The reactivation of a historic shaft-building

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Abstract

In the past, building care of monuments, in the Ruhr-district, was in the first place limited to representative buildings and a few residential houses. In the last few years current opinion has changed on this point. The people also recognise that the industrial evolution represents an essential part of their history, which is worth documenting. The inclusion of the coal mine Zollverein in UNESCO's world heritage list is an important milestone in this development. The repair of industrial memorials requires several treatments. Special aspects, which do not encounter the monument conservator during the classical repair tasks, are to be considered. Constructed for the economical use, the significance of industrial buildings, exceeding the utility value, is not always recognisable from the beginning. During their utilisation time the handling of such buildings is correspondingly committed from that. Because of the specialised construction of such buildings, the usability is often very strongly restricted. The acceptance of industrial buildings is rising, but it is still difficult to find a new occupant. The appearance of the buildings after their closure discourages many possible users. Sometimes the beauty and the historical importance of an industrial building are not recognised until it is completely restored. As an example, some typical difficulties are shown, and solutions are pointed out, for the tower upon the former shaft of Prosper 2 in Bottrop. In addition to the questions of contamination and overload, the balance between the demand of the user and the technical realities has to be found. The preservation of the building structure and simultaneous adaptation of the building to the needs of the occupant is the overriding intention of the works.
1. Why preserve industrial buildings?

Our cultural landscape is characterised not only by generally recognised historical monuments like churches, monasteries and castles, but also by industrial buildings. They are a witness to the industrial past and the economic development of their region [1]. This aspect is often not considered and the merits of preserving the buildings in terms of their historical, artistic and cultural significance recognised too late.

The first thing people associate with the sight of industrial installations is grime and hard work. People burdened with this negative image are difficult to convince of the merits of preserving industrial buildings. The idea of categorising industrial buildings as worth preserving beyond their operational life had caused extreme disconcertment among the population only a few years ago. Anything other than demolition would have been inconceivable back then. So everything associated with this unpleasant time was removed without further ado. With the gradual disappearance of the industrial installations, however, the identity of the region was also being lost. The identity-giving significance of these indispensable memorial sites began to be recognised more and more.

Optically upgraded, e.g. through artistic light installations, industrial monuments are being rediscovered by the population in many regions. Through the development of new perspectives, installations that were facing imminent demolition only a few years ago are suddenly considered worthy of preservation.

Figure 1: Malakoff tower above former coal mine Prosper 2 in Bottrop
2. Development of the preservation of industrial monuments

The importance of industrial installations is being recognised increasingly and is becoming ever more broadly accepted among the population. Numerous organisations are fighting for the preservation of the signs of industrial development. In the Ruhr area, one result of these efforts has been the creation of the Industrial Culture Route. The history of technology can be followed on tourist routes throughout the Ruhr area. An expansion of such routes on a European level is under discussion. A network already links industrial monuments in the Saarland with those in Lothringen. In Catalonia, too, there is a so-called "Industrial Heritage Route".

As a further milestone in this development, the Zollverein mine in Essen has been included in the UNESCO list of World Heritage Sites by the World Heritage Committee in Helsinki.

3. The industrial monument Malakoff tower at Prosper 2

The following is intended to explain the particular challenges of restoring industrial monuments and illustrate this using the example of the Malakoff tower above the former Prosper 2 pit in Bottrop/Germany.

This building was erected in 1873 as a brick-built shaft tower above the Prosper 2 coal shaft [2]. As the shaft depth increased, the existing structure was repeatedly modified. Thus in 1896 a steel headframe was placed on top of the tower, which, however, was replaced again in 1934 by a freestanding steel headframe [3]. The pit was used up until 1987. Today it is only used for measuring water levels and has been filled completely. The Malakoff tower is classified as a historical monument. It is the only Malakoff tower still preserved in the Ruhr area in which the subsequently added winding gear is still preserved.

