RESTORATION REPAIR ACTS · APRIL–MAY 2000

TsDN-710, RM-650 reduction gearboxes and EKG-10 No. 7 drives: metal grew back, no teardown

YuGOK OJSC, Kryvyi Rih · five acts approved by the plant's chief mechanical engineer, signed by the heads and chief mechanical engineers of the processing plants, with the company seal · work performed by XADO LLC and Kryvbasrudprom CJSC under contract No. 158 “a” of 31.03.2000

Kryvyi Rih, Ukraine · treatment 05–07.04.2000 · control measurements 16–18.05.2000

PRODUCT

XADO technology® (XADO RVS)

treatment of gear drives in the assembled state, without disassembling the reduction gearboxes or taking the machines out of the operating schedule

TEST OBJECT

Reduction gearboxes of mining and processing equipment

TsDN-710 · Ts2M500 · RM-650 · crowd, hoist and swing reduction gearboxes and the compressor of EKG-10 excavator No. 7

RESULT OF THE ENTIRE WORK

YuGOK OJSC act of 19.05.2000

“The positive results achieved demonstrate the effectiveness of applying XADO technology® on industrial equipment.” XADO technology® was recommended by the plant for further roll-out

OBJECT, SHOP	REDUCER	TOOTH CONDITION BEFORE TREATMENT	RUNNING TIME AT MEASUREMENT	ACT
Conveyor No. 16, crushing plant-1	TsDN-710	Cavities over **85 %** of the 2nd-stage pinion shaft surface, tooth root wear, scuffing	over **450 h**	16.05.2000
EKG-10 excavator No. 7, ore mining department	crowd, hoist, swing; compressor	Grooving at the tooth root, tooth flank wear of **1.5 mm** and more, scuffing and cavities over the whole flank	**350 h**	18.05.2000
Classifier No. 4-1, ROF-1	RM-650	Tooth profile wear over **50 %**, cavities over **85 %** of the surface, pitting, chipping at the tooth tip	about **400 h**	16.05.2000

OBJECT, SHOP	REDUCER	TOOTH CONDITION BEFORE TREATMENT	RUNNING TIME AT MEASUREMENT	ACT
Conveyors No. 1-1 and No. 2-2, ROF-2	conveyor drives	Cavities over **80 %** of the tooth surface, tooth root wear **10-50 %**, scuffing on the flank	**350 h** and **30 h**	17.05.2000
Conveyors No. 7KT and No. 8KT, crushing plant-1	Ts2M500	Cavities over **80 %** of the tooth surface, tooth root wear of at least **1.5 mm**, scuffing on the flank	**120 h** and **350 h**	17.05.2000

All reduction gearboxes were treated in the assembled state, without disassembly and without taking the equipment out of the operating schedule; “before” measurements — 05–07.04.2000, control measurements — 16–18.05.2000.

What repeated across the plant's reduction gearboxes

↑ 0.3-1.6 mm

tooth thickness along the profile on the reduction gearboxes of four machines

↓ 2.4-3.9 %

current draw of the conveyor drives at no load, 16.9 → 16.5 and 102.3 → 98.3 A

Tooth thickness — by object of the series

OBJECT, UNIT	RUNNING TIME AFTER TREATMENT	TOOTH THICKNESS GAIN
Conveyor No. 16, TsDN-710, 1st stage	over **450 h**	**0.9-1.6 mm**
Conveyor No. 16, TsDN-710, 2nd stage	over **450 h**	**0.9-1.3 mm**
EKG-10 excavator No. 7, hoist and swing reduction gearboxes	**350 h**	**1.0-1.2 mm**
Classifier No. 4-1, RM-650, gear M=8 Z=18	about **400 h**	**0.95 mm**
EKG-10 excavator No. 7, crowd reduction gearbox	**350 h**	**0.3-0.6 mm**
Conveyor No. 1-1, ROF-2, pinion shaft	**350 h**	**0.35 mm**

Absolute measurements: TsDN-710 — **12.9-13.2 → 13.8-14.8 mm** on the 1st stage and **18.2-18.9 → 19.1-20.2 mm** on the 2nd; conveyor No. 1-1 — **4.1 → 4.45 mm**.

Drive current draw at no load

OBJECT, DRIVE	BEFORE TREATMENT	AFTER RUNNING TIME	REDUCTION
Conveyors No. 7KT and No. 8KT, crushing plant-1, A30N 315 S4 motors	102.3 A	98.3 A	4.0 A · 3.9 %
Conveyor No. 1-1, ROF-2	16.9 A	16.5 A	0.4 A · 2.4 %

Measurements taken on 17.05.2000 on the conveyor drives of ROF-2 and crushing plant-1.

Compressor of EKG-10 excavator No. 7

PARAMETER	BEFORE TREATMENT	AFTER TREATMENT	REDUCTION
Time to fully charge the receiver	26 s	22.1 s	3.9 s · 15 %
Current draw at the start of charging, phase 3	35 A	31.5 A	3.5 A · 10 %

The act reads the shorter charging time as a **15 %** gain in compressor output.

What the plant's commissions recorded

The commissions of YuGOK OJSC recorded in the acts: the working surfaces of the teeth “took on the appearance of a smooth ground surface, i.e. the cavities and scuffing disappeared”, and a “build-up of a metal layer” was found in the contact zone. On the reduction gearbox of conveyor No. 16, after a running time of more than 450 hours, the tooth thickness was **13.8-14.8 mm** on the 1st stage and **19.1-20.2 mm** on the 2nd; on EKG-10 excavator No. 7 the tooth gained **0.3-0.6 mm** on the crowd reduction gearbox and **1.0-1.2 mm** on the hoist and swing reduction gearboxes; on the RM-650 the metal layer build-up was **0.95 mm** — even though about half the oil volume had leaked from the reduction gearbox during that running time. The plant's final act of 19.05.2000 also notes that the repair is carried out under normal operating conditions and requires no special equipment, premises or spare parts.

XADO

The results relate to the reduction gearboxes of the mining and processing equipment of YuGOK OJSC — TsDN-710, Ts2M500, RM-650, the crowd, hoist and swing reduction gearboxes of the EKG-10 — at running times of up to 450 hours after treatment; on other units and operating modes the figures may differ. The original acts are published in full and available for download. RVS is an obsolete XADO designation, the zero-generation compounds; the current product generation is revitalizants.