

Irina Viner-Usmanova Rhythmic Gymnastics Center in the Luzhniki Complex, Moscow

*A Russian example of the
OPEN BIM approach*

The Moscow architecture firm, CPU Pride, presents the design process that led to a new sports facility, which also won "BIM 2016," the Russian national BIM technology competition.

PRIDE ТВОРЧЕСКОЕ
ПРОИЗВОДСТВЕННОЕ
ОБЪЕДИНЕНИЕ

CPU Pride, Metropolis LLC

Type:

Sports facility

Location:

Moscow, Russia

Year:

2019

Client:

USM Development

General designer:

ISC Mosinzhprouekt

Size:

252,952 ft² / 23,500 m²

Software used:

**GRAPHISOFT ARCHICAD & BIMx,
Autodesk Navisworks & 3ds Max,
Solibri, Rhinoceros, Grasshopper,
Tekla, Revit Structure & MEP,
Allplan Engineering, ElumTools,
Autodesk, LIRA-SAPR, SAPFIR-3D**



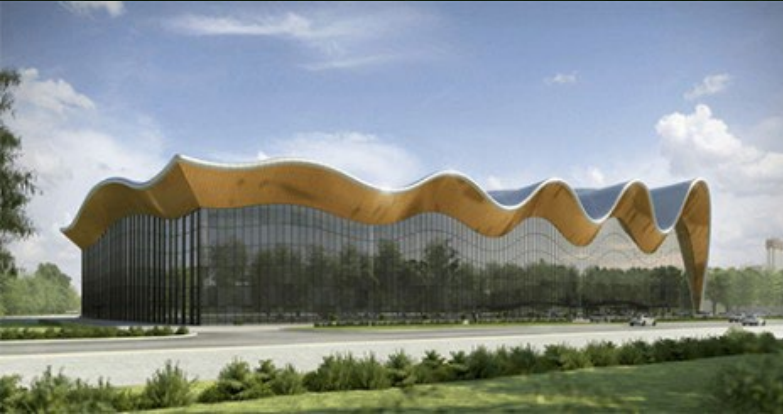
Irina Viner-Usmanova Rhythmic
Gymnastics Center in the Luzhniki
Complex, Moscow, Russia
Rendered Image
Image courtesy of CPU Pride
www.prideproject.pro

ARCHICAD is BIM

The Pride company was founded in 2013. Its founders are professionals with vast experience in implementing large and technologically complex buildings. Today, the company employs more than 60 highly-qualified specialists, including 30 architects. Pride not only provides architectural design, but also master plan development, structural and engineering solutions. The company handles a full line-up of services: from creating concepts to leveraging urban potential; creation of design development (DD) and construction documentation (CD) of buildings and supervision of the construction phase.

One of the most important priorities for the company is the widespread use of building information modeling technologies. Performing complex tasks requires a comprehensive BIM solution that can serve as the principal tool for coordinating the work of architects, designers, and engineers of all related specialties. BIM technology provides an integrated design approach throughout all the stages of the building life cycle.

The desire to offer customers unique architectural solutions and the ability to implement complex tasks was prompted by the company's management and resulted in the implementation of ARCHICAD: a program that doesn't require a time-consuming setup.

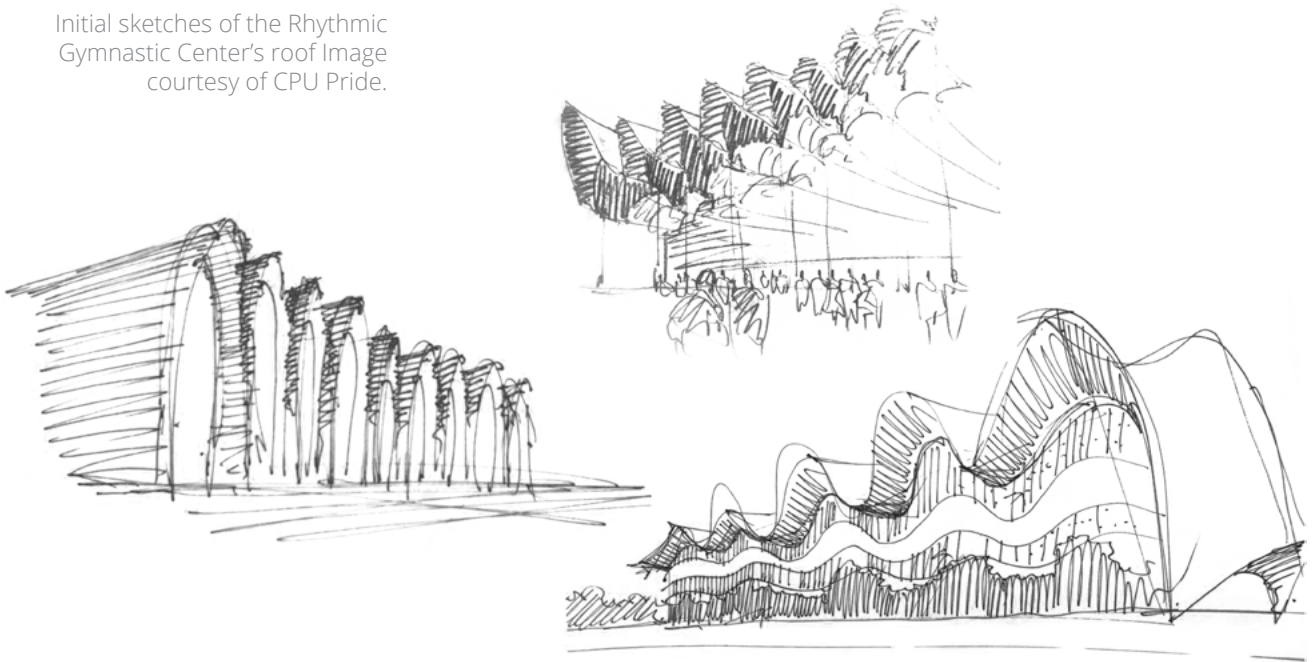


Irina Viner-USmanova Rhythmic Gymnastics Center in the Luzhniki Complex, Moscow, Russia
Renders were created using the architectural model.
Image courtesy of CPU Pride
www.prideproject.pro

One of the recent projects developed by the Pride company is the Irina Viner-USmanova Rhythmic Gymnastics Center, completed in 2019. The center, which is in Moscow's Luzhniki Olympic Complex, seats 4,000 and is ready to host competitions and training events. Its features include partially transformable tribunes and VIP boxes. Its appearance conveys a unique roof shape resembling the wave of a gymnastic ribbon.

“During the initial stage, we created a preliminary concept rather quickly, consisting of several completely different solutions, such as extraordinary forms, or a more geometric appearance maintaining a clear rhythm of the façade. The customer chose the form of a ribbon fluttering above the ground. We were able to develop the first 3D model in less than a month,” says chief architect of the Pride company, Elena Myznikova.

Initial sketches of the Rhythmic Gymnastic Center’s roof Image courtesy of CPU Pride.



