CEMWHR-2022

Case Studies for Challenges faced and Benefit Gained

A Presentation by

Bharathi Cement Corporation Pvt Ltd

Kadapa Dist., Andrapradesh

CEMWHR-2022

Case Studies for Challenges faced and Benefit Gained

An Overview Of Our Plant

Kiln Capacity : 6200 TPD

WHRS Unit Capacity : 9.5 MW
Commissioned : Sep 2019

AQC boiler-1 :
HP steam-23.7 TPH &LP Steam-4.5TPH

Preheater boiler-1:
HP steam-14.5TPH &LP Steam-11.5TPH

Make: ISGEC , Noida

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Safety Performance in Project

	Safe Man-hours	SOT	Walk by Inspection	Near Miss	First Aid	Loss time
Until Aug'19	> 1.5 Million Hours	950	165	55	2	0.00

524
Men / day in peak

9015
Man hours Trained

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Project Objective

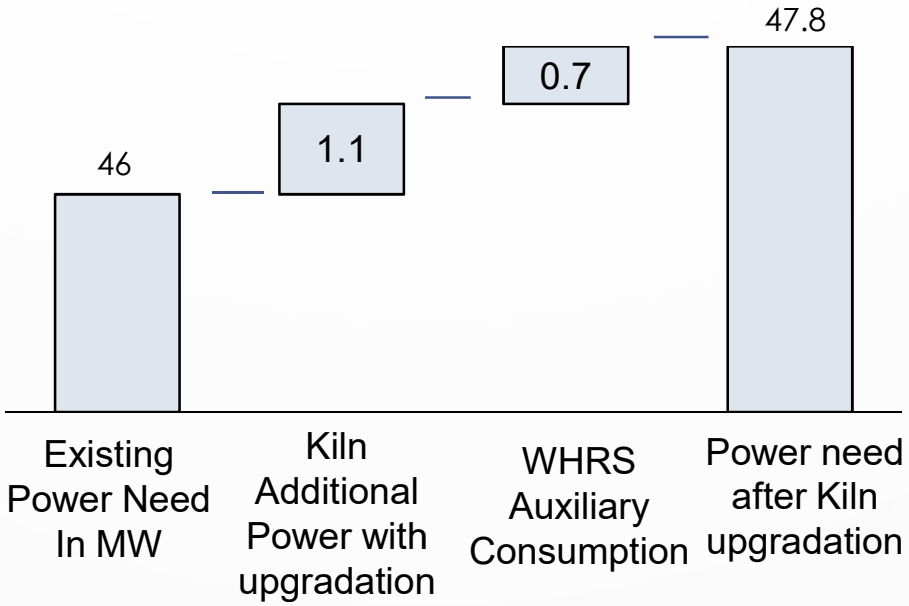
- Utilize the waste gases from pyro section with 6 stage pre-heater
- Generate power with WHRS and substituting power need of cement plant with lower cost WHRS Power

Pre-conditions for WHRS design

- Kiln production capacity of 6200 TPD (after cooler modification proposed for line 2)
- Both Kiln operations

Existing Source Mix [Net Power in MW]

- CPP : 27.5 MW
- Grid : 10 MW
- Exchange : 10 MW



Revised Source Mix [Net Power in MW]

- CPP : 27.5 MW
- WHRS : 8.75 MW
- Solar : 2 MW
- Grid : 10 MW

WHRS – Key Milestones

Aug'18
- Civil Contractor mobilization – 1st Aug
- Excavation 4th
- Bhoomi Puja 14th
- RCC pouring 14th

Nov '18
- Mechanical erection contractor finalized

Dec 18
- Structure fabrication work initiated on 5th Dec

Feb 19
- PH Col erected on 10th
- AQC Column erected on 11th Feb 2019
- PH Evp Coil received

Mar 19
- Mechanical erection started for ACC

Apr19
- AQC Coil erected – 23rd April

May 19
- 500 T Crane boom lifted on 1st May .
- PH Module erection started on 12th May

