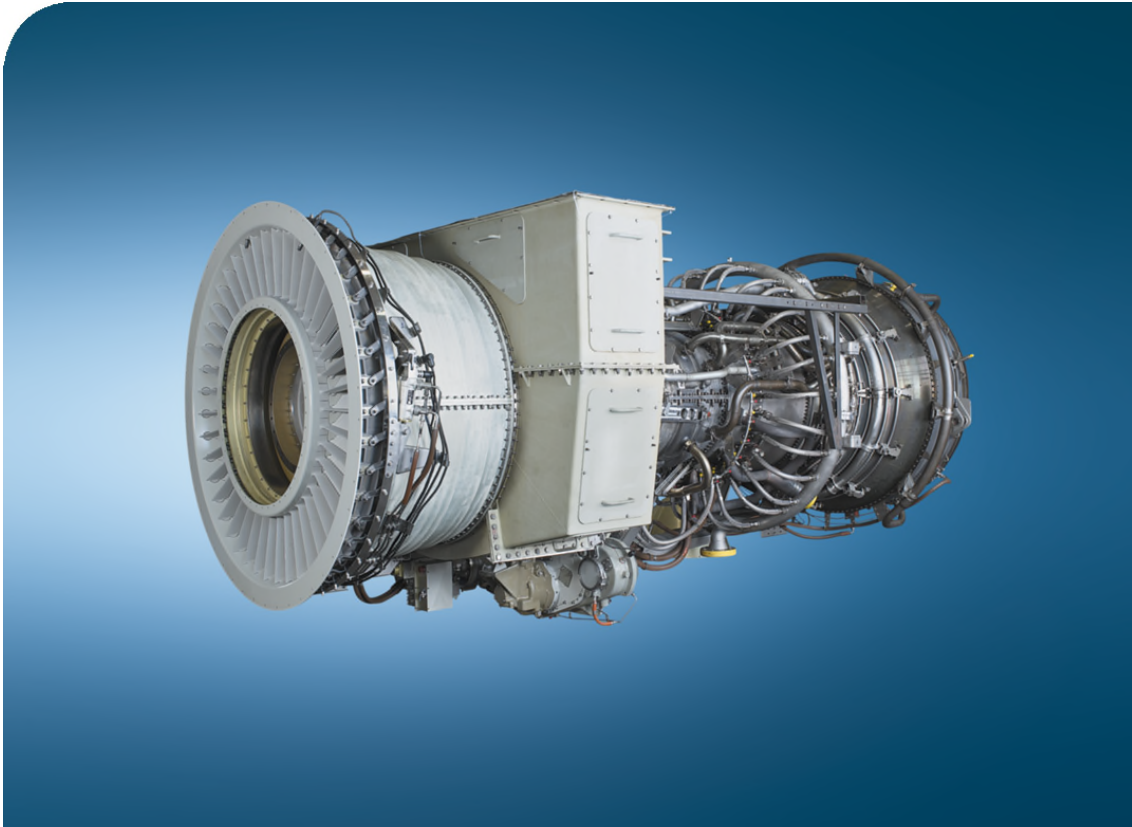


## Field Service Report

### Exchange of Stage 1 HPC blades and HPC blades cleaning LM6000 PC SAC



**MTU Representative:** Dennis Geissler

Markus Demko

**Serial Number:** 191-558

**Customer:** UTE

**Date of Visit:** 14.11.16 - 06.12.16



**Field Service Report**  
**Intervention**  
 LM6000 PC SAC

MTU Maintenance Berlin-Brandenburg  
 An MTU Aero Engines Company

**1. General**

Date	12.12.2016		
PO			
MTU WBS Element	P.0464808.01		
Customer	UTE		
Location	Punta Del Tigre / Uruguay; Onshore		
Customer Representative	Juan Pablo Ranz Pino	Tel: +598 2924 3927/31 e-Mail: jranz@ute.com.uy	
MTU Technician	Dennis Geissler		
Field Service Engineer	Lorgio Batard	Tel: +493378-824-268 e-Mail: lorgio.batard@mtu.de	
Customer Account Manager	Sebastian Bernard	Tel: +493378-824-783 e-Mail: sebastian.bernard@mtu.de	
GT Model	LM6000-PC-NDWG13	GT S/N	191-558
Unit	Unidad 3		
Packager	Steward Stevenson		
Control	Woodward MicroNet		
Driven equipment	Generator		
GT TSN	27587	GT SSN	1727
GT TSLO	unknown	GT SSLO	unknown
Date last inspection	unknown		
Date last MTU-Visit	First visit		
Date unit out of service	unknown		
Date unit return to service	30.11.16		
Type of Outage	Planned		
Type of Fuel	Dual Fuel		
NO <sub>x</sub> -Reduction	Water		
Power-Enhancement	N/A		



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## 2. History and Condition of Engine Operation

- This was the first MTU site visit. All units were serviced by TCT before.
- No problems or damages from the past operation period were reported by the customer.
- The unit was encountered in a generally good condition.

## 3. Findings and Conclusions

- Below are some findings listed that were found during the job:
- Left hand side stage igv clevis was found with one missing viton boot.
- VSV mount bolts on the right hand side were not safety wired.
- Right hand side stage 5 connecting link was found installed without the small bushing inside (See additional picture 29 in "general findings")