“We were able to develop the first 3D model in less than a month.”

Elena Myznikova
Chief architect, CPU Pride

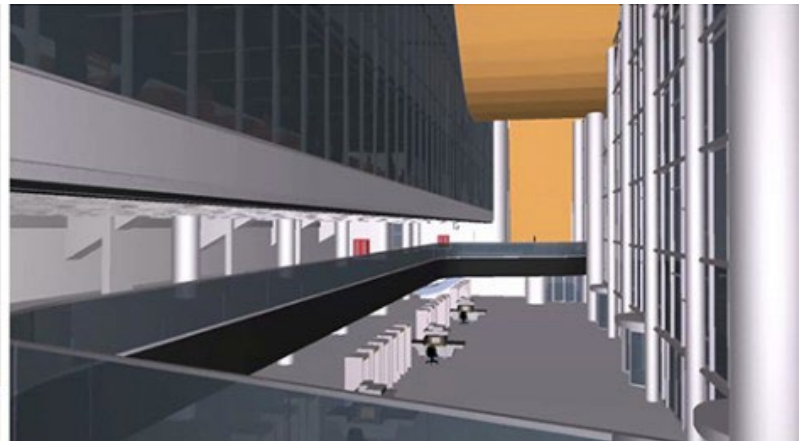
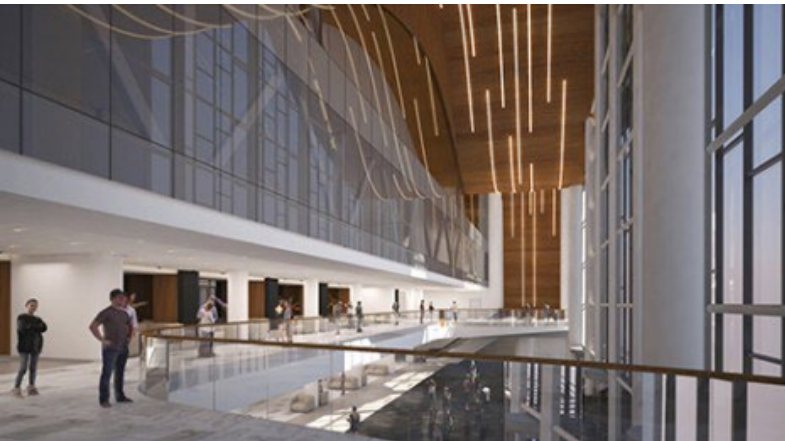
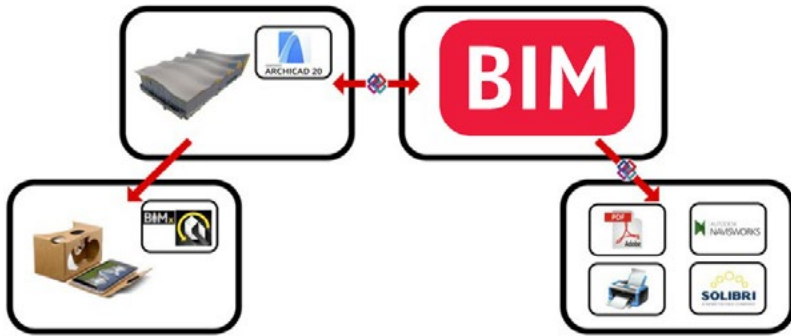
A single model from concept to documentation

The project won the “BIM 2016” Russian competition in the “BIM project:sports facilities” category, and demonstrates the successful use of the OPEN BIM approach in its design. The exchange of data between software platforms was carried out using the open IFC format developed by buildingSMART (International Alliance for Interoperability, IAI).

The architectural part of the project was carried out by the Pride Company. The main tools for the Design Development and Construction Documentation phases were ARCHICAD and Rhinoceros/Grasshopper. The final demo model was done in ARCHICAD, with nested Xref files, structural elements, etc. The complex design of the roof was created in Rhinoceros/Grasshopper. Its structural and engineering solutions were developed by the Metropolis company using a software for engineers.

“At a construction site, we always go with the tablet that contains an ARCHICAD model. When discussing our solutions and ideas with our clients, we usually use the BIMx mobile app. BIMx is also indispensable when you need to focus on a certain part of the project and to monitor the progress of construction. Using BIMx, we can easily access all the necessary specifications of BIM model elements,” says chief architect of the Pride company, Vitaliy Krestianchik.