July 19
- AQC Coil erection completed
- Boiler Integral Piping work started
- Lub Oil flushing started

Aug '19
- Hydro test on AQC- 4th Aug
- Turbine on Barring gear on 29th Aug 2019





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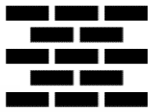
De-bottlenecking …..through Hand holding

Procurement

- Visits to Vendor premises for effective co-ordination and follow up of :
  - Pressure parts
  - ISGEC Boiler factory, & Tubes Mfg facility
  - Bellows, Dampers, Valves, Pipes, Supports
  - ACC – Enexio HO, Ducting / Tanks/ Gear Box / Motors
  - EOT Crane
  - Siemens – Turbine
  - Electrical - LT Bus Ducts
- ISGEC Eng. office
- Dedicated team of 8 - 10 no's members for material follow-up



Civil Construction

- Planned to crash 10 months schedule to 6 months
  - Facilitated timely payments to vendor
  - Deployed our Manpower for finishing work ahead of schedule to meet the targets – IPR flooring, Granite fixing, AC installation / Tiles fixing etc.
  - Maximum PCC/RCC and Brick work was completed in Jan'19.
- Deputed local contractors for better control / co-ordination

Execution

- Cancellation of erection contract in mid way May'19
- Mobilizing new erection contractor during June'19
- Mobilizing 2 cranes to execute Boiler jobs in parallel
- Deputing more than 7 contractors & additional engineers from EPC and BCCPL to split work and execute them in parallel and strong supervision
- Incentives for target completion

Fabrication

- Decision for in-house fabrication taken due to uncertainty in contracting from EPC agency – 2000 Tons
  - To ensure quality and avoid delays
- Deployed 3 Major Contractors for fabrication work.
- Steel / Tools procurement done by BCCPL from time to time.

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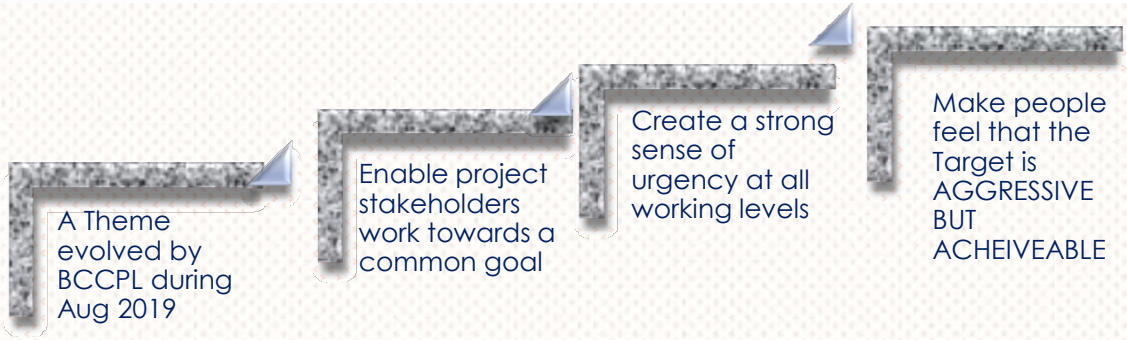

SANGHARSH 21st

despite all odds, we will win

Why SANGHARSH 21st

Why was it required?.

It was seen that there were lots of jobs to done/pending in Erection, Procurement, Piping, E&I, Refractory work proceeded with Commissioning activities on 25th August 2019.

After Micro Level Planning of above these, total days coming was nearly 64 Days.

Major jobs were

- Erection work of 250 tons
- Piping welding work of 3500 Inch dia
- Cable laying and termination of 30 Kms
- Refractory of nearly 300 tons in duct and AQC hopper.
- Commissioning activities of 2 weeks.

