GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

No.98/M(N)/951/12/Pt.I
Dated: 14/9/12

The Chief Mech. Engineers
All Zonal Railways(open line)

Sub: Damages to wagons during loading/unloading

During the last GMs conference held in New Delhi on 24th and 25th Aug. 2012, the matter of damages to wagons during mechanised loading/unloading was discussed. During the meeting a Booklet titled "Damages to Wagons caused by mechanised loading/unloading" was given to all General Managers. A copy of this Booklet has since been E-mailed to all CRSEs.

A report on mechanised loading/unloading of BOXN wagons submitted by CAMTECH is also sent herewith for necessary appropriate action by zonal railways.

Encl: as above

(Ashesh Agrawal)
Executive Director Mech. Engg.(Fr.)
Railway Board

C/-

EDS(W)/RDSO – with reference to his letter No. MW/TPL dt. 18/2/2011, it is informed that RDSO my pursue the EOI for damage free mechanised loading/unloading systems for BOXN/BOXNHL type wagons of Indian Railways
REPORT ON

MECHANISED LOADING/UNLOADING OF BOXN WAGONS

CAMTECH/M/W/Mechanised loading/unloading-1.0

September - 2010

Indian Railways
Centre for Advanced Maintenance Technology
1.0 INTRODUCTION

Railway Board vide their letter No. 98/M(N)/951/12 Pt.I dated 24/27.12.07 instructed CAMTECH and RDSO to identify equipments which could be used for unloading coal wagons without causing damages to the wagons structure and to frame standard instructions to customers to regulate use of such mechanized loading/unloading equipment.

2.0 METHODOLOGY ADOPTED

Officers and supervisors of CAMTECH visited following sidings:-

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Siding</th>
<th>Place</th>
<th>Type of Work being undertaken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Jayaswal NECO Industries</td>
<td>Raipur</td>
<td>Unloading of Coal, Iron Ores by the Tipler</td>
</tr>
<tr>
<td>2.</td>
<td>SKS Ispat &amp; Power Ltd.</td>
<td>Raipur</td>
<td>Unloading of Coal, Iron Ores by the Hydraulic excavators and Clamshell bucket and loading of release material by pay loaders.</td>
</tr>
<tr>
<td>3.</td>
<td>Shardha Sidings</td>
<td>Raipur</td>
<td>Unloading of Coal, Iron Ores manually</td>
</tr>
<tr>
<td>3</td>
<td>Bimila sidings</td>
<td>Raipur</td>
<td>Unloading of Coal, Iron Ores by the Hydraulic excavators and Clamshell bucket and loading of Bauxite by pay loaders.</td>
</tr>
<tr>
<td>4.</td>
<td>Llyod Steel Ind. Ltd.</td>
<td>Wardha</td>
<td>Unloading of Coal &amp; Iron Ores by Hydraulic excavators and Clamshell bucket.</td>
</tr>
</tbody>
</table>

Matter was discussed with siding owners of above sidings. Suggestions were also asked from all the CRSEs of the Zonal Railways. Finding of CRSE’s committee on related subject have also been studied. Discussions were also held with Sr DME/Raipur, Sr DME/Nagpur and Sr DME/Dhanbad.

3.0 DISCUSSIONS

3.1 Wagon damage due to Pay loaders

The fact that damages are being caused by pay-loader, JCBs, clamshalls, grabbers, mechanized showells, etc. during loading and un-loading of commodities such as coal, iron ore, clinkers, lime stone, etc. is well known.

There are large number of sidings where loading (coal, ore, etc.) is being done by pay loaders. During the process wagons are getting damaged due to following action of the equipments.
i) Wagon doors being closed with JCB/Pay loaders' grab.

ii) Unloading of coal from wagons by scooping with pay loader buckets.

iii) Hammering of top coping of wagons by pay loader bucket or arm during loading or withdrawal of bucket after loading.

iv) Shunting and positioning of wagons at material heap by pay loaders.

v) Pressing of stanchions by wheels of Pay-loaders.

vi) Hitting of bucket against the side wall of wagons to drop the sticky coal during loading operation. This has the effect of side wall being pulled outwards and welding cracking open.

vii) Sometimes due to mis-operation by driver, the bucket hits the side wall leading to tearing/perforations in side walls.

viii) Floor is damaged because of hitting of floor plates by buckets especially when buckets have teeth, these tend to pull out the floor plates.

As a result, following areas of a wagon are getting damaged.
i) Top coping

ii) Stanchions

iii) Wagon doors

iv) Side panels

v) Floor

A few photographs of typical damages attached as Annexure I

3.2 Effect of wagon damages on safety of Rolling Stock

3.2.1 Damage of wagon doors caused by hitting of grab of JCB/Pay loader ultimately leads to bending of wagon doors. Such bent doors are difficult to close and when partially closed, open out on run and cause hitting of wagon doors with OHE mast.

3.2.2 Similarly, hammering of top coping of wagons by pay loader bucket or arm and pressing of stanchions by wheels of pay loader leads to bulging of wagon side walls beyond safety limits.

