



STEEL AUTHORITY OF INDIA LIMITED
स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड

WELCOME TO SALEM STEEL PLANT

M Manoj, Asst. General Manager (Project)
M Dhanasu, Senior Manager (CEM)

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SALEM STEEL PLANT



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SALEM STEEL PLANT

| | |
|-----------------------------|------------------------------------|
| Location | : Salem, Tamil Nadu |
| Connected with Chennai | : By Road/Rail 335 km |
| Connected with Bangalore | : By Road 200 km By Rail 215 km |
| Area | : 15.5 sq km (3973 acres) |
| Manpower | : 1323 |
| ISO14001 certified township | : 832 dwellings |

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Certified by M/s TUV

| | | |
|-----------------------|---|----------------|
| QMS | : | ISO 9001:2008 |
| EMS | : | ISO 14001:2004 |
| OHSAS | : | BS 18001:2007 |
| Social Accountability | : | SA:8000:2008 |

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SALEM STEEL PLANT

ENVISAGED AS INTEGRATED SPECIAL STEEL PLANT

IMPLEMENTATION IN STAGES WITH REVERSE
INTEGRATION CONCEPT

COLD ROLLING MILL (COMMISSIONED IN SEPT 1981)

HOT ROLLING MILL (COMMISSIONED IN SEPT 1995)

STEEL MELTING SHOP
(SCHEDULED COMMISSIONING - MARCH 2010)

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SALEM STEEL PLANT FACILITIES

| Unit | Commissioned | Capacity (T/year) | Investment (Rs. Cr) |
|-----------------------|--------------|-----------------------|------------------------|
| CRM Z MILL 1 | 13.09.81 | 32,000 | 181.19 |
| Z MILL 2 | 26.03.91 | ENHANCED TO 70,000 | 76.27 |
| BLANKING LINE | 24.12.93 | 3,000 | 14.90 |
| HRM - STECKEL MILL | 11.09.95 | 1,86,200 | 623.10 |
| | | Total | 895.46 |

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PRODUCTS

HOT ROLLED STAINLESS STEEL COILS & SHEETS

HOT ROLLED CARBON STEEL COILS & SHEETS

COLD ROLLED STAINLESS STEEL COILS, SHEETS
AND COIN BLANKS

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PRODUCT DETAILS

Stainless - Austenitic, Ferritic & Martensitic grades steel

**301, 304, 304L, 304M, 310, 310S, 316, 316L, 321
409, 409M, 410, 410S, 420, 430, 439
SSLN1, SSLN2, SSLN4 , SSLNQ ,204 Cu**

Carbon Steel -

**Corten, SS4012A(E38), IS 1079D, IS 1079 DD
IS 2062 E250B, IS 2062 E250C, S4012A (E34)/(E38)
IS 5986 Fe 410, SAILMA 350HI, SAILMA 410HI, E500etc
IS 5986 Fe 410, SAILMA 350HI, SAILMA 410HI, E500 etc.**

HOT ROLLING MILL





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MAJOR FACILITIES AT HRM

- WALKING BEAM RE-HEATING FURNACE
- 4 HI REVERSING ROUGHING MILL
- 4 HIGH REVERSING STECKEL MILL WITH LEVEL 2 AUTOMATION
- DOWN COILER
- ROLL SHOP

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COLD ROLLING MILL





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MAJOR FACILITIES AT CRM

- COIL BUILD UP LINE
- BELL ANNEALING FURNACES
- ANNEALING & PICKLING LINES
- 20-HIGH SENDZIMIR MILLS
- STRIP GRINDING LINE
- 2 HIGH SKIN PASS MILL WITH ELONGATION CONTROL
- SHEARING LINE & SLITTING LINE WITH ONLINE MARKERS
- ROLL SHOP WITH CNC MACHINES

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COIN BLANKING



COUNTRY'S FIRST TOP-OF-THE-LINE STAINLESS STEEL BLANKING FACILITY OF COIN BLANKS AND UTILITY BLANKS / CIRCLES.





