



ANDHRA PRADESH STATE ROAD TRANSPORT CORPORATION

No : PRD1/462(01)/2011-MED

O/o VC&MD  
Hyderabad - 624

**CIRCULAR NO: 16/2011 – MED, Dt : 13.05.2011**

SUB: **ENGINES – Breakage of Engine Blocks and Crank shafts –**  
Guidelines - Reg.,

- Ref: 1. Circular No. 54/91-MED, dtd: 9.12.91  
2. Circular. 40/92-MED, dtd: 4.8.92  
3. Circular no. 03/2000 – MED dt. 29.02.2010  
4. Circular no. 18/2007 – MED dt. 06.09.2007

Corporation has spent ₹ 104 Cr in the year 2010 – 11 on Workshops, out of which ₹ 19.79 Cr alone on Engines overhauling. Being the major cost component of workshops and contributing the lion share of ZWS CPK, **no stone shall be left unturned** in increasing the Engine life and minimizing premature failures and breakage of Engine Blocks & Crankshafts.

Detailed guidelines were issued vide Circulars cited, on maintenance of Engines to improve unit life as well as HSD KMPL & LUB KMPL. Proper maintenance of Cooling system, lubrication system not only improves the Engine life but will have its substantial effect on key MED parameters like HSD KMPL, Lub KMPL etc., and paves way for the reduction of CPK on MED. With the introduction of sophisticated Engines like BS II & BS III, the responsibility of maintenance staff increments proportionately to improve the Engine life.

Carrying out Top overhaul for an OE Engine / C.O Engine is a healthy practice of Depots and prime step in increasing the Engine life. Vide Cir. No 54/91 – MED dt. 09.12.1991 & Cir. No 40/92 – MED dt. 04.08.1992, guidelines were given in selection of vehicle for Top-overhauls, works to be carried out during the top overhaul, need for the carrying out compression test etc., In spite

of the instructions, majority of the depots are slowly slipping from the track for one reason or the other, which is a matter of serious concern.

Workshops also equally responsible for improvement of Engine life and reduction of CPK. Proper assembling practices, inspection procedures, testing of Engines after carrying out Complete overhaul etc., play a significant role in rolling out the most qualitative Engine to Depots.

A study of the breakage of Engine blocks and Crank shafts during the year 2010 – 11, revealed many distressed facts. As many as **614 Engine blocks** and **298 Crankshafts** got broken among all the Workshops which amount to ₹ **5 Cr.** In addition to the pecuniary loss, vicariously we have lost the passengers faith due to failure of the vehicle, which is priceless.

The major causes contributing the above damage are defective cooling system, defective lubrication system, improper driving habits etc., and most of them are avoidable in nature. The cause wise damages are summarized below.

| S.no | Cause of Failure      | Engine Blocks | %  | Crank shafts | %  | Total      | %  |
|------|-----------------------|---------------|----|--------------|----|------------|----|
| 1    | Defective Cooling     | 313           | 51 | 60           | 20 | 373        | 41 |
| 2    | Defective Lubrication | 118           | 19 | 129          | 43 | 247        | 27 |
| 3    | Other reasons         | 183           | 30 | 109          | 37 | 292        | 32 |
| 4    | Total                 | <b>614</b>    |    | <b>298</b>   |    | <b>912</b> |    |

From the above, it can be concluded that formation of sludge, delayed EOCs, topping up of burnt lub oil, oil starvation etc., are mostly responsible for crankshaft breakages. Few crankshafts have broken due to blowholes, improper fillet radius and other miscellaneous reasons.

Formation of rust on water channels of engine block due to improper coolant and water mixture, sludge formation, improper torque given to connecting rod bolts etc., are the reasons for breakage of engine blocks and development of cracks between adjacent cylinder bores.

Workshop-wise Engine block breakages and crank shafts breakage are furnished here under.

| S.no    | ZWS  | Engine Blocks |     |     | Crank shafts |     |     |
|---------|------|---------------|-----|-----|--------------|-----|-----|
|         |      | A             | B   | C   | A            | B   | C   |
| 1       | UPL  | 8             | 17  | 41  | 28           | 77  | 61  |
| 2       | KRMR | 99            | 06  | 54  | 03           | 03  | 22  |
| 3       | NLR  | 33            | 14  | 04  | 05           | 04  | 02  |
| 4       | VJA  | 17            | 16  | 04  | 05           | 05  | 0   |
| 5       | VZM  | 89            | 17  | 29  | 9            | 2   | 3   |
| 6       | KDP  | 62            | 38  | 44  | 10           | 26  | 15  |
| 7       | TPT  | 05            | 10  | 07  | 0            | 12  | 06  |
| TOTAL → |      | 313           | 118 | 183 | 60           | 129 | 109 |

**A:** Defective Cooling

**B:** Defective Lubrication

**C:** Others

From the above data, it is observed that Breakage of Engine blocks is on high side at KRMR & UPL in Ashok Leyland area and KDP & VZM in TATA area.

The factors responsible for this extensive damage of Engine Blocks and Crankshafts are discussed here under for necessary follow up.

