

GEARBOX TREATMENT REPORT · BAKU STEEL COMPANY

Rolling mill gearbox: mesh clearances reduced, scoring filled without teardown

Baku Steel Company (BSC), rolling mill, roughing group of the stand No. 5 line · treatment performed by POO "YARASA" · report signed by the plant's chief mechanical engineer and electrical engineer, two "Approved" endorsements, seals of both parties

Baku, Azerbaijan · 2001 · control measurements after 950 h of gearbox operation

PRODUCT

XADO RVS, gel formulation
added through the oil filler port
in 3 stages — the gearbox was
not disassembled

TREATED UNIT

CONTI – 1 (FLANDER)
power gearbox
roughing group of the stand No.
5 line · made in Germany

DOCUMENT TYPE

Report on treatment results
with signatures and seals
of both parties

EQUIPMENT**CONDITION AT START OF TESTING****WHAT WAS MEASURED**

CONTI – 1 (FLANDER) power
gearbox, roughing group of
the stand No. 5 line

Pinion and gear wheel teeth worn
due to overheating; pitting and
scoring on the teeth

Radial (S) and backlash (N)
clearances in the mesh — 12 points;
condition of the tooth surfaces

High-speed and low-speed
shafts of the same gearbox

Scatter of clearances across
measurement points — a sign of
heavy tooth wear on both shafts

Radial play of each shaft before
treatment and after 950 h of operation

Clearances were measured by crushing lead plates at four shaft positions, every 90° of shaft rotation, in the left, right and middle parts of the mesh.

Key results

↓ **0.3-0.6 mm**

radial clearance in the mesh, 1.2-1.6 → 0.9-1.2 mm

↓ **0.05 mm**

radial play of the shafts, 0.75 → 0.70 and 0.60 → 0.55 mm

Gear mesh clearances — before treatment and after 950 h of operation

SHAFT ROTATION	PART	RADIAL CLEARANCE S, BEFORE → AFTER	BACKLASH N, BEFORE → AFTER
0°	left	1.6 → 1.0 mm	1.2 → 1.0 mm
0°	right	1.3 → 1.0 mm	1.4 → 1.0 mm
0°	middle	1.3 → 1.2 mm	1.4 → 1.0 mm
90°	left	1.6 → 1.0 mm	1.4 → 1.0 mm
90°	right	1.5 → 0.9 mm	1.4 → 1.2 mm
90°	middle	1.5 → 1.0 mm	1.4 → 1.0 mm
180°	left	1.3 → 1.1 mm	1.0 → 1.0 mm
180°	right	1.2 → 1.2 mm	1.0 → 1.0 mm
180°	middle	1.5 → 1.0 mm	0.8 → 1.0 mm
270°	left	1.4 → 1.0 mm	1.0 → 1.2 mm
270°	right	1.4 → 1.1 mm	1.4 → 1.0 mm
270°	middle	1.5 → 1.2 mm	1.4 → 1.0 mm

Measured with lead plates, values in mm. The reduction in clearance is a direct result of the metal-ceramic layer built up on the working surfaces of the teeth.

Radial play of the gearbox shafts

SHAFT	BEFORE TREATMENT	AFTER 950 HOURS OF OPERATION	CHANGE
High-speed	0.75 mm	0.70 mm	-0.05 mm
Low-speed	0.60 mm	0.55 mm	-0.05 mm

The report states the same value in prose: “the radial play values of the high-speed and low-speed shafts decreased by 0.05 mm”.

Tooth condition: inspection before treatment and after 950 h of operation

WHAT WAS INSPECTED	BEFORE TREATMENT	AFTER 950 HOURS OF OPERATION
Tooth surface	Pitting and scoring, wear due to overheating	Scoring and pits filled with a ceramic layer
Layer on the teeth	No coating, worn metal in operation	Build-up on the pinion and gear wheel teeth 0.3-0.4 mm
Tooth contact area	Scatter of readings across the points — heavy tooth wear on both shafts	Contact area evened out across all teeth of the high-speed and low-speed shafts

Surface condition and build-up thickness were recorded by visual inspection of the commission, as stated in the report.

Commission conclusion

The gearbox came to treatment in severe condition: the pinion and gear wheel teeth were worn due to overheating, with pitting and scoring on the teeth. The formulation was added through the oil filler port in three stages; the gearbox was neither disassembled nor taken out of service. The commission of Baku Steel Company (BSC) and POO "YARASA" recorded in the report: after **950 h** of gearbox operation "the build-up on the teeth reached up to **0.3-0.4 mm**. The contact area evened out across all teeth of both the high-speed and the low-speed shafts. Visual inspection revealed that the scoring and pits had been filled with a ceramic layer". The magnitudes of the change in backlash and radial clearances are given in the table of the report, while "the radial play values of the high-speed and low-speed shafts decreased by **0.05 mm**, which likewise confirms the positive result of the treatment".

XADO

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The results relate to the CONTI – 1 (FLANDER) power gearbox of the Baku Steel Company (BSC) rolling mill and to its operating conditions; on other gearboxes the figures may differ. RVS is an obsolete XADO designation, the zero-generation formulations; the current product generation is revitalizants. The original report is published in full and available for download.