A PROJECT REPORT ON

COIL PROCESSING IN BUILD-UP & SIDE TRIM LINE OF SILICON STEEL MILL

AT

ROURKELA STEEL PLANT

SUBMITTED BY:

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CERTIFICATE

This is to certify that the project entitled ***"COIL PROCESSING IN BUILD-UP AND SIDE TRIM LINE OF SILICON STEEL MILL AT ROURKELA STEEL PLANT"*** *submitted by Sambeet Moharana, Regd. No. 1401106305, B.Tech in Mechanical Engineering, College of Engineering and Technology, Bhubaneswar, Odisha has been carried out under my guidance and supervision. The work presented herein is original and has not been submitted in either part or full to this or any other industry.*

Date:

Place: *Rourkela* ***(Shri R. Rath)***

DECLARATION

I do hereby declare that the project entitled ***"COIL PROCESSING IN BUILD-UP AND SIDE TRIM LINE OF SILICON STEEL MILL AT ROURKELA STEEL PLANT"*** *is the original and authentic work carried out by me as an internship project under the guidance and supervision of Shri. Rajnikant Rath, AGM, Silicon Steel Mill, Rourkela Steel Plant, Rourkela. No part of this project report has been submitted to this industry or to any other industries.*

Date:

Place: *Rourkela* ***(Sambeet Moharana)***

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(Sambeet Moharana)

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ROURKELA STEEL PLANT:

AN OVERVIEW

- Rourkela Steel Plant (RSP), the first integrated steel plant in the public sector in India, was set up with German collaboration with an installed capacity of 1 million tonnes. Subsequently, its capacity was enhanced to 2 million tonnes of hot metal, 1.9 million tonnes of crude steel and 1.67 million tonnes of saleable steel.
- After implementing a massive modernisation and expansion, Rourkela Steel Plant has enhanced its capacity to 4.5 million tonnes of Hot Metal and 4.2 Million Tonnes of Crude Steel.
- It is also the first steel plant in SAIL and the only one presently where 100% of slabs are produced through the cost-effective and quality-centric continuous casting route.
- It is SAIL's only plant that produce silicon steels for the power sector and high quality pipes for the oil & gas sector.
- Its wide and sophisticated product range includes various flat, tubular and coated products.

SILICON STEEL MILL (SSM)

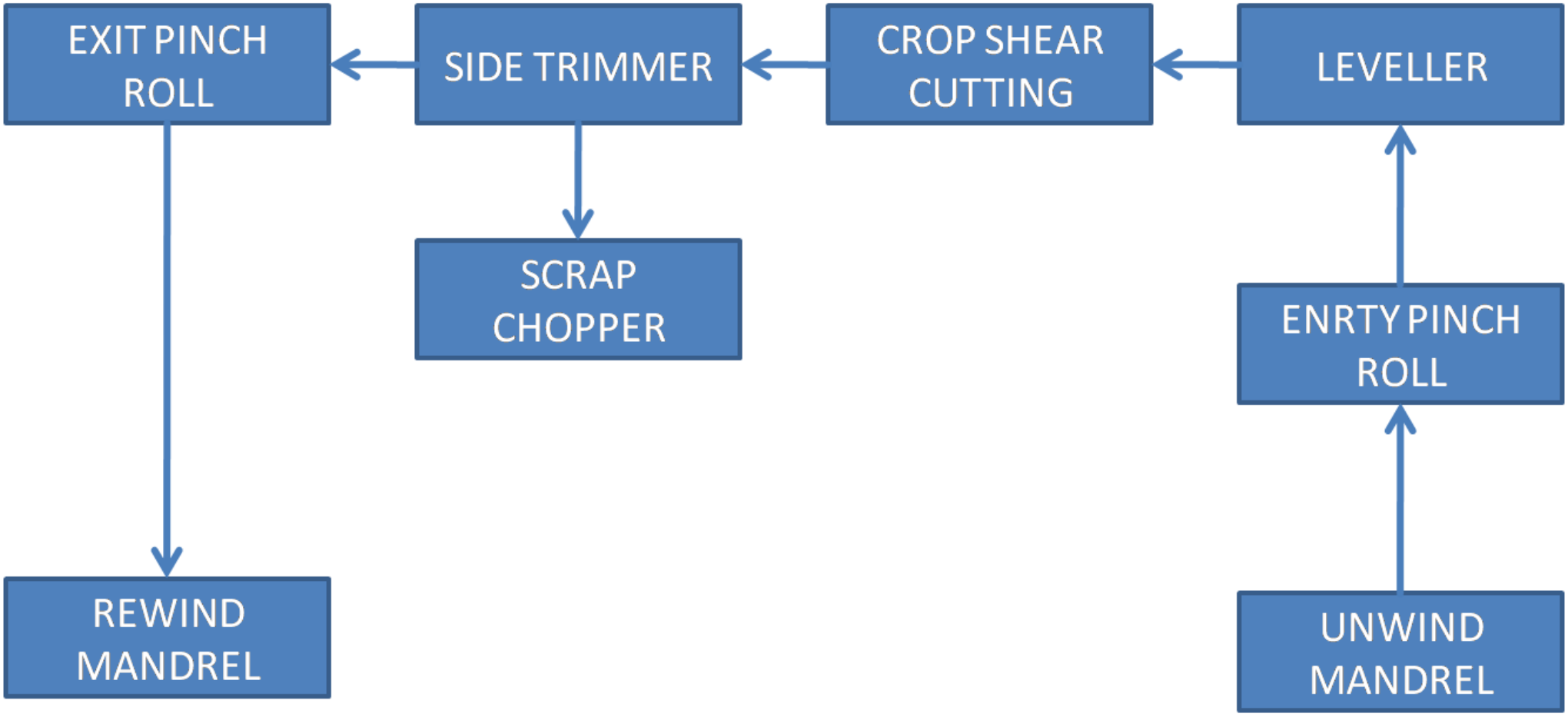
- It was commissioned in 1984 with Tech collaboration from ARMCO (USA) for manufacture of Cold Rolled Non-Oriented (CRNO) steel.
- It is widely used for manufacture of electrical equipments like armatures, generators, motors, relays, small transformers, etc.
- Used primarily in special rotating and static electrical equipment, the CRNO steel is characterized by low watt loss (core loss) and high permeability.
- It is SAIL's only plant that produces silicon steels for the power sector.
- The product range includes fully processed grades of CRNO, namely, C-350, C-430, C-470, C-530, C-600 and C-700.
- It is an ISO-9001 (2008), ISC-14001 and SA 8000 certified unit.
- It is a leading producer of CRNO steels in India, with an annual production of 85000 tons.

