Co-relation of various refractory & operational parameters on the steel ladle life of ISP.

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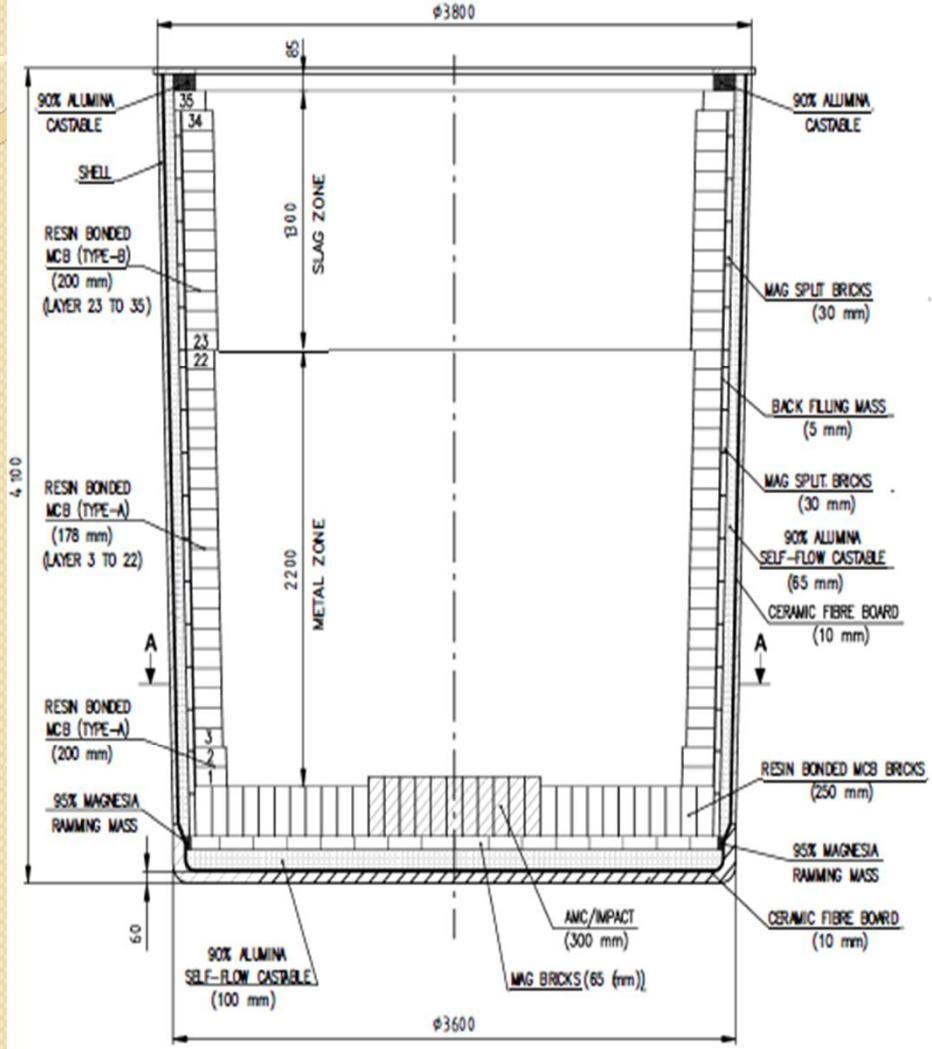
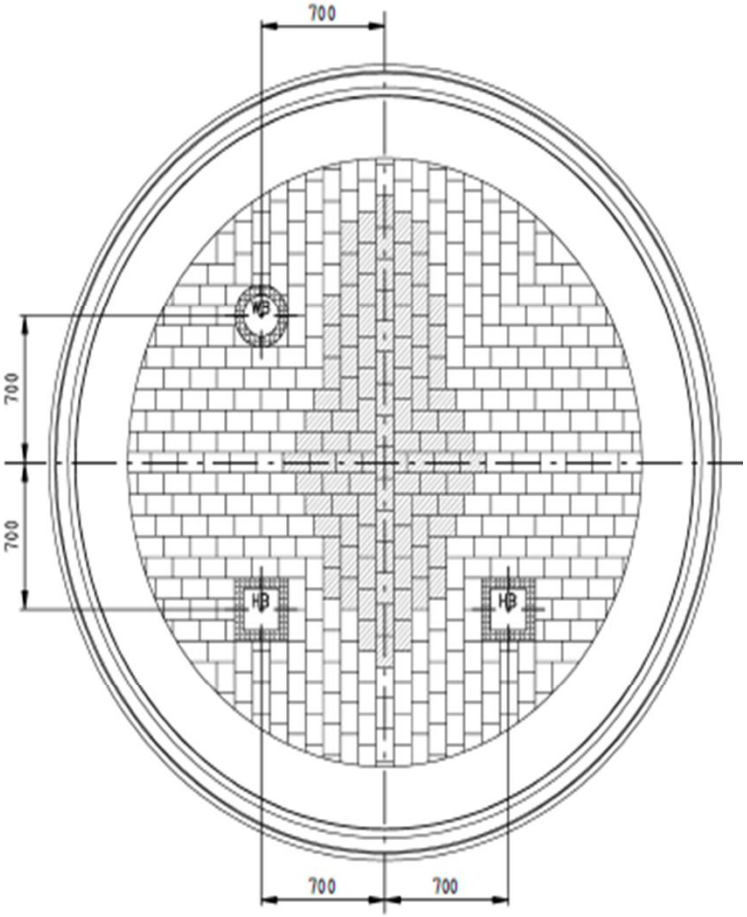
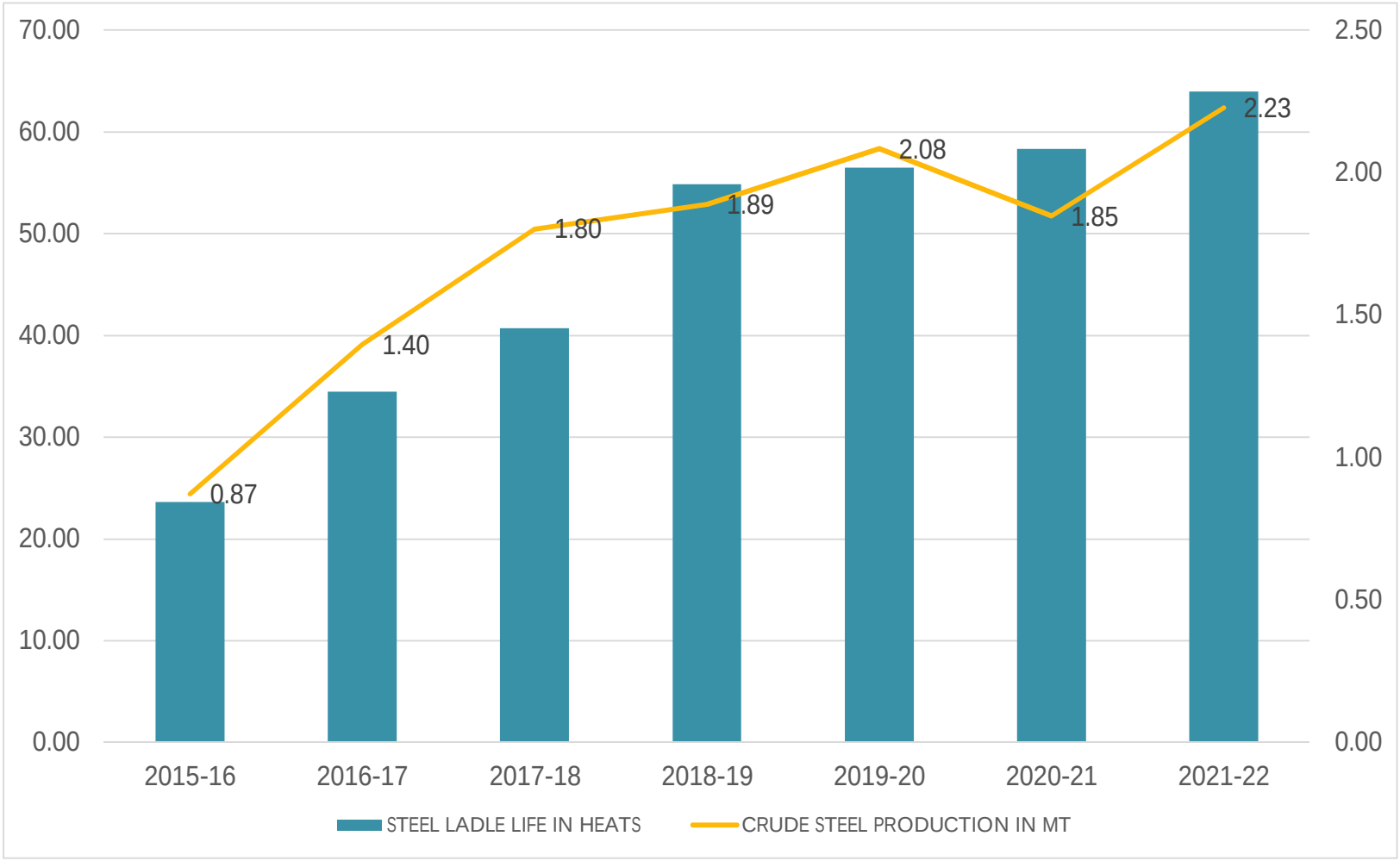
STEEL LADLE REFRACTORY LINING IN ISP



