germany (G.F.R.) | Italy |
| Great Britain | Malta |
| Ireland | Portugal |
| Iceland | Spain |
| Liechtenstein | Turkey |
| Luxembourg | |
| The Netherlands | |
| Norway | |
| Sweden | |
| Switzerland | |

Concerning the northern part of Europe the consultant started work by sending out a questionnaire which was answered by nearly all countries. At the time of writing the report, the replies of two countries only, who are member states of the European Council, are outstanding (Ireland and Iceland). For the purpose of comparison the questionnaire was also sent out to some of the countries in the northeast of Europe (Czechoslovakia, Hungary and Poland). The given answers have been supplemented using the relevant literature, above all using the transactions of the first, second, third and fourth International Conference on the Conservation of Industrial Monuments "T.I.C.C.I.H." (Ironbridge 1973, Bochum 1975, Stockholm 1978, Lyon and Grenoble 1981). Furthermore, publications were sent in by various electronic literature-information services such as "ESA", "Golem" and "Questel".

The aims of the study are to give a survey of the recent situation and to provide a definition of the built technical and industrial heritage and information on the methods used for conservation and conversions of these monuments and sites.

With the former preparatory work of the Council of Europe in this field in mind, and the work which might be done in other international organisations, an attempt has been made to make proposals for further actions and to point out the areas which call for future consideration and research.

Last but not least I want to mention the correspondents in the different countries: Mr Adriaan Linters (Belgium), Mr Jiri Majer (Czechoslovakia), Mr Paul Strømstad (Denmark), Mr Rainer Slotta (Germany),

Mr Michael Stratton (Great Britain), Mr Mihaly Kubinsky (Hungary), Mr Walter Walch (Liechtenstein), Mrs Michèle Krieps (Luxembourg), Mr F.D.ten Hallers (The Netherlands), Mr Torleif Lindtveit (Norway), Mr Jan Pazdur (Poland), Mrs Marie Nisser (Sweden) and Mr Marc-A. Barblan (Switzerland). I have to thank them all very much; they played an essential part in the working out of all this report by answering our questionnaire.

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Vienna, December 1983

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## 2. INTRODUCTION: HISTORY OF INDUSTRIAL ARCHAEOLOGY

The term "Industrial Archaeology" covers both the research done on the technical and industrial heritage and the preservation. The only relation this bears to classical "Archaeology" is the interdisciplinary method of investigation, which in particular connect social history, economic history and the history of technology, as well as the organisation of this special field. The man considered responsible for creating the term as we understand it today was the Professor of Latin at the University of Birmingham, Donald Dudley. It is found for the first time in literature in an article by Micheal Rix in "The Amateur Historian"; René Evrard used it in Belgium five years previously in connection with an archaeological dig.

The term "Industrial Archaeology" is therefore relatively new; the actual beginning of industrial archaeology can however be set at the start of the 18th century, when in 1794 the first technical museum of the world, the "Conservatoire des Arts et Métiers" was founded in Paris.

It took, however, nearly a hundred years before the preservation of our "built technical and industrial heritage" became a matter of general public interest: in 1981 the Swedish sociologist Arthur Hazelius founded the first open-air museum in the world "Skansen" in Stockholm.

Industrial archaeology received a further boost without doubt when the foundation store of the Deutsche Museum was laid in Munich in 1906. In the first decade of our century the first museums housed in former industrial complexes and showing former factories in situ also came into being. In the years between 1903 and 1906, for example, in Eskilstuna, Sweden, one of so-called "Rademacher forges" was turned into a museum.

The further rapid development in technology and the destruction caused by the First World War led in the twenties and thirties to a new wave in the founding of industrial museum. Finally, the immense destruction caused by the Second World War induced the greatest wave in the preservation of technical and industrial buildings up to that time. The perle of this development was formed by the foundation of the Ironbridge Gorge Museum Trust in 1968 in the valley of Severn, Shropshire, with the centres of Coalbrookdale and Ironbridge. It is also of worldwide significance that in 1973 the first international congress for industrial archaeology took place in Ironbridge.

The second meeting of this kind was held in 1975 in Bochum. Almost at the same time followed the rescue of one of the most important technical mining works when the 68 m high pithead building "Germinia" in Dortmund was moved to a new location: it was re-erected as a symbol above the mining museum in Bochum, visible for miles around.

The preservation of the pithead gear, which was built in the 1930's illustrates a further important part of industrial archaeology today; that is to say the interest in buildings of the recent past, the monuments of the future, as it were. A few years before the congress in Bochum in 1973 the open-air museum of technical-cultural monuments in Wiesental near Hagen was also opened after about ten year's work.

The importance that industrial archaeology has achieved in some countries is shown by the example of the paper factory in Frövifors in Sweden, as presented at the third industrial archaeological congress in Stockholm in 1978: here a workshop of considerable size with machines dating from the beginning of this century was placed under protection to document the work routine and working conditions.

The most recent industrial archaeological congress took place in France at Lyon and Grenoble in 1981. The results of the project "Le Creusot" could be inspected there and then. This centre of French heavy industry founded in 1782 and extended after 1837 by the Schneider family was closed in 1960. Fourteen years later followed the official foundation of the "Ecomusée", which started with the documentation and museum presentation of the development and significance of this field in industry.

In the past few years there has in fact been a wave of enthusiasm for industrial archaeology: a new technical science museum which is now being founded in the Parc de la Villette in Paris, due to be opened to the public in 1985, covering an area of 40.000 m2.

The technical and industrial monuments in the eastern states of Europe occupy a special place: Poland, which actually passed its own law on the so-called "objects of material technology and culture", has demonstrated a new line in the preservation of historical industrial sites in museum form: it has joined together the functions of a museum and economic production. An example would be the former Fiedler textile factory in Opatowek near Kalisz: there a museum for industrial history was founded but in one wing of the building, however, textile production was taken up again. Using the old machines special types of tweed are produced.

It is also characteristic that recent years have seen the reconstruction or at least part reconstruction of technical and industrial sites: one of the most famous examples in this context is the smelting hall of Sayn, Germany. It was built in 1830, constructed almost entirely out of cast iron parts. The main facade of the factory was rebuilt in 1980/81.

In 1980 in Venice a large exhibition took place under the title "Venezia, Citta industriale", in which the significance of the city as a historical industrial centre was described. Among the numerous projects there is one of particular interest: the idea of revitalising the industrial mill, situated on the Giudecca, the "Molino Stucky", built in 1895/96 by the German architect Ernst Wullekopf.

A second Italian project of exemplary and national importance concerns the Canale Navile in the region of Bologna. The canal which goes back to the middle ages, gradually lost its significance in the course of the 20th Century. The rediscovery of the value of the canal and the significance of an open canal in the town architecture was described as a "new chapter in urban development".

A further example illustrates the present enthusiasm: the Spanish architect Ricardo Bofill, who has shaped the silhouettes of many towns with his new buildings, lives and works on the outskirts of Barcelona, in San Justo Desvern, in an old cement factory.

It has even been possible to open up universities to industrial archaeology in recent years. In England "The Institute of Industrial Archaeology" was created by the "Ironbridge Gorge Museum Trust" together with the University of Birmingham. It has been working since 1980 and has offered degree courses in this field since the academic year 1982/83.

While the co-operation which has existed up to now has been based on more or less close personal contacts, in Sweden "The International Committee for the Conservation of Industrial Heritage (T.I.C.C.I.H.)" has been formed; the Committee is expected to enter UNESCO or one of its organisations in the near future.

The "Fifth International Conference on the Conservation of the Industrial Heritage" will be held in June 1984 in New England, (U.S.A.).

## 3. QUESTIONNAIRE SENT OUT AND ANSWERS

### 3.1 THE QUESTIONNAIRE

LAWS:

Does a special law on the preservation of technical and industrial monuments exist in your country?

NUMBER OF MONUMENTS:

a. Are any of the technical and industrial monuments and sites protected?

b. How many technical and industrial buildings, plants or ensembles have the character of monuments in your country?
Is it possible to estimate the number?

NEW MUSEUMS:

Please mention any new museums opened since 1975 which have been installed in former industrial buildings or plants.
Please give:
Name of museum
Address
Former use of the building
Age of the historical building in which the museum is installed
Year of foundation of the museum

CONVERSIONS:

Please let us know about conversions of technical or industrial museums since 1975, which have been given a new use (other than as a museum).
Please give:
Address
Former use of the building
Age of the historical building
New use of the building
Year of conversion

WORKING CLASS HOUSES:

a. How many ensembles of working class houses are there in your country approximately?

b. How many of these ensembles have been restored since 1975?
Indicate:
Address
Age of the buildings
If possible, indicate the exact work of restoration which has been done
Year of restoration

FURTHER ACTION AND RESEARCH:

If your country has proposed further action or research please mention them.

## 3.2 ANSWERS OF THE MEMBER STATES OF THE EUROPEAN COUNCIL

### 3.201 AUSTRIA

LAWS:

There are no special legislative measures for technical and industrial monuments in Austria. The law on the protection of monuments and sites, first passed in 1923, renewed in 1978, recognises the abstraction "the value of culture" and so these buildings and others can be protected. - As early as 1925 protection of technical and industrial monuments was provided by creating a special department for this purpose at the Federal Office for the Protection of Monuments in Vienna which still exists today. A second important thing is that - according to this law - all buildings which are in public possession are designated as "monuments" as long as the Federal Office does not attest the contrary. So many of the technical constructions in Austria - such as bridges, ancient roads, railways and so on - are under protection "ex lege".

NUMBER OF MONUMENTS:

a. There are 254 technical and industrial monuments listed by law.

b. Since 1976 the Technical University of Vienna is working on a catalogue of the technical heritage in Austria. At the moment about 2000 buildings are listed in this catalogue.

NEW MUSEUMS:

Museum: Gold-dressing-museum of the Federal province of Salzburg
Address: A-5645 Böckstein
Former use: Gold-dressing plant
Built: In 1741
Opened: 1978 (first building, the whole museum area is not finished yet)

Museum: Austria coal-mining museum
Address: A-8753 Fohnsdorf
Former use: Coal-mining plant
Built: 1884
Opened: 1983

ADAPTIVE RE-USE:

Address: A-2361 Laxenburg
Former use: Railway-station
Built: Ca. 1840
New use: Tennis centre and restaurant
Re-Opened: 1983

Address: A-7335 Rauchwart bei Güssing
Former use: Distillery-factory
Built: About 1900
New use: Painter's studio and residence
Re-Opened: In restoration since 1981

Address: A-1020 Wien, Obere Donaustraße 26
Former use: Depot for sluice-boards
Built: 1907/08 by the famous architect Otto Wagner
New use: School-house for the Federal Office of weights and measures
Re-Opened: 1976/77

Address: A-2483 Weigelsdorf a.d. Fischa
Former use: textile mill
Built: 19th century
New use: "Art-factory", (Art-centre with work-shops and so on, realized on private initiative)
Re-Opened: 1981

WORKING CLASS HOUSES:

a. A definite number of historical working class houses in Austria is not known. Perhaps about one hundred still exist.

b. Address: A-2603 Felixdorf, so called "Bau" (9 houses with about 72 flats)
Built: 1869 by the famous Viennese architect Carl Tietz
Restoration: Exterior of the houses
Year of Rest.: 1978

FURTHER ACTION AND RESEARCH:

No proposals from the official side.

3.202 BELGIUM

LAWS:

Belgium is a country of two "communities", the Walloon and the Flemish community, both having their own structures and administration in the cultural field. The legislation dealing with the preservation of historical buildings is different in Flanders from that in Wallony. There are no specific laws dealing with industrial heritage. The regional decrees for Flanders dealing with the preservation of monuments and sites (1976), and dealing with movable heritage (1982)

include nominatim the term "industrial archaeology" as a motive for scheduling or listing.

