HHM Global TechService

Li Junhua
✓ Brief of HHM and HHM GTS
✓ Engine Spares supply
✓ Service
✓ Engine Retrofit and reference
✓ Training
Organization

HHM

CMD

HHM GTS

Spares
Service
Retrofit
Training
Calibration & Testing
Our Principle

- Quality
- Professional
- Systematic
Service Right

HHM GTS Merit:
- The biggest low speed engine components producer and purchaser in China.
- Produce both licensers engines.
Licensee Engine Type Under CSSC

**MAN:**
MC, MC-C, ME-B, ME-C

**Wartsila:**
RND, RTA, RT-flex, X-type

**HHM**

**CMD**

**CMP**

**ACD**

**DAIHATSU**
DK-20/26/28/36, DC-17/32
Over 2000 engines delivery by HHM & CMD in service, 30% of these vessel installed auxiliary engine from CMP or ACD.

HHM GTS could supplier main engine and auxiliary engine spares.
The **benefits** of one window (HHM Global TechService) to customer:

- Offer one-stop service for both main engine and auxiliary engine
- Reduce the intermediary business cost
- Save logistics fee
- Satisfy your needs through simplicity
Distribution - Domestic

- Changjiang area
- Shanghai area
- Medium area
- South area

Tianjin service station
Jianyin service station
ChangXin island service station
ZhouShan service station
Zhanjiang service station
Guangzhou service station
It plans to set up over 20 overseas service stations or representatives within the next 5 years.
Spare Parts
## Engine Type

- S26MC
- L35MC S35MC
- L42MC S42MC
- S46MC-C S46ME-B
- S50MC S50MC/-C
- S50ME-B
- L60MC
- S60MC/-C S60ME-C
- L70MC S70MC/-C
- S70ME-C
- K80MC-C K80ME-C
- S80MC S80ME-C G80ME-C
- K90MC-C S90ME-C
- K98MC

## Description

- **Cylinder cover; Cooling jacket; O-rings**
- **Piston ring, crown, skirt, rod, O-rings**
- Stuffing box spare parts
- **Cylinder liner; Cooling jacket; O-rings**
- Cylinder lubricator system
- **Connecting rod and crosshead spare parts**
- Hydraulic cylinder unit, rubber membranes
- Main starting valve and cylinder starting valve
- **Starting air distributor spare parts**
- Exhaust valve spindle, seat, etc.
- **Exhaust roller guide spare parts**
- High pressure pipe, complete
- Suction valve, compl.; Puncture valve, compl.; non-return valve, compl.; etc.
- Fuel pump roller guide, compl.
- **Reversing mechanism spare parts**
- Fuel valve, nozzle; spindle guide compl.; non-return valve compl., etc.
- **High pressure pipe, complete**
- Overflow valve, complete
- Air cooler spare parts
- **Safety valve, complete**
- Relief valve
- **Safety valve, complete**
<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTA38</td>
<td>Thrust bearing, main bearing, connecting rod bearing.</td>
</tr>
<tr>
<td>RTA48 RTA48T</td>
<td>Cylinder liner, cover and O-rings</td>
</tr>
<tr>
<td>RT-flex48D</td>
<td>Exhaust valve spindle, seat and O-rings</td>
</tr>
<tr>
<td>RT-flex50B/D</td>
<td>Piston ring, crown, skirt, rod</td>
</tr>
<tr>
<td>RTA52 RTA52U</td>
<td>Water guide jacket</td>
</tr>
<tr>
<td>RLB56</td>
<td>Lubricating quill with accumulator, complete and parts</td>
</tr>
<tr>
<td>RTA58 RTA58T-B</td>
<td>Lubricating pump and accumulator for Pulse lubrication</td>
</tr>
<tr>
<td>RT-flex58T-B/D/E</td>
<td>Gland box for piston rod, complete and parts</td>
</tr>
<tr>
<td>RT-flex60C/B</td>
<td>Fuel injection valve and parts</td>
</tr>
<tr>
<td>RTA62 RTA62U</td>
<td>Spill, suction and delivery valves and springs</td>
</tr>
<tr>
<td>RT-flex68B/D</td>
<td>Regulating linkage for injection pump</td>
</tr>
<tr>
<td>RMD68M</td>
<td>Camshaft drive, camshaft and control elements</td>
</tr>
<tr>
<td>RTA84</td>
<td>Servo oil pumps</td>
</tr>
<tr>
<td>RTA84</td>
<td>Starting valve complete and parts</td>
</tr>
<tr>
<td>RTA84</td>
<td>Safety valve, indicator on cylinder cover</td>
</tr>
<tr>
<td>RTA84</td>
<td>Harmonica valve group</td>
</tr>
<tr>
<td>RTA84</td>
<td>High pressure fuel/servo oil pipe/hose</td>
</tr>
<tr>
<td>RTA84</td>
<td>Various rubber O-rings</td>
</tr>
<tr>
<td>RTA84</td>
<td>Various safety valves</td>
</tr>
<tr>
<td>RTA84</td>
<td>Injection Control Unit (ICU)</td>
</tr>
<tr>
<td>RTA84</td>
<td>Crank angle sensor, complete and parts</td>
</tr>
<tr>
<td>RTA84</td>
<td>WECS-9520 components</td>
</tr>
</tbody>
</table>
Spare Parts

