

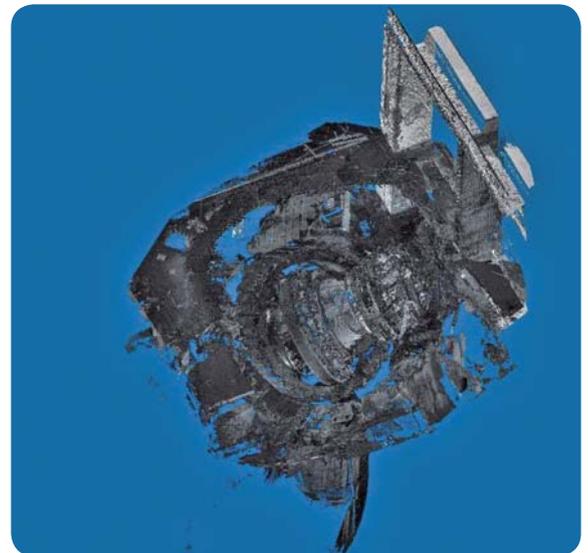
Accident Investigation at Russian Power Station

by Pavel Karpov

After one of its turbines was pushed out by water pressure, 75 people died at the Russian Sayano-Shushenskaya hydroelectric power station in the summer of 2009. Leica Geosystems' equipment was chosen to scan the disaster area during the first phase of reconstruction.

The accident happened after one of the hydropower units was pushed out and lifted into the air by the pressure of a stream of water. After the water pressure decreased, the power unit – now more or less a pile of waste metal with a total weight of 2,000 tons – came to rest upon a crane base. After detailed inspection it became clear that it would be necessary to drag it out of the debris for further inspection and to determine the cause of the terrible accident as well as the cost of reconstruction, which was estimated to be around 40 billion Rubles (almost 1 billion Euro).

The only way to lift the unit was to use one of the cranes – although it was possible that both the crane



■ Point cloud of the scanned turbine.

and the turbine would collapse during the operation. A 3D model of the power units was needed to aid decision-making for this high-risk undertaking. Laser scanning was chosen since the fragments were too big to survey using a total station. Three specialists



of Leica Geosystems' partner Naveocom Engineering carried out the scanning.

The Naveocom team's goal was to supply design engineers with all documentation needed to dismantle the power unit. The scans had to be performed within a very tight schedule and harsh conditions. The Leica HDS6100 laser scanner proved to be the ideal instrument for the job: "It is a scanner that met all our requirements for successful job performance," says Pavel Karpov, senior engineer at Naveocom Engineering. "For those who work outdoors the advantages of this scanner are very notable. You can manage everything from onboard controls: no need for external controllers, notepads, etc. The power unit is also 'onboard' – no external power units and cables are needed: If a surveying device requires extra equipment, it means you need an extra person to carry it, but during this project we faced a lot of situations where two persons simply wouldn't fit."

During the scanning phase, one of the Naveocom specialists worked with a total station to georeference the object, while the other two scanned the

damaged unit and two other nearby units from 50 stations. Field work – while completed with as much detail as possible – took only three days.

Due to the high point density achieved with the Leica HDS6100 scanner, it was possible to create a precise and very detailed 3D model of the three extremely complex power units. Additionally, the Naveocom team could generate a full set of plots and drawings that was passed to the customer. Leica Cyclone software was used for post-processing. Afterwards, the scans were referenced into one single point cloud to create the 3D models. ■

About the author:

Pavel Karpov is a Senior Engineer at Naveocom Engineering, Leica Geosystems' distribution partner in Russia.