NUMBER OF MONUMENTS:

a. There is no inventory or gazetteer of industrial sites and industrial heritage available. The Department of Historic Buildings and Landscapes is organising an inventory of the architectural heritage (in which the industrial architecture is included), but this project is progressing at a very slow pace. Only the reports on cities of Ghent and Antwerp have so far been completed, and a few other "arrondissments" (districts). It is difficult to "distil" the technical and industrial monuments from the general figures. In Flanders there are some 4000 buildings scheduled as monuments; some 25/30 of these are industrial or technical monuments, not including wind and watermills.

b. If one were to keep to the same criteria as in Britain, one would suppose there to be at least 1000 industrial and technical monuments in Belgium (Flanders and Wallony).

NEW MUSEUMS:

Museum: National Flax Museum

Address: Etienne Sabbelaan, B-8500 Kortrijk

Former use: A farm where flax was processed. There are about 1500 old flax retteries of which the remains can be seen in the region, near the Leic-river.

Opened: 1982/83

Museum: National Hopsmuseum

Address: Gasthuisstraat, B-8970 Paperinge

Former use: City hopswarehouse

Opened: Some years ago

Museum: National Genera- and Distillery Museum

Address: Thonissenlaan 75, B-3500 Hasselt

Former use: Old distillery of which the buildings remain

Opened: The restoration plans for the buildings have been approved, and restoration will start in 1984. The museum buildings are the property of the city, the museum itself is run by a voluntary trust.

ADAPTIVE RE-USE:

There is no inventory available of adaptive re-use of industrial buildings.

* The first example of the readaptation of an industrial building is located in Ghent and is the former textile mill A. Van Hove built in 1912, which has been re-used as offices since 1949, and is now the directorate of the University of Ghent.

WORKING CLASS HOUSES:

a. No general figures available. The town of Ghent still has some 220 "beluiken" (closes, inner-block housing), and there are also some in Lokeren (a dozen), Kortrijk (5 or 6), Izegem (4), Ronse (ca. 10), Aalst (maybe 1 or 2 rows remaining), Hasselt (1), etc... We have no information dealing with the workers houses with a facade to the street. Some books have been written on the development of "social housing" since the beginning of this century (but they don't give a real inventory), and on the so-called "garden cities" built around the coalmines in Limburg (1907 - ca. 1940: Beringen, Zolder, Houthalen, Zwartberg, Waterschei, Winterslag, Eisden). Best known are the remains of the "familistere" built by Godin in the 1880's in Laken-near-Brussels: the building is now used as a storehouse by a transport firm.

b. No example of real restoration of workers houses is known. In some cases they have been renovated, but have thereby lost their historic image.

FURTHER ACTION AND RESEARCH:

At the moment it is necessary to develop the much needed structures, organisations, contacts and co-ordination. As there is no new initiative being taken by the government, this must be carried out by volunteers.

Moreover one has to find a solution for the lack of a real inventory. The Flemish Association for Industrial Archaeology recently started to distribute inventory cards to its members, to local historical and archaeological societies, and to the public: they hope to be able to set up a "record and information centre on the industrial heritage", but this project is developing slowly because of the lack of sponsorship. Nevertheless the first results have already started to come in.

3.203 DENMARK

LAWS:

When declared under preservation, technical and industrial monuments are protected by The Danish Preservation of Buildings Act of 1981.

NUMBER OF MONUMENTS:

a. The technical and industrial monuments of Denmark are listed in the register of preserved buildings, but it is not easy to give a number.

b. It is impossible to give an overall number of technical and industrial buildings of particular value.

NEW MONUMENTS:

Museum: Arbejder-, Handverker- og Industrimuseet
(Workers´-, Artisans´- and Industrial Museum)
Address: Gasvej 17, DK-8700 Horsens
Former use: Electricity power plant
Built: 1906
Opened: 1975

Museum: Danmarks grafiske Museum
(Denmark´s graphical Museum)
Address: Østergade 32, DK-5000 Odense C.
Former use: Textile mill
Built: ca. 1880 and 1920
Opened: 1981

Museum: Arbejdermuseet
(Workers´ Museum)
Address: Rømersgade 22-24, DK-1362 Kobenhavn K.
Former use: Workers´ meeting House.
Built: 1879
Opened: 1982

Museum: Gamle Carlsberg
(The brewery Old Carlsberg)
Address: Valby Langgade 1, DK-2500 Valby
Former use: Brewery
Built: 1867
Opened: 1982

Museum: Dansk Jernbanemuseum
(The Danish Railway Museum)
Address: Odense Jernbanestation
Former use: Engine depot
Built: ca. 1900
Opened: 1975

Museum: J. Smiths Papfabrik
(The Papermill of J. Smith)

Address: Bruunshåb

Former use: Papermill

Built: 1909

Opened: 1979

Museum: Rebstrup Uldspinderi
(The Wool spinning Mill of Rebstrup)

Address: Stampen pr. Hjortekaer

Former use: Fulling-mill (Stamping mill)

Built: ca. 1900

Opened: 1980

Museum: Bing & Grøndahl Museet
(The Museum of Bing & Grøndahl´s Porcelain-factory)

Address: Vesterbrogade 149, DK-1800 København V.

Former use: Porcelain-factory.

Built: 1853 and later

Opened: 1978

ADAPTIVE RE-USE:

There is no example of the conversion of a technical or industrial building available.

WORKING CLASS HOUSES:

a. The number of working class houses is numerous.

b. There is no information about restoration of working class houses.

FURTHER ACTION AND RESEARCH:

A research-project for the documentation and preservation of monuments of the Brick Works Industry is going on.

3.204 GERMANY (G.F.R.)

LAWS:

Owing to the federal structure of the German Federal Republic, each "Bundesland" ("state") has its own law on the protection of monuments and sites. There is no special law on the protection of technical and industrial buildings but, in spite of this, it is possible to protect

these and other buildings. So each "Bundesland" has its own Office of Historic Monuments, eg in the North Rhineland-Westphalia region there are two officials responsible for technical monuments.

NUMBER OF MONUMENTS:

a. A number of protected technical and industrial monuments is not known exactly; but about one hundred buildings of this kind are now protected.

b. The number of buildings, which can be characterised as monuments, is not available but this number is certain to be in the thousands.

NEW MUSEUMS:

Museum: "Fastnachtsmuseum" (carnival-museum)
Address: Bad Dürrheim
Former use: Brine-tower

Museum: Salt-mine Berchtesgaden and salt-museum
Address: Berchtesgaden
Former use: Salt-mine

Museum: German puppet-museum and puppet-theatre
Address: Bochum
Former use: Water-tower

Museum: Malakoff-tower "Prinzregent Dannenbaum"
Address: Bochum - Wiemelhausen
Former use: Winding tower
Built: 1875, closed 1905

Museum: Textile Museum
Address: Borken
Former use: Textile mill "Weberei Biming"

Museum: Fischbacher copper-mine
Address: D-6580 Fischbach/Nahe
Former use: Mine
Built: 1473

Museum: Henrichenburg boat lift
Address: Henrichenburg
Former use: Boat lift
Built: 1894-99

ADAPTIVE RE-USE:

Address: Bad Salzuflen
Former use: Railway station of the Federal German Railway
New use: Flats

Address: Bad Wildungen-Hof Gershausen
Former use: Lime-furnace
New use: Flats

Address: Bielefeld
Former use: Spinning-mill "Vorwärts"
New use: Still used for industrial purposes

Address: Bielefeld
Former use: Spice-factory "Ostmann"
New use: Student accomodation

Address: Bielefeld
Former use: Ravensberg textile mill
New use: Adult education, training and leisure centre

Address: Bielefeld
Former use: Mechanical weaving mill
Built: ca. 1860
New use: Supermarket and shopping centre

Address: Düsseldorf-Hohenbudberg
Former use: Water-tower of the Federal German Railways
New use: Flats

Address: Gelsenkirchen
Former use: "Holland mine"; building housing the ventilation system.
New use: Flats and restaurant

Address: Hamburg
Former use: Factory
New use: Communications-centre

Address: Hamm
Former use: Mine "Maximilian"
New use: Gardening-exhibition

Address: Herford
Former use: Tobacco factory
New use: Town Library

Address: Krefeld
Former use: "Old Kralmen & Gobblers silk factory"
Built 1897
New use: Flats

Address: Kreuztal
Former use: Fire-station
New use: Social centre (private initiative)

Address: Lemgo
Former use: Lime-furnace
New use: Flats

Address: Mönchengladbach
Former use: "Gladbach mill and textile factory"
Built: 1853/55
New use: Professional training centre

Address: Münster
Former use: Pumping-station
New use: Communications-centre

Address: Saarbrücken
Former use: Head office of the Federal Mines of Prussia
New use: Still used as head office of the "Saarberg A.G"

Address: Wilhelmshaven
Former use: Pumping station
New use: Communications-centre

WORKING CLASS HOUSES:

A number for historical working class houses in Germany is not available; however, in the Ruhr-valley alone there are about one thousand ensembles!

FURTHER ACTION AND RESEARCH:

No official statement.

3.205 GREAT BRITAIN

LAWS:

There is very extensive legislation for the protection of historic buildings in this country under which many early industrial buildings are included and some dating through to the 20th Century. Lists of buildings of special architectural or historic interest are compiled by the Department of the Environment and these lists are periodically updated. Buildings are chosen according to the following criteria:

All buildings built before 1700 which survive in anything like their original condition are listed, most buildings from the period 1700-1840 are listed, and between 1840-1940 only those of definite quality and character are listed, and a start has been made on listing selected buildings of high quality of the period 1840-1939. Particular emphasis is given on buildings illustrating particular aspects of social-economic history so that the most important railway stations, mills, markets and warehouses are listed. Other industrial buildings are protected because of their pioneering significance in terms of construction, such as their incorporation of cast iron. The major projects are with the large scale industrial monuments of the 20th Century; very few power stations, factories or airport buildings are protected.

NUMBER OF MONUMENTS:

It is estimated that there will soon be 500,000 listed buildings. About 200 to 300 a year are being added to the lists through the re-surveys. Unfortunately there is no breakdown as to what number of this half a million could be described as industrial and what proportion of the total stock of such buildings are affected.

NEW MUSEUMS:

There are a considerable number of museums that have opened since 1975 which are installed in redundant industrial buildings. The following are perhaps some of the most interesting:

Museum: Bass Brewing Museum

Address: Bass, Burton-on-Trent

Former use: Brewery

Built: 19th century

Museum: Heritage centre (concentrating on celebrating the work of the engineer I.K. Brunel)
Address: Bristol Temple Meads station
Former use: Railway station
Built: The station has an outstanding 1840 train shed

Museum: Maritime museum
Address: Chatham, Kent
Former use: The planned museum will contain the extensive naval dock yards which have just been closed and a series of reports are being produced for the conversion of some of the buildings to a maritime museum concentrating on naval history

Museum: Cotton mill museum and workshops
Address: Cromfood, Derbyshire
Former use: The museum contains a series of important water-powered cotton mills
Built: 1771 - 1791

Museum: Canal Museum
Address: Ellesmere Port, Cheshire
Former use: The museum is based on a series of warehouses and locks by the Manchester Ship Canal

Museum: Museum
Address: Halifax, West Yorkshire Piece Hall
Former use: Market building
Built: 1779

Museum: Industrial Museum for Manchester
Address: Liverpool Road Station, Manchester
Former use: Railway station
Built: The station is the original 18th century terminus of the Liverpool and Manchester railway

Museum: Liverpool Maritime Museum (part of)
Address: Liverpool, Albert Dock
Former use: The buildings are probably the finest of all Britain's docks
Built: 1841 - 45 by Jessie Hartley
Some of the buildings are to be incorporated in the Liverpool Maritime Museum

Museum: Textile mill (still working)

Address: Styal, Cheshire

Former use: The mill is one of the finest Georgian industrial buildings in the country which is now under the administration of the National Trust

Museum: Mining Museum

Address: Chatterley Whitfield Colliery, Tunstall, Staffordshire

Former use: Colliery

ADAPTIVE RE-USE:

The British correspondent is not aware of any conversions of museums to other uses during the period 1975 onwards.

