COMMISSION REPORT · TROYANOVO-3 MINE

KA218 bevel gearbox: metal built up on the teeth, drive load went down

Mini Maritsa-Iztok EAD, Troyanovo-3 mine branch · commission: chairman Eng. D. Cholakov, members T. Sotev, V. Kitanov · treatment carried out by May OOD

Mednikarovo, Bulgaria · measurements before treatment 24.03.2004, repeat measurements 26.05.2004

PRODUCT

XADO revitalizant gel

for transmissions and gearboxes · 3 stages of 2.330 kg at 8-hour intervals · 700 l oil bath

TREATED UNIT

Bevel gearbox KA218-1000 kW/1216-F2

station T6 · pinion z=22, wheel z=99 · module 10.75 mm · 980/260 rpm

DOCUMENT TYPE

Commission report of the Troyanovo-3 mine

measurements before and after treatment in the presence of mine and May OOD representatives

EQUIPMENT	CONDITION AND PARAMETERS BEFORE TREATMENT	WHAT WAS MEASURED
Bevel gearbox KA218-1000 kW/1216-F2, station T6	Deliberately picked as the most worn unit: deep pitting on the wheel teeth, under load noisier than the three neighbouring gearboxes of the station	Tooth thickness with a gear tooth vernier caliper, condition of the working surfaces
Bevel gear pair and drive electric motor	Pinion z=**22**, wheel z=**99**, module **10.75 mm**, **980** / **260 rpm**; oil bath **700 l**	Motor current at no load and under load

The revitalizant gel was added to the gearbox oil bath: 3 stages of 2.330 kg at 8-hour intervals, 6.990 kg in total per 700 l of oil.

Key results

↑ 0.20 mm

wheel tooth thickness in the wear zone, 12.50-19.00 → 12.70-19.20 mm

↓ 8.3 %

drive motor current at no load, 36 → 33 A

Wheel tooth thickness — metal gain at every point of the wear zone

TOOTH AREA	HEIGHT FROM TIP	BEFORE, mm	AFTER, mm	GAIN
158 mm from the end face	5 mm	12.50-12.55	12.70-12.75	+0.20
158 mm from the end face	8 mm	14.60-14.75	14.80-14.95	+0.20
158 mm from the end face	11 mm	16.80-16.90	17.00-17.10	+0.20
158 mm from the end face	14 mm	18.90-19.00	19.10-19.20	+0.20
40 mm from the end face	5-14 mm	11.75-18.25	11.75-18.25	no change

Gear tooth vernier caliper, three marked teeth at each height. Metal built up on the section towards the smaller diameter — where the pitting was concentrated.

Pinion tooth thickness — measured 11 mm from the tip

TOOTH	BEFORE, mm	AFTER, mm	GAIN
Tooth 1	17.10	17.50	+0.40
Tooth 2	17.10	17.30	+0.20
Tooth 3	17.15	17.70	+0.55

Measured 158 mm from the tooth end face, on the same marked teeth before and after treatment.

Load on the drive electric motor

MODE	BEFORE	AFTER	CHANGE
No load	**36 A**	**33 A**	**−8.3 %**
Rated load	**39-51 A**	**36 A**	below the previous range

Current measured in both standard operating modes of the station, before and after treatment.

Condition of the working surfaces of the wheel teeth

TOOTH AREA	24.03.2004 — BEFORE	26.05.2004 — AFTER
Middle part of the profile	Isolated pitting cavities **1-1.5 mm** in diameter, **0.1-0.2 mm** deep	Pitting cavities filled in, a visible layer of XADO metal-ceramics formed
Start of the tooth on the smaller-diameter side	Severe pitting damage, cavities up to **3-5 mm** in the largest dimension, **2-3 mm** deep	Partial filling of the pitting by the XADO layer
Operation under load	Noisier than the other three gearboxes of the station	Noise level dropped significantly

Inspection and noise assessment by the mine commission after the gearbox top cover was removed, on 24.03 and 26.05.2004.

Commission conclusion

The gearbox was selected for treatment as the most worn unit at station T6: deep pitting on the wheel teeth, cavities up to **3-5 mm** and **2-3 mm** deep. Two months later the commission recorded, on the same teeth, filled cavities and a visible layer of XADO metal-ceramics. Commission of the Troyanovo-3 mine: “Treatment by XADO technology of the KA218-1000kW gearbox of shut-off station T6, specially selected for this purpose because of its heavy wear, produced a positive result. Restoration of the bevel gear parts worn during operation led to a considerable improvement of the gearbox operating parameters: vibration and noise levels were reduced, the load on the electric motor decreased and the condition of the gearbox teeth and bearings improved. The results obtained give every reason to state that the use of XADO technology in heavily loaded machinery will significantly extend service life.”

XADO

The results relate to the KA218-1000 kW/1216-F2 bevel gearbox of station T6 at the Troyanovo-3 mine and to its operating conditions; on other equipment and in other modes the figures may differ. The original commission report is published in full and available for download.