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INDUSTRIAL CASE STUDY | MINING · RAIL TRANSPORT | DIESEL LOCOMOTIVE · ENGINE AND COMPRESSOR

REPORT OF 22.05.2000 · CHECK AFTER 560 ENGINE HOURS

Locomotive TM2UM-941: engine and compressor restored without disassembly

OJSC YuGOK (Southern Mining and Processing Plant), railway transport department · commission: chief mechanical engineer of the railway department V. S. Pavlovsky, head of the rolling stock shop P. A. Grisenko, representatives of CJSC Kryvbasrudprom and XADO LLC · approved by the plant chief mechanical engineer I. L. Kramar

Kryvyi Rih, Ukraine · measurements 11.04.2000 and 18.05.2000 · report approved 22.05.2000

PRODUCT

Restorative repair by XADO technology®

treatment without disassembly, in service · contract No. 158 "a" of 31.03.2000

TEST OBJECT

Locomotive TM2UM-941

diesel engine and air compressor · the locomotive was scheduled for factory overhaul in 2000

DOCUMENT TYPE

Commission report of OJSC YuGOK with signatures and seal

EQUIPMENT	CONDITION AT THE START OF TESTING	WHAT WAS MEASURED
Diesel engine of locomotive TM2UM-941	Factory overhaul scheduled for 2000; compression uneven across cylinders, **24-30 atm**	Compression in six cylinders, fuel consumption, oil pressure
Air compressor of the same locomotive	Regular duty on the locomotive ahead of the factory overhaul	Charging time of the main reservoirs from **7.2** to **8.2 atm (g)**

Baseline measurements — {{11.04.2000}}, control measurements — {{18.05.2000}}, after {{560 engine hours}} of locomotive operation with the treated units.

Key results

↑ 6.7-25 %
compression across cylinders, 24-30 → 30-32 atm

↓ 15 %
fuel consumption at idle, 8.95 → 7.6 l/h

↑ 30 %
compressor output at maximum engine speed, charging 13 → 10 s

Diesel engine — compression across cylinders

CYLINDER	BEFORE TREATMENT, 11.04.2000	AFTER 560 ENGINE HOURS, 18.05.2000	CHANGE
Cylinder 1	26 atm	32 atm	+6 atm
Cylinder 2	28 atm	32 atm	+4 atm
Cylinder 3	26 atm	32 atm	+6 atm
Cylinder 4	30 atm	32 atm	+2 atm
Cylinder 5	24 atm	30 atm	+6 atm
Cylinder 6	27 atm	32 atm	+5 atm

Spread between cylinders **6 → 2 atm**: compression evened out and came close to a common level — it cannot rise above the factory nominal.

Diesel engine — fuel and oil system

PARAMETER	BEFORE TREATMENT	AFTER 560 ENGINE HOURS	CHANGE
Fuel consumption at idle	8.95 l/h	7.6 l/h	−1.35 l/h
Oil pressure at idle, t = 60 °C	2.0 kgf/cm²	2.1 kgf/cm²	+0.1 kgf/cm²

Both parameters were taken at idle — the main operating mode of a shunting locomotive.

Air compressor — charging time of the main reservoirs

ENGINE MODE	BEFORE TREATMENT	AFTER 560 ENGINE HOURS	OUTPUT
Maximum engine speed	13 s	10 s	+30 %

ENGINE MODE	BEFORE TREATMENT	AFTER 560 ENGINE HOURS	OUTPUT
Idle	33 s	30 s	+10 %

Charging from **7.2** to **8.2 atm (g)**; compressor output is inverse to charging time — the report states a reduction in time of **9 %**.

What the commission recorded

> The commission of OJSC YuGOK — the chief mechanical engineer of the railway transport department, the head of the rolling stock shop and representatives of CJSC Kryvbasrudprom and XADO LLC — recorded in the report after **560 engine hours** of operation: "Fuel consumption at idle decreased by **15%**; oil pressure in idle mode rose by **0.1 kgf/cm sq.** the compression values across the cylinders evened out with a simultaneous increase". On the compressor: "Charging time was reduced by **9%**". The locomotive was heading for the factory overhaul scheduled for 2000: the restoration was carried out on the running machine, without disassembling the diesel engine and the compressor.

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The results refer to shunting locomotive TM2UM-941 and the air compressor installed on it under the railway transport conditions of a mining and processing plant; with other equipment and operating modes the figures may differ. The original report of 22.05.2000 with signatures and seal is published in full and available for download.