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A NEMETSCHEK COMPANY

Photo of the new production complex in its entirety after completion of the works
By courtesy of CSF Inox SpA / Ingenieurbüro Inoving

Allplan in practice

BIM: LEAVING NOTHING TO CHANCE

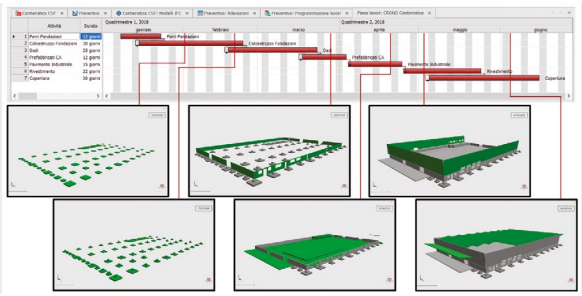
Versatile design and construction for the CSF INOX production plant

When designing the new production plant for the pump manufacturer CSF Inox in Montecchio Emilia near Parma, Italy, the engineering office INOVING had to rely on the highest possible flexibility. This project was the first stage of a larger production complex, which was to become the company's new management center on a site of around 50,000 square meters. Therefore, the requirements for future expansion work had to be taken into account during design and project development. For this reason, it was decided to create a steel structure ideal for maximum versatility and better seismic performance. The construction was therefore realized with HE profile columns, main beams with a truss roof support structure or with solid profiles.

PROJECT CHALLENGES

- Design of the first part of a more comprehensive overall project
- Prediction of the exact position of existing machines already in the design phase
- Multi-directional dialogue and interaction between the different project phases

ALLPLAN BIMPLUS BY ALLPLAN



Top: Virtualization in the execution phase when laying the foundation reinforcement
Below: 4D simulation of construction processes
By courtesy of CSF Inox SpA and engineering firm Inoving

NUMBERS, GEOMETRIES AND CONSTRUCTION FEATURES

The building covers an area of around 6,700 square meters on a total area of 15,000 square meters. It has a regular geometric shape, enhanced by an original architectural appearance, which is expressed at the top by a curtain wall that is not orthogonal to the ground floor, with a projection of about one meter from the base of the building.

The roof, with a saw tooth shape for more brightness, has a height of 8.50 meters under the main beams and consists of pre-painted sheet metal sandwich panels combined with high-performance insulating materials. In this way, thermal insulation and heat displacement achieve values that correspond to energy class A4.

50 percent of the total energy requirement of the systems was covered by a photovoltaic system with an output of approx. 250 KW, which made it possible to meet the requirements for the use of renewable energies.

The building is to house the client's new production area, with ancillary rooms for the warehouse, the personnel areas with changing rooms, the service areas, a medical room, break rooms and toilets, the offices, meeting and technical rooms as well as the tool store. On the south-east side there is a large open terrace on which the extraction and air-conditioning systems are located, whilst on the ground floor of the same part of the building there is space for compressors and forklifts.

PREPARATION PHASE OF THE PROJECT AS A BASIS FOR ITS SUCCESS

The preparatory phase of the project and the preliminary feasibility study played a fundamental role in analyzing and optimizing all existing variables in order to best predict, manage and optimize the various phases of the project, works and execution milestones, as well as the timetable and costs.

For this type of analysis and planning, INOVING engineering consultants used Allplan Engineering and Allplan Architecture software solutions, advanced solutions for structural design and the planning of the execution phase. In addition, Allplan Bimplus was used – an open cloud-based BIM platform that enabled efficient coordination of all parties involved in the construction process, thus eliminating the risk of collisions, overlaps or incompatibilities in advance.

Installation of structural steel framework
With courtesy of CSF Inox SpA and C&P Studio

ADVANTAGES OF SOFTWARE SOLUTIONS FOR EFFICIENT PROJECT MANAGEMEMENT

The Allplan BIM software was crucial throughout the project, from the preliminary study to structural analysis, from the elaboration of the models of the final project to execution planning.

One of the main advantages for such a project was the use of the interdisciplinary cooperation platform Allplan Bimplus and the effective ability to control and manage data from very different software solutions.

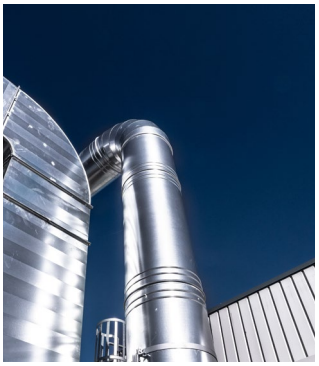
This greatly simplified the interaction and exchange of specialist data between the various planners involved, thanks to the perfect compatibility of the files exchanged and the precision with which the data was imported from different sources. This made it possible to work with the greatest possible efficiency in collision control, to analyse the matches between the various design phases and to identify various problems with very high precision.

All the operations carried out on the equipment were also studied and presented in the BIM model.

