"Comparison of Three Remedial Alternative Solution's And Selection of Best for Alternative Design of Pressure Board UVSL"

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***Abstract*— study of the existing system and possible alternative so as to avoid the delay in guide wood setting, Guide wood and side guide is an arrangement in cold rolling so as to provide back tension in 1st pass and strip centering in order to create straight winding In coil along with proper shape . wood s are clamped in set of various widths of coils to be rolled. Width of coils varies from 900mm to 1330 mm.**

***Index Terms*— Cold Rolling, Pressure Board, 4hi Mill**

I. INTRODUCTION

Guide wood and side guide is an arrangement in cold rolling so as to provide back tension in 1st pass and strip centering in order to create straight winding In coil along with proper shape . Existing system is simple but having a major drawback as it is consuming more time during width change. The existing systems consist of wooden pieces of two different sizes, one size for top and another for bottom setting. Both types of this guide wood s are clamped in set of various widths of coils to be rolled. Width of coils varies from 900mm to 1330 mm. every times the width change the setup of guideword need to be changed and thus delay is caused .guide wood setting is fully a manual process and is done by operator himself . as manual factor is involved there are maximum chances of error that may cause wastage of time and material as well .moreover the guide wood setting causes the disturbance of rhythm of production any error in guide wood setting results in false value of parameter necessary for rolling that may defect in output.

II. OBJECTIVE OF THE PAPER :-

This paper deals with the study of the existing system and possible alternative so as to avoid the delay in guide wood setting

A. EXISTING SYSTEM:-

a) Components of pressure board:-

Various component of pressure board are as given below

1) Top guide wood :- To press the sheet from top in downward direction so as to provide back tension .It is fixed in slots provided top clamp , mounted on top portion of pressure board , It is about 1000 mm in length , 104 mm in thickness , and weigh about 8 kg .

2) Bottom guide wood: - To hold the sheet and top pressure board . It is fixed on clamps provided in bottom pressure board. It is 815 mm in length, 65 mm in thickness, and weighs about 4 kg.

3) Guide roll:-guide rolls are the rolls provided on both side so as to centre the strip during rolling first pass and to keep it in centre throughout first pass.

4) Side guide :- side guide are the guide on which the guide roll is mounted it consist of following parts i) base plate , ii) guide roll , iii) screw , iii) bearings .

5) Clamps :- clamps are used to hold top and bottom guide wood in proper position , top clamps are used to hold the top guide and bottom clamps are used to hold bottom guide wood . There are 4 no of top and bottom clamps each; having two slots each to tighten it in position.

6) Lead screw: - lead screw is a special type of screw having right hand side thread on operator side and left hand side thread on drive side .this facilitate the movement of side guide with roll on both side to move simultaneous in and out .lead screw is made up of stainless steel .having square thread. All the load of strip centering comes on lead screw through roll, side guide and side frame mountings.

7) Pneumatic cylinder: - pneumatic cylinders are connected to top pressure board to move it up and down and to hold the pressure board in position. It is a double acting cylinder. Two pneumatic cylinders are used to provide equal load on both side. Pneumatic cylinder facilitates the work of holding the cylinder in up position as well as holing it down.

B. Working of existing system :-

1) When lead screw is made to rotate by hydraulic motor then opposite direction threads on both side made the side guide to move in opposite direction i.e. they are either moving toward each other or moving away from each other .when the strip is to be centered then the side guide is moved in inward direction, and when the strip is to be released then they are moved away from each other.

2) Two pneumatic cylinders are provided to move pressure board up and down .the pressure board remains in down position during first pass so as to provide back tension and remain up in later passes.

3) When sheet is feeded for first pass then side guide is set to adjust the width of the sheet by moving it in and out, after that the top pressure board is made to rest on sheet which is lying on bottom pressure board.

4) During first pass top pressure is kept rest on bottom pressure board and after completion of first pass they are made to move upward to relieve sheets

5) Side guide can be moved in and out in both position of pressure board up as well down .

