

GEARBOX TREATMENT REPORT · MARCH–JULY 2010

VVM 2-150 pump gearbox: tooth geometry restored without disassembly

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Chernyansky District, Belgorod Region, Russia · treatment from 22.03.2010, control measurement 14.07.2010

PRODUCT

XADO revitalizant compounds
full treatment cycle of the gearbox in service

TREATED UNIT

VVM 2-150 pump drive gearbox
gear wheel · bearing supports of shafts 1 and 2

DOCUMENT TYPE

Plant report signed and stamped by the OAO

UNIT	CONDITION BEFORE TREATMENT	RUNNING TIME TO MEASUREMENT	WHAT WAS MEASURED
VVM 2-150 pump drive gearbox	Accumulated mechanical wear of the wheel teeth; chains of pitting cavities on the working surfaces	1440 h after treatment	Tooth thickness at the constant chord; condition of the working surfaces

The treatment was carried out without disassembling the gearbox and without taking the pump out of service; the before and after measurements were made on the same equipment.

Key result

↑ **0.05-0.10 mm**

wheel tooth thickness at the constant chord, 8.7-8.8 → 8.8-8.9 mm

Wheel tooth thickness at the constant chord height

TOOTH	BEFORE TREATMENT	AFTER TREATMENT AND 1440 h	GAIN
Tooth No. 1	8.7 mm	8.8 mm	+0.10 mm
Tooth No. 2	8.75 mm	8.8 mm	+0.05 mm
Tooth No. 3	8.75 mm	8.85 mm	+0.10 mm
Tooth No. 4	8.8 mm	8.85 mm	+0.05 mm
Tooth No. 5	8.8 mm	8.9 mm	+0.10 mm

ShZN-18 gear tooth vernier caliper, measurement height 5.25 mm; the measurements were taken jointly by plant and XADO specialists. Metal built up on all five teeth.

Working surfaces of the teeth: before and after treatment

FEATURE	BEFORE TREATMENT	AFTER TREATMENT
Pitting cavities	Chains of cavities 0.1-0.3 mm deep, largest measurement up to 1.5 mm	Part of the micro-damage eliminated by the metal-ceramic layer
Fine scratches and cavities	On the working sides of the wheel teeth	Gone
Contact pattern	Area limited by the accumulated tooth wear	The contact pattern area on the wheel teeth increased

Inspection of the working surfaces of the wheel teeth. The pitting had formed before the treatment because of the high contact loads on the gear mesh.

Conclusion of the plant commission

After a full treatment cycle and **1440 hours** of gearbox running time, the plant commission, with XADO specialists taking part, recorded the following:

1. Chains of pitting cavities **0.1-0.3 mm** deep and up to **1.5 mm** in largest measurement had formed before the treatment because of the high contact loads; part of the micro-damage on the working surfaces of the teeth was eliminated through the formation of a transparent and durable metal-ceramic layer.
2. The contact pattern area on the wheel teeth increased, the fine scratches and cavities on the working sides of the teeth disappeared, and the surface finish improved.
3. Tooth thickness increased by **0.05 to 0.10 mm**, which indicates that the accumulated mechanical wear of the teeth was made good through the formation of the metal-ceramic layer. In the commission's judgement, the metal-ceramic layer formed made it possible to reduce the specific loads per unit of contact pattern area and to increase the service life of the parts by at least **2x**.



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The results apply to the VVM 2-150 pump drive gearbox at OAO Chernyansky Sugar Plant and to 1440 hours of running time after treatment; on other equipment and under different loads the figures may differ. The original report of 14.07.2010, signed and stamped, is published in full and available for download.