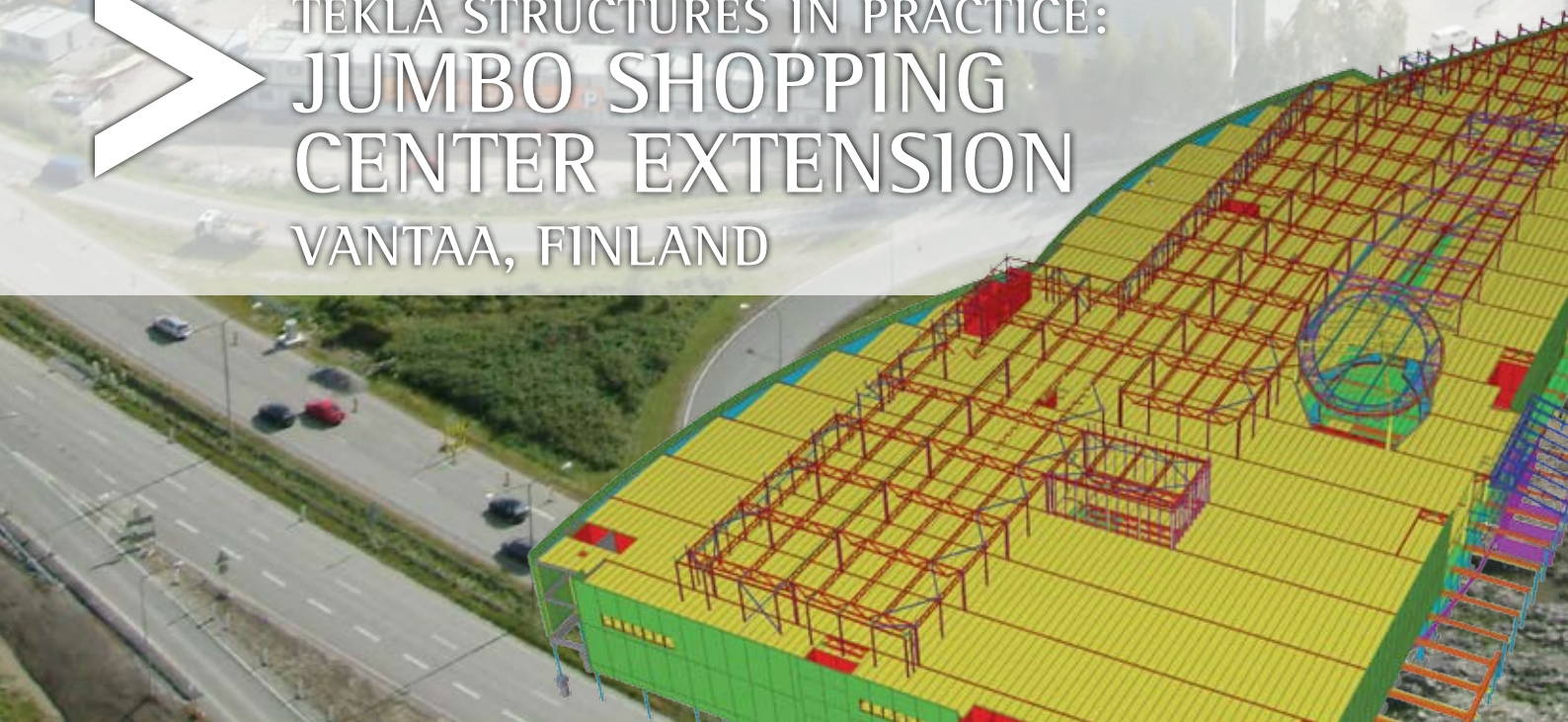
TEKLA® Structures

TEKLA STRUCTURES IN PRACTICE:

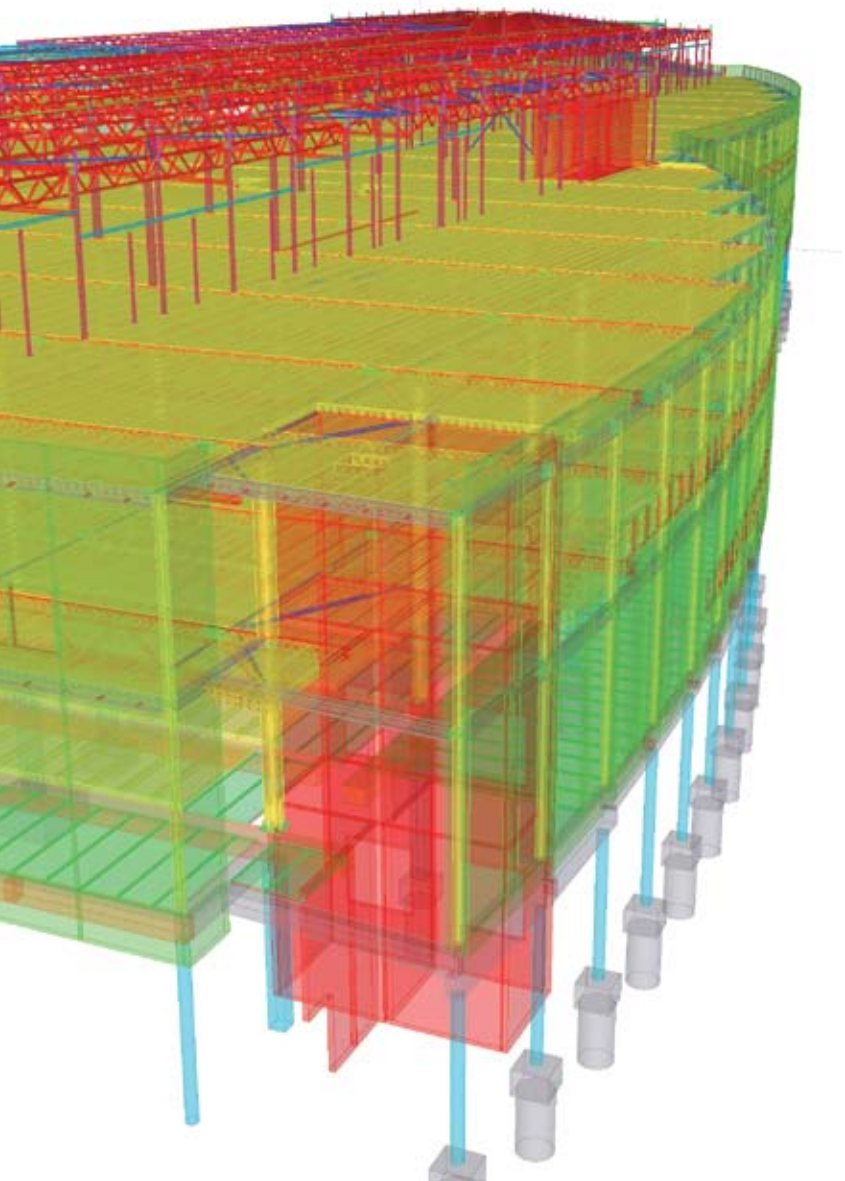
JUMBO SHOPPING CENTER EXTENSION

VANTAA, FINLAND



TEKLA Structures

4D MODEL SHOWED ITS METAL AT JUMBO SITE



The use of BIM (building information modeling) on a construction site was put to the biggest test to date in Finland in connection with the extension of a shopping mall in the capital region. The building project was a pilot in the utilization of a 4D building information model produced with Tekla Structures software for planning and steering site operations. The benefits of 4D modeling truly came into their own when the project's tight schedule was jeopardized by a several week delay.

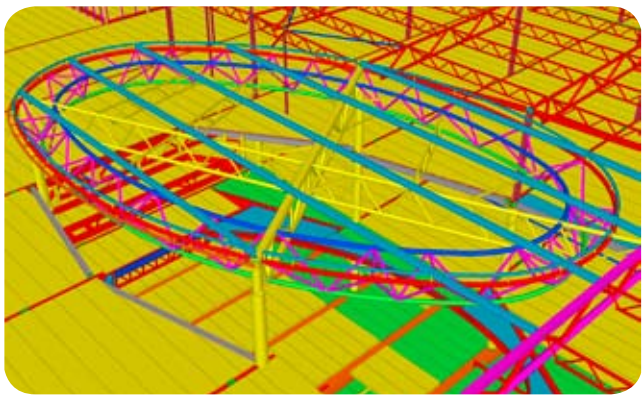
> *"WE USED THE BUILDING INFORMATION MODEL TO TEST HOW THINGS COULD BE MADE TO WORK. WHEN WE ASSESSED THE SITUATION IN DETAIL WITH THE SUBCONTRACTOR, THE IMPOSSIBLE STARTED TO LOOK POSSIBLE."*
– Juha Höyhtyä, Lemcon Ltd.

