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 LaserAnimation 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 concieved 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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