

Implementation of a sand control system in an Aluminum No Bake Foundry

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Outline

1. Background
2. Data collection
3. Casting defect monitoring and recording
4. Design of a sand control system
5. Implementation of a sand control system

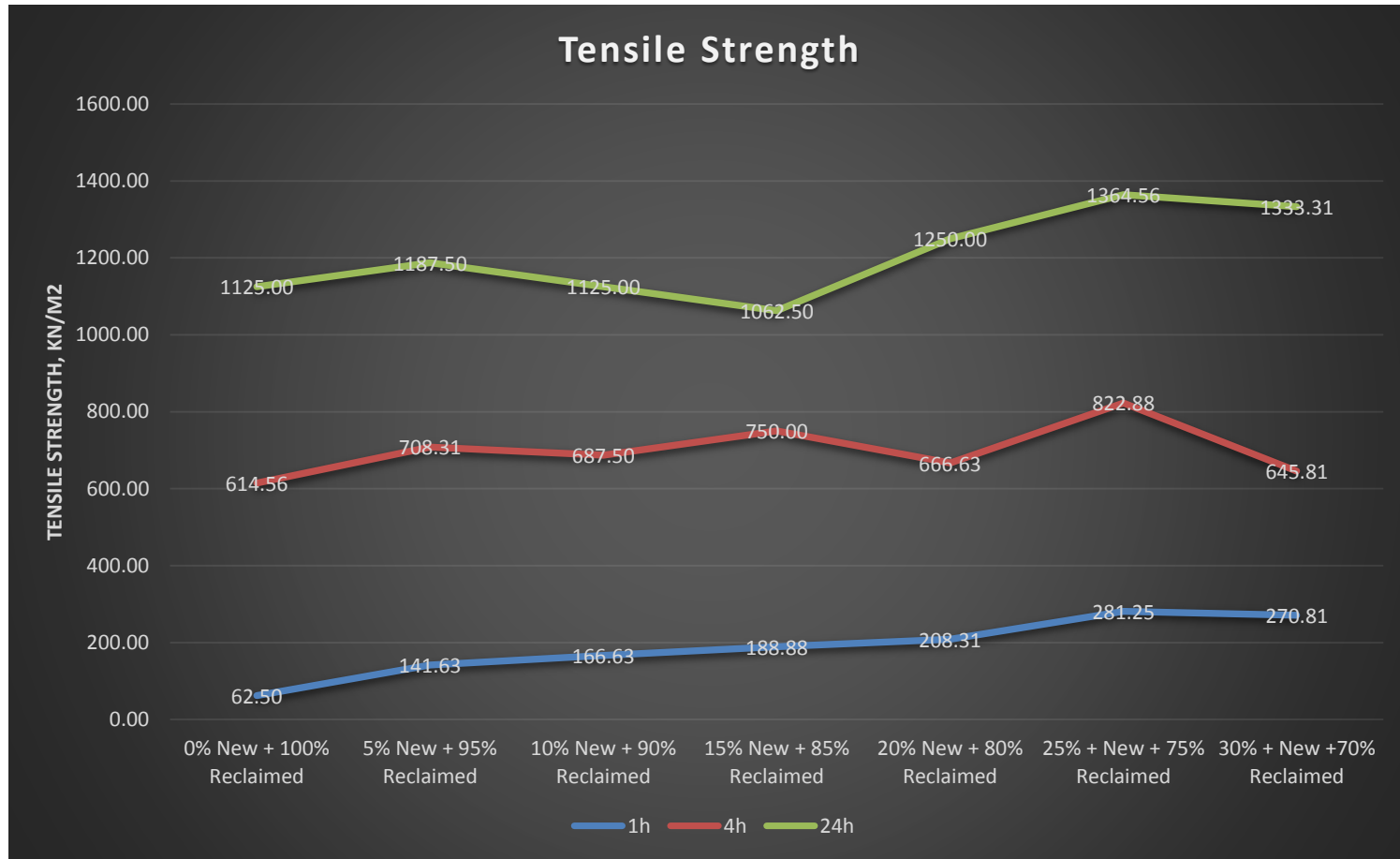
Background

- The NFTN intervention at Mcwade Productions with the aim of improving efficiencies in the sand plant.
- The project involved laboratory test work and trials in the foundry
- Project was carried out over a period of 5 months

