Gas Turbine – Palm Eltmann
Summary of Maintenance History

08.2022

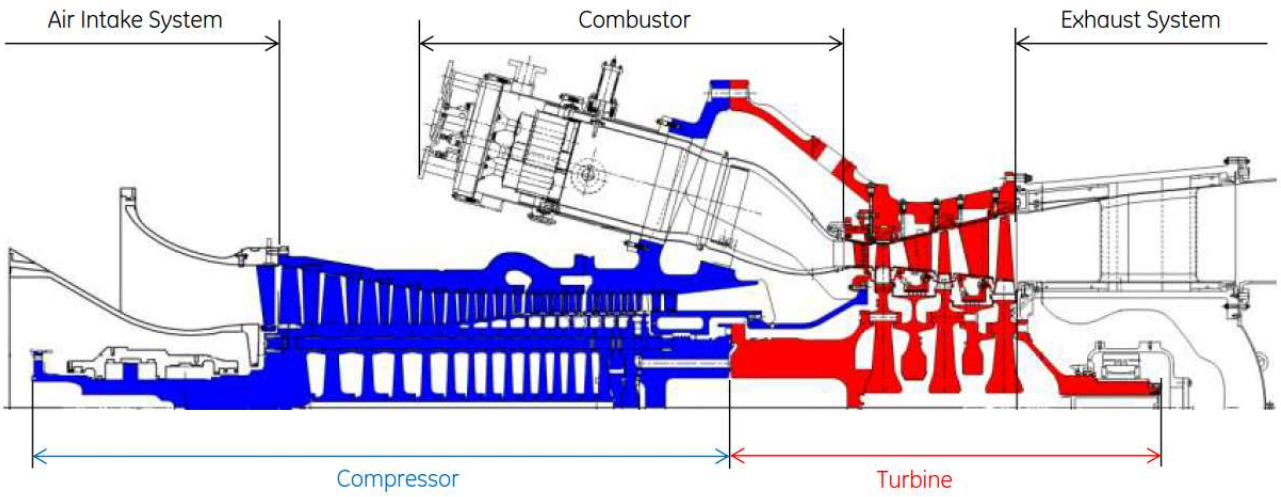
Table of Contents

Revision	Date	Status	Author	Checked	Approved
	12 Aug 2022	Approved	M. Dürr	H. Hasselbach	W. Wünnemann

1 GT UNIT OEM DATA

Gas Generator:	Siemens Industrial Turbomachinery AB	Type: SGT-800	S/N: B000561
Main Gear:	Flender Graffenstaden	Type: TX112/ 4C	S/N: 9016
Electric Generator:	Siemens Energy	Type: SGEN5-100A-4P	S/N: 12007947
Max. Capacity:	47.5 MWe – after upgrade in 2010		

2 TERMINOLOGY (GAS GENERATOR)



3 GT UNIT CURRENT STATUS AND MAIN ISSUES

Last reported OH	118,120 EOH
Last reported maintenance	A-Inspection at 110,753 EOH
Major Repairs	maintained in accordance with OEM recommendations
Exchanges	no additional work outside the normal service range
Upgrades	unit was upgraded to A-Plus as per OEM package

All detailed maintenance reports will be made available on request by interested buyer.

4 MAINTENANCE HISTORY AND KEY FINDINGS

The following is a chronological summary of the most important maintenance activities and their key results.

All inspections were executed by the Original Equipment Manufacturer Siemens Industrial Turbomachinery AB, Finspong, Sweden for the Gas Generator and Siemens Energy, Essen, Germany for the Electric Generator.