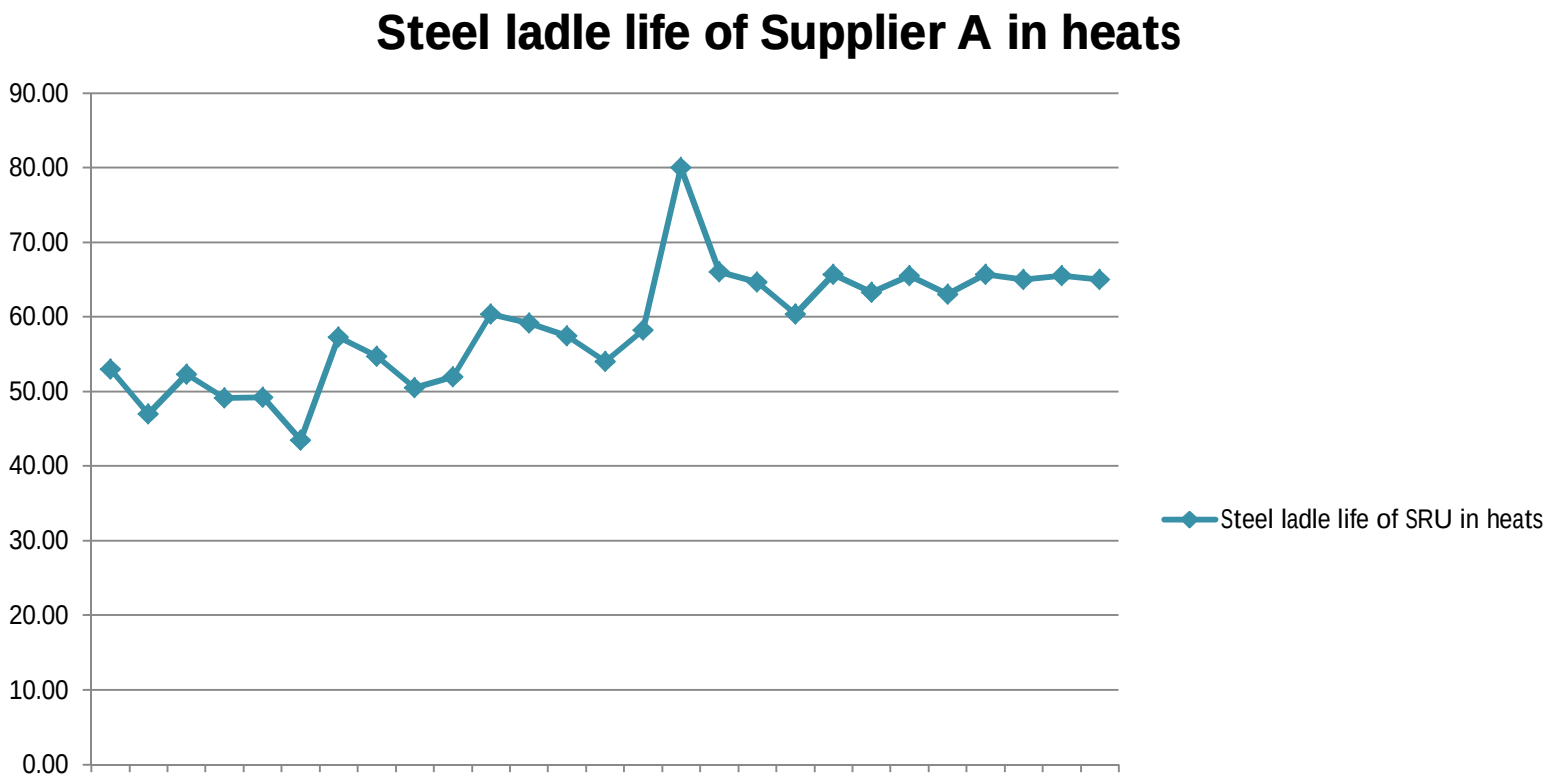


SECTION A - A

LIFE OF STEEL LADLE IN ISP



TREND OF STEEL LADLE LIFE IN LAST TWO YEARS



DATA COLLECTION

- Two stable phases of steel ladle life where there is an improvement of monthly average ladle life by approx. 15 heats.
- First phase from April 2020-September 2020 (Phase X) where the average life is constant at around 50 heats.
- Second phase from April 2022-August 2022 (Phase Y) where the life is around 65 heats.

