BENCHMARKING FOR IMPROVEMENTS IN STEEL MAKING AND CONTINOUS CASTING

SUBMITTED BY :
K.K.SINGH
Deputy Manager, SMS-II
ROURKELA STEEL PLANT

Material Flow at Steel Melting Shop-II, RSP

Improvements at BOF

Aluminium addition at BOF Shop.

1. Aluminum chute created at BOF for all three converters.
2. Trials with aluminium shots/nuggets continuing.

	Unit	2015-16	2016-17	2017-18 Till date
Specific Al consumption	kg/TCS	2.02	1.99	1.76

Improvements in secondary steelmaking

- Decreasing Al input at LHF .
- Modification of existing wire feeders.
- Achieving lesser arcing time, at LHF by ensuring appropriate chemistry and opening temperature from BOF.
- Routing all heats for UST plate grades through RHOB for caster#3.
- Highest life of snorkels achieved was 148.

Improvements in continuous casting

- Reducing machine preparation time
- Increasing Yield and Caster Throughput
- Preventing breakdown and breakouts
- Increasing SEN and Tundish life
- Making value added product
- Slab and rolled plate quality

Reducing Machine Preparation Time

- Our machine preparation norm is 2 hrs from tail out start to cast start.
- Use of inclinometer in old casters for blocking.
- T section packing in all three casters.
- New Quick Change stand (mould, seg. 1,seg2) for caster 3.

Increasing Yield and Caster Throughput

- Reducing P and S
- Lechler modification and new spray pattern in old casters
- Use of ladle cover to maintain temperatures
- Use of 100% AMLC in all the casters
- Changeover to Ni coated moulds in old casters for improved life
- Trial of Ni-Co moulds for 1500 life

Preventing Breakdowns And Breakouts

- Corner gap restricted to 0.2 mm
- Corner gap and width measurement after end of each sequence
- T section anchoring to prevent packing failures
- Revival of Roll Gap Checking for machine profile and gap.

