ISSN No:-2456-2165

An Analysis on Deviation of Sectional Dimensions during Production of Rail

Nuresh Kumar Khunte, Rahul Mishra
Department Of Mechanical Engineering
Kalinga University Raipur, Chhattisgarh, India

Abstract:- Rail plays a highly significant part in the economic well-being of India. Rail is traditionally strong in transporting heavy and bulk commodities. Rail is one of the very important product of SAIL, Bhilai Steel Plant. In my work of "Analysis on Deviation of Section Dimension during production of Rail." The though study of Rail production techniques in Rail and Structural mill of BSP was discussed. I have concentrated my research area on the different problem regarding dimension variation of Height, Flange and Webof Rail.

In my work I have concentrated mainly on the effect of manufacturing process in section dimension variation and its deviation, I have taken my work to the solution level, how the problem of sectional dimensional deviation occurs and further more how these will be encountered, I have studied the pattern of variation in dimension and calculated the standard deviation and process capability.

In this project the description of rail drawing, standard shape of Rail, Rail dimension analysis during periods with diagram and a proper statistical method to study the problem during production of Rail are given. This analysis will help in improving the process by minimizing deviation in dimensions during rail rolling.

Keywords:- *BSP-Bhilai Steel Plant, KPP-Key Performance Factor, PPES-Personal Protection Equipment System.*

I. INTRODUCTION

Rail is a critical component of railroad operations and a challenging portion for the roll designer and roller. With the evolution of travel speed and the weight of cargo transported, more and more has been demanded of the rail, and no product has been subjected to more rigorous service circumstances than the rail till now. The rail should be built to have the highest possible transverse strength, supply an abundance of metal for wear, present a wide base for attachment to the cross tie, and be of the lightest section possible for economy's sake.

II. METHOD OF RAIL PRODUCTION

At SMS-2, rail is manufactured in a BOF convertor and then processed through a RH degasser and a ladle furnace, among other things. The resulting steel is extremely clean, with an inclusion concentration of less than 2 ppm. It is constantly cast into blooms, which are flame cut to prescribed lengths and weights before being transferred to the Rail and Structural Mill to be rolled. SMS-1 produces steel for rolling structural's, which is cast into ingots and rolled into blooms at the blooming and billet mill. [17]

III. ROLLING IN THE HEAT AND COLD

- Cold rolling is the rolling process that takes place at temperatures below the Recrystallization temperature.
- Furnaces for Heating
- Blooms from the BBM and continuous casting routes are fed into the Reheating Furnaces' charging rolltable through three Bloom Feeders.

PROFILE	HEIGHT	FLANGE	HEAD	WEB
UIC 60	172 +0.8/-0.4	150 +1.2/-1.0	74.3 +/-0.5	16.5 +1.0/-0.5
IRS 52	156 +0.8/-0.4	136 +/- 1.0	67 +/-0.5	15.5 +1.0/-0.5

Table 1

The blooms are reheated in three reheating furnaces, each with a capacity of 75 T/hr. These furnaces have three zones and are continuous pusher type, end-charging end-discharging type injection burner type furnaces. The fuel for these furnaces is a 1900 Kcal/NM3 blend of cokeoven and blast furnace gas. Natural draught is used for both the air supply and the flue gas exit. The fuel gas has been warmed.

IV. LITERATURE SURVEY

- This chapter contains a thorough assessment of the literature on many aspects of the rail system. This chapter contains a literature review that covers all areas of the current project.
- From the earliest days of railways to the present day, Cannon et al., (2003) provided an overview of rail problems and their implications. They found that present research and modeling efforts are largely focused on this issue, but that the situation is complicated. To tackle the RCF problem, it was expected that a significant advancement in rail/wheel technology would be necessary.
- Clark (2003) discussed the current technology used in rail fault detection, as well as instances of recent field

applications. Some of the current advancements as well as future options were also covered.(2005, Silvast et al.)

V. COST LOSS DATA SHEET

Considering the cost of Prime Rail as Rs. 50,000/- per ton& cost of IU Rail as Rs.35,000/- per ton approx.

VI. RESULT AND DISCUSSION

The Roller is authorized to alter the collar gaps based on the site conditions within a range of 1-2mm of the pass scheme. Guidelines are given below to take care of typical sectional variations. However, before any alterations are done to pass setting, It must be ensured that the mill is properly tightened. Also, it is advisable to make alterations one-by-one and check the section after each alteration.

LOSS CALCULATION DUE TO SECTIONAL VARIATIONIN RAILS		
YEAR	IU DUE TO SECTIONAL DIMENSION(tonnage)	LOSS DUE TO DIFF. IN PRICE OF PRIME & IU RAIL *
2013-14	13306	19.959 crores
2014-15(Till 10thJune)	3066	4.599 crores

VII. METHODOLOGY

This study focuses on rail production, specifically the variation of sectional dimensions during rail rolling. The study focuses on the rolling of UIC 60 Rails sections and the temperature variations that occur during rail manufacture. This problem demonstrates the impact of the work process and continuous train production. Rail bloom is made for rail that comes from the steel melting shop-2. This blooms are reheated in a reheating furnace for up to 7-8 hours in a rail & structural mill, depending on the process. After reheating, the bloom must pass through the 950 stand seven times to maintain a temperature of 1280°C. The dimensions of the profile change with temperature, roll wear collar gap setting, and mill rigidity during the rolling operation.

REFERENCES

[1.] Carboni M.," Application of eddy currents to the inspection of fatigue-corroded railway axles", 18th World Conference on Nondestructive Testing, 16-20 April (2012) Durban, South Africa.
[2.] Clark R., "Rail flaw detection: overview and needs for future developments", NDT&E International 37 (2004) 111–118.
[3.] Cannon D.F., Edel K.O., Grassie S.L., Sawley K., "Rail defects: an overview", Blackwell publishing Ltd. Fatigue FractEngng Mater Struct 26 (2003) 865-887.
[4.] Emadi A., Saboonchi A., Taheri M., Hassanpour S., "Heating characteristics of billet in a walking hearth type reheating furnace", Applied Thermal Engineering 63 (2014) 396-405.
[5.] Golightly D., Ryan B., Dadashi N., Pickup L., Wilson J.R., "Use of scenarios and function analyses to understand the impact of situation awareness on safe and effective work on rail tracks", Safety Science 56 (2013) 52–62.
[6.] Guerrieri M., Parla G., Ticali D., "Mono and Stereoscopic Image Analysis for Detecting the Transverse Profile of Worn-Out Rails", Procedia - Social and Behavioral Sciences 53 (2012) 611 – 621.
[7.] Hajiaghaei–Keshteli M., Aminnayeri M., FatemiGhomi S. M., "Integrated Scheduling of Production and Rail Transportation", Computers & Industrial Engineering (2014).
[8.] Jaklic A., Vode F., Kolenko T., "Online simulation model of the slab-reheating process in a pusher-type furnace", Applied Thermal Engineering 27 (2007) 1105–1114.
[9.] Karimi H. J., Saidi M. H., "Heat Transfer and Energy Analysis of a Pusher Type Reheating Furnace Using Oxygen Enhanced Air for Combustion", Journal of iron andsteel research International 17 (2010) 12-17.
[10.] Liu X., Lovett A. Dick T., RapikSaat M., "Optimization of Ultrasonic Rail Defect Inspection for Improving Railway Transportation Safety and Efficiency", Journal of Transportation Engineering, (2014).