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MODIFICATION OF A LISTED PIT HEAD INTO A VIEWING PLATFORM

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ABSTRACT

Headframes are the far out visible landmarks of current and former mines. They dominate the landscape and give witness to the industrial development of a region.
The head frames are special constructions for which a new use, apart from preservation as a symbolic landmark, is hard to find. The strong point of the head frames is on the one hand its historical significance and attraction and on the other hand their size and visibility. For this reason, they are ideal as viewing platforms. But head frames in their original condition are not suitable to take groups of visitors. Access is generally provided only for trained staff to perform maintenance.
Among the headgears of the Ruhr area, the construction above the former shaft Prosper II is unique. More than 100 years of winding technique is summarized from the Malakoff stone construction to the steal headgear. The tower and adjacent washrooms are today protected and separated from the plant. Even if the construction is historically important it is still standing inside of an active plant. This fact lead on to the decision, that an overhaul of the framework should be used to modify the construction into a viewing platform, so that people can safely stand inside of an active mining plant.
This paper outlines the way a head gear can be modulated for the needs of a viewing platform. It takes into account the demands of the historic preservation and the security the construction needs to be accessible for groups of visitors.

Keywords: *Industrial heritage, Re-use*

1. INTRODUCTION

1.1. Prehistory

By the middle of the 19th Century, today´s city of Bottrop was just a farming village with 3,500 inhabitants. During the time of industrialization, coal was needed and below Bottrop there was plenty of it. The Duke of Arenberg Prosper Louis as the owner of mineral rights joins together with well-known industrialist and founded the Arenberg'sche Actiengesellschaft. In August 1865, the sinking of Bottrops first shaft Prosper I has been finished [1]. But the mine cannot satisfy the urgent demand of coal. In 1871 a second plant, called Prosper II, has been built in Bottrop Batenbrock, which has remained in operation. The shaft is equipped with a stone tower, a so called Malakofftower. After 40 years of mining Bottrop has 25,000 inhabitants and the staff of the mining company increased to 5,700 persons. In 1880 the tower receives a steel structure for the operating reserve in order to increase efficiency. At the mid-1930s, the tower structure cannot carry the economically needed loads anymore. A new freestanding steel construction has been build up to decouple the extraction loads from the wall construction. From now on the Malakoff tower is used only as a protective building to keep wind and rain away. In the late 1950s, the structure is enlarged by a second cable sheave platform. In 1986, a 3.6 km long, inclined by 21%, belt conveyor went into operation. It transports raw coal to the complex of Prosper II. After 111 years of mining the shaft of Prosper II no longer needed and in 1987 it was durably filled [2]. One year later, the pit of Prosper II was picked up into the monument list as the only still-preserved Malakofftower with a supplemented framework of the Ruhr district.

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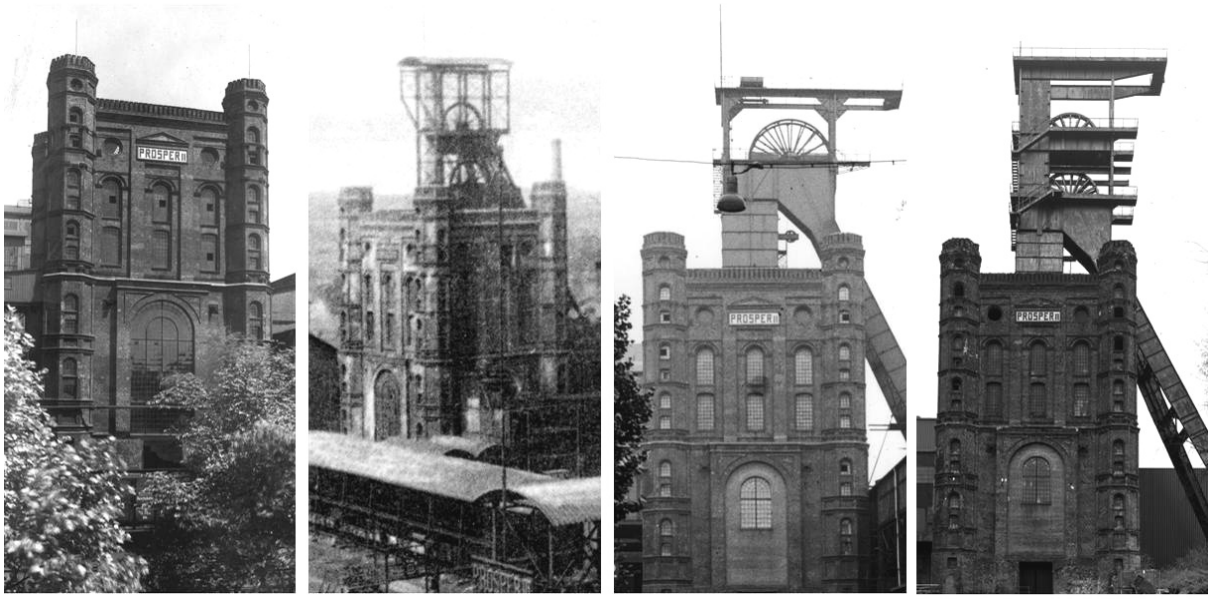

