Volume 3, Issue 1, January 2013 ISSN: 2277 128X

International Journal of Advanced Research in Computer Science and Software Engineering

Research Paper

Available online at: www.ijarcsse.com

To Determine the Amount of Edging by Observing Various Parameters of Platemill (Thickness, Dimensions etc) at Roughing Stand Using MATLAB

[1]**Ms. Pranita Deshmukh,** I&C,M.Tech Scholar,B.I.T Durg,
[2]**Prof.R.M.Potdar,** Electronics & Telecommunication, B.I.T Durg,
[3]**Prof.Ramesh Kumar,** CSE Department, B.I.T Durg,

Abstract: The continous casting machine solidifies refined molten steel in to adequate crosssection and produces steel pieces slab, billets and blooms which are rolled by hot rolling mills.rolling is an important manufracturing process to provide a wide range of product used in automotive ,construction and steel industries.The complex control systems have been applied to rolling process ,especially flat rolling processs for which it is easy to derive mathematical or physical models as a result they have conntributed to high quality, high productivity, high yield ratio and low energy consumption.This paper produces the rolling of plate at the roughing stand and to obtain the amount of edging to reduce the losses and hence to increase the plate yield there by getting the plate dimension to be more accurate.this can be done by using a statisticalnanalysis and a MATLAB program.

Keywords:edging,untrimmed plates,random nos.,slab profile,plate profile

I. INTRODUCTION

This paper produces a way to recongnise the exact amount of edging in order to produce untrimmed plates by using statistical analysis.Firstly the slab profile and the plate profile is determined and then it is rolled by giving appropriate amount of edging.This amount is identified by statistical methodsthere by going through various processes of plate manufracturing and measuring the dimensions after each passes and corresponding final results and finally calculating the requirements in dimensional change by application of force using AGC.

II. DATA COLLECTION

The data collected from plate mill is as under mentioned in the table 1 below

Table 1: of slab profile, plate profile, l_rr, b_rr

sl. no.	Slab length	Slab width	Slab thickness	Plate length	Plate width	Plate thickness
1.	2600	1600	220	13406	2438	28
2.	2600	1600	220	12970	2439	28
3.	2600	1600	220	13407	2435	28
4.	2600	1600	220	12944	2436	28
5.	2600	1600	220	12500	2439	28
6.	2600	1600	220	12500	2444	28
7.	2600	1600	220	13408	2439	28
8.	2600	1600	220	13401	2439	28
9.	2600	1600	220	13400	2438	28
10.	2600	1600	220	13000	2440	28

© 2013, IJARCSSE All Rights Reserved

sl. no.	longitudinal rolling ratio	broad side rolling ratio
1.	5.1562	1.5237
2.	4.9885	1.5244
3.	5.1565	1.5219
4.	4.9785	1.5225
5.	4.9785	1.5244
6.	4.8077	1.5275
7.	5.1569	1.5244
8.	5.1542	1.5244
9.	5.1538	1.5237
10.	5.0000	1.5250

III. GENERATION OF RANDOM NUMBERS

The readings obtained from the plate mill are not sufficient to reach any conclusion after calculations. Therefore it is required to generate random numbers between two possible values the coding for the generation of random numbers are as mentioned below.The random numbers are generated in order to get values available for statistical analysis.Thus we proceed to generate the 50 random numbers between two possible i.e. lowest and highest values.

The random numbers for longitudinal rolling ratio are calculated as under using the rand command:

```
l_rr = [1* rand (1, 50) + 1]';
```

The random numbers for broad side rolling ratio can be obtained as under:

```
b_rr = [0.0055*rand (1, 50) + 1.5220]';
```

The random numbers for other variable is obtained as under:

```
deltawc = [60* rand(1,50)+ 20]';

deltaec = [60* rand(1,50)+  20]';

delta_w = [6*rand (1, 50) + 6]';

delta_c = [1000*rand (1, 50) - 500]';

deltael =[40*rand(1,50)+20]';
```

The random numbers generated in a table format can be shown in the following table using the command as mentioned below:

```
table =[l_rr, b_rr, deltaec,

        deltawc, delta_w,  delta_c]
```

Thus we will get a tabulated form of above parameters which are sufficient to draw all the conclusions using statiostical analysis

IV. Proposed method to derive UPR

A simplified slab plan view in plate rolling process can be roughly divided into the following three principal stages:

(a) Sizing rolling in this stage, the slab is rolled in the longitudinal direction to Produce the required intermediate thickness;

(b) broadside rolling to obtain the required plate width, the slab is turned around 90° and rolled in the transverse direction;

(c) Finish rolling the slab is turned around 90° again and rolled to the final thickness.