BUILD UP & SIDE TRIM (BUST)

- The head of the strip isn't of required shape and the sides gets damaged or deformed during transportation. So this is done to remove them by trimming.
- Head and Tail trimming is done by crop shear cutter.
- Side trimming is done by rolling knives on both sides.
- The Hot Rolled Non-Oriented (HRNO) steel is processed where side trimming of the coil takes place and the width of the coil is reduced from 1055 mm to 1028/978/928mm.

Irregular shape of head

BLOCK DIAGRAM OF BUST LINE



EQUIPMENTS USED

- Unwind Mandrel
- Entry Pinch Roll
- Leveller
- Crop Shear Cutter
- Side Trimming
- Scrap Chopper
- Exit Pinch Roll
- Rewind Mandrel

Unwind Mandrel

Entry Pinch Roll

Crop Shear Cutter

Side Trimmer
(Rolling Knives)

Exit Pinch Roll

Rewind Mandrel

INPUT TO BUST LINE

- The input to BUST line is coils of Hot Rolled Non-Oriented (HRNO) steel from Hot Strip Mill (HSM).
- The weight of coil ranges from **12 ton-13 ton**.
- Dimensions:
  - The width of the coil strip ranges from **1055 mm-1070 mm**
  - The thickness of the coil strip ranges from **2.50 mm-3.20 mm**

Coil at input

OUTPUT OF BUST LINE

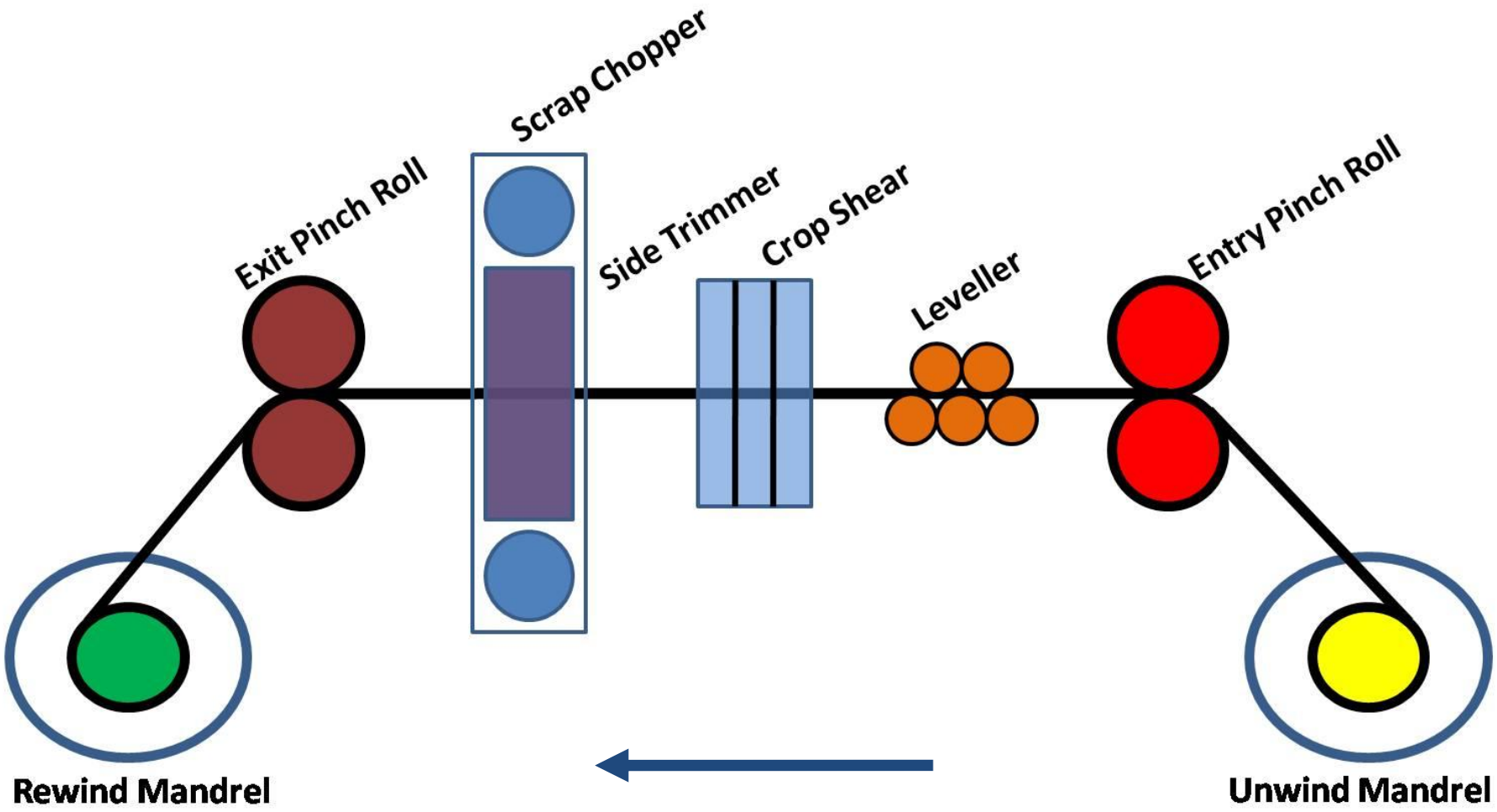
- The output of BUST line is trimmed coils of Hot Rolled Non-Oriented (HRNO) steel.
- The weight of coil ranges from **10 ton-12.5 ton.**
- Dimensions:
  - The width of the coil strip is **1028 mm/978mm/928mm**
  - The thickness of the coil strip ranges from **2.50 mm-3.20 mm**

