SEAISI Steel Mega Event & Expo
(Technology, Sustainability, Construction)

Sunway Pyramid Convention Centre, Malaysia
17 Nov 2022

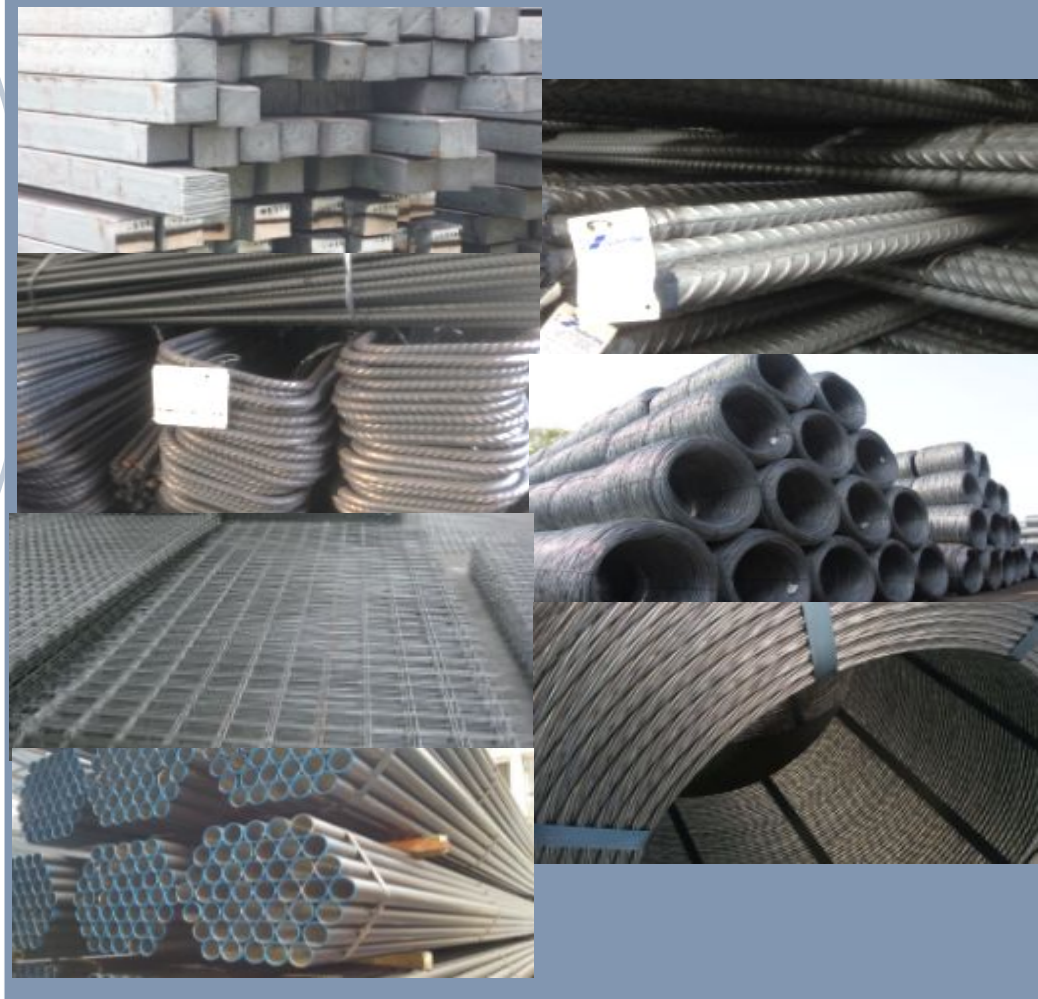
南達 Southern Steel
A Member of the Hong Leong Group

Upgrade Rolling Mill No.1 Laying Head Machine

Company: Southern Steel Berhad

Project Team: Power Team

Presenter: Lee Soo Chin
Ong Say Howe
Tan Boon Loong



Southern Steel Group

- Leading Malaysian Steel Group
- 59 years of experience
- Expertise in steel products manufacturing (steel mesh, steel pipe, cut & bent, & etc)

<u>Northern Region</u>

Southern Steel Berhad

Southern Steel Pipe Industry

Southern Steel Pipe

Southern Steel Mesh

<u>Central</u>

Southern Steel Mesh

Southern PC Steel

Peninsular Malaysia

Southern Steel Berhad
Perai, Penang

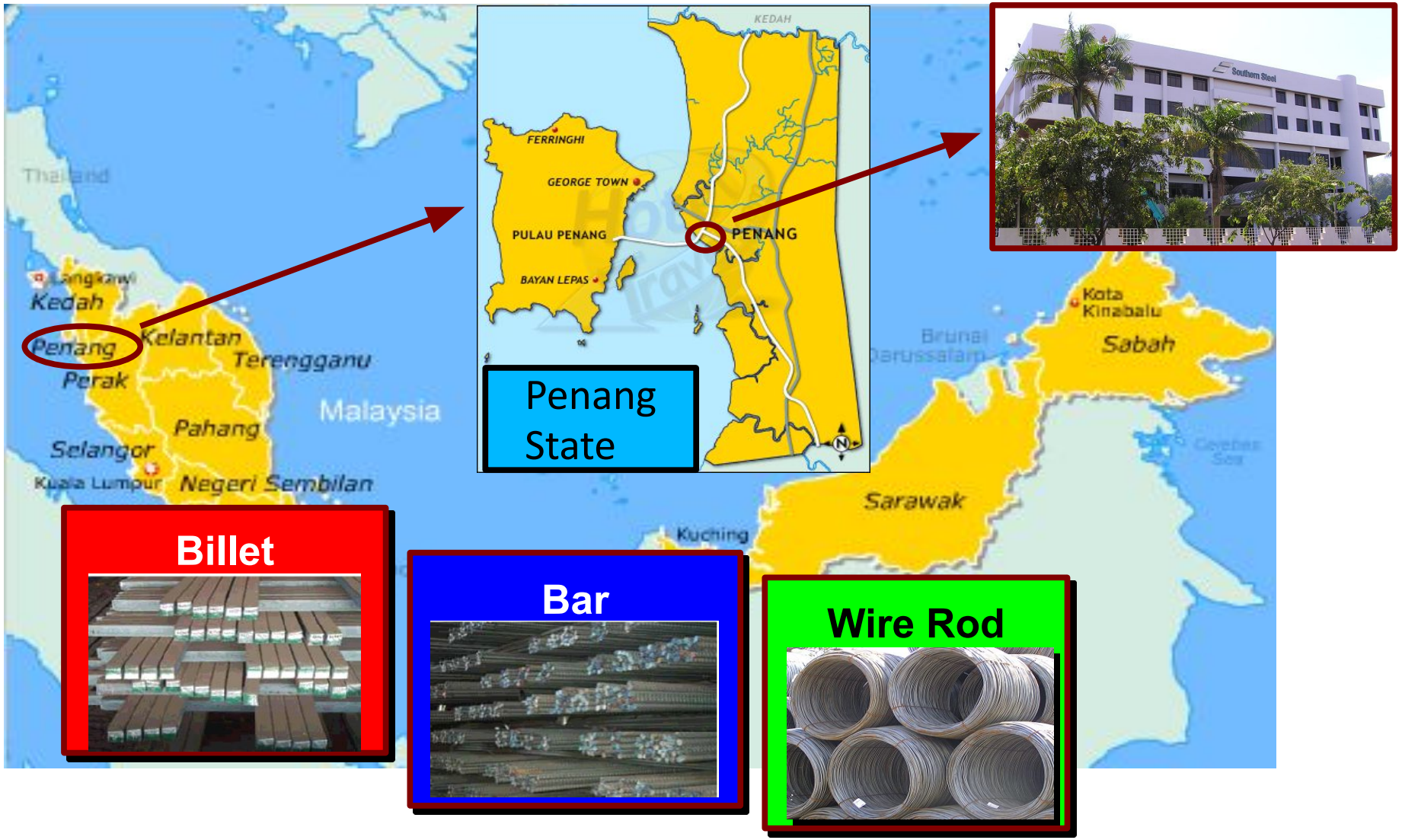
Located in Penang

Founded in 1963

Listed KLSE in 1993

Steel Manufacturers

Product Range



Company Vision & Mission

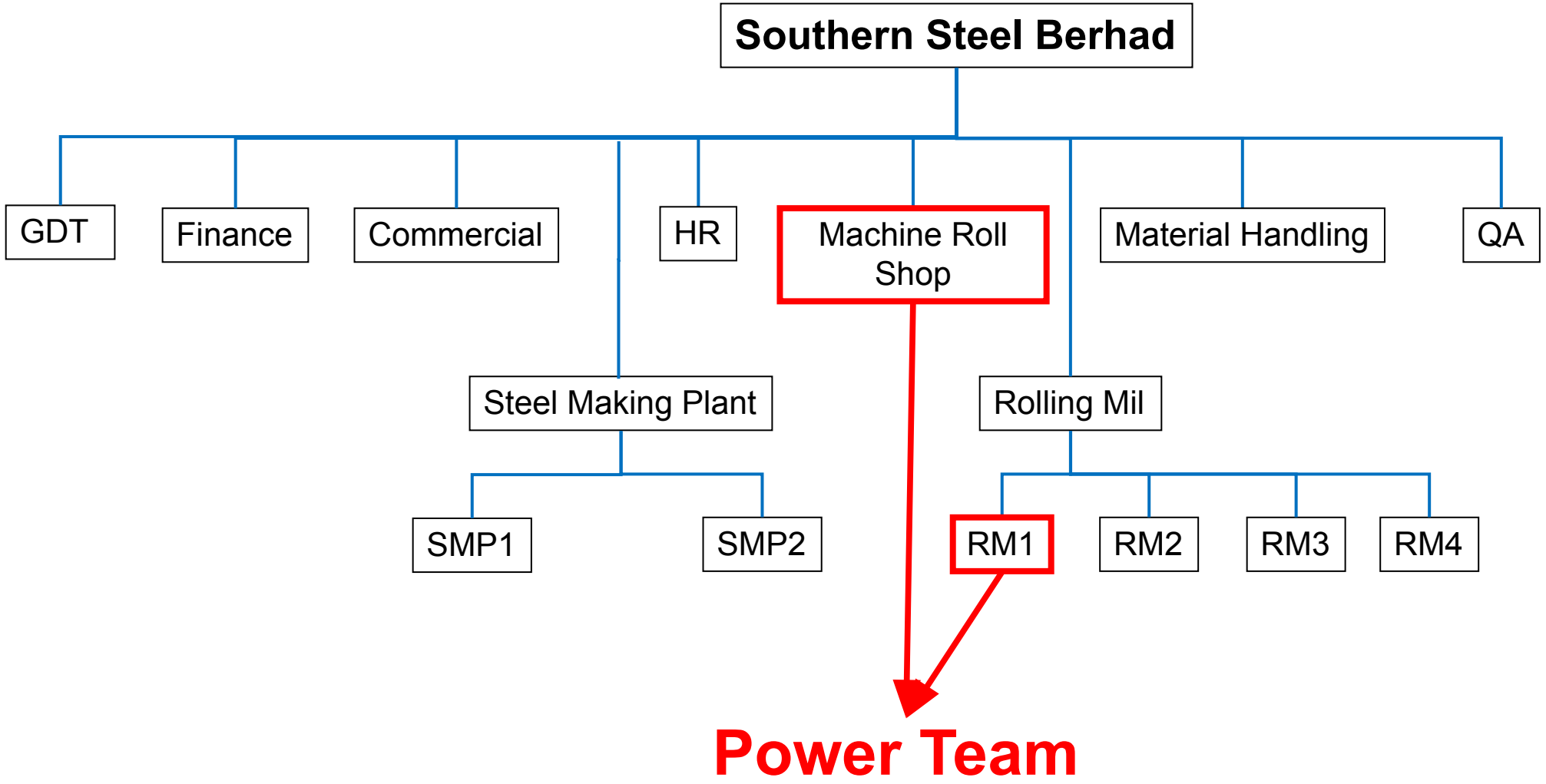
OUR VISION

TO BE A SUPPLIER OF CHOICE ACHIEVING TOTAL CUSTOMER SATISFACTION AND ENHANCING SHAREHOLDER VALUE THROUGH TECHNOLOGY DRIVEN PRODUCTS AND CONTINUOUS IMPROVEMENT CULTURE

