

# Lessons from the National Foundry Technology Network (NFTN)'s Technical Assistance Programme for South African Sand Foundries

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# Outline

1. NFTN's Technical Assistance Programme for SA Foundries
2. MCTS Support for the Foundry Industry
3. MCTS Technical Interventions for NFTN programme
4. Results of Case Studies
5. Lessons from the Projects
6. Conclusion
7. Questions



# 1. NFTN's Technical Assistance Programme for SA Foundries

## 1. The National Foundry Technology Network (NFTN):

- Department of Trade and Industry (DTI)'s initiative: Technology Localisation, Foundry Industry Competitiveness, Human Resource Capacity in Metal Casting, etc.
- Established in 2008
- Implementation/ Monitoring by Council for Scientific and Industrial Research (CSIR)

## 2. The Technical Assistance Programme to SA Foundry Industry:

- Casting scrap reduction programme
- Casting design – new products, process improvement
- Compliance with SA environment regulations (gas emission, noise, waste, pollution, etc.)

## 3. Request for Proposals/ Quotation & Tender Process



## 2. MCTS Support for the Foundry Industry

### 1. The Metal Casting Technology Station (MCTS):

- Technology Station under the Technology Innovation Agency (TIA/ DST)
- Established in 2005
- Located at the University of Johannesburg (UJ) – Department of Metallurgy

### 2. MCTS Focus Area:

- Sand Casting
- Physical Metallurgy
- Casting Simulation
- Rural foundries
- Training & Education



# 3. MCTS Technical Interventions for NTFN programme

## 1. Casting Scrap Reduction/ Process Improvement Interventions in Sand Casting Foundries:

- Projects of 3 to 6 months
- Involvement of interns (Experiential Learning)
- Availability of international expertise (TBUF/ Germany)
- Use of UJ facilities (including analytical equipment: XRF, XRD, SEM)

## 2. Major Projects (2015 – 2016):

- 4 local projects: 2 Gauteng & 2 KZN
- Total Value: R 1 500 000.00



# 3. MCTS Technical Interventions for NTFN programme (Continued)

## 3. Elements of Methodology

- Root Cause Analysis
- Raw material characterisation
- Sand Testing
- Casting Trials
- Training