Fig. 1 Development of shaft building Prosper II 1875, 1896, 1934 and 1958 [compare 5]

1.2. Former rehabilitation work and re-use

With the implementing of the conveyor belt demolition and renovation of the ground facilities was associated. Only the bathhouse and the support structures of the shaft remained. The elimination of the adjacent buildings affected the adverse consequence that the interior was exposed and weather, flora and fauna ruins the inner constructions. To ensure the preservation of this important building a new use was required. In this way, an ongoing maintenance of the used buildings will be secured.

With the financial help of IBA-landscaped park the German Mining Museum Bochum implemented in cooperation with the architect Thomas Ritter and the support of the city of Bottrop, the new users and the owner, a new use as a venue center for migration history. The concept of the new use particularly focuses onto the preservation of the remaining structures and historical work traces. The overriding objective was to secure safety and stability of the building and keep the former function visible. The use has been carefully placed into existing structures. Required toilet facilities have been placed outside the building. These constructions are planed reversible so it can easily be removed if the requirements are changing. The new use was initially limited to the lower section of the building [3, 4]. After the reactivation the building became more attractive and the user expanded by building a small archive. Furthermore a climbing club converted the inner upper wall sections into a training course.

1.3. Assignment

The special attraction of the shaft tower in the pit of Prosper II is among other things, the immediate vicinity of active mining. Work processes can live be experienced at the cable sheave platforms. Furthermore a lot of visitors request to see the view from the top of the construction. Unfortunately, the upper section of the building is not yet accessible for the public.

The repair of the tower at the millennium did not include the upgrading of the steel tower. Here, only a color coating could be applied. Parts of the stairs are in disrepair and need replacing. Furthermore the user intends a better resistance to rain and air exchange. The huge number of joints, which were harmless for the use as an industrial plant, limits the utility as a venue center in the case of some bad weather events.

For these reasons, a change of use of first sheave platform into an observation point is aimed. The existing structure is not designed for groups of visitors. It sought a solution that meets the requirements for safety and takes into account the issues of historic preservation.

2. CONDITION

2.1. Location

The building is surrounded by an active mining plant. Coal from the northern fields is transported via conveyor belts and comes to light here. It is washed and mixed before being loaded and transported to

the coke plant. On the nearby pithead stocks, a company has settled which offers numerous sporting and leisure opportunities. At the top of the tip stands the far away visible landmark tetrahedron.

2.2. Stairs

At least since the abandonment of the shaft in 1987 there was no repair work taken at the headframe anymore. With the paint in 2003, loose metal parts have been taken away. The fully-walled struts framework was designed for large loads and is also funding for a capacity reduction due partly damaged sections are sufficiently stable. This does not apply to the over 75-year-old staircase from the roof of the Malakoff tower to the 1st sheave platform. Three quarters of a century, wind and rain have left their mark. The stairs cannot be prepared safe and must be replaced. In the regard of preservation this stairs have no special characteristics.

Fig. 2 The shaft tower is standing inside an active mining plant, stairs are destroyed beyond repair

2.3. Interior

For the new use the building required a ventilation and smoke extraction system which was installed on the original level close to the roof. This reduced the free accessible areas in this section. Indoors, the user installed an archive on the intermediate level. Later on climbing walls has been erected at the upper walls. Because of the possible flue gas development in the case of a fire a separate escape route for visitors must be installed from the observation deck.