When plate rolling is performed by maintaining a constant plate thickness during each rolling pass, a distinct distortion of the plate plan view from a true rectangular shape takes place.

The finishing plate plan view shape is mainly affected by the slab dimensions, the broadside elongation ratio (b_rr = plate width/slab width) and the longitudinal elongation ratio (l_rr: plate length/slab length) and therefore the amount of crop length (delta_c) and width deviation (delta_w) are also dependent on these factors. When the crops of both ends in the longitudinal direction take a convex shape, then it is called positive crop, and conversely when they take a concave shape, it is called negative crop. Referring to definition shown in Fig.2, the crop length DC can be quantitatively calculated by Eq. (1):

© 2013, IJARCSSE All Rights Reserved

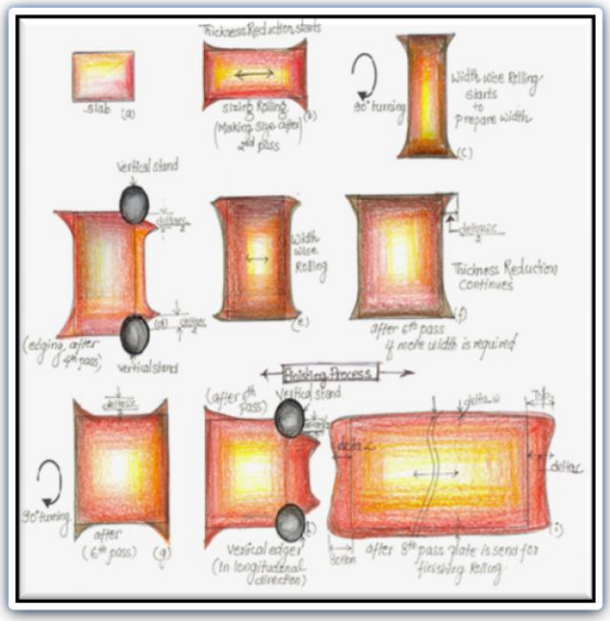

Fig.1.preparation of untrimmed plates

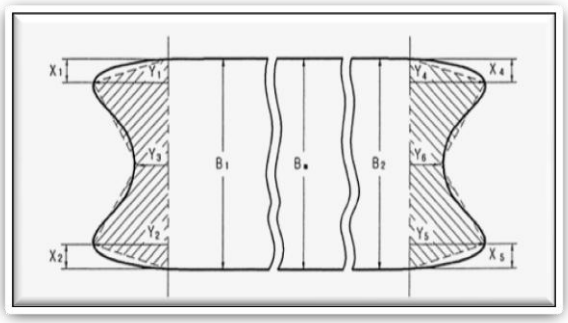

Fig:2 derivation of crop length and width deviation[2]

$$\text{delta_ c} = \frac{\text{Area}^{\text{top}} + \text{Area}^{\text{bottom}}}{B_m}$$

---------- Eq. 1

Where, $$\text{Area}^{\text{top}} = 0.5\left\{\begin{array}{l}(X_1Y_1 + X_2Y_2) + (Y_1 + Y_3)\left(\frac{B_1}{2} - X_1\right) + (Y_2 + Y_3) \\ \left(\frac{B_2}{2} - X_1\right)\end{array}\right\}$$

----------Eq. 2

$$\text{Area}^{\text{bottom}} = 0.5\left\{\begin{array}{l}(X_4Y_4 + X_5Y_5) + (Y_4 + Y_6)\left(\frac{B_1}{2} - X_4\right) + (Y_5 + Y_6) \\ \left(\frac{B_2}{2} - X_5\right)\end{array}\right\}$$

----------Eq. 3

Where equation 2 and 3 represents the equation for calculating area. In the case of width deviation, if the sides of the plate take spool shape, then it is called negative width deviation, and when they take a barrel shape, then it is called positive width deviation. The amount of width deviation can be quantitatively calculated by Eq. (4)

$$\text{delta_w} = B_m - 0.5(B_1 + B_2)$$

----------Eq.4

© 2013, IJARCSSE All Rights Reserved

V. CORRELATION ANALYSIS

The coding for the correlational analysis is as under:

```
l_rr = [1* rand (1, 50) + 1]';
b_rr = [0.0055*rand (1, 50) +1.5220]';
deltawc = [60* rand(1,50)+20]';
deltaec = [60* rand(1,50)+20]';
delta_w = [6*rand (1, 50) +6]';
delta_c = [1000*rand (1, 50)-500]';
deltael =[40*rand(1,50)+20]';
table =[l_rr, b_rr, deltaec, deltawc
        ,delta_w, delta_c]
```