Co-operate with supplier to supply high quality spares in competitive price to clients

Fuel valve

Piston rings
Warehouse

- **12** Millions Euros components consist of
  - 2 stroke engine parts
  - 4 stroke engine parts

- **5,000 m²** warehouse with **10,000** different parts

- New engine parts can be transferred in *emergent case*
For key customers

Pre-fabrication based on client’s engine types, quantities, components life time and running hours.

Benefits

- Quick delivery of spare parts
- Save your storage fees
- More preferential price
- Same quality with new engine parts
Service
24hrs/7days

Professional service

– Maintenance
– Consulting
– Trouble shooting
– Performance evaluation
Annual on board to inspect engine operating condition, main components on behalf of ship owner; to review engine performance in professional.
Technical Service

Field service
Crankshaft repairing

- Crack repairing on A-frame
- Thrust bearing repairing
- Engine overhaul
- Bedplate replacement
Technical Service

Recondition

– Piston crown
– Piston rod
– Cylinder cover
– Exhaust valve
– Fuel pumps
Engine Retrofit
Engine technical upgrade

- Engine D-rating for slow steaming
- Electric lubricating
- Slide type fuel valve
- Cold corrosion solutions
- Oil mist detector system
- Bearing monitoring system
- Oil water detecting system
- Others
  - Operation on Distillate Fuels
  - Ballast Water Management System
Reference:

- 6S60MC Mark5 engine, output information as below.
- Signed main engine D-rating commercial contract on August of 2013, carry out retrofit on January of 2014.

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMCR</td>
<td>11,680kW, 100rpm</td>
<td>6,500kW, 85rpm</td>
</tr>
<tr>
<td>MEP</td>
<td>18bar</td>
<td>11.8bar</td>
</tr>
<tr>
<td>CSR</td>
<td>10,510kW, 96.5rpm</td>
<td>5,800kW, 81.8rpm</td>
</tr>
<tr>
<td>Current service point</td>
<td>5,760kW, 79rpm</td>
<td></td>
</tr>
</tbody>
</table>
Modification content

- Re-match engine
- Renew T/C,
- Compressing shim,
# Fuel oil Cost saving:

<table>
<thead>
<tr>
<th>aft. retrofit CSR5800kW</th>
<th>bef. SFOC g/kWh (measuring value)</th>
<th>aft. Retrofit g/kWh</th>
<th>saving g/kWh</th>
<th>annual saving fuel</th>
<th>annual saving cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFOC</td>
<td>206</td>
<td>187</td>
<td>18</td>
<td>676t</td>
<td>318,000€</td>
</tr>
</tbody>
</table>

Annual running 260 days, fuel oil 470 €/t.
This project vessel also retrofit the propeller, so the total costing saving as below.

