

RESTORATIVE REPAIR ACTS · DECEMBER 2002 — SEPTEMBER 2003

Gears and gear couplings: tooth body grew in service, no-load current dropped

KGGMK Krivorozhstal — UGM forge shop, steel structures shop, SPTs-2, RMTs-2 · acts approved by the head of department — chief mechanic of the works V. T. Laduba, signed by the shop commissions

Kryvyi Rih, Ukraine · contract No. 4626 of 28.11.2002 · treatments 05.12.2002–20.06.2003 · acts 13.02, 18.02 and 16.09.2003

PRODUCT

XADO technology
restorative repair of gear drives,
couplings and cylinders

UNITS IN THE SERIES

Machines of four shops of
the works
M 4140 hammer · N-483
guillotine shears · mill drive and
furnace pusher, SPTs-2 · 16K20
lathe

DOCUMENT TYPE

Four acts of the works
signed by the shop
commissions

MACHINE, INV. No. AND SHOP	TREATED ASSEMBLIES	SERVICE BEFORE MEASUREMENT	ACT
M 4140 hammer, inv. No. 420141, UGM forge shop	Compressor gearbox, compressor cylinder, bearing No. 3632	over 350 h	18.02.2003
N-483 guillotine shears, inv. No. 420313, TsMK	Main gearbox: worm and worm wheel	over 320 h	13.02.2003
Billet furnace pusher and mill drive, SPTs-2	Stage I gearbox, gear couplings No. 9 (N-14) and No. 3 (N-11)	over 450 h	16.09.2003
16K20 lathe, inv. No. 420699, RMTs-2	Headstock drive gearbox	300 h	18.02.2003

Equipment of operating shops, in service, with wear recorded before the work began. The work was performed by specialists of CJSC Krivbassrudprom.

What repeated on every machine

↑ **0.05-0.95 mm**

tooth body thickness of gear pairs and couplings,
320-450 h of service

↓ **4.9-20 %**

no-load current of the drives, 8.2 → 7.8 A on the lathe
and 75 → 60 A on the hammer

Tooth body thickness — comparison across machines

MACHINE	PART AND MEASUREMENT POINT	BEFORE, mm	AFTER, mm	GAIN, mm
M 4140 hammer	Compressor gearbox gear wheel, three points	10.35-10.75	10.40-10.80	+0.05
M 4140 hammer	Compressor gearbox pinion shaft, three points	10.50-10.60	10.60-10.65	+0.05-0.10
N-483 shears	Worm sector of the main gearbox	18.6	19.05	+0.45
N-483 shears	Worm wheel tooth, measurement depth 15 mm	16.1	17.05	+0.95
Furnace pusher, SPTs-2	Stage I herringbone gear tooth, module 8 mm, depth 6.00 mm	10.25	10.65	+0.40
Coupling No. 9 (N-14), SPTs-2	External tooth, measurement depth 12.00 mm	14.60	15.40	+0.80
Coupling No. 9 (N-14), SPTs-2	Internal tooth, measurement depth 12.00 mm	14.50	15.40	+0.90
Coupling No. 3 (N-11), SPTs-2	External tooth, measurement depth 12.00 mm	13.40	14.30	+0.90
Coupling No. 3 (N-11), SPTs-2	Internal tooth, measurement depth 12.00 mm	13.50	14.35	+0.85

Measurements at marked points at a fixed depth — before the repair and again after the service hours; in SPTs-2 with a ShZN-18 No. 1741 gear tooth caliper.

No-load current of the drives

MACHINE	MEASUREMENT	BEFORE, A	AFTER, A
M 4140 hammer	Compressor gearbox drive, phases A and C	75	60
N-483 shears	Main gearbox drive, all phases	45	44

MACHINE	MEASUREMENT	BEFORE, A	AFTER, A
16K20 lathe	Headstock drive, phase by phase	8.2-9.4	7.8-8.5

Measured at no load before the repair and after the service hours; on the SPTs-2 furnace pusher gearbox the current was not measured.

M 4140 hammer — compressor cylinder and bearing

ASSEMBLY	PARAMETER	BEFORE	AFTER	CHANGE
Compressor cylinder	Inner diameter, point a	690.08 mm	689.88 mm	-0.20 mm
Compressor cylinder	Inner diameter, point b	690.17 mm	689.75 mm	-0.42 mm
Bearing No. 3632	Radial clearance	0.15 mm	0.10 mm	-0.05 mm

The cylinder diameter decreased owing to the layer built up on the wall: wall thickness gain of 0.20 and 0.42 mm.

What the shop commissions recorded

All four acts were signed not right after the treatment but after service hours — from **300 to 450 hours** of operation. Act on the N-483 guillotine shears: "The working surface of the worm mating with the gear wheel took on the appearance of a smooth polished surface (i.e. the pits disappeared), a cermet layer formed on the working surface that cannot be worked with a smooth file. The thickness of the sector body was **19.05 mm** (an increase of **0.45 mm**)". Act on SPTs-2: "the pits on the contact surface disappeared, the tooth thickness was **10.65 mm** at a depth of 6.00mm (the gain in tooth body thickness was **0.40mm**)". Teeth that before the work were pitted over **60-80 %** of their surface built up metal right in service, and the drives became lighter in no-load current.

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The results refer to the gear drives, couplings and drives of the listed machines of KGGMK Krivorozhstal at 300-450 hours of service; on other equipment and duty cycles the figures may differ. The originals of the four acts, signed by the shop commissions and approved by the chief mechanic of the works, are published in full and available for download. The work was performed by CJSC Krivbassrudprom under contract No. 4626 of 28.11.2002.