THE FORMWORK

NOE® report

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Facades reflect riparian woodland

Creating the look of riparian woodland with NOEplast textured formliners

The exposed concrete surfaces of the Auwald Sports Centre, Gundremmingen, make aesthetic reference to the surrounding riparian woodland.

The Auwald Sports Centre built by the municipality of Gundremmingen, Bavaria, was designed by Schuster Engineering GmbH based in Neuburg an der Kammel and is notable for the harmony its architecture creates with the surrounding environment. The facades of the sports centre also reflect the characteristic features of their riparian woodland setting. The architects decided in favour of concrete sandwich wall elements for the facades. The project team chose NOEplast textured formliners from NOE-Schaltechnik, Süssen, for manufacturing the formwork facing and for applying a relief to the concrete surface.

The Auwald Sports Centre built by the municipality of Gundremmingen, Bavaria, included a shooting gallery, an event hall with a stage and a clubhouse in addition to the sports hall. The facility is a favourite venue for sporting activities, social occasions and other festivities – and not without good reason. The architecture is extremely fitting for the location. The visitor can appreciate it well before entering the building. The attractive structure with the curved roof wins the observer over with its unmistakable exposed concrete facade. Parts of the facade are textured and show off a stylised image of riparian woodland. The sports centre was designed by engineering and architectural consultants Schuster Engineering GmbH. The designers had heard about NOEplast textured formliners manufactured by NOE-Schaltechnik at a conference on concrete and were fascinated by the possibilities offered by this technique.
The concrete surface can be inscribed with a wide choice graphic images, textures, reliefs and ornamental features. The process is equally suitable for use on exposed concrete elements on site or in the precasting works.

Any design you like

The manufacturer offers a wide choice of different standard designs to guarantee he can always provide the most appropriate motif for the customer's building. Beyond these standard motifs, he can also realise your own ideas. This was a possibility architect Sigrid Baumgärtner accepted without hesitation for the sports centre at Gundremmingen. Because the sports centre is in the immediate vicinity of riparian woodland, she took this theme and designed the motif around the idea of a stylised riverside forest. The question arose whether to inscribe the tree motif into the concrete or have it stand out from the surface. Some sample panels were cast and she decided on the second option.
Sigrid Baumgärtner had this to say about the advice from NOE: "The engineers at NOE were very accommodating and impressed me with their specialist knowledge. I always felt they considered it important to provide the best advice necessary to achieve an outstanding result. In the end, NOE used the motif we had jointly developed to manufacture the textured formliners." They are required in order to produce the textured concrete elements. The process is explained in more detail below.

Attaching the formliners

Because NOEplast textured formliners can be used equally well for in-situ concrete on site and for precast concrete units in the factory, they have an extensive field of application. The sports centre at Gundremmingen was for the most part built using precast concrete components. These included the facade panels. The designers opted for precast concrete insulated or "sandwich" wall panels. They consist of an 8 cm external layer, 14 cm of expanded polystyrene insulation and a 20 cm thick structural backing and were manufactured at the precasting factory operated by Dobler in Kaufbeuren. The precaster worked as a subcontractor on the Gundremmingen project and was responsible for the production and installation of the precast concrete elements. To cast the textured external layer of the sandwich elements, the Dobler precasting works team glued the textured formliners on to a supporting board and fixed the assembly onto the vibrating table. This method is very popular because it saves time on site and the precasting factory provides the perfect working conditions.

The precast concrete units were manufactured in the precasting factory operated by contractor Dobler from Kaufbeuren.

Contractor Dobler was also responsible for installing the precast concrete units on site.

An old architects' saying proves to be true at the Auwald Sports Centre in Gundremmingen: a building only works successfully through the interplay of its various materi-als, which all have their own distinct language of form and colour.

The manufacturer provides an unusual and special service that eases the task of working with NOEplast textured formliners: on request, NOE attaches the textured formliners onto the form or onto a supporting board. This is a great advantage, particularly on site. The textured formliners are delivered ready for immediate use on site or in the precasting works. NOE can also prepare the formwork reuse plan and concreting schedule.