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6) Width of guide wood can be changed by removing or adding guide wood to the set .

Actual schematic of existing system

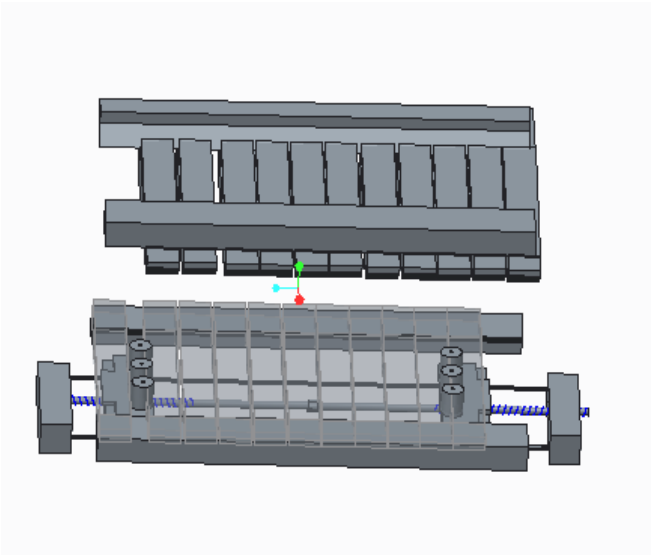

Fig no1 :- front view of existing guide wood

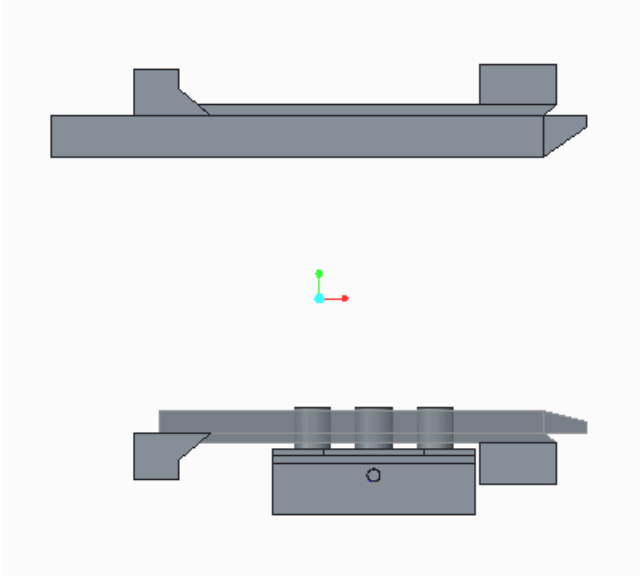

Fig no 2 :-side view of existing guide wood

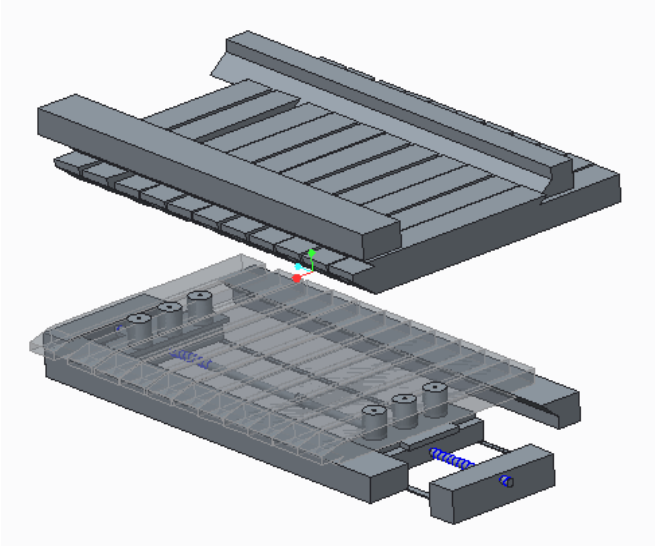

Fig no 3 :-3-d view of existing guide wood

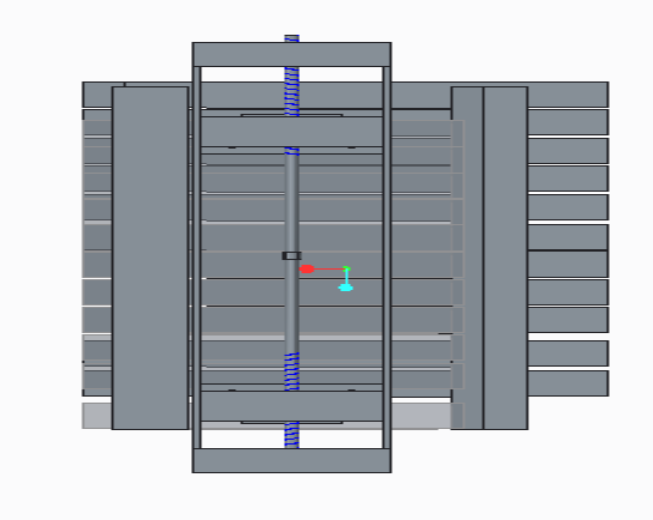

Fig no 4:- bottom view of existing guide wood

Description of various views of existing system:-

Various views show the components of pressure board. Front view is showing top pressure board, bottom pressure board, clamps and side guide roll s. side view show the side guide roll as well as view of clamps from side. Bottom view shows the lead screw and its arrangement. Various views give the clear understanding of various components and their location in existing setup of pressure board**.**

Advantages of wooden pressure board:-

1) Low in cost.
2) Low in maintenances and fewer systems are involved.
3) Wooden pieces are readily available.

Limitations of wooden pressure boards :-

1) Much time is required during guide wood setting.
2) Guide wood is of wood it is having less life span.
3) Wood is prepared by cutting trees so harming environment.
4) Many times the set up of wood get disturb during first pass so they needed to reset.

