

REPORTS OF THE "ELEKTROTYAZHMASH" PLANT · TREATMENT 30.08.2012 – 28.01.2013

Lathes 16A20, 1K62D: truer and quieter spindle, drive draws less current

SE "Elektrotyazhmash Plant", Kharkiv · reports approved by the chief engineer of the plant; measurements taken by the chief mechanic and the lead engineer of the plant's chief mechanic department together with engineers of XADO LLC

Kharkiv, Ukraine · shops No. 078 and No. 121 · reports dated 25.02.2013

PRODUCT

XADO revitalizant compounds
full treatment cycle of the gearbox and the spindle unit

OBJECTS

Two screw-cutting lathes
16A20 F3S32, inv. No. 053980 ·
1K62D, inv. No. 053884

DOCUMENT TYPE

Two technical reports
signed and sealed by the
plant

MACHINE	SHOP AND INV. No.	RUNTIME BETWEEN MEASUREMENTS	WHAT WAS MEASURED
Screw-cutting lathe 16A20 F3S32	shop No. 078, inv. No. 053980	739 h	Spindle runout and play, current draw, vibration
Screw-cutting lathe 1K62D	shop No. 121, inv. No. 053884	727 h	Spindle runout and play, current and power draw, vibration, surface roughness of a turned part

Both machines were in production service; the full treatment cycle of the gearbox and the spindle unit ran from 30.08.2012 to 28.01.2013.

Key results

↓ **11-20 %**

idle current draw, 6.5 → 5.2 and 15.9 → 14.2 A

↓ **23-84 %**

vibration displacement at the test points, 2.97-55.6 → 1.08-15.6 μm

Spindle unit: runout, play and surface finish

PARAMETER	16A20: BEFORE	16A20: AFTER	1K62D: BEFORE	1K62D: AFTER
Face runout of the spindle seat, mm	0.020	0.005	0.030	0.020
Radial runout of the spindle seat, mm	0.03	0.01	0.02	0.01
Radial play of the spindle bearings, mm	0.015	0.005	0.02	0.02
Axial play of the spindle bearings, mm	0.03	0.01	0.02	0.01
Roughness of a workpiece turned on the machine, Ra, µm	—	—	5.2	4.2

Indicator stand with an ICh-10 dial indicator; repeat measurements after 739 and 727 hours of operation. Roughness measured at the plant's central laboratory.

Electric drive: current and power draw

PARAMETER	16A20: BEFORE	16A20: AFTER	1K62D: BEFORE	1K62D: AFTER
Idle current draw, A	6.5	5.2	15.9 · 16.5 · 15.6	14.2 · 16.7 · 13.3
Current draw in cutting mode, A	7.2	6.1	15.3 · 16.0 · 15.9	14.8 · 16.9 · 13.4
Power draw in cutting mode, kW	—	—	3.4 · 3.3 · 2.13	3.15 · 3.0 · 1.98

ATK2200 multimeter; idle running — 800 rpm on both machines, cutting — feed 0.20 mm/rev, depth 0.20 mm. On the 1K62D, current and power were recorded per phase (A · B · C).

Vibration at the test points of the spindle and the bed

PARAMETER	16A20: BEFORE	16A20: AFTER	1K62D: BEFORE	1K62D: AFTER
Vibration displacement by point, µm	6.44-55.6	1.08-9.15	2.97-36.0	1.36-15.6
Vibration velocity by point, mm/s	0.32-1.53	0.21-0.64	0.429-1.73	0.326-1.56

SENDIG 911 vibrometer, idle running: 9 test points on the 16A20 and 10 on the 1K62D; vibration displacement fell at 18 of the 19 points.

Findings of the plant commissions

The commissions of SE "Elektrotyazhmash Plant" re-measured both machines after **739** and **727 h** of operation and recorded the same thing. For the 16A20 lathe: "the face runout of the spindle seat decreased by **0.015 mm**, and the radial runout fell by **0.02 mm**"; the current draw, per the report's conclusion, fell by **16 %**. For the 1K62D lathe: "the power draw fell by **23.4** and **7.7 %** in idle running and at a fixed spindle speed respectively", while the face and radial runout decreased by **0.01 mm**. Both reports read this the same way: the reduction of play and runout "indicates the elimination of mechanical wear, the reduction of thermal clearances in the spindle bearing assemblies and the normalisation of the spindle bearings themselves", and both commissions estimate the remaining service life of the spindle unit to be higher "by at least 1.5×".

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The results refer to the screw-cutting lathes 16A20 F3S32 and 1K62D of SE "Elektrotyazhmash Plant" and to the measurement modes stated in the reports; on other equipment and in other modes the figures may differ. The originals of both reports, signed and sealed, are published in full and available for download.