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Analysis of Problem of Sectional Variation During Production of Rail

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Abstract— Rail is the most important and critical component of the permanent way. Bhilai Steel Plant is the biggest producer of rail. In my work of**" Analysis of Problem of Sectional Variation during Production of Rail".** The thorough study of rail Manufacturing techniques in rail structural mill of Bhilai Steel Plant Bhilai was discussed. I have concentrated my research area on the different problem regarding variation of rail. in my work I have concentrated on mainly affects of section variation ,causes I have taken my work to the solution level ,how the problem of section variation occurs and further more how these will be encountered, I have go through the temperature variation data during rail manufacturing . My work is thoroughly based on temperature study, roll setting, collar gap and time study.

In this project the description of rail drawing, standard shape of rail and mill setting are shown with diagram and a proper method to reduced the problem during production of rail are given.

During the production of rail section variation occurs after analyzing that the reasons behind it is find out, it is a graph shown monthly cobble (defect piece) comes from section variation.

Keywords—rail,rolls press,collar gap,flange and mills.

I. INTRODUCTION

M.Papaelias et all: the future of rail inspection technology , focus on Rail infrastructure managers are showing strong interest in the development of novel techniques for the reliable and accurate evaluation of rail which will lead to the improvements of the efficiency of preventive maintenance and reduce the need for reactive maintenance to the lowest possible level. Commonly employed rail inspection methodologies do not achieve the highest level of reliability and cost effectiveness objectives required by the industry.

Deffects in rails can develops in the head, web or foot of the rail. The majority of rail defects are detected on the rail head although significant number of defects are also found on the web as well as the foot of rail. In first way during rail manufacturing process to maintain the section variation and other vary value so that the defect will be reduce.[5]

Problem Identification :- e problem the analysis for rail bloom for three different dates was analyzed.

Rail Diamension & Tolerance:- (by RPDB)

DIAMENSIONS	R-52Kg/m		R-60Kg/m	
HEIGHT	156.0	+0.8 -0.4	172.0	+0.8 -0.4
HEAD WIDTH	67.0	±0.5	74.3	±0.5
FLANGE WIDTH	136.0	±1.0	150.0	±1.2
WEB THICKNESS	15.5	+1.0 -0.5	16.5	+1.0 -0.5

According to the table of rail dimension and tolerance I found some error in the inspection report.

Observation Report Based on Analysis : The dimensions which are bold and underlined in stage inspection report are the dimension's that are either more are less from the standard dimension tolerance In report prepared the report on the possible reason for this observation which depends on the following factor:-
Temperature variation ,Mill setting ,Roll setting, Collar gap

Temperature variation : It will be better for temperature of the bloom should be more then 1080^0c after 950 stand and the temperature before finishing should be 900 ± 30^0c. In my observation I have not found any instant where the change in dimension was caused by the fall of temperature. Nevertheless, the possible reason for the change in dimension can be that for some reason the bloom might have waited in the roll table before being rolled in finishing stand.

Mill Setting : Mill setting has an imported role on the dimension. The rigidity of the stand should be as per the norms. The arrangement of the mill component should be properly done. All the nuts and bolts should be fastened properly. Improper setting may cause defect in dimension.

Roll Setting :Care should be taken on working in roll setting that all the nuts and bolts are properly fastened. There should never be any movement in X and Y direction accepts the roll during the rotation of rolling.

Collar Gap : According to the standard should be maintained as per rolling scheme and standard mill spring,

only in case of change in dimension the collar gap to be adjusted to set the required dimension.

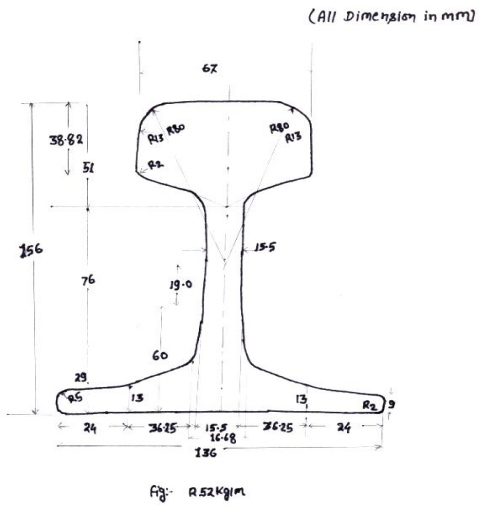

Fig: R.52Kg/m

Mill setting : Adjustment in the collar gaps and roll gaps to get the necessary section. Mill setting for 950 stand condition of roll bearing fixture, cooling arrangement along with checking of collar gap and cross abnormally if any shall be rectified before, clearance for rolling is given.

