STREAMLINING STANDARD FOR
101 HAULAGE AND R.A.W
EXCESSIVE SWITCHES IN HAULAGE

RE-INSTALL THE SWITCH IN THIS POSITION

DEVELOPMENT

REMOVE SWITCH FOR ONE WAY TRAFFIC IF DIRECTION IS

DIRECTION OF TRAVEL

FIGURE 5
STANDARD TRACK LAYOUT
FOR STREAMLINING
101 RAW and HAULAGE
12 SLEEPERS per TRACK

FIGURE 4
NOTE: CROWN WELDING TO BE GROUND OFF WITH RAIL GRINDER

WELD FISH PLATES TO RAIL "CROWN & WEB" (BOTH SIDES OF RAIL)

WELD WEB OF RAIL ONLY (NOT THE SHOULDER)

WELD FISH PLATES TO RAIL (BOTH SIDES OF RAIL) CROWN & WEB
5.1.2 Compact the ballast so it will stay where it is placed for as long as possible (Figure 7):

**Function:** The compaction of the ballast is done by super-imposing a squeezing motion on the vibratory motion using hydraulic power. The squeeze action pushes and compacts the ballast under the sleeper in the rail support area to hold the track in its correct geometric alignment position.

5.2.1 **Technical Specification for the Plasrail:** Figure 8 & 9

- **Prime Mover:** Deutz Diesel F4L 912W
- **Maximum power:** 38 - kW/2 300 R.P.M.
- **Maximum Torque:** 196 Nm
- **Front Axle:** Cradle mounted
- **Suspension:** Rubber spring system
- **Maximum travelling speed:** 15 km/h
- **Wheel base:** 2.8 metres

5.2.2 **Tamping units**

- Hydraulic driven and controlled.

- Non-synchronous uniform pressure tamping system. (Infinitely variable to suit ballast conditions).

5.2.3 **Transmission**

- Running wheel diameter 380 mm
- Flame hardened
- 4 Wheel drive
- Powered by 2 hydraulic motors driving the axles the way of chain drive

5.2.4 **Maximum Tamping Speed**

- 10 sleepers per minute subject to ballast conditions.
5.2.5 Electrical System

12 V Negative earth.

5.2.6 Running Gear

Headlights
Tail lights
Hooter

5.2.7 Chassis

Rigged all steel welded construction, robust and strong.

6. COST COMPARISON: CONVENTIONAL MANUAL METHOD OF BALLASTING VERSUS USE OF A MECHANICAL BALLASTING MACHINE

If manual labour were to be used to maintain 7 200 metres of ballasted track it would require 16 labourers working 7 days a week in order to achieve 12 complete cycles of the track system per year assuming that manual ballasting could meet the standards required for this high capacity haulage where 15 ton trolley locomotives and 18 ton hoppers will operate.

Streamline operations commenced in December 1984. The Plasserail was commissioned in March 1985 (21 months in operation).

6.1 Cost/metre to streamline : R16,03

6.2 Fuel cost/hour : R7,00

6.3 Spares cost/hour : R1,66

6.4 Lubricant cost/hour : R0,23

Current hour reading : 1 893 hours

Total length to streamline : 7,2 km
Distance completed : 6,9 km

Total estimated cost for 101 including workshops, rolling stock & electrical : R3,2 million
: R444,44 / metre
6.5 Mechanised Track Maintenance

6.5.1 Months operational : 21
Total hours worked : 1 893

6.5.2 Spares Cost

<table>
<thead>
<tr>
<th>Item</th>
<th>Monthly Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>One directional valve</td>
<td>R 897.89</td>
</tr>
<tr>
<td>Four time shafts</td>
<td>261.28</td>
</tr>
<tr>
<td>Two levers</td>
<td>500.00</td>
</tr>
<tr>
<td>One V-Belt</td>
<td>8.59</td>
</tr>
<tr>
<td>12 Oil Filters</td>
<td>134.04</td>
</tr>
<tr>
<td>12 Fuel Filters</td>
<td>44.85</td>
</tr>
<tr>
<td>One hydraulic cylinder</td>
<td>1 152.06</td>
</tr>
<tr>
<td>One hydraulic filters</td>
<td>148.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>R3 147.21</strong></td>
</tr>
</tbody>
</table>

6.5.3 Lubricants/Fuel Cost

<table>
<thead>
<tr>
<th>Item</th>
<th>Monthly Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic oil 2ℓ/month</td>
<td>R 108.36</td>
</tr>
<tr>
<td>Engine oil - 6 changes - 6.5 ℓ/ change</td>
<td>205.80</td>
</tr>
<tr>
<td>Grease 1/2 kg/month</td>
<td>132.72</td>
</tr>
<tr>
<td>Fuel 10 ℓ/hour @ 70°C/ℓ @</td>
<td>13 251.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>R13 697.88</strong></td>
</tr>
</tbody>
</table>

Total operating cost/month  R16 845.09 = R802.15

6.5.4 Summary

(a) Total operating hours = 1 893
(b) Spares cost / hour = R1.66
(c) Fuel cost / hour = 7.00
(d) Lubricant cost / hour = 0.23

Total operating cost / hour = R8.89
6.5.5 Labour Cost

Official (1) = R2 200.00
Union (1) = 550.00

R2 720.00

Therefore, total monthly cost = R3 552.15

6.5.6 Conventional Track Maintenance

Cost manual labour : 16 x R550/month = R 8 800
1 Official Supervisor = R 2 200

R11 000

With Plasser & Aebi the savings is R7 447.85/month
Payback period ± 15 months.

7. GENERAL

7.1 Can handle more than 1 haulage per shaft

7.2 From the cost comparison it is evident that the following savings are being achieved :-

7.2.1 Reduced labour and time for haulage maintenance.
7.2.2 Stores cost - rails, fishplates, sleepers, etc.
7.2.3 Less maintenance on rolling stock.
7.2.4 Greater safety - no derailments.
7.2.5 Minimum downtime on plasserail.
7.2.6 Fewer haulages to maintain.
8. CONCLUSIONS

8.1 Track maintenance with a plasserail ensures effective tamping of ballast.

8.2 Safety hazard reduced to minimum.

8.3 It is not practical to maintain 7,2 km of haulage during tramming operations in a high capacity haulage (6 000 tons/day) and if such a haulage is to be maintained with manual labour (on Sundays only) such a volunteer labour force cannot be guaranteed.

8.4 The standard of trackwork required for this high capacity haulage can only be achieved with a mechanical tamping machine, because manual labour is not able to ballast the sleepers as effectively as with the plasserail.
PLASSERAIL TAMPING MACHINE
BEING SERVICED IN
UNDERGROUND WORKSHOP

PLASSERAIL TAMPING MACHINE
BEING SERVICED IN
UNDERGROUND WORKSHOP
JOINTS HUCK BOLTED AND WELDED

CROWN WELDED AND GROUND OFF WITH RAIL GRINDER
FISH PLATES HUCK BOLTED

SHOWING HUCK BOLTED JOINT WITH HOPPER PASSING OVER
PLASSERAIL TAMING MACHINE
IN HAULAGE 101 LEVEL

TAMPING HEADS IN BALLAST
A) FLUIDISE BALLAST
B) COMPACT BALLAST
HAULAGE BEFORE

NOTE: A) RUN OF MINE BALLAST AND DRAINS
     B) ALIGNMENT AND GRADE OF TRACKS

AFTER

NOTE: A) ALIGNMENT AND GRADE
     B) BALLAST

PLASSERAIL