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MAJOR FACILITIES AT BLANKING LINE

- BLANKING PRESS
- RIMMING MACHINE
- ANNEALING FURNACE
- PICKLING AND POLISHING MACHINES
- COUNTING MACHINES
- EFFLUENT TREATMENT PLANT

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APPLICATIONS OF STAINLESS STEEL

- ARCHITECTURE
- ELEVATORS
- CHEMICAL INDUSTRIES
- AUTOMOBILE INDUSTRIES
- TANKS AND PIPE LINES
- RAILWAYS
- DOMESTIC APPLIANCES
- KITCHEN EQUIPMENTS
- STRATEGIC SECTORS

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EXPANSION PROJECT

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EXPANSION PLAN

| DESCRIPTION | CAPACITY (TONNES) | |
|----------------|-------------------|-----------------|
| | PRESENT | AFTER EXPANSION |
| SLABS | ---- | 1,80,000 |
| HR COILS | 1,86,000 | 3,64,000 |
| CRSS | 65,000 | 1,46,000 |
| SALEABLE STEEL | 1,75,000 | 3,40,000 |



MAJOR EXPANSION FACILITIES

STEEL MELTING SHOP

- 55 ton Electric Arc Furnace
- 60 ton Refining Converter
- 60 ton Ladle Furnace
- Single strand Slab Caster
- Slab Grinder
- Associated auxiliary facilities



MAJOR EXPANSION FACILITIES COLD ROLLING MILL EXPANSION

- Annealing and Pickling Line
- Mixed Acid Recovery System
- Coil Preparation Line
- 20 High Sendzimir Mill
- Skin pass Mill
- Tension Leveling Line
- Slitting Line
- Roll Grinders for CRM (2 nos)
- Rotary Polisher
- Associated auxiliary facilities



MAJOR EXPANSION FACILITIES

UPGRADATION OF Z MILL 1 & 2 AT CRM

- Online shape control
- New wiping system
(For improvement of quality and productivity)