MISSION STATEMENT

WE ARE COMMITED TO DELIVER SUSTAINABLE STAKEHOLDERS' VALUES THROUGH CUSTOMER-CENTRIC PARTNERSHIPS WITH INNOVATIVE PRODUCTS AND SOLUTIONS TO CO-CREATE VALUES IN THE INDUSTRY

Organization



Biographical Data

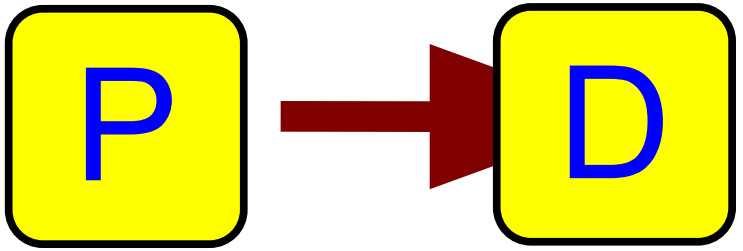
Company	: Southern Steel Berhad
Team	: **Power Team**
Project Title	: Upgrade Rolling Mill No.1 Laying Head Machine
Dept. / Section	: Rolling Mill No.1 & 2/Machine Roll Shop
Work Location	: Rolling Mill No. 1 Laying Head
Team Formation	: 18 February 2016
Project Duration	: Feb'16 – Mar'18

Team Member

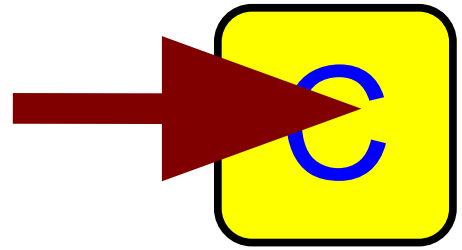
Name	Role	Position
Tan Boon Loong	Project Owner	Plant Manager
Ang Leow Hong	Team Facilitator	Mechanical Head
Ng Hock Teik	Team Leader	Engineering Manager
Ong Say Howe	Team Member	Assistant Eng. Manager
Ng Hock Keong		Senior Eng. Executive
Khor Chun Leng		Eng. Executive
Lim Wenn Dar		Senior Production Engineer
Jamal		Mechanical Engineer
Mohd Farid		Engineering Supervisor
Lee Soo Chin		Electrical Engineer
Aw Kwok Kong		Senior Eng. Engineer

Methodology

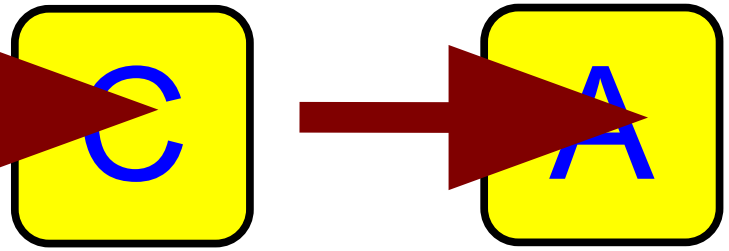
Plan
- Problem Listing / Selection
- Data Collection / Analysis
- Project Definition
- Root Cause Analysis & Measurement
- Proposed Solution and Action Plan



Do
- Implement
- Monitoring
- Verify Action

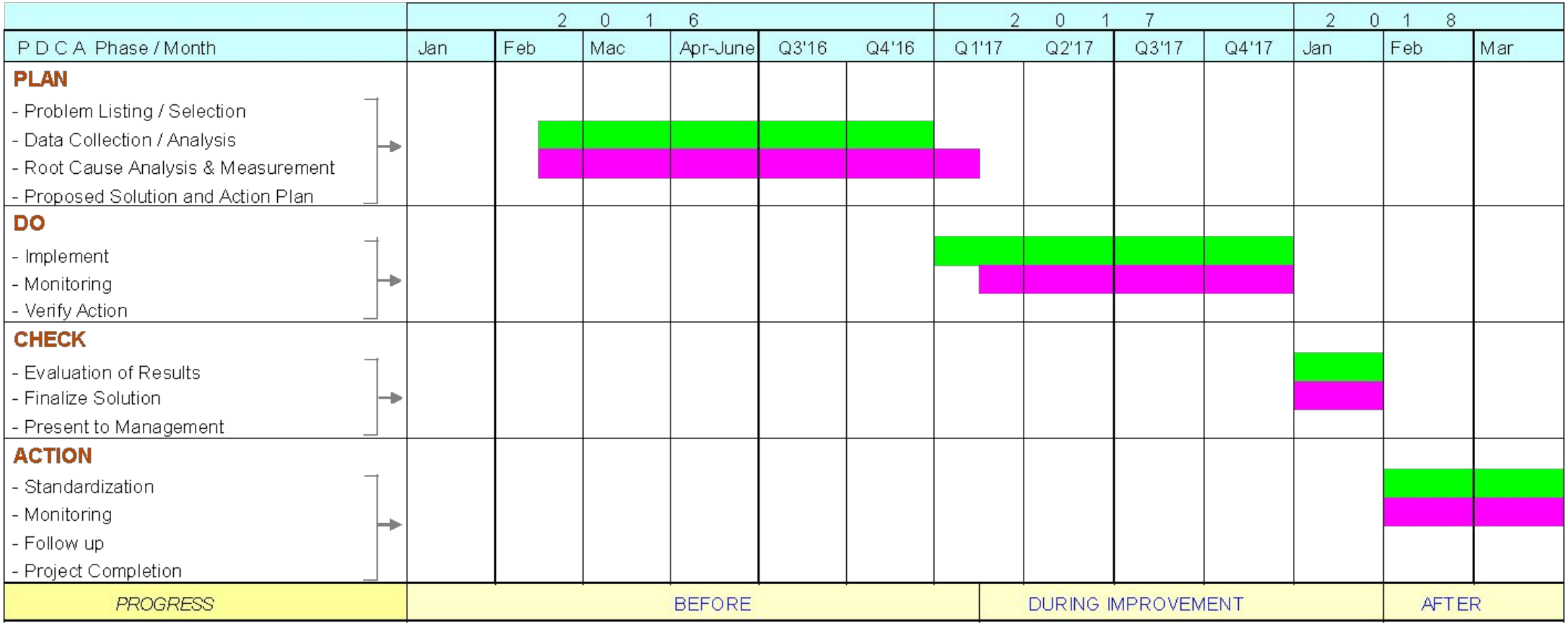


Check
- Evaluation of Results
- Finalize Solution
- Presentation to Management



Action
- Standardization
- Monitoring
- Follow up
- Project Completion

Milestone Chart



Legend : SCHEDULE / ACTUAL

DO & CHECK = During Improvement (When solution is developed and implemented)

POWER TEAM

Meeting Attendance

Project Title: Upgrade Rolling Mill No.1 Laying Head Machine
Venue: MRS Office Meeting Room

	Meeting No	1	2	3	4	5	6	7	8	9	10
No	Name	18/2/16	20/4/16	16/6/16	19/08/16	14/10/16	20/12/16	6/3/2017	15/6/17	17/8/17	15/11/17
1	Ang Leow Hong	/	/	/	/	/	/	/	/	/	/
2	Ng Hock Teik	/	/	/	/	/	/	/	/	/	x
3	Ng Hock Keong	/	/	/	/	/	x	/	/	/	/
4	Khor Chun Leng	/	x	/	/	/	/	/	/	/	/
5	Lim Weng Dar	/	/	/	/	/	/	x	/	/	/
6	Jamal	/	x	/	/	/	/	/	/	/	/
7	Mohd Farid	/	/	/	/	x	/	/	/	/	/
8	Lee Soo Chin	/	/	/	/	/	/	/	/	x	/
9	Aw Kwok Kong	/	/	x	/	/	/	/	/	/	/

/ Present x Absent

Attendance Rate 91.0%

NOTE:

1 The persons who are absent had given the acceptable reason, such as on leave, attended to other job/meeting

2 The persons absent were briefed immediately by team leader after the meeting.

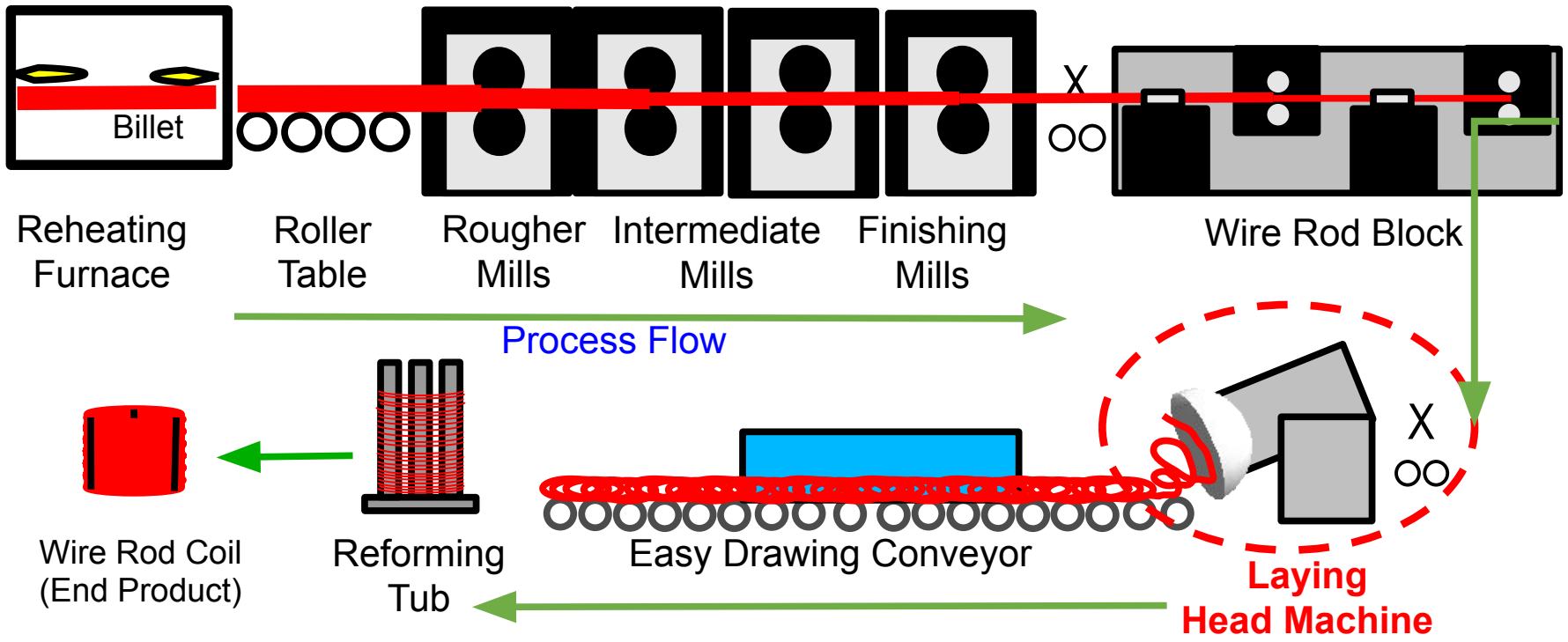
Ong Say Howe joined as team member after manpower restructuring in 1st October 2021

PLAN

- Problem Listing / Selection
- Data Collection / Analysis
- Project Definition
- Root Cause Analysis & Measurement
- Proposed Solution and Action Plan

Location

Where and What is Rolling Mill No.1 Laying Head Machine ?