- At the front frame on the left hand side two bolts are broken and a therefore loose bracket was found. The bracket has been removed and was given to the customer.
- HPC stage 4 upper and lower half rings were found with 6 missing inserts in the actuating ring spacers / stops. (3 inserts each side, upper and lower half)
- Chafing marks were found at the hpc case outer stage 4 area, caused by the damaged actuating ring spacers.
- All hpc stage 3 to 5 washer / bushings were found worn out.
- Whilst the hpc top case was removed and cleaned by hand it was discovered that the stage 1 shroud showed some spalled coating material. Still within the serviceable operating limits.
- During the cleaning of the hpc blades, 6 blades in stage 3 were found with small blade tip impacts. Those findings are very small and within the serviceable limits.

## 4. Work carried out

- Exchange of blade stage 1 set including hand cleaning of hpc blades by hand after top case removal in accordance with GEK 105059 - WP 241300.
- HPC stage 2, 3 and 4 blade chord length inspection in accordance with GEK 105059 - WP 241300. This was performed on customer request and all blades were found within the limits.
- HPC stage 3 to 5 washer - bushing replacement per GEK 105059 - WP 141200. This was performed on customer request with parts provided by UTE.
- Exchange of 6 hpc stage 4 acutating ring spacer and adjustment of dimension "M" in accordance with GEK 105059 - WP 141100.
- VSV travel check and start up of unit including leak check after work completion and a 1 hour test run at base load. All running parameter were found within their operation limits.

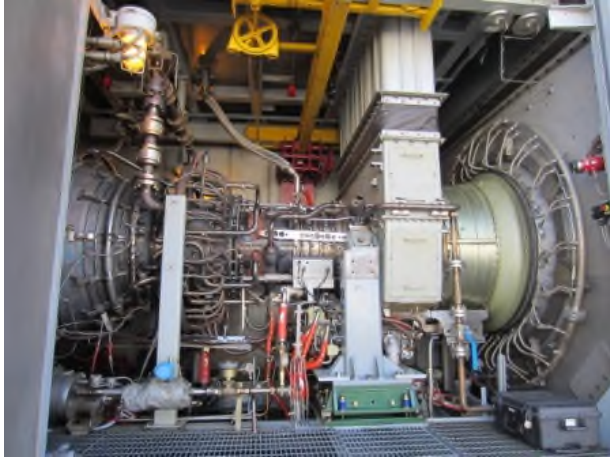
## 5. Open Items

- None.

## 6. Recommendations

- Installation of bushing into stage 5 connecting link on the right hand side during the next intervention.
- Installation of missing viton boot at the master lever arm and check of condition of the remaining viton boots during the next intervention.

