Building report

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The heart of the Russian hi-tech stronghold

Looking to the future: At the Hypercube in Skolkovo, the Schöck Isokorb thermal insulation element ensures that the balcony connections are thermally isolated.

Baden-Baden (Germany)/Moscow (Russia) – Skolkovo, around 20 kilometres west of the centre of Moscow, is home to the developing innovation city known as "Innograd". In just a few years, it is hoped that more than 30,000 scientists and engineers will work in Russia's Silicon Valley. The first building and beating heart of the site is the Hypercube, a transformable, high-efficiency communication centre with freely cantilevered balconies on all sides. The balconies are both supported and thermally separated from the building envelope by the Schöck Isokorb thermal insulation element, which is a proven success even in the harsh continental climate.

When vision, science and economic strength come together, increased prosperity is sure to follow. The aim of founding the innovation city, which was announced in 2010 by then Russian president Dmitry Medvedev, is to create the perfect environment for the development of ultra-modern technologies – the Russian Silicon Valley. Particularly high standards were set for the first Skolkovo building. It had to be innovative, versatile and forward-looking, to serve as an inspiring examples for all other buildings that are to be constructed on the 400-hectare research site – and much more besides.

The task of designing and planning the first Skolkovo building fell to Moscow architect Boris Bernaskoni in 2010. At the time, he was 33 and well-known for a wide range of successful, visionary projects.

Energy efficiency at the highest level

Bernaskoni designed a flexible, hi-tech building to meet the strict international guidelines regarding energy efficiency, ergonomics, cost-effectiveness and environmental responsibility. “These concepts are only slowly gaining significance in Russia,” says the ambitious architect. “Most developers focus very much on the short term. They build low-cost buildings and then sell them on, rather than using the buildings themselves. And this is a major problem, because sustainable architecture needs clients to think about the long term. The Hypercube managed to overcome many challenges – including this one. The Skolkovo Foundation is pursuing a visionary goal. And we feel very lucky that we were able to set an example with this project which has attracted huge interest in Russia and all over the world,” says Boris Bernaskoni.

The Hypercube was built in accordance with the green standard “Leadership in Energy & Environmental Design” (LEED v3). The LEED certification system was developed in the USA and is used internationally, although not – until now – in Russia. Was it possible to achieve the required efficiency values, even in Moscow's extreme continental climate? After all, the northernmost areas of the United States, excluding Alaska, are on approximately the same latitude as the subtropical south of Russia, around the city of Sochi. Boris Bernaskoni relied on the latest technologies, which had to prove themselves equal to Moscow's demanding climate conditions in tests.

Thermal bridge challenge

Bernaskoni's design was not just for a “green” building, which is heated entirely with geothermal energy, uses its own recycling system for service water and covers part of its electricity requirements using solar energy. It is also innovative in terms of its interior layout, the size and height of which can be modified over time. A rust-proof metal grid stretches over the external façade. This transforms the building into a gigantic screen, onto which images and messages can be projected. “Particularly in a metropolis like Moscow, it is extremely important to be able to feel a connection with the outside world and with nature during your day-to-day work. This is why we have fitted large windows and included freely cantilevered balconies on all seven storeys of the building,” says Bernaskoni.

But how could the thermal bridges which are created when the balconies are connected to the building envelope be minimised? After all, the temperatures in the Russian capital can range from +40 degrees Celsius in the summer to -40 degrees Celsius in the winter. The air conditioning and heating systems would be working flat out, to say nothing of the risk of condensation and mould. “To achieve a high level of energy efficiency in the building, you have to ensure that the building envelope is well-insulated and sealed as far as possible. Any additions must be thermally isolated,” says Nikolay Pavlov, Sales Manager at Schöck OOO, Moscow. “This means that you have to tackle the problem of thermal bridges early on in the planning phase.”

Load-bearing thermal insulation element

Boris Bernaskoni became aware of the Schöck Isokorb during consultations with international experts. This load-bearing thermal insulation element solved the Hypercube's structural and energy-related problems, whilst also offering a large degree of aesthetic freedom due to the numerous product versions available. The Schöck Isokorb type KXT with an insulation thickness of 120 mm (see info box) was used to reduce thermal bridges on the connections between the reinforced concrete balconies and the building. To optimise the thermal isolation properties, the Isokorb was simply inserted between the pre-installed balcony and interior ceiling reinforcement during the construction of the Hypercube.

“Overall, 800 Schöck Isokorb elements were used in the construction work on the Hypercube,” explains Valeri Tscherkas, International Design Engineer at the Schöck headquarters in Baden-Baden, Germany. “Schöck puts together the right Isokorb type KXT standard variants according to the load-bearing capacity required at the installation location in question. In addition, special constructions are implemented quickly and simply by Schöck Application Technology for individual connection situations. This was the case for the Hypercube: as it had to be possible to change the layout of the interior, the Isokorb could not always be anchored in the building's ceiling construction. We therefore bent the Schöck Isokorb bars in the relevant places and adapted them to the specified shape in accordance with all engineering rules.”

More information about Schöck Isokorb can be found at www.schoeck.de.

