Proceedings of the 33rd European Safety and Reliability Conference (ESREL 2023)
Edited by Mário P. Brito, Terje Aven, Piero Baraldi, Marko Čepin and Enrico Zio
 Published by Research Publishing, Singapore.
doi: 10.3850/978-981-18-8071-1_P219-cd

MAINTENANCE METHODE EVALUATION OF CASING ALIGNEMENT USING LASER MEASUREMENT TECHNIQUE: A CASE STUDY OF GAS TURBINE GENERATOR 100 MW CLASS

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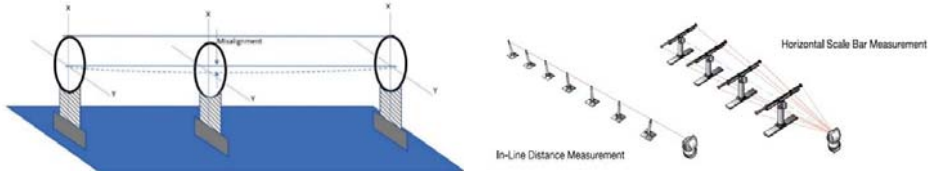
In the asset management system, the management of maintenance activities includes both preventive and corrective maintenance management methodologies. It is defined as maintenance specifications and schedules, procedures for maintenance execution and missed maintenance, inspection measurements and results. During the Major Inspection Overhaul the casing alignment activity on rotating equipment, especially the gas turbine generator (GTG) is a form of maintenance activity that is grouped into life cycle delivery. This is a follow-up on asset performance and health monitoring. This activity involves aligning or leveling the turbine casing in the X and Y axes so that the GTG unit can operate reliably. The concept of aligning the turbine casing on the X and Y axes as can be seen in Fig. 1 (a).



(a) (b)

Fig. 1. (a)The concept of aligning the turbine casing on the X and Y axes. (b) How to measure casing alignment data using a laser alignment tool

During the life cycle of an asset from the construction stage to operation, there will be a change in the structural characteristics of the GTG foundation resulting in a change in the position of the turbine casing, both the internal casing and the external casing. Changes in casing position and casing deformation can result in misalignment and vibration when the unit is operating. This work aims to provide an understanding of the effectiveness of using laser alignment on the GTG casing. The measurement casing alignment data using a laser alignment tool as shown in Figure 1 (b).

The method used is taking points on all compressor casing, compressor discharge casing (CDC), inner barrel, turbine casing, turbine shrouds, inlet casing, exhaust casing, and all pedestal bearings as ilustrated by Fig. 2.

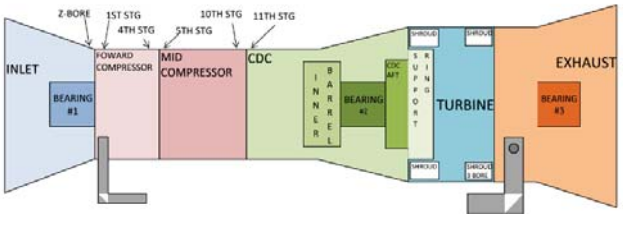
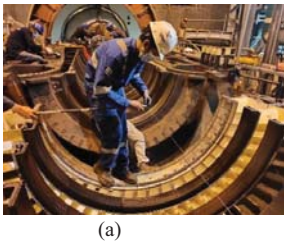


Fig. 2. Parts of the 100MW class gas turbine casing that can be performed casing alignment

In case alignment work is generally done by 2 methods, top on and top off as seen in Fig. 3. Top On is done by attaching the upper casing to the lower casing, while the top-off is done without installing the upper casing, both methods are carried out without the rotor being attached to the turbine casing.



(a)

(b)

Fig. 3. casing alignment data collection process (a) Top off with piano wire (b) Top On with laser alignment tool.

Based on the case study of the GTG 100 MW class has been proven to be able to speed up measurement time compared to the piano wire method for 1 days with a time comparison that can be seen in Table 1.

Table 1. *Comparison of casing alignment time using piano wire and laser alignment tools*

Work Item	Piano wire (hours)	Laser alignment tools (hours)
Tools installation and calibration	4	1
Initial alignment reading	6	0.5
Data validation	4	0.5
Tools removing	1	0.5
Correction move for alignment	16	16
Tools installation and calibration after corection movement	4	1
Casing alignment reading	6	0.5
Data validation	4	0.5
Total	**45**	**20.5**

In Table 1 we can see that the use of laser alignment tools took a total of 20.5 hours compared to the use of piano wire which took a total of 45 hours. The use of laser alignment tools is proven to speed up the time in the process of installing tools, calibrating, reading and validating data and get accurate results where the measurement results can reach 0.001mm in carrying out casing alignment on GTG. This method benefits unit owners with reduced maintenance time and increased unit performance.

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