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Copenhagen Concert Hall - A strong team on site

Arnstorf/Copenhagen, May 2008 – The new Danish Radio Concert Hall in Copenhagen is currently one of the most spectacular building sites in Europe from an architectural point of view. Over 8600 individual components manufactured by Voringer from Töging am Inn in Upper Bavaria formed a significant part of the overall design. The plasterboard panel components were fitted by Lindner, the globally active company, which is based in Arnstorf in the Rottal-Inn region of Lower Bavaria. The components were moulded and cut to size by Voringer in Töging.

Lindner AG, which is based in Arnstorf, is now one of the leading companies in this sector. At the very outset of the company, which was founded in 1965 by Hans Lindner, were two men, one idea and the will to work. From this has grown a global company, with subsidiaries in almost all European countries, as well as in the USA, China, Russia and Dubai, with a workforce of some 4800 employees and an annual turnover of around 650 million euros last year.

A significant step on the route towards internationalisation was provided by the large order, which Lindner secured for the Airport in Hong Kong in 1995. Nowadays its international turnover makes up 44 percent of the company's total turnover and recently included the first large order placed in Dubai for the interior fit-out of fully air-conditioned underground stations with an order value of approximately 70 million euros.

The striking feature of the new Danish Radio Concert Hall, which has, an auditorium and audience of around 1800, is that there are almost no right angles. Everything is round, arched and curved, all with different radii and without any recognisable symmetry despite the harmoniousness of the overall design. The advantage of this complex interior architecture will be reflected in acoustics that will be without equal worldwide. The total order volume for the Linder Group is just over 32 million euros.

“The demands on the design of the interior space embody our motto perfectly,” comments Franz Voringer. “When it has to be round...Voringer“. The engineers and entrepreneurs from Winhöring, who have their head office in Töging, took a chance in the 1980’s and made the jump from a secure position with BMW in Munich to self-employment, specialising in dry lining. They have since moved on from the manufacture of conventional orders and from installation to concentrate on the design and prefabrication of customised plasterboard components. There was a bit of a glitch at the start of the company’s history however. “Our employees were simply not paying enough attention. Plasterboard panels were stored incorrectly, became damp and lost their shape. “But we formed an idea from this glitch,” recalls Franz Voringer. In a number of different attempts, we developed tools and processes for bending Fermacell panels (originally manufactured by Fels and now by Xella, part of the Haniel Group) even with very tight radii to prefabricate them as arched shells.

The expertise that Voringer has gained in recent years has not only been put to use on construction projects, designed by the stellar architect Norman Foster in London, but also on the renowned Dolder Grand Hotel in Zurich or on the Hotel Überfahrt on the Tegernsee lake, but also on the Danish Radio Concert Hall in Copenhagen. A forthcoming project sees the use of the technology and the round plasterboard components on cruise ships built by the Meyer shipyard in Papenburg, a project that will also be completed with Lindner AG.

We actually only won the order in Copenhagen because we had quoted for something other than what was asked for,” admits the Winhöring entrepreneur. The essential difference between what was specified and the order that we delivered lies in the installation of the curved components and in the static concept. Instead of the lengthy and expensive process of installing the components with metal fixings, Voringer proposed a support structure that would fix the round shells and segments for the interior of the concert hall to frames made of plasterboard panels on the concrete walls, rather like the planks of a ship.

The building in Copenhagen is making the most exacting demands on all the companies and employees involved in the interior fit-out, in the perfect symbiosis

of statics, acoustics and fire protection. But the look has to be right too. Around 100 Lindner AG employees are currently employed on site in Copenhagen – both from Lower and Upper Bavaria but also from other European countries. In the coming weeks this total will rise to 150 to complete the finishing work. “And we are constantly on the look-out for new employees, specifically for our international projects,” comments the Departmental Manager for International Projects Stefan Ehgartner.

A brief comment about statics and acoustics: in order to provide optimum sound-proofing, ceiling segments must weigh over 100 kilos per square metre - something that places huge demands on the statics and the fixings.

In order to shorten time on site and improve the work sequences, the segments for the internal shell of the concert hall and also for the frame between the concrete wall and the internal shell, were prefabricated by Voringer in Töging and cut, numbered and packed according to the three-dimensional plan.

These prefabricated components, some of which had been manufactured to a predefined design with different perforations, formed a total surface area of exactly 33,382 square metres, a volume of 500 cubic metres and a total weight of 330 tonnes.

The parts for the three-dimensional puzzle in Copenhagen were packed on 457 pallettes and sent to the site in the Ørestad district. There Voringer’s partner Lindner had already erected tents, in order to arrange the pallettes in such a way that the workers would have ready access to the parts in the right order.

The dimensions of the concert hall are also awesome: 100 metres long, 60 metres wide and a total of 45 metres tall. The concert hall alone is 24 metres tall and has a volume of 28,000 cubic metres.

A “ceiling sail”, the height of which can be adjusted, is positioned over the orchestra stage. Covered with 14 Fermacell plasterboard panels, which have been curved in two directions, the “ceiling sail” has a total weight of 75 tonnes.

Voringer also manufactured these curved panels. The striking feature about the plasterboard panels is that they consist of plaster and cellulose. This mix provides the best possible mouldability as well as excellent fire protection and

acoustic properties. Almost everything has now been fitted and the interior of the concert hall should be ready by August. Then the precision work, such as acoustics, will start. This is when the surface structure of the round plasterboard interior shells will come into its own. The panels do not cover the wall surfaces with the same thickness throughout. There are also cavities, which are accessible via routes behind the wall. It is here, behind the scenes, that the insulation layer in the cavity can be modified. Everything should be finished by January of the coming year, which is when the opening with the Danish Queen is planned.

The acoustic design for the building was developed by Nagata Acoustics in Tokyo. The Parisian architect Jean Nouvel designed the building. All those involved are waiting expectantly for the first dress rehearsal because that is when the acoustic design will be transferred from a small-scale model to its real-life dimension. Measurements conducted to date are meeting the specifications. The precise drawing-based work, which had to be done three-dimensionally with asymmetrical curves and almost no right angles, was the most exacting challenge for the team on site. “That and continually incorporating the changes required by the designers, made the order just that little bit more exciting,” comments Tobias Koller, Project Manager with Lindner AG.

“We have our own measuring office on site that is continually monitoring and documenting the precision of the work on site,” emphasise Lindner AG’s Department Manager Stefan Ehgartner and Project Manager Tobias Koller on site.

“We have to keep pace with precision and internationality”, says Franz Voringner. The company, which has around ten employees in Töging prefabricated the components with CNC-controlled machines, based on plans produced by a freelance employee based in Burghausen, who had sent his data and plans online and conditional on other orders from Singapore.

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