Fig - Mill for Finishing Stand

Check list:-Routine checks which need to be performed during regular mill check-up are listed below.Check the collar gap on both sides and rectify if found not as per scheme(RPDB) Check the roll cross rectify if cross is in the mill. Ensure that all the plank nuts of both top and bottom roll fully tight. Ensure that the roll neck is not heated up. Check the condition of collar bearing and their locking. Check the top roll body cooling and pass cooling pipes condition. Check the condition of passes. Check the condition of housing rest bar and roll rest bar. Also ensure that steel wedges are firmly in between them also ensure that the nose of guards of the roll rest bars are resting properly in the roll grooves.

Collar gap Adjustment:- The collar gap for rails shall be 15mm at '0' dia reading to check the collar gap the following steps shall be followed. Set the dial reading 40mm. Measure the collar gaps ends with caliper and scale it should be 55 mm. If collar gap is not ok then adjust it by the following:-

(a) See which side the collar gap is more
(b) Disengage the other side screw down.
(c) Lift the top roll from the other side to the required height.
(d) Measure the gap.
(e) Engage the other side screw down.
Measure the collar gap again on both sides if should be 55mm at 40dial reading if necessary dial indicator motor can be operates.

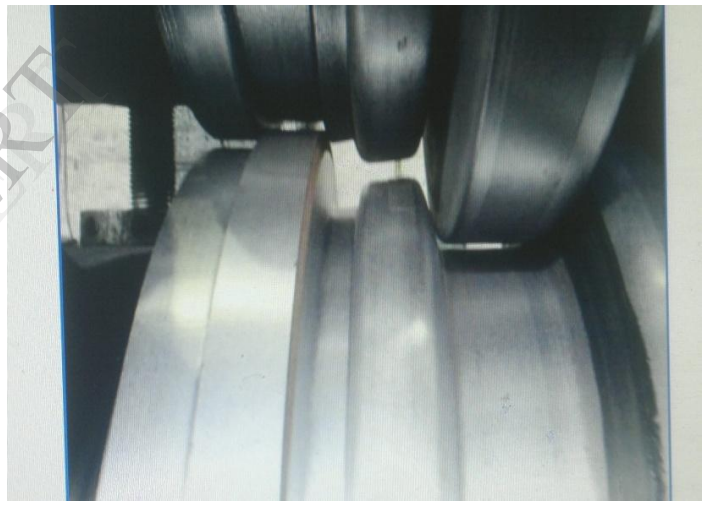

Fig- Collar Gap Between Roller

General guide line for mill setting:-

- Ensure that the mill is kept tightened all the time for this hammer the head wedges and shoes of all stands regularly at least once during every two hours of regular rolling. Also ensure that the side planks are properly tightened.
- Ensure that the bar does not wait before any pass or before 950 stands.
- Check the condition of passes plan for pass/stands changing if pass is worn out.

Guide line for typical sectional variation:-The roller is authorized to alter the collar gaps based shift condition within range of 1-2mm of the pass scheme guide lines are given below to take care of typical technical variation. However

before any alternating are dance to pass setting it must be ensured that the mill is properly tightness also, it is ad visible to make alternation one by one and check the section after each alteration. Also it is advisible to make alteration.

(A) Over Height:-

(1) Press sixth pass.
(2) Raise fifth pass from head side.

(B) Under Height:-

(1) Raise sixth pass
(2) Lower the fifth pass from head side.

(C) Wide Flange:-

(1) Press finishing pass from flange side.

(D) Narrow Flange:-

(1) Raise the finishing pass from flange side.