> The frame construction of the 72,000 square meter, 400,000 cubic meter extension of the Jumbo shopping mall near the Finnish capital Helsinki began in March 2004. The completion of the extension was scheduled for late 2005 to get business premises up and running for the Christmas sales.

The project management contracting was carried out by Lemcon Finland. Project Director **Juha Höyhtyä** explains that a tight timetable meant that the design, purchasing, prefabrication and site activities ran very much in parallel.

"The traditional method of completing the design project before starting anything else wouldn't have been possible here. Instead, design work began on the sections that were to be handed over first, and purchases were divided into reasonably sized entities," Höyhtyä describes.

Due to its nature, the building project was selected as a pilot for the 'Pro IT – Product Model Data in the Construction Process' project by the Confederation of Finnish Construction Industries. The objectives of the Jumbo extension pilot included testing the combining of the frame's concrete and steel structures into a single Tekla Structures model and testing the deployment of the model for scheduling site activity. In addition, experiences were gathered concerning the usability of programs, model-based data transfer, and data sharing between organizations.



ONE MODEL FOR STEEL AND CONCRETE STRUCTURES PLUS SCHEDULES

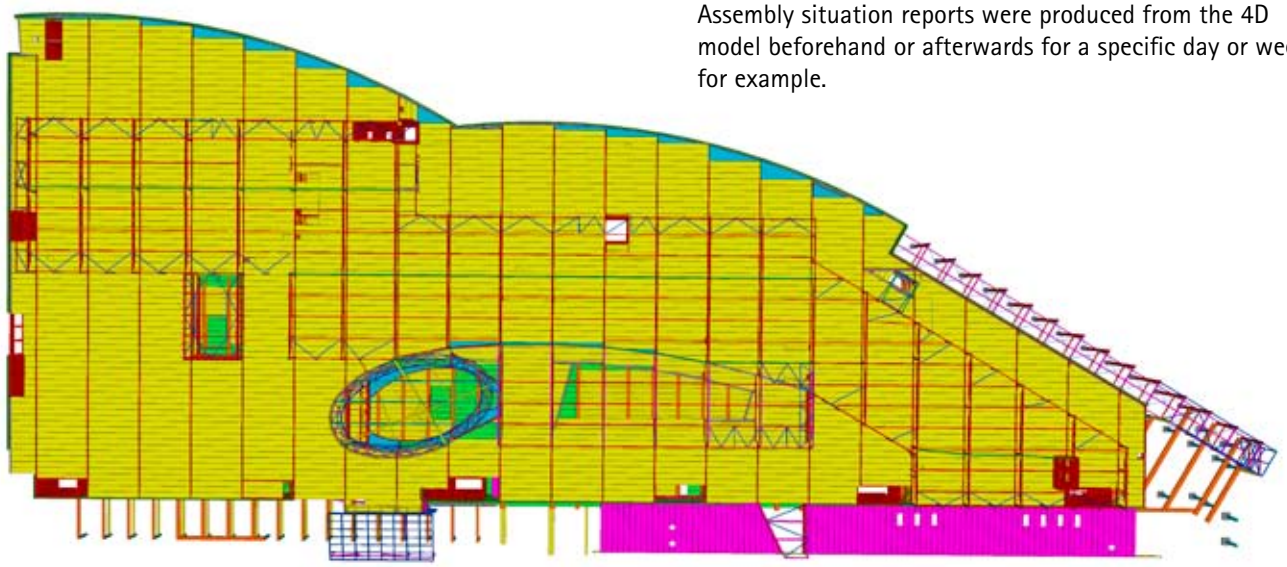
> Jumbo's design had advanced quite far when Pro IT's piloting began. The steel structures were under planning with the Tekla Structures modeling software, and traditional 2D drawing had already been selected as the design method for concrete structures and shells. For the purposes of the pilot, the concrete structures' geometries were also modeled with Tekla Structures.

Site management was further improved by combining the steel and concrete frame and facade shell models into a single 4D model that incorporated geometries, volumes and schedules for all elements as well as the identifiers used in the original 3D models or 2D drawings. All project participants had similar local models in their use – the management contractor Lemcon, structural designer Finnmap, steel supplier and frame constructor PPTH, and Tekla, the partner responsible for the pilot's technical implementation. The models were kept identical through mutual synchronization.

Tekla Structures makes it possible to save a virtually unlimited volume of status data in a single model. But because construction work had already begun when the pilot got underway and the partners had been brought together at short notice, a decision was made to work with relatively simple yet essential assembly and manufacturing data.