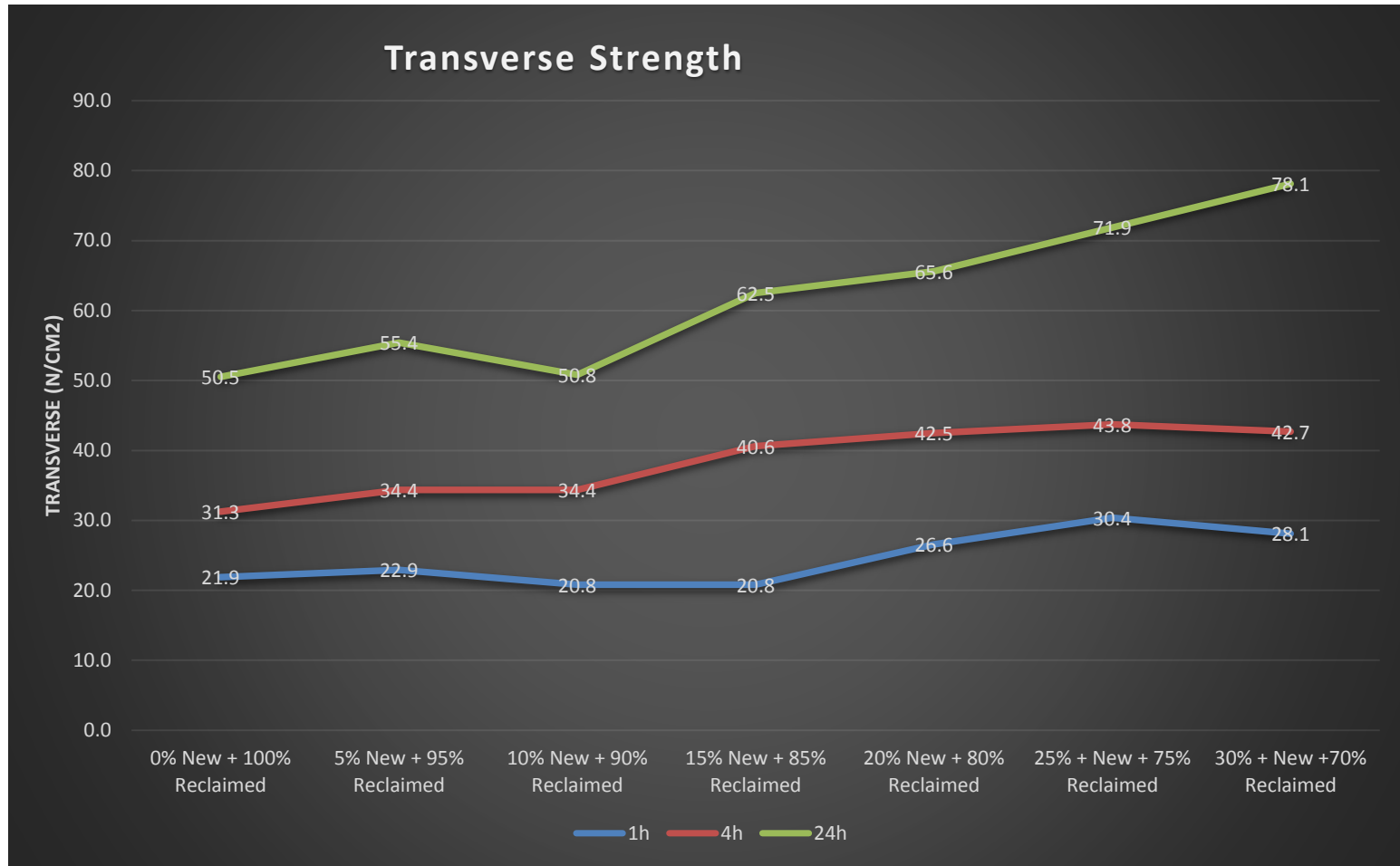
Data collection

- Data was collected over a period of 1 month
- Aluminum and gunmetal castings
- Sand to metal ratio 8:1
- Average loss on ignition value 6.40%
- Major defect :Rough castings surface finish

