

TREATMENT OCTOBER 2007 — JANUARY 2008 · REPORTS JANUARY–FEBRUARY 2008

Spindles 3U131V and BHU-25: vibration and current down, grinding accuracy up

AVIASTAR-SP JSC, Ulyanovsk · plant commission: deputy chief mechanic, department No. 162, shop No. 170, with the participation of XADO LLC

Ulyanovsk, Russia · treatment cycle October 2007 — January 2008 · four reports, signatures and plant seal

PRODUCT

XADO revitalizant compounds

treatment of the spindle lubrication system without stopping for repair and without disassembling the unit

TEST OBJECT

Spindle units of four cylindrical grinding machines

3U131V ser. No. 22 and No. 58 ·
BHU-25 ser. No. 178604 and
No. 178610 · plain bearings

DOCUMENT TYPE

Four technical reports of AVIASTAR-SP JSC

approved by the Director for ETOS and R, certified with the plant seal

MACHINE	SER. No.	SPINDLE AT MEASUREMENT	RUN TIME AFTER TREATMENT	WHAT WAS MEASURED
Cylindrical grinder 3U131V	22	1285 rpm	482 h	current and power, spindle and bed vibration, part roundness
Cylindrical grinder 3U131V	58	1285 rpm	457 h	current and power, spindle and bed vibration, part roundness
Cylindrical grinder BHU-25	178604	1450 rpm	245 h	current and power, spindle and bed vibration, part roundness
Cylindrical grinder BHU-25	178610	1450 rpm	325 h	current and power, spindle and bed vibration, part roundness

Machines in current plant service. Measurements were taken before treatment and repeated after the full cycle and the stated run time under normal operation.

What repeated on all four machines

↓ **7-15 %**

current draw per phase, 5.2-7.9 → 4.5-6.8 A

↓ **48-72 %**

vibration velocity at the spindle bearings and bed, 0.4-2.9 → 0.2-1.4 mm/s

↓ **0.002 mm**

roundness deviation of the test part, 0.004-0.01 → 0.002 mm on all four machines

Power consumption of the spindle drive at idle

MACHINE, SER. No.	CURRENT BEFORE, A	CURRENT AFTER, A	CURRENT REDUCTION	POWER REDUCTION PER REPORT CONCLUSIONS
3U131V, ser. No. 22	7.4-7.9	6.7-6.8	9-14 %	22-26 %
3U131V, ser. No. 58	5.2-5.3	4.8-4.9	7-9 %	22-27 %
BHU-25, ser. No. 178604	5.37-5.42	4.6-4.8	11-15 %	22-27 %
BHU-25, ser. No. 178610	5.2-5.3	4.5-4.7	9-15 %	18-22 %

Current and power over three phases, ATK2200 multimeter, idle running. Power is given per the report conclusions; per-phase measurements on BHU-25 give 21-31 %.

Vibration of the spindle bearing units and the bed

MACHINE, SER. No.	MEASURING POINTS	VIBRATION VELOCITY BEFORE, mm/s	AFTER, mm/s	TYPICAL REDUCTION
3U131V, ser. No. 22	15	0.52-2.89	0.29-1.13	22-75 %
3U131V, ser. No. 58	15	0.44-1.48	0.27-1.41	17-59 %
BHU-25, ser. No. 178604	15	0.69-1.72	0.23-0.58	58-72 %
BHU-25, ser. No. 178610	16	0.86-2.84	0.23-1.15	57-75 %

SENDIG 911 vibrometer; points on the front and rear spindle bearings and on the bed, idle running and grinding. At the strongest points the reduction reaches 80-84 %.

Machine accuracy measured on a test part

MACHINE, SER. No.	ROUNDNESS DEVIATION BEFORE, mm	AFTER, mm
3U131V, ser. No. 22	0.004	0.002
3U131V, ser. No. 58	0.004	0.002
BHU-25, ser. No. 178604	0.01	0.002
BHU-25, ser. No. 178610	0.004	0.002

Roundness tester mod. 290, in-house measuring laboratory of AVIASTAR-SP JSC. The item measured was a pin ground on the same machine before and after treatment.

Finding of the plant commission

On all four machines the commission of AVIASTAR-SP JSC recorded the same picture: lower current and power consumption at idle, a lower vibration level of the spindle bearing units and the bed, and a **2.0×** smaller roundness deviation of the test part. The reports name the mechanism directly: "The reduction in power consumption became possible owing to the lower friction coefficient in the plain bearings", and the gain in accuracy — "owing to optimisation of thermal clearances in the spindle unit bearings by means of a metal-ceramic layer". The outcome: the treatment "made it possible to substantially raise its accuracy and extend the machine service life by no less than **2.0×** without stopping for repair or disassembly", and the improved parameters allow more precise operations to be performed on these machines. On machine ser. No. 178610, bearing repairs were carried out in the same period, and the report attributes the result not to the treatment alone.

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The results relate to the spindle units of 3U131V and BHU-25 cylindrical grinding machines with plain bearings treated at AVIASTAR-SP JSC in 2007–2008; on other equipment and under other operating conditions the figures may differ. The originals of all four reports with signatures and seals are published in full and available for download.