WORKING CLASS HOUSES:

a. It is simply not possible to quantify the number of groups of working-class housing, since the Victorian terraced house is probably the most wide-spread type of building in the country.

b. Since the middle of the 1970's, considerable emphasis has been put on the restoration rather than the clearance of working-class housing. Grants for house-improvement are almost universally available and there are special planning facilities for giving additional grants through "General Improvement Areas". This legislation makes considerable grant aid possible.

FURTHER ACTION AND RESEARCH:

Industrial archaeology is taught as an option at several universities such as the University of Exeter, Southampton and Strathclyde.

3.206 IRELAND

No direct answer. The questionnaire is filled out according to a national report about Industrial Archaeology in Northern Ireland, given by Alan McCutcheon during the Third International Conference on the Conservation of Industrial Monuments, Stockholm 1978 (Nisser M., The Industrial Heritage, Transactions 1, Stockholm 1978, S. 109-124).

LAWS:

No special law on the conservation of technical and industrial buildings. In 1962 the Ministry of Finance in the Government of Northern Ireland established the first full-time regional survey of industry archaeology in the United Kingdom. The survey was organised through the Public Record Office of Northern Ireland and work began in the winter of 1962 on preparing the ground for ensuing fieldwork.

Recent legislation has required the Department of the Environment to compile lists of buildings of special architectural or historic interest and during the years between 1972 to 1978. Well over a thousand buildings within the six north-eastern counties of Ireland have been statutorily listed in this way. If a statutorily listed building - ie a building for which "listed building consent" is required before demolition or alteration can occur - is liable to fall into disrepair through the neglect of the owner, the Department of the Environment has the power to acquire it compulsorily, together with any land which is required for preserving, managing or affording access to it. There are various provisions in the 1972 Planning Order for safeguarding the interests of the owners of buildings, and grants or loans may be payable by the Department for the repair or maintenance of the buildings which have been placed on the statutory lists. In addition to the listing of individual buildings the Historic Buildings Council may advise the Department of the Environment to designate what are term "Conservation Areas" within which the complete physical fabric of a village or compact rural area of outstanding interest may be safeguarded against unauthorised or piecemeal development.

NUMBER OF MONUMENTS:

Under this listing procedure a relatively small number of industrial buildings and a somewhat greater number of buildings connected in one way or another with transport and commerce in the 18th and 19th Centuries have already been protected. These include railway stations, canal locks and lock-keeper's cottages, a linen hall, corn mills, railway viaducts, bleach works and beetling mills, coastguard dwellings, mill housing, disused wind-mills, a hydro-electric power station, flax-scutching mills, a road viaduct, harbours, lighthouses, a coaching inn, a bleach green watch hut, a former shirt factory, linen warehouses, a brewery entrance archway, a graving dock and a complete mill village.

NEW MUSEUMS, ADAPTIVE RE-USE, WORKING-CLASS HOUSES:

No recent examples available.

FURTHER ACTION AND RESEARCH:

No official comment.

3.207 ICELAND

No answer by the correspondent. No information is available.

3.208 LIECHTENSTEIN

LAWS:

There is no special law concerning technical or industrial monuments; but the recent law on the protection of monuments and sites of 1977 enables the protection of buildings of this kind as well as other kinds.

NUMBER OF MONUMENTS:

In Liechtenstein there are only two technical buildings under protection by law:

* Wooden bridge over the river Rhine, built in 1860

* Grain-mill in Eschen, installed in 1778.

NEW MUSEUMS AND ADAPTIVE RE-USE:

There is no museum installed in a technical or industrial building, nor is any example of adaptive re-use known.

WORKING CLASS HOUSES:

There are two historical dwellings; both once belonged to the weaving-mill Jenny and Spoerry:

| | |
|---|---|
| Address: | Vaduz, Mühleholz |
| Built: | About 1840 |
| Restoration: | Restoration of one building is finished; some others are "in restauro". |
| Address: | Triesen; so called "Kosthaus" |
| Built: | About 1880 |
| Restoration: | Currently in process. |

FURTHER ACTION AND RESEARCH:

At this very moment the commission for the protection of monuments and sites is examining the possibility of protecting more technical buildings, as there are electric power stations, factories and so on. But - due to the small size of the State (160 km2) and the agricultural structure of the economic system - these kinds of buildings are relatively rare.

3.209 LUXEMBOURG

LAWS:

There is no special law for the preservation of technical and industrial monuments; however, the new law of the 18th July 1983, which concerns the procedure of "monument classe" (buildings protected by law), has incorporated into its first article the word "industrial", which does not exist in the previous law of 1927. By doing this it has also enabled buildings of industrial value to be put under governmental protection, which was not the case before.

NUMBER OF MONUMENTS:

Two industrial buildings are "spot-listed", which means that they have been put on a list called "Ergänzungsliste der öffentlichen Denkmäler", or "inventaire supplementaire", which is a milder form of conservation than the "monument classe".

These buildings are:

* Niederwiltz, wind-mill

* Pintsch, former tannery

NEW MUSEUMS:

Museum: Wine-museum Würth
Address: Ehnen
Former use: The museum located in the Moselle region was the former house of the wine-growing family Würth
Opened: 1980

ADAPTIVE RE-USE:

Address: Diekirch
Former use: Brewery
Built: About 1900
New use: Cultural and community centre
Re-opened: Conversion of the building will take place in 1984/85

Address: Feulen, "Hennesbau"
Former use: Tannery
Built: 1826
New use: Threefold function; i.e. a cafe-restaurant on the ground floor, a museum for architecture on the first floor and a hall for social occasions on the secound floor
Re-opened: The conversion of the building will be finished in 1984

Address: Mauternach
Former use: Paper-mill
Built: About 1850
New use: Centre for drug-addicts
Re-opened: 1981

Address: Mertzig
Former use: Tannery and farm buildings
Built: 1840
New use: Multi-functional use, e.g. administration offices, festivity-hall and a building for the use of the fire brigade
Re-opened: 1976

Address: Noerdange
Former use: Railway-station-building
Built: About 1880
New use: Offices for the Post Office
Re-opened: 1980

Address: Tétange
Former use: Shoe factory
Built: End of the 19th century with a later addition at the beginning of the 20th century
New use: Community-centre
Re-opened: 1979

Address: Vianden
Former use: Tannery
Built: About 1900
New use: Cultural and sporting-centre
Re-opened: 1981

WORKING CLASS HOUSES:

The south of Luxembourg is the industrial area and several examples of workers' housing estates (terraced houses) have survived. The best example for this type of architecture can be seen in Lasauvage, where a whole settlement of dwellings has survived. None of these have been restored as an ensemble. But individual houses have been restored by their owners over the last two years.

FURTHER ACTION AND RESEARCH:

It is necessary to attract the public attention and to encourage the protection of the industrial heritage in Europe.

3.210 THE NETHERLANDS

LAWS:

There is now special law on the preservation of technical and industrial monuments, but the monuments of Industrial Archaeology can be listed under the existing Monuments Act, published in 1961 (total number of listed buildings ± 41,000).

NUMBER OF MONUMENTS:

a. The number of listed technical and industrial buildings can be shown as follows:

| | | |
|---|---|---|
| Windmills | | 1,071 |
| Watermills | ± | 40 |
| Steam pumping houses | | 12 |
| Railway stations | | 15 |
| Water-tower | | 5 |
| Lighthouses | | 15 |
| Warehouses | | 10 |
| Factories | ± | 10 |

b. Altogether there are about two thousand buildings or ensembles which are designated as monuments.

NEW MUSEUMS:

Museum: Bell-foundry, museum-oven, still actively operating
Address: Klokkengietersstraat, Aarle-Rixtel
Former use: Bell-foundry "Petit en Fritsen"
Built: 1906
Opened: 1983

Museum: Shipyard "'t Kromhout", still in active operation
Address: Kadijk, Amsterdam
Former use: Shipyard
Built: 1867, a steam engine of the year 1874 is still exists
Opened: 1979

Museum: vegetable market house
Address: Broke op Langendijk
Former use: Vegetable auction-house
Built: 1912
Opened: About 1978/79

Museum: Philips factory museum
Address: Enmasingel, Eindhoven
Former use: Electric bulb factory
Built: 1891 (former buckskin factory of 1875)
Opened: About 1979

Museum: Zuiderzee Museum (open air museum)
Address: Enkhuizen
Former use: Various industrial buildings, once connected with the former Zuyder Zee
Built: Three lime-kilns, 1861, Akersloot steam-laudry works, dated from the beginning of the 19th century with a steam-engine 1901, Ysselmuiden
Opened: 1983

Museum: Textielindustriemuseum (annex appartments)
Address: Industriestraat 2, Haaksbergerstraat, Enschede
Former use: Spinning mill of the "Jannihk" textile factory
Built: 1900
Opened: 1983

Museum: Textielmuseum
Address: H. Geertstraat 4 B, Geldrop
Former use: Stocking factory
Built:
Opened: 1983

Museum: Steam-saw-mill, still in active operation
Address: Winterswijkseweg, Groenlo
Former use: Steam-saw-mill
Built: 1890
Opened: 1980

Museum: Pithead of the coalmine Oranje Nassau I, (part of the mining museum of Kerkrade)
Address: Kloosterweg, Heerlen
Former use: One of a pair of two pitheads of the former mine "Oranje Nassau I"
Built: 1898
Opened: 1982

Museum: Pithead "Nulland"
(part of the mining museum of Kerkrade)
Address: Kipstraat / Nullandstraat, Kerkrade
Former use: One of the pitheads of the former "Domaniale Mijn"
Built: 1909/1921
Opened: 1978

Museum: Stoommachinemuseum
Address: Oosterdijk, Medemblik
Former use: steam-pumping house "De Vier Noorder Koggen"
Built: 1869/1907
Opened: 1984

Museum: Museum "Geelgieterij Keverling", brass foundry, still in active operation
Address: Geelgieterstraat 6 en 11, Sinnebuorren, Joure
Former use: Brass-foundry
Built: 1854/1910/1954
Opened: 1983/84

Museum: Nederlands Textielmuseum
Address: Goirkestraat 88 t/m 96, Tilburg
Former use: Woollen fabrics factory "Mommers" and others
Built: 1877 and later
Opened: The conversion into a museum will be finished in 1986

Museum: Museum "From clay to brick"
Address: Rijndijk, Wageningen
Former use: Brick-kiln "Plasserwaard"
Built: 1984
Opened: The museum will be opened in 1984

Museum: Shipyard "Zwolsman", still actively operating
Address: Workum
Former use: Shipyard

Museum: Brick-kiln museum
Address: Panovenweg 18, Zevenaar
Former use: Brick-kiln
Built: About 1920
Opened: The museum will be opened in 1984

ADAPTIVE RE-USE:

Address: Entrepotdok, Amsterdam
Former use: Bonded warehouses
New use: Housing, offices, car park

Address: Van Diemenstraat 10, Amsterdam
Former use: Warehouse
Built: About 1880
New use: several functions (housing)
Re-opened: About 1981

Address: Wilhelminasingel 19, Breda
Former use: Watertower
Built: 1894
New use: Architect´s office
Re-opened: 1975

