SCIA scientific software

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e News

November 2005

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NEWS

▶ Customers can help each other. Join us in turning the **SCIA Forum** into a real success! **Register today** …

▶ Our SCIA Website contains sections **FAQ** and **Downloads**

▶ If you have an **urgent question**, send an e-mail, with a description of your problem together with your project, to **support@scia-online.com**

EVENTS

▶ SCIA takes part in '**Batimat 2005**'in Paris (F) from 7th to 12th November 2005 … **more**

▶ In cooperation with Nemetschek, SCIA organizes **software innovations** for the building industry in Graz (A) on 10 and 11 November 2005 … **more**

▶ SCIA participates in "Project - en Industiebouw", a **trade-fair for industrial and utility building** on 16th and 17th November 2005 in Antwerp (B) … **more**

▶ SCIA participates in the '**Betondag 2005**' (Concrete Day) in "de Doelen" in Rotterdam (NL) on 17th November 2005 … **more**

▶ SCIA organizes **releasedays** for SCIA.ESA PT 5.2 in Herk-de-Stad (B) on 22nd and 23rd november 2005 … **more**

TRAINING

▶ SCIA organizes a course '**finite elements in SCIA.ESA PT**' in Arnhem (NL) on 9th December 2005, **Training Calendar**

GALLERY

▶ Some screenshots from the new **SCIA.ESA PT 5.2**
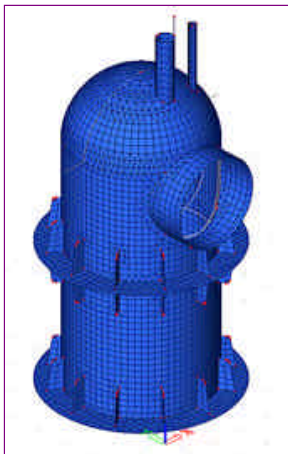
Dear eNews reader,

Currently there is a lot going on in the construction world and through this eNews we like to fill you in on various topics. As always, our regular items inform you about the latest state of technology, the developments on the market and striking projects. We gladly invite you to one of the many events SCIA organises or in which we participate.

Here are the items for this month:

» SCIA Corporate News: 4D design and construction
» Product News: New possibilities and efficiency with design software Allplan 2005.1
» The Market: 2 billion people to be housed from now up to 2030
» Customers Projects: ESA-Prima Win was used to compare the Belgian Standard with the Eurocode
» Support Tips & Tricks: Wind and Snow generator in SCIA.ESA PT 5.2

SCIA Corporate News: 4D design and construction

In the August edition of the Structural Engineering International magazine an interesting article was published by a well-known contractor in Germany, explaining why they decisively have chosen the 4D way of design. **4D means 3D modelling enhanced with the factor time, representing chronological relationships**.

Admitting the need to change the culture within their company, their experiences are worth to be repeated: in the early stage of every project the ratio of time needed to explain a problem, to the time needed to solve the problem is approximately 80 to 20%. Therefore **communication** based on 3D models with interactive imaging results in vivid discussions. Geometric incompatibilities (especially between an architectural and a structural engineering design) are identified at an early stage, **improving the design quality**. Planning of a construction project is a difficult science; simulation of construction sequences results in alternative options for a better and more cost-effective solution. Also **the construction progress** is visualised and recorded with 4D simulation. Photo realistic images of projects are very helpful for **marketing & sales** especially in the bidding phase. Providing an interactive virtual 3D model to the client is a valuable asset. Even more important is the creation of **cost estimates** at an early stage, through generation of material lists and project tasks. Although the design process is fully 3D, certain details and information will still be supplemented in 2D, yet linked to the model.

e-Construction is in full advance. SCIA contributes to it with many software tools. **SCIA is the e-partner for architectural, engineering and construction Building Information Modelling**.

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New possibilities and efficiency with design software Allplan 2005.1

With Allplan 2005.1 Nemetschek and SCIA have released various new modules.