Architectural project issue scheme.
Courtesy of CPU Pride

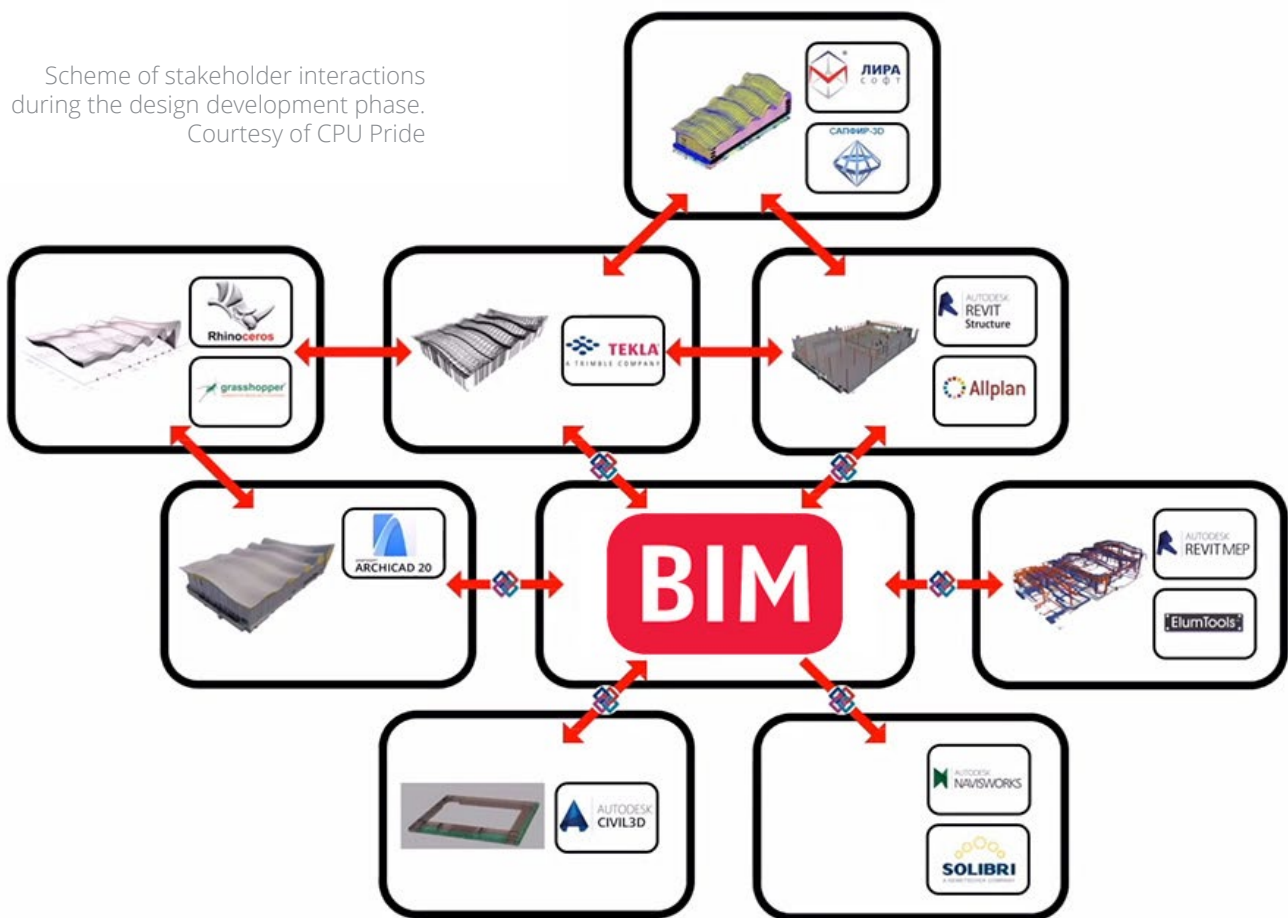


The hand sketches were recreated as the ARCHICAD 3D model, while the render was created using 3ds Max.
Courtesy of CPU Pride

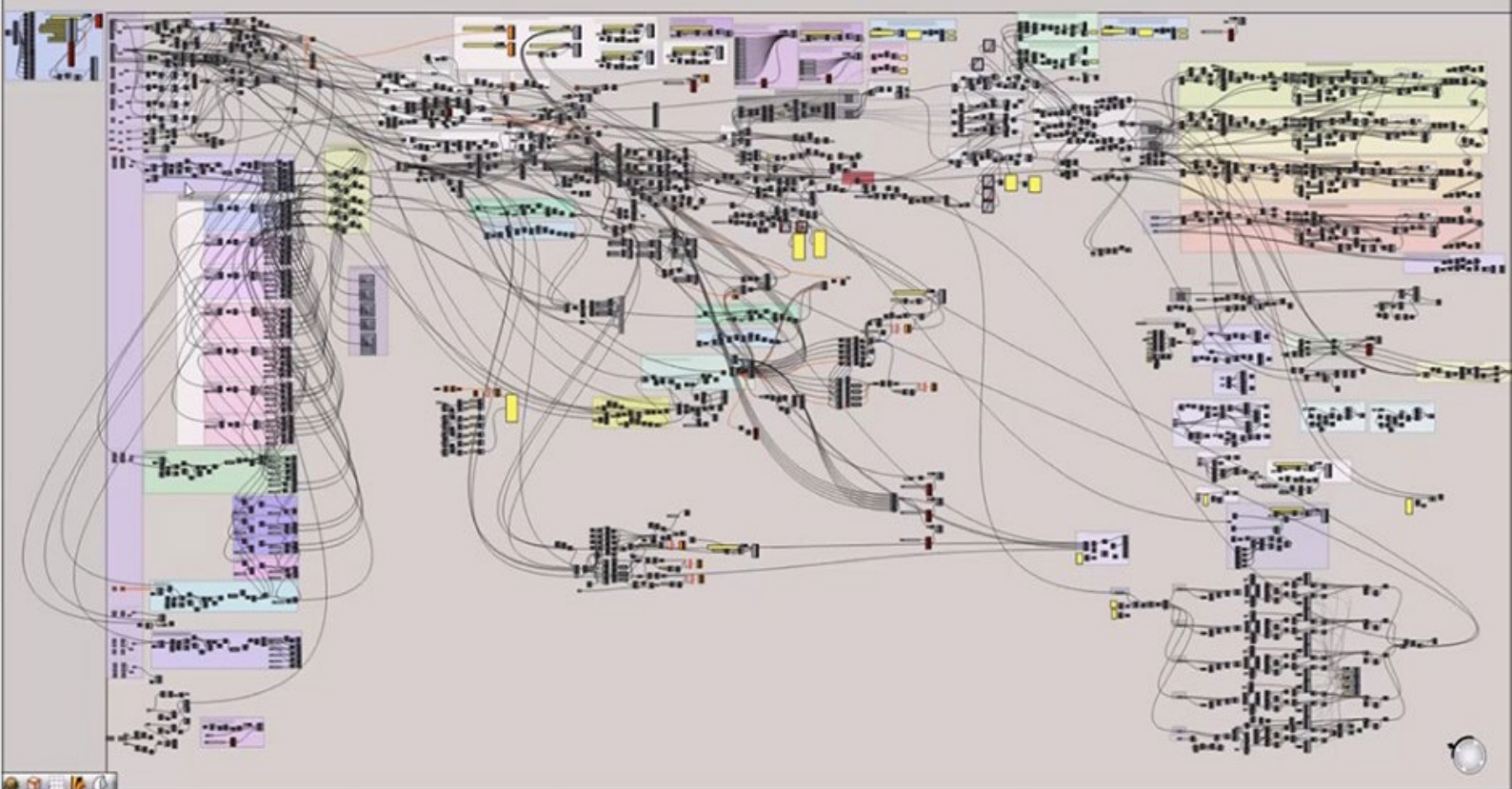
Each project starts with a concept and a brainstorming session. The first pencil sketches were recreated in ARCHICAD as a 3D model. Visualization was created using 3ds Max. The process of BIM design started at this stage: the model contained essential information about the materials needed and became the basis for the first client meeting.

During the concept stage of development, the floor areas, ceilings and floor finishes, opening quantities and other common parameters were defined. For coordination of the concept with the general designer, Mosinzhproekt, and the client, Pride used BIMx - a handy tool for viewing BIM models on mobile devices. All project files and documentation drawings were combined into a single Hyper-model and displayed using BIMx. Thus, the Pride company was able to rotate the project in a 3D environment to allow consideration of additional details.