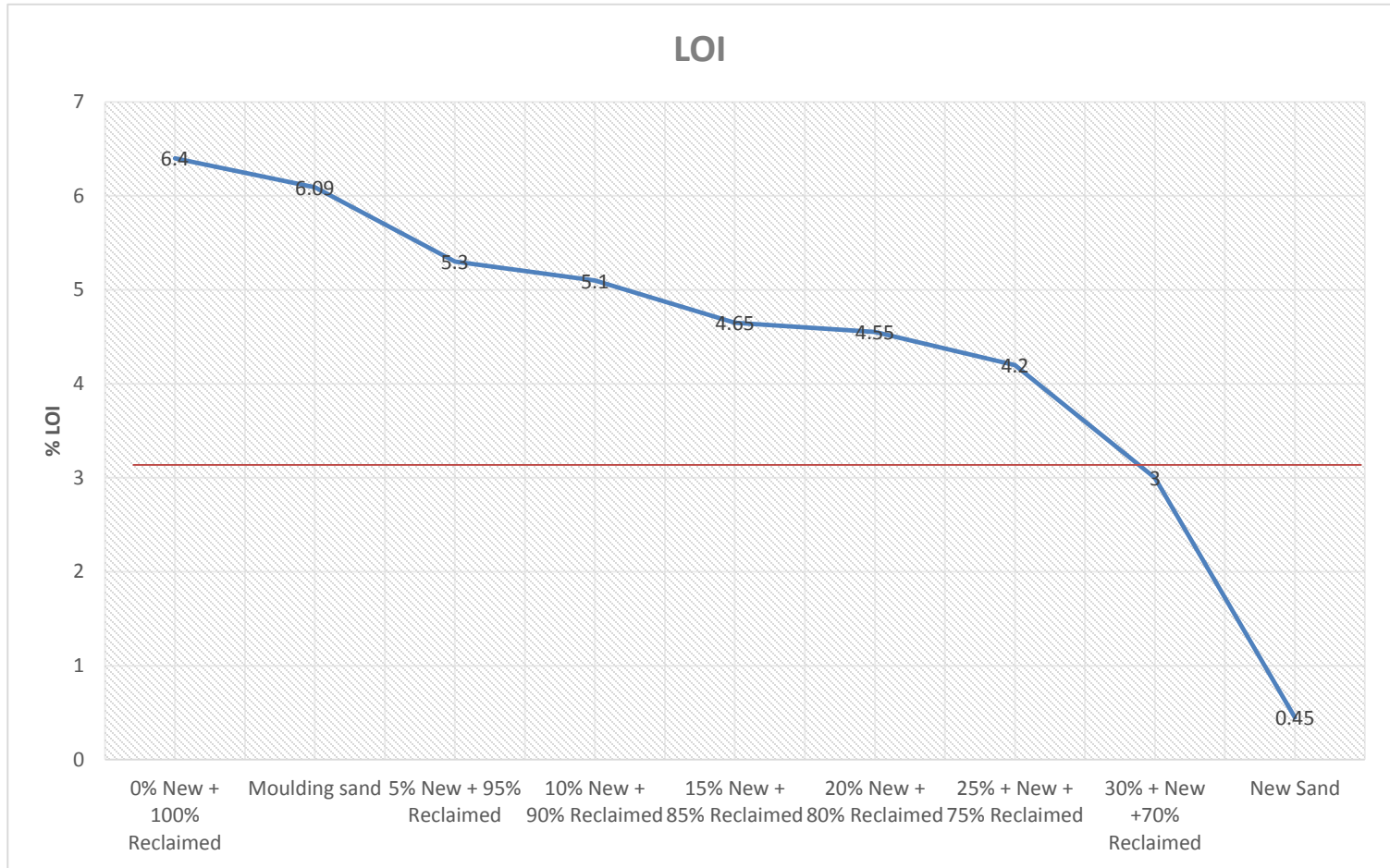
Laboratory experiments



Laboratory experiments



Laboratory experiments



Foundry trials

Casting 1 (Elbroc cap)

5% new sand addition



10% new sand addition



15% new sand addition



30% new sand addition



Foundry trials

Casting 2 (Delta clamps)