(E) Thick Web:-

(1) Press finishing pass from both side.
(2) Press sixth pass.

(F) Thin Web:-

(1) Raise finishing pass from both side
(2) Raise sixth pass.

(G) Heavy Head:-

(1) Press finishing pass from head side.
(2) Press sixth pass.
(3) Raise fifth pass from head side
(4) Press fourth pass

(H) Light Head:-

(1) Press finishing pass from head side
(2) Raise sixth pass
(3) Lower fifth pass from head side
(4) Raise fourth

(I) Heavy Section:-

(Thick web, heavy head, wide flange, over height)

(1) Press sixth pass.
(2) Press fourth pass.
(3) Press finishing pass from both sides.

(J) Light Section:-

(Thin web, light head, narrow flange, under height)

(1) Raise sixth pass.
(2) Raise fourth pass.
(3) Raise finishing pass from both side

(K) WideFlange:-

(Thin web, light head, under height)

(1) Press finishing pass from flange side and raise from head side.
(2) Raise second pass
(3) Take less metal from 950 stands.s

(L)Narrow Flange:-

(Thick web, heavy head over height)

(1) Press finishing pass from head side and raise from flange side
(2) Press second pass.
(3) Take more metal from 950 stands.

II. RESULT

Rail and Structural Mill , Bhilai Steel Plant Bhilai produced 250-300 bloom per shift of rail. After that some bloom which doesn't treated with proper heat has been cobbled, so that when it rolled a defect show causing from section variation if it has been analysis of rail production and defect piece year wise and month wise graph is plotted named A and B simultaneously. Graph A shows percentage (%) of defect material of rail production causes by section variation year wise, like same graph B shows percentage of defect material of rail production causes by section variation month wise.

During the rail production follows 5.2 Guide line for typical sectional variation, which overcome the section variation defect in small scale, which is only for one month. If it will possible to increase the production .12% in month of September than it will increases the production 1.44% yearly. 900 bloom rolled for one day. Apart from them 894 bloom only are free from defect. It will follows 5.2 Guide line for typical sectional variation, then this production increases as 897 bloom as perfect product. It means it looking for one month calculation then 90 blooms may save from section variation. According to that calculation production of Rail and Structural Mill , Bhilai Steel Plant Bhilai, has increases contineusoly graph C shows the percentage (%) defect of section variation in the monthly of September. This all problem consist of 52Kg/m type of rail. Section variation defect in September month, after analysis shows graph C.

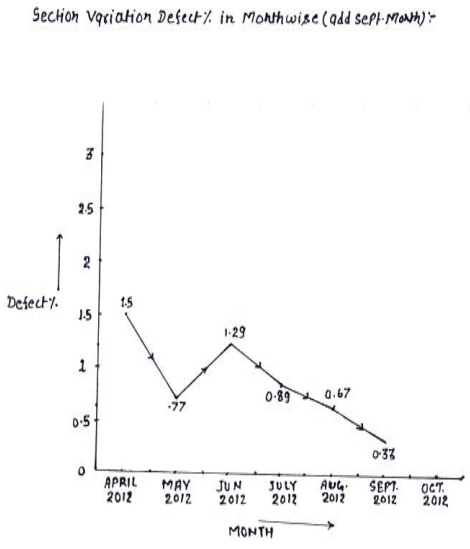

Fig :-Sectional Variation Defect in Monthwise (add September month after analysis

III CONCLUSION

At first I have noted the temperature of bloom before and after comes from reheating furnace to rolling table to be rolled. According to observation found that there is decreasing in temperature continuously after each and every rolling stand after rolled. It created a little problem in rolling. After getting a perfect temperature the desirable shape and size gain. If there are some error then we check continuously for a section until the original shape and desirable size not found causes of this problem there is defect in the section but it have a particular solution to solve this problem. In this particular work the various analysis on the section variation of rail was done:-

1. Mill setting
2. Collar gap
3. Temperature variation
4. Roll setting was analyzed

On the basis of above said the guide line for typical section variation and guide line for mill setting was given. In the above said project the thorough study for section variation was done.

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