

## REPORT ON RESTORATIVE REPAIR OF CONVEYOR GEARBOXES

# KTs-2-750 and KTs-1-500 gearboxes: teeth gained metal, drives run lighter

InGOK OJSC, crushing plant, site No. 2 · approved by the chief mechanical engineer of the works, G. N. Panisko · report signed by six managers of the works, the plant and the contractor

Ukraine · treatment 19–21.07.2000 · repeat measurements after more than 450 h of operation · report dated 02.09.2000

**TREATMENT**

XADO revitalization  
carried out by specialists of  
XADO LLC (Kharkiv) and  
Krivbassrudprom CJSC on  
19–21 July 2000

**TEST OBJECT**

Conveyor drive gearboxes  
KTs-2-750 (three stages) and  
KTs-1-500 (two stages), site  
No. 2 of the crushing plant

**DOCUMENT TYPE**

Works report  
dated 02.09.2000  
bearing the “Approved”  
endorsement of the chief  
mechanical engineer of InGOK  
OJSC

**GEARBOX****CONDITION BEFORE TREATMENT****WHAT WAS MEASURED**

KTs-2-750  
three stages

Pitting over **70–85%** of the working tooth  
surfaces, tooth wear **from 20% to 70%** and  
above

Tooth thickness at each stage,  
no-load current of the drive

KTs-1-500  
two stages

Same condition; there was no hard layer on  
the working surface — it was cut away by a  
new smooth-cut file

Tooth thickness at each stage,  
no-load current of the drive

The drives ran under the normal duty of the crushing plant; repeat measurements were taken after more than 450 hours of operation.

# Key results

↑ **6.1-17.4 %**

tooth thickness, KT<sub>s</sub>-2-750, 9.2-16.3 → 10.8-17.3 mm

↑ **1.8-5.3 %**

tooth thickness, KT<sub>s</sub>-1-500, 14.6-19.2 → 15.2-20.07 mm

↓ **13.2 %**

no-load current of the KT<sub>s</sub>-1-500 drive, 76 → 66 A

## KT<sub>s</sub>-2-750 gearbox — tooth thickness by stage

| STAGE AND GEAR                    | BEFORE, MM | AFTER, MM | GAIN, MM |
|-----------------------------------|------------|-----------|----------|
| Stage I, bevel gear wheel         | 9.2        | 10.8      | 1.6      |
| Stage II, cylindrical gear wheel  | 13.03      | 13.85     | 0.82     |
| Stage III, cylindrical gear wheel | 16.3       | 17.3      | 1.0      |

Tooth thickness increased at all three stages: metal built up on the working surface instead of wearing off it.

## KT<sub>s</sub>-1-500 gearbox — tooth thickness by stage

| STAGE AND GEAR                 | BEFORE, MM | AFTER, MM | GAIN, MM |
|--------------------------------|------------|-----------|----------|
| Stage I, bevel pinion          | 14.6       | 15.2      | 0.6      |
| Stage I, bevel gear wheel      | 17.1       | 17.4      | 0.3      |
| Stage II, central gear wheel   | 19.05      | 20.06     | 1.01     |
| Stage II, far right gear wheel | 19.2       | 20.07     | 0.87     |

The gain was obtained on both the bevel and the cylindrical gears of a single gearbox — the layer builds up where the load is carried.

## Drive current draw at no load

| GEARBOX   | BEFORE TREATMENT, A | AFTER, A | REDUCTION, A |
|-----------|---------------------|----------|--------------|
| KTs-1-500 | 76                  | 66       | 10           |
| KTs-2-750 | 26                  | 24       | 2            |

The current was measured with the drive running at no load — this is the direct friction loss in the gearing; the reduction was recorded on both gearboxes.

## Recorded in the report

Before the work began, the working surfaces of the teeth were covered with pitting over **70–85%** of their area, with tooth wear from 20% to 70% and above, and there was no hard layer on them — the surface was easily cut by a new smooth-cut file. After more than **450 hours** of operation the commission of the works recorded: “the working surface of the teeth of the mating parts has taken on the appearance of a smooth ground surface, i.e. the pits have disappeared. A durable metal-ceramic layer has formed on the working surface in the contact zone, which cannot be cut by a new smooth-cut file”. The measurements confirm this: tooth thickness increased at every stage of both gearboxes, and the no-load current of the drives fell. Worn gears gained metal and turned more easily, remaining in service on the plant's conveyors.

**XADO**

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The results relate to the KTs-2-750 and KTs-1-500 conveyor drive gearboxes at the crushing plant of InGOK OJSC at the stated degree of gear wear; on other equipment and with a different condition of the units the figures may differ. The original report dated 02.09.2000 is published in full and available for download.