Manufacture and assembly

After checking that the formliners cannot slip out of place, the Dobler precasters place concrete into the form. As soon as the concrete has hardened sufficiently, the forms are stripped to reveal the motif on the precast unit. Using this method, the 740 m² of textured concrete elements were completed in the shortest possible time. The largest had a width of 7.37 m and a height of 3.21 m. The precasters needed only two NOEplast textured formliners with an area of 2.48 x 8.43 m to manufacture all 73 sandwich panels.

After the sample panels were cast, architect Sigrid Baumgärtner from Schuster Engineering GmbH, Neuburg a. d. Kammel, decided in favour of the raised, stylised riparian woodland motif. Light and shadow bring textured concrete surfaces to life.

They were able to do this only because the textured formliners were reused almost 40 times. In general, NOEplast textured formliners are capable of being reused up to 100 times, which means they are extremely cost efficient.
The designers put figures to this statement by carrying out a comparative analysis. According to their findings, the textured sandwich elements cost only slightly more to produce than non-textured. Thus a beautiful result was achieved with relatively little capital outlay. It is worth mentioning here that on this project all the participants – i.e. the architects, structural engineers, NOE-Schaltechnik and the contractors – were involved at a very early stage in the design. This cooperation resulted in everything running very smoothly on site and a result that completely satisfied everyone – above all the users of the sports centre.

First face formwork with NOEtop EinsA swivel bearings. One advantage is that it is not necessary to invest in a new formwork panel system. The NOEtop panel system can be easily refitted with NOEtop EinsA.

NOEtop wall formwork with one-sided tie rod system

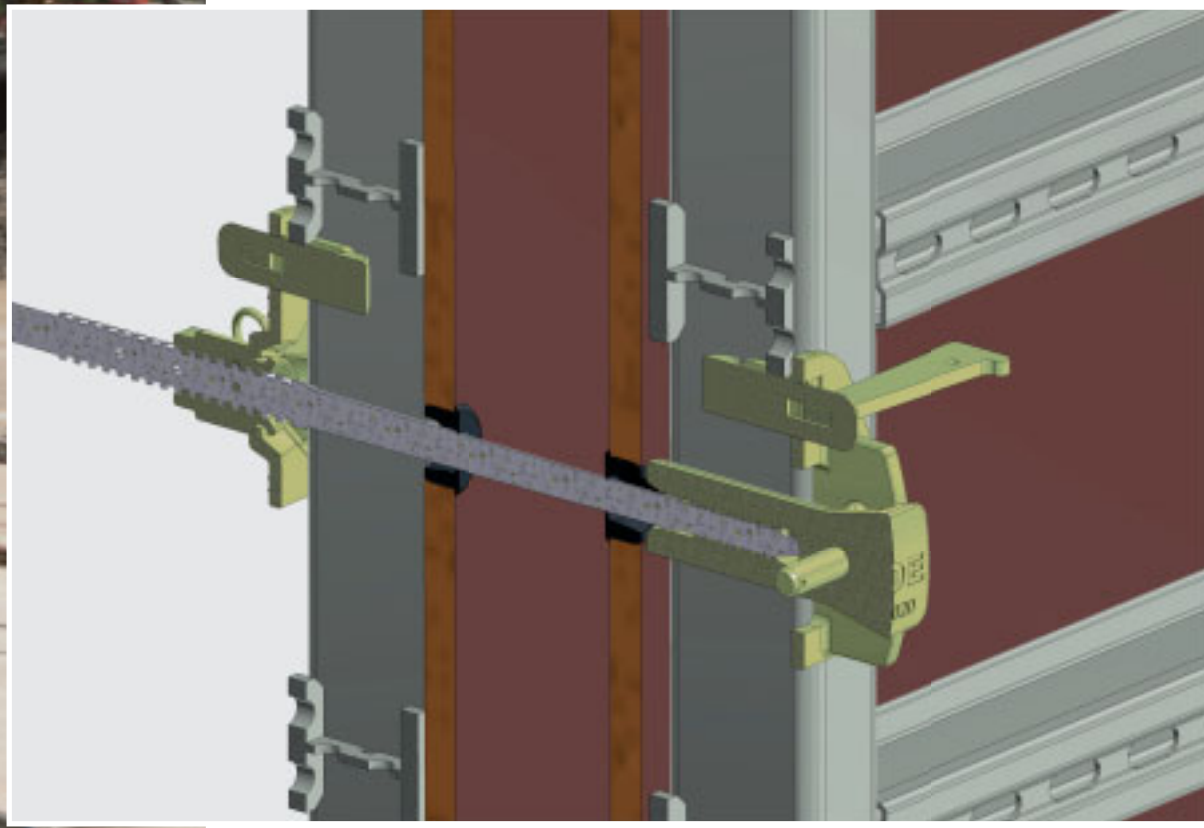
NOEtop EinsA can be used with NOEtop panel system