5% new sand addition



10% new sand addition



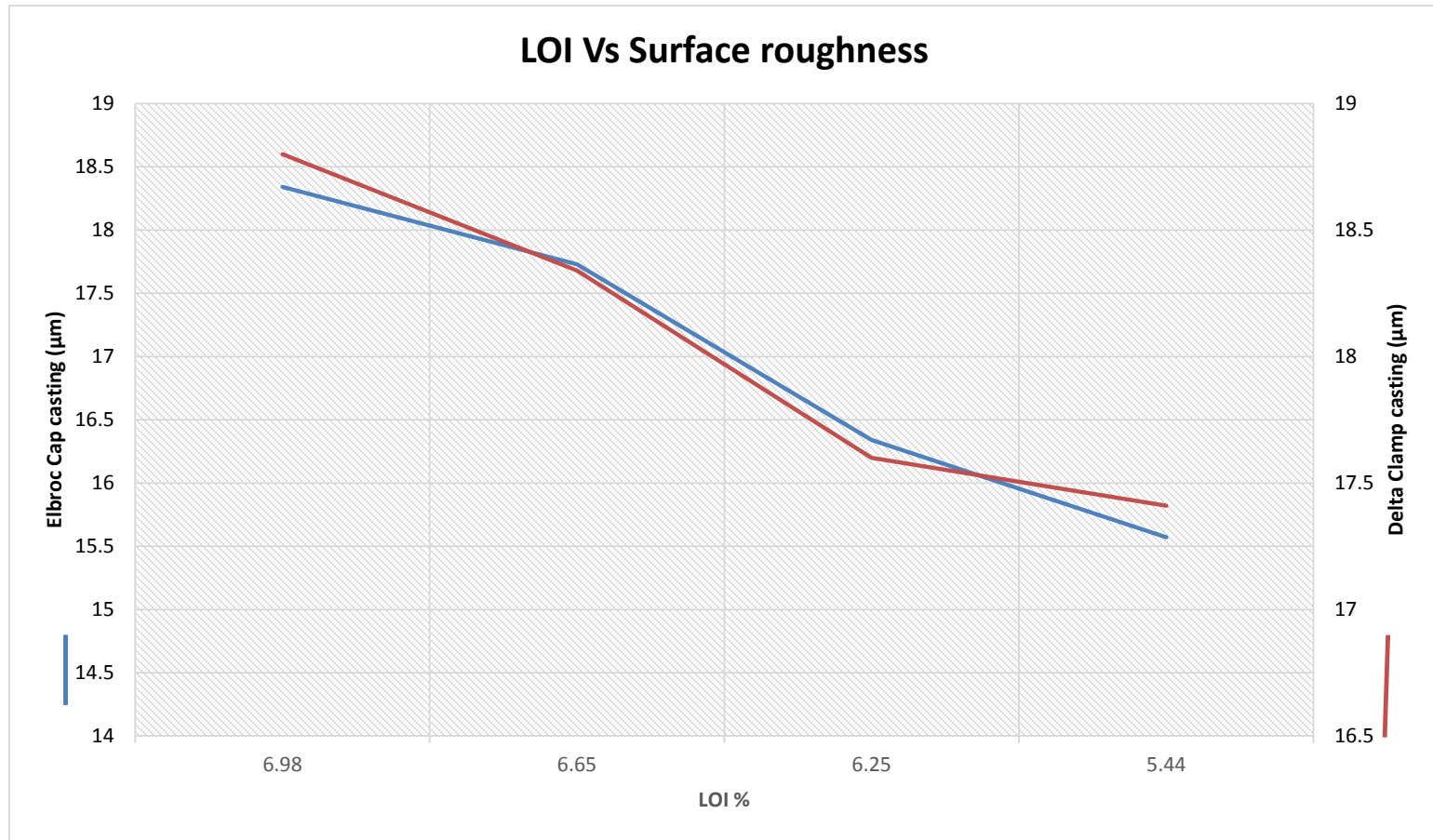
15% new sand addition



30% new sand addition