Rolling Mill No. 1 - Plant Process Flow

Selection Grid

Selection grid had been done by all the team members against the need for improvement of Critical Factor in Rolling Mills, 2016 :

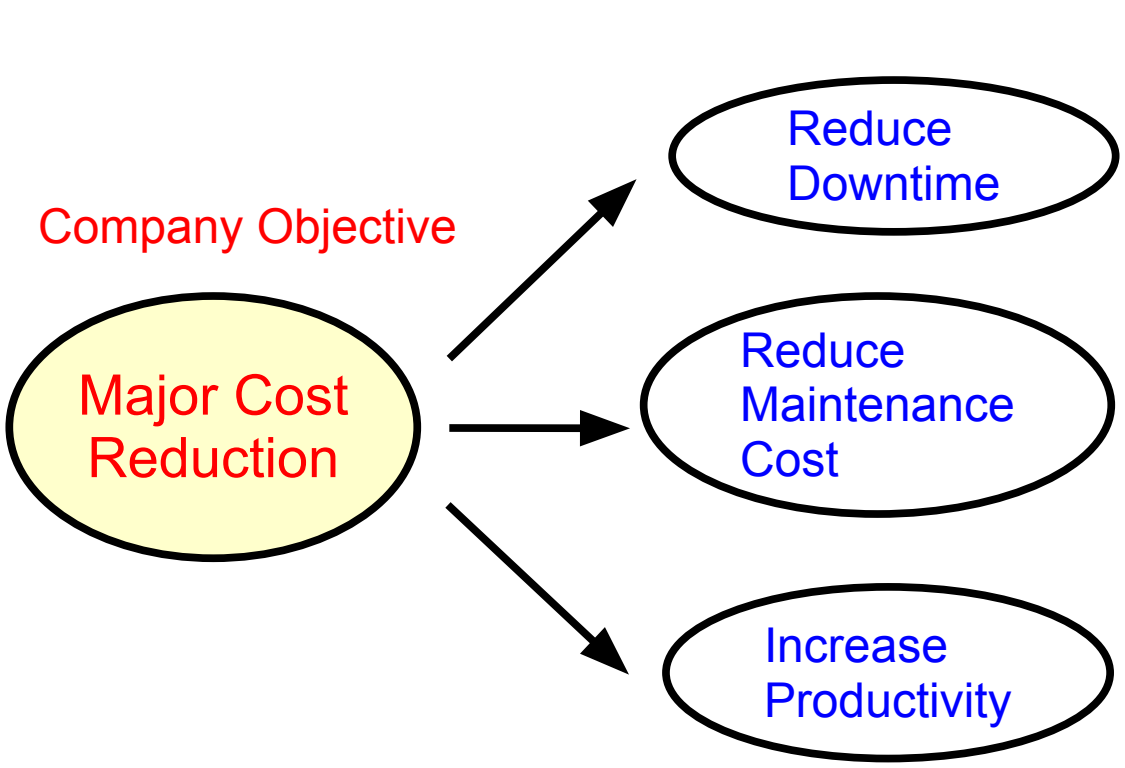
	Critical Factor	Customer Satisfaction		Cost Vs Benefits		Organisation Goals		Need For Improvement		Resources		Total Score
1	**Safety, Health & Environment**	Pts	Vote	Pts	Vote	Pts	Vote	Pts	Vote	Pts	Vote	
		(5)	4	(5)	5	(5)	4	(5)	3	(5)	4	
		(3)	6	(3)	5	(3)	5	(3)	4	(3)	4	
		(1)	0	(1)	0	(1)	1	(1)	3	(1)	2	
		Total = 38		Total = 40		Total = 36		Total = 30		Total = 34		**178**
2	**Major Cost Reduction**	Pts	Vote	Pts	Vote	Pts	Vote	Pts	Vote	Pts	Vote	
		(5)	7	(5)	7	(5)	8	(5)	7	(5)	5	
		(3)	3	(3)	3	(3)	2	(3)	3	(3)	4	
		(1)	0	(1)	0	(1)	0	(1)	0	(1)	1	
		Total = 44		Total = 44		Total = 46		Total = 44		Total = 38		**216**
3	**Inventory Reduction**	Pts	Vote	Pts	Vote	Pts	Vote	Pts	Vote	Pts	Vote	
		(5)	5	(5)	6	(5)	7	(5)	6	(5)	5	
		(3)	4	(3)	4	(3)	3	(3)	3	(3)	4	
		(1)	1	(1)	0	(1)	0	(1)	1	(1)	1	
		Total = 38		Total = 42		Total = 44		Total = 40		Total = 38		**202**

The highest score – Major Cost Reduction
Then, we focus on this pain point for improvement.

POWER TEAM

Selection Grid

For maintenance and production area, the MAJOR COST REDUCTION can be achieved from : -



Laying Head- High vibration Level & frequent checking

Laying Head Pipe Wear Off Fast

Coil Shaped Problem

Selection of Problem

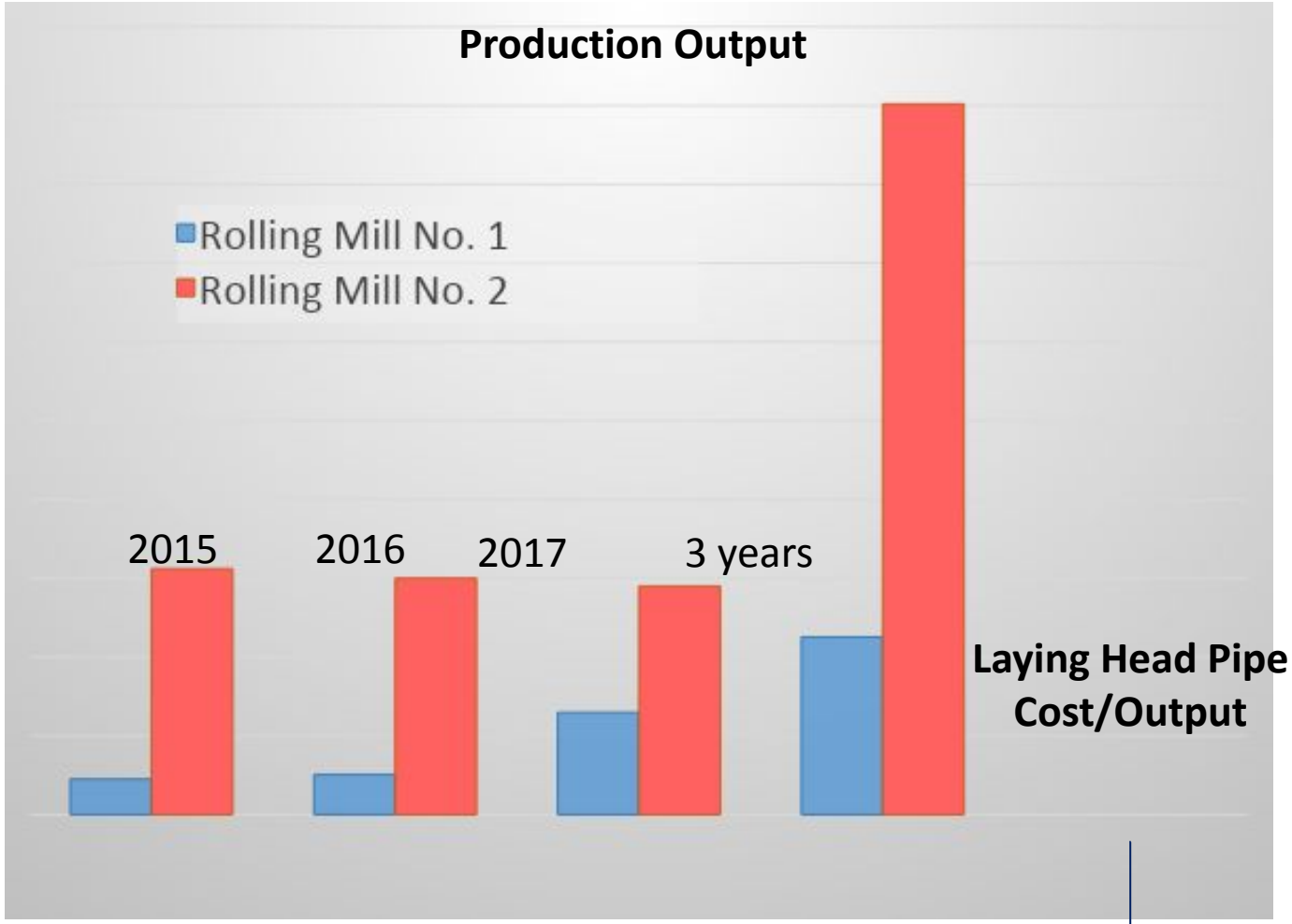
	Plant	2015	2016	Remarks
Laying Head Downtime Record Analysis (%)	Rolling Mill 1	**0.98**	**1.02**	2016 one improvement Project had been formed
	Rolling Mill 2	0.21	0.22	--
Rolling Mill No. 1 Laying Head Pipe Cost Analysis (MYR/MT)	Rolling Mill 1	**0.93**	**0.69**	Higher cost compared to Rolling mill No. 2
	Rolling Mill 2	0.09	0.08	----
Coil Shape Out Tangle(Rejection%)	Rolling Mill 1	**0.07**	**0.07**	Higher coil shape rejection compared to Rolling Mill No. 2
	Rolling Mill 2	0.03	0.04	--

POWER TEAM

Selection of Problem

Problem identification (methodology)

1. Investigate the cost spent on laying head pipe in 2015, 2016 & 2017
2. Analyzed the frequency of pipe changes of laying head in 2015, 2016 & 2017
3. Calculated the total pipe cost for Year 2015, 2016 & 2017 with respective output.
4. Compare the Cost with Rolling Mill No.2



RM1 vs RM2
9 times higher

Confirmation of Problem

Laying Head Problem

- Old Design / Unreliable
- Hard to maintain due to gear box complex design & in closure type housing
- Laying Head Pipe Wear-off Fast
- High Vibration Level & Downtime
- Coil Shaped Problem

Therefore, we confirm the potential improvement area from here, and we decide to -

****Upgrade Rolling Mill No. 1 Laying Head Machine****

Why this project was selected ?

Align with the department's structure tree – To reduce production downtime and maintenance cost in order to achieve the objective of reduce conversion cost.

