

## Innovative drive configuration improves production in GKN foundry

**GKN Sheepbridge Stokes is the UK's leading manufacturer of cylinder liners for the automotive engine market. GKN has redesigned the control of their 8-head cylinder liner casting machine and is seeing substantial energy and production benefits from the innovative drive configuration used.**

The Nemesel 8 machine has 8 cylindrical casting dies mounted 45 degrees apart on a circular horizontal table which indexes between 'service stations'. At the stations the horizontal die is cleaned and prepared and the molten steel is inserted. By high speed rotation of the dies, a measured volume of molten steel becomes a solid steel cylinder which cools as the table is indexed round the 8 stations and is extracted from the die on the final station. About 75 cast steel cylinders are produced every hour.

With the die spinning at station 1, a lance is inserted into the die to vacuum out the debris from the previous casting, and then a measured volume of special casting sand is added, which due to the centrifugal force, evenly lines the die. The table indexes through station 2, a maintenance gate, to station 3 where the molten steel is poured into the spinning die. As the table indexes round through stations 4, 5 & 6, cooling water is sprayed onto the spinning die and the centrifugally formed cylinder progressively solidifies. At station 7, the high inertia die is braked to standstill, ready for the extrac-

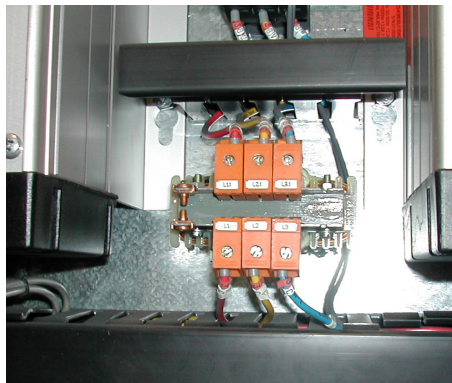
tion of the cast cylinder on station 8, then spun up and moved onto station 1 where the whole process starts again, while the next cast steel cylinder is extracted from station 8.

Substantial amounts of energy must be dissipated during the deceleration process on station 7, while each of the other 7 drives is either spinning its die or, in the case of the extract station, stationary. On older machines on site, the energy stored in the spinning cylinder at station 7 is simply burned off through braking resistors, further exacerbating the high ambient temperature within the foundry environment.

Tony Saunders, Electrical Project Manager at GKN " I decided a new approach was called for and carried out a detailed survey of the market for drives which would meet the demanding performance and environmental demands of the Nemesel machine. IP54 ac drives are essential given that the pervasive and highly conductive carbon graphite dust is emanated by the casting process. But equally high dynamic performance is required of the

drives as the 350 kg spindles must accelerate to 1400 rpm in only 3 seconds and decelerate on station 7 in under 7 seconds. An efficient braking arrangement and DeviceNet communications was also on my specification. Danfoss was one of the very few suppliers who could offer suitable IP54 enclosure drives. Danfoss' 24/7 backup is also attractive because of the high cost of production lost to machine downtime."

VLT® Decentral FCD 300 drives were selected for the five lower power indexing, autopour, casting cleaning and lance drive functions because of the IP 66 enclosures. Again the drives were fitted with DeviceNet communications so that the whole sequence is PLC controlled with minimum control cabling.



Load share coils mounted between the drives

*Tony, the engineer, selected 5.5 kW VLT® 5000 IP54 series drives for the spindles, and by paralleling up the dc busses of the eight drives, was able to recirculate and recover the braking energy from station 7 via the dc bus, to the other spindle drives. This highly efficient form of regenerative braking completely eliminates the energy lost in braking resistors, along with the heat output from braking resistors, now no longer necessary. It also provides superior braking performance.*