III. STUDY OF OPETIONAL SYSTEM :-

A. Five roll arrangement system :-

Fig no 5:-3-d view of five rolls arrangement system

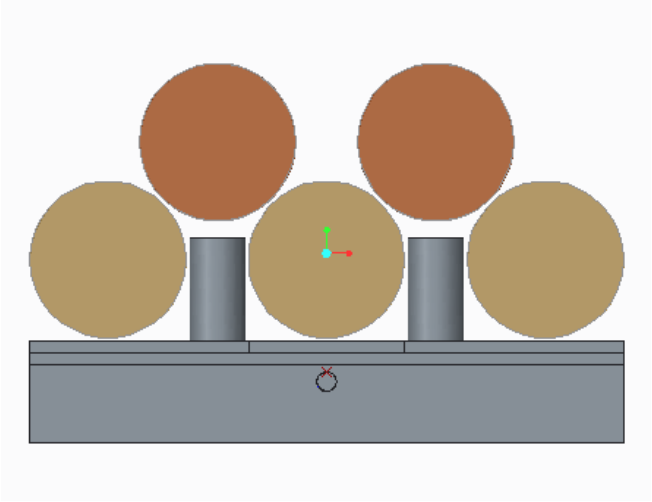

Fig no 6:- side view of five roll arrangement system

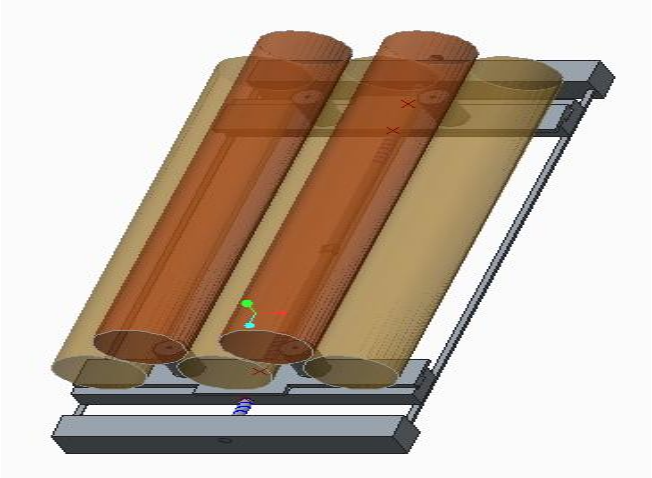

Fig no 7 :-3-d view of five roll arrangement system

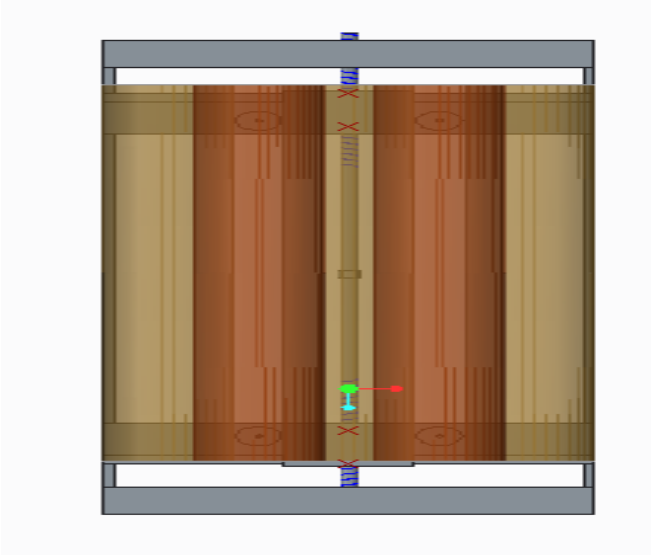

Fig no 8:- bottom view of five rolls arrangement system

Description: - The above figures show the various arrangement of one of the alternative systems

Component:-

1) Pressure Rolls: - the five rolls will be mild steel of length 1450 mm and diameter 100 mm each. All rolls will of equal shape and size.

2) Guide rolls: - the guide roll needed to be modified. The height of the guide roll will be increased up to 75 mm so as to facilitate the pressure of top guide roll.

3) Lead screw :- same as the original system

Arrangement:-

The five rolls will be arranged in alternative manners two rolls over the top and the three rolls in the bottom. The arrangement can be clearly seen in the side view. The side guide roll is arranged in between the three bottom rolls so as to facilitate the inward and outward movement of the roll. The base plate on which the roll is mounted is kept in such manner as it should not interrupt in the up and down movement of the pressure rolls. The top two rolls will be mounted on the clamps which can be moved up and down so as to allow the feeding of sheet before first pass . the bottom pressure rolls are fixed so that the top roll should rest on the bottom roll and it should hold the top roll pressure and sheets as well .

Function : - The function of the above arrangement is as given below

1) While feeding of the coil prior to first pass the top two roll will be lifted so as to allow the space to feed the coil in between the two arrangement (i.e. top and bottom roll arrangement)

2) Now the coil will be feeded in between the given space and between the roll in to the gripper.

3) Once the coil is feeded between the rolls and into the gripper the coil is centered in the pressure roll arrangement by the side guide rolls.

4) The side guide roll will move in and out to adjust with the width and to maintain the sheet in centre of the rolls.

5) Now the strip is centered in between the work roll as well as the bottom pressure roll , the top arrangement of the pressure roll will be moved downward on the sheet and the bottom set of pressure roll

6) The gap between the alternative rolls are arranged in such a way that there will be contact in between each roll and sheet as well

7) The rolls are free to rotate as they will be provided with bearing, thus they will move in the same direction as the sheets.

8) This will resist the movement of the sheet to some extent this in turn provides the back tension to the sheet for rolling.