Address: Hortsedijk, Helmond
Former use: Brick-kiln "De Nijverheid"
Built: 1920
New use: Restaurant "Briketterie"
Re-opened: 1981

Address: Rijndijk, Rhenen/Wageningen
Former use: Brick-kiln "Blauwe Kamer"
Built: About 1920
New use: Studio / schietbaan
Re-opened: 1980

Address: Honigerdijk, Rotterdam
Former use: Watertower and annexes
Built: 1873
New use: Studentaccomodation
Re-opened: 1980-1983

Address: St. Josephstraat 133, Tilburg
Former use: Textile factory
Built: 1850
New use: Youth-centre "'t Duvelhok"
Re-opened: About 1978

Address: Lindendijk, St. Oedenrode
Former use: creamery (melkfabriek)
Built: 1916
New use: Chinese restaurant
Re-opened: 1983

Address: Boschveliweg 72-73, 's-Hertogenbosch
Former use: Cigar-factory "Goulmy en Baar" (Willem II)
Built: 1897/1908
New use: Several functions
Re-opened: 1981

Address: St. Josephstraat 126, Tilburg
Former use: Textile factory Beka, former "Lancierskazerne" (barracks)
Built: 1847 and later (1870)
New use: No change of function
Re-opened: ca. 1980

Address: Rijndijk, Wageningen
Former use: Brick-kiln:
Built: About 1920
New use: Youth centre
Re-opened: 1978

Address: Woerden
Former use: Watertower
Built: 1906
New use: Housing/gallery
Re-opened: 1983/84

Address: Zaltbommel
Former use: Watertower
Built: 1905
New use: Housing
Re-opened: About 1975

* Last but not least several railway stations have been converted in recent years, e.g.:

Ede Centrum - museum
Lunteren - housing gallery
Echtelo - housing
Almen Laren - housing
Vorden - offices of several dentists
Winterswijk - housing
Loppersum - bank

WORKING CLASS HOUSES:

a. Ensembles of working class houses were specially built near factories or industries to house people who worked in these plants; there are about some 30 to 40 still existing.

b. There is only one example of restoration known.

* Address: "De Hopel", Mezenlaan e.o., Kerkrade
* Built: Today "De Hopel" is a complex of 46 dwellings built from 1906 up to 1940
* Restoration: Total renovation
* Year of Restoration: 1981/82

FURTHER ACTION AND RESEARCH:

No official statement

3.211 NORWAY

LAWS:

The Norway Cultural Heritage Act came into force in 1979. It contains special paragraphs dealing with the protection of technical and industrial monuments. Paragraph 4 categorises the monuments which are protected according to the provisions of this Act; the listing mentions especially:

* Settlement sites, caves, natural rock shelters with traces showing that people once lived or worked there.

* Sites and remains of workshops and other places of work of all kinds, such as quarries and other mining sites, iron extraction sites, charcoal kilns and tar kilns and other traces of craft or industry.

* Roads and all other road-ways constructed of stones, wood or other materials, or mere tracks, entirely unpaved; dams and weirs, bridges, fords, harbour-works and crew-changing stations, landing places and old slip-ways or the remains of such, bars made of sunken vessels, landmarks for use on land and at sea.

NUMBER OF MONUMENTS:

a. Since the Norway Cultural Heritage Act has been very rarely used in connection with industrial monuments, only two monuments are now protected by law. The normal procedure has been for a general agreement to be made to preserve a monument.

b. It is very difficult to estimate the number of technical and industrial monuments. A rapidly growing interest in the preservation of industrial monuments is noteworthy. The number of buildings which have the character of monuments would amount to several hundreds without doubt.

NEW MUSEUMS:

| | |
|---|---|
| Museum: | Klerfoss industrimuseum (mainly paper- and pulpindustry) |
| Address: | N-4340 Løten |
| Former use: | Chemical pulp and paper factory |
| Built: | Mainly 1911 |
| Opened: | The new museum situated near Hamar will be opened in 1984 |

| | |
|---|---|
| Museum: | Norsk Kjøretøyhistorisk Museum (mainly automobiles) |
| Address: | Oslo |
| Former use: | Mechanical industry |
| Built: | About 1900 |
| Opened: | 1983 |

Museum: Industriarbeidermuseet
Address: N-3660 Rjukan (Vemork)
Former use: Hydroelectric power station
Built: 1909

Museum: Hermetikkmuseet (Canning industry museum)
Address: Østre Strandgate 88 A, N-4000 Stavanger
Built: 1908
Opened: 1982

ADAPTIVE RE-USE:

No technical or industrial monuments have been converted to other uses in Norway in recent years.

WORKING CLASS HOUSES:

a. There is no survey on working class houses in Norway available. According to the National Authorities for Antiquities (Riksantikvaren), between 50 and 100 ensembles of dwellings are estimated.

b. Since 1975 ensembles have been restored or are now in restoration in the following places: Rjukan, Sauda, Eikelands Verk, Bergen, Eydehavn, Kalvskinnet (Trondheim) Øvre Verket (Ulefoss), Blåfarveverket (Modum), Folldal Verk, Frysja (Oslo).

FURTHER ACTION AND RESEARCH:

Both the Norwegian Museums Organisation and the Norwegian Cultural Council are much aware of the importance of preserving industrial monuments; special working committees are to evaluate the problems and possibilities for a nation-wide plan for industrial monuments. An important record is being made of grain mills all over the country, and considerable registration work has also been done on old bridges and roads.

3,212 SWEDEN

LAWS:

There is no special law in Sweden concerned with the protection of monuments of industry and technology. 1960 ars lag om byggnadsminnen is concerned with solitary buildings in private ownership and not with sets of buildings or environments. Around 20 industrial monuments have been protected by means of this law, among them a large number of buildings in the old bruks of Sweden. 1920 ars Kungörelse med föreskrifter om det offentliga byggnadsväsendet deals with monuments owned by the State. Ca. 350 monuments are protected according to these regulations, among them a few warehouses and workshops mainly in the care of the Fortification Authorities. Some lighthouses and railway stations are also scheduled. 1942 ars lag om fornminnen protects old monuments; some blast furnaces, ruins of forges, grainmills and sawmills are scheduled according to this law. So are some old bridges and roads.

NUMBER OF MONUMENTS:

a. For the number of protected technical and industrial monuments see answer of the previous question.

b. The complete number of technical and industrial buildings which have the character of monuments is probably about 200.

NEW MUSEUMS:

Sweden has a long-standing tradition in the creation of company museums; most of them were established many years prior to 1975. However, there are a few industrial plants and buildings which have recently been converted into museums.

| | |
|---|---|
| Museum: | Borad museum, Tekomuseum |
| Address: | Skaraborgsvägen 27, S-502 34 Borås |
| Former use: | Textile mill (exclusively spinning) |
| Built: | Several buildings from 1890-1920 |
| Year of foundation: | 1972 |

| | |
|---|---|
| Museum: | Eskilstuna faktorimuseum<br>The Museum is situated on the small islands in the Eskilstuna River not far from the Rademacher Forges, built in 1658. The Factory museum is set up in premises once built for a rifle factory. Here old power engines, vehicles, workshops and products are exhibited. Weapons, which in particular emphasize their technical features, are exhibited in a separate building. |
| Address: | S-901 60 Eskilstuna |
| Former use: | Rifle production |
| Built: | About 1830 |
| Year of foundation: | 1979 |

| | |
|---|---|
| Museum: | J.E. Hylténs mekaniska verkstad, Gnosjö<br>J.E. Hylténs Mechanical Workshop in Gnosjö, province of Smaland. A small enterprise that employed around 30 people and mainly produced brass articles and fire hose accessories. The factory closed down in the early 1950s. It has been taken over by the local authorities. Production is maintained to a certain extent; otherwise it is used for museum purposes. |
| Address: | Gnosjö |
| Former use: | Mechanical Workshop |
| Built: | (1897), 1914 |
| Year of foundation: | 1978 |

| | |
|---|---|
| Museum: | Remfabriken i Göteborg. A Transmission belts factory; closed down in 1977. The factory has remained fairly intact since it started up in the early 20th century. The machinery remains in good repair and is still kept in working order by a society of enthøusiasts. |
| Address: | Avägen 15, S-412 51 Göteborg |
| Former use: | Transmission belts factory |
| Built: | About 1910 |
| Opened: | 1977 |

| | |
|---|---|
| Museum: | Industrimuseet, Göteborg |
| Address: | Box 5037, S-402 21 Göteborg |
| Former use: | Mineral water factory |
| Built: | 1936 |
| Year of foundation: | 1957. Installation in new building: 1982 |

| | |
|---|---|
| Museum: | Rosenlöfs tryckeri (Rosenlöfs' printing-press) |
| Address: | Korsikavägen 23, Fack 26, S-812 03 Kungs-garden |
| Former use: | Printers' workshop |
| Built: | 1899/1900 |
| Opened: | 1983 |

| | |
|---|---|
| Museum: | Norrköpings Stadsmuseum<br>Norrköping, one of the early centres of the textile industry in Sweden; it has started up a museum located in a former textile mill and, above all, devoted to the textile history of Norrköping. The textile machinery is in working order. |
| Address: | Västgötegatan 19-21, S-602 21 Norrköping |
| Former use: | Textile mills |
| Built: | Several buildings from 1890-1900 |
| Year of foundation: | 1981 |

| | |
|---|---|
| Museum: | Finnfors kraftverksmuseum<br>Finnfors historical hydroelectric power plant has remained intact with its original equipment for since it came into existence. |
| Address: | c/o Skellefteå museum, S-931 33 Skelleftea |
| Former use: | Hydroelectric power station |
| Built: | 1907 |
| Opened: | 1983 |

| | |
|---|---|
| Museum: | Central Museum of Science and Technology, Stockholm. Department of Crafts and Electricity.<br><br>The Museum has opened a new wing, built into connection to the main building, the department of Crafts and Electricity. Originally this wing served as stables for the Royal Dragoons; it is not actually an industrial plant but should be mentioned in this context. |
| Address: | Museivägen 7, S-115 21 Stockholm |
| Former use: | stables, Royal Dragoons |
| Built: | 19th century |

Year of foundation: 1938. Museum wing in question: 1983

| | |
|---|---|
| Museum: | AB Urfabriken i Svängsta |
| Address: | S-270 90 Svängsta |
| Former use: | Mechanical workshop for the production of watches |
| Built: | Not known, year of the foundation of the workshop: 1887 |
| Opened: | 1976-77 |

ADAPTIVE RE-USE:

An example of adaptive re-use in recent years is not known.

WORKING CLASS HOUSES:

It is absolutely impossible to give any number for working class houses. There are the old "bruks" and quite a number of areas with working class housings in Sweden

FURTHER ACTION AND RESEARCH:

No official statement.

3,213 SWITZERLAND

LAWS:

There is no special law but in 1981 the "Bundesrat" (Federal Council) officially announced the Swiss policy for the protection of the industrial heritage. Since 1969 there have been 11 industrial buildings under federal protection, but most of the technical and industrial buildings are protected by the work of the "Kantone" (Federal provinces). By a law passed in 1966 it is furthermore possible to enter in the land-register any building in need of protection. A law passed in 1974 orders that financial aid may be given.

NUMBER OF MONUMENTS:

No number of technical and industrial monuments is available. Only some towns, eg Zürich, have drawn up an inventory of these buildings. Recording is still in progress, with the valuable support of universities and private associations for industrial archaelogy (eg "Association pour le Patrimaine Industriel", founded 1979 in Geneve).