Scheme of stakeholder interactions during the design development phase.
Courtesy of CPU Pride



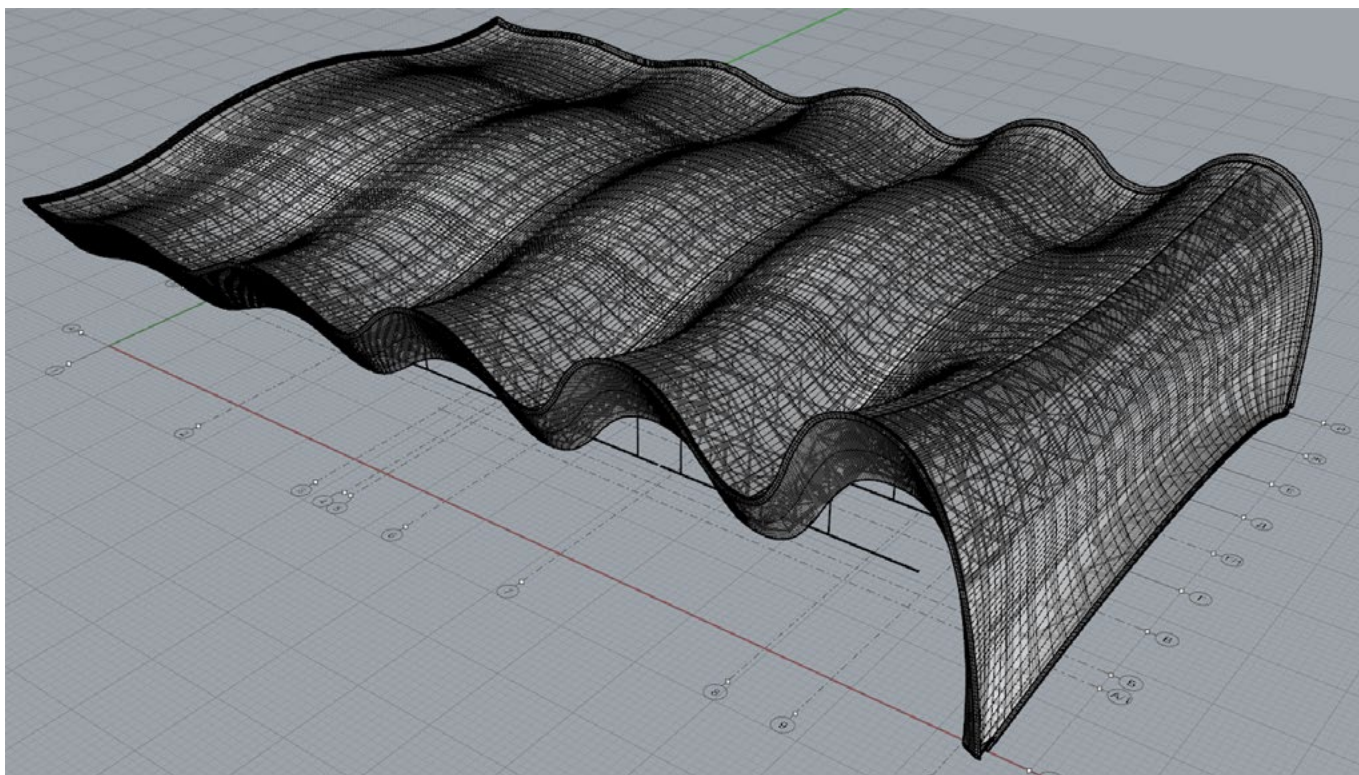
After approval of the concept, the architectural model was transferred to the relevant consultants using the IFC format. For each contractor, the file was prepared separately in ARCHICAD: some subcontractors didn't need a roof, while others didn't need concrete structures. To locate errors, the Solibri Model Checker application was used to perform collision detection analysis of information models.

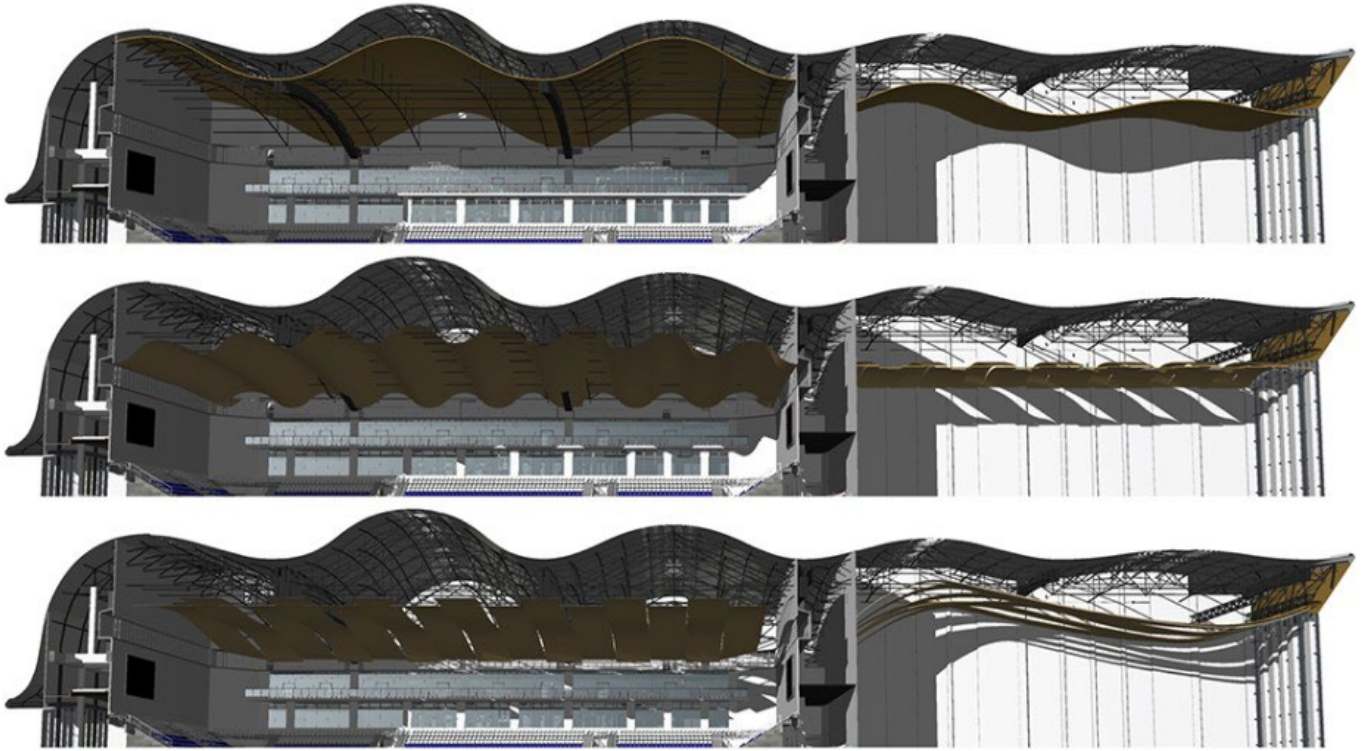


Grasshopper script of the roof.
Image courtesy of CPU Pride

At the same time, we made a parametric model of the roof using the Rhinoceros and Grasshopper-ARCHICAD Live Connection, which determined the options for the optimization of the metal frame elements. With this information, the manufacturer of the standing seam roof presented examples of the roof panel arrangements that were possible, based on the load-bearing capabilities of the metal sheets. The calculated parameters helped to determine the optimal shape of the roof.

And the result of the script in Rhino.
Image courtesy of CPU Pride





Design variations in ARCHICAD.
Image courtesy of CPU Pride

“BIM helps prevent human error...Using 2D it would be simply impossible to detect all of these conflicts...”