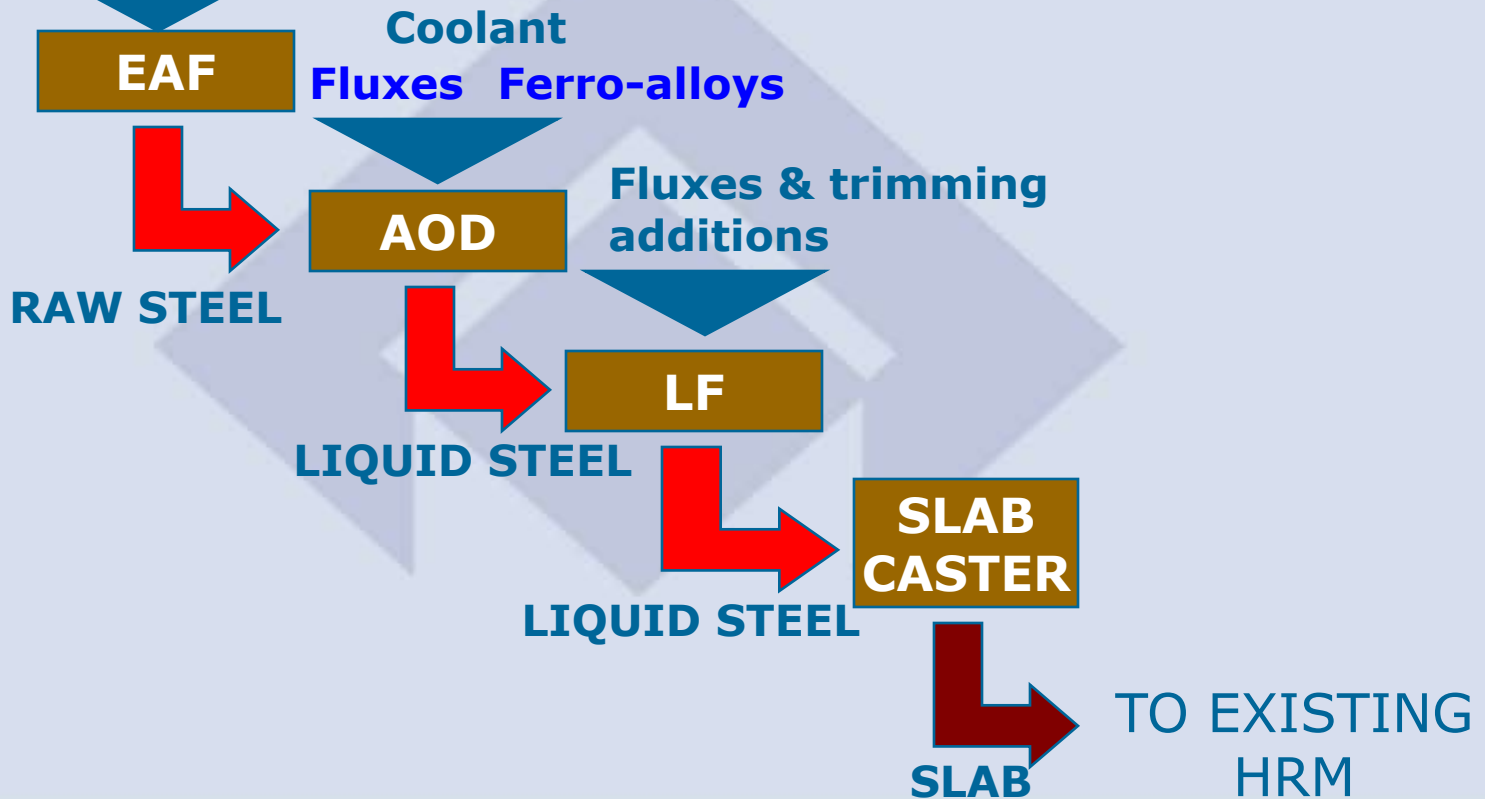
BALANCING FACILITY AT HRM

- CNC Roll Grinding Machine for Hot Rolling Mill



PROCESS FLOW IN SMS

Purchased MS Scrap Revert SS Scrap
Fluxes Ferro-alloys





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MONTHLY ENERGY CONSUMPTION

| | |
|-------------------|-----------------------|
| Electrical energy | : 75 to 90 lakh units |
| Maximum Demand | : 26500 kVA |
| LPG | : 1000 to 1200 Tonnes |
| Husk | : 600 Tonnes |

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TOTAL CONNECTED LOAD

| | |
|-----------|---------|
| HRM | : 40 MW |
| CRM | : 50 MW |
| UTILITIES | : 3 MW |

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ENERGY CONSUMPTION

- **HEAT ENERGY:**
FUEL
Reheating Furnaces : LPG
Boiler : HUSK, DOB, SAW DUST
- **ELECTRICAL ENERGY: TNEB & WHEELING**



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USE OF RENEWABLE ENERGY

- HUSK IS USED AS FUEL FOR FBC BOILER AND IT IS COST EFFECTIVE
- NOT DEPLETING NATURAL RESOURCE

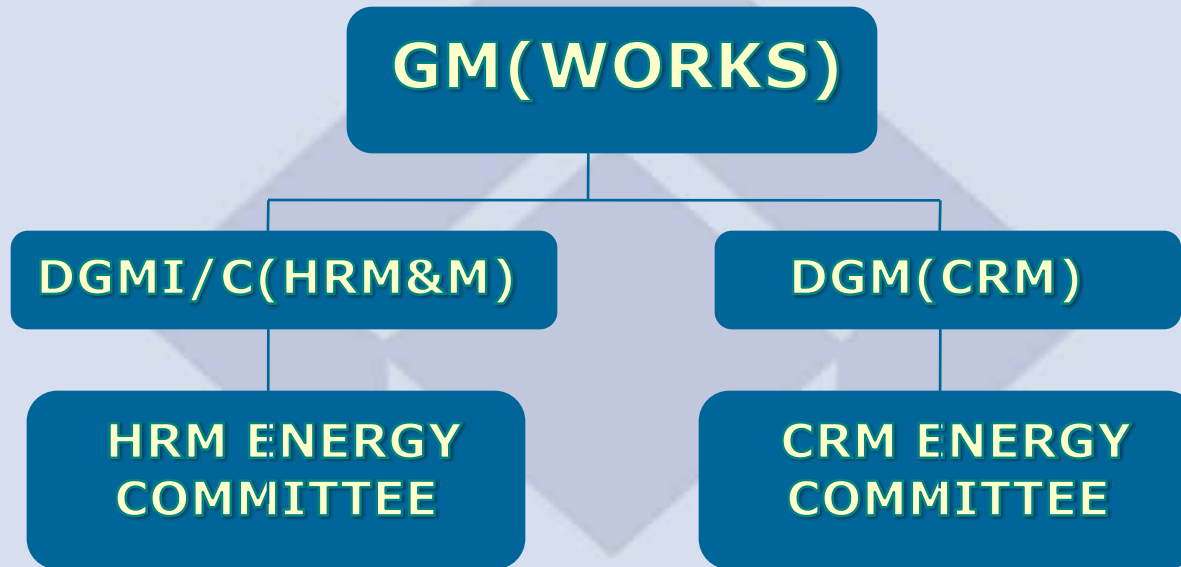
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ENERGY COMMITTEES