Approx. 6300 characters (incl. spaces)

Authors: Maria Chernysheva and Nikolay Pavlov

Construction sign

Location:	Innograd Skolkovo 1, Moscow, Russia
Client:	Skolkovo Foundation / non-profit organisation "Foundation for Development of the New Technologies Development and Commercialization Centre"
Consulting/engineering:	AF-Consult and IVL, Sweden
Appraisal/building/ structural planning:	OOO PSP-Farman, Moscow, Russia
Building contractor:	OOO PSP-Farman, Moscow, Russia
Construction period:	November 2011 to September 2012
Product:	Schöck Isokorb® type KXT, additional special constructions in some cases

Schöck Isokorb® KXT

The Schöck Isokorb® type KXT with HTE pressure bearing pads (HTE stands for High Thermal Efficiency. The module is made from high-performance fine concrete with micro-fibre reinforcement) and a 120-mm-thick insulating element made from Neopor® belongs to the latest Schöck Isokorb® generation. The load-bearing thermal insulation element transfers bending moments and shear forces one way and minimises thermal bridges when connecting cantilevered concrete building elements to ceiling or wall constructions. The Schöck Isokorb® type KXT is fitted with hanging and perimeter tensile reinforcement as standard. This saves the need for extra stirrups or hooped mats, which would otherwise be required on the balcony side.

The Schöck Isokorb® type KXT is suitable for freely cantilevered or supported structures and offers a large degree of creative freedom on new buildings thanks to the numerous structural variants. Using Schöck Isokorb® when connecting cantilevered components ensures a high standard of thermal insulation and impact sound insulation as well as optimal damage protection according to the European fire resistance rating REI 120. In addition, the Schöck Isokorb® type KXT has been certified as a “low thermal bridge construction” by the German Passive House Institute in Darmstadt, and is therefore suitable for buildings which comply with the Passive House standard.

Approx. 1250 characters (incl. spaces)

Photos

[Hypercube.jpg]

The Hypercube is the first building in the Skolkovo innovation city, and forms the heart of the site. It now houses the offices of the four key partners of the innovation centre – Cisco, IBM, Siemens and Johnson & Johnson – along with 16 Russian startups. The Hypercube represents a milestone for the whole Skolkovo innovation city, and is also an important step towards increasing energy efficiency awareness in Russia.

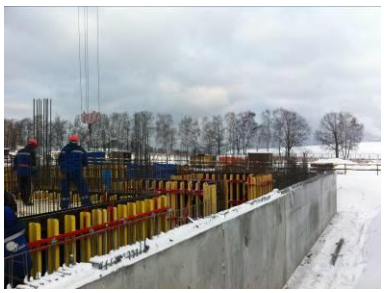
Source: Skolkovo Foundation, © BERNASKONI

[Hypercube_Illuminating.jpg]

For architect Boris Bernaskoni, the Hypercube's changeable exterior shell and variable interior layout symbolise five different dimensions: communicative connectivity and flexibility over time with regard to height, width and depth.

Source: Skolkovo Foundation, © BERNASKONI

[Hypercube_Construction_1.jpg] [Hypercube_Construction.jpg]



In November 2011, construction work began on the Hypercube in temperatures as low as -20 degrees Celsius. Working in three-shift operation and using optimised components such as the Schöck Isokorb, the building's seven storeys – covering 6630 square metres – were completed in just a few months. It was officially opened in September 2012.

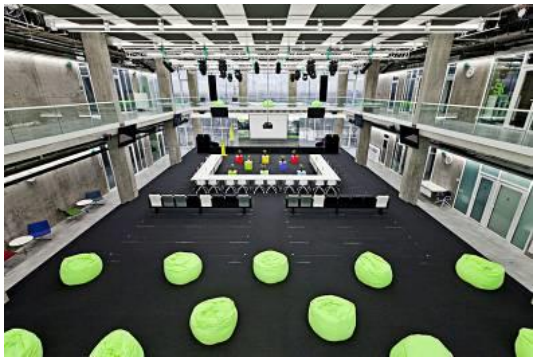
Source: Skolkovo Foundation © BERNASKONI

[Hypercube_Balcony]

There are freely cantilevered balconies on all sides of the building. The load-bearing thermal insulation element Schöck Isokorb type KXT was used to ensure thermal isolation. This minimises thermal bridges, which results in lower heating costs and reduces the risk of condensation and mould forming in the connection areas of the balconies.

Source: Skolkovo Foundation © BERNASKONI

[Hypercube_Conference.jpg]



[Hypercube_Staircase.jpg]

The interior has a minimalist design with exposed concrete walls. For a building in the continental climate zone, the Hypercube has very large insulated glass windows which flood the rooms with natural light and also save on lighting costs. It is not just the façade of the Hypercube that can be transformed. The interiors can also be converted over time, turning large conference rooms into smaller offices, whilst the construction of mezzanines creates additional space.

Source: Skolkovo Foundation © BERNASKONI

About the architect

[BorisBernaskoni.tif]

Source: © BERNASKONI

Boris Bernaskoni was born in 1977 in Moscow and studied architecture at the Moscow Academy of Architecture and marketing at the Plekhanov Russian University of Economics. Immediately after graduating in 2000, at the age of just 23, he founded his own interdisciplinary company and gained a doctorate from the Moscow Academy of Architecture. At the same time, he began teaching at his alma mater.

Bernaskoni's company works on projects in the fields of architecture, graphic design, industrial design, communication design, interior design, landscape construction, exhibition stand construction, infrastructure planning and town planning, and also provides consulting services. With his various projects, Boris Bernaskoni has made a name for himself as a provocative, non-conformist, self-confident and successful architect.

In addition to the Hypercube, Boris Bernaskoni has also designed another building for Skolkovo by the name of Matrex (or, in Russian, Matryoshka – the name for Russian nesting dolls). The multifunctional business centre is currently being built opposite the Hypercube.

More information on Boris Bernaskoni, his company and his projects can be found at www.bernaskoni.com.

For questions and feedback, please contact

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