NEW MUSEUMS:

| | |
|---|---|
| Museum: | Papiermühlemuseum (paper-mill) |
| Address: | St. Albantal, Basel |
| Opened: | 1980 |

| | |
|---|---|
| Museum: | Sawing-mill-museum |
| Address: | Bassersdorf |
| Former use: | Sawing mill |
| Founded: | 1846 |
| Opened: | Restored 1976 to 1979 |

| | |
|---|---|
| Museum: | Rheinschiffahrtsmuseum (museum of the Rhine-shipping) |
| Address: | Rheinschiffahrtsmuseum, Basel, Klein-Hüningen |
| Opened: | 1979 |

Museum: Bergbaumuseum Graubünden
(Mining museum of Graubünden)
Address: Davos
Opened: 1979

Museum: Museum der schweizerischen Fliegertruppe
(Museum of the Swiss air force)
Address: Militärflugplatz Dübendorf
Former use: Hangars
Built:
Opened: 1978

Museum: "genossenschaft drechslerei kleintal"
(A old turner´s workshop, still operating)
Address: Fischental, "Im Kleintal"
Former use: Turner´s workshop
Built: 1856 (closed 1973), turbines installed 1869
Opened:

Museum: Electricity-museum, textile-mill
Address: Reusstal
Former use: Turbine-hall
Built: 1881 (out of use since 1970)
Restored: 1981 (opened?)

Museum: Musee du fer
(iron-working museum)
Address: Vallorbe
Former use: Forge "Große Schmiede"
Built: 16th century
Opened: 1980

ADAPTIVE RE-USE:

Address: Dachsen
Former use: Railway-station-building and inn
Built: 1857 (out of use since 1916)
New use: Housing

Address: Dielsdorf
Former use: Dyer's workshop
Built: 1842 (closed 1930)
New use: Community-hall

Address: Geneve, Halles de l'Ile
Former use: Slaughter-house
Built: 19th century
New use: Exhibition and art-centre
Re-opened: 1980

Address: "Chante-Joux", La Chaux-du-Milieu
Former use: Watch-factory
Built: 1910
New use: Housing
Re-opened: 1981

Address: "Camino spinirolo", Meride
Former use: Ichtyol-factory (shale)
Built: 1907 (out of operation since 1962)
New use: Art and holiday-centre (based on private initiative)
Re-opened: 1981

Address: Wädenswil
Former use: Silk-weaving-mill "Gessner AG"
Built: 1898/99
New use: Trade-centre
Re-opened: 1978/79

WORKING CLASS HOUSES:

a. A number for working class houses is not available.

b. Examples of the restoration of working class houses are:

Address: La Chaux-de-Fonds, "le Manège"

Built: Former riding-hall, adapted in 1868 into worker's housing

Year of Rest.: 1979-81

Address: Neuenburg, "l'Immobilière"

Restoration: Conservation of parts of the dwellings

Year of Rest.: 1980-81

FURTHER ACTION AND RESEARCH:

No official statement.

3,3 FOR COMPARISON: ANSWERS OF SOME STATES OF THE NORTH-EAST OF EUROPE

3,31 CZECHOSLOVAKIA

LAWS:

It is possible to protect technical and industrial buildings by the law for the protection of cultural monuments and by the law concerning museums and galleries, both passed in 1959. At the moment a new law concerning the protection of monuments and sites is being worked out; it will be passed in 1984.

NUMBER OF MONUMENTS:

a. At the moment there are some 1200 technical and industrial buildings listed by the national survey. This represents about 3% of the 33,000 monuments recorded.

b. Without question the number of 3% is not at all representative of the value of their technical heritage.

NEW MUSEUMS:

Following the general tendency, the industrial heritage in Czechoslovakia is by preference protected in its natural environment; this makes it possible to preserve evidence concerning the original economic and social relationships. If the buildings concerned are threatened in situ, they are incorporated into one of the "scansens" that group together popular buildings.

Two of the most recent museums are:

Museum: Erzbergbau-Freilichtmuseum
(Iron-ore mining, open air museum)

Address: Banska Stiavnica

Former use: Iron-ore mining

Built: At the moment a gallery from the end of the 18th century and a machine hall from the 19th century can be visited. Some more buildings belonging to other mines will be located there in the form of an off-site museum.

Museum: Erzbergbau-Freilichtmuseum:
(Iron-ore mining, open air museum)

Address: Pribram

Former use: Iron-ore mining, "Sevciner Grube"

Built: Mining started at the end of the 16th century. There are many buildings, machines and so on. Most of them are from the end of the 19th century.

Opened: Museum-work started in 1975

Another tendency is to create a museum "on-site" just before work is stopped there. Such attempts are being made in three coal mines in old Bohemia at Dladno, Ostrava and Rtyne near Svatonovice; museum work has already started there inspite of the fact that coal-mining is to continue for some seven to ten years!

ADAPTIVE RE-USE:

It seems that adaptive re-use of technical and industrial buildings is not known in Czechoslovakia.

WORKING CLASS HOUSES:

a. No number for ensembles of working class houses is available. But there are many which were built during the 19th century, above all in the mining centres such as Kladno, Ostrava, Pribram and Most.

b. None of these dwellings have been restored.

FURTHER ACTION AND RESEARCH:

No official statement.

3,32 POLAND

LAWS:

Since 1962 Poland has had a special law for the protection of "cultural monuments".

Systematic research work has been carried out by the Institute for the History of Material Culture (Polish Academy of Science) in Warsaw, by the Institute for the History of Architecture, Art and Technology at the Engineering College in Wroclaw and by the Institute for the History of Architecture at the Engineering College in Lodz.

NUMBER OF MONUMENTS:

In 1981 the total number of industrial objects included on the register of cultural monuments already amounted to 400.

NEW MUSEUMS:

Since 1975 many technical and industrial museums located in former industrial plants have been created.

| | |
|---|---|
| Museum: | Technological museum |
| Address: | Warsaw |
| Former use: | "Norblin and Ska Company" (steelworks) |
| Built: | 19th century |
| Opened: | In 1982 the Technological Museum of Polish Federation of Engineering Associations took possession of the buildings and started to adapt the objects to museum purposes. |
| Museum: | Coal mining museum |
| Address: | Zabrze |
| Former use: | Coal mining, "Guido shaft" |
| Built: | 19th century |
| Opened: | 1982 by the Coal mining museum Zabrze |

ADAPTIVE RE-USE:

It seems that the method of "adaptive re-use" is not used in Poland.

WORKING CLASS HOUSES:

No answer.

FURTHER ACTION AND RESEARCH:

No official statement.

3,33 HUNGARY

LAWS:

There is no special law, but in 1951 the protection of technical and industrial monuments had already started with the reconstruction of the blast furnace at Ujmassa, built in 1813. Since 1974 recording of the industrial heritage has been continuing.

NUMBER OF MONUMENTS:

No number of technical and industrial monuments is available, but there are some hundreds under protection.

NEW MUSEUMS:

Most of the museums are - according to the economical structure of the country - of agricultural interest, for instance the museum of agricultural vehicles at Mateszalka.

ADAPTIVE RE-USE:

It seems that the method of "adaptive re-use" is not used in Hungary.

WORKING CLASS HOUSES:

a. No number of protected working class houses is available.

b. No examples of the restoration of dwellings are known.

FURTHER ACTION AND RESEARCH:

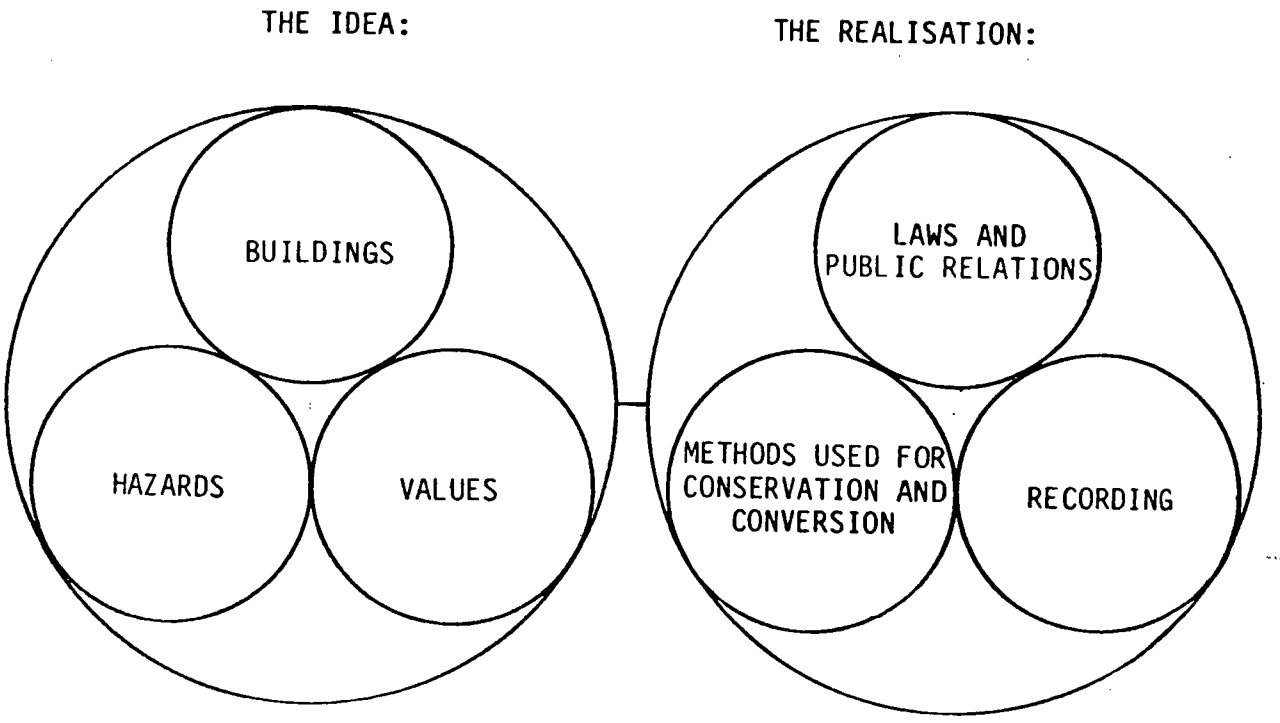
No official statement.

