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Improving the Productivity by Increasing Availability at SkinPass Mill by Time Study

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Abstract*—The aim of this report is to Improving the Productivity by Increasing Availability At Skin pass mill by Time Study. This report gives brief introduction to Skin Pass Mill and its process. The subsequent time study is done on the delays of machine and some delays are reduced.SPM (skin pass mill) is one of the vital processing line of cold rolling mill & the delay at SPM line directly effects next line (finishing lines) production & timely delivery to customers. Annealed coils cannot be held for more than 60 hours in SPM WIP, due to chances of rust formation. So this project is mainly based on the view that there must be eliminate defects like rust &maximum continues running of line. This in terms involves study of various delays occur in line and reducing the ineffective time by time study. The time study is done for the whole machine and the comparison is done for empirically proved standard time duration. This project also involves solving the problem causing unnecessary time loss & operator fatigue. The Project also aims at improving safety by reducing man-machineinterface.*

Keywords—Skin Pass Mill, Time Study, Man Machine Interface, Pay off reel, Entry Bridle, Exit Bridle, Productivity, Availability.

I. INTRODUCTION

The Skin pass mills are used fora very light cutback to annealed stock. Their secondary uses are to impart a desired finish to the surfaces of the work piece. Electrostatic Oiler machine is designed to apply a uniform coating to a moving substrate, using Electrostatic forces at Spm.

The Classification of Skin Pass Mill are as follows:

- Dry Skin passMill
- Wet Skin passMill.

Components of Skin pass mill are:

1. POR (Pay Off Reel): The payoff reel is provided with four segment expanding/collapsing overhung mandrel, sliding base by means of hydraulic cylinder. Barrel Length: 1450mm, Collapse Diameter: 560mm, Expand Diameter: 630mm, True circle Diameter: 610mm ,Motor Rating:225KW
2. Snubber Roll: Hollow steel roll 200mm dia and 400mm long with polyurethane covering. Roll is driven by hydraulic motor along with chain and sprocketarrangement.
3. Tension BriddleRoll Assembly: The bridle unit is provided at mill entry and delivery side and is provided to deflect the strip , to give strip tension for SkinPassing
4. Cylinders For Work Roll Bending: The up and down cylinders built in the MAE WEST Block operate in co-operation with each other andapplyan equalbending forcetotheupper andlowerworkrollstogether resulting positivebending.
5. Back-Up Roll Balance Cylinder: This cylinder is also contained in the MAE WEST Block and use to press the upper BUR in case of mill operation and also during assemblychanging.

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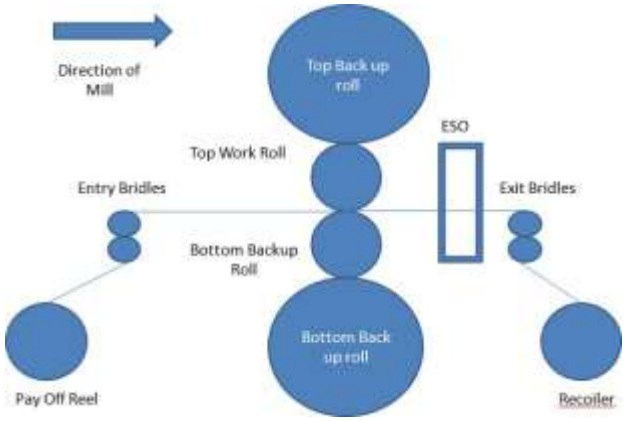

Figure 1: Skin pass mill

6. No load screw down unit (Passline Adjustment Device):The pass line adjustment device is provided to maintain pass line within specific range. This is an electro-mechanical type screw down and having double worm and worm wheel reduction, AC motors and screw and nut with trapezoidal threads. The electric motors are coupled to each other by means of electromagnetic clutch. For all roll gap adjustment, this clutch is disengaged so that the top BUR can be lifted up by running the electric motor. The screw down arrangement is selflocking.
7. Back –Up Roll: This is a special forged steel hardened roll fitted with 4 row tapered roller bearings on the roll neck. The bearings are lubricated with grease. Working Diameter: max diameter 1000mm and min diameter 930mm.Barrel Length: 1380mm withoutchamfer.
8. Work Roll: This is a special forged steel hardened roll, fitted with four row tapered roller bearing on roll neck. The bearings are lubricated by grease. The ends of work roll have across flat to receive the drive spindle head. Working Dia: max dia 40 mm and min dia 370mm. Barrel Length: 1430mm withoutchamfer.

II. PROCESSDESCRIPTION

Main Activities from loading to unloading of the coil

1. Prepare theCoil
2. Unloading TailEnd
3. Load the Coil on PORMandrel
4. Feed the coil up toMill
5. Feed the coil up toRecoiler
6. Feed the coil onRecoiler
7. Remove the coil fromRecoiler
8. Coil Entry &Strapping

III. TIME STUDY PROCEDURE ANDANALYSIS

ACTIVITY 1: UNLOADING THE TAIL END

TABLE 1: Unloading at tail end

Sr No.	Main Activity	Sequence of Sub-activities	Actual avg Time	Standard Time
1		Line stop & remove tension		

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2	1. Unloadingthe Tail end.	Cut the coil by exit shear	4 Mins	3 Mins
3		Forward the coil & sample cutting		
4		Remove the load		
5		Rewind the tail end on POR		
6		Take the coil car below tail end		
7		Tail end ring fixing		

From The above table it is concluded that this activity can be done in 3 minutes. We can salvage the 1 min duration from this activity.

