Lukas Steiner, Wikov Industry

Spassk Cement - Higher efficiency with a Wikov Side Drive

Mechanical gearboxes and gears have been manufactured by Wikov Gear in Pilsen, Czech Republic for almost 100 years. The brand is the successor to the globally-recognized Škoda brand, which has a rich gearbox installation base all around the world. Wikov Gear's history is bound to the demanding oil and gas and power-generation sectors but most importantly the cement sector, to which it provides equipment and services for ball mills, vertical roller mills and belt conveyors, among other parts. Here, the company describes a recent project to replace a ball mill drive for OAO Spassk-Cement, the largest project that it has ever undertaken.

In the autumn of 2013 Wikov Gear received an order for a 120t drive for a horizontal ball mill from Russia's OAO Spassk-Cement, part of the private Vostok cement group. Spassk-Cement is located in Spassk-Dalny in Russia's Far Eastern Federal District. The 3.4Mt/yr plant has three production lines that send 95% of their output to the domestic market.

The new drive to be supplied by Wikov was set to replace an original Aerofol-2 drive that was manufactured by Volgocemmash almost 40 years ago. The Aerofol-2 was designed as an experimental project and was the only drive of its type in the world. It had been supplied with numerous replacement parts for consumption during its lifetime. However, eventually there were no remaining spares and the most recent breakdown was 'fatal' to one of the plant's production lines.

Above: The Wikov brand succeeded the historic Škoda brand in 2004 after almost 90 years of operation.

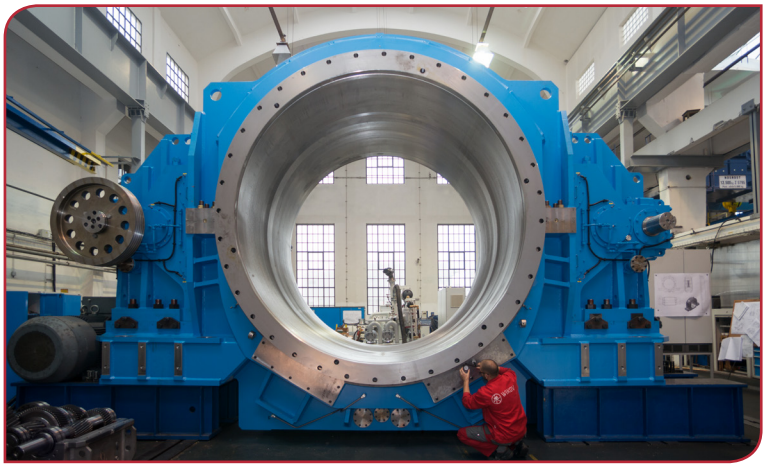
Right: The horizontal ball mill drive with two side drive gearboxes after assembly at Wikov Gear factory in the Czech Republic.

The original manufacturer was not able to support the plant, and so Spassk-Cement's specialists sought the help of specialised companies. "There was no company in Russia that was eligible for such a task," explains Alexander Alverov, chief engineer at Spassk-Cement. "There were proposals from renowned companies but none of the solutions met the technical requirements. We almost gave up and thought we could not find a resolution for the problem. Finally, help came from Wikov. It submitted a unique project for a new gearbox for Aerofol-2."

The Wikov drive for Spassk-Cement consists of two Side Drive gearboxes, each with nominal power of 2000kW. The Side Drive gearboxes belong to a new generation of ball mill drives. A major focus of the project lay in the elimination of contamination of the lubrication system. The extremely dusty environment of cement plants is often a cause of early wear for gears, bearings and other key components of the gearbox.

The size of the smallest dust particles is only 3µm, which explains why it is a demanding task for the designers to ensure perfect protection for the gearbox mechanism. The most critical areas are the gearbox input pinion, the connection of the girth gear of the ball mill with the gearbox and the sealing of the girth gear and its cover.

Wikov therefore developed a solution of a separated lubrication system that protects these main components from dust contamination. This feature is the key factor when it comes to upgrading



Above: From the Czech Republic to Russia's Far Eastern Federal District. Wikov Gear's largest ever gearbox was transported in 25 boxes by Agility.

existing conventional drives that are prone to early wear due to dust contamination. The design of the Wikov Side Drive gearbox protects the drive components of the gearbox such as gears and bearings from dust and dirt pollution. It extends the gearbox life and oil exchange intervals, resulting in reduced maintenance costs and downtime. The lubrication pipe system is located outside the gearbox housing, which makes the work for maintenace and service staff much faster and easier. There is no need to dismantle the whole gearbox in case of regular service. The design has been extensively used in cement plants around the world, mainly in Turkey.

"The assembly of the complete drive took almost 10 months and first start-up test took place in October 2014," said Tomas Zrostlik, managing director of Wikov Gear. "The gearbox was dismantled and transported to another part of the world in some 25 boxes. The heaviest part weighed around 45t."

Convoluted route

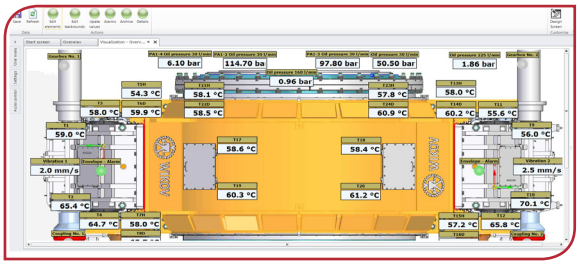
Complete logistics from truck loading at the Wikov plant in Pilsen via sea transport from Hamburg to Vladivostok and final unloading in the premises of the Spassk cement plant took 55 days.

Transport took place during winter, with delivery at the plant in Spassk-Dalny, Russia in March 2015. The temperatures at the destination vary from -40°C in winter to 40°C in summer. The installation of the drive was agreed for spring due to better climate conditions that facilitated preparation of the worksite.

The installation of the drive for the ball mill started on 8 April 2015, when factory service engineers arrived in Vladivostok. The live operation started on 28 April 2015 after just 20 days of assembly, testing and modifications. This included the lubrication and cooling systems as per the customer's additional requests. The mill was filled to 50% of its total capacity, which equates to 48t of material and balls. "Our 'baby' was running so smoothly and quietly that we could not help but notice the bystanding staff of Spassk Cement being positively surprised," said Pavel Sulc, service manager of Wikov Gear.

All Wikov gearboxes can be fitted with WiGuard, a remote condition monitoring system developed by Wikov. The system was designed using the servicing experience of Wikov engineers from a variety of industrial applications. WiGuard provides real-time information about the performance of the gearbox during its operation, gathering data about vibrations, temperature, speed, pressure, oil quality and other parameters. It is accessed by Wikov service via a web interface for on-line analysis. Apart from its diagnostic capability, it serves as a safety tool by sending warning and error messages.

The WiGuard system at Spassk-Cement processes data from 35 sensors fitted on the gearbox. This gives Spassk the security of continuous operation of the ball mill and ensures efficiency of production at the cement plant, which is over 10,000km away from Pilsen. "At Spassk, WiGuard does not just serve as a performance and service tool, it also helps to control the operation efficiency of the mill," said Alexey Nikolajevich Sisoyev, executive director of Spassk-Cement.



Below left: A screen-shot from the WiGuard remote conditioning system, which allows Wikov's engineers to see a raft of key parameters remotely. In the case of Spassk-Cement, Wikov's engineers are 10,000km away.

Below: The gearbox is 8m long, 5m high and 2.5m wide. Since it started operation, Spassk-Cement confirms that the drive has run without problems for 1776hr. It has ground an average 264t/hr of cement. This means that it has ground over 468,864t of cement.