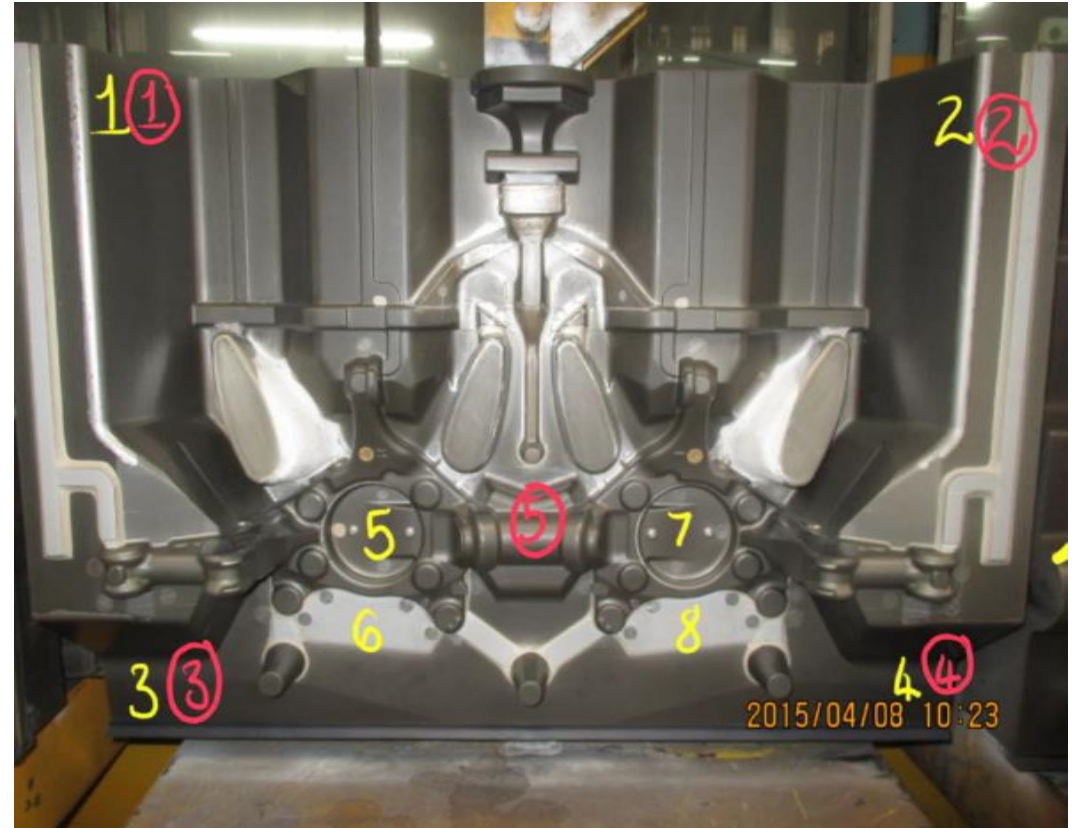
## 4. Case Studies

- Elimination of a shrinkage defect in a automotive casting in a local greensand foundry
- Process improvement in a PUNB Aluminium foundry for consistent mould production
- Design of sand control system in a engineering PUNB Aluminium foundry to reduce new sand addition
- Implementation of sand control system in steel casting foundry using jolt-squeeze moulding machines



# 4. Results of Case Studies

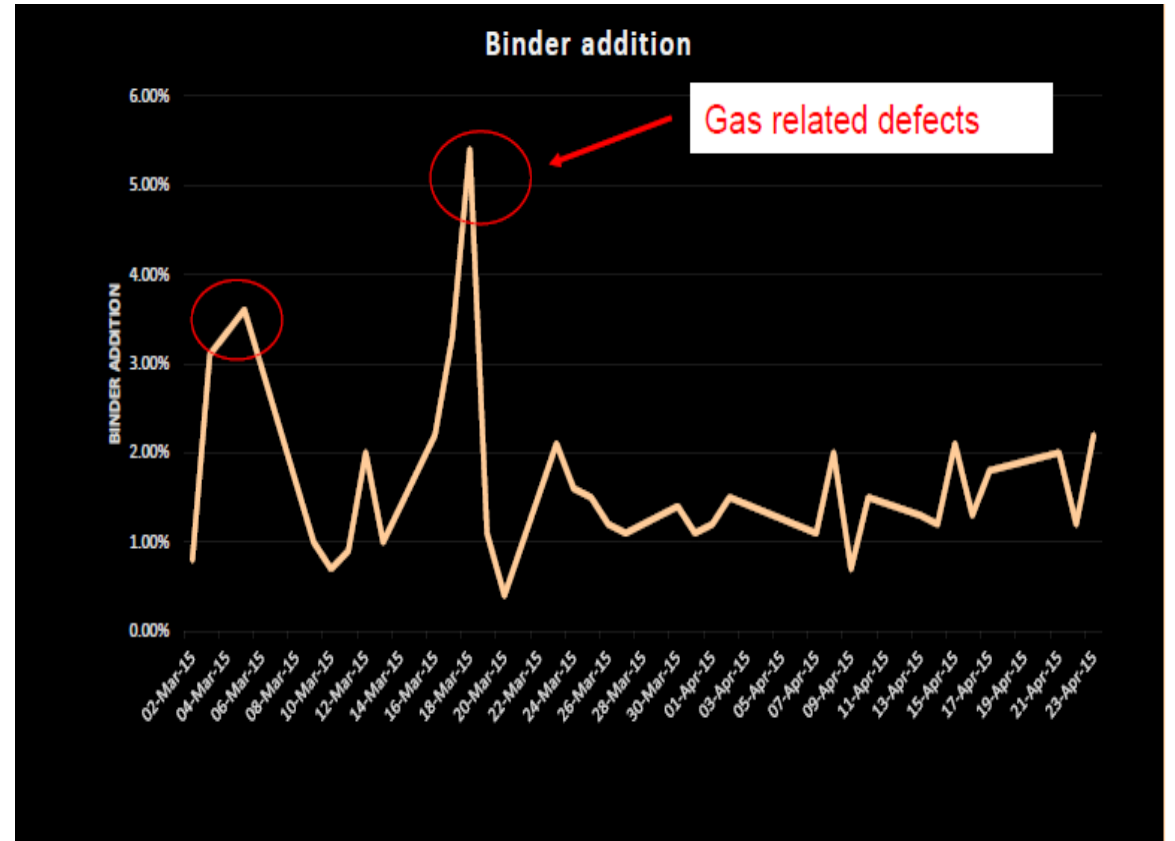
1. Elimination of a shrinkage defect in a automotive casting in a local greensand foundry:
  - Poor mulling efficiency.
  - Variation in sand density.
  - Sand laboratory staff need further training on fundamentals of sand testing.
  - There was no consistency in mould strength and hardness
  - The variation in strength is greater on different mould positions and on different sand batches.



