Service Report

Riverside
Thome Ship Management Pte Ltd

PrimeServ Houston
29 March 2021

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1. General data

Vessel:	Riverside	IMO no	9412464
Engine type:	6 S60MC-C	Run. hours:	53549
Engine builder:	STX Shipbuilding	Engine no.:	SB8031
Newbuilding yard:	[Plant: ShipYard]	Hull no.:	3010
Job order no.:	[Job Order No]	Sea trial:	2009-03-01
Spare parts from MAN:	STX Shipbuilding	Spare order no.:	N/A
Place:	Corpus Christi	ECS version:	N/A
Visit by:	Jesper Petersen (JPP)		
Period:	2021-03-16 – 2021-03-24		
Owner/manager:	Thome Ship Management Pte Ltd		
Requested by, P/O no.:	Mr. Joseph P Jude		
Reason:	Engine misfire resulting in hitting the pier		

2. Summary and conclusion

As requested by Mr. Joseph P Jude of Thome Ship Management Pte Ltd, our superintendent engineer Mr. Jesper Petersen attended above mentioned vessel at Corpus Christi. The reason for the attendance carried out from March 16th through 22nd 2021 was to investigate the failed engine response to start.

Scavenge port inspection showed good cylinder condition. All rings found intact. Wave cut pattern still visible up to just below the cylinder lubrication oil quills (See Enclosure 5)

When the vessel was still moored alongside the pier, engine operations was prohibited. As such we could not test start the engine to check various systems that could have caused the incident. However, a static test of all the pneumatic control valves related to the start sequence (except the starting air distributor and related 30 bar pneumatic control valves) was completed without finding any issue in their operation.

Vessel finally departed to the anchorage and the engine operated without issues. However, during preliminary test at anchorage, engine failed to start in ahead as no starting air was applied.

The pneumatic control valves incl. the 30 bar valves supplying air to the starting air distributor had all shown correct function since the engine started the first time when leaving the pier. However, after repeated starting attempts at anchor, it was quickly noted that starting air distributor actuator No. 6 did not move at all. After removing and dressing up the actuator and cylinder, the engine was test started again. This time, actuator No. 6 was found to operate normally. Engine was tested several times in both directions from the bridge, ECR and local control without any observed misfire.

The control air dryer had been recharged with coolant and is now working as specified by maker.

The engine tested in Ahead / Astern from the Bridge, ECR and Local Control.
The test was conducted by bringing the engine to DS Ahead and then to crash Astern from all three control stations. All three attempts were done to the satisfaction of the DNV surveyor .

A short sea-trial was conducted to check all engine systems functioned as requested by DNV class surveyor and USCG. Due to unrelated issues with operating the engine, USCG required a second sea trial.

Second sea trial completed. This time the camshaft wrong position alarm kept occurring and subsequently the sea trial failed again.
The issue with low exhaust valve spring air was solved and no further issues were observed with slow closing.

Exhaust valve on cylinder unit No. 1 was replaced as suspicion on correct operation was raised based on observations during sea trials

3. Background – reason for attendance

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4. Findings

Fuel oil viscosity found to be around 3.4 cSt. which is acceptable.

Fuel pump indexes found to be between 4 and 7 index.at engine stopped.

All cylinder liners, pistons and piston rings found in good operational condition.

The VIT STOP/ASTERN solenoid valve (No. 40) is not energized in engine STOP/ASTERN position

Starting air valves Nos. 5 and 6 found leaking slightly during a static leak test.

Starting air distributor actuator slide was found sticking which is the main cause of the initial engine starting issue.

Pneumatic control valves related to starting the engine tested and found working as per design. Main starting valve found working as per design. Valve 32 adjusted to release pressure after 1 sec as per our recommendations.
Please see attached STX Drawing No. 5154022410 for reference (See Enclosure 1)

The control air dryer is operating but has lost its refrigerant and subsequently do not remove any present water as per design. During our attendance onboard, refrigerant was added to the control air dryer and as such is now working.

The control air pressure regulating valve was not able to maintain the exhaust valve spring air pressure causing too slow closing of exhaust valve No. 1. Exhaust valve No. 1 had been replaced just prior our attendance. The new/overhauled exhaust valve will have a tight fit between the spring air seal and air cylinder which will make the exhaust valve close more slow than usual until the seal has worn in if the spring air in not correct.