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KPI :WHRS unit

Efficiency Parameters	UOM	Aspiration	Achieved-2020	Achieved-2021	Achieved-2022
Plant Load Factor- PLF	%	90.0	68.8	85.6	91.7
Auxiliary Consumption	%	4.5	5.5	4.7	4.5
Turbine Heat Rate	Kcal/ KWh	3963	4150	3977	3949
Availability	%	95	90	96	97
Specific Steam Consumption	MT / MWh	5.72	5.92	5.77	5.71
Specific DM water Consumption	M3/ MWh	0.06	0.37	0.06	0.07

Case Studies-1
Additional Fresh Damper Requirement : AQC Boiler

Challenges Faced

Tripping's of WHRS unit on High steam temperature during kiln abnormal condition

Remedial action done

Installed additional Fresh air damper to inlet flue gas duct of Boiler. Flue gas temperature controlling taken through end tap damper auto operation and auto water spray system in cooler.

Benefits Gained

- ✓ Eliminâtes high temp.trippings
- ✓ Increased Plant Availability
- ✓ reduced DM water consumption
- ✓ Reduced Genearation loss on trippings

Case Studies-2

False Air leakages : PH Boiler

Challenges Faced

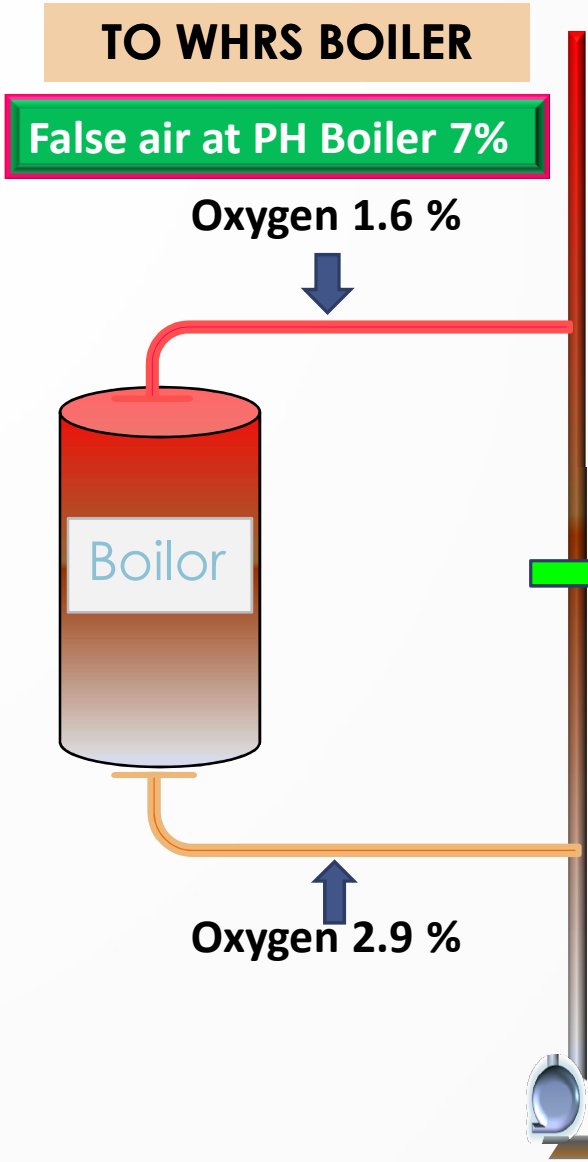
alse Air leakage in PH Boiler was high 21%

Remedial action done

- Temporary supports properly removed
- All expansion bellows, locking removed for free expansion
- Expansion indicators provided for all headers.
- Additional Gland packing arrangement given to Hammering system striking rod sleeves
- Left Over opening in errection jobs are completed
- False air leakages monitoring implemented on monthly Basis

enefits Gained

1. 4˚ Temperature incremental in inlet flue gas flow to Boiler
2. LP boiler Steam flow met to design net steaming rate.
3. Generation capacity met to design
4. Preheater Fan efficiency increased by reduction of power consumption



Case Studies-3

Flue Gas Duct Erosion : AQC Boiler

Challenges Faced

Flue gas duct erosion in AQC Boiler and overloading of Cooler ESP Fan

Remedial action done

180 Deg Baffle arrangements provided for the bend and expansion bellow for diverting the flow where the high erosions are taken place

