

Confirmation of diagnosis

Gas Compressor Crosshead Pin / Bush Clearance Concern

Summary - This document consists of the detection and verification of a failure in the area of stems and crossbars of a JGK4 gas compressor with 3000 hours of operation. A PV measurement was performed with Windrock hardware equipment, the results were analyzed by detecting a stroke at the moment when there was no load, consequently the dimensional control of cylinders, pistons, rods, connecting rods and crosspieces corresponding to the compressor was verified, verifying the damage diagnosed.

I. INTRODUCTION

The machine condition analysis is based on vibration and ultrasonic measurements taken with the WINDROCK 6320 PA equipment. The data obtained from the engine crankshaft analysis were processed, analyzed and compiled by a qualified professional analyst, resulting in the following recommendation of repair:

- .Stem rod and crosshead.
- .Cil#3 impact at zero loading moment on the crosshead
- .Throw #3 Clearances have to be checked

II. DEVELOPMENT

1. Detection.

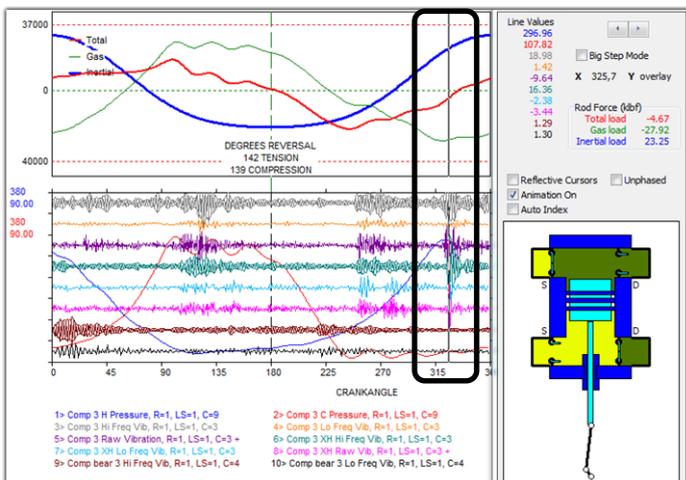
i. Theoretical references:

Any deficiency between the two-piece clearances will be evident in the changes in loads between compression and tension.

ii. Impact on crosshead

Onsite PV and vibration measurement acquired with the Windrock equipment on the throw#3 can be shown as follow:

Graph 1. Gas pressure (green), piston (blue) and total (red).



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An impact on the crosshead is observed at 325.7°, at the same moment of zero load, indicating that the impact is the product of a clearance deviation in the crosshead Bush / Pin assembly.

As a conclusion of this analysis it was preconized to relieve gaps of the corresponding throw assembly in order to be able to compare the metrological survey with the Windrock visualized impact.

2. Metrological checks

The compressor throw#3 was disassembled and abnormal markings were found on the surface of the pin (Figure 1), mainly in the areas adjacent to the lubrication groove of the connecting rod bushing.



Figure 1: Pin surface.

As can be seen in Tables 1 and 2, gap measurements were performed on six different transverse planes on each direction. Table 1 shows the gaps for connecting rod N°3, noting that for plane 3 in directions B and C it is seen that the gap is the minimum acceptable, but as the worn zone was found it can be said that the previous gap was smaller than minimum.

N° Biela	Huelgo buje/ perno [mm] Máximo = 0.10/ Mínimo = 0.05 Referencia 114.25						
	Dirección	Plano 1	Plano 2	Plano 3	Plano 4	Plano 5	Plano 6
#3	A	0.095	0.07	0.06	0.11	0.10	0.07
	B	0.095	0.07	0.05	0.10	0.09	0.07
	C	0.09	0.07	0.05	0.095	0.07	0.06

Table 1: Bushing / bolt clearance [mm] connecting rod N°3.

N° Cruceta	Huelgo buje/ perno [mm] Máximo = 0.10/ Mínimo = 0.05 Referencia 114.25											
	Dirección A				Dirección B				Dirección C			
	Buje 1	Buje 2	Buje 1	Buje 2	Buje 1	Buje 2	Buje 1	Buje 2	Buje 1	Buje 2	Buje 1	Buje 2
#3	0.09	0.09	0.08	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08

Table 2: Bushing / bolt clearance [mm] crosshead No. 3.

III. CONCLUSION

It can be concluded that the predictive diagnosis obtained from the onsite measurements and the data analysis was the correct one. The predicted damage can be verified visually and theoretically from the predictive measurements practice.