4. CONSOLIDATED REPORT

4,1 PRELIMINARY NOTE

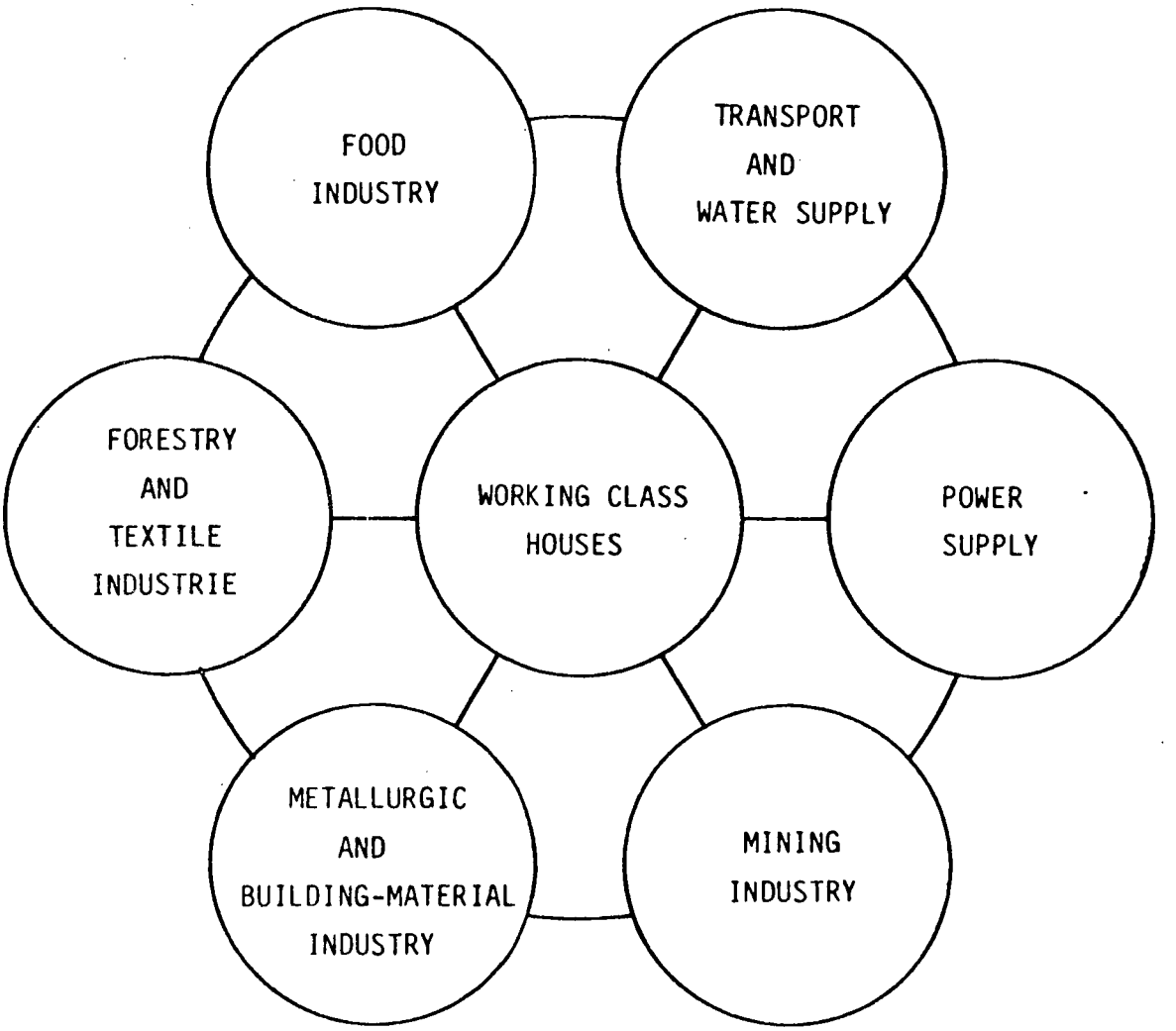
The preservation of technical and industrial monuments is a special task belonging to the general protection of the historical heritage.

A model for a concept and its realisation shows the following scheme:




4,2 THE BUILDINGS (DEFINITION OF THE BUILT TECHNICAL AND INDUSTRIAL HERITAGE)

Without question there are different ways of classifying the large variety of technical and industrial buildings. One way to do this according to their original use, ie:




Some examples:

* Transport and water supply: streets; bridges of wood, stone, steel and concrete; railways and railway stations, viaducts, galeries; weir-buildings, aqueducts, watertowers and reservoir constructions, pumping stations, waterworks, backwater pumping plants, drainage installation buildings, crane-buildings, hoisting towers, harbours, lighthouses, docks, warehouses, canals; etc.

* Power supply: Hydro-electric power stations, gasworks, gasholders, machine halls, oil-tanks etc.

* Mining industry: Mines with mining-shafts, headstocks, winding tower and engine houses; colliery buildings; salt-works etc.

* Metallurgic- and building-material industry: Blast furnaces and forges; lime-, cement- and tile-kilns, porcelain- and glass-furnaces etc.

* Forest and textile industry: Sawmills, pulp and paper mills; palm-houses; spinning and weaving mills, textile factories etc.

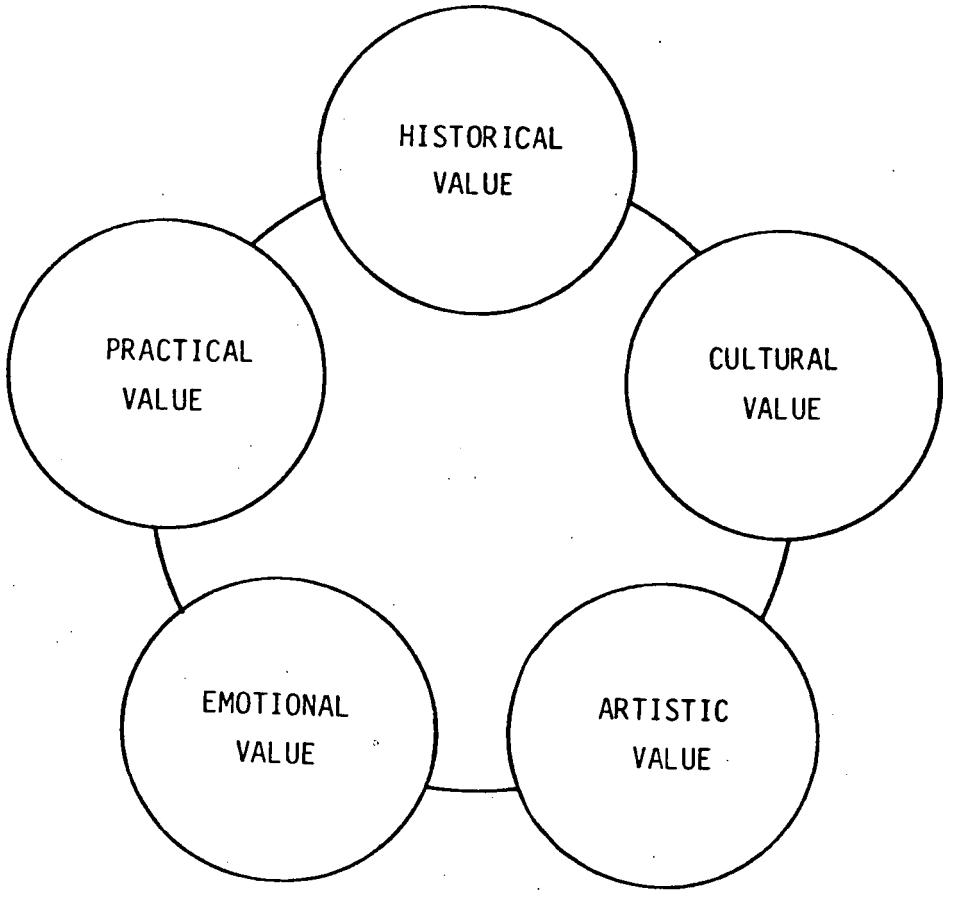
* Food-industry: Wind- and water-mills, breweries, slaughter houses, food factories etc.

* Working class houses: Houses, dwellings, wash-houses etc.

Perhaps it is necessary to say at this point something about the time frame of the term "industrial buildings", because very often it is thought industrial archaeology starts at the beginning of industrialism, ie in the 18th century. But the time frame is open - at the beginning and at the end point: industrial production has undoubtedly existed for a long time, and industrial organisations existed long before the words "manufacture" and "factory" came into use. As an extreme, the Austrian scientist Richard Pittioni traces production on an industrial basis back to the second millenium before Christ. On the other hand Kenneth Hudson, one of the fathers of "industrial archaeology", stated that industrial archaeology should also embrace modern industrial plants.

4,3 THE VALUES

The values of monuments were already formulated in 1903 by Alois Riegl, Austrian Professor for History of Art at the University of Vienna in 1903. In a revised version these values are:



Some comments will be necessary:

* Historical value: buildings are physical remains and every remain is a source of information that every historian recognises (Akos Paulinyi, TICCIH - Conference 1978); technical and industrial buildings are of particular importance to the general public.

* Cultural value: "Cultural value" is the most used term specifying the values of the technical and industrial heritage. The word marks the fact that these special kinds of buildings show clearly the rapid evolution in technology and industry to everybody, eg seeing an old water driven mill. Last but not least there are great social values and great sentimentality attached to the heritage of industrialism showing the relationships between Man and Work.

* Artistic value: many of the technical and industrial buildings have a real artistic value, eg the salt-mine buildings of the 18th century or the palm-houses of the 19th century.

* Emotional value: without question it was originally nostaligic enthusiasm that was the prime motive in rescuing technical and industrial monuments. So too railways, wind and water mills and small factories possessing a strong romantic air have been the most popular structures for preservation. Very often the characteristic structures of technical or industrial buildings have become landmarks; in some cases such monuments have become a heraldic symbol for a whole town.

* Practical value: the use of buildings which in the fundamental requirement for their conservation is the biggest problem in protecting the built technical and industrial heritage. - see Methods, Point 4,7.

4,4 THE HAZARDS

Man and nature are always responsible for the dangers to extant monuments.

* By men:

  Till some years ago the technical and industrial monuments - except water and windmills and other buildings as mentioned above - did not enjoy the attention which is their due. The constructions and industrial installations are even today to a large degree, judged negatively. A factory building in a residential area is felt to be an annoyance, because it makes people think of "work" and "workers", both of which they like to forget during their non-working hours. Ultimately it was the engineer himself who appeared as an enemy and destroyer of the buildings he created; for him only the latest and best technical standards were of interest; he neglected his own history! Fortunately this attitude has changed on a broad level - today restoration of technical and industrial monuments is much more handicapped by financial problems.

* By nature:

  Because of their construction material many technical and industrial buildings are much more exposed to the dangers of weathering and corrosion, than other monuments eg cast iron constructions or the historical boat lifts. Furthermore, buildings which have been out of use for a long time are destroyed very rapidly.

## 4.5 LAWS AND PUBLIC RELATIONS

In every European country it is possible to protect technical and industrial monuments as well as others, although in some countries a minimum age of the buildings is required. Modern laws use the word "industrial monuments", older ones speak about buildings of "cultural value". Only in the north-east of Europe are there special laws on the protection of the technical and industrial heritage.

In nearly every European country, above all in England, Sweden and in the Netherlands the first pioneering work was done by groups of enthusiasts and today many initiatives are being taken by voluntary charitable trusts too, eg the first national society for the preservation and protection of windmills was the Dutch society "De Hallandsche Molen", which was founded as early as 1923. In 1979 - to give a recent example - eighty-five societies undertaking specific research or preservation projects on the field of industrial archaeology have been recorded in Great Britain. National societies of Industrial Archaeology have been set up at different towns eg in Italy at Milan, Bologna etc. These workgroups have organised lectures and exhibitions. Another example: in Denmark the Flemish Association for Industrial Archaeology has organised the 3rd Flemish-Dutch meeting for Industrial Archaeology, focused on industrial, technical and scientific museums and has organised study-tours, visits and courses for volunteers. The workgroup for Industrial Archaeology Geraardsbergen in the same country has given a lecture on the match industry in that town in April 1983: the workgroup started with the idea of compiling an inventory of all industrial buildings in Geraardsbergen from 1830 to 1914. Because this led to too much information, the decision was made to deal with particular aspects of the industry: the first one was the match industry. The workgroup organised this evening lecture to see how the local population would react to their historical work.

One of the most discussed public initiatives has been the example of Eisenheim, a 19th Century industrial colony in the Ruhr-valley, Germany: in 1972 the inhabitants succeeded in preventing the destruction of their community and the replacement of their houses by blocks of high-rise flats, with the help of a group of staff and students from the "Fachhochschule Bielefeld". Eisenheim was the first working class dwelling in Germany which was protected by law and became a model for similar cases. Already in 1977 there were some 50 working class initiatives taking place in Germany.

## 4.6 RECORDING

Methods of recording and industrial archaeological field work have been adequately described in conference-papers and books (Major J.K., Fieldwork in Industrial Archaeology, Batsford 1975).

The question fundamental to any recording programme is for whom and why?