Benefits Gained

- ✓ Eliminated duct erosion
- ✓ Reduced Cooler ESP fan Power consumption
- ✓ Clean Environmental atmosphere

Case Studies-4

LP Steam Lines Cracks : AQC Boiler

Challenges Faced

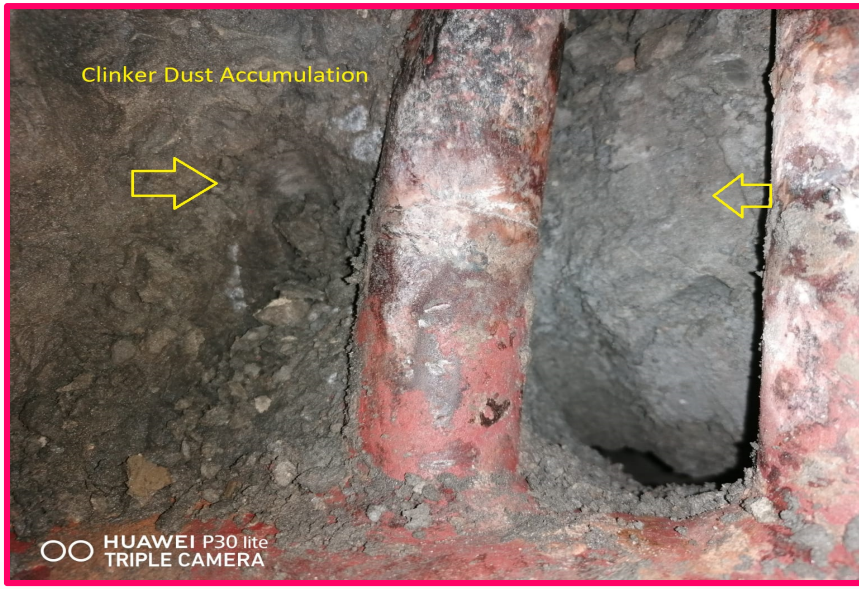
Repeated cracks occurred in LP Main steam line

Remedial action done

- All Expansion supports made free to expand the MS line
- PMI test for Main steam line carried out
- Header Casing opened and checked for clinker dust accumulation.
- Thick Packing of ceramic wool provided for header casing
- Baffle arrangement given for coil assy bottom

Benefits Gained

- ✓ Cracks on MS line sort-out
- ✓ Free Expansion of MS line
- ✓ Repairing & Maintenance cost reduced



Case Studies-5

Vacuum Stability in Dusty Atmosphere: ACC

Challenges Faced

Poor Vacuum stability during peak summer

Remedial action done

1.Installed water mist fog spray system
2.Cleaning of Bundles with hardness nil water on 15 days of frequency
3.Water pond made at bottom of ACC fan building concrete face for dust collection

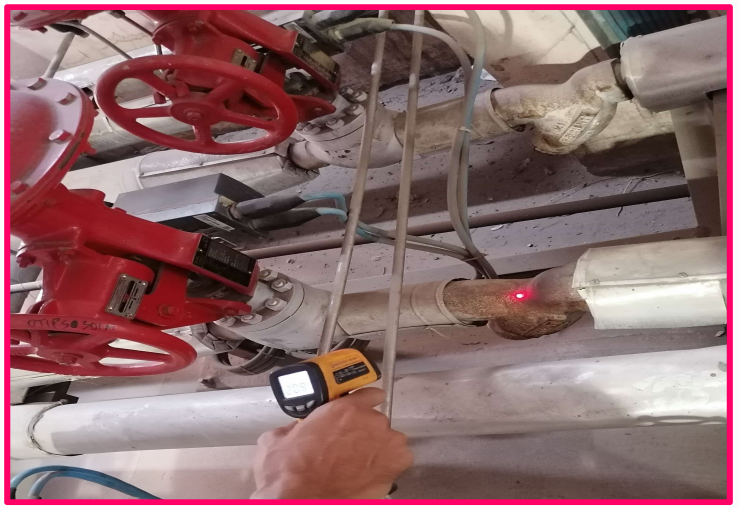
Benefits Gained

- ✓ Dustless free air intake to ACC fan
- ✓ Vacuum stability increased
- ✓ Maximise the generation during peak summer hrs.

