

Sika at Work



Turów Power Plant, Poland

Major Concrete Refurbishment Programmes and Durability Assessments

Concrete Repair: **Sika® MonoTop® System,**
Sikacrete® PP1 TU

Protective Coatup: **Sikagard®- 700 S, Sikagard®- 680 S,**
Sikagard®-550 W Elastic,
Sika® Icosit Poxicolor, Sika® Icosit 2406,
SikaCor® EG 5





Turów Power Plant: Poland

Situated in what was previously known as the "Black Triangle", due to the heavily polluted environment, and close to the borders of Poland with the Czech Republic and Germany, the Turów Power Plant is now the primary energy producer in the region. In the early 1990's, there was 14'000 MW of power generating capacity from 10 plants within a 50 km radius of Turów. Following the numerous environmental improvements undertaken throughout this region in recent years, the area would now better be called the "Green Triangle". The Turów Power plant itself has won many ecological awards – In 2002, the plant received the Polish Ecology Leadership Prize in recognition of its environmental achievements. In 2004 it was awarded Poland's prestigious "White Tiger Laurels" for technical achievement with its ecological retrofit.

Project Problems and Challenges

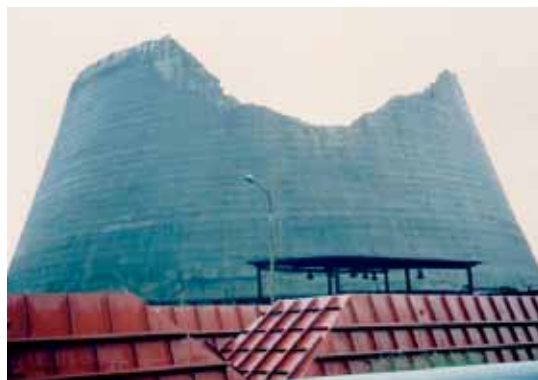
In 1988, one of the 9 large cooling towers in this power plant has collapsed due to serious deterioration of the reinforced concrete structure. This catastrophe has triggered a full survey of all such structures in Poland. It was found that several other cooling towers were also in a seriously deteriorated condition and therefore in need of immediate repair.

At the Turów plant itself, out of the remaining 8 towers, cooling tower #2 – was found to be so structurally at risk, that it had to be shut down and repaired immediately.

At this time, there were no specialist contractors, specialist access equipment or established repair systems for cooling towers in Poland; therefore experienced contractors and well proven access and repair systems from Germany were selected and brought in to carry out this first project.

Then throughout 1990's, in a planned programme of works, all of the remaining cooling towers and associated chimneys at the Turów plant were refurbished, initially by the same German contractors, who hired and supervised Polish sub-contractors so that they were able to take over and continue the projects.

The **Sika® MonoTop** repair system that was selected for the first cooling tower repair project has proved so efficient that the same technology has remained for the refurbishment of all of the towers and chimneys in the plant. Most of refurbishment works was on the end carried out by this local specialised contractor Savex, which is now due to the experienced gained in this plant perceived as respective, reliable contractor, operating in various countries, specializing in construction and refurbishment of high engineering structures.



Sika Repair System Solutions

Chimneys	Cooling Towers
Internal refurbishment:	Internal refurbishment:
Patch repairs of concrete shell using the Sika® MonoTop® system	Patch repairs using the Sika® MonoTop® system
	Dry sprayed repairs using shotcrete improved with the modified, silica fume containing additive Sikacrete® PP1 TU
	Internal protection with Sika® Icosit® 2406 specialized epoxy coating system (Icosit® 2406 Primer, Icosit® 2406 Deck I, Icosit® 2406S Deck II)
External refurbishment:	External refurbishment:
Patch repairs using the Sika® MonoTop® system	Patch repairs using the Sika® MonoTop® system
Zone 1 and 2: Sika® Icosit Poxicolor and SikaCor® EG 5	Dry sprayed repairs using shotcrete improved with the modified, silica fume containing additive Sikacrete® PP1 TU
Zone 3: Sikagard®-700 S hydrophobic impregnation primer, then protective coating Sikagard®-680 S or elastic Sikagard®-550 W Elastic	Sikagard®-700 S hydrophobic impregnation primer, then protective coating Sikagard®-680 S or elastic Sikagard®-550 W Elastic

Assessment of the Concrete Repair and Protection Systems

During the past 20 years of concrete refurbishment works in the Turów plant, more than 240'000 m² of reinforced concrete surfaces have now been successfully refurbished.

In 2007, an investigation was carried out by the Building Research Institute of Poland (Independent State body, approved and certified according to all respective EU regulations) to assess the efficiency and durability of the concrete repair and protection systems used in the plant.

This survey confirmed the excellent performance of the products used and the professional standard of their application. Following in-situ inspections and tests, an extended technical approval for Sika refurbishment systems was granted for construction and reconstruction of cooling towers and chimneys in Poland.

In 2008, Sika commissioned the same technical Institute, to conduct an in-depth investigation into the behaviour of the protective coatings applied as components of the repair systems on these cooling towers, both internally and externally.

Cores were taken from the reinforced concrete shell of two different cooling towers and pull off tests were made internally and externally, on one of the towers that was shut down for equipment maintenance. These cores were sent to the Institute for testing in accordance with the latest European EN 1504 standards, and also in comparison with new samples of the same freshly applied materials.

For the internal coatings (**Sika® Icosit®-2406** system), the tests conducted were adhesion (EN 1542) and water permeability (EN 1062-3).

For the external coatings (**Sikagard®-700 S** and **Sikagard®-680 S**), the tests conducted were adhesion (EN 1542), water permeability (EN 1062-3), water vapour permeability (EN ISO 7783-2) and carbon dioxide permeability (EN 1062-6).





Concrete Coring in action



Concrete Core already taken

In its overall conclusions, the Polish Building Research Institute stated that:

"the technical performance properties of Icosit 2406 and Sikagard®-700 S/Sikagard®-680 S coating systems, have not deteriorated after 16 years of service, during which the coatings were subjected to the aggressive exposure conditions on the Cooling Towers in the Turów Power Plant. All of the tested coating systems still provide protection against water and condensate penetration, water vapour penetration (or allow diffusion as appropriate), plus they retain high carbon diffusion resistance. Their protective barrier performance still meets or exceeds the requirements of European Standard EN 1504-2"

Project Participants

Turów Power Plant – the owner and investor at the same time
 Savex – Main contractor who is involved form more then 10 years in all refurbishment jobs.

ITB - National Building Research Institute (Instytut Techniki Budowlanej)
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