9) Thus in this arrangement the purpose of the pressure board to provide strip centering and to facilitate back tension is fulfilled.

Modification required:- The following changes needed to be done to change over to the five roll arrangement

1) The up down movement of the roll need some different types of arrangements so as to hold the roll in such a way that their holder should not come in contact with each other , also it should allow the free contact of top and bottom pressure rolls with each other .

2) The side guide roll needed to be increased in length so as to adjust with the diameter of the rolls.

3) No pressure board clamps will be there as the pressure board will be totally replaced.

1) Six rolls arrangements system :-

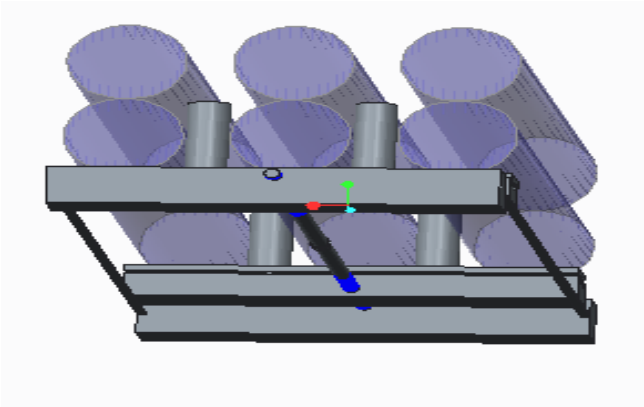

Fig no 9 :-3-d view of six rolls arrangement

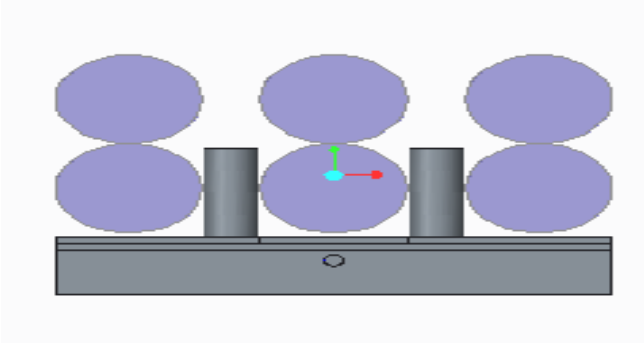

Fig no 10 :-side view of six rolls arrangement

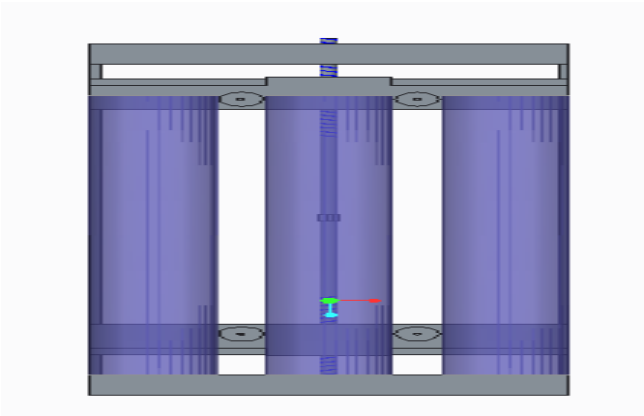

Fig no 11 :- Top view of six rolls arrangement

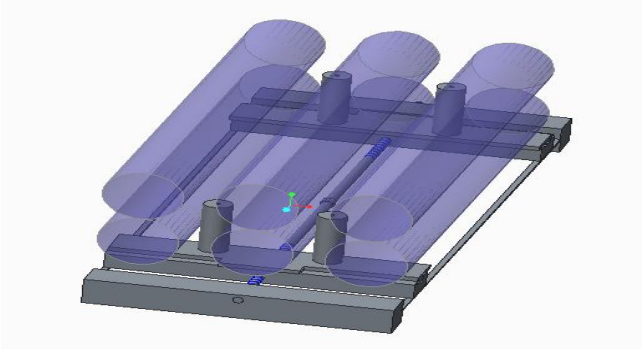

Fig no 12 :- 3-d view of six rolls arrangement

Description: - The above figures show the various arrangement of the another alternative systems