- 1. Engine Oil top up practices:** In some cases it was observed that Engines failed due to Engine oil starvation which is a serious crime. One of the prime activities of Schedule I Maintenance is to check the Engine oil level. In some cases, the activity of topping up is left to the discretion of Shramiks allocated to Schedule I Mechanic who may not aware of the importance of maintaining correct level of Engine Oil. Frequent change of Shramiks in Schedule I also may lead to irregular topping up of Engines.
- 2. Engine Oil Change Delays:** Engine oil changes need to be carried out at specified intervals in the respective models of Engines. Delayed oil changes lead to the loss of lubricating properties in Engine oil and in turn lead to Engine failures. Further, in case of New vehicles / C.O Engines, first Oil change is to be carried out at after 1,000 Kms of operation inclusive of oil filter change. It takes care of removal of any sediments mixed in the Engine oil resulted out of overhauling / assembling of Engine. Such removed oil can be used for top up of Engines after careful filtering only. (Please Refer Circulars 23/2008 – MED dt. 29.09.2008 & 29/09 – MED dt. 24.12.2009)

3. **Delayed Top overhauls:** Engines need to be taken up for top overhaul immediately after observing blowing defect to prevent faster wear of Cylinder liner and piston rings. Any delays in carrying out top overhaul may lead to breakage of Engine blocks and crankshafts.

Select Engines for top overhaul based on the criteria of loss of power due to drop in compression pressure in Cylinder / observing blowing, rather than based on kms operated by the Engine. In most of the depots, it was observed that top overhauls are being taken up whenever the Engines fail due to sound or some other reason. This is merely breakdown maintenance, against to the maintenance policies of the Corporation. The activity of Top overhauling is to be considered under **Preventive Maintenance** system.

4. **Neglected Cooling System:** Proper maintenance of cooling system is another factor contributing to improved Engine life. Most of the Engines are failing due to overheat generation, which is the effect of defective cooling system. Overheating of Engine leads to seizure of piston rings in piston grooves and scoring of cylinder liners, rapid wear of piston rings which in turn lead to Engine blowing and may lead to extensive damage of Engine block and its components. Maintaining specified coolant concentration, leak proof cooling system, changing of coolant at specified intervals, replacing / repairing Radiator whenever blocked / leaking, maintaining pressurized Radiator cap are the prerequisites for an effective cooling system which will in turn takes care of Engine life. It shall be ensured that Radiator cowl shall not be disturbed in case of Radiator changing, Cylinder Head gasket change etc.,
5. **Driving Habits:** The analysis of Engines failed due to Bad driving habits give enormous information on the driving habits of drivers. The Maintenance In charge shall take necessary steps like counseling & educating the drivers, explaining the consequences of Engine failure etc.
6. **Overhauling Practices:** As mentioned, overhauling practices also need much concentration in reducing the Engine failures. Every activity right from Engine stripping to overhauled Engine testing must be carefully carried out as

well as supervised. Pressure testing in case of Cylinder heads, valve seat lapping, preparation of crank shaft, fillet radius on crank pins & main journals, clearance between mating parts, preparation of big end & small ends of connecting rod etc., are some of the areas which need to be concentrated. The same is also applicable to overhauling of **Sub assemblies** like Cylinder Head, Air Compressor & Water pump, preparation of crank shaft, connecting rods etc.

7. **Joint Inspection of Failed Engines:** During the review meetings it is informed that many prematurely failed / extensively failed Engines are lying idle days together at Workshops for want of joint inspections by Works Managers and Dy. CMEs. This will result in production hold ups, which ultimately leads to off-road of vehicles for want of Engines. On the other hand, delayed inspections lead to non-identification of primary cause of failure of Engines / Crank shafts. Identification of the root cause is most vital for controlling further damages. Works Manager has to organize joint inspection of such extensively damaged Engines and educate the unit officers, Maintenance In-charges and concerned staff of the Depots. The Works Manager shall submit monthly consolidated report of the premature failure and extensively damaged units to the respective Regional Managers, Dy. CMEs and the Depot Managers besides discussing the same in the PRC meetings to bring awareness among all the Dy. CMEs.

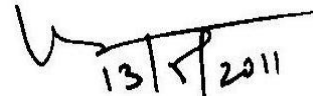
**It is not out of place to mention that the targeted CPK of ZWSs for the year 2011 – 12 is 38 Ps which, if achieved, will result in a saving of ₹ 14.10 Cr. This is possible only when the major contributing units like Engine are taken care of.**

Hence all the **Depot Managers** are advised to concentrate on the above factors and strive hard to improve the Engine life and minimize the damages thereby achieving the targeted CPK.

All the Dy. CMEs are advised to ensure proper maintenance & critically analyze the Engine failures during the course of their Inspection of depots and

take corrective action to avert further loss. The Engine lives shall be reviewed critically in the periodical meetings with DMs and AEs(M) of the Depots for the better maintenance. The anomaly in the systems among the Depots shall be corrected by the Dy.CMEs. There shall be healthy improvement in Engine lives and with the same focus, the Engine lives will be reviewed by the Head Office in the periodical meetings with Dy.CMEs.

All the Works Managers are advised to ensure proper assembling practices and production line inspections for generation of qualitative Engines and Sub-assemblies and take part in maintaining low production costs besides achieving targeted CPK. They shall take prompt action to inform the abused maintenance practices to the defaulting Depots for taking timely corrective action at the respective Depots.

A handwritten signature in black ink, followed by a horizontal line and the date '13/5/2011' written below it.

Vice Chairman & Managing Director

Copy to: Dir (V&S) for information.

Copy to: ED(E&IT), FA, CAO, ED(A&P), ED(HRD&MED) & Secy to Corpn for information

Copy to: ED (HYD&GHZ), ED(KRMR), ED(KDP), ED(NLR), ED(VJA), ED(VZM) for information and n/a.

Copy to: CME(O),CME(C&B),CE(IT),CCOS,CA for information

Copy to: All Regional Managers for information & necessary action

Copy to: All Works Managers for necessary action.

Copy to: All Dy.Chief Mechanical Engineers for necessary action.

Copy to: All Depot Managers for necessary action.

Copy to: All Maintenance In-charges for necessary action.