The documentation of an industry can serve a variety of purposes:

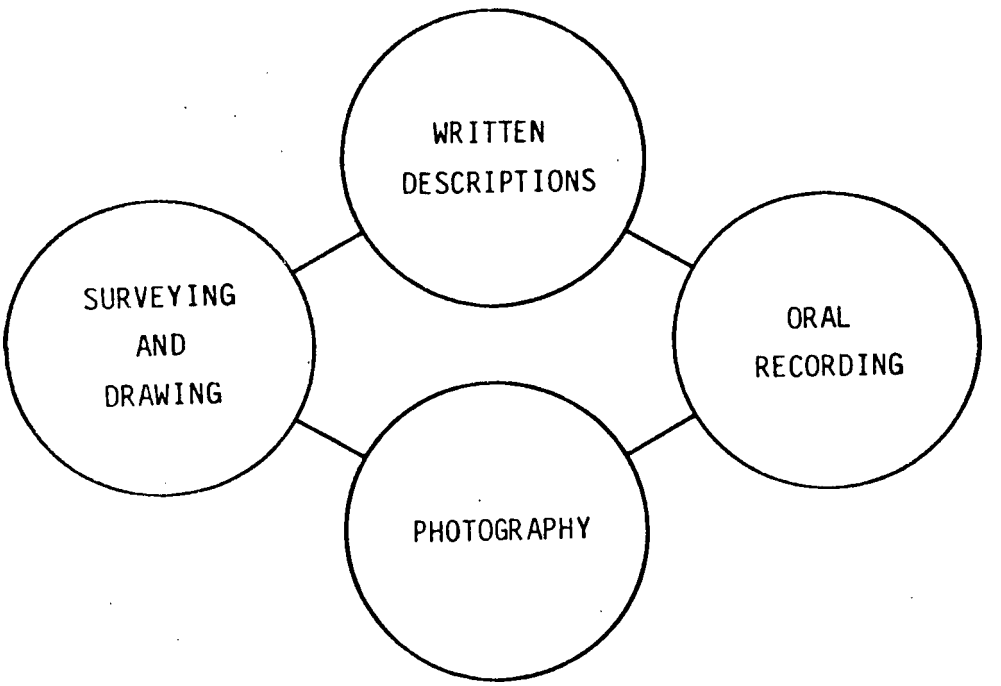
* to record the industrial or technical processes of a factory before it is annihilated;

* to investigate the social structure of a place of employment;

* to record an industrial facility prior to its restoration.

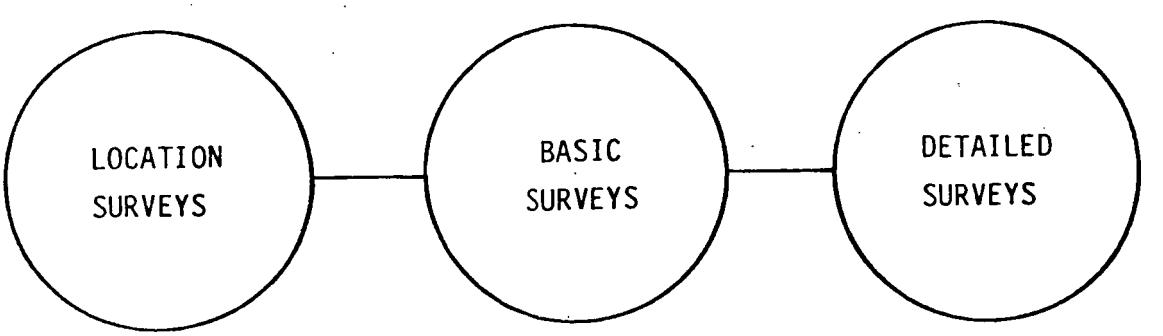
These various purposes have various results. The ideal must be a combination catering for all requirements and furnishing all the data that can be required in order for a restoration to be successful.

The techniques available summed up first by Keith A. Falconer (T.I.C.C.I.H. - conference 1978) are:




There is no need to give detailed information about these techniques. But it has to be noted that a special place has been taken by a sudden rise in interest for "oral history"; its many applications to industrial recording are obvious.

Most recording being undertaken at present utilizes a combination of the techniques mentioned above but only rarely include cine film, aerial photography, photogrammetry or taped oral interviews. It is conducted at various degrees of intensity which for convenience can be categorized into three main levels:



x Location Surveys

These embrace elementary index card systems such as the National Record of Industrial Monumentsin Britain and the Records Centre for Historical Monuments in Poland but they can also be quite sophisticated as in the case of the Historic American Engineering Record (HAER) with its use of large format punched edge file card. These are all part of an inventorying process - a vital first step to the formulation of national or regional programmes of both preservation and recording.

The following figure shows a Report Card used by the Council for British Archaeology:

NATURE OF SITE (Factory,mine,etc.) | COUNTY | REF.No.

| Grid Reference or Location | Industry | Dating | Parish/Township | Date of Report |
|---|---|---|---|---|

DESCRIPTION: dimensions; present condition; architectural features etc.

(Further remarks or photo/sketch may be recorded on the back)

Machinery and Fittings

Danger of Demolition or Damage

Printed, Manuscript or Photographic Records

Reporter's name and address:- | Return to:-

Institution or Society:-

C.B.A. Industrial Archaeology Report Card.

K.A. Falconer, Survey Officer, University of Bath BA2 7AY.

As a group, all but HAER lack as an essential component illustrative material and this, along with lack of specific detail of a structure is the main distinction between the more sophisticated location surveys and the elementary basic surveys.

The value of location surveys must be judged in terms of the usefulness and comparability of the information which can be retrieved and this in a large measure is dependent on standardisation in the collection of data.

Both the Polish and HAER inventory systems have as their aim computerised retrieval of information.

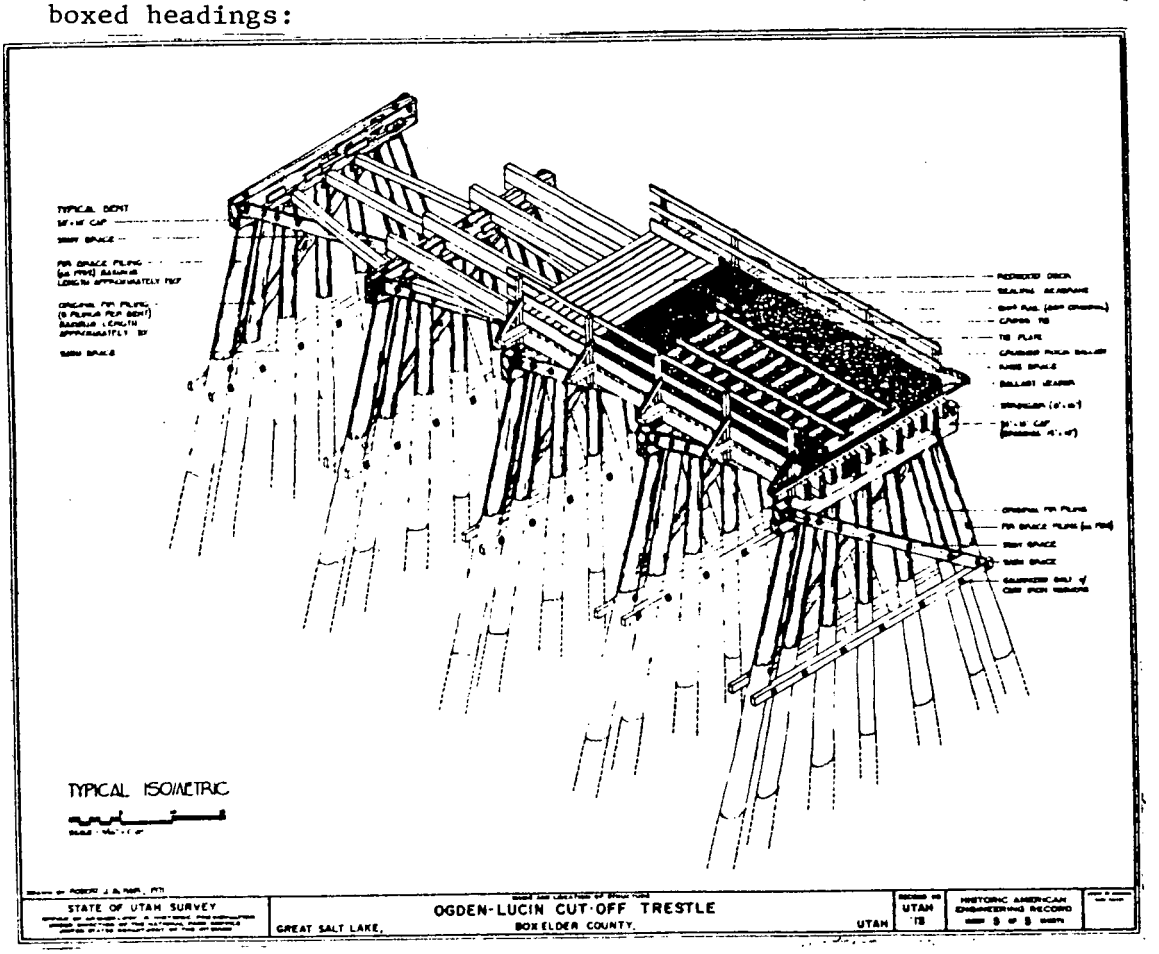
* Basic Surveys

These records must all contain as a minimum qualification illustrative material accompanied by written descriptions giving specific as well as background detail.

* Detailed Survey

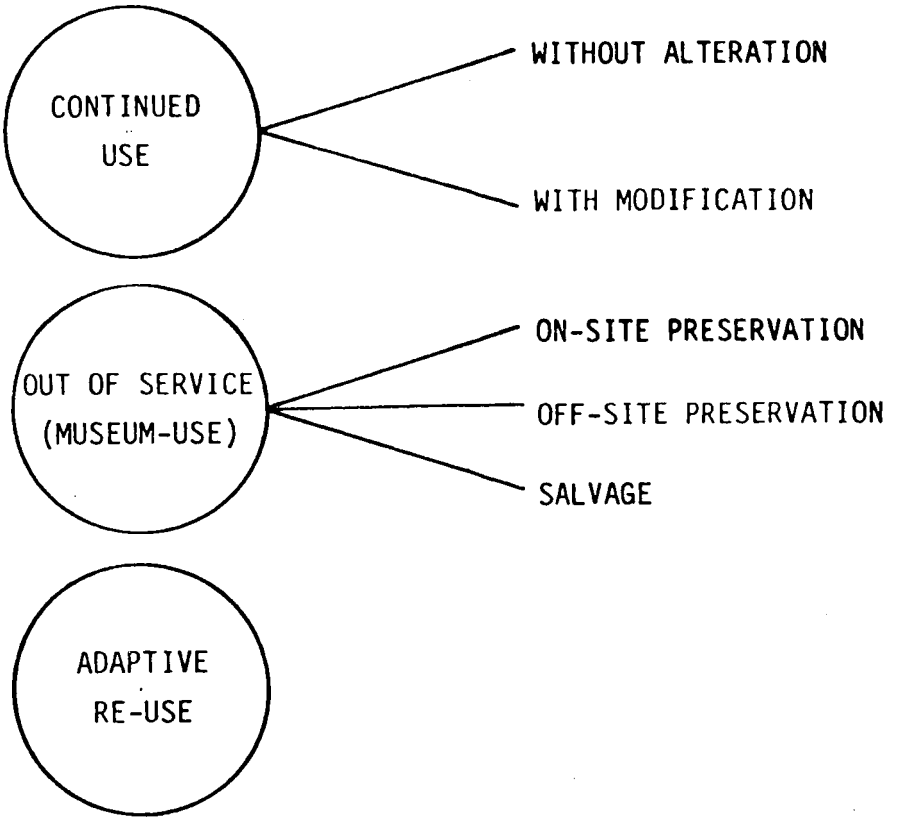
The distinguishing property of this category of survey is that it contains in some form measured dimensions sufficient for full analysis and subsequent measured drawings.