Figure 2: South facade

4. Utilisation concepts

In order to work out a sustainable preservation concept for historical monuments, it is extremely important to find a suitable user. This is particularly difficult where industrial buildings are concerned. Whereas hall structures are relatively
easy to convert, new uses are difficult to find for special constructions that are optimised for a specific operational process. A lack of physical building attributes such as sound and heat insulation necessitates additional conversion measures. Even the preservation of the structure of buildings and their industrial character is often difficult to implement. However, at least with listed buildings, this preservation should be regarded as a minimum requirement.

The tower structure of the Malakoff tower severely restricted the utilisation possibilities. The small floor area inside the building limits the potential spectrum of uses. The use therefore had to exploit the vertical space. This gave rise to the concept of a cultural and training centre on the subject of migration. Particular value was placed on the preservation of the existing building structure. It was possible, to a very large extent, to incorporate existing installations in the utilisation concept. Small meetings are possible on the ground floor, which has been extended by a gallery. Above this, there are the training rooms. The upper areas of the tower can be developed in further phases of the project.

5. Pollution

Due to their industrial use, the buildings are often contaminated with harmful substances. Hazardous substances, which were required for the production process, contaminate the surfaces. In order to prevent damage to health, it is therefore always imperative to carry out an investigation into such hazardous substances first and, possibly, an appropriate specialist clean-up before restoration work begins. The analysis of the building surfaces of the Malakoff tower only revealed that it was covered in a layer of coal dust. Chemicals were not used in the extraction process. Due to the mining of coal, however, another problem presents itself in our case. There are always high concentrations of combustible methane gas inside coal mines. If allowed to accumulate, methane can lead to dangerous gas explosions. It has been shown that the methane concentration can rise unexpectedly, sometimes only years later, particularly in old pits. In order to prevent any risk to future users of the tower, a gas drainage system has been installed as a precaution. This drains any methane that may occur harmlessly from the building.

Figure 3: Gas drainage system
6. Loads

In addition to the usual loads on buildings such as wind, snow, dead and live load, industrial installations are heavily impacted by mechanical loads. During work the installations are objects of use first and foremost, loads up to and beyond the load limit are not uncommon.

The original loads which resulted from the use of the tower and for which it was constructed, no longer exist today. Nevertheless some structural measures were necessary. Through overloading, the Malakoff tower has moved off plumb by 80cm over its total height of 32m. In addition, numerous cracks have appeared over the years of use. In order to make it stable again, it was necessary to strengthen the tower’s corner structures by means of a bracing technique [4] [5].

7. Maintenance and upkeep

Maintenance measures on industrial buildings are not always carried out to the same aesthetic standards as with institutional buildings. Here the functional and economic aspects of the measure are often paramount.

The filling in of window openings with concrete seals and brickwork repairs with lime sand brick are only two examples of this practice. The value of the buildings over and above their pure utility value is only seldom recognised during the operational life of industrial buildings. Maintenance work is then neglected, particularly in the final phase of use. Since maintenance work did not seem appropriate towards the end of the operational period, the Malakoff tower was left in a state of necessity to be repaired.
After the demolition of non-listed adjacent buildings, large openings were left which gave the weather, flora and fauna unhindered access to the inside of the tower. For this reason, it was necessary to disinfect the building and remove animal carcasses first before the actual restoration work began.

The redevelopment planning of a building does not end with the dismantling of the site facilities. The financial plan should already make provisions, in the form of funds, for maintenance and operation after restoration. In the case of the Malakoff tower, the first three years of operation are already covered in the financial plan.

Figure 6: Opening in north facade

8. Conclusion

Industrial monuments are indispensable identity-giving witnesses to the historical, social and economic development of their region. Some of the problems associated with preservation and restoration are different from those associated with the redevelopment of institutional buildings. For the specialist engineer this means new challenges in a hitherto somewhat neglected area of the preservation of monuments.
References
