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IE B025 | INDUSTRIAL CASE STUDY | MECHANICAL ENGINEERING | COMPRESSOR EQUIPMENT

TECHNICAL ACT OF 1 JULY 2004

305 VP 10/8 compressor: less power and noise, higher output

OJSC Poltava Auto Aggregate Plant (PAAZ), main compressor station · approved by: chief power engineer A. K. Cherednyk

Poltava, Ukraine · works 02.04–01.07.2004 · act of 01.07.2004

PRODUCT

XADO revitalizant gel

formulation for compressors and bearings

TEST OBJECT

305 VP 10/8 piston compressor

two-stage, inv. No. 18860 · driven by an electric motor

RUNNING TIME AFTER TREATMENT

215 hours

control measurements after three months in service

UNIT	RUNNING TIME AT CONTROL MEASUREMENTS	WHAT WAS MEASURED
305 VP 10/8 piston compressor, inv. No. 18860 — stages I and II with the drive electric motor	**215 h** over the period 02.04–01.07.2004	Current and power on three phases, vibration at 5 points, noise at 2 points, receiver filling time

The baseline and control measurements were taken in identical modes: idle at 1 kgf/cm² and under load at 6 kgf/cm².

Key results

↓ 8.1 %

power draw under 6 kgf/cm² load, by phase 58.5-61 → 54-57 kW

↓ 3.5-10.3 %

current draw by phase under 6 kgf/cm² load, 114-117 → 105-110 A

↑ **2.7** %

output, receiver filling 0-7 kgf/cm², 3 min 44 s → 3 min 38 s

↓ **6.5-7.5** dB

noise level at two points, 87.5-89.5 → 80-83 dB

Electricity consumption — current and power by phase

PARAMETER	MODE	BEFORE TREATMENT	AFTER 215 H
Current on phases A / B / C, A	under load, 6 kgf/cm²	**114 / 117 / 117**	**110 / 105 / 109**
Current on phases A / B / C, A	idle, 1 kgf/cm²	**76 / 77 / 79**	**77 / 73 / 77**
Power on phases A / B / C, kW	under load, 6 kgf/cm²	**60 / 58.5 / 61**	**57 / 54 / 54**
Power on phases A / B / C, kW	idle, 1 kgf/cm²	**29.3 / 26.5 / 29**	**25 / 25 / 26**
Mains voltage, V	both modes	**390**	**392**

The mains voltage was virtually unchanged at the control measurement — the drop in power draw is not explained by a supply sag.

Vibration at five control points

MEASUREMENT POINT	SPECTRUM ENVELOPE	VIBRATION VELOCITY, mm/s	VIBRATION DISPLACEMENT, µm
P.1 — frame	**0.396 → 0.813**	**1.67 → 1.67**	**36.2 → 38.3**
P.2 — stage I, lateral	**5.18 → 5.97**	**3.15 → 3.1**	**107 → 106**
P.3 — stage II, lateral	**7.21 → 10.9**	**3.25 → 3.22**	**99.4 → 97.2**
P.4 — stage II, axial	**1.74 → 3.8**	**4.11 → 4.08**	**134 → 131**
P.5 — stage I, axial	**4.1 → 4.78**	**6.59 → 6.2**	**191 → 191**

The spectrum envelope is read as stated in the act: the larger it is, the lower the vibration level — this is what the commission used to derive the 13.2-54.2% reduction.

Output and noise level

PARAMETER	POINT / MODE	BEFORE TREATMENT	AFTER 215 H
Receiver filling time	from 0 to 7 kgf/cm²	**3 min 44 s**	**3 min 38 s**
Receiver filling time	from 4 to 7 kgf/cm²	**1 min 38 s**	**1 min 38 s**
Noise level	point 1 — motor side	**89.5 dB**	**83 dB**
Noise level	point 2 — control panel side	**87.5 dB**	**80 dB**

The filling time of the standard receiver is a direct measure of compressor delivery: the shorter the time, the higher the output.

Finding of the OJSC PAAZ commission

The commission of OJSC PAAZ recorded in the act: “The results of the final measurements of the compressor's operating parameters compared with the initial parameters show that, after the application of XADO revitalizants, the average power draw in idle mode decreased by **10.2%**, while in load mode the power draw decreased by **8.1%**. The vibration level at the control points decreased by **13.2%** to **54.2%** (a larger spectrum envelope means a lower vibration level). The compressor noise level at the control points decreased by **6.5 dB** to **7.5 dB**. The compressor output when filling the receiver from 0 atm to 7 atm increased by **2.7%**. According to the operating personnel, oil consumption from the crankcase and through the lubricator decreased, and the noisiness of the compressor's operation was noticeably reduced. The analysis carried out demonstrates the effectiveness of applying XADO technology for the purpose of saving electricity, restoring worn parts and extending the service life of the compressor.”

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The results apply to the 305 VP 10/8 piston compressor of the main compressor station of OJSC PAAZ and to 215 hours of running time after treatment; on other units and in other modes the figures may differ. The measurements were taken jointly by plant specialists and representatives of JV AVIS and XADO LLC; the act was approved by the plant's chief power engineer. The original act is published in full and available for download.