

PLANT REFERENCE AND TECHNICAL REPORT · 2013–2015

PLATINO 2040: turbine bearing overheating eliminated without part replacement

Kharkiv State Aircraft Manufacturing Company (KhGAPP), blanking and stamping shop · approved by:
Deputy General Director — Chief Engineer V. I. Aleinikov · prepared by: Chief Mechanical Engineer V. A.
Trushev

Kharkiv, Ukraine · treatment 21.01.2013 · reference letter 13.02.2013 · technical report No. 109/107 of
23.01.2015

PRODUCT

XADO "Protective 60K"
grease with revitalizant
cavities flushed with XADO
universal industrial flush · 25-30
g packed into each bearing unit

OBJECT

PRIMA POWER PLATINO
2040 metal laser cutting
machine
generator turbine bearing units,
operating speed up to 40 000
rpm

DOCUMENT TYPE

Chief Mechanical
Engineer's reference
and KhGAPP technical
report
signatures of authorised
officers, company seal

OBJECT AND DOCUMENT**HOURS AT START****WHAT WAS RECORDED**

PLATINO 2040 machine, blanking
and stamping shop — Chief
Mechanical Engineer's reference,
13.02.2013

over **5000 h**, three
years in service

23 days of normal operation after the
treatment of 21.01.2013, overheating
emergency stops did not recur

Same machine — technical report,
approved by the Chief Engineer,
23.01.2015

same, treatment
21.01.2013

about **23 months** of operation (January 2013
— December 2014), bearings never
replaced, one preventive inspection with
grease top-up

Both documents describe the same machine at two points in time: three weeks and two years after the treatment of 21.01.2013.

Key result

23 months

machine running in normal mode after treatment with no bearing replacement, January 2013 → December 2014

Turbine bearing units: before and after treatment

PARAMETER	BEFORE TREATMENT (December 2012 — January 2013)	AFTER TREATMENT (2013–2015)
Bearing unit temperature	On reaching critical values the machine's automatic emergency shutdown was triggered	Does not exceed the values permitted by the operating manual; emergency stops ceased
Reaching operating modes	The unit was never switched from the 14 000 rpm test mode to the operating mode	The machine runs in normal mode, turbine operating speed up to 40 000 rpm
Bearing condition	Extraneous noise; one bearing worn more than the others — found during disassembly on 21.01.2013	Bearings not replaced throughout the period; over two years — one preventive inspection with a top-up of the same grease
Cost per unit	Set of new SR sleeves with bearings — about 93 000 UAH (2013), over 90 000 UAH (2015)	Flush and XADO "Protective 60K" grease — under 300 UAH in 2013, under 500 UAH including the top-up

Temperature was monitored by the machine's built-in system with emergency shutdown on overheating; bearing noise and wear were assessed during unit disassembly.

Timeline: what preceded the treatment

STAGE	WHAT WAS DONE	RESULT
About 4000 h of service	10-15 g of the standard grease added to each bearing unit	Extraneous noise disappeared, later intense heating of the units developed
December 2012 — January 2013	Standard grease replaced with high-speed Shell GADUS S5V42P, selected on the recommendation of its manufacturer	Heating did not stop; on severe heating the machine's emergency shutdown system was triggered
21.01.2013	Units disassembled, old grease removed, working cavities flushed, 25-30 g of XADO "Protective 60K" grease with revitalizant packed into each unit	After removing excess grease and 18-25 h of running-in, the temperature fell smoothly and stabilised — the machine was switched to the operating mode

The unit, the fault and the maintenance personnel were the same in all three episodes — only the product changed.

Conclusions of the plant

The machine came to the treatment in a failed state: after three years of service and over **5000 hours** of operation the turbine was overheating, the emergency protection kept tripping, and replacing the standard grease with high-speed Shell GADUS S5V42P produced no result; on disassembly one of the bearings proved to be worn more than the others. The Chief Mechanical Engineer of KhGAPP in the reference letter of 13.02.2013: "Considering the result obtained and the cost of the flush and the XADO "Protective 60K" grease (in this case the financial outlay amounted to **under 300 UAH**), I recommend using XADO "Protective 60K" grease as a replacement for, or an addition to, the standard grease for the high-speed bearings of the generator turbine." Two years later, the technical report of 23.01.2015 approved by the plant's Chief Engineer: "it is expedient to use the high-speed XADO "Protective 60K" grease as the best replacement for the standard grease for the high-speed bearings of the machine's gas turbine... the cost of the grease is **under 500 UAH**, whereas the cost of a set of new SR sleeves with bearings amounts to **over 90 000 UAH**".



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The results relate to the generator turbine bearing units of the PRIMA POWER PLATINO 2040 laser cutting machine and to its operating conditions at KhGAPP; on other equipment and under other duty cycles the figures may differ. The originals of the reference letter of 13.02.2013 and of the technical report of 23.01.2015 are published in full and available for download.