Fig. 3 Access to the roof is limited by the ventilation system

Fig. 4 Cable sheave platform in original state

2.4. Cable sheave plattform

The pulley level is designed for high loads and in a relatively good condition. The weldability of the used steel has not been examined. Only bolted connections have been chosen.

3. REQUIREMENTS

The requirements for an accessible to the public headframe differ significantly from the requirements of an unused industrial building.

3.1. Safety

For publicly accessible buildings are high demands on safety. This applies both safety against fall from heights and fire safety. A second escape route must be provided for the visitors. If, in the case of a fire, one route is blocked the second escape route can be used. Rescue scenarios with abseiling from the headframe at 60m height recommended by fire safety experts, were rejected by the building owners, planers and firemen.

3.2. Monument care

The special significance of this industrial monument is explained by the composition of the remaining Malakoff tower with the addition of a pithead, because it is the only one where this combination is preserved. For the cultural significance the masonry tower and the steel construction scaffolding are equally important. For the reason of monument care the outer optical impression of this combination should not be changed more than necessary.
The monument care is anxious to communicate the history and characteristics of the monuments to the public. Understanding and support for the preservation efforts can be enhanced by the experience of an open and active building. The aim of monument care must therefore be the ongoing use of the tower and expansion to the still uncultivated parts of the plant.

3.3. Maintenance

To assure maintenance and care, the accessibility of all areas must be guaranteed. For this use by individual persons a stairway, like it already exists, with a width of only 60 cm is sufficient. Unfortunately this stairway is irreparably damaged and must be replaced.

4. CONVERSION CONCEPT

4.1. Pathway

The selection of the path to the observation platform opens up new areas of the monument to the public. The historical fire escape routes are returned to their original function. This route is a spiral staircase made of sandstone and red-brick. From the stairs of the lower pit head the visitor passes through this polygonal south-western corner tower to the roof from where he will get onto the outer pithead staircase. The shaft Tower of Prosper II will be the first Malakofftower with an accessible historical turret.

Fig. 5 Reactivated fire escape stairway

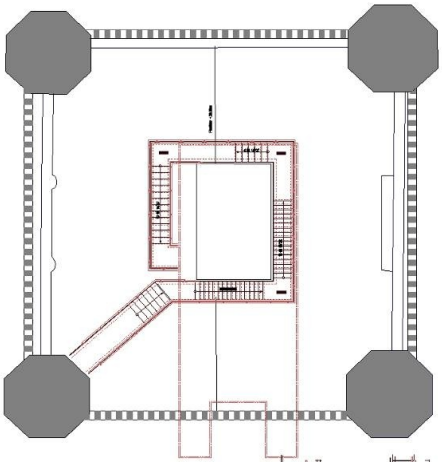

Fig. 6 Groundplan roof

With the current width of the stairway of 60 cm the original stairs cannot be retained if they should be used by visiting groups. The building regulations prescribe a minimum width of one meter in order to allow two-way traffic. This would, however, led to a sharp change in the appearance. As a compromise between conservation interests and building regulation both could agree on a stairway width of 80 cm. The less secure due to the reduced width is compensated by the fact that only small guided groups commit the pulley stage. This is also indicated with regard for the use of a rescue platform.
Apart from the structural condition of the staircase and the structure is designed for individual technicians. Depending to the new use an exchange is required by a stronger construction anyway. Although the staircase was designed too steep for a public offense the historic staircase curve, is obtained in order to preserve the overall appearance.
The new stairs use the original brackets. The consoles are reengineered but keep their original position and shape despite the length of the cantilever.