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ENERGY COMMITTEE -HRM

S/Shri

| | | |
|--------------------|----------------|-------------|
| D.V.Subramaniam | DGM(HRM-E) | -Chairman. |
| S.B.Padmanaban | Sr.Mgr(HRM-O) | - Convener. |
| C.Mahendranath | Sr.Mgr(HRM-E) | - Member. |
| Kulandaivelu. | Sr.Mgr(HRM-O) | - Member. |
| J.J.Niranjanadevi. | Sr.Mgr(CEM) | - Member. |
| Angapachetti. | Dy.Mgr(HRM-M) | - Member. |
| R.Natarajan | Sr.Tech(HRM-E) | - Member. |
| P.Chandran. | Sr.Tech(HRM-M) | - Member. |
| K. Perumal. | Sr.Tech(HRM-O) | - Member. |
| R.Thiyagarajan | Sr.Tech(CEM) | - Member. |

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ENERGY COMMITTEE -CRM

S/Shri

| | | |
|--------------------|----------------|-------------|
| S.Manivannan | AGM(CRM-O) | -Chairman. |
| K.V.Chandrasekar. | Sr.Mgr(CRM-O) | - Convener. |
| K.Balakrishnan | AGM(CRM-E) | - Member. |
| S.Prabhakaran | Sr.Mgr(CRM- M) | - Member. |
| J.J.Niranjanadevi. | Sr.Mgr(CEM) | - Member. |
| Ajai Kumar Baskar | Manager(CRM-E) | - Member. |
| Subramaniyan | Sr.Tech(CRM-M) | - Member. |
| Suruliyandi | Sr.Opr(CRM-O) | - Member. |
| Y.Elangorajan | Sr.Tech(CRM-E) | - Member. |
| Gomathinayagam | Sr.Opr(CRM-O) | - Member. |

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CERTIFIED ENERGY AUDITORS

S/Shri

M Manoj, Asst. General Manager (P)

K Prakasam, Senior Manager (P)

M Dhanasu, Senior Manager (CEM)

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ENERGY REVIEW

- SPECIFIC CONSUMPTION - TARGET AND ACTUALS OF ELECTRICAL ENERGY AND FUELS
- POWER FACTOR, COST SAVING MEASURES AND COST OF ENERGY

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ENERGY REPORTS

- DAILY CONSUMPTION
- SPECIFIC CONSUMPTION
- POWER FACTOR
- MAXIMUM DEMAND

DAILY AND MONTHLY REPORTS GENERATED
AND MONITORED

REPORTS GENERATED FROM SCADA

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ENERGY REVIEW

- DAILY REPORT – UNIT HEADS
- BI WEEKLY – CHIEF OF WORKS
- MONTHLY – ENERGY COMMITTEES
- MONTHLY PERFORMANCE REVIEW :-
CHIEF EXECUTIVE
- MANAGEMENT REVIEW MEETING :-
QUARTERLY