Component:-

1) Pressure Rolls: - the six rolls will be mild steel of length 1450 mm and diameter 100 mm each. All rolls will of equal shape and size. The rolls will be arranged in the set of two rolls each thus there will be 3 set of rolls

2) Guide rolls: - the guide roll needed to be modified. The height of the guide roll will be increased up to 75 mm so as to facilitate the pressure of top guide roll. The number of the guide roll required will be two sets.

3) Lead screw: - same as the original system

Arrangement:-

The six rolls will be arranged in set of two rolls each thus having the three sets of rolls three rolls over the top and the three rolls in the bottom. The arrangement can be clearly seen in the side view. The side guide roll is arranged in between the three set of rolls so as to facilitate the inward and outward movement of the roll. The base plate on which the roll is mounted is kept in such manner as it should not interrupt in the up and down movement of the pressure rolls. Each set of rolls will be mounted on the clamps which can be moved up and down so as to allow the feeding of sheet before first pass. The bottom pressure rolls are fixed so that the top roll should rest on the bottom roll and it should hold the top roll pressure and sheets as well.

Function : - The function of the above arrangement is as given below

1)While feeding of the coil prior to first pass the top set of three roll will be lifted so as to allow the space to feed the coil in between the two arrangement (i.e. top and bottom roll arrangement)

2) Now the coil will be feeded in between the given space and between the roll in to the gripper.

2) Once the coil is feeded between the rolls and into the gripper the coil is centered in the pressure roll arrangement by the side guide rolls.

3) The side guide roll will move in and out to adjust with the width and to maintain the sheet in centre of the rolls.

4) Now the strip is centered in between the work roll as well as the bottom pressure roll , the top arrangement of the pressure roll will be moved downward on the sheet and the bottom set of pressure roll

5) The gap between the top and bottom rolls are arranged in such a way that top set of roll will lie on the bottom set.

6) The rolls are free to rotate as they will be provided with bearing, thus they will move in the same direction as the sheets.

7) This will resist the movement of the sheet to some extent this in turn provides the back tension to the sheet for rolling.

8) Thus in this arrangement the purpose of the pressure board to provide strip centering and to facilitate back tension is fulfilled.

Modification required:- The following changes needed to be done to change over to the six roll arrangement

1) The up down movement of the roll need some different types of arrangements so as to hold the roll in such a way that their holder should not come in contact with each other , also

it should allow the free contact of top and bottom pressure rolls with each other .
2) The side guide roll needed to be increased in length so as to adjust with the diameter of the rolls.
3) No pressure board clamps will be there as the pressure board will be totally replaced.