During several starts attempts in both directions, the camshaft wrong position alarm came up frequently on cylinder unit Nos. 1 and 2.

5. Work carried out

Scavenge port visual inspection completed on all six cylinder units.

Fuel pump puncture valves free movement checked and found in good order.

Exhaust valve air spring function tested as per our maintenance manual (drop down test) all exhaust valves passed the test.

All about mentioned pneumatic (See Findings) function tested and found working as intended. E/O sorted out the power issue to the VIT STOP/ASTERN. The VIT control pressure adjusted to 5 bar in STOP/ASTERN.

Starting air valves Nos. 5 and 6 replaced.

Actuator No. 6 was found sticking in the starting air distributor. The actuator removed and cleaned. Before mounting, the cylinder counterpart was also cleaned.

6. Sea trial

A short sea trial was completed to the satisfaction of all involved with respect to starting the engine

7. Conclusion

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8. Recommendations

The pneumatic solenoid valve for activation of VIT in STOP/ASTERN is working erratic. The solenoid part should be replaced soonest to ensure full VIT in STOP/ASTERN.
Both VIT pressure regulating valves should be replaced/overhauled soonest to ensure correct air pressure supplied to the VIT actuators.

It is recommended to replace/overhaul all main engine pneumatic components every 2 years as per our recommendations (See Enclosure 2).

It is recommended to regularly measure the cylinder liner diameter in order to keep track of the wear. At the same time it is also recommended to compete a scrape down analyze on a regular base again to monitor the cylinder liner condition (See Enclosure 3)

To keep track of the fuel pump wear, it is recommended to record engine performance once a month. Please see attached performance sheet and fill out all cells. The more accurate the recordings the more accurate the evaluation of the various engine components (See Enclosure 4)

It is recommended to continue operating the engine on cylinder oil with TBN 70 for a while regardless of sulphur content of the fuel oil in order to wash away debris from the combustion process.
However, close observation of the overall cylinder liner and piston assembly condition must be conducted on a regular basis to avoid bore polish of the cylinder liners due to excessive un-scavenged calcium deposits

9. Enclosures

ME pneumatic.pdf

Enclosure 1. STX Drawing No. 5154022410

SL2001-394.pdf

Enclosure 2. Service Letter SL01-394 “Maneuvering Systems**”**

SL2014-587.pdf

Enclosure 3. Service Letter SL2014-587 “Cylinder Lubrication Update”

Service Performance u iso.xls

Enclosure 4. Service Engine performance sheet

Enclosure 5. Scavenge port inspection

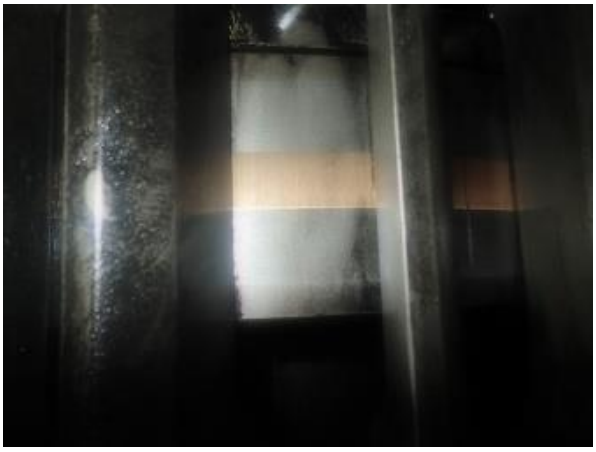
Enclosure 6. In situ Piston Ring Inspection

Enclosure 7. Various videos of starting air distributor in action.