Tie rods for formwork systems that can be installed from one side of the form are in great demand. NOE-Schaltechnik has answered the call with a special solution: the manufacturer's NOEtop panel system can now be used with NOEtop EinsA one-sided tie-rods.
This gives NOEtop customers a particularly large advantage: they do not have to invest in a new panel system because the thoroughly tried-and-tested NOEtop formwork system is very easy to refit with NOEtop EinsA. A big plus for all contractors who already have NOEtop in their yards.

NOE-Schaltechnik launched NOEtop EinsA at bauma in April 2016. Contractor Grossman-Bau used the system shortly afterwards at Rosenheim for the construction of silo walls in a recycling centre in Munich. The contractor was trialling the new product to see if it would be suitable for use on future major projects. The results were very promising. Grossman-Bau's site foreman had this to say: "Our people required very little training because we often use NOEtop wall formwork. Therefore, we were off to a flying start almost from the word go. For example, we saved considerable time on the 18 m and 5 m high walls – the formwork was approximately two hours quicker to erect and one hour quicker to strip."

Tapering tie rods

The tie rod tapers and therefore no surrounding plastic spacer tube is required when using NOEtop EinsA. This means: the sleeve does not have to be cut to length and installed. There are no un-



Schematic diagram of the NOEtop EinsA one-sided tie rod system.

Fastening the swivel bearing that holds the tapering tie rod end on a NOEtop large area panel.

The tapering tie rod can be preset in 10 mm increments using the NOEtop EinsA adjuster nut.

Fitting the tapering tie rod and adjuster nut to lock the formwork on a NOEtop large area panel.

Locking the NOEtop EinsA formwork using a cordless driver.

Use of the NOEtop EinsA with external tie rod bridge on a NOEtop standard panel.

used tie rod holes to be sealed, nor is it required to erect scaffolding on the far side of the formwork to install the tie rods. Instead, the system has a simple clamping mechanism that can be preset using a 10 mm increment. This is how the required wall thickness is set. The process takes hardly any time at all. Cost-effective rubber seals ensure there are no leaks at the tie rods. The formwork can be operated completely from one side.

NOEtop can be refitted with NOEtop EinsA

NOEtop EinsA can resist concrete pressures of up to 60 kN/m². The new product is perfect for all companies that already have NOEtop panels in their yard and now would like to use the one-sided tie rod system. They do not have to invest in a completely new formwork system in order to use these one-sided tie rods. Instead, they can use their existing panel system that has served them so well on many sites and have it refitted. The most suitable systems are NOEtop large area panels with their integral bracing members. The swivel bearing that holds the tapering tie rod end or the adjuster nut for the rod need only to be clamped in the bracing profile. Tie rod hole bridges can be supplied for refitting standard panels. All available sizes of panel can also be manufactured as standard for use with NOEtop EinsA.