There is potential to improve the laying head in Rolling Mill No. 1. As we can see the different type of system used in Rolling Mill No.2 gives less problem and better performance.

Objective & Target Setting

Company Objective

Cost & Quality
(Cost Down)

Machine Roll Shop Structure Tree

Reduce Downtime
Reduce Maintenance Cost

Objective

To improve the efficiency of Rolling Mill No 1 Laying Head Machine
To improve coil shape and prolong life span of Laying Head Pipe

Laying Head Pipe Cost

Before

MYR 0.65 / MT

Target

Below MYR 0.30 / MT

Average record in 2015, 2016 & 2017:
Rolling Mill No. 1 Laying Head Pipe cost = MYR 0.65 / MT

Target to reduce > 50% to MYR 0.30 / MT with benchmark to Rolling Mill No. 2 Laying Head MYR 0.07 / MT

The expect rolling tonnage 300k per year
Target Saving = MYR105k/ yr

POWER TEAM

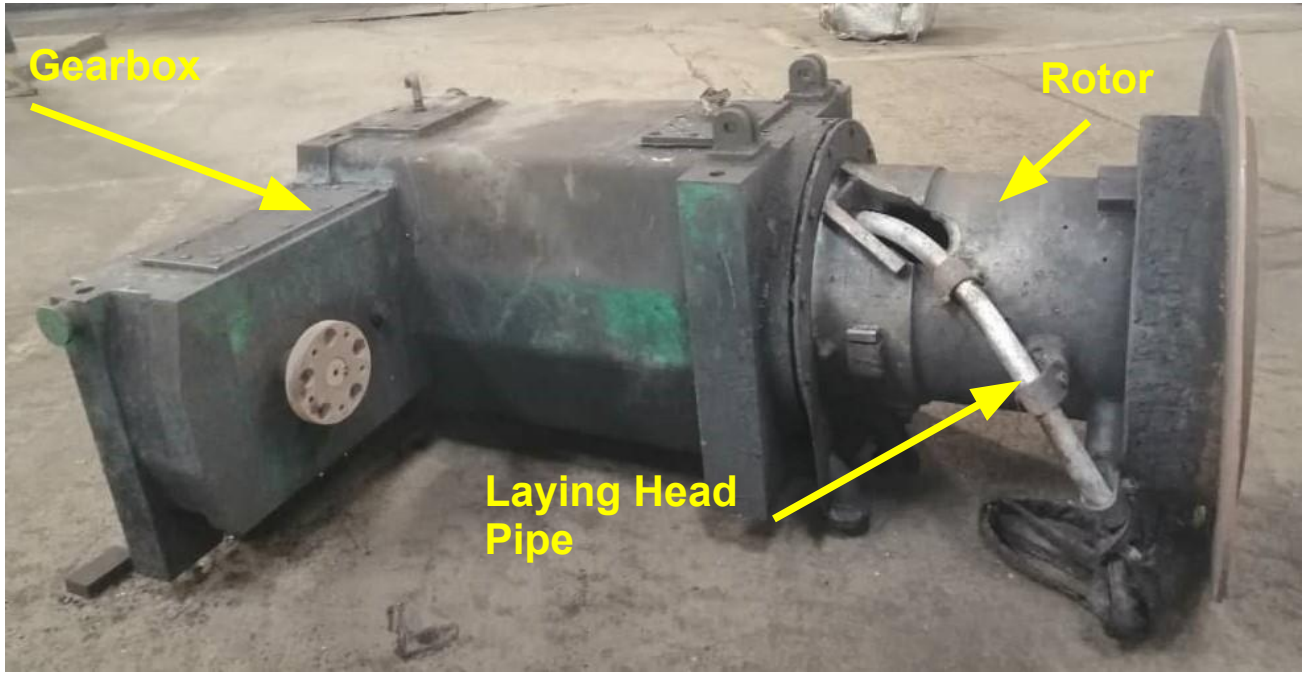
Machine Definition & Problem

1. **Laying Head high vibration and downtime**
2. **Laying pipe fast wear-off**
3. **Gearbox overhauling/servicing need longer time**

General Specification

Bar dimension	: dia 5.5mm~22mm
Machine Unit	: 5.92 tons
Dimension	: 1520 x 1000 x 1175mm
Drive	: AC Motor 240kw, 2500 RPM 415v 50Hz
Motor Weight	: 360kg

Rolling Mill No. 1 Laying Head Main Parts

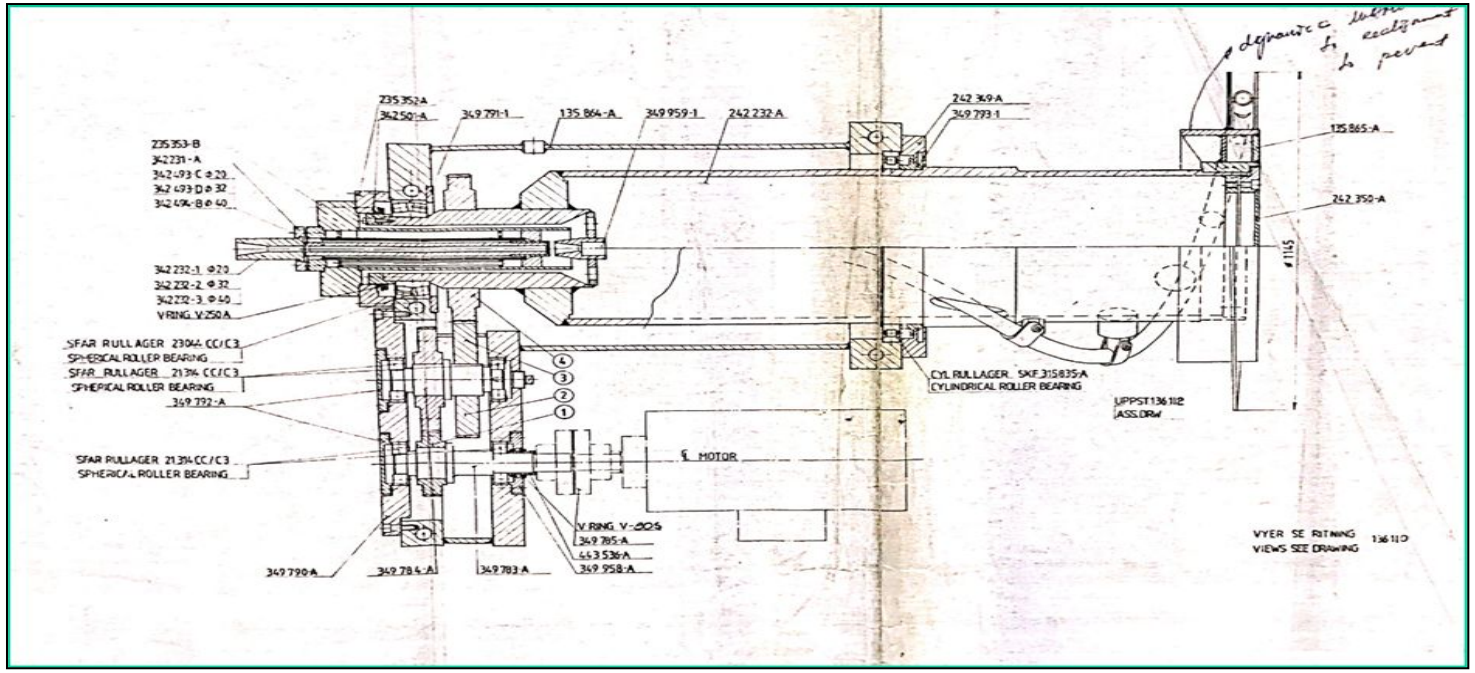


Function of Laying head

- High-speed precision device in hot-rolled wires production line
- Located in water cooling section after the finishing mill.
- Wire rods pass through the rotated laying pipe to form coils and lay on conveyor roller table

POWER TEAM

Definition



Laying Head Cross Section View

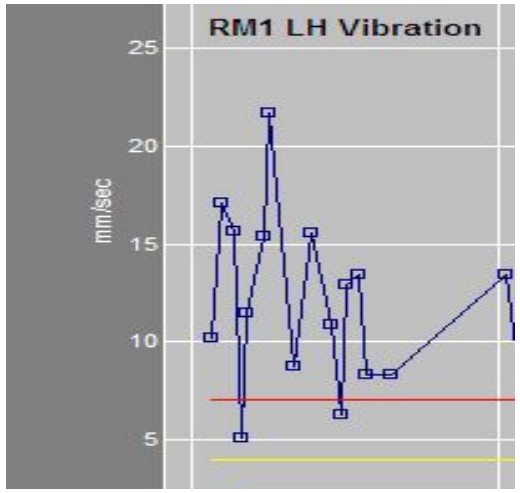
This project is to upgrade RM1 Laying Head with open type gearbox housing (as the item shown above) to achieve the objectives :-

1) **Reduce Laying Head Breakdown time & vibration level**
2) **Shorten gearbox overhaul time & plan stoppage time**
3) **Enhance laying head pipe life span**
4) **Improve Coil shape & reduce rejection**

POWER TEAM

Problem Definition

High vibration >19.0 mm/s



Laying head pipe fast wear-off

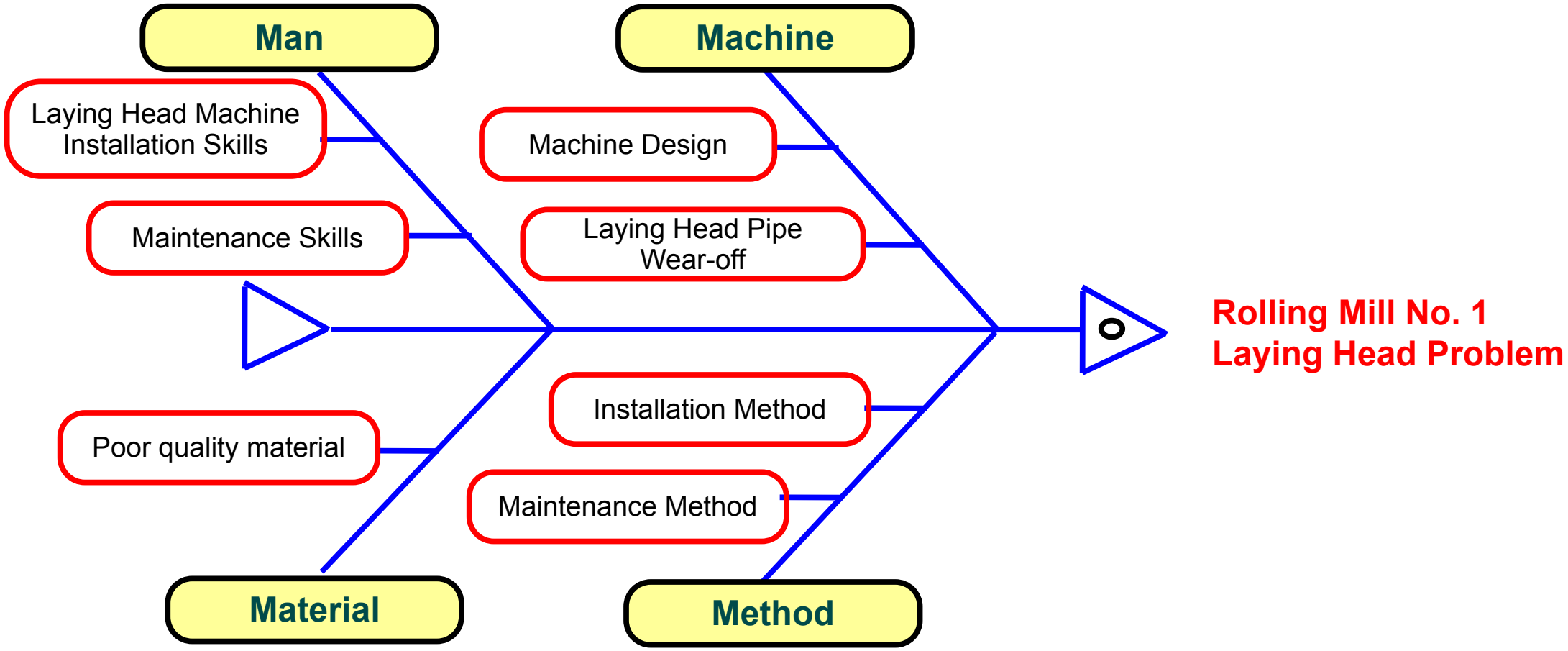
Coil Shape Problem

Closure Type Gearbox Structure

<u>Problem of Existing Laying Head</u> :

1. Production Breakdown for checking on high vibration level
2. Laying Head pipe wear-off with low production tonnage
3. Wire rod coil out of shape
4. Gearbox structure not ease for maintenance
   - Time consume for gearbox overhaul work
   - Unsafe for remove the rotor shaft

List of All Possible Causes



List Out All Possible Causes

All the possible causes is listed to carry out further analysis and verification of actual root causes.

