



KAZAN ARENA

Company: Outline

Location: Kazan, Russia

After a failed first attempt to hold the Summer Universiade in 2011, the Mayor of Kazan Ilсур Metshin and the President of the Republic of Tatarstan Rustam Minnikhanov were successful two years later in their bid for the 2013 Summer Universiade in the Kazan Arena. Kazan-based construction company, Komis won the tender to design, supply, install and set up the audio system within the stadium. The Kazan Arena has not only played host to the 2013 Summer Universiade, but will be the location of several high-profile matches during the 2018 World Cup in Russia, so the audio set-up needed to adhere to all of FIFA's technical parameters and specifications.

KS Engineering was subcontracted by Komis to design the audio configuration; the company's Andrey Smirnov used the floor plans of the stadium to make a 3D model with EASE software. "A design engineer from Komis called me to tell me that they were trying to get the contract to design the pro audio system for the

Kazan Arena. They asked me if my company could provide technical solutions and support should they get the contract," explained Andrey. "After the first design was made, we sent it to the Outline representative in Russia, who reviewed the system, corrected some weak points in loudspeaker connections and checked the specifications."

According to Sergey Chernitsyn, Project Director at Komis, there were two manufacturers to choose between for the audio system. Using Andrey's designs, the team tried out the loudspeaker set-ups from both manufacturers. The decision to opt for Outline was motivated by the satisfactory SPL levels and even coverage the loudspeakers produced.

"Outline amplifiers were chosen simply because the input and output characteristics, and the parameters of the amplifiers and the cabinets, had been set up and verified," Sergey explained. "Outline products were optimal for this installation because of their excellent technical and power parameters to price ratio."

The design process was a lengthy one, largely because the Kazan Arena was one of the first on such a scale in Russia. During this phase, and even after the audio system had been chosen, fundamental changes were made to the architecture of the venue. When the VIP boxes and storey layout had to be adapted during the



stadium's construction, Komis were forced to recalculate the suspensions and winch loads to re-assess the acoustic parameters within the space.

The original design specified chain suspensions for the Outline cabinets, but this set-up had to be abandoned because the winch loads were too heavy for the cabinets flown at two to four metres from the suspension points. Outline's representative in Russia, Alexander Klinushkin, suggested fitting the cabinets into a custom rigging construction made with metal plates and bars. The whole construction was then hung by chains from the girders and the purlins.

The audio configuration within the Kazan Arena comprised a combination of Outline and TOA products. Komis installed 24 Outline Spectra II 9075 wide-range, two-way active loudspeakers and 48 Outline Tripla II 9075 full-range, three-way active loudspeakers powered by 31 Outline T Nine amplifiers with KAESOP Ethernet card, all connected to five Outline Genius M412 matrices.

Furthermore, three TOA D-2000 rack-mounted digital mixing processor units work in combination with two TOA D-2012C remote console units with fader panels, one housed in the control room and the other is for remote use in the stands. Also from TOA was an SX-2000 system, which consisted in a single SX-2000AI audio input unit, four SX-2000AO audio output units and an SX-2000SM System Manager.

The weather conditions also posed considerable problems for the installation of the audio system, which took place in late autumn, when the temperature varies between 3° and -15° in Kazan. Komis had to work out a high-altitude method of rigging the cabinets in these conditions, a process made particularly complex by the stands in the Kazan Arena, which vary in height between 43-metres and 52 metres.

Another problem posed during the installation process was maintaining the hanging altitude and step of the loudspeakers as specified in the original design. In practice, the height of the girders and purlins varied from the measurements in the initial plan; engineers had to measure the girders, the purlins and the hanging points of the brackets to geometrically recalculate the optimum set-up. According to Komis' Sergey, the completion of the audio system is a significant achievement for the company: "This installation will go down in our company's history and in that of Outline as well, since the system has been installed at Kazan Arena, the first stadium built in Russia that will host the Football World Championship in 2018."

www.outline.it



Image courtesy of Laser-Kinetics

KAZAN ARENA

Company: Coherent, Laser-Kinetics Multimedia

Location: Kazan, Russia

The largest of several sports venues purpose-built for the 2013 Summer Universiade, the Kazan Arena mainly hosted football matches during the competition. It was also the setting for the Universiade's opening and closing ceremonies, which featured live music and visual effects, including a 'magic sphere' centrepiece with laser effects projected from the inside of a transparent PVC sphere.

With their unmatched ability to project a bright beam and multi-coloured graphics over large distances, lasers are ideal for use as part of vivid audio-visual shows in large indoor arenas and outdoor sports stadiums. The opening ceremony of the 2013 Summer Universiade in the newly constructed Kazan Arena was designed to be a spectacle where lasers played a key visual role.

The multimedia show was created by Moscow-based Laser-Kinetics, one of the few Russian-based companies with experience in both laser projection and water effects, particularly for larger venues. Compared to smaller installations, big stadiums need bigger audiovisual elements; at the heart of the 2013 Summer Universiade's Opening Ceremony was a large, eight-metre diameter PVC sphere, referred to as the 'magic sphere'.

Located at the centre of the show, the sphere was suspended in a way that allowed it to move and rotate during the ceremony. Eight laser projectors from Laser-Animation were set inside a three-metre diameter sphere, which was itself placed within this larger sphere. The lasers were arranged to project their beams radially out towards the inner surface of the spheres. The purpose of this unique set-up, a concept conceived by Laser-Kinetics, was to create the brightest possible graphics on the sphere by having light directed out towards the audience. Equally important from a safety perspective, by scattering the light on both the inner and outer spheres, as well as carefully focusing the laser, Laser-Kinetics was able to

eliminate any risk of laser beams directly reaching the audience.

Four of the projectors used were LaserAnimation Blitz Basics, each equipped with two Coherent Taipan lasers rated at 10W each. The other four projectors were also LaserAnimation Blitz Basics, but these were each powered by a single 10W Coherent Taipan laser. Although Taipan lasers are available with a full choice of colours, in red, green, blue and yellow, all of the lasers used in this project were at the same green 532nm wavelength.

Green lasers were chosen for their ability to emphasise spectacularly intense levels of brightness, with 120W of single-colour laser power rather than full-colour laser effects. In addition to all of these lasers, Laser-Kinetics also relied on its water-effect expertise to incorporate 70 single jet water fountains, a combination of 30 Kollektor-type 'effect' fountains and 10 'special' fountains, all driven by a massive 440kW water pump system.

Coherent Taipan lasers are based on third-generation, optically pumped semiconductor laser (OPSL) technology, which is characterised by all solid-state reliability as well as high electrical efficiency. Such efficiency is important because it minimises the heat loading produced by each laser head; in first generation light show lasers, over 99% of electrical power was converted into heat. With all the laser projectors confined to a closed plastic sphere measuring only three metres in diameter, heat loading was an even more important consideration than in typical displays, where the lasers are operated in an open environment.

According to Laser-Kinetics, the Blitz projector and Taipan laser combination provided three key benefits for the high-profile show, namely reliability, compact packaging, and electrical efficiency. "Laser reliability is very important in any light show, but unlike at an amusement park where occasional glitches may be accepted, reliability is absolutely vital in one time events like this opening ceremony. You only get one chance to do it right, so 100% reliability is needed; even 99.9% is not good enough."

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