Scheduling was carried out by management contractor Lemcon and steel supplier and frame constructor PPTH. Collaboratively they defined the assembly sequence and followed the assembly dates in the 4D model. The plan and its realization were kept fully up to date in the model with daily updates to schedule changes and realized assembly dates.

In the pilot, the partners received up-to-date situation reports in attribute format for entry into their own models. Assembly situation reports were produced from the 4D model beforehand or afterwards for a specific day or week, for example.



JUMBO EXTENSION MODELING PARTICIPANTS:

LEMCON
Lemcon Ltd. is the international project contracting arm of the Finnish Lemminkäinen group. The company has operated in more than 70 countries. With regard to the international building construction, the company's main focus is now in Russia, China, India and Europe. In Finland, the company is a front runner in management contracting.
More information at www.lemcon.fi

FINNMAP CONSULTING
Built around Finnmap Consulting Oy, FMC Group has a large network of regional and affiliated companies with approximately 20 offices providing local services in different parts of Finland and two associated companies in Latvia, Poland, and Russia, and in Estonia. FMC Group has plenty of competence in the different sub-areas of structural engineering, including both engineering design and design review.
More information at www.fmcgroup.fi

PPTH Solutions
Acquired by Rautaruukki Corporation in 2006, PPTH's expertise includes customer-oriented solutions in project management and structural design, as well as in components and construction site services. More information at www.ruukki.fi

SCHEDULES ON TRACK THROUGH SIMULATION

> According to Lemcon Project Manager Juha Höyhtyä, the 4D model validated itself during the pilot as a powerful tool for site management. Its ultimate capabilities were proven when the tightly scheduled project was threatened by a delay of several weeks in autumn 2004.

"A crisis emerged when a frame subcontractor fell behind schedule at a point where the frame assembly and interior work met. If we hadn't taken action, both the interior work and fitting the heating, plumbing, air-conditioning and other building services would have been significantly delayed," Höyhtyä says.

A traditional line schedule assessment showed that the building schedule could be squeezed a little but not enough.

"We used the building information model to test how things could be made to work. We entered the maximum amount of work for each day and examined the possibilities. When we assessed the situation in detail with the subcontractor, the impossible started to look more promising after all."

The building information model was used to carefully plan and simulate the assembly sequence for the next three weeks. With the management of dimensions and masses among its capabilities, the model supports tasks like planning hoisting. An option to view the assemblies for each day in a different color aided visualization.

"I was promised that the critical stage would be completed one Saturday in October at 3 pm. It was actually finalized a couple of hours earlier," Höyhtyä says.