The BIM concept has really given shape to in the new module for modelling steel constructions. With the parametric templates in Allplan it is possible to model and modify steel constructions, including connections. **It is also possible to use the powerful 3D modeller of SCIA.ESA PT within the Allplan environment**. As is customary in Allplan, steel objects and all other elements, such as concrete beams, brickwork walls, stairways, reinforcement, … are managed centrally in 1 model. **Within Allplan an overview list with steel profiles is made up and the desired views and cuts can be generated**. For presentation purposes, the steel structure can be made up with colours, textures, environmental objects such as thegrounds, the background (trees, people, …), in this way **photo-realistic images are created, stationary or moving**.
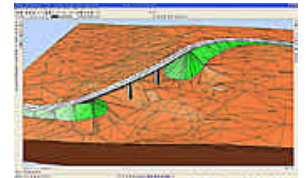
Allplan also disposes of a 'one-file' approach. A lot of drawing software is not built-up with regard to projects but is based on one single file, e.g. DWG, dgn, dxf. Allplan has the disposal of both possibilities; the recommended '**projects**' approach (prj), as well as the 'one-file' (ndw) approach. In this way, the **changeover** from your present drawing software to Allplan **is done without much retraining**. All the same, an approach 'by using projects' is much more advantageous when working in a multidisciplinary way to one virtual building model.

The modernised dimension lines and text layout attract the attention in the basic modules. In the architecture module, the macro for windowsills is new and the module for stairways is improved. Allplan Engineering offers the possibility to reinforce '**floors and walls with openings**' in one routine with bars that possibly have various bending spots. In the module 'section modeller', in which it is possible to model bodies based on a 3D section with variable cross-sections, it is now possible to have the cross-section tipped alongside the incline of the section but also to keep it vertical according to the absolute verticality. For clients with a license server it is now also possible to log out a workstation from the network in order to work locally with software protection.

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The market: 2 billion people to be housed from now up to 2030
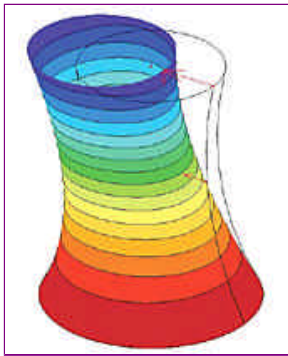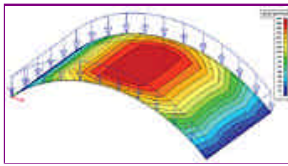
Whereas about half of the world population (3 billion) lives in urban zones - including 30% in slums -, **the 'Program of the United Nations for the human settlements ' (UNO Habitat) provides in its last annual report that nearly 2 billion additional man will need housing from today until 2030** .

According to an official statement of 'UNO Habitat' accompanying its annual report published last week, we quote: **"*during the next 25 years*, *more than 2 billion people will require housing*, *that is, 96.150 residences would have to be built each day, more specifically 4.000 per hour from today until 2030*"**
Under the heading "Financing of urban residences", the World Report 2005 on human settlements underlines the challenges the international community must face in order to be able to finance the development of urban residences, concentrating mainly on the needs of the poorest populations and taking the objectives into account which are stated in the **'Millennium Objectives for Development ' (MOD)** . If financial resources will not be invested in the development of urban residences, the two billion people who require housing in the next 30 years will fall into the trap of urban poverty and they will live under deplorable conditions, the report predicts.

"*The migrations of the rural zones towards the urban peripheries, where the habitat is of a summary type and unstable, will involve an accelerated extension of the shantytowns* ", according to Mrs. Tibaijuka, executive director of UNO Habitat. "*The shantytowns, where the natural environment is entirely degraded, are places where AIDS tends to occur*": she underlines. They are also places where the fertility rate and the infant mortality are very high.

The official report indicates that in Indonesia about 85 million people, that is to say 40% of the total population, lived in an urban zone in the year 2000 . However, from today until 2010, about 120 million people will live in urban zones, i.e. 50% of the population. According to forecasts of UNO Habitat, the country will need 735.000 additional housing units during the next ten years. 420.000 other residences will have to be improved. For the organization, the crises arisen by mass expulsions of the shantytowns, as was the fact in Zimbabwe, but also in Bombay, in India or in Malawi, lie within the broader scope of the crisis of the financing of urban housing in the long run.

The housing shortage arrives at a moment where world economy records a continued grow rate of 4% . In spite of this growth, poverty remains a "*durable problem*"; 64% of the population in Africa and South Asia lives on less than 2 dollars per day, as pointed out by UNO-Habitat in its official report.