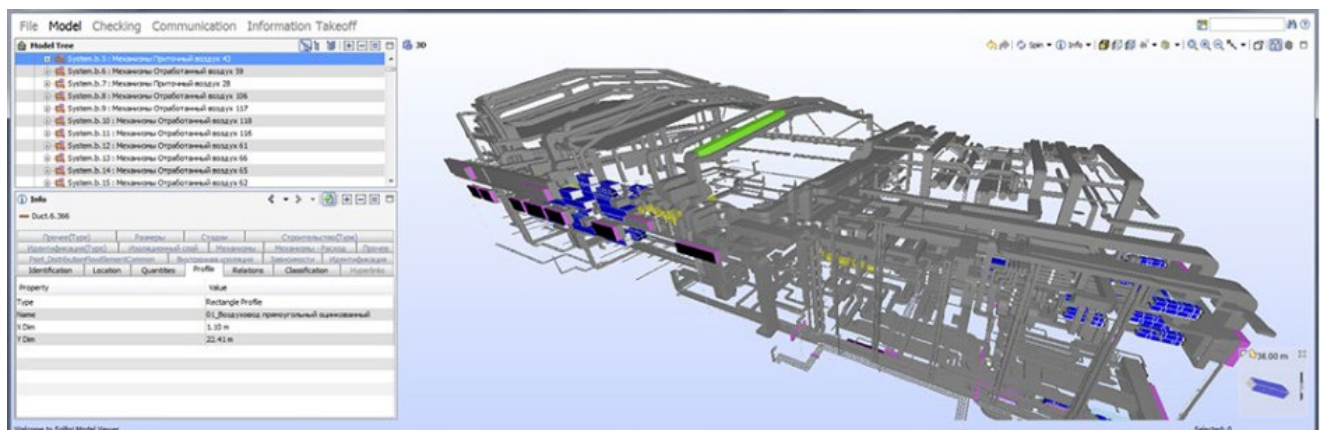
Vitaly Krestianchik
Chief architect, CPU Pride

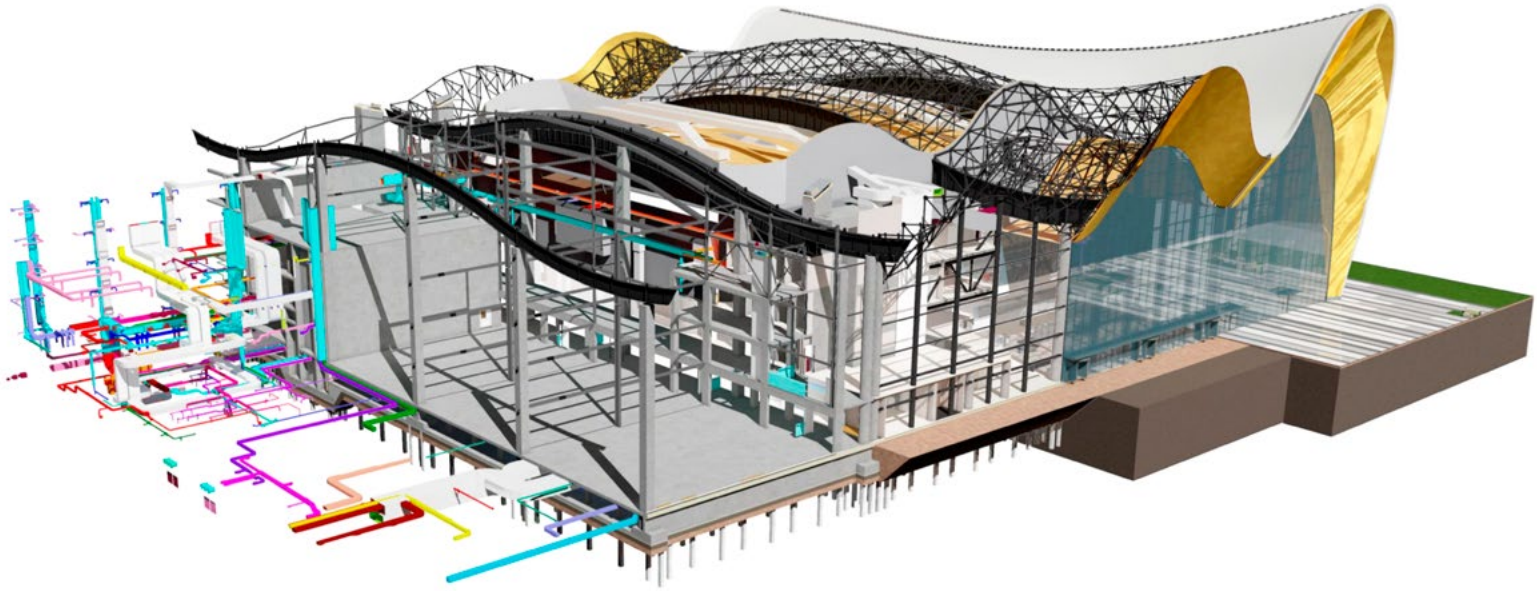
Checking collisions in Solibri Model Viewer.
Image courtesy of CPU Pride

BIM-duet: architects + engineers

In the next stage (DD), the architects continued to work with Metropolis, which specializes in the development of structural and engineering solutions and uses a different software. A reinforced concrete structural model was created in Allplan, and then through SAPPHIRE, the file was transferred to a local analytic program, LIRA-SAPR. The metal structural model was developed in Tekla Structures and was sent through an analysis application as well.

“BIM helps prevent human error. The first HVAC model we got from the engineers in the DD phase contained 1,800 collisions. And this, by the way, is not that many. Using 2D drawings, it would be simply impossible to detect all of these conflicts,” said Vitaliy Krestianchik, chief architect of the Pride company.