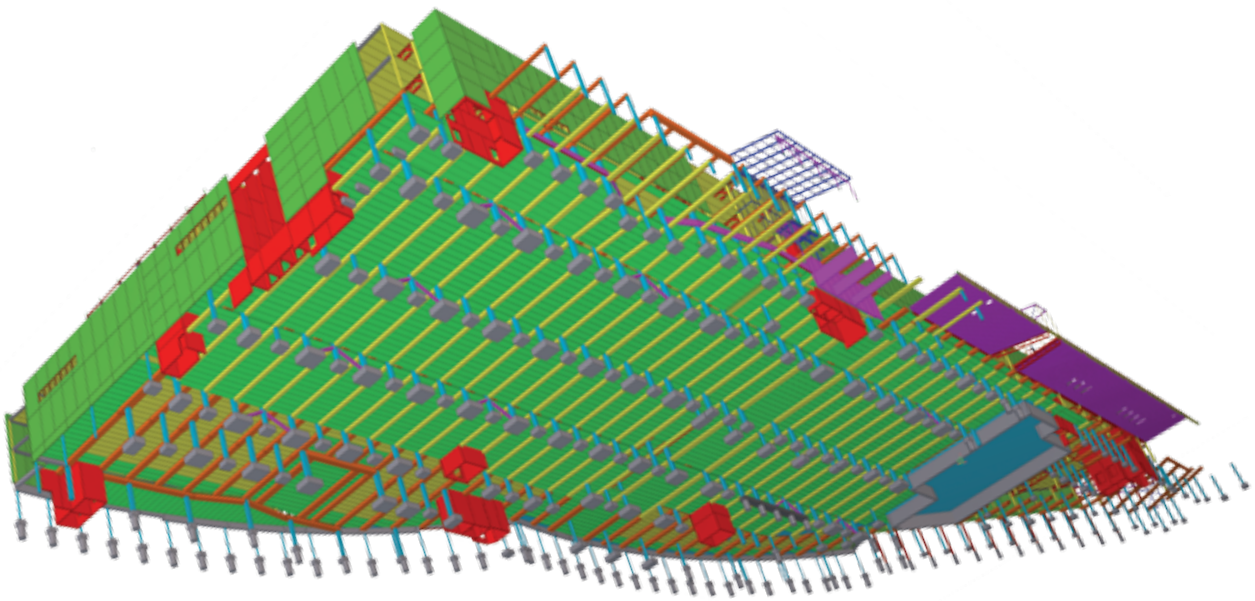
BENEFITS MEASURABLE IN DOLLARS

> Höyhtyä describes the product model as a functional tool that communicated the site's real situation with great reliability. The model facilitated the monitoring of site activity and the management of volumes, for example, and solidified the commitment of the project's various parties to the schedule. Communication was also enhanced.

"I believe that a good experience could bond the parties involved more permanently. In future it would be good to bring in the concrete element suppliers to utilize the product model more extensively than for schedule and logistics planning alone. With the steel structures, the pilot achieved a level where the drawings required for production were produced directly from the model," Höyhtyä says.

He believes the most significant cost benefits will in the future be derived from better schedule management and fewer errors since the use of a building information model enhances cooperation between design, pre-fabrication and assembly. He emphasizes that cooperation requires an open and honest operational culture from each party in the value chain.

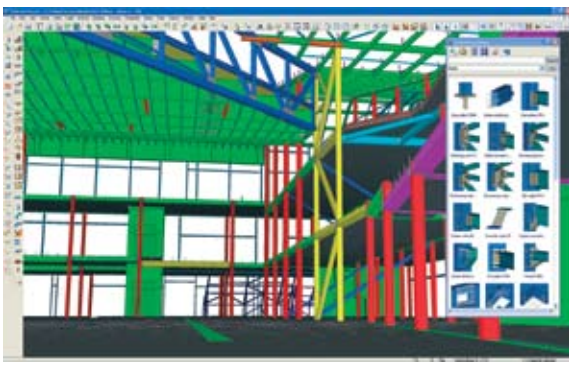
Höyhtyä concludes: "This would make it possible to switch from partial optimization to cooperation that strengthens the productivity of the entire value chain and ultimately benefits the customer."

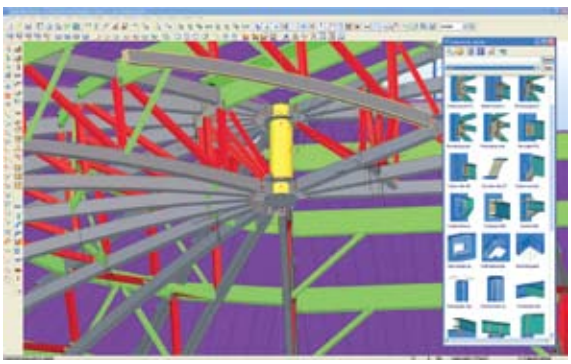


TEKLA STRUCTURES – AN OPEN AND INTELLIGENT SOLUTION

TEKLA CORPORATION

Tekla is a leading international software company whose innovative software solutions make customers' core businesses more effective. Tekla's software products and related services are used mostly in building and construction, but also in energy distribution and by municipalities. Tekla Corporation has area offices and partner organizations worldwide. International operations account for ~ 80% of net sales. Founded in 1966, Tekla is one of the oldest software companies in Finland.





TEKLA STRUCTURES

Tekla Structures software is a building information modeling (BIM) tool that streamlines the delivery process of design, detailing, manufacturing, and construction organizations. While integrating openly with architectural models, its strength lies in the contractor end of the process. Thousands of Tekla Structures software users in more than 80 countries have successfully delivered BIM-based projects across the world.

Tekla Structures' ability to process extensive amounts of data enables the creation of detailed 3D and 4D models that apply to every stage of design and construction. From planning and design development through to fabrication and installation, Tekla models naturally develop in parallel, representing the "as-built" condition of a building. Tekla Structures effectively integrates into any best-of-breed software driven workflow, while maintaining the highest levels of data integrity and accuracy. Such collaborative workflows are the key to minimizing errors and maximizing efficiency, resulting in high profitability and on-time project completion. Tekla Structures encompasses specialized configurations for structural engineers, steel detailers and fabricators, precast concrete detailers and manufacturers, as well as constructors.

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