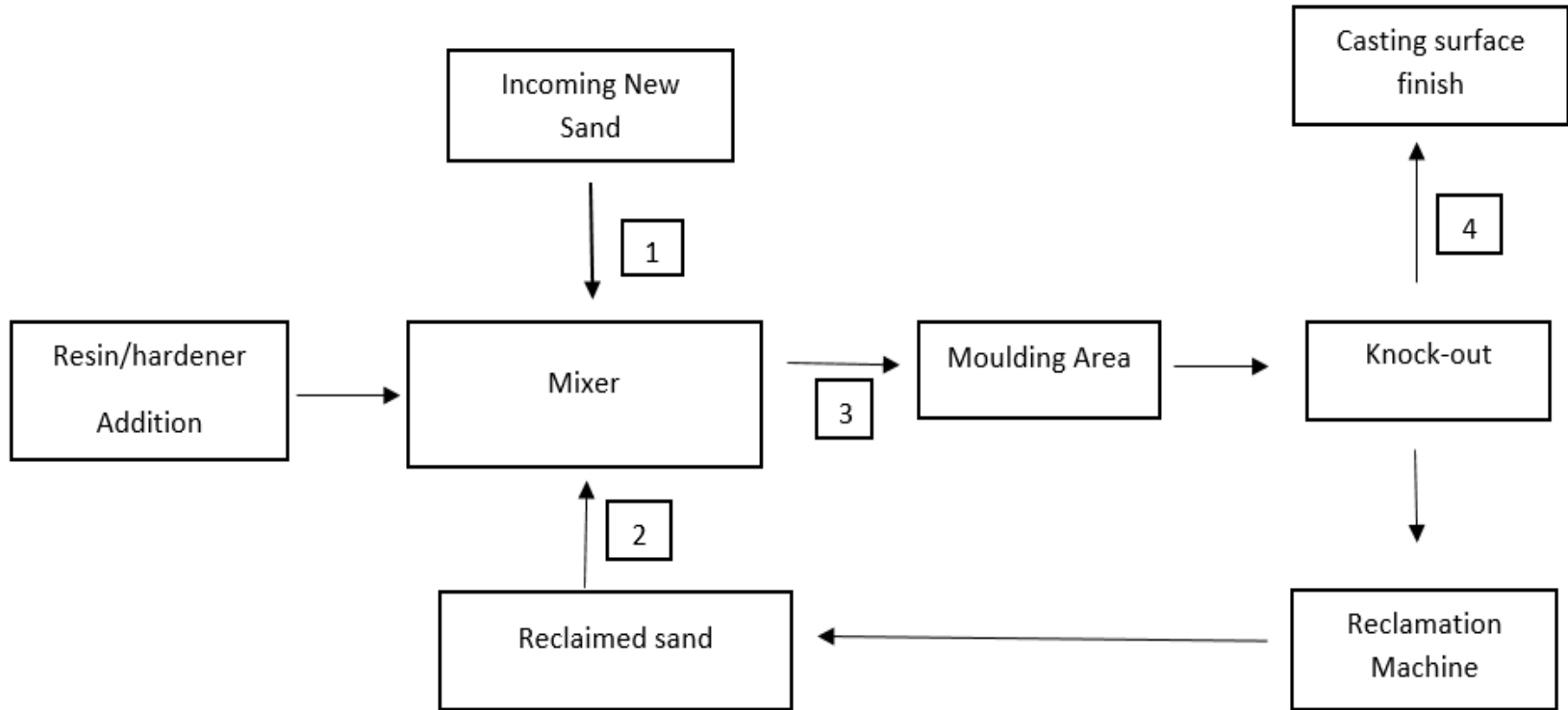


Foundry trials



As LOI decreases (increase of new sand addition), the surface finish of castings improves