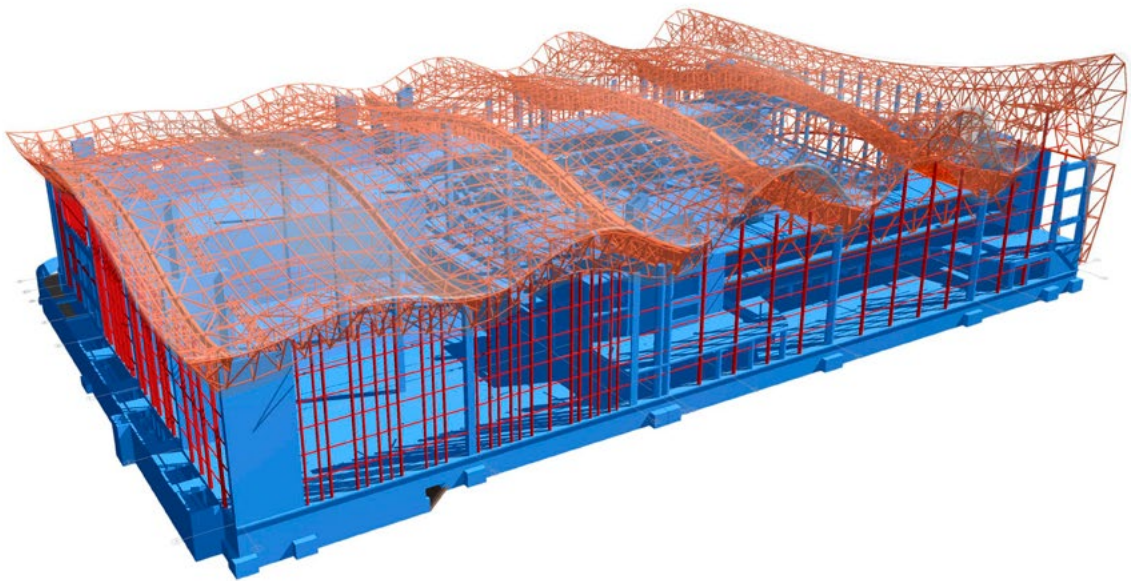


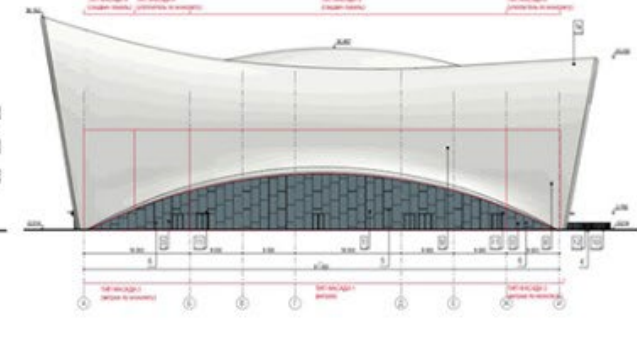
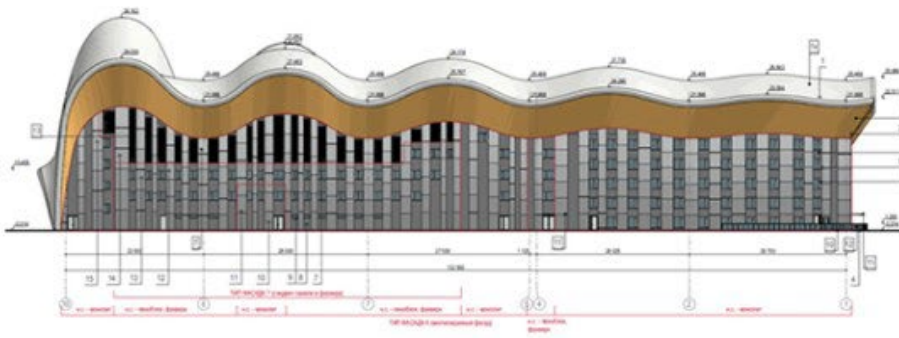
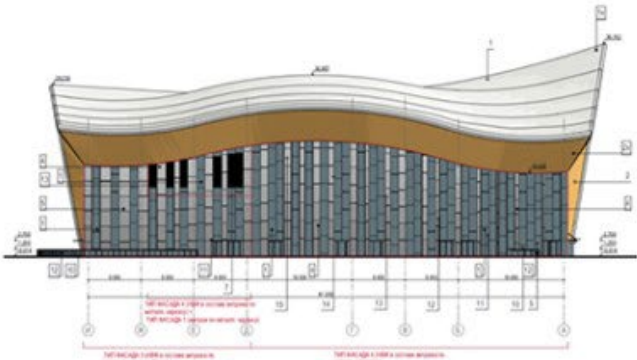
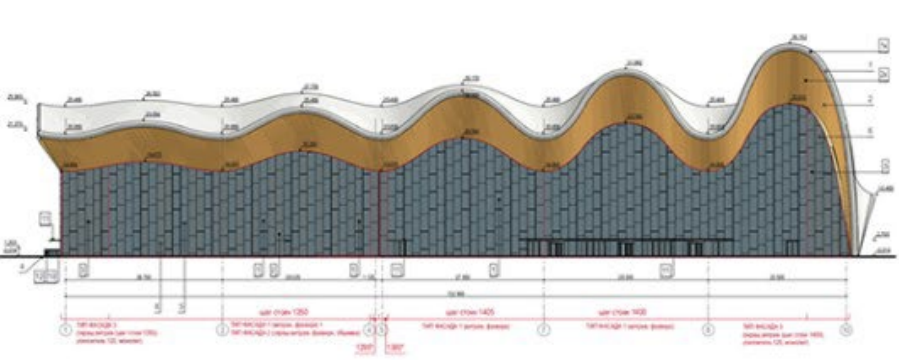
The complete BIM model together with the engineering and structural sections.
Image courtesy of CPU Pride

The building engineering systems were developed in Revit and MagiCAD. The IFC translators to save and import the first versions of these models - obtained from the engineers - required several days to set up. For the engineers, it was important to correctly save, and for architects to correctly import the data. After an exchange of models, collision detection, and further error corrections, the documentation development began.

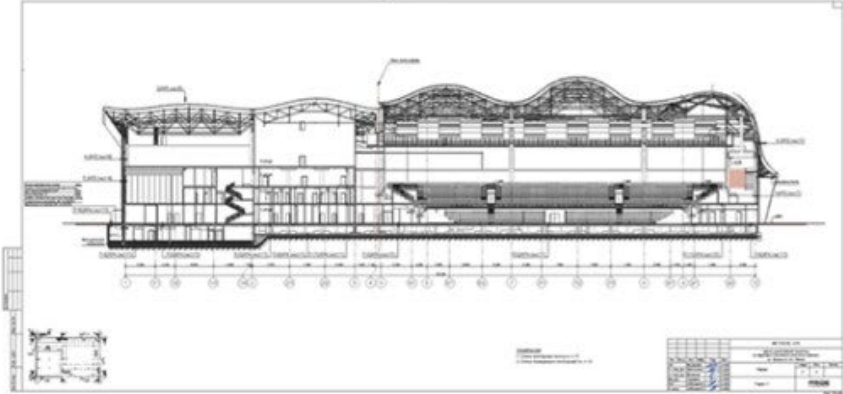
Structural elements shown in ARCHICAD.
The structural model was created and imported from Tekla .
Image courtesy of CPU Pride

“Building information modeling doesn’t mean you have to model each detail. To calculate the amount of materials needed to complete a project, ARCHICAD can import various manufacturers’ data (floors, doors, windows, etc.), and the schedules are automatically generated,” said Vitaliy Krestianchik, chief architect of the Pride company.