Operational Parameters

- Metal Holding Time
- Arcing Time
- Empty Time

	Ladle Life	Metal holding time in minutes	Arcing time in minutes	Empty Time
Phase X	49.02	179.48	17.44	187.65
Phase Y	64.5	140.19	16.76	126.65
% Change	31.59	-21.89	-3.86	-32.51

Operational Parameters

- No. of heats per day per ladle Vs. Empty Time in Phase X & Phase Y

Phase	No. of heats per day per ladle	Empty time in minutes
X	4.14	187.65
Y	5.07	126.65
% Change	22.46	-32.51

Operational Parameters

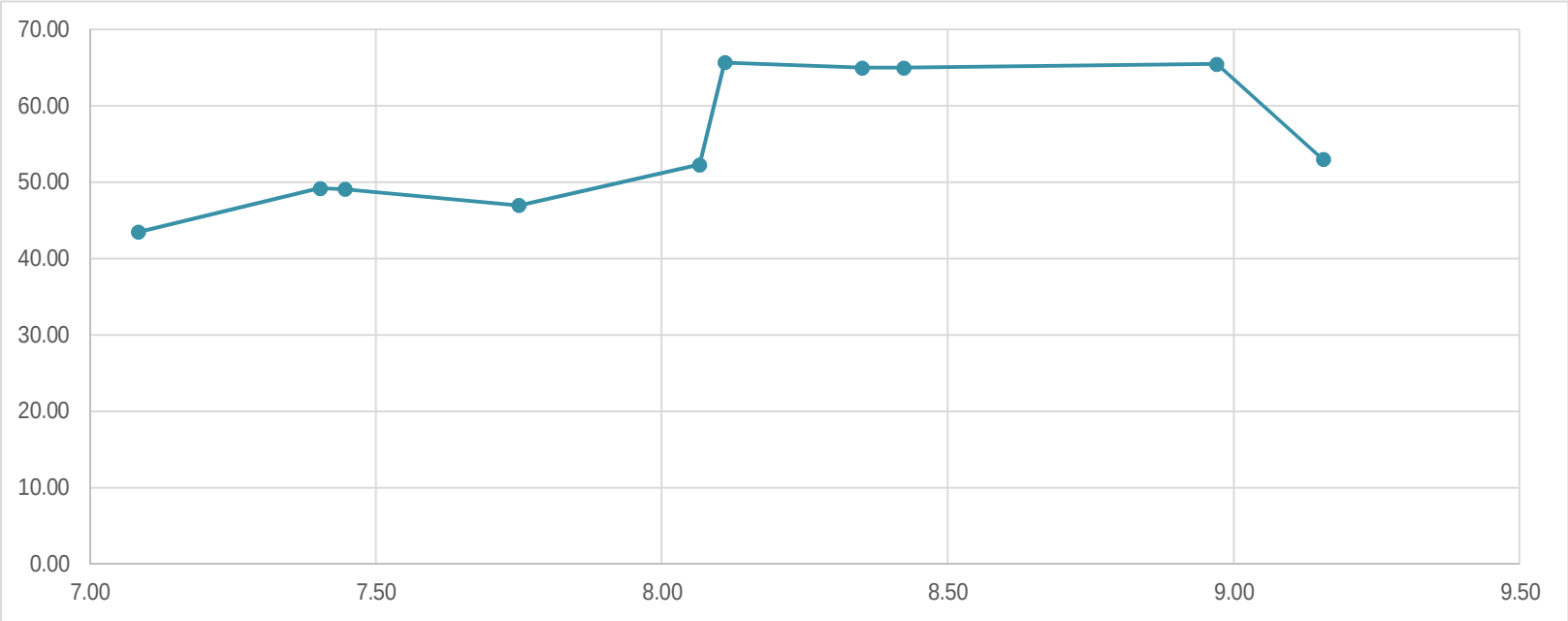
- No. of Purging failures Vs. Empty Time in Phase X & Phase Y

Phase	No. of purging failures (monthly average)	Empty time in minutes
X	6.33	187.65
Y	2.2	126.65
% Change	-65.24	-32.51

Frequency distribution of LF slag basicity

Phase	Ladle Life in heats	Mode	Mean	Median	Maximum	Minimum
X	49.02	1.67	1.71	1.71	1.99	1.17
Y	64.5	1.5	1.62	1.59	1.99	1.35
% Change	31.59	-10.18	-5.26	-7.02	0	15.38

Percentage of MgO in LF slag basicity Vs. Steel ladle life in heats



When percentage of MgO in LF slag is in the range of 8.07%-8.97%, steel ladle life is in the best range but when percentage of MgO in LF slag is either below or above 8%, steel ladle life shows a decrease in SAIL-ISP.

Conclusion

- Decrease in empty time (-32.51%) is directly co-related to the increase in steel ladle life (31.59%).
- Decrease in empty time (-32.51%) has lead to the increase in no of heats per day per ladle (22.46%).
- Decrease in empty time (-32.51%) has also lead to the decrease is bottom purging failure in steel ladles (-65.24%).
- The increase in steel ladle life is not highly co-related with the LF slag basicity as other operational parameters have become more dominant.
- High empty time in steel ladle leads to cooling of the refractory lining which results in higher thermal shock during next tapping of liquid steel.

Thank You