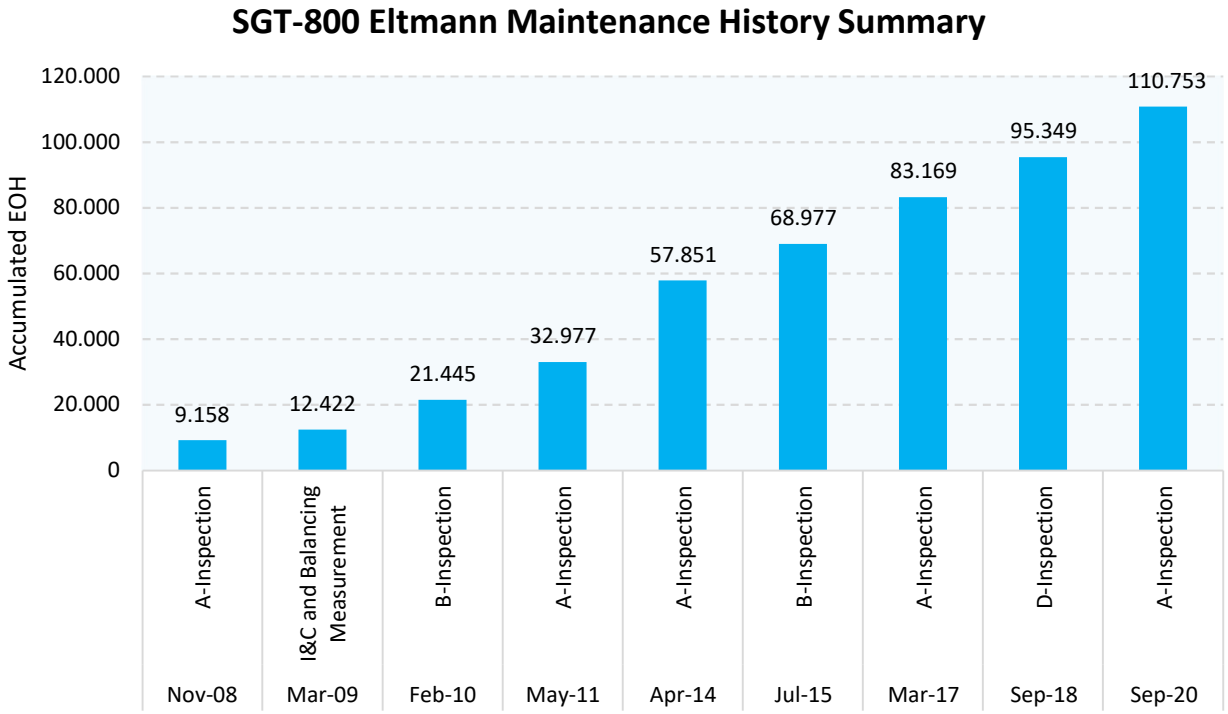
Date	EOH / Starts	Type of Inspection	Components inspected and key findings
11/2008	9,158 / 110	A-Inspection	Execution of a planned A-inspection according to OEM maintenance plan; Visual/borescope inspection of Air intake system; Guide vane control; Compressor rotor; Fuel injector; Central casing; Turbine rotor; Outlet casing; Exhaust diffuser; Main gearbox; Bleed valve adjustments, sensor exchange and minor repair works executed; Result: Unit is in serviceable condition
03/2009	12,422 / 124	Exchange OS hard drive Vibration measurements and balancing on site	Exchange of Bently Nevada cards and controller logic changes; Control and bleed valve corrective adjustment; Correction of elevated GT bearing vibrations after a GT trip
02/2010	21,445 / 137	B-Inspection	Execution of B-inspection according to OEM maintenance plan; Inspection at OEM factory of all rotors, casings, bearings, fuel injectors, fuel manifold, combustor Result: area inside turbine is wet from washing liquid; corrosion at stationary and rotary parts detected; Compressor rotor was replaced; New insulation at central and outlet casing installed; **Unit was upgraded to A+ as per OEM package**; Original compressor rotor was replaced with a similar rotor and was balanced together with the turbine rotor in the balancing test facility in Finspong; The seal support ring (HG 2580) was replaced with new ring due to new design; On the central casing and outlet casing new insulation were installed, according to latest design.
05/2011	32,977 / 156	A-Inspection	Execution of a planned A-inspection together with a logic modification regarding anti-icing system and time synchronization; Findings at Ventilation System, Air Intake system; Inlet piece, Compressor blades, Compressor stator, Combustor, Fuel manifold, Turbine blades, Main gear box;