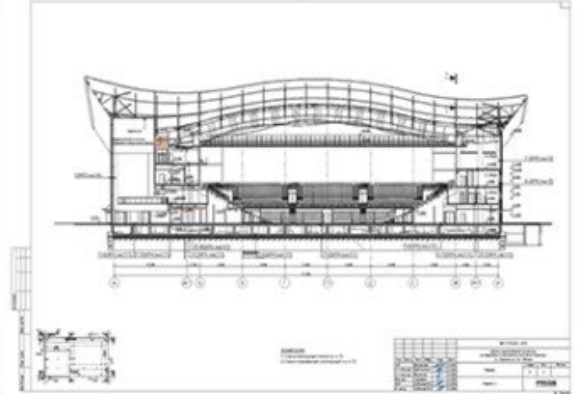




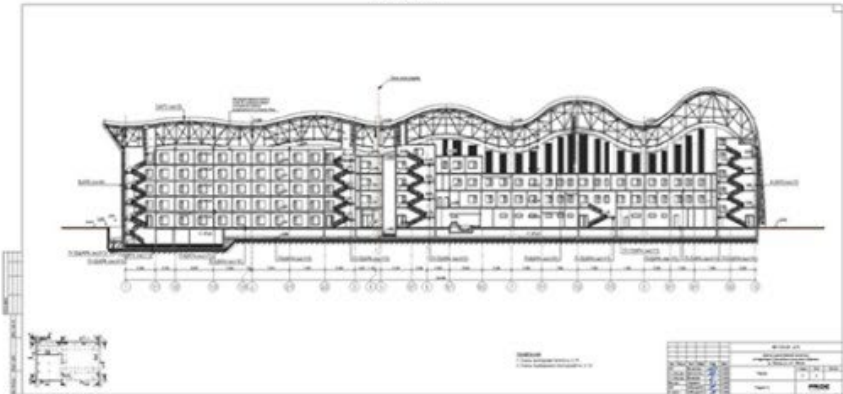
Paspes 1-1



Paspes 2-2



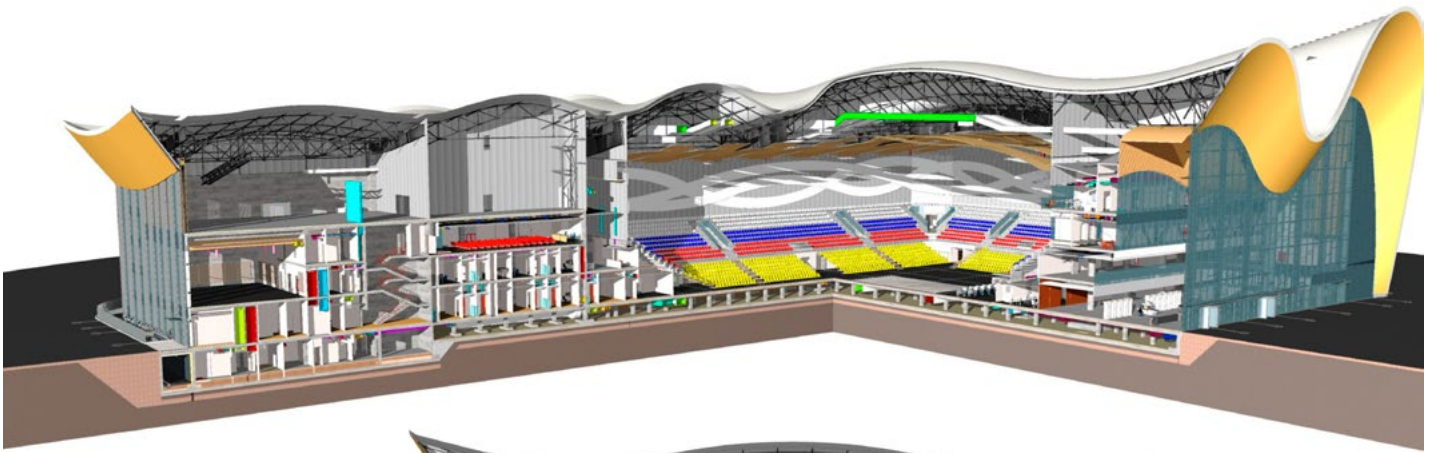
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Paspes 4-4



Documentation in ARCHICAD.
Image courtesy of CPU Pride



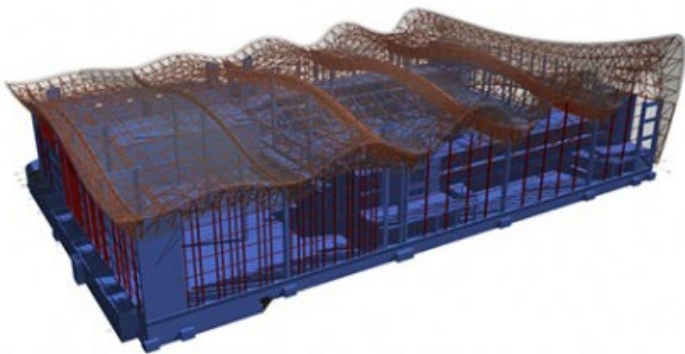
3D cuts of the architectural model.
Image courtesy of CPU Pride



“The architectural part of the project was done in ARCHICAD using Teamwork, a feature that allows each architect involved to see the entire project, track all the changes and avoid errors.”

Vitaly Krestianchik
Chief architect, CPU Pride

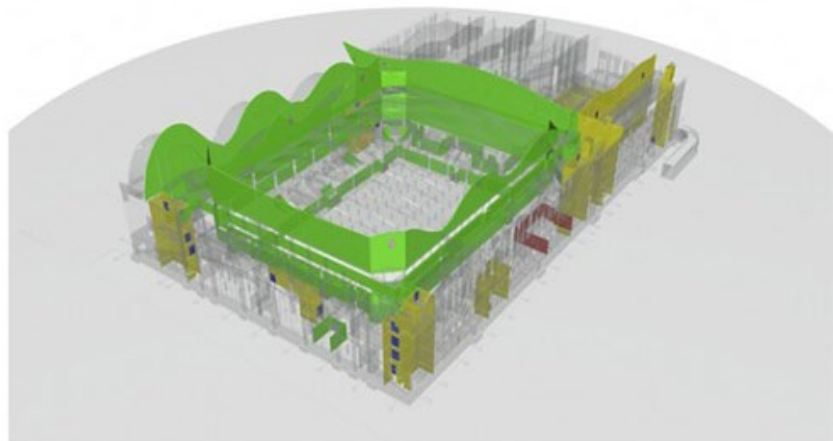
ARCHICAD's Graphic Override feature allows you to apply preset parameters for different display versions.
Image courtesy of CPU Pride



Teamwork workflow in ARCHICAD

Despite the complexity of the facility, thanks to ARCHICAD, the company managed to complete the project without hiring additional employees or BIM specialists. General BIM coordination of all disciplines and the workflow management during the DD and CD phases was carried out by a single architect. His tasks included the organization of teamwork in a single common shared project file. This entire process was based on the ARCHICAD Teamwork feature.

“The architectural part of the project was done in ARCHICAD using Teamwork, a feature that allows each architect involved to see the entire project, track all the changes and avoid errors. No matter what city or country an employee is in, it’s not a problem for Teamwork,” says Vitaliy Krestianchik, chief architect of the Pride company.



Data security levels and access rights to the model were determined by the BIM coordinator and depended primarily on the experience and skill of the technician. The BIM coordinator also placed limits on the creation and configuration details of layers in the project. The number of architects connected to the project at one time was no more than 15. Discussion of design solutions was streamlined with the help of the built-in Teamwork messaging service. The use of Teamwork significantly simplified the process of the model coordination. The processing time was reduced, and the performance of the team was significantly increased.