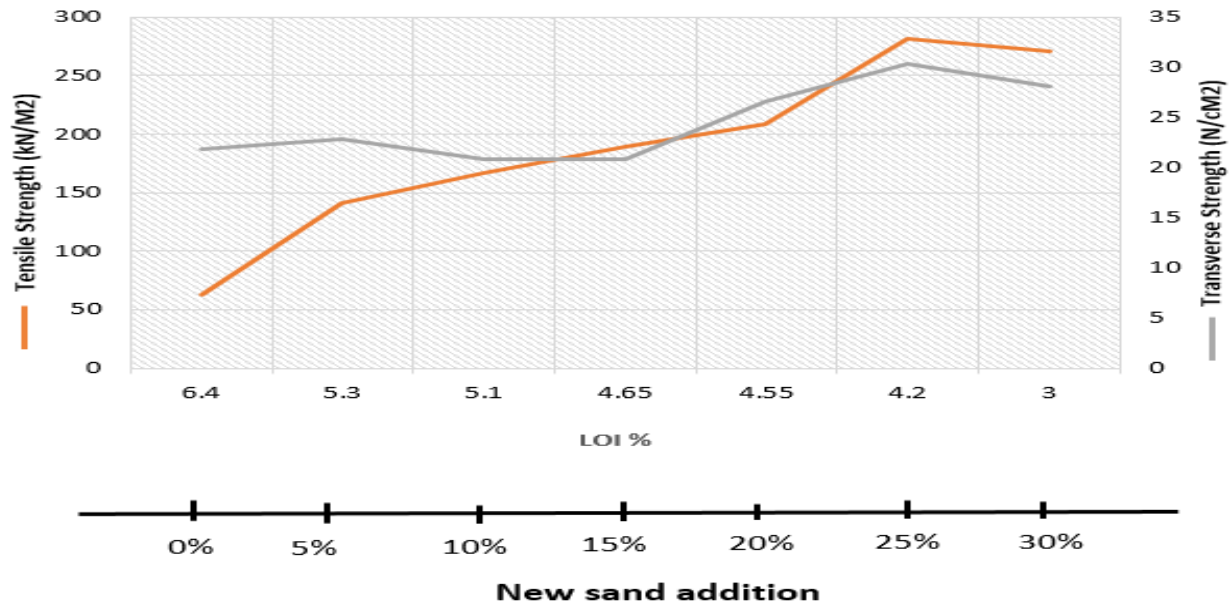
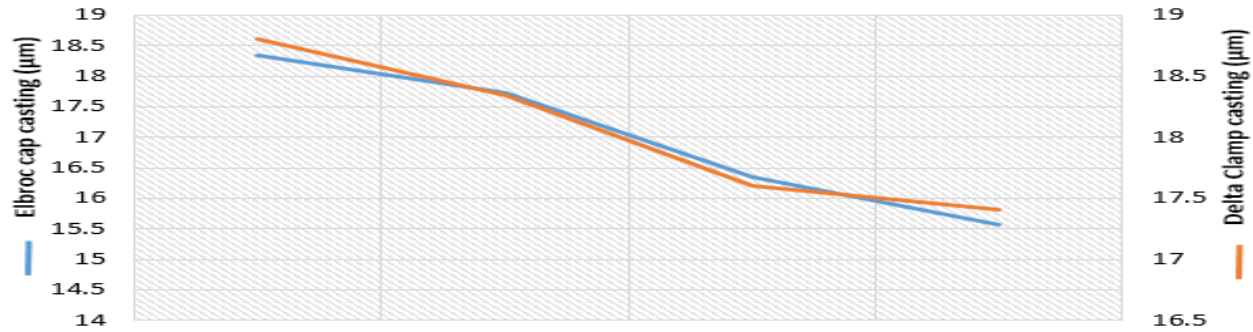
Sand control system sample collection points



Sand testing parameters and frequency

New sand (Sample 1)				Reclaimed sand (Sample 2)			
Sand testing parameters	Required results	Project results	Frequency	Sand testing parameters	Required results	Project results	Frequency
LOI	<3% Max	0.45%	On every new delivery	LOI	<3%	6.40%	2 times daily
AFS	50-60	65.40 AFS	On every new delivery				
Clay Content			On every new delivery				
Chemical composition(Si lica content)	95-96% min	90.9%	On every new delivery	AFS	50-60	55.60 AFS	2 times daily
Refractoriness	>1200°C		On every new delivery				
Moulding sand (sample 3)				Knock-off sand (sample 4)			
Sand testing parameters	Required results	Project results	frequency	Sand testing parameters	Required results	Project results	frequency
LOI	<3%	6.33%	2 times daily	LOI	<3%	4.83-6.63%	2 times daily
Tensile strength (kN/m ²)	*	141.63-270.81	*	Castings surface roughness Rz (µm)	*	16.50 -18.57	
Transverse strength (N/cm ²)	*	22.9-28.1	*				

Sand control chart



Adjustments at mixer

New sand addition	Thread no.
5% new sand + 95% reclaimed sand	2.5
10% new sand + 90% reclaimed sand	3.0
15% new sand + 85% reclaimed sand	3.5
30% new sand + 70% reclaimed sand	5.0

Conclusions

- The soundness analysis of castings in both trials met the specifications required by the inspection/quality department at Mcwade Foundry.
- Reduction in loss on ignition resulted in improved surface finish.
- Sampling points and frequency were identified for the foundry.
- Testing procedures were provided to the foundry.
- Control chart was provided to the foundry.
- Equipment to be invested in were identified for the foundry.

Thank you!

Questions