<table>
<thead>
<tr>
<th>State</th>
<th>Rpm/min</th>
<th>Speed/mile</th>
<th>Fuel oil t/day</th>
<th>Saving percent</th>
<th>Annual cost saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>78</td>
<td>14.5</td>
<td>25.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After 1</td>
<td>78.1</td>
<td>13.9</td>
<td>20.2</td>
<td>18.6%</td>
<td>697,000€</td>
</tr>
<tr>
<td>After 2</td>
<td>75</td>
<td>13.7</td>
<td>18.2</td>
<td>25.6%</td>
<td>942,000€</td>
</tr>
</tbody>
</table>

Annual running 260 days, fuel oil 470 €/t.

- About 10 days to carry out the modification.
- The project invest pay back time about 10 months.
Principle

- Mechanical lubricating oil rating related with rpm
- Electric lubricating oil rating related with engine load
lubricating upgrade

Options

• Hans Jensen Lubricator
  ◆ Mechtronic => target feed rate 0,9g/kwh
    easy retrofit on engine with Hans Jensen mechanical lubricating system
  ◆ Lubtronic + SIP valve=> target feed rate 0,6 g/kwh

• MAN Alpha lubricator
Cost saving:
6S50MC-C Engine

<table>
<thead>
<tr>
<th>CSR 5358KW</th>
<th>Former cyl. oil consumption</th>
<th>Setting value</th>
<th>Aft retrofit cyl. oil</th>
<th>Saving amount</th>
<th>Saving cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>l/year</td>
<td>t/year</td>
<td>g/kwh</td>
<td>t/year</td>
<td>t/year</td>
</tr>
<tr>
<td>Cyl. oil consumption</td>
<td>73,000</td>
<td>67.9</td>
<td><strong>0.8</strong></td>
<td>25.7</td>
<td>42.2</td>
</tr>
<tr>
<td></td>
<td>1.3</td>
<td>41.8</td>
<td>26.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6000hrs/year, density 930g/l, 1,858 € /t.

- About 5 days to carry out the modification.
- The invest pay back time about 1 to 1.2 year.
Selective Catalytic Reduction:
Nitrogen oxides (NO$_x$) are reduced into nitrogen (N$_2$) and water vapour (H$_2$O) using ammonia or urea at a suitable temperature on the surface of a SCR catalyst. SCR could be arranged before or after T/C.
- 2nd order vibration compensation required if hull-modes resonate with excitation from main engine, and result in excessive hull vibration.
- Electrically driven moment compensation outside of engine.
- It was cancel mechanical 2nd compensation design on engine type S50ME-B9 and S50ME-C.
HHM Global TechService was Sales and Service Agent for Cyeco BWMS production in worldwide.

**Cyeco BWMS Features:**

- UV + Filter principle, Safe operation without chemical additives or generation;
- Compact design with minimized footprint;
- Automatic & easy operation;
- Minimum Maintenance and long service life etc.
Engine will operate on distillate fuels, i.e. MGO and MDO within Control area according to Marpol73/78 rules required.

HHM GTS could offer the related retrofit package:

• Free of technical proposal
• Short-term of retrofit period
Training
Training Center

- Founded in 2010
- CCS approved
- Over 300 persons trained every year
Training Center

- Practice training center opened on 2014
- Focused on Electric Engine special components overhaul training
Training Course

Tailor-made for customer request.

2-stroke course:
- ME-C Operation & Practice
- ME-B Operation & Practice
- RT-flex Operation & Practice
- Alpha Operation

Automation course:
- SAM
- KONGSBERG

T/C: ABB T/C
Over 60 shipping company, management corporation and shipyard send their engineers to HHM for training.
Help trainee for call “airport pick up service” and “hotel reservation”
Station Engineer Training

- The first group of overseas engineers were trained in March of 2014.
- Training will be arranged regularly in future.
HHM-CTC approved by **CNAS** (China National Accreditation Service for Conformity Assessment). Various professional testing and facility, such as:

- Strength testing
- 3D measurement
- Physical & chemical laboratory
- Precision measurement
- NDT
- **Vibration** or noise measurement
If you have any question or any interested topic for engine technical upgrade, Please don’t hesitate to contact us or HHM GTS Athens:
The Window of HHM to serve the World!
For Spares: spare.gts@hhm.com.cn
For Service: service.gts@hhm.com.cn

SUMMARY