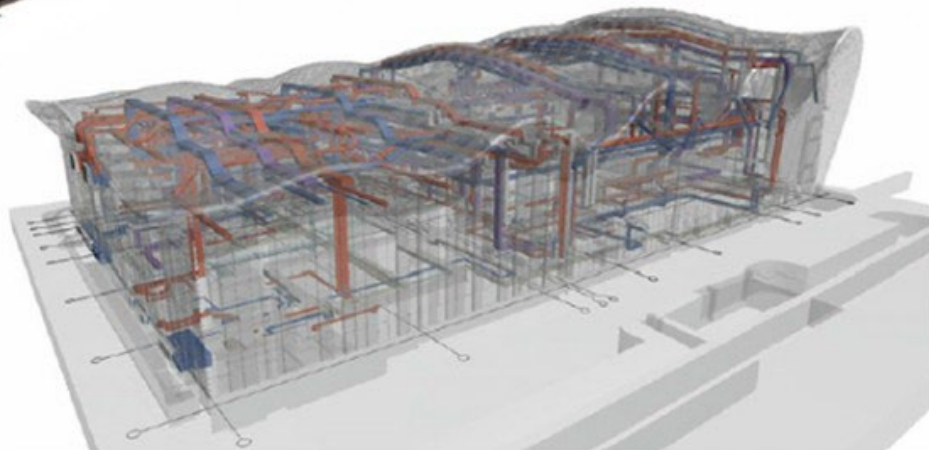
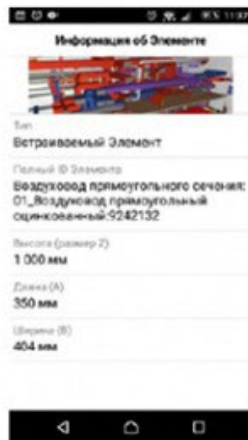
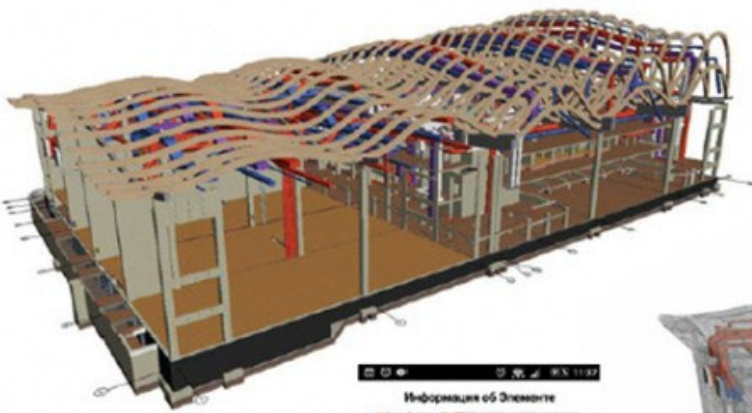


The Luzhnik Olympic Complex.
Courtesy of CPU Pride

The versatility of the OPEN BIM approach

The project is now in the construction development phase and is kept in a single BIM model. The OPEN BIM approach has proven its versatility. The OPEN BIM-based IFC file format is a universal language that enables the interaction of all project participants, regardless of the software they use and ensures the quality of data transmission. The design company followed the Russian and international standards of BIM implementation.

Displaying information about the BIM-project in the BIMx mobile app.
Image courtesy of CPU Pride



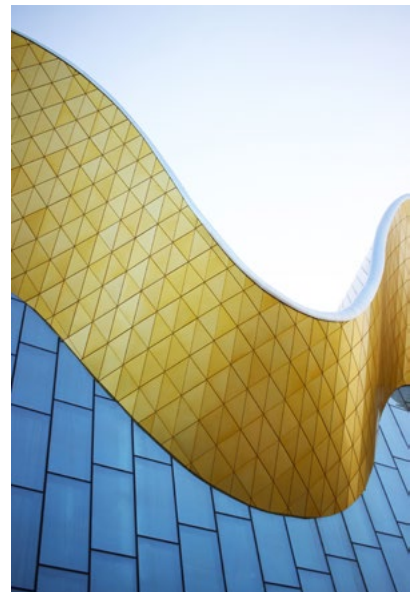
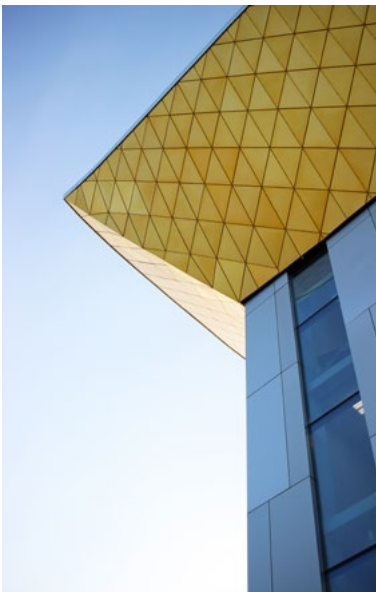
“BIM made it possible to build the design exactly as it was envisioned and documented by the architects.”

Nikolai Gordyushin
Chief architect and partner
CPU Pride

“Thanks to the OPEN BIM workflow, participants can use a variety of software and consistently operate professionally. Using the IFC BIM data exchange, professionals were elevated to a higher level. All of this prevented many mistakes, and the quality of the documentation was much greater. BIM made it possible to build the design exactly as it was envisioned and documented by the architects,” says Nikolai Gordyushin, chief architect and partner CPU Pride.



Irina Viner-USmanova Rhythmic Gymnastics Center in the Luzhniki Complex, Moscow, Russia, Rendered Image
Image courtesy of CPU Pride www.prideproject.pro



Irina Viner-USmanova Rhythmic Gymnastics Center in the Luzhniki Complex, Moscow, Photos: Vitaliy Krestianchik

About the Pride company

[CPU Pride](#), founded in 2013, is a young, promising and fast-growing office that provides a full range of services from concept planning and assessment of urban potential, to the development of design and construction documentation all the way through to building permitting. The team of 60 employees have already worked on such significant projects as the Luzhniki Olympic complex, Irina Viner-Usmanova Rhythmic Gymnastic Center, and the Seliger City residential complex. The company actively participates in competitions and has cooperated with large international architectural firms, adapting their work to the Russian market and state regulations, advising on all stages of implementation. The Pride company ensures quality and timely design of projects of any complexity, using modern technologies, and strict control of the project's construction process.

About GRAPHISOFT

[GRAPHISOFT](#)[®] ignited the [BIM](#) revolution in 1984 with [ARCHICAD](#)[®], the industry-first BIM software for architects. GRAPHISOFT continues to lead the industry with innovative solutions such as its revolutionary [BIMcloud](#)[®], the world's first real-time BIM collaboration environment; and [BIMx](#)[®], the world's leading mobile app for lightweight access to BIM for non-professionals. GRAPHISOFT is part of the [Nemetschek Group](#).

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