Date Signature

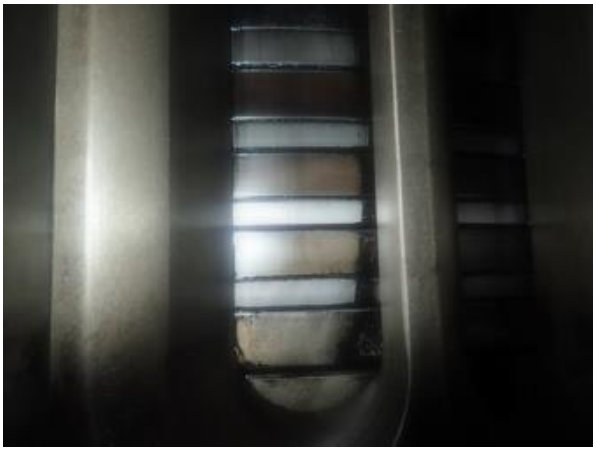
Enclosure 5

Cylinder unit No. 1



Piston Skirt

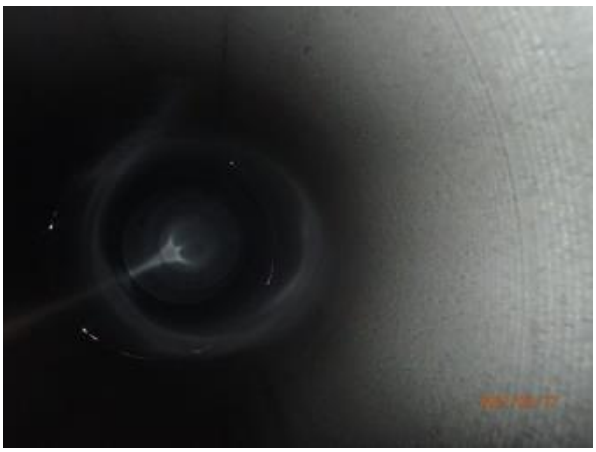
Piston top land



Piston rings

Piston Crown

Cylinder unit No. 1

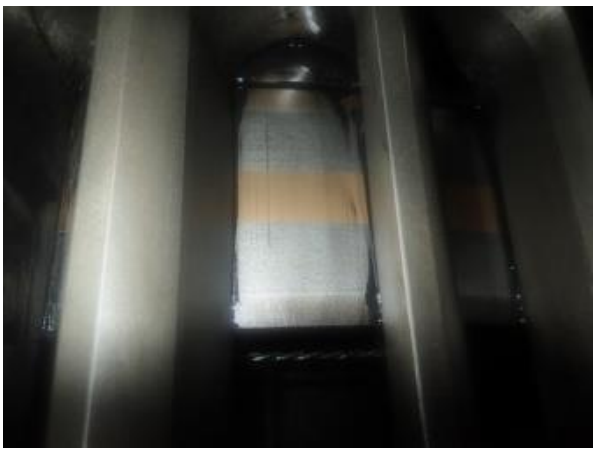


Cylinder Liner View 1

Cylinder Liner View 2

Cylinder Liner View 3

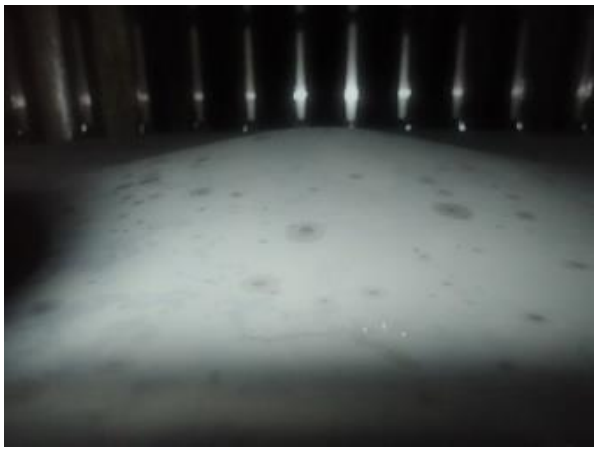
Cylinder unit No. 2



Piston Skirt

Piston top land

Piston rings



Piston Crown

Cylinder unit No. 2

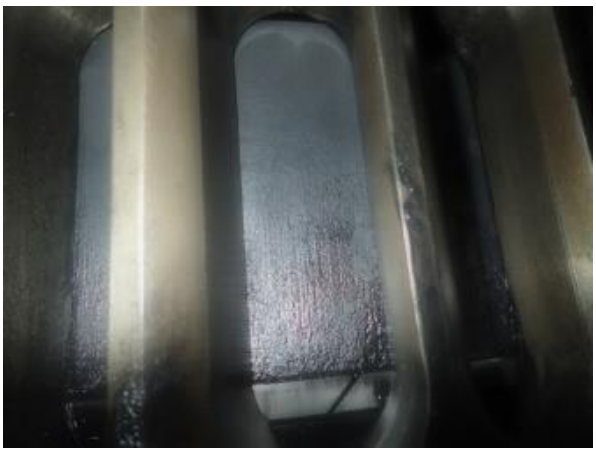
Cylinder Liner View 1

Cylinder Liner View 2

Cylinder Liner View 3

Cylinder unit No. 3

Piston Skirt

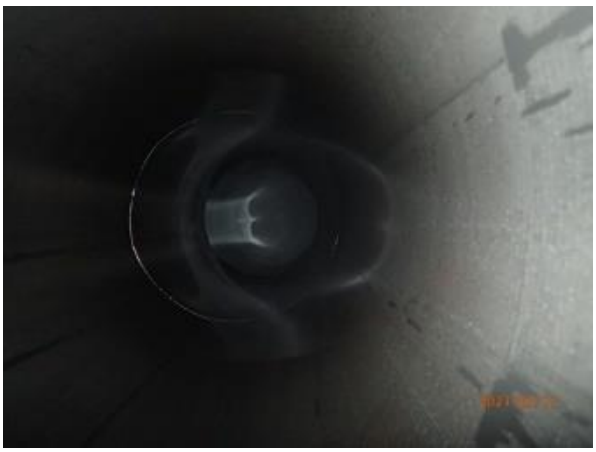


Piston top land

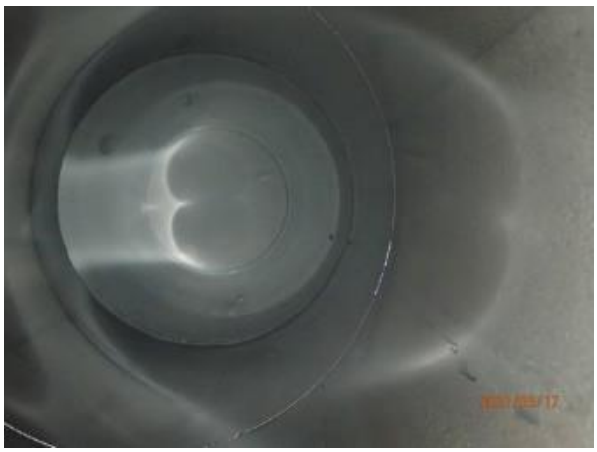
Piston rings

Piston Crown

Cylinder unit No. 3



Cylinder Liner View 1



Cylinder Liner View 2