Increasing SEN And TUNDISH Life

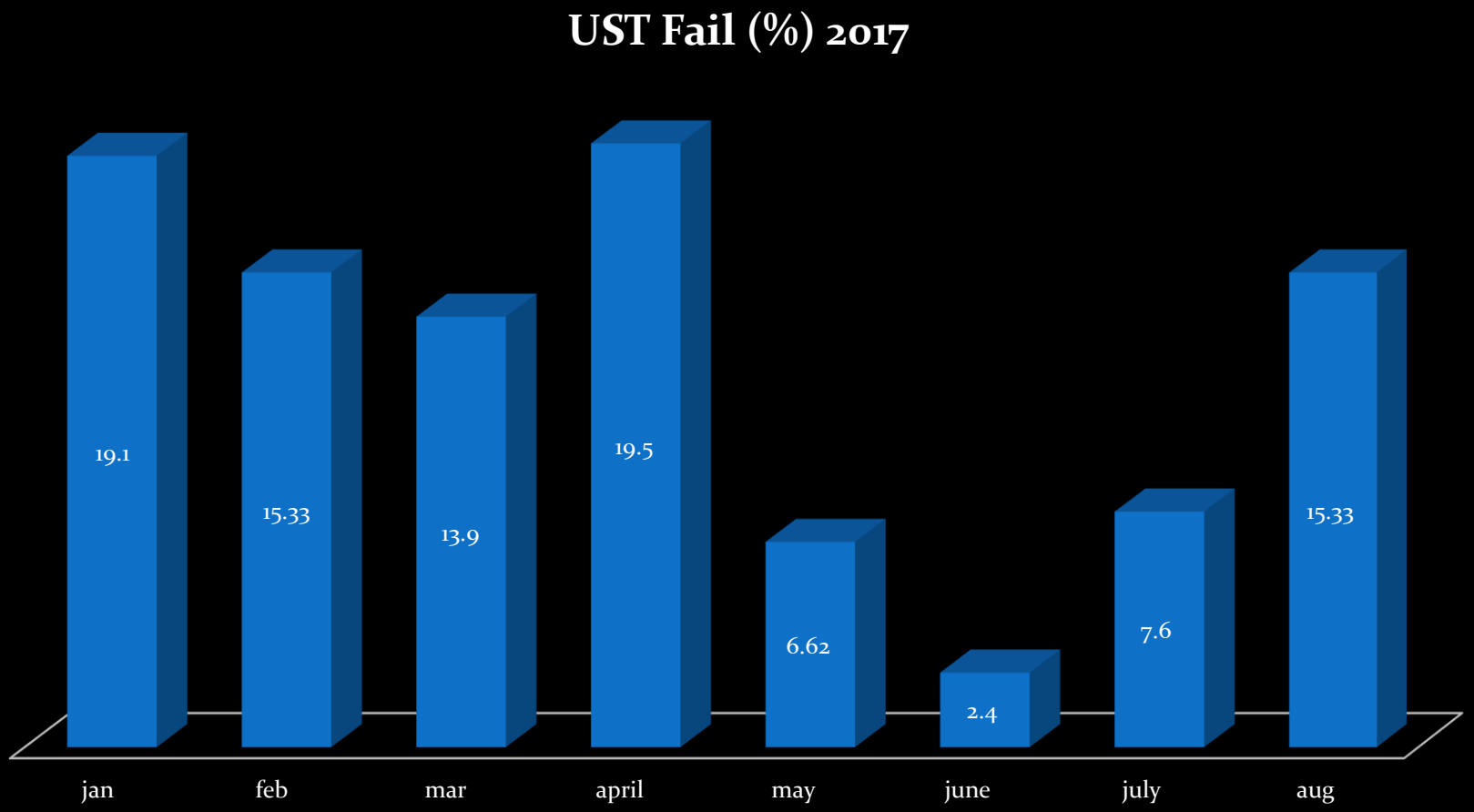
- Use of gasket to reduce SEN Clogging
- SEN change for smaller section
- Tundish ramping band also increased to increase SEN life
- New design for SEN change manipulator
- Cold SEN change for emergency situations
- Introducing special SEN for smaller sections leading to higher speeds casting.

Making Value Added Products

- Commissioning of 300 mm thickness slab casting facility
- IS 2062 E-450 Br & 450 Br Cu
- Hardox
- IS 2062 E 350 BR microalloys
- IS 2062 E 350 BR(non micro alloy)
- IS 2062 E410 BR
- API 5LX Gr 70

	2016-17	2017-18
Target (%)	22	33
Achieved(%)	19	-

UST failure in caster #3



Problems identified during investigation in caster 3:

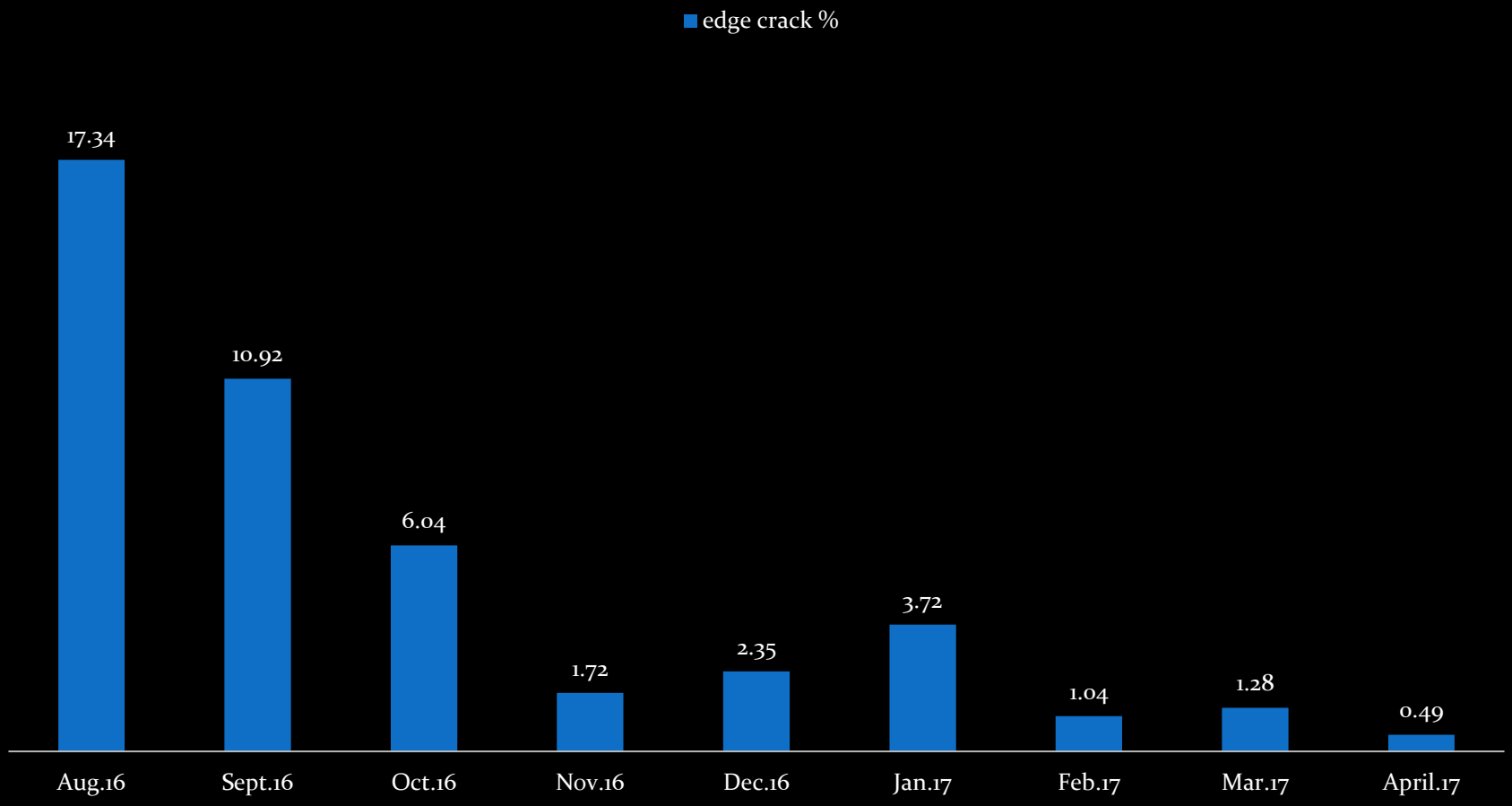
- It was observed that UST failure has direct link with dynamic soft reduction in caster 3.

- Soft reduction was not used in every heat due to :

1. Transducer problem, it is in process of stabilization.
2. Frequent speed variation.
3. M/c cooling leakage.
4. Level 2 updation of chemistry and superheat.

- % crack in slabs with soft reduction: 3.8
- % crack in slabs without soft reduction: 6.4

Edge cracks in slabs of caster 1,2



Problems identified and rectification in caster 1 & 2:

- Uneven mould oscillation of all the corners of the mould .As they were not moving in sync and stroke length also varies.
- Heavy rotary joints leakages in roller cooling circuit (hoses and rotary joints) were observed.
- Improper spray pattern due to clogged nozzles & disoriented nozzles and inappropriate spray plan.
- Low temperature at the edges of slab near straightening zone was observed.

Rectification

Control of Al and Nitrogen Levels

- Chemistry : Aluminium - 0.025 % (max)
- Avoid C = 0.08 – 0.13% (purely peritectic)
- Titanium can be added in the ratio of Ti/N ~ 3.0

Control of Mould flow conditions :

- Avoid Biased flow in the mould, low speed and high superheat

Control of Slab surface (edge)Temperature at unbending and straightening

- Slab surface (edge)Temperature => 900 to avoid low ductility trough by optimising secondary cooling spray pattern

Alignment of machine:

- Alignment of mould with top zone (after sequence break)
- Regular roll gap checking and adjustment

Machine cooling:

- Control of machine cooling leakage
- Replacement of clogged nozzles

Thank You