3.2.3 Excessive Pressure of pay loader bucket from top for wagon commodity adjustment and side wall bulged wagons can cause excess loading of commodity beyond permissible limit.
3.3 Visit to sidings

3.3.1 The sidings mentioned in Para 2.0 were visited by supervisor and officer’s of CAMTECH. The equipments used for loading/unloading of commodities such as coal/iron ore/clinkers/ bauxite etc are summarized below.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Equipments</th>
<th>Make</th>
<th>Model</th>
<th>Capacity</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>JCB Machines having toothed mechanism</td>
<td>JCB</td>
<td>3 DX</td>
<td>N/A</td>
<td>For loading/unloading and cleaning of floors/platforms</td>
</tr>
<tr>
<td>2.</td>
<td>Pay loader</td>
<td>Hindustan</td>
<td>2021</td>
<td>N/A</td>
<td>For loading from platforms/floors in the wagon or into the trucks etc.</td>
</tr>
<tr>
<td>3.</td>
<td>Loading Crane</td>
<td>Tata Hitachi</td>
<td>N/A</td>
<td>N/A</td>
<td>Having low operator’s cabin height. Operator is unable to see the operation inside the wagon.</td>
</tr>
<tr>
<td>4.</td>
<td>'Hydraulic Excavator having Clamshell bucket mechanism for grabbing of material</td>
<td>L&amp;T</td>
<td>L&amp;T 90</td>
<td>N/A</td>
<td>Having high operator’s cabin height. Operator is able to see the operation inside the wagon.</td>
</tr>
</tbody>
</table>

3.3.2 The facilities available in terms of plateform etc were also varying considerably. One siding SKS Ispat & Power Ltd was having a high level (about 4.0 feet height from rail level) plateform. The use of Payloaders and hydraulic excavator with clamshell bucket is very easy from this plateform for loading as well as unloading. The chances of excavator boom or bucket hitting the wagon top coping are less. However the chances of Payloader wheels hitting the wagon side walls are high.

3.3.3 Other siding had a concrete plateform of varying width from 15 to 30 feet at a level about 2.0 feet below the rail level. Here the Payloader wheels cannot damage the side wall. However, loading cannot be done by a payloader having dumping height of about 10 feet. Hydraulic excavator with clamshell with very high dumping height can only be used. Ever then, the visibility inside the wagon is poor.

3.3.4 Therefore in future sidings, it is suggested that there should be a high level plateform (4.0 feet height from rail level) and a 1.0 ft x 1.0 ft wall in place of coping. In addition a fencing of rail for full length of siding should be provided to avoid touching of Payloader bucket or boom with top coping and wheels of pay-loaders with side wall of the wagon.
3.3.5 Loading/unloading machines can be divided on the basis of dumping height and type of bucket. The equipment with a dumping height of about 10.0 feet are called Dumpers or Payloaders and generally have ditch cleaning type of buckets. These can be used only for unloading that too on a high level platform.

3.3.6 However hydraulic excavator with a very high boom have also been developed. These can be used with clamshell types of buckets. These can be effectively utilized for loading / unloading after taking due precautions. There use is also better from a high level platform few photographs depicting use of these equipments are enclosed in annexure-II

4.0 RECOMMENDATIONS

4.1 Recommended measures to reduce damage during mechanised loading/unloading.

4.1.1 It is observed that the main reason of damage is hitting of wagon by Payloader parts whether by large wheels or bucket or arms. Hence, restriction for such hitting may be considered by providing Rail bar fencing all along the siding with vertical bent rails and cross rails (provided horizontally on the front to prevent damage to stanchions and on height to prevent damage to top-copping). Suitable design may be finalized by RDSO in view of large variants of wagons with different heights.

4.1.2 It is also observed that in number of sidings where there is no platform, pay loaders try to move closer to wagon body so that wagon is within the reach of pay loader bucket. In such cases, wagon body is damaged by wheel pressing against stanchions and hitting of top copping by arm of the grab. Such damage can be avoided by providing a 1.0 feet high and 1.0 feet thick wall all along the siding in place of copping.

4.1.3 Where night loading is carried out, siding owner must ensure adequate illumination.

4.1.4 Siding with loading of 3 rakes or more per day may be asked to go for top loading through coal handling plant.

4.1.5 The siding agreements should be vetted by Sr. DME of the division concerned for availability of above facilities.

4.1.6 Quarterly joint checks by representatives of siding owners and Sr. DME may be carried out. Sr. DME is consultation with Sr. DOM/ Sr.DCM should device system of monitoring of damages in each siding. Suitable penalty should be levied for damages carried by the siding owners during loading/unloading. Necessary surprise checks should also be carried out by the representatives of Sr DME and necessary vehicles required should be arranged.

5.0 INSTRUCTION FOR SIDING OWNER’S, OPERATORS AND MODIFICATIONS IN EQUIPMENTS FOR MECHANIZED LOADING AND UNLOADING.

5.1 Mechanised loading / unloading

5.1.1 Equipment capability / modifications

The equipment to be utilized should have following features.

i. Driver seats height from Rail level should be about 4.2 meter or more.
ii. Buckets of capacity below 1.2 tons with smooth surfaces and no teeth. The corner and back face may be suitably covered by non-metallic material.
iii. Dumping height – Bucket should clear the wagon top coping by a margin of 2.0 feet.
iv. Speed control during loading/unloading.

5.1.2 Facilities in sidings
i. A continuous high level platform (height of about 4 ft from Rail level) of full length and 50 ft width.
ii. A 1.0 feet high and 1.0 ft wide wall in place of coping to avoid touching of loader with wagon.
iii. Adequate lighting (if operated at night)
iv. A rail fencing to avoid damage to top coping.

5.1.3 Instruction for operator
i. All functions of unloading machine to be checked properly.
ii. Avoid touching of wheels or any part of machine with wagon.
iii. The speed of grabbing from the wagon should be reasonable.
iv. Leave at least 1.0 ft material in the wagon.
v. The boom or bucket should not touch the top coping, side wall, floor or any part of wagon.
vi. Shunting and positioning of wagons should not be done by pay loaders.
vii. Hitting of bucket against the side wall of wagons to drop the sticky coal during loading operation should not be done.
Annexure I

Photographs of damages during mechanized loading and unloading