

NORTH EASTERN RAILWAY

CE'S CIRCULAR NO.52(P.W.) OF 1966.

CASE NO.W/275/0/A/W-7.

RESURFACING OF POINTS & CROSSINGS BY
GAS WELDING "IN SITU ".

1. INTRODUCTION:

1.1 In points and crossings the life of the xings.unit is shorter than that of the lead rails because the crossing is subjected to heavy hammer blows by passing vehicles. In order to increase the life of the points and crossings, these may be built up by gas welding without removing the xings from the track, which will give an additional advantage of the xings being built up to the form & height of adjacent parts of the turn out which have become depressed due to service.

1.2 It is considered unwise to resurface the xings where wear on the same is more than $\frac{1}{4}$ " and such xings should be only reclaimed by sending them to reclamation centre at SPJ, and if otherwise unfit to reclaim should be returned to ASK/CPA as scrap.

2. ORGANISATION:

2.1 Four mobile gangs have been formed under T.S.O.to carry out resurfacing by Gas Welding Process. More gangs will be formed after this work is not on a sound footing and adequate arrangements of tools and plant and other materials are made and existing gangs are fully utilised. This is possible only by active participation of the P.Way staff where the work is carried out.

2.2 The work has to be carried out on a Programme basis so that the movement of the gangs are chalked out in advance and arrangement of consumable materials such as Oxygen and Acetylene gases etc. are made in advance by the respective distt. This will also help the A.E.Ns and P.W.Is to arrange for carrying out the preliminaries required and imposition of speed restrictions.

2.3 The programme will be made by the T.S.O. after getting the complete information from DEN's about the nos.of xing. station-wise which requires resurfacing and their position in yard i.e. whether on main line or passenger or goods loop and the extent of wear on the Wing Tools and nose of crossings. This will also enable to gauge the total work load and more gangs will be formed if found necessary. This information must be sent by 30th June and 31st December of every year so that six monthly programme is made and intimated to all concerned.

3. PRELIMINARIES:

3.1 P.W.I.(Maintenance) will personally inspect all the crossings two days in advance and attend to the following points.

3.1.1 There is no fracture on base, web and head any component of crossing.

3.1.2 Bolts and blocks are properly tight.

3.1.3 Creep adjusted.

3.1.4 Standard gauge and clearance are available.

3.1.5 Cross levels are proper and all sleepers are properly packed.

3.1.6 Caution order is issued to all concerned and arrangement of protecting the track is made.

3.1.7 The crossing is ground to remove Loose scale deformed metal and surface cracks. Complete removal of surface cracks is necessary as the left-over cracks on the surface of the base metal get aggravated by the contraction of the reinforcement in cooling and may cause ultimate fracture in service.

3.1.8 Arrangement of Oxygen and Acetylene gases must be arranged in advance and arrangement of transporting the equipment available with welding gang and gas cylinders must be made. The average consumption of gases per crossing is 200 cft. of Oxygen and 230 Cft of Acetylene which will depend on the wear.

3.1.9 The extent of the wear is measured by means of a straight edge laid across the worn area and also by use of rail profile gauge of the section of the rails to be welded. These straight edges and gauges will form part of the equipment of the resurfacing party.

3.1.10 Locking under the bottom edge of the straight edge the beginning and finishing point of wear can readily be seen a chalk mark should be made on the rail where the deposit is to taper off into the normally worn surface. The shape of the portions to be built up is best ascertained by using a rail contour gauge. Surfaces to be welded should be cleaned and any burred metal should be filed off.

4. EQUIPMENT:

4.1 The "Oxy-Acetylene equipment comprises of the "Saffire, II H.P." welding blow pipe with tip size 5.75 & 90 suitable for rail resurfacing, at two state regulator for Acetylene and Oxygen, Red hose for Acetylene, black hose for oxygen being atleast 30'-0" long of 5/16" bore, ball pane hammer, double faced hammer, chisel, flatter, contour of the deposited metal is further checked by a wheel contour gauge. Immediately after the xing is welded, the date of welding should be indicated on the wing rail of the xing by the punch.