Summary

Any company interested in one-sided tie rod systems and wishing to use this one does not necessarily have to invest in a new panel system. With the NOEtop panel system, it is possible to muse a practice-proven formwork system in conjunction with NOEtop EinsA to take advantage of all the possibilities offered by one-sided tie rod installation.

Watertight tank concreted in 36 hours

NOEtop: solution for concrete pours generating high formwork pressures

The 11.50 m high and up to 60 cm thick walls had to be concreted all together in one pour.

A slaughterhouse designed expressly with sustainability in mind is being constructed in the Netherlands. Once completed, it will be one of the most advanced and sustainable slaughterhouses in the world. An important component of the new facility is the 300 m³ capacity waste water plant. A unique concreting process had to be adopted to ensure it was completely watertight. In order to withstand the high fluid concrete pressures generated during the pour, the site team opted to use the NOEtop panel system with BKS push-pull props from NOE-Bekistingtechniek b.v. Arkel, the Dutch subsidiary of NOE-Schaltechnik, Süssen.

The slaughterhouse for the cutting-edge meat processor Westfort in the Dutch municipality of Ijsselstein is currently being extended to provide one of the most advanced and sustainable slaughterhouses in the world. An important component of this project is the neighbouring waste water treatment plant. It is designed around a 26.60 m long and 14.70 m wide watertight concrete tank divided into individual sections by internal walls. All the walls had to be cast in one pour so that the tank would be completely watertight. With a wall thickness of 60 cm and a height of 11.50 m, this presented a real challenge because of the enormous pressure generated by the fluid concrete. The contractor's site team had first to find a formwork system that would be able to withstand this pressure. The solution proved to be a combination of NOEtop panel elements with heavy-duty BKS push-pull props.

NOEtop panel system

NOEtop is a steel frame formwork system known for its extreme robustness and long service life. The frame is hot-dip galvanised internally and externally. NOEtop can withstand a concrete pressure of 88 kN/m². A characteristic that made it absolutely perfect for the task in hand. Another advantage was that the formwork manufacturer offers the system in several well-selected panel formats. The largest is the XXL panel, which is the largest formwork panel on the market.

Imposing: 11.50 m form height, 0.60 m wall thickness and concreted in one pour in less than 36 hours.

NOEtop XXL panels provided part of the solution. These 5.30 x 2.65 m panels have a form area of over 14 m² and are the largest available on the market.

The NOEtop large-area panels have integral bracing, which reduces the need for additional stiffeners to a minimum.

A key component of the new Westfort slaughterhouse in Ijsselstein, the Netherlands, is the new waste water tank with a capacity of over 300 m³.

The NOEtop panel system is the obvious choice for high walls.

The panels are stabilized with NOE BKS push-pull props.

Impressive: only three NOEtop panels were required for over 30 m² form face.

With dimensions of 5.30 x 2.65 m, assembly and installation could not be more efficient. The site team combined two XXL panels with one 1.00 x 2.65 m NOEtop panel to reach the 11.50 m total panel height. The combined panels were assembled horizontally and lifted into their final positions using a crane.

BKS push-pull props

NOE BKS push-pull props were relied upon to keep the NOEtop forms safely in position. They are erected quickly and are generally used to stabilize precast concrete units and wall and column formwork. Capable of acting in tension and compression, the push-pull props are therefore perfectly suitable for resisting the additional wind loads on the Dutch site. The BKS push-pull props used for the construction of the waste water tank were 9.80 m long.

Concreted in 36 hours

The structure was concreted in full within only 36 hours, thanks to the successful systematic combination of NOEtop and BKS push-pull props. The concrete rose up the forms at a rate of 0.50 m per hour. The total area of formwork erected was 2630 m².

Site board:

- **Client:**
  Slachterij Westfort, IJsselstein, the Netherlands
- **Main contractor:**
  Cazant Betonbouw B.V., Kockengen, the Netherlands

Legal

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