SPECIFIC ENERGY CONSUMPTION

| AREA | | TARGETS | ACTUALS |
|------|-------|-----------|-----------|
| CRM | POWER | 925 KWH/T | 894 KWH/T |
| CRM | LPG | 32 KG/T | 34.5 KG/T |
| HRM | POWER | 171 KWH/T | 167 KWH/T |
| HRM | LPG | 35.8 KG/T | 38.1 KG/T |



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ENERGY AUDIT

AUGUST 2008 TO JANUARY 2009

- ENERGY AUDIT WAS CARRIED OUT BY M/s ERNEST & YOUNG (Pvt) Ltd.
- SUBMITTED REPORT AND PROPOSALS FOR ENERGY CONSERVATION

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ENERGY CONSERVATION PROPOSALS

| | |
|-------------------------------------|----|
| PROPOSALS | 26 |
| IMPLEMENTED | 9 |
| UNDER IMPLEMENTATION | 3 |
| PROPOSED For Next Financial Year | 8 |

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ENERGY CONSERVATION MEASURES

| SINO | Scheme | Annual savings in Rs Lakhs | One time investment in Rs Lakhs | Elect energy savings in Lakh KWh |
|------|-----------------------------------------------------------------------------|----------------------------|---------------------------------|----------------------------------|
| 1 | Process optimization in Annealing & Pickling Line 2 for 409M Grade material | 170.03 | NIL | 46.2 |
| 2 | VFD controller for Sendzimir Mill 2 spray lubrication | 24.07 | 22.0 | 6.54 |
| 3 | Conversion of cooling tower gear boxes in Hot Rolling Mill | 1.24 | 8.50 | 0.34 |



ENERGY CONSERVATION MEASURES

| SI No | Scheme | Annual savings in Rs Lakhs | Investment in Rs Lakhs | Elect energy savings in Lakh KWh |
|-------|---------------------------------------------------------------------|----------------------------|------------------------|----------------------------------|
| 4 | Soft starters for scale pit & DC hot well pumps in Hot Rolling Mill | 7.36 | 5.0 | 2.00 |
| 5 | Soft starters for Laminar Cold well pumps in Hot Rolling Mill | 2.65 | 2.6 | 0.72 |
| 6 | Usage of single high pressure De-scaling pump in Hot Rolling Mill | 63.30 | NIL | 17.2 |



ENERGY CONSERVATION MEASURES

| SINO | Scheme | Annual savings in Rs Lakhs | One time invest ment in Rs Lakhs | Elect Energy savings in Lakh KWh |
|------|----------------------------------------------------------------------------|----------------------------|----------------------------------|----------------------------------|
| 7 | Voltage reduction in high pressure de scaling pumps | 8.11 | NIL | 2.20 |
| 8 | Optimization of road lights | 2.94 | NIL | 0.80 |
| 9 | Optimization of power transformers in non rolling days in Hot Rolling Mill | 7.78 | NIL | 2.11 |



ENERGY CONSERVATION MEASURES

| SI No | Scheme | Annual savings in Rs Lakhs | One time investment in Rs Lakhs | Elect energy savings in Lakh KWh | Gas savings in Lakh cu met |
|-------|----------------------------------------------------------------------------|----------------------------|---------------------------------|----------------------------------|----------------------------|
| 10 | Reduction of slab discharge rate of re heating furnace of Hot Rolling Mill | 18.00 | NIL | NIL | 0.27 |
| | TOTAL | 305.68 | | 78.1 | 0.27 |



CASE STUDY #1

AP LINE 2- COLD ROLLING MILL Energy saving through Process optimization

- ANNEALING AND PICKLING PROCESS IS CARRIED OUT IN APL-2.
- 409 M IS A NEW GRADE OF SS REQUIRED FOR INDIAN RAILWAYS.
- DURING 409M PROCESSING, PROCESS WAS OPTIMISED TO CONSERVE ENERGY WITHOUT AFFECTING THE QUALITY.
- DURING OPTIMISATION, 1700KW LOADS WERE MADE OFF.