SIMPLE DESIGN AND OPTIMIZATION OF THE CONSTRUCTION SITE

Allplan software was also used to control the sequence of construction and earthmoving work. The small but significant differences in the height of the ground were analyzed in detail. As a result, the earth movements required to urbanize the entire 50,000 square meter site and to optimize the construction withholding tax could be evaluated right at the start of the construction phase. In this way, it was possible to reduce the quantities moved and achieve a significant reduction in construction costs.

Both the detailed design of the AC foundations under the supervision of INOVING and the construction of the metal structures (under the supervision of the contractor) were carried out using the BIM method. Thanks to Allplan, it was possible to transfer the external data and avoid possible collisions by positioning the metal structures, bolted to the foundations. The simulation was carried out by performing a „soft clash“ with a tolerance of 2 cm in relation to the positioning of the reinforcement cages, which solved possible collisions already during the design phase and thus accelerated the execution phase. The construction of the various plant, structural, architectural, cladding and manufacturing structures was also carefully designed.



Left: Mounting the roof truss in the metal fabricators workyard
Top right: Details of the air treatment plant
Bottom right: Extraction systems in the open mid-level floor
With courtesy of CSF Inox SpA and C&P Studio

This made it possible to speed up and simplify the construction phases. The positioning of the production facilities already existing in the old plant, as well as the design of the paths and the passage and movement areas, were already carried out in the design phase.

The entire management of the execution phase was realized with cloud tools. By using Allplan Bimplus, communication between the site management and the working group was very efficient: the contractor and client could quickly and easily access the BIM model and the technical documents.

PLANNING OF THE MAINTENANCE MANAGEMENT OF THE BUILDING

Allplan software not only proved to be an effective support in the entire design and execution phase of this project, but also enabled the client to set up a well-founded database geared to facility management. In fact, it was possible to easily capture all external data to extend the BIM model.

Thanks to this feature, all the technical parameters needed to manage the building and the installed production systems could be inserted and coded into the BIM model.

The BIM model for mapping the „as built" state, equipped with the database of products used during the construction phase, is used and updated by the client for advanced facility management, which significantly reduces the administrative costs of the complex.

The as-built model is also used by the company as part of the ISO 14001 qualification process. It not only serves as an operational tool for accessing work files, but also records deadlines and enables compliance with environmental regulations.

Photo of the installation phase of the roof in its entirety
With courtesy of CSF Inox SpA and engineering office Inoving

CHALLENGES:

› Coordination of various software products
› Managing the multidisciplinary aspect of the project
› Use of different software due to different project partners involved
› Need to get plant, structural and implementation projects under one roof
› Necessity to optimize time and budget plan

ACHIEVED OBJECTIVES:

› Immediate resolution of conflicts
› Development of the overall design with the BIM methodology
› Functional management and integration of the various software solutions used
› Simplification of interdisciplinary cooperation through central coordination
› Collision monitoring and immediate resolution of conflicts
› Simple exchange with the client within the scope of monitoring the progress of work thanks to comprehensive visualization of the intermediate steps
› Realization of versatile structures that are compatible with future expansion options
› Optimization of work processes on the construction site
› Accuracy in time and cost calculation
› Creation of a BIM database on the actually executed condition for the facility management of the building.

PROJECT INFORMATION

› **Client**: CSF INOX SpA
› **Project**: Construction of a new production plant
› **Architectural design, implementation design and site management:** Engineering office INOVING
› **Chronological course of the works:**
Start: November 2017
End: January 2019

SOFTWARE SOLUTIONS USED:

› Allplan Architecture
› Allplan Engineering
› Allplan Bimplus
› Allplan BCM

BIM model with panoramic view, for navigation with immersive Virtual Reality
With courtesy of CSF Inox SpA and Engineering office Inoving

THE CLIENT

INOVING is an associated engineering office specialized in services in the field of architectural, urban design, hydraulic and environmental design, tender preparation, operations management, safety and coordination. The high level of innovation that characterizes INOVING's expertise is reflected in our range of services, including:

› BIM Management: Complete management of BIM-based contracts
› Cloud Management: Management of cloud-based orders
› BIM Authoring: Development of BIM models
› BIM Validation: Validation of BIM models by model and code checking
› Virtual Reality: Immersive planning thanks to Virtual Reality
› 4D planning: virtualization of construction phases with 4D planning
› Quantity determination 5D: Economic analysis of orders on the basis of the BIM model

ABOUT ALLPLAN

ALLPLAN is a global provider of BIM design software for the AEC industry. True to our "Design to Build" claim, we cover the entire process from the first concept to final detailed design for the construction site and for prefabrication. Allplan users create deliverables of the highest quality and level of detail thanks to lean workflows. ALLPLAN offers powerful integrated cloud technology to support interdisciplinary collaboration on building and civil engineering projects. Around the world over 500 dedicated employees continue to write the ALLPLAN success story. Headquartered in Munich, Germany, ALLPLAN is part of the Nemetschek Group which is a pioneer for digital transformation in the construction sector.

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