Rolling Mill 1 - Laying Head		
4 M	Possible Root Cause	Details
Man	Laying Head Pipe Installation Skill	Not installed by trained persons.
	Maintenance Skill	Not serviced by trained persons.
Machine	Laying Head Machine Structure	Laying Head not reliable
		Rotor not balancing
Material	Poor Quality Material	Laying Head Pipe fast wear-off
		Unreliable Laying Head Pipe material
Method	Installation Method	Installation not follow instruction manual.
	Maintenance Method	Maintenance not follow instruction manual.

Root Cause Analysis

MAN

Possible Root Cause	Analysis / Inspection	Findings
Laying Head Pipe not install by Skill Person	- Actual inspection had been carried out at machine site to record down the persons on work in each shift. - Checked the skill profile of persons on work.	The 4 persons work on this job had been trained based on installation guide, they are competent.
Laying Head not service by trained persons.	- The maintenance crews is well train and specialize in servicing main gearbox & others critical machine - Checked the skill profile of persons on work.	The person in charge work on this job had been trained.

PIC : AKK / Khor Chun Leng

Root Cause Analysis

MACHINE

Possible Root Cause	Analysis / Inspection	Findings
Laying Head design not reliable enough.	Analysis of the physical item had been done (Refer to slide 21)	RM1 Laying Head Design not reliable enough compared to RM2 Laying Head
Laying Head Rotor Balancing	Checking on Laying Head Rotor in good condition. No aging and any abnormality found	Rotor still well function during operation.

PIC : Lim Wenn Dar /Mohd Farid

Root Cause Analysis

MATERIAL

Possible Root Cause	Analysis / Inspection	Findings
Laying Head Pipe Fast Wear-off	Inspection had been carried out on the actual pipe wear off condition & proper record was done.	• The pipe changed with low production tonnage • Mill scale accumulated in the pipe and machine vibration accelerated caused the pipe wear-off.
Laying Head pipe material not suitable	Analysis of the material for a typical wear-off pipe	• The material similar to Rolling Mill No. 2 • It is suitable as used in Rolling Mill No. 1 Laying Head pipe.

PIC : NHT / NHK

Root Cause Analysis

METHOD

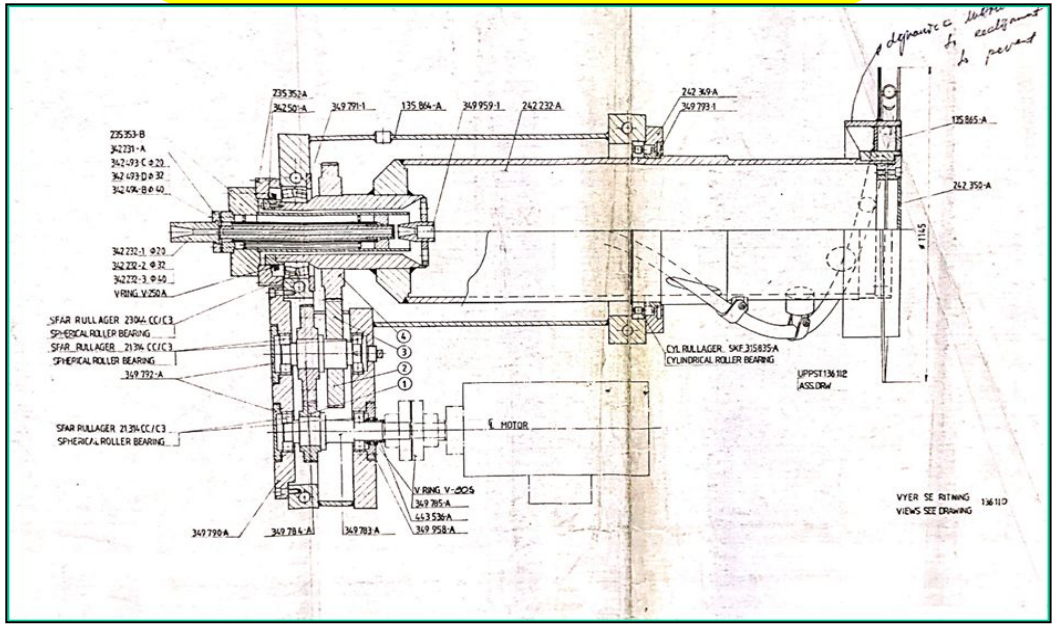
Possible Root Cause	Analysis / Inspection	Findings
Laying Head Pipe Installation not carry out properly	Inspection had been carried out to check the method applied by the persons on installation job.	The persons follow instruction manual as they were trained well in RM1 & RM2 laying head pipe installation
Laying Head Maintenance not follow instruction manual	Inspection had been carried out to check the method applied by the persons on maintenance and servicing	The persons follow the Instruction manual & laying head overhauling follow 150kmt production tonnage. Check/Change the parts so that all are confirm based on manufacturer specification

PIC : NHT / NHK

Root Cause Analysis

Comparison of laying head unit in Rolling Mill No. 1 & Rolling Mill No. 2

Rolling Mill No. 1 Laying Head



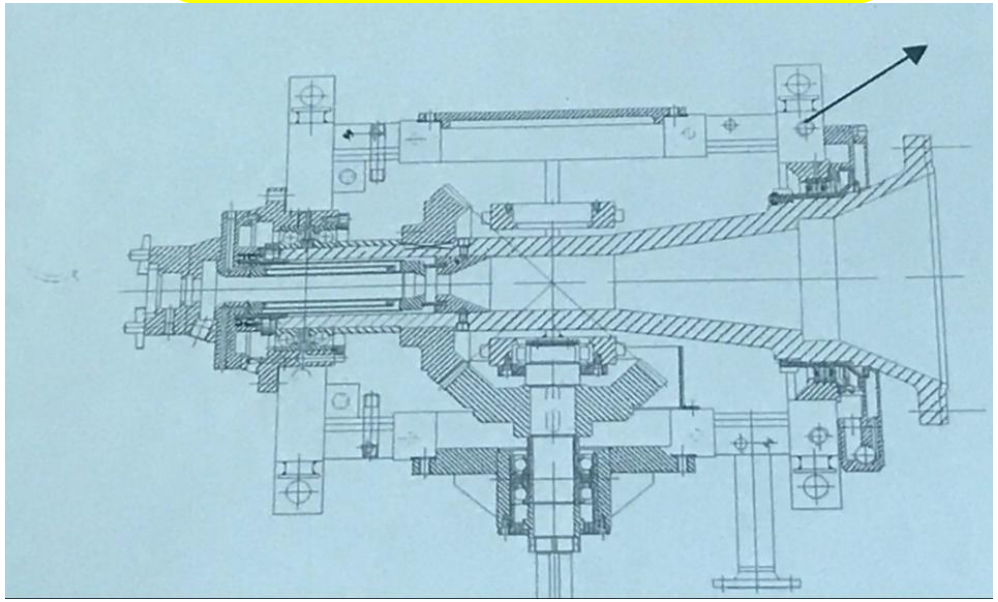
Weak Pt. 1
High Vibration Require checking

Weak Pt. 2
Laying Head pipe wear-off fast

Weak Pt. 3
Gearbox housing not open frame type, time consuming on gearbox overhaul

Weak Pt. 4
Coil Shape Out

Rolling Mill No. 2 Laying Head



- ***Rolling Mill No 2 Laying Head low vibration,***
- ***Open frame gearbox type***
- ***Laying Head pipe can last up to 60,000 MT.***
- ***Coil shape less problem***

Root Cause Analysis

Rolling Mill No. 1 Laying Head Machine Weak Points

DESIGN	WEAKNESSES	COMPLICATIONS
Weak Pt. 1 *Laying Head High Vibration level*	High vibration caused downtime for checking & coil shape problem	High downtime & Low productivity
Weak Pt. 2 *Laying Head Pipe wear off fast*	Laying Head pipe change frequently	High maintenance cost on Laying Head pipe
Weak Pt. 3 *Gearbox housing not in open frame type*	Time consuming & unsafe on gearbox overhaul	Consume longer time & unsafe to remove gear shaft and rotor
Weak Pt. 4 *Coil Shape Out (Tangle)*	Quality rejection	Production breakdown for Laying Head pipe change

Summary of Root Cause Analysis

After we have carried out the detail analysis for all the possible causes, it can be summarized as follows :

RM1 Laying Head			
4 M	Possible Root Cause	Details	Findings (/ or x)
Man	Laying Head Pipe Installation Skill	Not installed by trained persons.	X
	Maintenance Skill	Not serviced by trained persons.	X
Machine	Laying Head Machine Structure	Laying Head machine not reliable	/
		Rotor not balancing	X
Material	Material No Good	Laying Head Pipe wear-off fast	/
		Laying Head Pipe material not suitable	X
Method	Installation Method	Installation not follow instruction manual.	X
	Maintenance Method	Maintenance not follow instruction manual.	X

Propose Solution

PROBLEM

Rolling Mill No. 1 Laying Head Less Reliable

SOLUTION

1. **Fabricate New Rotor & gearbox housing to reduce vibration level**
2. **Add pressurize air header to Laying Head pipe to remove accumulate scale**
3. **Upgrade Laying Head gearbox to open frame housing**
4. **Add flange plate to rotor structure to minimize vibration level**

POWER TEAM

Cost Benefit Analysis

We selected all the proposed solutions, and the detail calculation of payback for New Laying Head Unit is shown as follows :

	Item Description / Details	Unit
1) Project Cost	Fabricate Gearbox Housing ,rotor & others parts RM280,000 & Laying Head internal bent pipe RM3,500	MYR 283.5K
2) Cost Benefit *(Assumption)*	2a) Assume cost reduction to 50% Laying Head pipe cost saving = MYR105k 2b) Gearbox overhaul time reduced from 2days to 1.5days, Time saving = 720mins Gearbox overhaul 2 times in one year, Time saving = 720mins x 2/60 = 24hrs /yr Cost benefit = MYR 180K/ yr	2a + 2b MYR285K per year
3) Payback	= (1) / (2) = 283.5k /285k	<1.0 year

