

COMMISSION REPORT ON THE USE OF XADO COMPOUNDS

LPS-ZU rotary gearbox: at work instead of overhaul, parts found serviceable

Kazzinc JSC, Tishinsky mine of LGOK, drilling and blasting section No. 6 · commission chaired by the mine's chief engineer R. V. Berger; report approved by the chief mechanic service of Kazzinc JSC

Leninogorsk, Kazakhstan · treatment 03–05.12.2001 · operation 28.12.2001–14.05.2002 · full teardown and measurements 18.05.2002

PRODUCT

XADO compounds
XADO grease compounds for
friction units · consumption per
unit 500 ml and 36 ml

TEST OBJECT

Rotary gearbox LPS-ZU
No. 16
drill rig of drilling and blasting
section No. 6 · 11,000 operating
hours, overall wear 70–80%

DOCUMENT TYPE

Commission report
of the Tishinsky mine,
Kazzinc JSC

UNIT OF THE ASSEMBLY	CONDITION BEFORE TREATMENT	WHAT WAS MEASURED
Rotary gearbox LPS-ZU No. 16	11,000 operating hours , overall wear 70–80% , drive seized, submitted for major overhaul	Operating hours and drilling footage after treatment
Gear rims of the upper and lower housing parts	Chipping on 3 and 4 teeth, wear above the maximum permissible	Tooth thickness at a depth of 4.3 mm : 3 teeth × 3 points
Splined rotor drive shaft	Chipping on 6 splines, wear of the spline joints above the maximum permissible	Tooth thickness at a depth of 4.5 mm : 3 teeth × 3 points
Bearings No. 405, No. 118, No. 1605, No. 407, No. 211 and the loose-ball bearing	Wear of rollers and balls above the maximum permissible	Radial clearances, condition of races and rolling elements
Planet gears and planet bearings	Wear of the gearbox gears above the maximum permissible	Chipping and damage found at teardown

Treatment with XADO compounds on 03–05.12.2001 during continuous operation; measurements at full teardown on 18.05.2002, after 300 operating hours and 850 m of drilling.

What the full teardown showed

0 new chips

chips on the rotor shaft splines and the housing rim teeth, 13 → 13 over 850 m of drilling

↓ 0.10 mm

largest loss of tooth thickness over 850 m of drilling, 3.00 → 2.90 mm

Condition of the units at full teardown after 850 m of drilling

UNIT	BEFORE TREATMENT	AFTER 850 M OF DRILLING
Splines of the rotor drive shaft	chipping on 6 splines	chipping on 6 splines, no new ones appeared
Gear rim of the lower housing part	chipping on 4 teeth	chipping on 4 teeth, no new ones appeared
Gear rim of the upper housing part	chipping on 3 teeth	chipping on 3 teeth, no new ones appeared
Bearings No. 405, No. 118, No. 1605, No. 407, No. 211 and the loose-ball bearing	wear of rollers and balls above the maximum permissible	after washing and control measurements of radial clearances, fit for further operation
Rolling elements of the housing loose-ball bearing	wear above the maximum permissible	show no one-sided wear, fit for further operation
Planet gears and planet bearings	wear of the gearbox gears above the maximum permissible	no additional chipping or damage, in working order

Chips were counted at the full teardown on 18.05.2002 and compared with the inspection record of 05.12.2001. The friction surfaces show areas of a glossy mineral-ceramic coating.

Tooth thickness of the lower housing part gear rim, mm

TOOTH	MEASUREMENT POINT	BEFORE TREATMENT	AFTER 850 M OF DRILLING	CHANGE
1	near end, 10 mm from the edge	6.05	6.10	+0.05
1	middle	5.95	5.90	-0.05

TOOTH	MEASUREMENT POINT	BEFORE TREATMENT	AFTER 850 M OF DRILLING	CHANGE
1	far end, 10 mm from the edge	6.85	6.90	+0.05
2	near end, 10 mm from the edge	5.75	5.70	-0.05
2	middle	5.95	5.95	0
2	far end, 10 mm from the edge	5.75	5.70	-0.05
3	near end, 10 mm from the edge	5.75	5.80	+0.05
3	middle	5.70	5.60	-0.10
3	far end, 10 mm from the edge	5.65	5.65	0

Measured at a depth of 4.3 mm at three points of the tooth — 10 mm from each edge and at the middle, on three teeth of the rim.

Tooth thickness of the splined part of the rotor drive shaft, mm

TOOTH	MEASUREMENT POINT	BEFORE TREATMENT	AFTER 850 M OF DRILLING	CHANGE
1	20 mm from the shaft	3.40	3.35	-0.05
1	30 mm from the shaft	2.85	2.80	-0.05
1	40 mm from the shaft	2.55	2.50	-0.05
2	20 mm from the shaft	3.00	2.90	-0.10
2	30 mm from the shaft	2.90	2.85	-0.05
2	40 mm from the shaft	2.55	2.50	-0.05
3	20 mm from the shaft	3.10	3.05	-0.05
3	30 mm from the shaft	2.95	2.95	0
3	40 mm from the shaft	2.85	2.80	-0.05

Measured at a depth of 4.5 mm at three points by distance from the shaft — 20, 30 and 40 mm, on three teeth of the splined part.

Conclusion of the commission

The gearbox had been submitted for major overhaul: **11,000 operating hours**, overall wear **70-80%**. After **850 m** of drilling, the commission of Kazzinc JSC dismantled the unit completely and recorded:

1. All bearings and units of the LPS-ZU No. 16 rotary gearbox, after washing, replacement of the rubber seals, cotton packings and the standard lubricant, are fit for further operation.
2. All spline and gear meshes, over **850 m** of drilling length, acquired no additional chipping and no increased wear (more than **0.05 mm**), are in working order and fit for operation.
3. On the friction surfaces of all interacting units and parts, clearly pronounced areas with a glossy, hard mineral-ceramic coating are visible, formed by interaction with the XADO compounds.
4. The commission recognises the use of XADO compounds for the repair and restoration of the LPS-ZU No. 16 rotary gearbox during its continuous operation as effective and expedient.



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The results relate to the LPS-ZU rotary gearbox of a drill rig under underground mine conditions; with other units and operating modes the figures may differ. The original report of 18.05.2002 with signatures and stamps is published in full and available for download. The commission included staff of W.F.G. Corporation LLP, which carried out the treatment.