



# HIGH-PERFORMANCE REFRACTORY

## Increased Run Time of Spent Wash Boiler Operations



### Background Situation

Spent liquor – a potential hazard – is a by-product of the distillery in Sugar Manufacturing industries. The spent liquor needs to be disposed off instead of drained to soil or water bodies (which increases pollution). Many Indian OEMs have come up with the technology of spent wash Boiler, where the spent liquor is burnt thereby generating power.



#### Problems

- Performance related issues: spalling, erosion, infiltration of spent liquor inside the refractory lining.



Pictures from the sugar plant displaying non-Calderys refractories.



#### Goals

- Achieve reliable performance from refractory and avoid emergency shutdowns due to tube leakages.
- Decrease erosion significantly.

The refractory solution provided by Calderys shows no erosion in refractories even after 10 months of operation, as seen below:



After 4 Months

After 10 Months

## Actions Taken

- Calderys India Lab investigation to understand the perennial problem of refractory spalling, erosion, and infiltration of spent liquor in refractories, which was common in spent wash Boilers with non-Calderys refractory materials
- Samples of spent liquor and ash collected from a sugar plant site having thermax Boiler
- Cup test carried out in Calderys India Lab with spent liquor and ash to study the effect on different quality refractory products
- Special refractory "ACE PLAST RAM BS2" proved to be the most effective solution - recommended for spent wash Boiler project of thermax for M/s. Jaywant Sugar Project

### Corrosion test with spent wash Boiler waste

#### 1. Analysis of spent waste powder

Na <sub>2</sub> O	K <sub>2</sub> O	SO <sub>3</sub>	NO <sub>3</sub>	CL
8.72	12.48	4.99	7.94	2.63

2. Corrosion test done with waste powder: 30g was put in each crucible; pre-fired at 500°C for 3 hours and 1300°C for 5 hours:

Cut texture of different qualities after test:



ACCMON ASZI

ACEPLAST RAM BS2

ACCMON 70 M

Supramon MRZ (Trial)

Supramon MS (Trial)

Supramon MR(Trial)

### Observations :

Interaction was found negligible in all the six samples, but ACEPLAST RAM BS2 was the best after 5 hours interaction at 1300° C.

3. Small pieces (500°C for 3 hours) of all the qualities were dipped in the spent wash liquid (for 1 day):



pieces were kept in Spent Wash Liquid at 100°C (hot Plate)

Samples after liquid evaporation.

Chemical analysis of spent wash liquid for 1 day:

Na <sub>2</sub> O	K <sub>2</sub> O	NO <sub>3</sub>	SO <sub>3</sub>	CL	Liquid	Solid
0.58	0.94	1.72	0.92	0.35	93.32	6.68

**Observations:** ACEPLAST RAM BS2 was least affected even after exposure to liquid for a day.

**Remark:** From the above corrosion test it can be stated that behavior of ACEPLAST RAM BS2 was found to be better under lab condition.

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## Results

- ACE PLAST RAM BS2 Plastic refractory applied in hot face lining in spent wash Boiler of M/s. thermax at M/s. Jaywant Sugar site, Satara (Maharashtra)
- The refractory lining met its performance objective

After 8 Months of Boiler operations  
(200 days of continuous operation with spent liquor) - November 2019



## Benefits to the Customer

- Higher productivity
- Lower downtime – Boiler in continuous operation for 200 days using spent liquor
- Fuel savings – No intermediate shutdowns, which involve cooling down and re-heating to service temperature

## Accolades

- Appreciation letter received from M/s. Thermax after job completion
- Appreciation letter received from M/s. JAYWANT SUGARS for Performance – Non Stop Boiler Operation for 200 Days using spent liquor