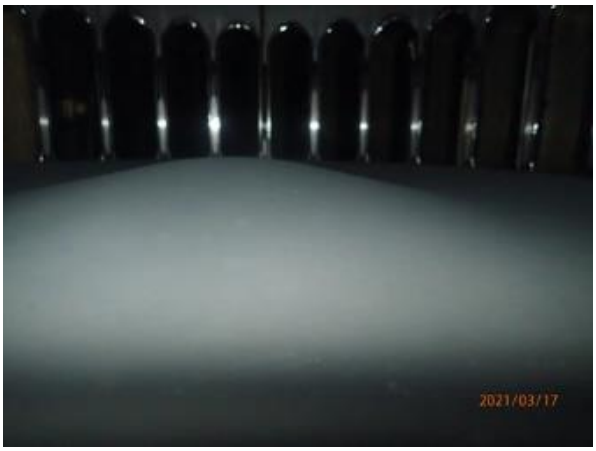
Cylinder Liner View 3

Cylinder unit No. 4

Piston Skirt

Piston top land

Piston rings

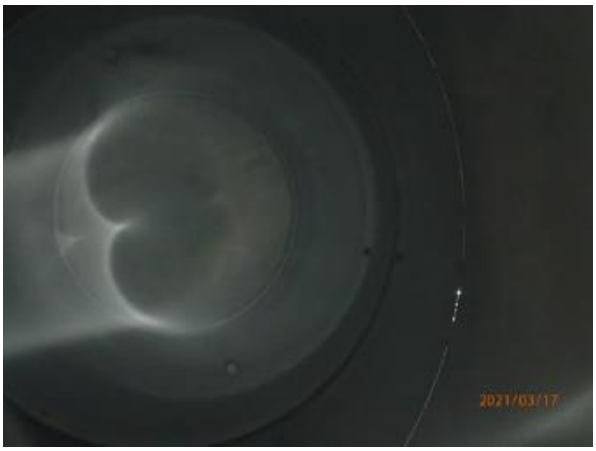


Piston Crown

Cylinder unit No. 4

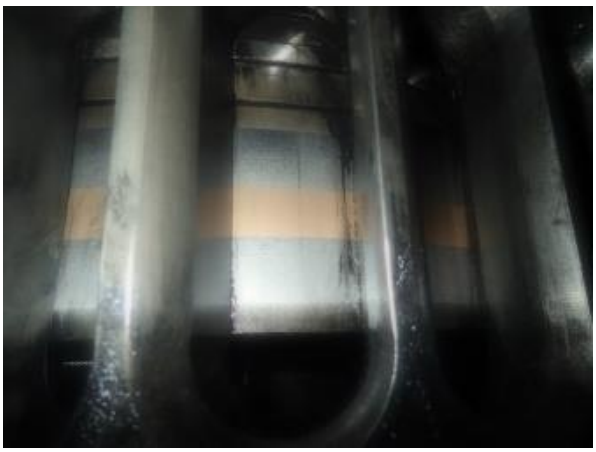
Cylinder Liner View 1

Cylinder Liner View 2



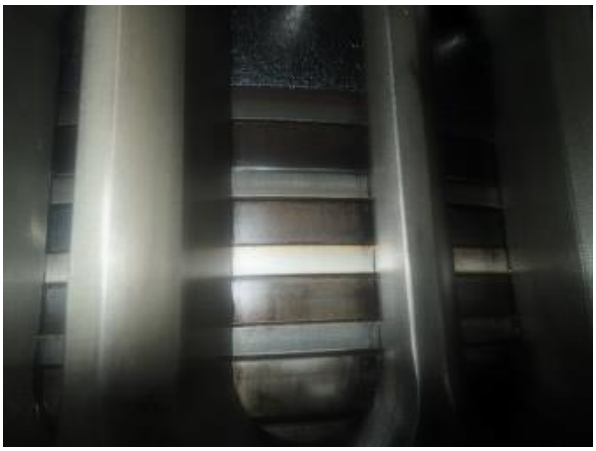
Cylinder Liner View 3

Cylinder unit No. 5



Piston Skirt

Piston top land



Piston rings

Piston Crown

Cylinder unit No. 5

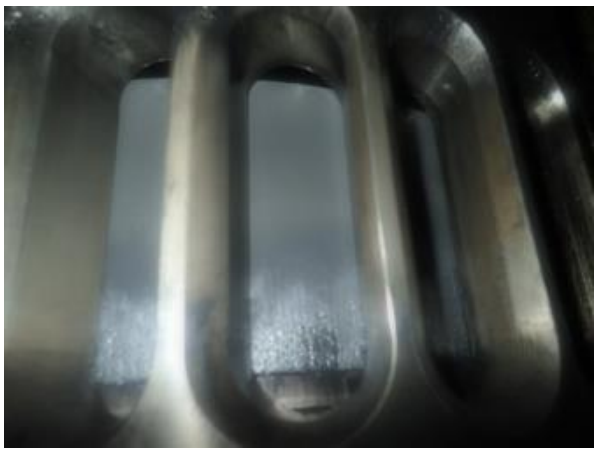
Cylinder Liner View 1

Cylinder Liner View 2

Cylinder Liner View 3

Cylinder unit No. 6

Piston Skirt



Piston top land

Piston rings

Piston Crown

Cylinder unit No. 6

Cylinder Liner View 1

Cylinder Liner View 2

Cylinder Liner View 3

Enclosure 6

Insitu Piston Ring Inspection

Piston Ring Groove / Piston Ring Clearances						
	Piston #1	Piston #2	Piston #3	Piston #4	Piston #5	Piston #6
Top Ring	0.50 mm	0.50 mm	0.60 mm	0.65 mm	0.55 mm	0.55 mm
2nd Ring	0.50 mm	0.45 mm	0.50 mm	0.60 mm	0.45 mm	0.45 mm
3rd Ring	0.45 mm	0.50 mm	0.50 mm	0.50 mm	0.55 mm	0.55 mm
4th Ring	0.45 mm	0.50 mm	0.60 mm	0.50 mm	0.55 mm	0.55 mm

Vertical clearance, worn parts, max. 0.92 mm
Vertical clearance, new parts 0.43 mm

Clearance accetable

Clearance borderline when operating hours are taken into accoun

Clearance NOT accetable when operating hours are taken into ac

The relative small clearances highlighted in yellow is most likely caused by insufficient cleaning between piston ring / ring groove.
The overall cleanliness of all the pistons looks a little on the dirty side, again caused by insufficient cleaning of the cylinder lub oil.

Enclosure 7.