# 4. Results of Case Studies (Continued)

## 2. Process improvement in a PUNB Aluminum foundry for consistent mould production:

- Inferior properties of raw material (e.g. Silica sand).
- Poor/ inexistent sand reclamation.
- Inconsistent sand mixing (e.g. resin and catalyst addition)
- Factocode assisted to put up a laboratory by the TLIU.
- Foundry can consistently monitor raw materials and sand mixing
- Improved moulding efficiencies

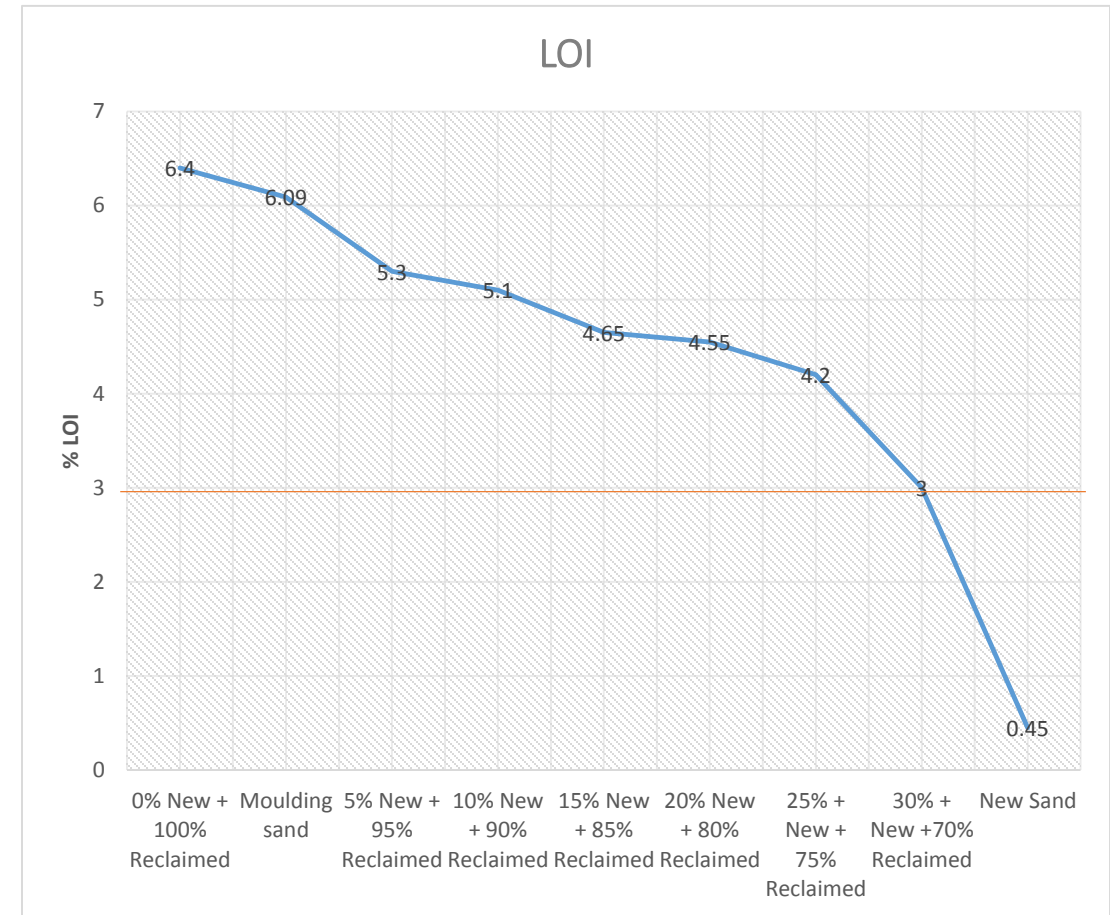




# 4. Results of Case Studies (Continued)

## 3. Design of sand control system in a engineering PUNB Aluminium foundry to reduce new sand addition:

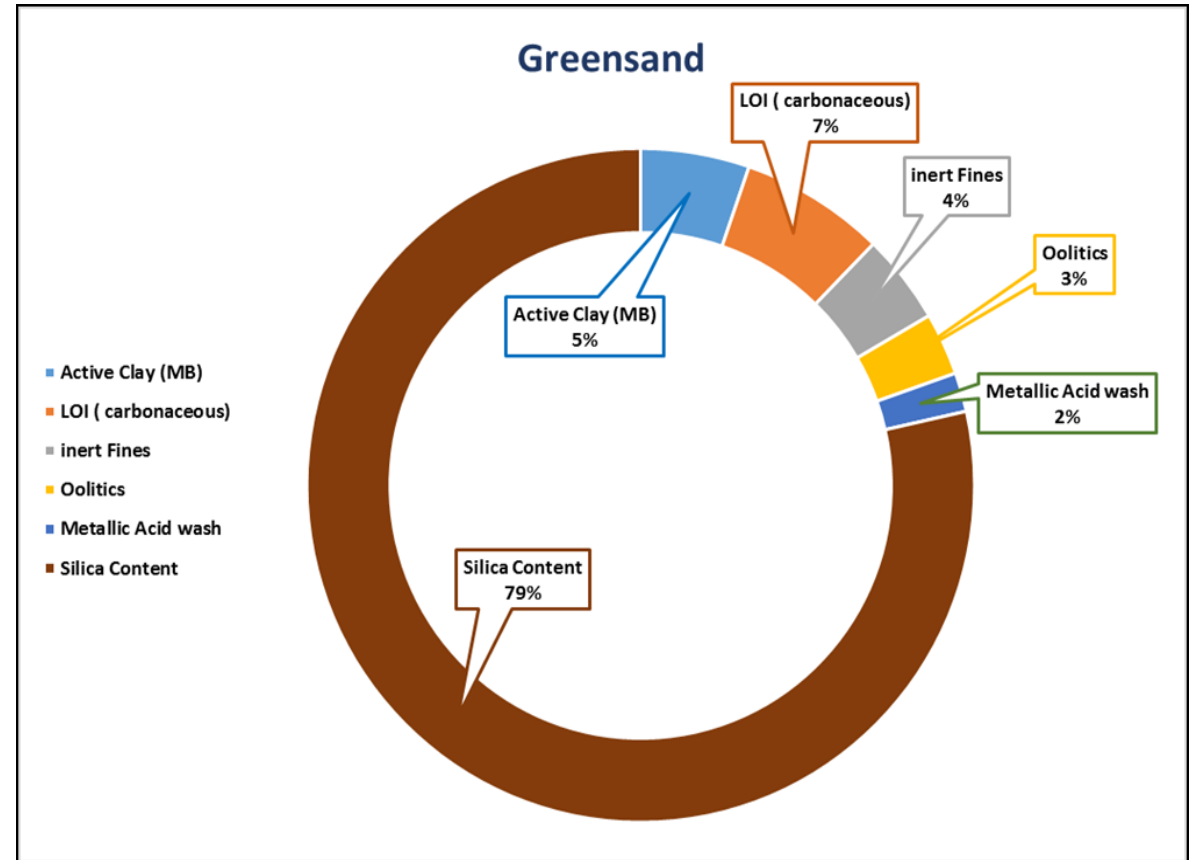
- Important variation of moulding and casting parameters (e.g. sand to iron ratio, pouring temperature, alloys)
- No sand reclamation
- Designed a sand control system with sand properties and most important casting quality parameters.



## 4. Results of Case Studies (Continued)

4. Implementation of sand control system in steel casting foundry using jolt-squeeze moulding machines:

- Elementary sand control system
- Blowholes were a common problem
- Moisture additions were reduced after comparison of moisture measuring devices



# 5. Lessons from the Projects

## 1. Positives

- Technical challenges can be overcome to increase competitiveness
- Raised awareness of availability of local expertise (MCTS, UJ, SAIF, CSIR, Mintek, etc.)
- Human resource capacity and development (internship programme)

## 2. Negatives

- Inferior raw materials in terms of properties used by foundries
- Elementary sand control system
- Lack of investment in new technology
- Skill shortage
- Limited funding



# 6. Conclusions

1. Successful involvement of the MCTS in the NFTN programme
2. NFTN's Technical assistance to be strengthen and widen
3. Technical assistance to be coupled with equipment/ technology acquisition programmes
4. Excellent opportunity for Experiential Learning and human capacity development