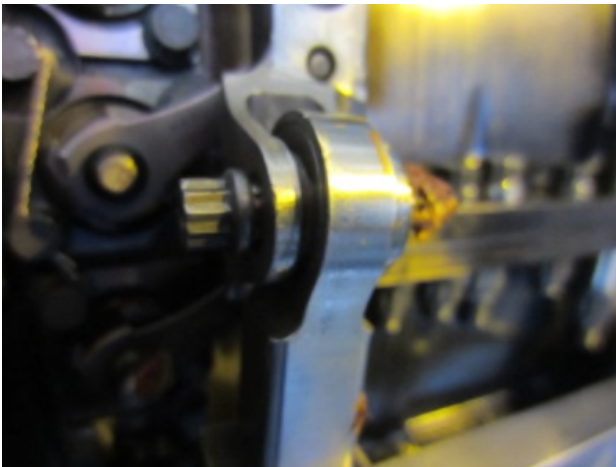
## 7. Pictures – General Findings



Picture 1: Unit 3 overview



Picture 2: Stage 5 clevis with red silicone



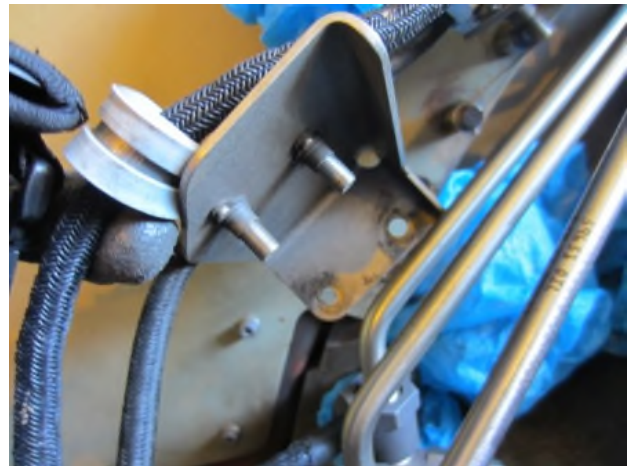
Picture 3: Stage 5 conn. link with missing bushing



Picture 4: L/H stg. IGV clevis with missing boot



Picture 5: L/H broken front frame bolts



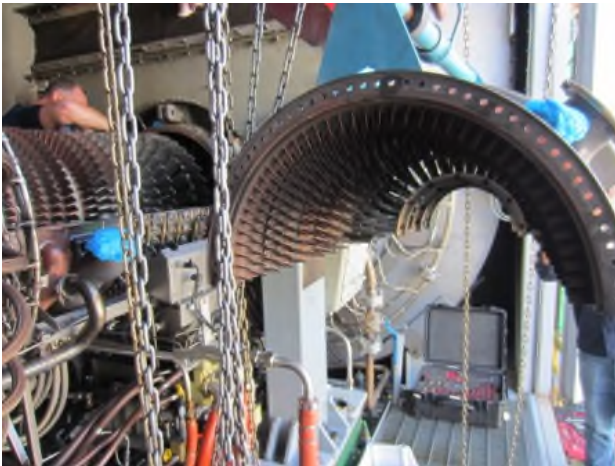
Picture 6: Loose bracket at front frame



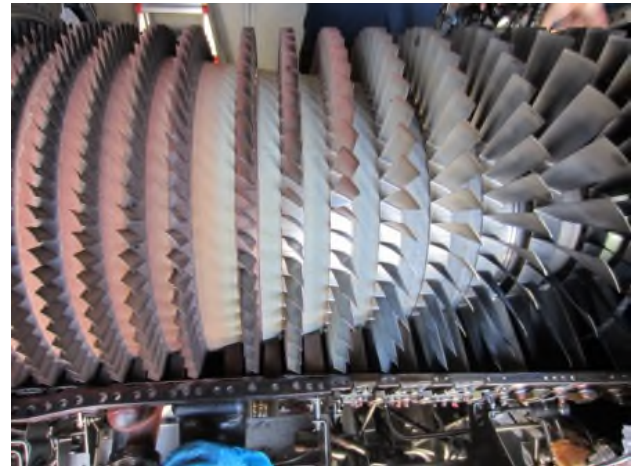
Picture 7: VSV mount bolts without safety wiring



