

Industrial roof portfolio

Tailored revitalisation ensures normal operations

Successful roof facility management – Georgsmarienhütte example

Industrial flat roofs are exposed to very great stresses during their life cycle due to the climatic conditions (high temperatures, extreme rainfall, strong winds) and structurally-related heavy usage or stressing of the surfaces. Machinery worth millions and/or sensitive production areas are often located under the roof. Continuous roof facility management helps enhance the long-term durability and safety of industrial flat roofs. After all, timely measures not only protect the expensive equipment but also effectively reduce the cost of roof maintenance. The example of the Georgsmarienhütte GmbH steelworks shows that solid preliminary work and the close networking of all involved in a project can even facilitate the revitalisation of roof surfaces during normal operations.

The Georgsmarienhütte steelworks has been located in the town of the same name south of Osnabrück for more than 150 years. Georgsmarienhütte GmbH (GMH) is one of Europe's leading suppliers of bar steel, semi-finished steel and bright steel. The steel-melting facilities are operated 7 days a week, 24 hours a day. Parts of the industrial flat roofs on these facilities were erected in the fifties. An inspection of the roof surfaces uncovered waterproofing problems and static defects in the perforated brick cover supporting shell. It seemed that extensive renovation work would be needed on the roof surfaces to secure operations. However, stopping production while this took place was out of the question. Therefore, GMH called in the roof specialists from VEDAG GmbH, Bamberg.

Flat roof analysis uncovered an urgent need

The state of the flat roofs was first comprehensively analysed before the renovation work began at Georgsmarienhütte. This gave the ex-



perts from VEDAG several things to think about. The analysis showed highly varying layer depths across the 12000m² roof surface, for example, while the waterproofing was also heavily encrusted with dirt in some cases. In addition to this, water penetration damage was found in many areas and had already affected the supporting shell. The two old layers, with bitumen adhesion, were also bonded very strongly together and to the roof. The results of the analysis were unequivocal - mechanical removal of the old roof would require a great deal of work if the framework was not to be destroyed.

Homogenous combination of old surfaces and new waterproofing

Following in-depth laboratory investigations of the old roof, the flat roof specialists at VEDAG recommended applying two new layers to the old ones. This would revitalise the roof and remedy its defects. However, first they had to find out which material would bind best to the old waterproofing on the roof.

VEDAG laid small test roof surfaces with different membranes for this. These were intensively tested on site and in the laboratory. One challenge lay in finding a material which could be best welded to achieve a homogeneous, full bonding of the first waterproofing layer to the old

cleaned waterproofing layer. Therefore, tests were performed with differently modified sheeting from the area of waterproof polymer sheeting. Ultimately, an elastomeric bitumen waterproof sheeting (VEDAFLEX G4E) achieved the best on-site results. VEDAG and GMH included a roofing contractor in the planning at this early stage also - local company Salzer & Piepmeyer was asked to assess how the material could be processed with reference to the joints, connection points and roof structures. Further laboratory tests, which also included the simulated, accelerated ageing of the sheeting, confirmed that the right material had been chosen. "However, it was crucial for us that VEDAG was prepared on the basis of the laboratory results to grant a 15-year guarantee for the new waterproofing", emphasised Karsten Jung, planner and engineer at GMH.

Ongoing production placed high demands on planning and implementation

Ensuring production would continue as normal was the top priority when planning the renovation measures. A concept for the construction processes that was based on production requirements and adjusted to the various protected areas in the plant was created to accommodate this. The covering of the old roof structures needed extensive renovation. The work which could not be performed during normal production for occupational safety reasons had to be carried out in the short periods of production standstill. Extensive interior safety measures presented another challenge to the planning and project team. "We had to apply a degree of spontaneity and creativity to dismantle the interior. We initially thought this wouldn't be possible", said Thomas Pfeiffer, Product Service Manager at VEDAG. The complete revitalisation took place over several partial sections from autumn 2009 to autumn 2010.

Extensive preliminary planning ensured smooth execution

Roofing contractor Salzer & Piepmeyer laid an initial 1000m² test surface in autumn 2009. After a favourable wait time over the long and cold

winter of 2009/2010, the first section was finally tackled in summer 2010. The entire roof surface first had to be cleared of heavy encrustations using a special high-pressure cleaner. The experts replaced particularly badly damaged perforated brick cover sections with trapezoidal steel plates. A special solution (Emaillit BV schnell) characterised by its quick drying time and improved dust binding quality was used as the primer.

Unlike waterproofing for a new building, the homogenous, all-over compound welding in roof renovations necessitates special burner control. The specialists in VEDAG application technology helped support the roofing contractor on site with this. The second top sheeting was only applied once the first waterproofing layer had been completely welded to the existing material. A special polymeric bituminous waterproof sheeting (VEDATOP DUO (t3) dolomite grey) which ensures particularly high-grade water-proofing both in relation to increased fire protection in accordance with DIN V ENV 1187 and long-term coating behaviour was used for this.

Marking the maintenance paths

The maintenance paths to the individually built systems and between the individual roof surfaces were precisely marked to complete the revitalisation measures. A special red path for walking (VEDAWALK) designed to be particularly robust was used for this. Paths for walking are not only a generally useful addition to fall prevention measures but act as extra protection to the roof waterproofing also.

Roof facility management ensures a cost-efficient revitalisation

Thanks to the close and timely cooperation of all companies involved in the project (planners, users, manufacturer and roofing contractor), the "large-scale Georgsmarienhütte project" was implemented successfully, without hitch and during normal operations. "Having to perform the preparatory work and coordinate all involved in the short periods of production standstills presented a particular logistical challenge", explained Karsten Jung from GMH.

It is clear that continuous roof facility management should be established for large industrial roof surfaces in particular. “The increasing number of roof collapses in recent winters due to heavy snowfall alone has proven that a simply reactive policy on the part of the operator can have devastating consequences”, stated Thomas Pfeiffer. The constant inspection and assessment of industrial flat roofs is not only a safety measure but also something that could potentially save the operator a lot of money. Complete renovations can often be avoided if action is taken at the right time. Revitalising measures can then achieve outstanding results in terms of roof surface durability.

The Georgsmarienhütte example shows that such large-scale projects can only be successfully implemented when both the bearing capacity and condition of the layers of the individual roof areas are analysed precisely and evaluated in advance. Specialists such as VEDAG GmbH offer professional on-site support for this.. “Industrial companies should always consider that good roof facility management is an important factor in the smooth operation of their systems”, explained Pfeiffer. “Only a stable, leakproof roof guarantees uninterrupted production and the safety of persons working in the building.”



The heavily encrusted old roof had to be intensively cleaned beforehand.

Source: VEDAG GmbH



*The poor condition of the roof of the Georgsmarienhütte before the revitalisation. **Source:** VEDAG GmbH*



*The first layer (VEDAFLEX G4E) is applied to the prepared surface. **Source:** VEDAG GmbH*



*The VEDATOP DUO dolomite grey Broof(t3) top layer is welded on during normal production in the steelworks. **Source:** VEDAG GmbH*



*Endurance test passed: the test roof surface after six months. **Source:** VEDAG GmbH*



*Steel production continued under the roof while the complex revitalisation work was ongoing. **Source:** Georgsmarienhütte GmbH*