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ESA-Prima Win was used to compare the Belgian Standard with the Eurocode

SCIA-software is also used at universities and colleges during the courses, practices and for theses . It happens quite often that a thesis is entered in a contest and that it receives a prize. On repeated occasions this has been the case with the '**Student Steel Prize**'.

Recently, Mr Ben Cools, student at the 'Vrije Universiteit Brussel', submitted to us a very interesting thesis. It regards a comparative study between the Belgian standards and the Eurocodes. It has been carried out **in cooperation with Victor Buyck Steel Construction from Eeklo**. **Prof. ir. Wim Hoeckman**, university teacher for steel structures and bridge construction, acted as his **supervisor**. For this study, the new bascule bridge '**Boulevardbrug**' of Willebroek has been recalculated according to the Eurocodes, originally the bridge was calculated taking the Belgian standards into account. The recalculation has been executed, just like the original calculation, with the SCIA software solution ESA-Prima Win.

The bridge has a span of 65m, the largeness is 16m, it weighs 900 tons and the counterweight is 1200 tons. Image by Ney & Partner.

The study:

In general, the Eurocodes prescribe lower but more concentrated traffic loads. On the one hand, they have a favourable influence on the transversal supports but on the other hand they cause a more unfavourable loading of the orthotrope road surface. The simple fatigue check is considerably more severe than the Belgian standards; there is absolutely no possibility to take the opening and closing of the bridge into account. A check by means of the reservoir method is on the other hand possible and the results are always more favourable than both other checks.

Further on, the Eurocodes don't give calculation rules or methods for a simplified check of the general stability. A second order calculation shows that the method with retaining forces, as prescribed by the Belgian codes, provides very conservative results. In this way, a rather big save in weight can be realised in the frame structure of the bridge.

The Eurocodes incite the developers to use more accurate methods with the aim of obtaining more favourable results. These methods are sometimes more time-consuming but this is largely intercepted and compensated by the availability of specialised software such as ESA-Prima Win and SCIA.ESA PT.
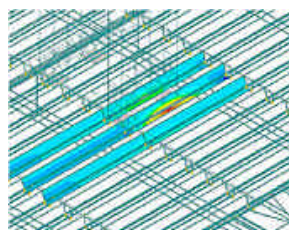
The checking of the orthotrope road surface has however no benefit from this new calculation, it is considerably more severe than the check according to the Belgian codes. Finally it should be mentioned that the Eurocodes don't give wind loads in the case of opening movable bridges.

Importance of the calculation software:

As the Eurocodes offer more facilities for accurate calculations, it is indispensable that the calculation software connects seamlessly with the codes. The global stability control and the non-linear analysis clearly provide a gain. It also appears that the more strict results of the Eurocodes regarding the orthotrope road surface can be compensated partially by using a detailed finite-element-model. The provisions for mobile loads in ESA-Prima Win

allow for tracking the critical points in the structure, in a fast and simple way, notwithstanding the more complex calculation rules of the Eurocodes.

If it were up to SCIA, Ben Cools would win the highest award for this thesis .

## Tips & Tricks: Wind and Snow generator in SCIA.ESA PT 5.2

One of the most tedious tasks to input are the wind and snow loads for a construction .
This is mainly caused by the fact that wind from both directions needs to be modelled, overpressure, under pressure, …

The latest version, SCIA.ESA PT 5.2 can generate the wind and snow load cases automatically on the frames of the structure . First of all, a single load case is needed, for example the self-weight of the structure.
Next, the Wind snow generator is used.

This generator will automatically generate all the necessary load cases and put them in exclusive load groups. One by one the load cases are generated and can be edited by the user:

The load case manager now shows the following:
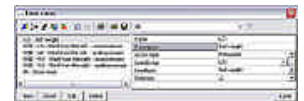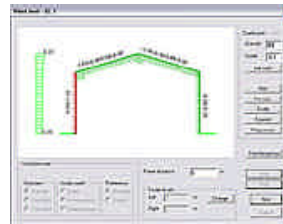
It is clear that this new generator provides for a quick and easy input of the wind and snow loads on the construction .

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