4.2 The work is being done with WRAS-AIDA rods which is stocked at Kanpur depot. This is an imported and RDSO have approved the use of ACHR-20 rods which are indigenously manufactured by M/s Advani Oerlikon Electrode Private Limited, Bombay. ACHR-20 has a slight tendency for the deposit metal to chip off after certain period. The firm having undertaken improvement in the rod have developed a further variant of this electrode viz. ACHR-20-D which has been found to give the same results as WRAS-AIDA rods and may, therefore, be used in preference to the letter on account of their being available indigenously.

5. OPERATIONS:

5.1 On the day actual welding operations are to be done the PWI (Maintenance) will protect the line according to para 1504 of IRWW/Manual and will arrange to move all welding equipments Acetylene and Oxygen Cylinders to the point to be welded by his labour to enable to start the actual operation without delay, as atleast about 7 to 8 hours continuous work has to be done in order to complete a xing the same day it is started.

5.2 During working hours cylinders should be protected from the hot rays of the sun by means of a tarpaulin cloth cover.

5.3 It is of utmost importance that there should be complete understanding and cooperation between the flagmen and welder. The welder should be warned of approach of a train sufficiently ahead to enable him to roughly smooth and shape the deposit before the train is allowed.

5.4 It is essential for the deposit to be hammered before the traffic passes over it otherwise the rolling action of the wheels may squeeze the uncompressed metal out of shape. As soon as the warning whistle of the approach of a train is given, further depositing of metal should stop and the pad should be immediately hammer forged. On hearing the second whistle, the line should be cleared and the train allowed to pass the spot at a restricted speed of 10 KMPH. Before allowing the train to pass, an Acetylene flame (without Oxygen) should be used to deposit soot on the welded portion to detect unevenness on the surface.

5.5 For resurfacing, the 'Right ward' or 'Back ward' technique of Gas welding is employed. The total area to be resurfaced is divided into a number of small sections of about 4 sq. in each. Heat is applied over a section and a flame with slightly excess acetylene is used until the rail surface begins to sweat. The rod is then melted on the sweated surface. While welding, the rail surface ahead of the deposit is preheated automatically, sweating precedes the deposit and operation becomes continuous. After the section is built up to the full thickness, the deposited metal is uniformly heated to

visible rod and then hammered under blow pipe flame to approximately level surface. Each section is sweated, built up to the required thickness and hammered in this way. The edges of each section are tapered down to the rail surface and when depositing adjoining section, the new deposit is fused to this taper. The built up surface is then thoroughly sweated by using a more excess acetylene flame to eliminate the residual unevenness and further hammering is done while deposit is red hot. In case of low pressure below pipe the pressure of Oxygen is kept 21-25 lb/sqr inches and Acetylene 2 lbs. sq.inches and in case of "Saffire II H.P." welding below pipe the pressure of oxygen and the pressure of Acetylene varies according to the tip sizes and should be kept as follows:

Tip size	Oxygen & Acetylene pressure
55	5 lbs./sq.inches
70	6 " "
90	7 " "

While depositing filler metal the approximate size of the inner cone and outer feather of the flames which should have slight excess of Acetylene should be about $\frac{3}{4}$ " to 1" and $\frac{1}{4}$ " to $\frac{1}{2}$ ", respectively. While doing hammer forging, the length of inner cone and outer feathers should be about 1" and $2\frac{1}{4}$ " to $2\frac{1}{2}$ " respectively.

5.6 Deposition of rod without proper seating would also result in ultimate reduction of hardness of the deposited metal.

5.7 3 D/Acetylene cylinder should be connected by means of 3 way-value Adaptors and connecting arms during welding work.

5.8 The acetylene cylinder valve should be opened $\frac{1}{4}$ turn as is normally required. The welders open it fully resulting in acetone, in which this gas is dissolved, coming out.

5.9 When resurfacing under fast traffic, care should be taken to avoid undue heating of the parent metal, as the rail is liable to become deformed under wheel loads if too hot.

6. PRECAUTIONS IN HANDLING & STORES OF CYLINDERS:

The following precautions should be taken:

6.1 Cylinders whether full or empty should not be subjected to shock, rough usage or heating;

6.2 Cylinders should not be dented or allowed to come into violent contact with each or any other object.

6.3 Cylinders should not be lifted in loose slings.

6.4 Damaged or defective cylinders:

All cylinders should be examined when received from the factory and if they appear damaged or defective they should not be used but put aside and the suppliers advised. The cylinder should be checked by pressure gauge whether they are full.