3. Slot arrangement system :- the slot arrangement system is as given below

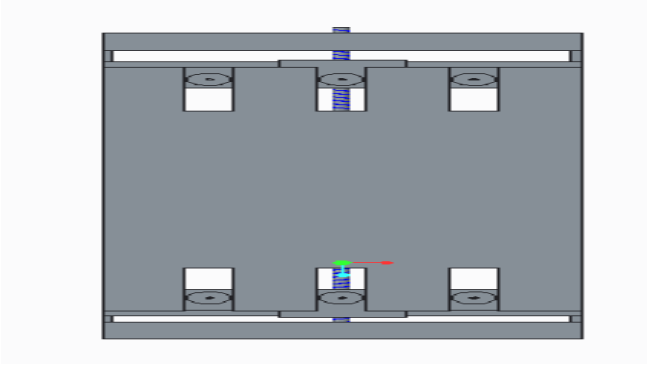

Fig no 13:- Top view of slot arrangement

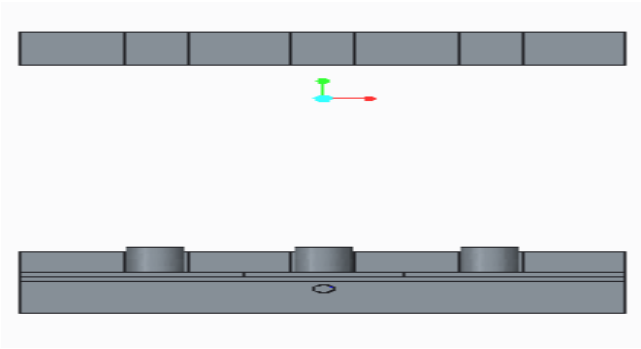

Fig no 14:- Side view of slot arrangement

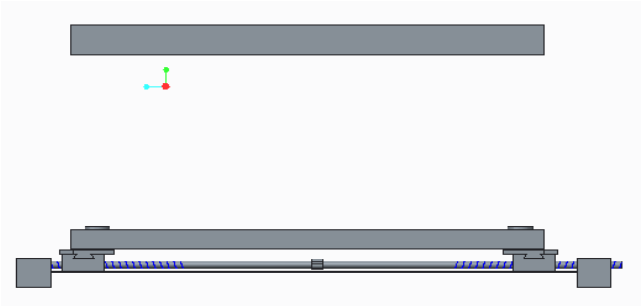

Fig no 15:- Front view of slot arrangement

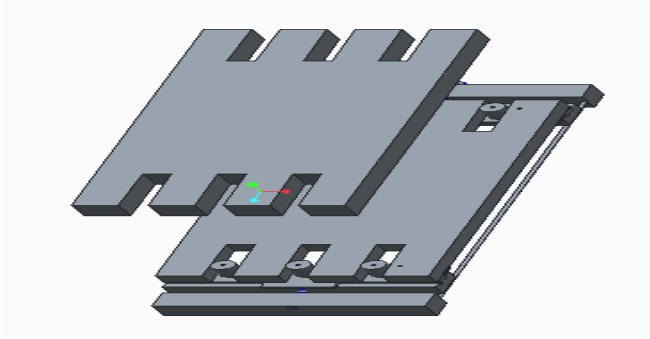

Fig no 16:- 3-d view of slot arrangement

Component:-

1) Pressure board arrangement: -the pressure board arrangement will be same as that of the original existing system with slot provided in between to allow the side guide roll freely .
2) Guide rolls: - the guide roll need not to undergo any modification as the same will be required that of the original system
3) Lead screw: - same as the original system

Arrangement:- The slot arrangement will be the small modification in the original existing system . The difference will be that some slots will be provided in between to allow the movement of the side guide roll. It will consist of top and bottom pressure board also.

Function : - The function of the above arrangement is as given below

1)While feeding of the coil prior to first pass the top pressure board will be lifted so as to allow the space to feed the coil in between the two arrangement (i.e. top and bottom pressure board arrangement)
2) Now the coil will be feeded in between the given space and between the pressure boards in to the gripper.
3) Once the coil is feeded between the rolls and into the gripper the coil is centered in the pressure board arrangement by the side guide rolls.
4) The side guide roll will move in and out to adjust with the width and to maintain the sheet in centre of the rolls.
5) Now the strip is centered in between the work roll as well as the bottom pressure board the top pressure board will be moved downward on the sheet and the bottom pressure board
6) The friction between the top pressure board and bottom pressure board with the sheet in between will resist the movement of the sheet thereby generating back tension.

Modification required:- The following changes needed to be done to change over to the slot arrangement

1) Slots will be provided in top and bottom pressure board to allow the movement of the guide roll.

IV. RESULT

1) The original system is studied
2) The three possible alternative's are studied

V. CONCLUSION

The possible alternatives are feasible and they can be implemented to avoid the delay

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[2] Iron making and steel making volume 32, no5
[3] International journal of civil engineering and building material vol 2, no4