ACTIVITY 2: TAIL END PUSHER TO UNCOILER EXPAND

TABLE 2: Tail End Pusher to Uncoiler Expand

Sr No.	Main Activity	Sequence of Sub-activities	Actual Avg Time	Standard Time
1.	2. Tail End Pusher to Uncoiler Expand	Coil Strap cutting and Removing.	3Mins	2Mins
3.		Put the strapping putty in Scrap Box		
4.		Coil Inspection		
5.		Coil Car alignment and Lifting of Coil		
6.		Alignment OF coil with Mandrel		

From The above table it is concluded that this activity can be done in 2 minutes. We can salvage the 1 min duration from this activity.

ACTIVITY 3: UNCOILER EXPAND TO EXIT SHEAR

Sr No.	Main Activity	Sequence of Sub-activities	Actual avg Time	Standard Time

TABLE 3: Uncoiler Expand to exit Shear

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1.	3. Uncoiler Expand to Exit Shear	Front end bending by Peeler Table	4 Mins	3Mins
2.		Feeding of Front end through / without Bridle Roller		
3.		If front end is damaged cut it by Entry Shear		
4.		Feeding of Coil in Mill		
5.		Apply Load on Mill		

concluded that this activity can be done in 3 minutes. We can Salvage the 1 min duration from this activity.

ACTIVITY 4: EXIT SHEAR TO RECOILER

TABLE 4: Exit Shear to Recoiled

Sr No.	Main Activity	Sequence of Sub -activities	Actual avg Time	Standard Time
1.	4. Exit Shear to Recoiler	Feed the coil through exit bridle	5Mins	4Mins
2.		Front end bending		
3.		Feeding in Recoiler Mandrel		
4.		Remove Belt wrapper		
5.		Start the line thread		
6.		Stop line, Measure Sheet size (Thickness & Width)		

above table it is concluded that this activity can be done in 4 minutes. We can salvage the 1 min duration from this activity.

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CORRECTIVE ACTIONS ON IDENTIFIEDPROBLEMS

Problem Statement:Coils (HRSPO) are not transferred from pickling time to time resulting into delay in coil loading.

Reasons for the coil being unloaded:

1. High age coils are to be processed first (To prevent fromrusting).
2. According to the Ra requirement thicker gauge coils are to be loaded first (to be loaded as perthickness).
3. To be processed as per urgency of the customer or the next processing lines (Finishinglines).

While making the planning the operator will write R (red), Y (yellow), B (blue) &G (green) in front of the coil no. and will use respective colour cotton clothe for coil marking. Also the white board can be used to give identification to the crane operator by writing just R-Y-B-G.

Problem Statement: HRSPO coils are not transferred from pickling timely resulting into delays in coil loading at SPM.

Corrective action taken: One point lesson is been made to communicate with all employees so that by following the method suggested the resulting delay can be reduced.

Reason for abnormality: Not transferring of coils from pickling bay to Mill bay.

Troubleshooting : Timely follow up with pickling and crane department to shift the coils from pickling bay to mill bay.

Problem Statement: In CRFH coils, front end position lies on top side which restricts the operator to perform coil preparation activityoff-line.

Corrective action taken: One point lesson is been made to communicate with all employees so that by following the method suggested the resulting delay can be reduced.

Reason for abnormality: In CRFH coils the front end lies on top side of the coil.

Troubleshooting: Put the strap cutter in strapping Patti and then load the coil on POR mandrel & cut the strapping Patti only after coil is been loaded on mandrel.

Problem Statement: In Mode 2 problem while feeding the coil at top entry bridle due toinadequate provision for guiding the strip resulting into more coil feeding time in Mode2.

Corrective Actions: Pneumatic cylinder with wheel type rollers and guide bar is provided for guiding the front end of the coil to avoid manual intervention during feeding the coli in Mode 2.

Problem Statement: At ESO (Electro Static Oiler) teflon guide plates are having less size which was resulting into stuck up of front end while coil feeding through ESO and subsequent delay in coil feedingactivity.

Action Taken:

Guide plate length and width increased for better guiding of strip and to avoid stuck up of coil .Additional guide plate provided at ESO for ease in guiding the strip.

IV. RESULTS ANDDISCUSSION

Total Handling time reduced from 16 Mins to 12.72 Mins.

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Achieved Handling Time	12.92	Mins / Coil
Saving	2.77	Mins / Coil
Target Handling Time	2,838	Hrs/Year

V. CONCLUSION AND FUTUREWORK

Thus we can conclude that after execution of this project the operational delays are reduced up to great extent and thus increasing the efficiency& availability of the system as well as reducing unnecessary labour fatigue also improving the safety and moral of employees. The company will be going to implement many advance techniques for achieving the above purposes such as provision of cameras for inspection purpose, auto control of loading, bending and other parameters and auto entry of coil in the system.

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