Date	EOH / Starts	Type of Inspection	Components inspected and key findings
			Compressor was found clean, minor corrosion; Minor oxidation at the combustor with small loss of material on the outer heat shield in front of guide vanes; Turbine blade no. 1, minor TBC loss was observed at the blade tips and a few blades has TBC loss at the platform; The main gear pinion wheel and main wheel has white colourized spots on the cog tips from oil spray nozzles; Result: unit found in serviceable condition, some corrosion at blades and vanes at compressor and turbine was detected
04/2014	57,851 / 180	A-Inspection	Execution of A-inspection according to OEM maintenance plan; Result: missing protection cover at the start motor fan identified as safety risk, damaged cables at vibration measurement for the starter motor detected, oxidation at battery detected, need for maintenance at fuel gas isolation valve identified, PT100 temperature transmitter exchanged
07/2015	68,977 / 193	B-Inspection	(1) Execution of B-inspection incl. IGV-modification according to OEM maintenance plan, and Microsoft Windows was upgraded to Windows 7; PCS7 was upgraded from PCS7 v.6.1 to PCS7 v.8.0; As a consequence, significant start problems related to FLC modifications and PCS7 upgrade occured; Protective net at cooling fan on top of the start motor still missing. (2) Execution of inspection at electrical generator including inspection of cooling systems. Bearings at generator were cleaned and polished, labyrinth seals replaced, dust cleaning of stator and rotor of generator and exciter; bearing pedestals wet cleaned.
03/2017	83,169 / 221	A-Inspection	Execution of A-inspection according to OEM maintenance plan; Oxidation at outer vane plates at turbine stage no. 1 detected as well as TBC coating damage; compressor, air intake section and combustion section found in normal condition. Result: unit found in serviceable condition.
09/2018	95,349 / 237	D-Inspection	Execution of D-inspection according to OEM maintenance plan;

Date	EOH / Starts	Type of Inspection	Components inspected and key findings
			Assembly of new bellow between outlet casing and intermediate cone; Assembly of new SSS-clutch; New set of HS and LS shafts at the gear were assembled; New set of tie bolts and nuts at both ends were assembled; Eddy current and replica was performed on all turbine discs; AMOT valve temperature bodies were changed to new ones; Soft start logic was implemented and tuning of the soft start was made; various instrumentation adjustments and logic changes in the turbine controller were implemented. Execution of small revision at the electrical generator including pressure test at the generator coolers;
09/2020	110,753 / 269	A-Inspection	Execution of A-inspection according to OEM maintenance plan; Package ventilation filters were found to be in soiled condition and no longer functioning effectively as significant contamination was passing to the package; Missing bolt at compressor and inlet section; one of the insulation screws from outside close to the hatch was noticed cracked the surface on inside of inlet plenum; Contamination was noticed between inlet piece and intermediate shaft; Oil was noticed on split plane between VGV stage no. 0 until stage no. 2 bottom part at the compressor; Corrosion was noted on the rotor body at all stages and guide vanes on stage no. 8 as well as on the rear stator (surface rust). Rubbing marks from grating were noticed on central gas supply in the enclosure; oxidation was observed on several outer vane plates at the stator no.1; Soft insulation on inlet plenum was noticed missing and ragged on several places; soft insulation on bleed air pipe was noticed ragged; Erosion due to oil jet nozzle was noticed on the pinion cogs towards GG and towards generator, Main wheel towards GG, the marks (in 3 positions) correspond to the position of the oil nozzles; Rubbing marks were noticed on jacking oil pipe close to gear box casing.

5 SUMMARY

The following diagram shows an overview of the maintenance activities.



End of Document