EQUIPMENTS WORKING BEFORE OPTIMIZATION

| EQUIPMENT | | RATING IN KW |
|--------------|--------------------|--------------|
| QUENCH1 | 3 BLOWERS OF 180KW | 540.0 |
| QUENCH2 | 1 BLOWER OF 150 KW | 150.0 |
| EXHAUST | 1 BLOWER OF 110KW | 110.0 |
| RECTIFIER | 4 Nos. OF 210KW | 840.0 |
| NEOLYTE PUMP | 2Nos. OF 15KW | 30.0 |
| BRUSH M/C | 2Nos. OF 11KW | 11.0 |
| OTHERS | | 16.7 |
| TOTAL | | 1708.7 |



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CASE STUDY #1

EQUIPMENTS WERE WORKING AT 80% LOAD.

CONSUMPTION : $1708.7 \times 0.8 = \mathbf{1336.96 \text{ KW/ Hour}}$

The 409M GRADE IS PROCESSED FOR 12 DAYS IN A MONTH.

ENERGY CONSERVED IN A YEAR :

$1336.96 \times 24 \text{ HRS.} \times 12 \text{ Days} \times 12 \text{ Months} = \mathbf{46,20,533 \text{ KWH}}$

Total cost saving @ Rs.3.68/- per KWH

$4620533 \times \text{Rs.}3.68 = \mathbf{\text{Rs.}170.03 \text{ lakhs}}$

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CASE STUDY #2

High Pressure Pumps – Hot Rolling Mill

Energy saving through Process optimization.

Motors : 850 kW

Before Modification:

2 pumps running, 1 standby



CASE STUDY #2

High Pressure Pumps – Hot Rolling Mill

Pressure of High Pressure water studied during entire rolling cycle for different grades.

After Modification:

1 pump running, 2 standby

Presently most grades are running with one pump



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CASE STUDY #2

High Pressure Pumps – Hot Rolling Mill

Savings

Energy :

$850 \text{ kW} \times 24 \text{ hours} @ 75\% = 15300 \text{ units / day}$

Cost :