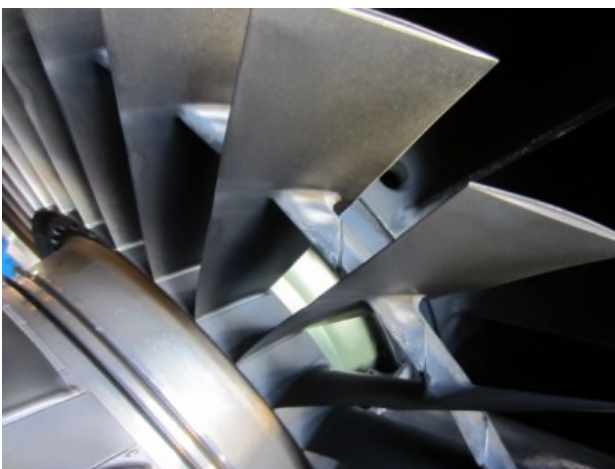
Picture 8: Top case lifter installed



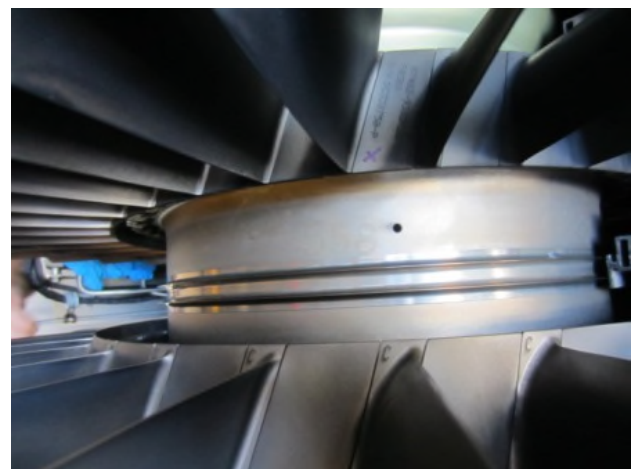
Picture 9: Lifting of upper case



Picture 10: HPC rotor blades



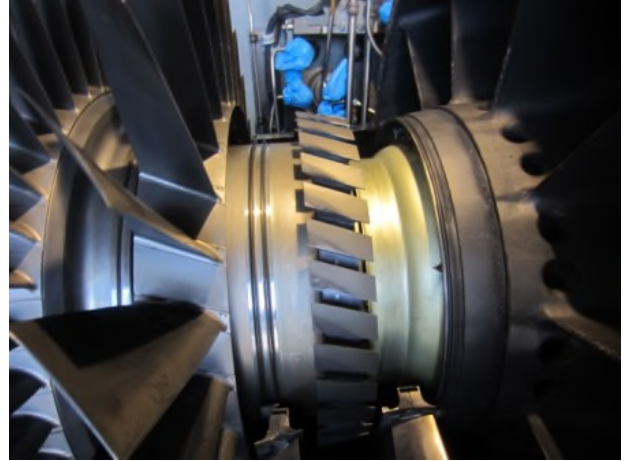
Picture 11: Old blade stage 1 set



Picture 12: Weep hole without oil traces



Picture 13: Old mid span damper pad stage 1



Picture 14: Removed blade stage 1 set



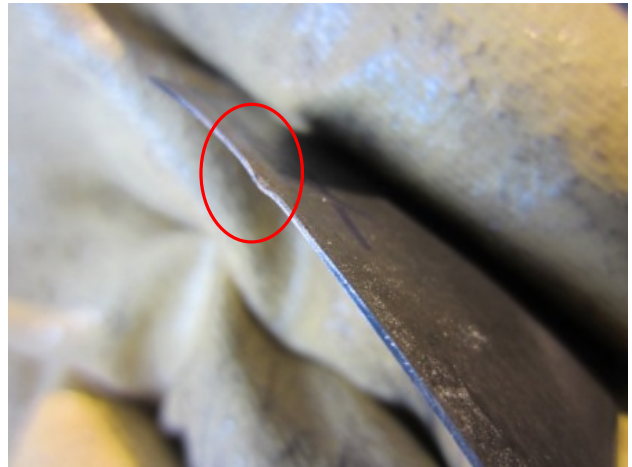
Picture 15: Hand cleaning of hpc blades



Picture 16: New stage 1 set installed



Picture 17: Bended stage 1 blade retainers



Picture 18: 1 of 6 stg. 3 blade tip with small impact



Picture 19: Upper stator case in workshop



Picture 20: Spalled coating on stg.1 shroud



Picture 21: Washer / bushing replacement upper case



Picture 22: Worn stg.5 bushing example



Picture 23: Missing insert in actuating ring spacer



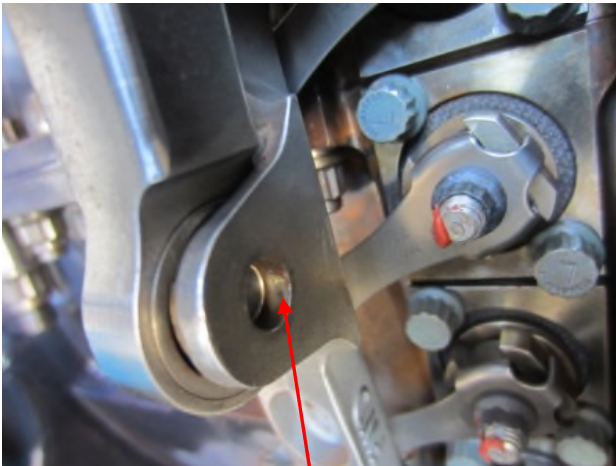
Picture 24: Chafing marks on stage 4 stator case



Picture 25: New actuating ring spacer with inserts



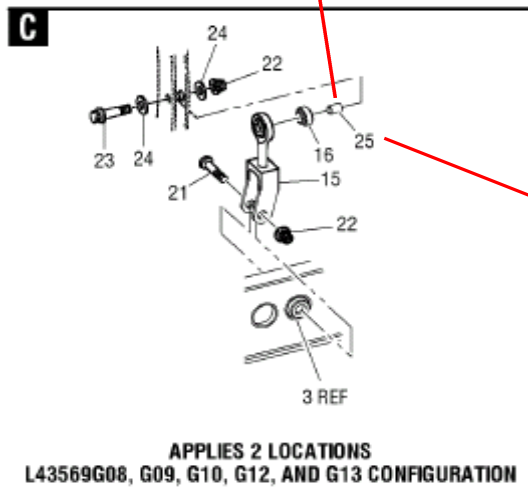
Picture 26: New actuating ring spacer installed



Picture 27: Stg.5 connecting link missing bushing



Picture 28: Red silicone in stg.5 link as support



- 25 9609M88P04 .BUSHING, SLEEVE.  
 02 1332001200

Picture 29: Drawing of the missing bushing inside the connecting link of stage 5. "Item 25"





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**8. Replaced Parts (all parts have been provided by UTE)**

No.	Description	Part No.	Removed	Serial No.	Removed	Qty.
			Installed		Installed	
1	Spacer VSV	1333M60P02		without		2
		1333M60P02		without		2
2	Guide VSV	9609M13P02		without		2
		9609M13P02		without		2
3	Washer VSV	705B734P13		without		1
		705B734P13		without		1
4	Gasket triangle "B" sump	L46032P01		without		1
		L46032P01		without		1
5	Gasket	9294M61P03		without		1
		9294M61P03		without		1
6	Gasket	9057M92P10		without		1
		9057M92P10		without		1
7	Gasket	J219P05		without		1
		J219P05		without		1
8	Gasket	J219P08		without		1
		J219P08		without		1
9	Kit Washer Bushing stage 3 - 5	L694G02		without		1
		L694G02		without		1