Metalock Engineering UK

Press Information

METALOCK CLAIMS A WORLD FIRST WITH PF MILL GIRTH RING REPAIR FOR POWERGEN/COTTAM

In what is claimed as a world first, Metalock Engineering UK saved Powergen's Cottam Power Station, Retford a substantial amount of expenditure by repairing a 4.45 metre diameter girth ring on one of the station's 16 pulverised fuel mills.

The giant girth ring is the main driven element used to rotate the PF mill and its 100 tonnes of milling balls and is a double helical gear with 174 teeth in herrringbone form, 760mm wide. The teeth also have a lead (spiral twist) from the outside edges into the centre gap of the herringbone. During an routine check by gear specialist J D Gears(West Midlands), a crack was found along one of the gear teeth. Monitoring over ensuing months revealed that there were further cracks which were spreading. The cost of replacing the girth ring and matching pinion could have approached £0.5 million, particularly as many ancilliary items would also have to be replaced. Labour and downtime costs also had to be considered.

The Cottam plant team called in Metalock to evaluate the possibility of repairing the cast steel girth ring by machining out the three cracked teeth and replacing them with a matching insert. Although it was believed that such a repair on a double helical gear of this type and size had not been attempted by anybody before, Metalock engineers were confident that they could achieve an effective result. They set about designing a rig to mill out the offending section. In practice, the leading and trailing faces were dovetailed to retain the new insert. Meanwhile, a new 45t/in² UTS steel insert was made with the three teeth, cut on a five-axis milling machine to achieve the lead, and a male dovetail to provide a tight clearance fit of 0.0015/0.002 inches (0.037/0.050 mm) and a lift value of 0.0005 inches (0.013 mm).

Once the insert was fitted, Metalock stitched along its base interface 130mm deep from the gear edge and at the inner edge in the tooth clearance curve area. Additionally, the two dovetail interfaces were drilled and tapped to accept studs fitted along their length to completely lock the insert into position.

These studs were subsequently machined flush. As the existing gear teeth had up to 2mm of drive face wear, those on the new insert were milled and fitted to match.

Commenting on the repair Zahir Esmail, Cottam's Milling Plant Team Leader said that it was an excellent engineering project. "We did not think it possible but the mill is up and running well".

The girth ring is the main driven element used to rotate the PF mill and is a double helical gear 4.45m diameter with 174 teeth. 3 cracked teeth were replaced by Metalock in what is thought to be a world first.

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