Coil at output

SAMPLE DATA OF SOME COILS AT OUTPUT

	Sample I	Sample II	Sample III
Diameter of coil (mm)	1544	1535	1538.1
Length (m)	551.49	498.76	553.12
Weight (Ton)	10.967	10.598	10.999

PROCESS FLOW DIAGRAM OF BUST LINE



STANDARD OPERATING PRACTICE (SOP) FOR BUST LINE

- Place the coil on the saddle.
- Lift the coil with entry coil car & bring to unwind mandrel.
- Cut the strapping from the coil with strap cutter.
- Raise the coil car, align & engage the coil in the mandrel.
- Switch “ON” tension & jog strip to crop shear.
- Cut the off gauge portion of head end.
- Check width of side trimming strip (1028/978/928mm).
- Jog strip to tension reel, raise exit table & grip head end in gripper slot.
- Make 2 to 3 wraps on mandrel.
- Raise hold-down Roll & shear pinch rolls.
- Lower entry pinch roll, exit pinch roll & exit tables.
- Make flattener clutch “OFF”.
- Start line & gradually increase line speed to 70-120 meter per minute.
- Adjust trimmer guides to get equal trimming on both sides.
- Gradually slow down the line to 10 to 20 mpm, when 10 to 15 laps remain on unwind. Stop the line when coil end leaves the unwind mandrel.
- Center the tail end with crop shear guide.
- Cut “OFF” Gauge portion beyond 3.2 mm of head end/tail end & chewed up portion.
- Jog tail end up to tension reel.
- Position exit coil car below the tension reel.
- Lower the scrubber roll on the coil.
- Raise coil car to touch the coil.
- Jog tension reel to bring strip tail end above coil car.

- Collapse mandrel & strip out coil by moving coil car out.
- Keep the coil on saddle.
- Strap the coil with strapping & sealer.

PROBLEMS IN BUST LINE

- Wavy edged coil strips are difficult for side trimming.
- Burr edges give rise to cracked edges during rolling.
- Miscutting of sides results in deviation from required width.
- After continuous use, the edge of the knives gets damaged which results in marks on the coil strip.
- Breaking of knives while trimming process is carried out.
- Jamming of scrap tray and vibrator.

MEASURES ADOPTED TO MINIMIZE PROBLEMS

- Proper alignment of the coil strip is done with the help of guide rolls on both sides, so that the strip remains in the centre.
- Replacement of old knives with new ones is done.
- The scrap tray is cleaned manually in case it gets jammed.
- The chopping knives are replaced with new knives after every 650 tons of output.

INFLUENCE ON ENVIRONMENT

- Non-uniformity in gauge & width will lead to more material loss due to generation of more amount of rejection in the form of coil ends, side trimming resulting in more consumption of resources.
- Adherence to the SOP will result in thorough monitoring & feedback to HSM with respect to gauge, width & shape for continual improvement of yield.

SAFETY

- Be alert of the movement of the overhead crane.
- Use safety applicable:
    - safety boots
    - safety helmet
    - hand gloves
    - ear muffs
    - safety goggles
    - gas mask

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