Calculation of coefficients of the equation dependent on deltaec, l_rr and b_rr.
For deltawc = f (l_rr, b_rr. deltaec)

```
X = [ones (size (l_rr)) l_rr b_rr deltaec];
a = X\deltawc
```

Calculation of coefficiants of the equation dependent on deltael and deltawc
For delta_w = f (deltael , deltawc)

```
y = [ones (size (deltael)) deltael deltawc];
b = y\delta_w
```

Calculation of coefficiants of the equation dependent on deltael and deltawc

```
c =y\delta_c
```

Based on these codings we can calculate the coefficients of the equation below which is dependent on deltaec, l_rr and b_rr. Also equations dependent on deltael and deltawc can be calculated.
Where; deltawc represents width deviation after broadside rolling.
deltaec represents the broadside edging amount.
delta_c is crop amount after finish rolling.
delta_w is the width deviation after finish rolling and,
deltael is the longitudenal edging amount.

VI. RESULT AND DISCUSSION

The coefficients of the equations obtained are as under

```
a =
    835.1494
   -6.6770
   -506.0842
   -0.1231
b =
    9.9897
   -0.0278
   -0.0024
c =
   149.3185
   -3.6721
   0.8378
```

From these obtained coefficients we can calculate the equations as under. The coefficients can be written by making the transpose of matrix. Above and we obtain A, B, C as under from this the equations can be formed which is well explained in the result part.

A = 835.1494, -6.6770, -506.0842, -0.1231
B = 9.9897, -0.0278, -0.0024
C = 149.3185, -3.6721, 0.8378

© 2013, IJARCSSE All Rights Reserved

Based on this method we can plot the graph and also can obtain the polynomial equation also a method is developed to find the optimum amount of edging with the help of vertical stand. The equation obtained from the co relational analysis is as shown in the result obtained.

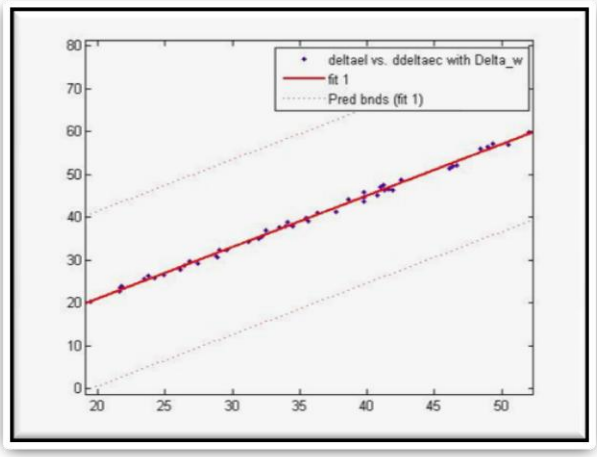

Fig.3.final result

REFERENCES

1. C.H. Moona, Y. Leeb,," The effects of rolling method changes on productivity in thick plate rolling process",proceedings of Journal of Materials Processing Technology 210 , pp. 1844–1851, (2010)
2. M.S. Chun, Y.H. Moon," Optimization of the amount of edging to increase rolling yields in a plate mill",proceedings of Journal of Materials Processing Technology ,pp. 11-16, (2000)
3. Zhu fu-wen, Hu Xian-Lei,Zhao Zhong,Liu xiang-Hua, "Analysis of process control model for plate MAS Rolling",proceedings of international Journal of Iron and steel research 17(4), (SCIENCE DIRECT),pp. 31-33,2011

BIOGRAPHIES:

	Pranita Deshmukh M.Tech scholar BIT Durg
	Prof.Ravindra Manohar Potdar.senior associate professor at BIT durg having subject of intrest in the fied of control systems and industrial applications from last 17 years.
	Prof. Ramesh Kumar. He has specialization in the field of software, artificial intelligence and MOEMS and guided this work with great zeal.

© 2013, IJARCSSE All Rights Reserved