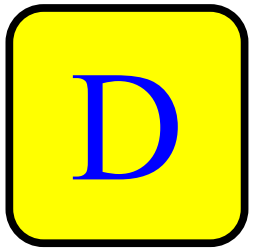
Action Plan

Problem	Identified Solution	Plan Start	PIC
Laying Head Machine Problem	**Upgrade Rolling Mill No. 1 Laying Head with new gearbox housing & rotor**	**Mid Mar '17**	**NHT Khor CL NHK Jamal Farid AKK**

ACTION PLAN SCHEDULE

No	Implementation/Action	Plan Date	PIC
1	Study & Prepare Laying Head Engineering Design	Feb'16 ~Mar'16	NHT
2	Getting Mgmt Approval & Budgetary Cost	'Mar'17	NHT
3	Establish Assembly Drawing	Mar'17	NHK
4	Prepare Details Drawing	Mar'17 ~April'17	NHK
5	Sourcing for Quotation (Local Fabrication)	Apr'17 ~May'17	NHK
6	Justification & Award	May'17	NHT
7	Parts Delivery		
a	Gearbox housing	May'17 ~Oct'17	NHK
b	Rotor shaft	May'17 ~Oct'17	NHK
c	Laying Head Pipe & others parts	May'17 ~Sept'17	Jamal
8	Laying Head Assembly (Offline)	Nov'17 ~Dec'17	KCL/Farid
9	Laying Head Installation(Online)	Jan'18~Feb'18	KCL/Farid
10	Testing & Commissioning	Jan'18~Feb'18	Jamal/AKK

POWER TEAM



Do

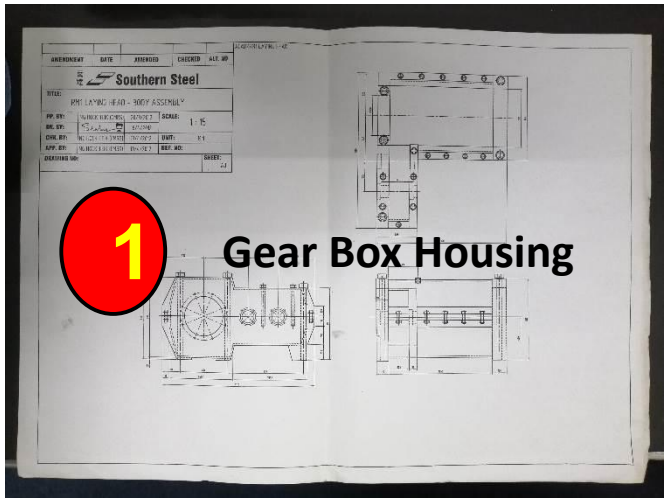
Do

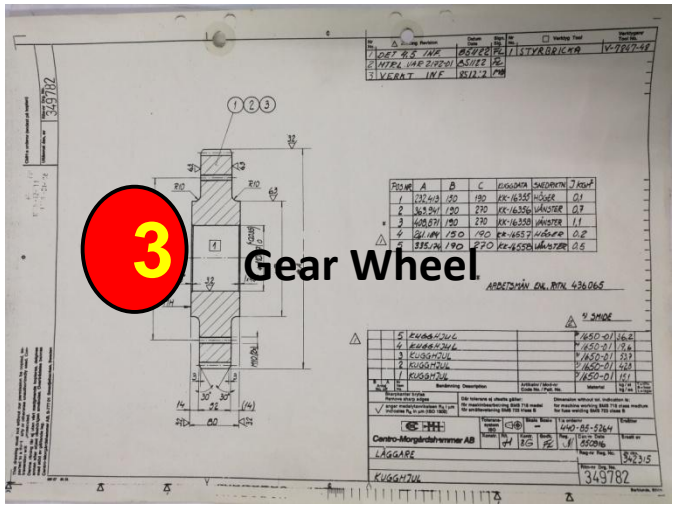
- Implement
- Monitoring
- Problem Encountered

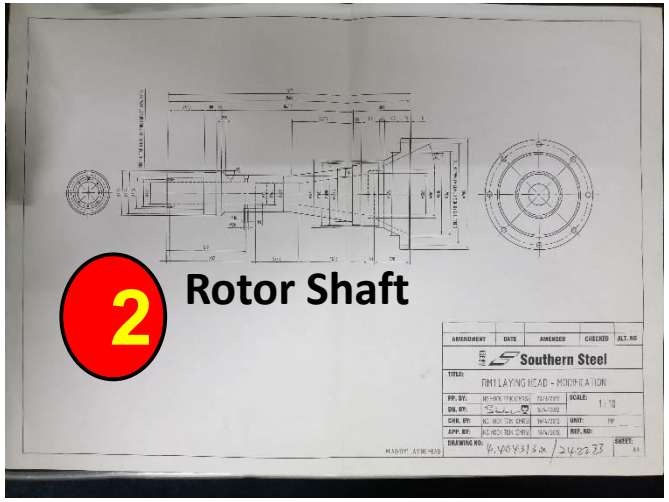
Creative Solution

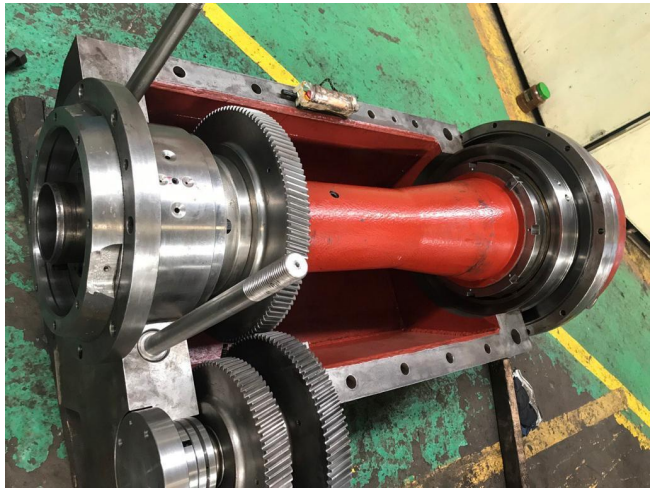
The parts listed below had been prepared for assembly at workshop.

No	Description	Qty	Total Price (MYR)
1	Gear Box Housing	1 unit	180,000.00
2	Rotor	1 unit	
3	Gear Wheel	1 set	45,326.25
4	Bearing	1set	38,635.00
5	Flange, spacer, collar, shaft, & laying head pipe	1 set	13,757.00
	Total	1 set	**Approx.. 280,000.00**







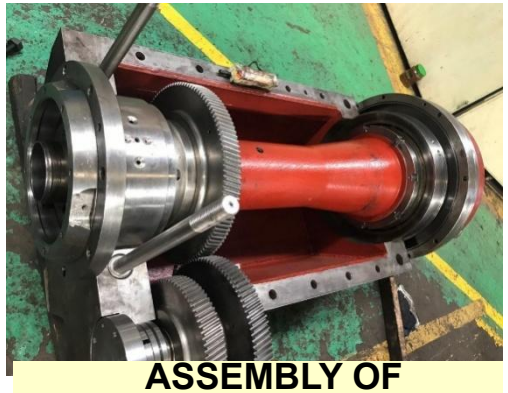


Project Execution – Offline Preparation

Sep 2017

CLEANING OF GEARBOX CASING

MACHINING OF ROTOR SHAFT



ASSEMBLY OF BEARINGS, GEARS & ROTOR SHAFT

FIXING OF CASING COVER

INSTALLATION OF ROTOR WITH PIPE

04 Jan 2018
Completed

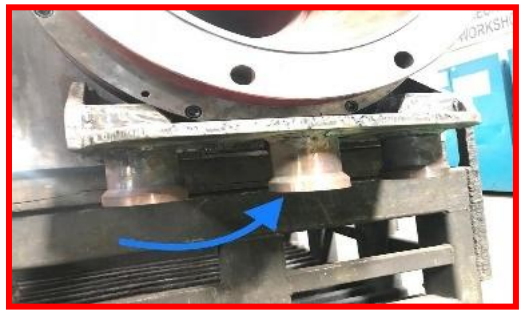
Project Execution – Upgrade Features

Add in pressurized air line to remove accumulated scale in Laying Head pipe

Additional Protection Plate
To avoid wire rod head and tail stuck at rotor fixed structure

Open Top Gearbox Structure
Ease for maintenance
Save time to remove rotor & gear
Safe on overhauling

Project Execution – Upgrade Features



Slot in
Lubrication Pipe
Save time
Less work

Isolate Gearbox structure
from Rotor for easy maintenance

Common Spare Part on
Rotor & Gear wheel
with Rolling Mill No. 2

New Laying Head
Unit is ready

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Project Execution

Plan Vs Actual

No	Implementation/Action	Plan Date	Actual	PIC	Status
1	Study & Prepare Laying Head Engineering Design	Feb'16 ~Mar'16	Feb'17	NHT	Done
2	Getting Management Approval & Budgetary Cost	'Mar'17	Mar'17	NHT	Done
3	Establish Assembly Drawing	Mar'17	Mar'17	NHK	Done
4	Prepare Details Drawing	Mar'17 ~April'17	Apr'17	NHK	Done
5	Sourcing for Quotation (Local Fabrication)	Apr'17 ~May'17	Apr'17	NHK	Done
6	Justification & Award	May'17	Apr'17	NHT	Done
7	Parts Delivery				Done
7.a	Gearbox housing	May'17 ~Oct'17	Sept'17	NHK	Done
7.b	Rotor shaft	May'17 ~Oct'17	Oct'17	NHK	Done
7.c	Bearing & others parts	May'17 ~Sept'17	Oct'17	Jamal	Done
8	Laying Head Assembly (Offline)	Nov'17 ~Dec'17	Nov'17	KCL/Farid	Done
9	Laying Head Installation(Online)	Jan'18~Feb'18	Jan'18	KCL/Farid	Installed in Jan'18
10	Testing & Commissioning	Jan'18~Feb'18	Jan'18	Jamal/AKK	

Implementation & Monitoring

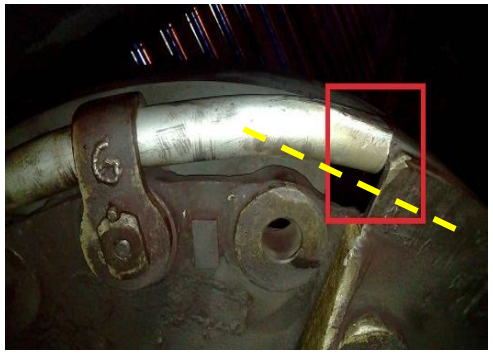
- Laying Head gearbox housing arrived on site in Sept 2017.
- The housing was check and clean in next day.
- The rotor shaft received in mid Oct ’17.
- The rotor shaft being check & inspected by Machine Roll Shop maintenance crew
- During the checking, the rotor shaft diameter is slightly over the required diameter and bearing will not fix in place. The rotor shaft required for machining.
- The process installation of new Laying head follow the proper procedure and all bearing & gear were put in place. High Precision bearing was installed.
- Laying head unit ready in Nov ‘17 & waiting for installation.

