

Slab Grinder Drives, Outokumpu, Sheffield



Drives boost performance of slab grinder at Outokumpu, Sheffield.

Outokumpu Stainless has significantly cut set-up and downtime on their three massive slab grinding machines thanks to the replacement of hydraulic drives with variable speed AC.

Outokumpu in Sheffield is Britain's biggest manufacturer of stainless steel, producing a wide range of grades in slabs, blooms and billets. The company's attention became focussed on one of its key Centro slab surface grinders, when downtime for maintenance was becoming excessive.

"We had converted all of our grinding machines to the use of water based non-flammable hydraulic fluids, to eliminate a potential fire risk" explained Outokumpu Mechanical Operations Engineer, Shaun Penn. "However this has proved to be very corrosive. We wanted to look at a better, more environmentally acceptable solution and called in local drives specialists Drives and Automation, who recommended a solution based on Unidrive SP drives from Control Techniques. There was initial scepticism from the machine manufacturer, but the electrical drives route has proved to be much more accurate and has significantly reduced setting-up time.

The slab grinder, utilising a 910 mm diameter grinding wheel at speeds up to 2,500 rpm, removes impurities and inclusions, such as nitrides and titanium clusters, on the face of cast slabs of stainless steel. Sizes range between 950 to 1600 mm width, 5 to 15 meters long, between 170 and 300 mm in thicknesses and in weights up to 35 tonnes.

Depending on the grade of stainless steel, slabs undergo a light de-scaling pass or one to two heavy passes and a polishing pass on both upper and lower faces. The machine has three loading tables and a turning unit to 'flip' the slab for cleaning of the reverse face.

The retrofits involve the replacement of the hydraulic table drive with a servo positioning solution using a Unidrive SP in conjunction with a 75kW Leroy-Somer induction motor coupled with a 56.1 gearbox. The overall machine control was also upgraded to an Allen Bradley SLC 5/05 PLC with Drives and Automation writing new software designed to reduce the slab loading and unloading cycle time.

Operating in flux vector mode, the Unidrive for the table control was fitted with an SM Applications module to provide fast automatic positioning control of the table. Two additional I/O plug in modules were provided for the multiple feedback signals from light beam edge sensors (detecting the ends of the slab), the LVDT rope tension transducer and incremental encoders.

Technical Details

- Control Techniques Unidrive SP Drives
- Unidrive SP SM Applications/CTNet Modules
- Allen Bradley SLC5/05 PLC System
- InTouch SCADA
- Pilz Multi Programmable Safety Relay System
- Cressall Dynamic Braking Resistors



Ethernet communications connected the table drive, PLC and a panel PC running an Intouch SCADA package.

The operator sets up operating parameters such as table speed and head power while the new control system provides automatic edge detection, slab end power reduction, protection against the head going beyond the edge (drop safety) and other safety interlocks.

The old analogue amplifier for the hydraulic head drive had become difficult to maintain with no spares available, so an alternative solution had to be found. The solution put forward by Drives and Automation, comprised a Unidrive SP fitted with a level 4 PLC application module to provide fast PLC control of the hydraulic head positioning system. "This was the most economic solution to this particular problem," says John Goodwin of DnA.

"To achieve the required processing speeds and capacity, the alternative was a powerful, and costly, PLC with motor control. The Unidrive SPs on-board PLC gives us open programmability combined with high speed. We used an analogue output from the Unidrive SP and a DnA designed interface card to connect directly to the head solenoid valve."

"The objective is maintain a constant peripheral speed as the grinding wheel wears down, with both precise and fast pressure control," explains John Goodwin. The new control set-up provides a superior performance in both of these areas and gives additional safety features including effective drop-off prevention."

"We are delighted with DnA's work and with the performance of the Control Techniques drives," says Shaun Penn. "As well as being much more environmentally friendly, the new control system has cut downtime and maintenance - and the reduced set-up time on each size of slab has increased product throughput on the machine."

Another project recently completed by DnA at Outokumpu includes an upgrade on a billet grinder, again using Control Techniques Unidrives which, not only gives automatic set-up, but has significantly reduced grinding wheel wear giving operational savings.

Drives and Automation (DnA) based near Sheffield provides a comprehensive system design and built or retrofit service for control systems, encompassing drives, PLC systems and complete projects.

Outokumpu is one of the largest manufacturers of stainless steel in the world. SMACC (Stainless Melting and Continuous Casting) at Shepcote Lane produces in excess of 600,000 tonnes of stainless steel per year. It has the capability to melt 130 tonnes of material in just 85 minutes



in the arc furnace, reaching temperatures up to 1600°C. Today SMACC makes more steel per year than has ever been made in the history of Sheffield. The company has recently invested more than £15 million in its manufacturing capacity.

Problem Solved

- Hydraulic Pump Life Poor
- Machine Reliability
- Slow Machine set-up
- High Maintenance

Solution

- Electrical positioning drives
- Modern Control System
- Scada Control
- Machine Diagnostics
- Ease of Use

Benefits

- Cost Savings
- Reduced Downtime
- Improved Quality
- Reduced Energy Consumption
- Environmental Benefits