

Paris-Saclay Campus Project Enter the Final Stage

At the heart of the Paris-Saclay campus, Ecole Polytechnique has initiated the construction of a multisports hall. White concrete twists, reminiscent of DNA, constitute the frame of the building.



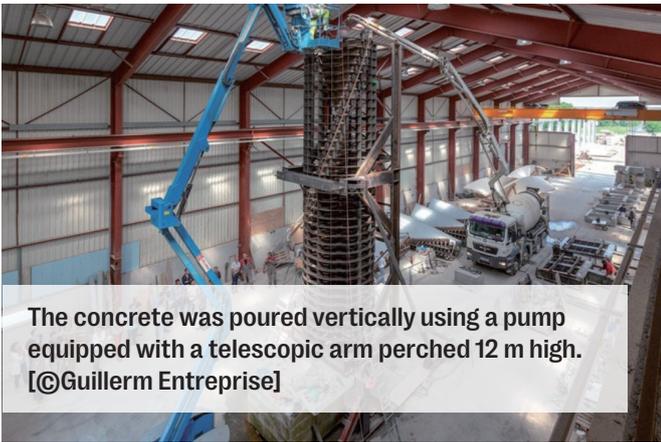
In a place where knowledge is gold and excellence is silver, the creation of a multisports hall at the heart of the Paris-Saclay campus has to match its surroundings. Developed by the Ecole Polytechnique in the commune of Palaiseau (91), this new building contains several areas dedicated to combat sports. Combining aesthetics and technicality, the multisports hall was designed, after a competition, by the architectural firm Stoffel Lefebvre. "It's encircled by DNA-shaped white concrete parts we call 'volute,'" explains Jean-Paul Deniel, production manager at Guillerm, the concrete manufacturer that produced and delivered the parts. Measuring 9.30 m in height, the 43 white concrete parts protect a pedestrian passageway and act as sunshades. They also give passers-by a glimpse of the athletes in action. A larger number of elements are arranged on the south face of the building.

Their undulating shape and soothing whiteness offer a sensation of lightness, which, in our imagination, could swirl in the wind. But these tendrils weigh as much as 9.30 t. Each part is held in place by metal mounting plates embedded in the concrete at the top and bottom. No rotation is therefore possible. "Three types of scrolls make up the work. For two of them, the rotation is 180° over the height, following a vertical axis with a twist to the right and left. Finally, the third rotation to the right is only 120° along a 15° axis," explains Jean-Paul Deniel. The white concrete for these parts was developed in collaboration with the admixture manufacturer BASF France Division Construction. "The constraint was to have a concrete fluid enough for pump pouring, with a rheology of 2 h."



Aesthetic and technical volutes.

It is composed of Aalborg white cement, Argical M-1000 metakaolin from Imerys and white Betocarb from Omya. Added to this are MasterGlenium ACE 482 and MasterEase 3500 superplasticizers (high water reducers), and MasterFinish DF 880, an anti-bullage additive, all from BASF. A gas pedal completes the recipe for the coldest days. To create the scrolls, Guillerm produced three molds with a metal base covered by a wooden skin. "Each is made up of four modules. They were assembled in our locksmith/metalwork shop from laser-cut parts."



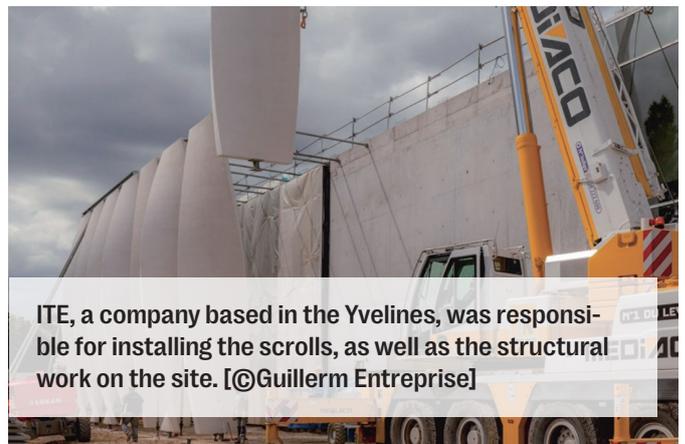
The concrete was poured vertically using a pump equipped with a telescopic arm perched 12 m high. [©Guillerm Entreprise]

The manufacturer's joinery workshop then took over to make the trim. "Here too, precision was essential," continues the production manager. "Some parts had to be made using a 3D machining center. The molds looked like boat hulls!" The skin of the molds also benefited from very fine sanding, reinforced with special epoxy varnish and polyurethane paint. While studying the mold design, the team had to think about the pouring phase, to be able to work indoors. "The idea of a horizontal assembly and formwork solution, followed by a lift for the pouring and drying phase, was necessary. Several 3D simulations were used to validate this technique." Guillerm's locksmith workshop also produced a tilter, capable of manipulating the volute in its mold. The latter was closed with some 80 Artéon-type rods, then welded once closed.

Unusual pouring and stripping.

"The lifting operation lasted around 15 minutes and was like a rocket about to take off," recalls Hubert Boulch, a form worker on the project. The concrete was produced in one of Guillerm's four plants and transferred by a pump mixer. Poured via a telescopic arm perched 12 m high, the concrete was poured vertically, limiting undercuts. Operators were able to control the filling process from a cradle. The reinforcement, produced in Guillerm's reinforcement workshop, and the formwork were traversed by a metal pipe to facilitate the descent of the concrete to the base of the formwork. The spiral-shaped framework is made up of two 4.60 m long elements and assembled with connecting bars directly inside the mold.

"Filling had to be done at low speed, to avoid 'exploding' in the formwork. Indeed, the pressures were very great. A downtime of 5 minutes every 10 minutes was necessary to give the concrete time to degas and stabilize." Disassembly and form stripping, carried out the day after pouring, took just 2 hours. The scrolls, stored on special trestles, were sprayed with Guard Industrie's BF24H water repellent before being shipped to Palaiseau. Here, Yvelines-based ITE was responsible for on-site installation. "The installation involved the use of a self-propelled crane with a



ITE, a company based in the Yvelines, was responsible for installing the scrolls, as well as the structural work on the site. [©Guillerm Entreprise]

double winch." The first to lift the part, the second to tilt it. The 43 scrolls were installed at a rate of four per day. This new multisports hall, shared by various institutions present on the Paris-Saclay site, is destined to become part of the DNA of the campus.