<<Click here for a video>>

Problem Encountered

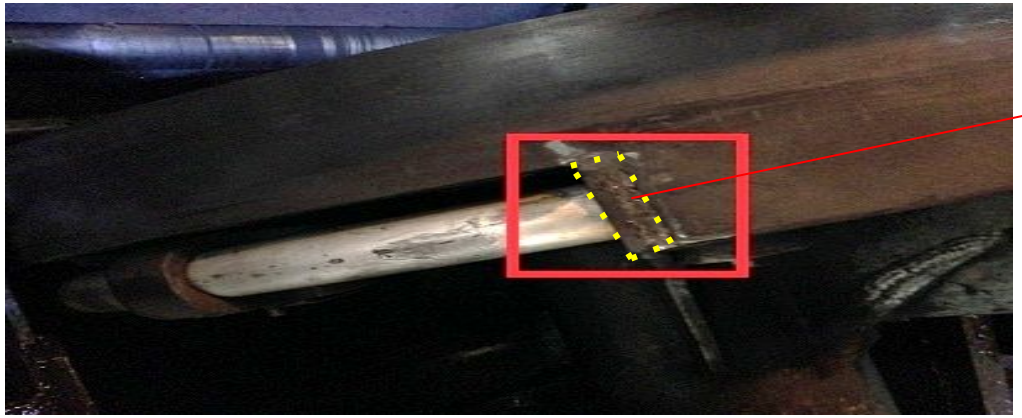
Rolling Mill No. 1 New Laying Head Machine Abnormal Sound & High Vibration

PROBLEM ENCOUNTERED



- **Laying head pipe ejected from origin**
- **Generate abnormal sound during operation**

ACTION TAKEN



Kaizen : Add guide plate 50 mm to hold the Laying Head pipe.

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C

Check

Check

- Evaluation of Results
- Finalize Solution
- Presentation to Management

Evaluation of Results

Comparison of Before and After Vibration Level

	Old Laying Head unit			New Laying Head Unit			
Laying Head Downtime Record Analysis (%)	2015	2016	2017	2018	2019	2020	Remarks
	0.98	1.02	0.93	0.13	0.07	0.07	Significant reduced to 0.09% (avg)

- Vibration level reduce to acceptable range, directly reduce downtime
- Require checking if vibration exceed 10mm/s

Average 0.98%

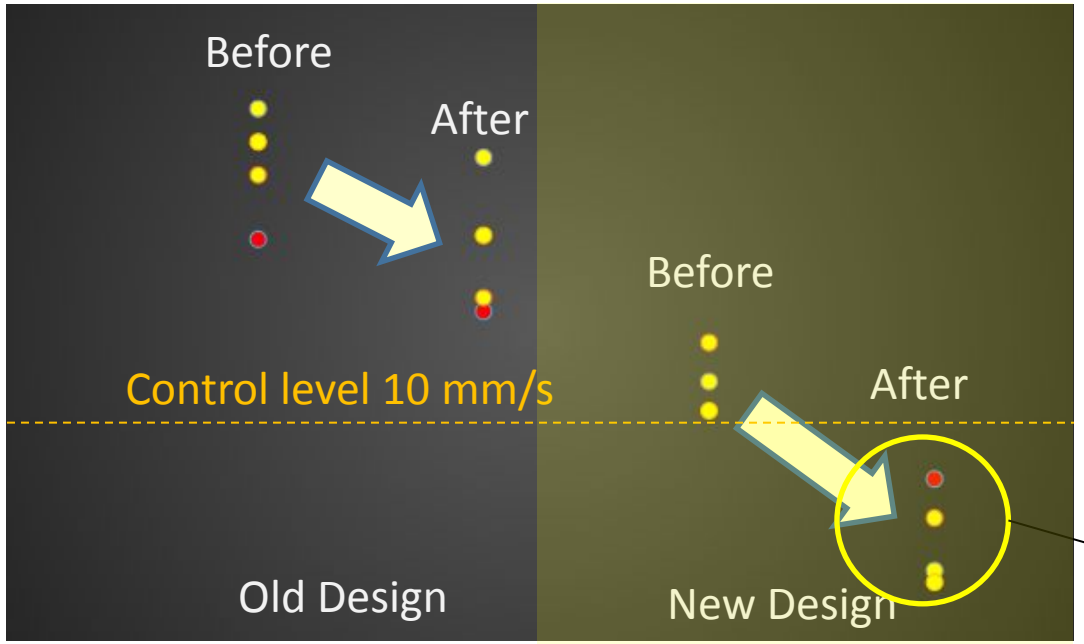
Average 0.09%

Reduced 0.89%

Evaluation of Results

Vibration Monitoring-Old Versus New Laying Head Unit

Balancing Adjustment Chart



Rolling Mill No. 1- Laying Head Vibration Level

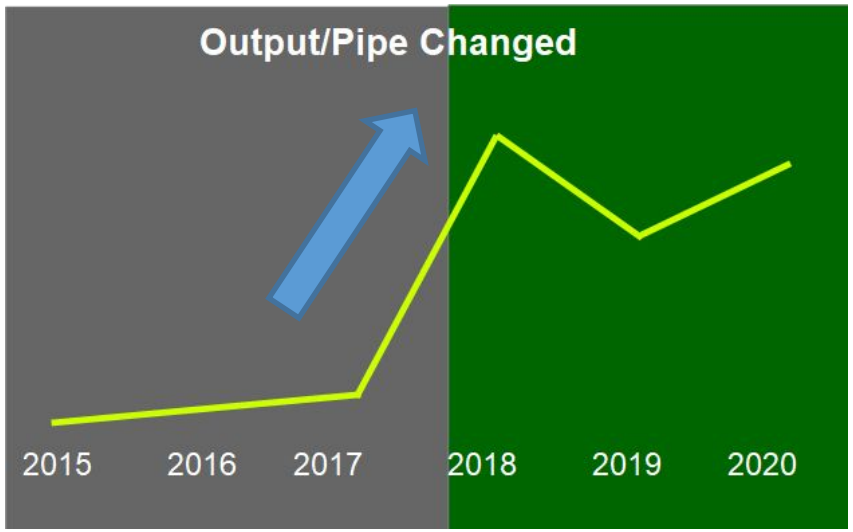
Laying Head Design	Balancing level improvement	After Balancing - Findings
Old design	0%	Above 10 mm/s
New design	100%	Below 10 mm/s

Control below 10.0mm/s

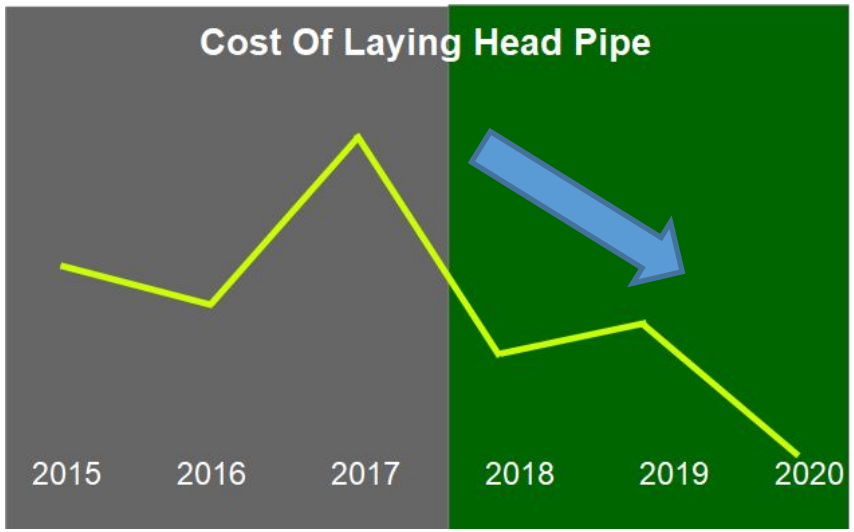
Evaluation of Results

Laying Head Pipe life span has improved to 4.5 times, therefore conversion to 78% of performance improvement with total saving of MYR 197,000.

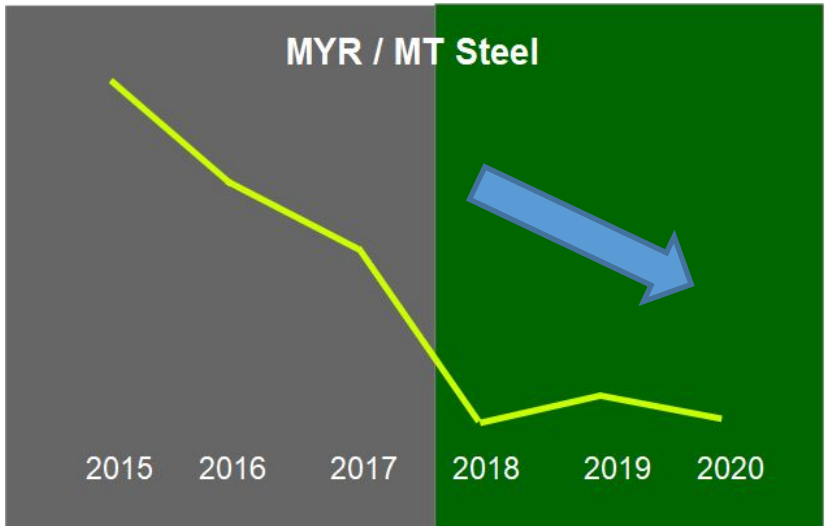
Charts to represent Laying Head performance



Life span improved 450%



Reduced 57% spending



Improved 78% performance

Evaluation of Results

Coil shape condition improved

Old Laying Head Machine

Bad Coil Shaped

New Laying Head Machine

Good Coil Shaped

Final Solution

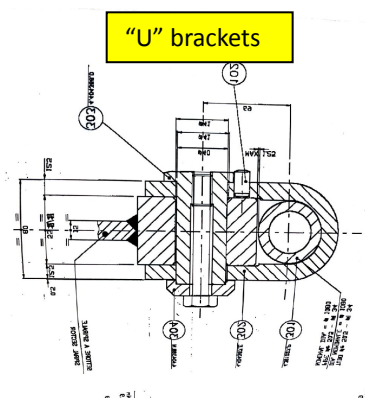
- Preliminary installation in Dec 2017 to matching with existing foundation footing
- All proper procedures were followed in the installation job, and *positive results had been obtained.*

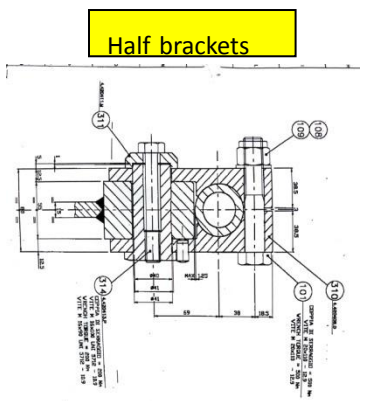
- The Laying Head machine installed according to the schedule.
- The new gear and shaft were assembly properly & fix to new structure.
- Test & commissioning done in Jan 2018 *Checking on Vibration Level in acceptable range*

A Action

Action
- Standardization
- Monitoring
- Follow up
- Project Completion

Standardization - Laying Head Pipe Installation SOP





Established SOP
- For clearer & proper installation
- Standardized locking torque on tightening U bracket & half bracket