Case Studies-6
Importance of Steam trap Management System

Challenges Faced

Low Temperature Maintained in LP Main Steam line to Turbine



Remedial action done

We are Maintaining steam trap management system on monthly basis through right time maintenance schedule

Benefits Gained

- ✓ Reduced liquid droplet erosion in tubes bends
- ✓ Increased LP MS temperature to Turbine
- ✓ Reduced steam losses

Steam Trap Management System

EQUIPMENT	STEAM TRAP LOCATION	TRAP NO	BEFORE	AFTER	STATUS	ACTION PLAN
PH BOILER						
LP M.S (From downstream)	Ph Boiler To AQC Boiler	1	65.4	55.2	Good	
		2	117.1	70.2	Good	
		3	86.4	70.3	Good	
		4	62.3	54.2	Good	
HP M.S (From downstream)	Ph Boiler To AQC Boiler	1	88.2	52.3	Good	
		2	54.7	39.3	Good	
AQC BOILER						
HP M.S(From down Stream)	Deaerator Floor	1	89	67	Good	
		2	52	34	Good	
		3	65	43	Good	
LP M.S (From downstream)	Deaerator Floor	1	116	64	Good	
LP M.S. Common Header	Deaerator Floor	1	70	38	Good	
		2	111	79	Good	
TURBINE DRAIN HEADER						
LP Injection Drain(After CV)	Turbine Ground Floor	1	86	49	Good	
LP Injection (Bottom Drain)		2	101	78	Good	
Basket Drain		3	59	64	Good	
LP Injection Drain(Near BFP)		4	63	45	Not Good	
Rear Gland Drain		1	50	37	Good	
LP Casing Drain		1	44	36	Good	
Gland Sealing Control Valve Station		1	70	46	Good	
		2	61	46	Good	
HP Steam TSSV After		1	149	59	Good	
Ejector	Near CEP	1	70	63	Good	
	Near LP Flash Tank	2	45	37	Good	
Pegging	Deaerator Floor	1	96	65	Good	

OPERATION HOD(TURBOTECH) OPERATION HOD(BCCPL)

Encourage for Team Work And Celebration

WHRS SHIFT WISE GENERATION REPORT-MAY- 2022

DATE	ACTIVE POWER 00:00HRS	ACTIVE POWER/ DAY	SHIFT	ACTIVE POWER AVG/SHIFT	ACTIVE POWER MIN/MAX	SHIFT WISE GENERATION	WHRS DCS BOILER/TURBINE	WHRS SE
8-May-22	218	221.5	A	9.14	5.0/9.8	73.12	SANKAR/KONDA REDDY	MOHAN
			B	9.26	8.2/10.02	74.08	SRINIVASULU /SUDHHER	RAMANA REDDY
			C	9.29	8.78/9.74	74.3	SRINIVAS REDDY/SUDHHER	HARISH
9-May-22	217	215.78	A	9.02	8.28/9.55	72.16	SANKAR/KONDA REDDY	RAMANA REDDY
			B	8.94	8.09/9.68	71.52	SRINIVASULU/KONDA REDDY	HARISH
			C	9.01	8.2/9.5	72.1	SRINIVAS REDDY/SOHAIL	IJAJ
0-May-22	218	217.272	A	9.02	8.55/9.4	72.16	RAMSAGAR/SHUDHEER	RAMANA REDDY
			B	9.25	8.2/9.77	73.992	SRINIVASULU/SOHAIL	IJAJ
			C	8.89	7.48/9.72	71.12	SANKAR/SOHAIL	HARISH

- Shift Based Generation Monitoring Syste
- The Target Achieved Personals are benefited to Award for the month.

Bipinson AK & Pavan kumar Reddy

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AB1 AK Bipinson, 14/06/2022