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Hägglunds drive systems from Rexroth increase productivity and availability

CEMENT MANUFACTURING: FINE CONSTRUCTION MATERIALS FROM THE GRINDING ROLLS

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Greater efficiency, lower energy consumption, and maximum simplicity – these are the trends driving the development of grinding technology in the cement industry. Mills of various types are used in cement works, from grinding the raw material through to crushing the clinker into fine powder. Alongside vertical and ball mills, HPGRs have proved suitable for a wide range of applications. In a bid to increase production capacity, Austrian company Wopfinger Baustoffindustrie GmbH has replaced the electromechanical drive technology of its existing HPGRs with hydraulic direct drives from Rexroth. The stated goal was to increase machinery uptime. Although the uses of concrete are practically unlimited, the cement needed to make it has always been manufactured from natural raw materials: chiefly limestone, clay or marl, and sand. With the correct mix of aggregates, manufacturers can make adjustments to configure the cement for specialized applications. The basic principle of cement manufacturing has been the same for decades: Mills crush the raw material mixture into a fine rawmix, which is simultaneously dried by injecting dry air. The heat source is waste heat from the rotary kiln in which the powder is neutralized (losing CO2) and sintered to become clinker. After cooling, the clinker is again put through a mill, resulting finally in the cement powder that will either be bagged or placed in silos. What sounds like a simple process actually needs sophisticated process engineering to make it work. This is
especially true today, given the desire to increase energy efficiency, life cycle, and productivity.

**More power in the same space**

In the course of a capacity upgrade program at Wopfinger’s cement works in Lower Austria, it became clear that existing production technology had reached its limits in some respects. On the HPGRs, increased output had resulted in damage to the electromechanical drive. Obvious symptoms of overloading included problems with the motor bearings, gears, and drive shaft. The goal of the upgrade was to increase roller press uptime, so that the machinery could operate at sustainable levels of capacity utilization. The space was too cramped to accommodate more powerful electromechanical drive technology of the kind used in the past, so the company began to examine how drives of higher power density could be installed. What was needed was a drive system that delivered torque of up to 500 kNm to the rollers in a speed range of 18 to 24 rpm. Whatever the advantages in terms of reliability, uptime, and life cycle, the new technology could not be less efficient than the electromechanical drives. Wopfinger boasts an extremely lean production process. The 500-worker site is one of the cleanest building materials plants in the world.

To begin with, Wopfinger conducted an extensive survey of the plant to identify potential areas for improvement. For instance, maximum torque loads on the fixed and movable rollers were analyzed, as were the prevailing slip behavior and the axial forces occurring in the drive shafts during operation.

**New-generation motors deliver even more torque**

The parameters finally resulted in Hägglunds CBm motors being installed. With maximum torque of 2,000 kNm, these are the most powerful direct drives on the market. In its Hägglunds CBm series, Bosch Rexroth has improved torque by 50% over the previous series, while achieving weight savings of up to 50%. Thus equipped, the HPGRs can turn at full power from startup.

The Hägglunds motors deliver their full torque from the outset, so there are no starting losses. Process reliability aside, the maintenance costs show how well the system has performed in practice. Wopfinger expects to spend significantly less on maintenance and servicing. Now, thanks to the Hägglunds drive system, the energy input to the rollers can also be limited.

A brief period of two weeks during plant shutdown was the only time available for the upgrade. The Bosch Rexroth service department teamed up with other contractors to carry out those parts of the work that could be completed in advance of the shutdown. The Hägglunds drive system had to be integrated into an existing production system, so the bases of the electric gear motors and the drive shafts of the HPGRs remained in position. In addition, when designing the hydraulic direct drive technology, the structural engineering of existing buildings had to be considered.

**Summary**

The roller press case study shows how cement manufacturing machinery can achieve higher productivity and uptime when powered by hydraulic direct drives. Thanks to their high power density, Hägglunds drive systems allow compact integration in existing machine structures. The hydraulic unit used also increases flexibility for making optimum use of existing production space.