Established SOP to avoid improper installation cause high vibration issue

Standard Operation Procedure For Rolling Mill 1 Mechanical

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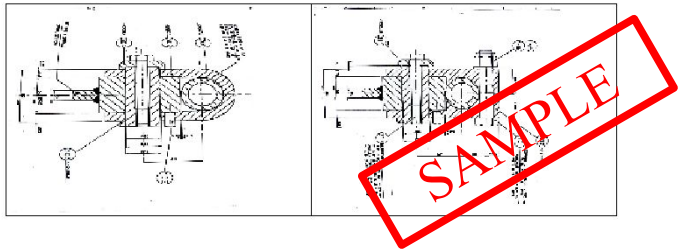
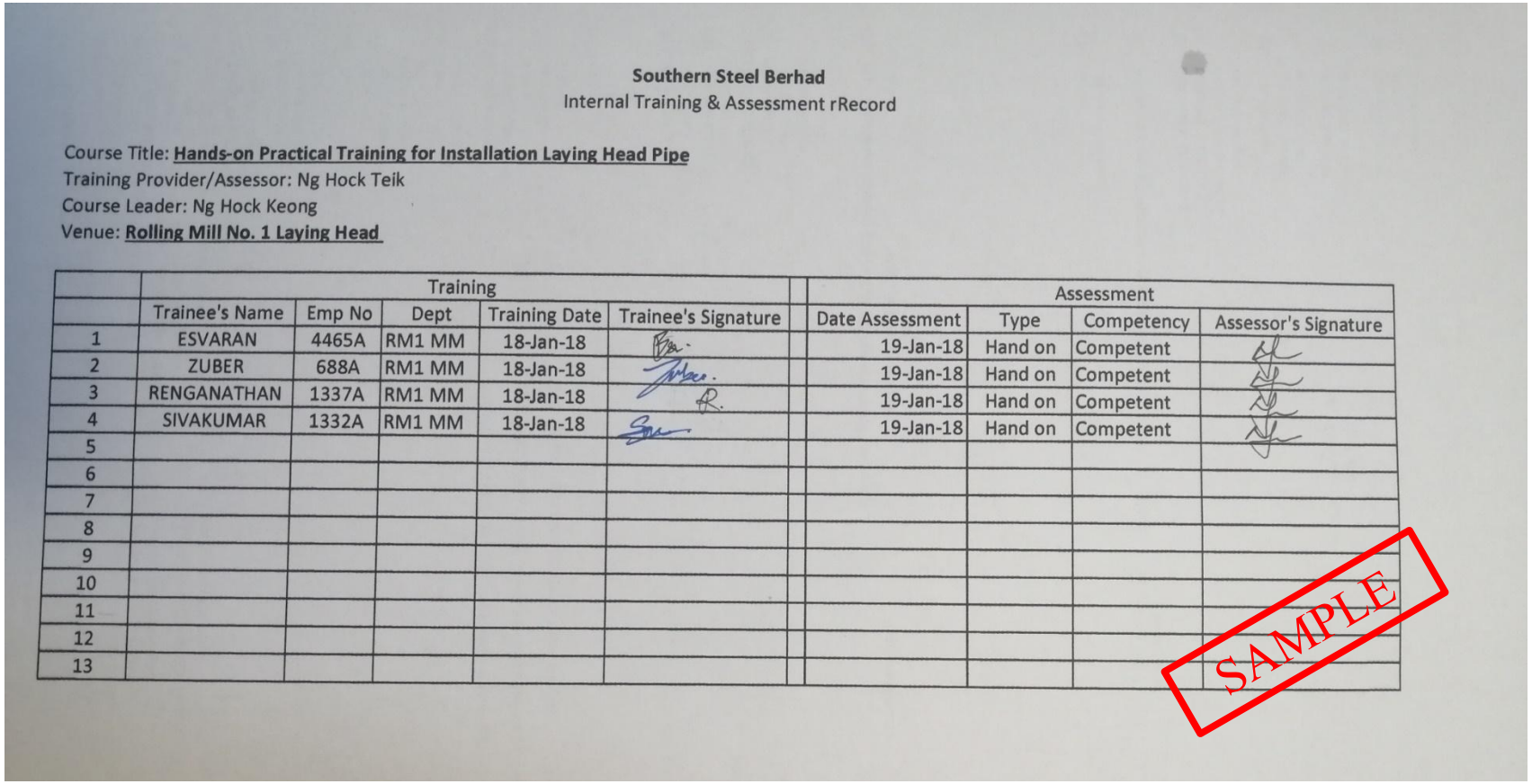
SOP of Replacement of Laying Head Pipe

- Unscrew (1) the tightening between Laying Head Machine with rotor M36 screw.
- Push forward and carry up the rotor to the workshop for the replacement of the pipe.
- Cut the protective wires which tie the bolt on the brackets of the pipe.
- Loosen and remove the fixing bolt of the (3) "U" brackets and of the (2) half brackets that block the laying head pipe to the supports welded on the rotor.
- Moreover, loosen and remove the fixing bolts of the laying head pipe and the half brackets.
- Remove the (4) laying head pipe.
- Insert the new laying head pipe sufficiently to it into contact with the bracket. When inserting the laying head pipe.
- Fasten the laying head pipe to the rotor by means of (3) "U" brackets and by means the (2) half brackets.
- For what concerns the locking torques of the various fixing bolts of the laying head pipe, see the following table:

	Locking Torque (Nm)	Locking points
Bolt locking the half brackets to the rotor.	200	1
Bolt for blocking the half brackets to the turn forming pipe.	500	1
Bolts for blocking the "U" brackets to the rotor.	200	4



Competency Training Record



Southern Steel Berhad
Internal Training & Assessment rRecord

Course Title: **Hands-on Practical Training for Installation Laying Head Pipe**
Training Provider/Assessor: Ng Hock Teik
Course Leader: Ng Hock Keong
Venue: **Rolling Mill No. 1 Laying Head**

	Training					Assessment			
	Trainee's Name	Emp No	Dept	Training Date	Trainee's Signature	Date Assessment	Type	Competency	Assessor's Signature
1	ESVARAN	4465A	RM1 MM	18-Jan-18		19-Jan-18	Hand on	Competent	
2	ZUBER	688A	RM1 MM	18-Jan-18		19-Jan-18	Hand on	Competent	
3	RENGANATHAN	1337A	RM1 MM	18-Jan-18		19-Jan-18	Hand on	Competent	
4	SIVAKUMAR	1332A	RM1 MM	18-Jan-18		19-Jan-18	Hand on	Competent	
5									
6									
7									
8									
9									
10									
11									
12									
13									

SAMPLE

COMPETENCY TRAINING RECORD FOR LAYING HEAD PIPE INSTALLATION

Impact to Team Members

1) Improve various type of skills for team members such as problem solving and presentation.

2) Form a good teams work & promote collaboration among the team member.

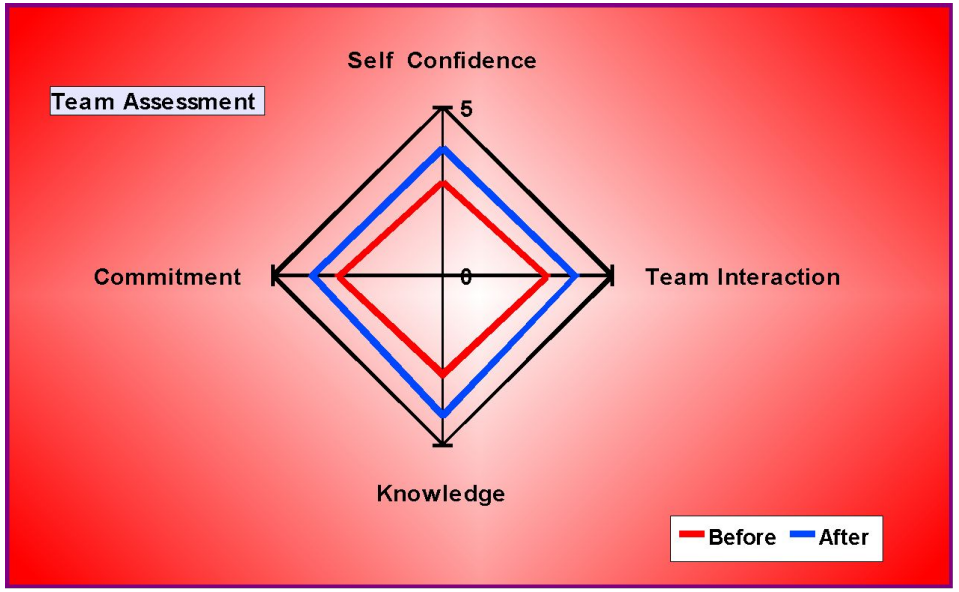
3) Share ideas among members for total improvement.

4) Promote higher commitment to job performance.

5) Work towards a smarter way and provide extra time to family, etc.

Team Self-Assessment

Radar Chart



1. Poor 2. Weak 3.Good 4.Excellence

Member Name	Knowledgeable		Commitment		Self Confidence		Team Interaction	
	Before	After	Before	After	Before	After	Before	After
Ng Hock teik	3	4	3	4	3	4	3	4
Ng Hock Keong	3	4	3	4	3	4	3	4
Khor Chun Leng	3	4	3	4	3	4	3	4
Lim Weng Dar	3	4	3	4	4	5	3	4
Jamal	3	4	2	4	3	3	3	4
Mohd Farid	3	4	2	4	3	4	3	4
Lee Soo Chin	3	4	3	3	2	4	3	4
Aw Kwok Kwong	2	3	2	3	2	3	2	3
Average	3	4	3	4	3	4	3	4

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Payback

RM1 Laying Head Net Cost Benefit (2018~2020)

	Item Description / Details	Total
1) Cost Benefit	1a) In 2018, 2019 & 2020, Laying Head pipe cost saving = MYR197,072 1b) Gearbox overhaul time reduced from 2days to 1.5days, Time saving = 12 hrs Gearbox overhaul 2 times in a year Time saving =12hrs x 2time x 3 yr = 48 hrs Cost benefit = MYR360,000	(1a + 1b) / 3 year MYR 557,072/3yr = MYR185,690 per yr
2) Downtime Reduction	Downtime reduced for 0.89% 0.89% x 6516 hrs =58 hrs Cost benefit = MYR 435,000	MYR 435,000/3 yr = MYR 145,000 per yr
3) Project Cost	New laying head unit, 1 set	MYR 283,500
4) Payback	= (3) / (1+2)	<1 years

(Saving is compared with the Amount of Before Improvement period (2015,2016 & 2017).

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Tangible Benefit

		Total Amount (MYR) (Year 2018)	Total Amount (MYR) (Year 2019)	Total Amount (MYR) (1st Half of 2020)
1	Maintenance Cost Saving (Laying Head Pipe)	92,000	82,000	23,000
2	Gear Box Overhaul Cost Benefit	120,000	120,000	120,000
3	Downtime (0.89% reduction)	192,000	188,000	55,000
4	Project Cost	283,500	0	0
Total Net Saving = (1)+(2)+(3)-(4)		**120,500**	**390,000**	**198,000**

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Others Benefit

	Before	After
Downtime	Yr 2017 0.93%	Yr 2018, 2019 & 2020 0.09%

Note :

High vibration caused downtime, such as checking & balancing

Coil Tangle (Rejection%)	Yr2017 0.19%	Yr2018 0.06%
		Yr2019 0.05%
		Yr2020 0.06%

Note :

Coil shape problem, rejection reduced

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Upgrade Rolling Mill No. 1 Laying Head machine

THE END

Thank you !

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