$15300 \times \text{Rs. } 3.80 = \text{Rs. } 58,140 / \text{day}$



CASE STUDY #3

Direct Cooling Pump House– Hot Rolling Mill

Energy savings through Automation using Level Switches and Softstarters

Hot Well: Motors : 90 kW

Scale Pit: Motors : 121 kW

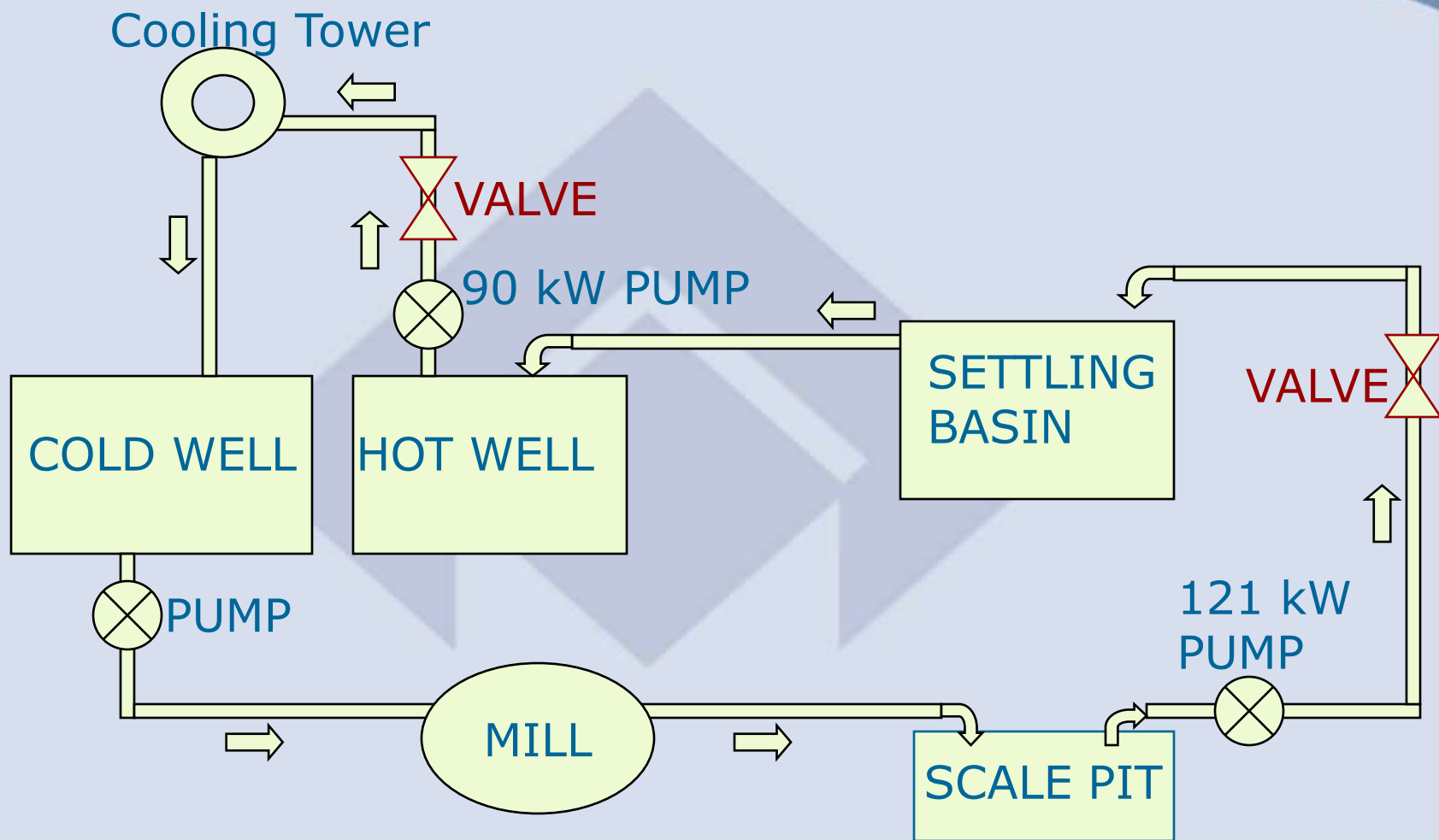
Before Modification

Hot Well: Motors : 2 pumps running, 1 standby

Scale Pit: Motors : 2 pumps running, 1 standby



Direct Cooling Pump House- Hot Rolling Mill





CASE STUDY #3

Direct Cooling Pump House– Hot Rolling Mill

Study of water system done. Manual switching on/off done to avoid overflow and chocking of valves. After verification, scheme was implemented.

After Modification:

- 1 pump runs continuously
- 1 pump goes on/off automatically
- 1 standby



CASE STUDY #3

Direct Cooling Pump House– Hot Rolling Mill

After Modification: Hot Well

1 pump runs continuously

1 pump goes on/off automatically - On 39%, Off 61%

1 standby

Savings

Energy : $90 \times 0.61 \times 24 \times 0.9$: 1185 units / day

Cost : $1185 \times \text{Rs. } 3.68$: Rs. 4,360 / day



CASE STUDY #3

Direct Cooling Pump House– Hot Rolling Mill

After Modification: Scale Pit

1 pump runs continuously

1 pump goes on/off automatically - On 30%, Off 70%

1 standby

Savings

Energy : $121 \times 0.7 \times 24 \times 0.9$: 1829 units / day

Cost : $1829 \times \text{Rs. } 3.68$: Rs. 6,730 / day



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CASE STUDY #4

Laminar Cooling Pump House– Hot Rolling Mill

Energy savings through Automation using Level Switches and Softstarters

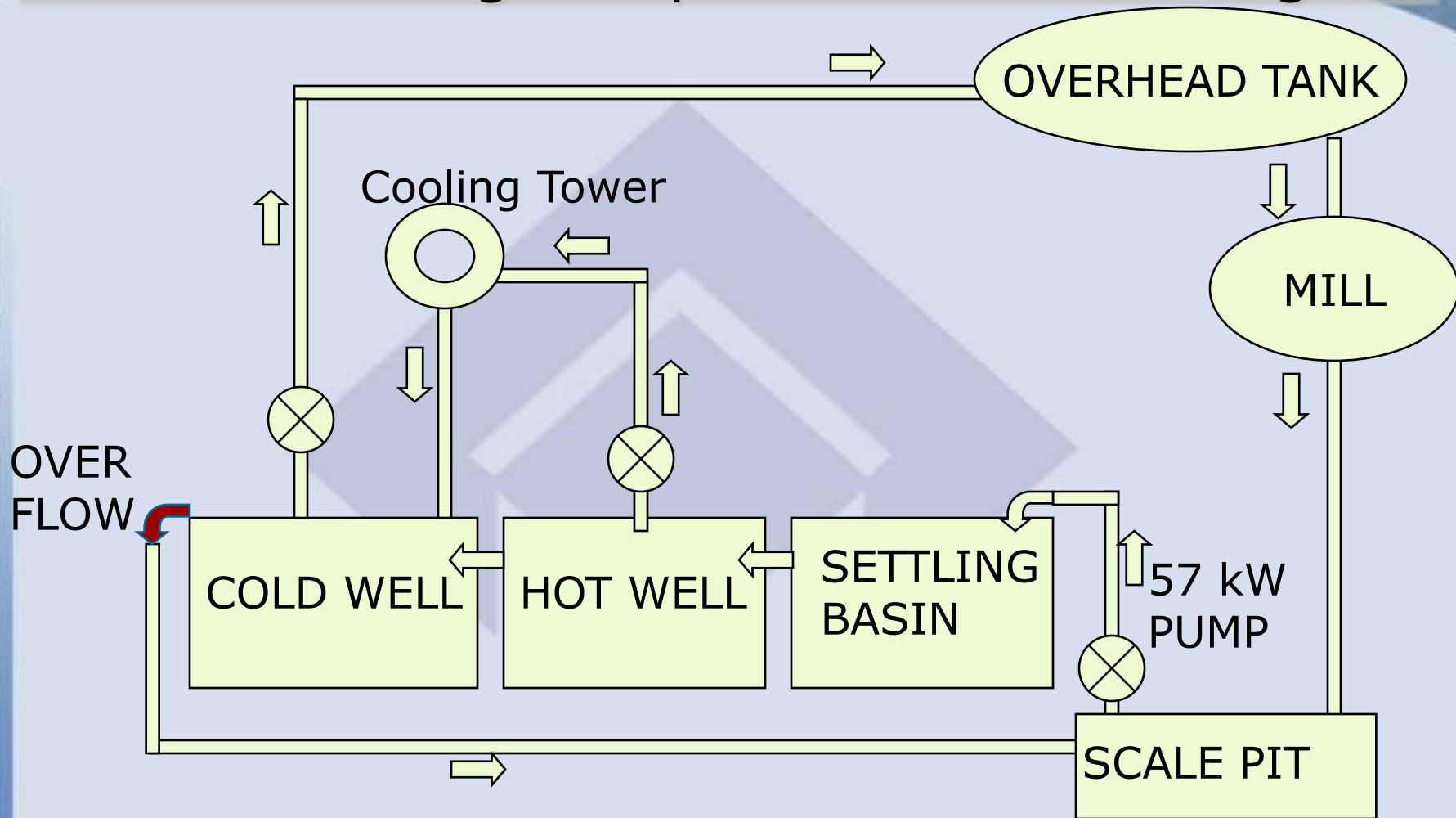
Motors : 57 kW

Before Modification:

2 pumps running, 1 standby



Laminar Cooling Pump House- Hot Rolling Mill





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CASE STUDY #4

Laminar Cooling Pump House– Hot Rolling Mill

Study of water system done.

Manual switching on / off done to avoid overflow and chocking of valves. After verification, scheme was implemented.



CASE STUDY #4

Laminar Cooling Pump House– Hot Rolling Mill

After Modification:

1 pump runs continuously

1 pump goes on/off automatically On 12%, Off 88%

1 standby

Savings

Energy : 1083 units / day

Cost : 1083 x Rs. 3.68 = Rs. 3,985 / day



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