



COMMISSION REPORT OF 17.12.2009 · 488 HOURS OF OPERATION

Separator drive reduction gearbox: the teeth gained metal, the drive draws less power

JSC "Kharkiv Yeast Plant" · commission: Chief Technical Manager I. Yu. Biryukov, Chief Power Engineer V. A. Zubkov, mechanic fitter A. V. Donoshenko

Kharkiv, Ukraine · treatment 07.09.2009 · repeat measurements 17.12.2009 · total operating time 488 h

PRODUCT

XADO revitalizant
compounds

full treatment cycle of the worm
gear drive and the reduction
gearbox bearing housings

TEST OBJECT

HD A75-06-16 worm gear
reduction gearbox

serial No. 1658-036 · yeast
cream separator drive

DOCUMENT TYPE

Treatment results report
commission signatures and
plant stamp

COMPONENT	CONDITION BEFORE TREATMENT	WHAT WAS MEASURED
Worm gear drive	Fine scratches and scoring on the contact patches of all worm wheel teeth — visible and felt by hand	Thickness of five control teeth at height $h=3.5$ mm from the tip
Reduction gearbox bearing housings	Operating as part of the yeast cream separator drive	Vibration acceleration, velocity and displacement at six points
Drive electric motor	Normal operation under separator load	Stator current and power draw across phases A, B, C

Observation period 07.09–17.12.2009; total reduction gearbox operating time after treatment — 488 hours. The unit was taken from live production, without disassembly.

Key results

↑ **0.1-0.15 mm**

worm wheel tooth thickness, 6.50-6.55 →
6.60-6.65 mm

↓ **9.9 %**

electric motor power draw across phases,
50.1-52.3 → 44.9-47.4 kW

↓ **13.3 %**

electric motor stator current across phases,
86.2-89.2 → 75.4-78.1 A

Worm wheel tooth thickness at height h=3.5 mm from the tip

CONTROL TOOTH	BEFORE TREATMENT	AFTER 488 H	GAIN
Tooth No. 1	6.50 mm	6.65 mm	+0.15 mm
Tooth No. 2	6.55 mm	6.60 mm	+0.05 mm
Tooth No. 3	6.55 mm	6.65 mm	+0.10 mm
Tooth No. 4	6.55 mm	6.65 mm	+0.10 mm
Tooth No. 5	6.50 mm	6.60 mm	+0.10 mm

Measured with a ShZN-18 gear tooth caliper. All five control teeth gained metal; the report attributes the gain to the metal-ceramic layer that formed.

Current and power draw of the drive electric motor

PARAMETER	READING 14.10.2009	READING 17.12.2009, 488 H	CHANGE
Stator current, phase A	89.2 A	77.2 A	-12.0 A
Stator current, phase B	86.2 A	75.4 A	-10.8 A
Stator current, phase C	89.1 A	78.1 A	-11.0 A
Power draw, phase A	52.3 kW	47.4 kW	-4.9 kW
Power draw, phase B	50.4 kW	45.3 kW	-5.1 kW
Power draw, phase C	50.1 kW	44.9 kW	-5.2 kW

ATK 2200 clamp meter; supply voltage 393-401 V in both readings. The final reading was taken at full separator load: 100 % yeast cream, 3.9 kgf/cm².

Vibration of the reduction gearbox bearing housings, six control points

POINT	VIBRATION ACCELERATION, m/s ²	VIBRATION VELOCITY, mm/s	VIBRATION DISPLACEMENT, μm
Point No. 1	29.0 → 13.8	8.07 → 2.98	28.6 → 15.5
Point No. 2	34.2 → 13.5	7.02 → 3.04	37.1 → 15.2
Point No. 3	33.2 → 8.6	7.08 → 3.81	32.1 → 20.0
Point No. 4	18.6 → 10.7	4.89 → 2.51	21.3 → 13.0
Point No. 5	22.3 → 13.98	4.63 → 2.59	23.5 → 14.4
Point No. 6	18.3 → 11.0	6.27 → 3.16	31.3 → 23.1

Sendig 911 vibration meter. After 59 hours of operation, water ingress into the housing led to replacement of the reduction gearbox bearings and a repeat treatment.

Conclusions of the plant commission

After a full treatment cycle with XADO revitalizant compounds and **488 hours** of operation, the commission of JSC "Kharkiv Yeast Plant" recorded the following: on the contact patches of all worm wheel teeth the fine scratches and scoring are still visible but can no longer be felt by hand — before treatment such wear marks were both visible and palpable. The working surfaces of the teeth have a matt shade characteristic of a metal-ceramic layer, and through the formation of this layer the worm wheel tooth thickness increased by **0.1-0.15 mm**; the part surfaces and the lubricating oil contain no wear products in the form of fine bronze chips, which indicates reduced contact loads and the halting of wear on the worm wheel and worm gear teeth. The vibration level at the reduction gearbox control points fell by an average of **15-35 %** — through the formation of optimal clearances in the bearings and the gear drive. The repeat readings taken at full separator load recorded a reduction in the power drawn by the electric motor of **9.9 %** and in the current of **13.3 %**.

XADO

© XADO. All rights reserved.

The results relate to the HD A75-06-16 worm gear reduction gearbox of a yeast cream separator drive under conditions of continuous food production; on other units and operating modes the figures may differ. The original report with the commission signatures and the plant stamp is published in full and available for download.