6.5 Cylinders painted Maroon in colour Acetylene and cylinders painted black in colour contain Oxygen.

6.6 The neck end of the cylinder has an aluminium panel which shows the number of the cylinder.

6.7 The following conditions should be observed for storage of cylinder.

6.7.1 Cylinders should not be exposed to sun or any other source of heat.

6.7.2 Cylinders should not be stored near inflammable substances.

6.7.3 Cylinders should preferably be stored vertically, but if stacked in layers should not be stacked in more than four layers. Large cylinders should not be stacked on the top of small cylinders.

6.7.4 Cylinders should be kept in a dry place, preferably under cover and should not be allowed to lie about under conditions which will cause them to rust. Their valves should be kept free from dirt or grit.

6.7.5 Empty cylinders should be stored apart from full ones.

6.7.6 The valves of all empty cylinders should be kept closed and the importance of closing the cylinder valves before regulator or other fittings are removed from the cylinders should be impressed upon all welders.

6.7.7 Any cylinder which may have defective valves causing leakages should be stored separately in the open. If the leakage cannot be stopped the gas should be used at once.

6.7.8 Cylinders which have been in stock longest should be used before others:

6.7.9 Cylinders & fittings should be kept from all sources of contamination such as oil barrels, overhead shafting, cranes or belts.

6.7.10 Do not smoke wear oily or greasy clothes or have any exposed light or fire in any place where compressed gases are stored.

6.7.11 Prevent grit, dirt of any sort or oil and water from entering cylinder valves and store them clear of all corrosive influences.

6.7.12 Cylinders should not be lifted by using chain slings. A rope sling may be used to lift one cylinder but never more than one at a time.

6.7.13 Do not lubricate any valve or fitting and do not use any white or red or any other joining compound to stop leakage.

6.7.14 Never allow cylinders to come in contact with electrical apparatus or live wires, since arcing may be set up which will heat or damage the cylinders.

6.7.15 Never transport cylinders with the regulators and hose attached unless a proper trolley or carrier is used.

6.7.16 PWI's should maintain a register for keeping the movement of cylinders separately for oxygen and acetylene showing the date of receipt, R.R.No. and date cylinder No., date of the cylinder becoming empty, the date of return to the firm, with R.R.No. & date and the number of days cylinder remained with the P.W.I. This will help him in verifying the firm's challan.

. Return of Empty Cylinders:

7.1 The supply of gases from the firm will depend upon the quick return of the cylinders and it is, therefore, essential to return the cylinders immediately after they are emptied. The empty cylinders should be returned to the firm mentioning the number of each cylinder. Any cylinder which has been cut, dented or damaged during use or storage should be labelled accordingly before returning to the suppliers.

7.2 If the gases are received from more than one source, it should be ensured that the cylinders of one firm do not get mixed up with others. For this purpose it is better to make small distinguishing paint marks on cylinders, the cylinders of one firm being given the same paint mark.

7.3 Where cylinders are supplied with caps for protection of the valves during transit the caps should be replaced on the empty cylinders before they are returned.

7.4 Cylinders should not be loaded loosely in wagons as they may bounce and come into violent contact with each other or the sides of the wagon.

7.5 If acetylene is supplied in cylinders protected by coir covering they should be returned with this coir covering undamaged.

PROGRESS REPORT & RECORD OF WELDING:

8.1 APWI/Welding will submit a weekly progress report of resurfacing the xing to the TSO/GKP in the proforma given in Annexure I.

8.2 A remark should also be given in the points and xing register by the PWI (Maintenance) mentioning the date of resurfacing. This date is always embossed on the xing wing rails by the welding gang.

This is in supersession of the CE's Circular No.3 of 1956 and TSO's Notes on proposed mobile welding gangs for points and xings on N.E.Railway issued under TSO/GKP's No. W/308/41/11/Pt.IV/2040 dated 12.6.1964.

WEEKLY PROGRESS REPORT OF WELDING:

For the week ending..

Mobile Welding Gang No.

Name of Welder

Name of Khalasis (1)

(2)

S. No.	Name of station	King. No.	Ext-ent of wear	Engle as & sec. of xing.	Work started at	Work finished at	Material consumed
					Ti-Da-me te	Ti-Da-me te	Oxy-Ace-W & tyle AS ne

Total xings.done during the week.....
 ,, ,, upto the end of last.. ..
 ,, ,, during the month upto ..
 ,, ,, the end of this week ..