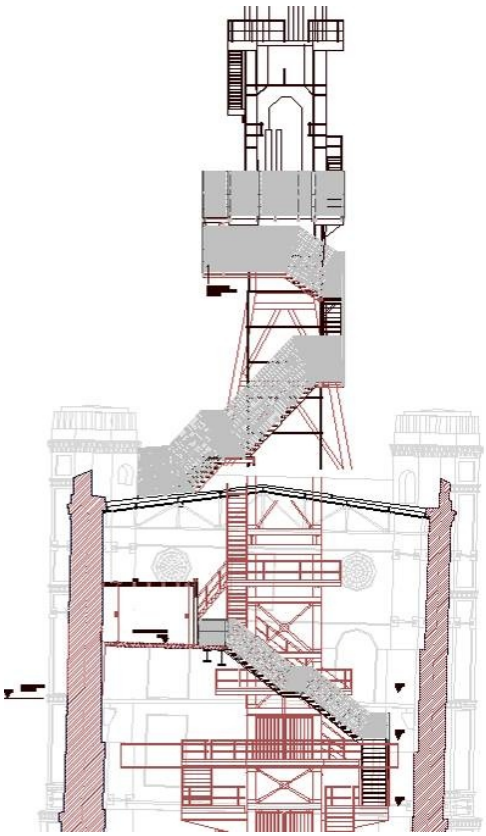

Fig. 7 Path to opservation plattform

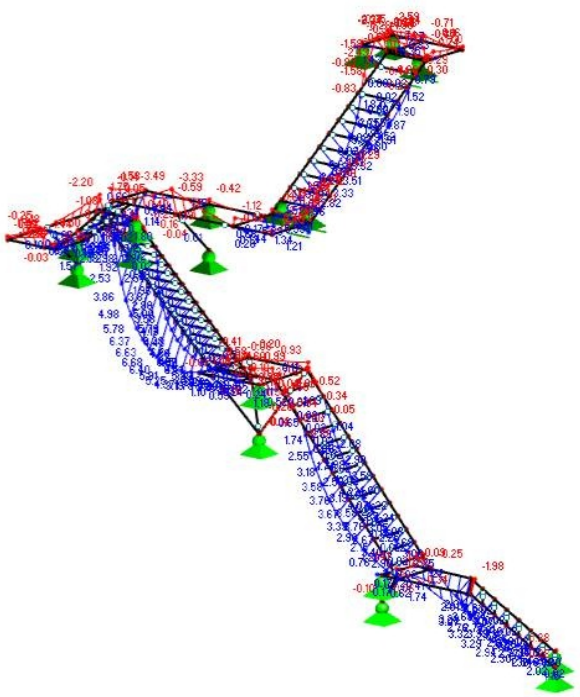

Fig. 8 Structure and bending moment of stairsystem

4.2. Railing

To satisfy the demands of monument care the railings should be made as transparent as possible. This makes them appear less apparent. For the fall protection zinc-coated metal fencing were chosen. The mesh size and an excess length of the bars at the upper edge block the climbing over.

4.3. Escape route

In addition to the common path a supplementary rescue route will be established for groups of visitors. The path goes along from the headframe via the fire-safe areas of the polygonal corner tower down to a rescue platform which can be reached by the fire and rescue service . To host groups of visitors safely until to the arrival of the fire brigade, an additional fire-safe room is created on the platform at 22 m height.

5. CONCLUSIONS

The conversion of shaft towers poses a particular challenge. Adaptations of historical substance is essential to enable safe use. In every single case it has to be examined how far modifications can be accepted. How much historic preservation is necessary and how much variations of the safety

restrictions can be taken by the responsible persons. In some cases a supposed lack of safety at one point can be compensated by appropriate counter-measures at another point.

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REFERENCES

[1] Vorstand Deutsche Steinkohle AG (ed) (2006) *150 Jahre Bergbau in Bottrop*, Mühlheim.
[2] Huske J. (2006) *Die Steinkohlenzechen im Ruhrrevier*, Bochum, 797-800.
[3] Niederhagemann, Stefan (2003) the reactivation of a historic shaft building. In Brebbia C.A.(ed) *Heritage Architecture VIII*, Wessex Institute of Technology, 771-777, Ashurst Southhampton.
[4] Niederhagemann, Stefan (2004) Die Reaktivierung des Malakoffturmes Prosper 2 in Bottrop. *Der Anschnitt, 5-6*, Bochum.
[5] Historische Gesellschaft Bottrop (1996) *Ein Turm mit Vergangenheit und Zukunft*, Bottrop.

PICTURE CREDITS

Fig. 1: Historische Gesellschaft Bottrop, Deutsches Bergbau-Museum Bochum, Jürgen Heckes
Fig. 2: Thomas Ritter
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