The following figure shows a measured drawing of the HAER-System, produced and filed on a standard 600 mm x 900 mm mylar sheet incorporating boxed headings:




## 4.7 METHODS USED FOR CONSERVATION AND CONVERSION

Methods for conservation and conversion of technical and industrial buildings have been characterised by Manfred Wehdorn (T.I.C.C.I.H. - conference 1975) and by Robert M. Vogel (T.I.C.C.I.H. - conference 1978) as follows:




The significance of these methods for the preservation of technical and industrial monuments is:

* Continued use:

  a. Without alteration:

     This may be regarded as the preservation ideal, always sought, rarely attained. The preservation of evidence of the structure (or process) itself, its method of use, and its relationship to its setting is total. There is, strictly speaking, no formal preservation here, and thus no assurance of continued life. Examples for this class conservation are masonry bridges of former centuries, sometimes railways, canal locks, warehouses, factories and mills; many of them still do useful work cheaply, eg some windmills in the Netherlands.

  b. With modification:

     This type of preservation is a far more common phenomenon than the former, the concept of "modification" usually having provided a degree of flexibility that has fitted an early structure or industrial process to the requirements of the present. Numerous early railroad and highway bridges in iron and concrete have survived in full modern service by having been inconspicuously reinforced not, generally, out of any conscious preservation impulse, but simply as an economy measure.

* Out of service (museum use):

There are two basic forms, ie:

a. On-Site preservation:

With the cessation of a site's original function comes an enormous reduction on its value as a historical document capable of explaining precisely how it operated.

Historically most industrial structures were built in specific localities for specific purposes which in large measure often depended upon that locality. Again the full understanding of an industrial site depends upon it being maintained within its locality. Objects and structures are symbols of their environment even when that environment changes. So far most of our important industrial structures, the only form of museum preservation which will not incur archaeological loss must be preservation on-site.

The principal obstacle to be overcome here, naturally, is the cost, represented by maintenance and the lost return from the land occupied. In view of this cost only the most significant sites and structures can justify such preservation as is planned at Neunkirchen in Germany - to mention one example only.

According to the fact of cost interesting attempts have been started at first in the north-east of Europe by creating so called "working museums", that means that production goes on in a suitable part of the old building. On the one hand this raises the value of information for the visitors and on the other hand some money is earned above all by producing souvenirs.

b. Off-Site preservation:

For a variety of obvious reasons it often is impossible to preserve in situ even an extraordinarily important structure. In these cases off-site preservation is a clear alternative when the physical and financial circumstances permit; moving it elsewhere to continue its life in a protected setting. In nearly every country represented here there are open-air museums, testifying to the practicality of this method and without doubt it will be necessary to create some more museums of this type is special cases.

c. Salvage:

At the bottom of the list of preservation alternatives is a desperation technique that can be resorted to when all else fails. It is surgical in nature and frequently is referred to as "salvage archaeology", whether involving work above or below the ground. The method involves the removal for preservation in a museum or elsewhere of a select group of key components of a doomed structure, eg sawing some typical "joints" from iron truss bridges during the course of their demolition.

* Adaptive re-use:

The adaptive re-use of buildings involves the conversion of an existing building into a new function. Without question during this process much of the original evidence of the building may be destroyed. But in spite of the application of modern building regulations, fire precautions and worker facilities the atmosphere and outward appearance of such structures can often be saved.

Especially factories, mills and railway stations have been converted into everything from apartment units, to arts and crafts studios, to shops, to professional and municipal offices, to museums, to schools and universities. Such projects have been undertaken at all levels of public and private ownership and with financing of every sort imaginable. Above all municipalities show a higher willingness to experiment with concepts of adaptive re-use. Without doubt the use of this method can be seen much more in the southern countries of Europe while in the north-eastern states there is almost no practice of adaptive re-use. In France for example there are specialists for this kind of work and the conversion of the Le Blan factory at Lille has become a model of its kind.

At this point it must be reported that the American preservation movement is beginning to recognise industrial buildings as emminently suitable for innovative adaptive re-uses. Witness to this is the fact that three of the 1981 Honor Awards presented by the National Trust for Historic Preservation went to industrial buildings.

The same thing will happen in Europe in the coming years, because most of the converted buildings are of extremely high interest for the general public and create a special "ambience": eg Covent Garden, London's fruit and vegetable market, has become a major tourist attraction, following its refurbishment as a covered area of shops and restaurant.

## 5. GENERAL CONCLUSIONS AND RECOMMENDATIONS

A short summary on the situation of the built technical and industrial heritage in the northern states of Europe can be given as follows:

5.01 Our whole environment is determined by
* technical and industrial buildings;
* technical and industrial sites;
* industrial landscapes

Above all in the north-east of Europe there are already a large number of industrial landscapes by law. In Czechoslovakia in 1881 the sum of "educational footpaths" through industrial landscapes was 44.

5.02 The importance of these buildings for our towns and landscapes has been accepted by every European state and secured by legal measures.

5.03 Industrial heritage is no longer a field of research and studies reserved exclusively for specialists but has now become an interest shared by large groups of people. A lot of small local Industrial Archaeology Societies have been set up and many local museum projects have been realised during recent years.

5.04 A new and interesting connection can be seen between tourism and industry.

5.05 In spite of the great public interest research has shown that the number of industrial monuments is still dropping rapidly in every country.

5.06 Active presentation is badly handicapped by the prevailing economic situation.

5.07 In many countries, a lack of central organisation is felt. So - in general - financing and management seem to be more serious problems than legal protection in itself.

This situation requires the following action and research programme:

5.08 It is not possible to protect all existing technical and industrial buildings even when they are of a relatively high value. The choice of buildings that are to be restored over the next few years has been devised in such a way as to ensure a well-balanced representation of the major branches of production.

5.09 On this account special attention must be given to the recording of the technical and industrial heritage. Perhaps the preparation of legislative machinery to record industrial monuments, as done in Great Britain, is necessary.

5.10 It is necessary to introduce industrial archaeology into all levels of education. Above all the establishment of chairs for this special field of science at the universities is highly recommended. In countries where this has already been done the universities have become one of the centre of co-ordination, recording and adaptive re-use work. They must also supply the training facilities for the required specialists.

5.11 The creation of new technical museums has become infinitely more difficult and may become impossible in the very near future. Due to this situation adaptive re-use must be - in spite of all the risks - one of the most attractive methods of preserving technical and industrial structures.

5.12 Most of the measures taken to restore industrial monuments can take the form of relief work projects for unemployed persons. This has already been done in Sweden and has thus served the dual purpose of providing employment and preserving cultural monuments of importance for our understanding of the past.

5.13 There is a need for international contact, above all the problems of recording and adaptive re-use must be discussed at an international level. An exchange of information is needed and an international bibliographical index on industrial archaeology has still not been provided. It must be recommended that the European Conference send a representative to the next T.I.C.C.I.H. - conference held in New England in June 1984.

5.14 A year for our "Industrial Heritage in Europe" proclaimed by the Council of Europe would be of great help to draw attention to and encourage the protection of our technical and industrial buildings.

# 6. LITERATURE

## 6.1 PERIODICALS, PUBLISHED IN THE NORTHERN STATES OF EUROPE

AUSTRIA:

No special periodicals. Articles about technical and industrial monuments have been published in:

* "Österreichische Zeitschrift für Kunst und Denkmalpflege", Wien 1947 ff.

BELGIUM:

* "Tijdschrift industrieel erfgoed" (Industrial Heritage Revue), published by the Flemish Association for Industrial Archaeology since 1983 (it succeeded the VVIA-Newsletter, published since 1978: the newsletter only reached the members of the association, the Revue wants to reach a broader public).

* "Tijdschrift voor Geschiedenis van Techniek en Industriele Cultuur" (Bulletin on the history of techniques and industrial culture). Newsletter of the Gent Museum of Industrial Archaeology and Textile, published since 1983.

DENMARK:

* "Industrialismens bygninger og boligner" (Industrial Buildings and Dwellings), 1975-1978, continued by:

* "Fabrik og Bolig", (Factory and Dwelling), issued by the Danish Association for the Conservation of the Industrial Heritage, 1979 ff.

* "Tijdschrift Industrieel Erfgoed", newsletter of the Flemish Association for Industrial Archaeology (Vlaamse Vereniging voor Industriele Archeologie, V.V.I.A.), 1978 ff.

GERMANY (G.F.R.):

No special periodicals. Articles about technical and industrial monuments have been published especially in:

* "Der Anschnitt. Zeitschrift für Kunst und Kultur im Mergbau", Bochum 1949 ff.

* "Kultur und Technik", München.

GREAT BRITAIN:

There are a range of journals covering industrial archaeology of which the most important are:

* "The Journal of Industrial Archaeology", Newton Abbot, Devon 1964-1974, 1977 ff.

* "Industrial Archaeology Review", Oxford 1976 ff.

Other journals concentrate more on aspects of technology, probably the most important being:

* "The Journal of the Newcomen Society"

* "The Journal of the Historical Metallurgy Society"

There are also a series of bulletins such as printed by the Association for Industrial Archaeology which presents shorter notices which are of interest.

IRELAND:

None.

ICELAND:

None.

LIECHTENSTEIN:

None.

LUXEMBOURG:

None.

THE NETHERLANDS:

* "Tijdschrift Industriële Archeologie", 1981/82 ff.

* "Bulletin and Nieuwsbrief (Newsletter) voor de vrienden van de Stiching tot behoud van Monumenten van Bedrijf en Techniek in het Zuiden van Nederland".

NORWAY:

None.

SWEDEN:

There are no periodicals exclusively dealing with the industrial heritage. A journal dealing with the history of science and technology was recently started:

* "Polhem. Tidskrift för teknikhistoria", first published 1983.

The yearbook of Central Museum of Science and Technology is quite often concerned with the Industrial Heritage too:

* "Daedalus. Tekniska museet arsbok", 1930 ff.

SWITZERLAND:

* "Industriearchäologie. Zeitschrift für Technikgeschichte", Brugg 1977 ff.

6.2 PUBLICATIONS, EDITED BY T.I.C.C.I.H.

T.I.C.C.I.H. - Conference 1973: Ironbridge Gorge Museum Trust (ed.), Transactions of the First International Congress on the Conservation of Industrial Monuments, Ironbridge 29 May - 5 June 1973, Ironbridge 1975.

T.I.C.C.I.H. - Conference 1975: Deutsches Bergbau-Museum Bochum (ed.), S.I.C.C.I.M. II. International Congress on the Conservation of Industrial Monuments. 3. - 9.9.1975 Transactions, Bochum 1978.

T.I.C.C.I.H. - Conference 1978: Nisser M. (ed.), The Industrial Heritage. The Third International Conference on the Conservation of Industrial Monuments. Sweden 30 May - 5 June 1978. Transactions 1: National Reports, Transactions 3: Working Groups, Stockholm 1978 and 1981.

T.I.C.C.I.H. -: CILAC (ed.) 4° Conference Internationale pour l'étude et la mise en valeur du patrimoine industriel, Vol. 1: Rapportsnatianaux 1978-1981, Paris 1981.

6.3 OTHER PUBLICATIONS

Literature about industrial archaeology is abundant today. A good survey can be given by recent computer literature information services.

In drawing up this report the following publications have been used:

Buchanan R.A., Industiral Archaeology in Britain, London 1972.

Bofill R., La Cimenterie San Justo Desvern, Barcelone, in: L'architecture d'aujourd'hui, 213/February, Paris 1981, p. 18-21.

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Sande Th.A., Industrial Archaeology. A New Look at the American Heritage, New York 1978.

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