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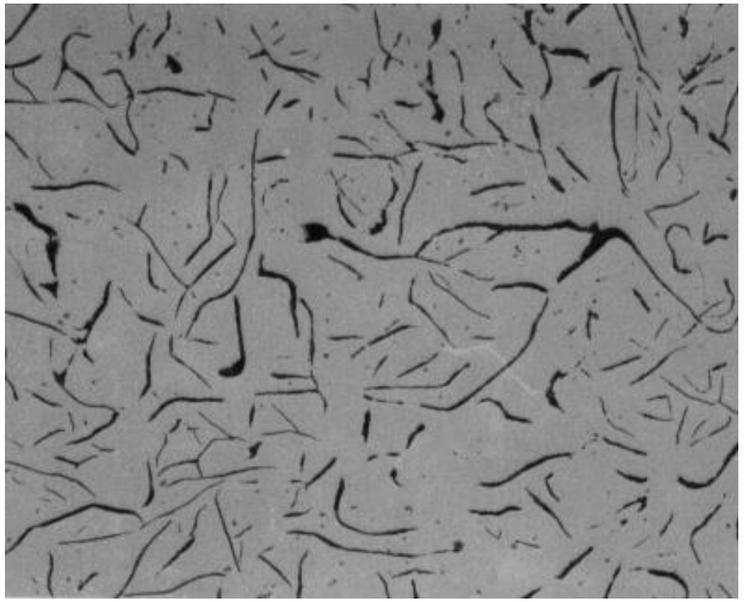
EXPERT

Speciality Mg-treatment alloys for specific applications

Dr. Mathias Lueben

Nodularisation

Flake graphite



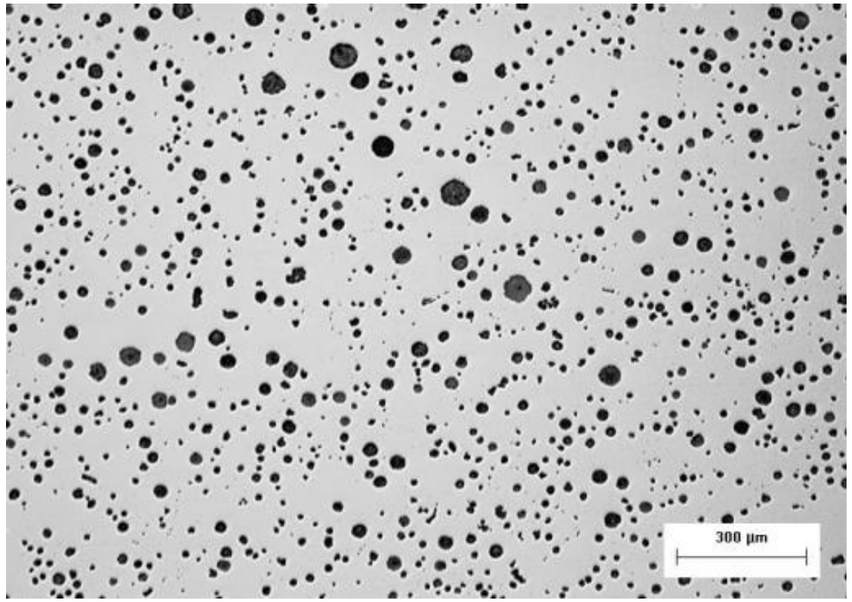
Grey iron

Elements:
- Mg
- Ce
- La

NODULARISATION

Agents:
- Mg metal
- NiMg-alloys
- MgFeSi
- Misch metal

Nodular graphite



Ductile iron

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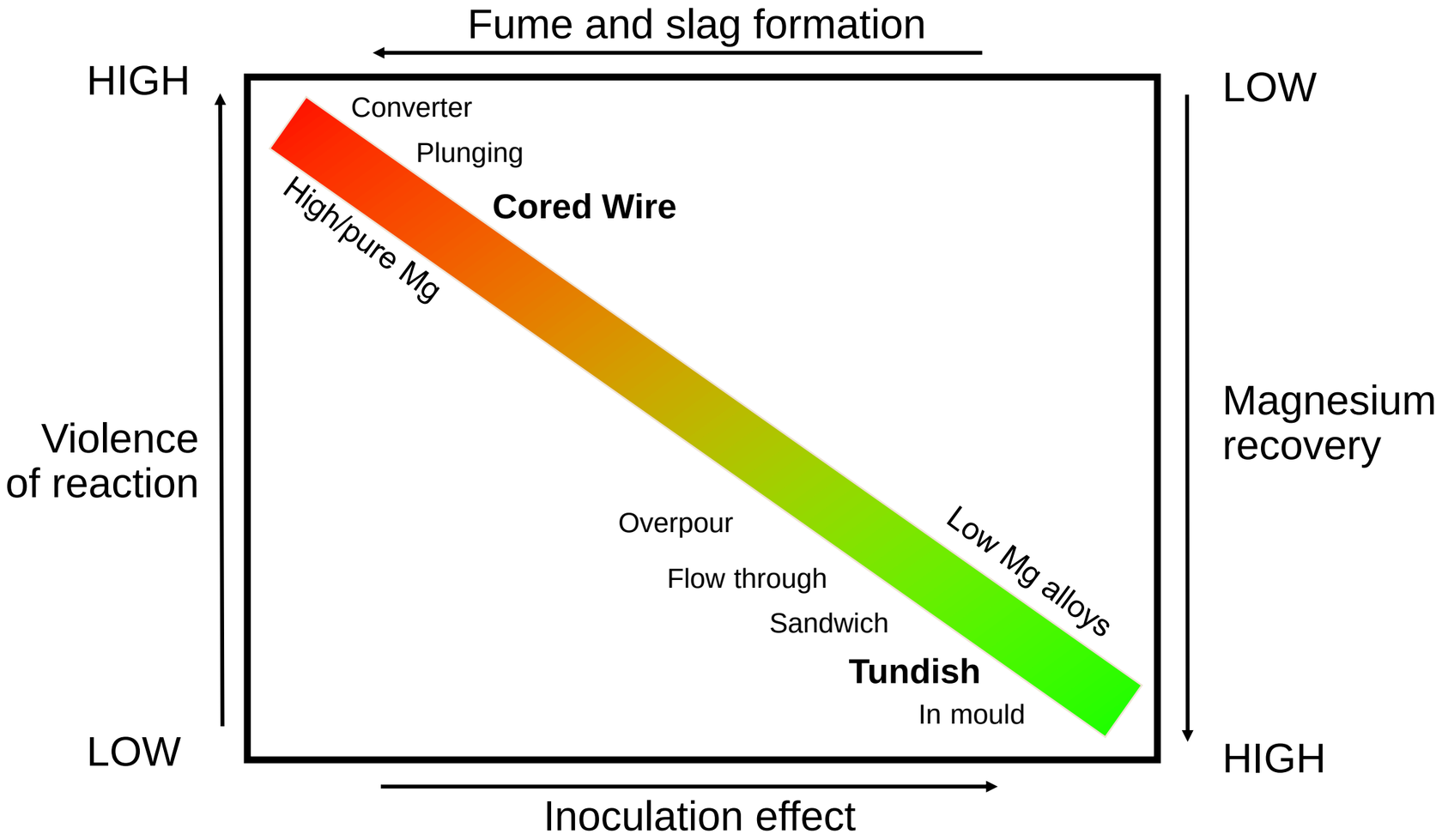
Efficiency comparison

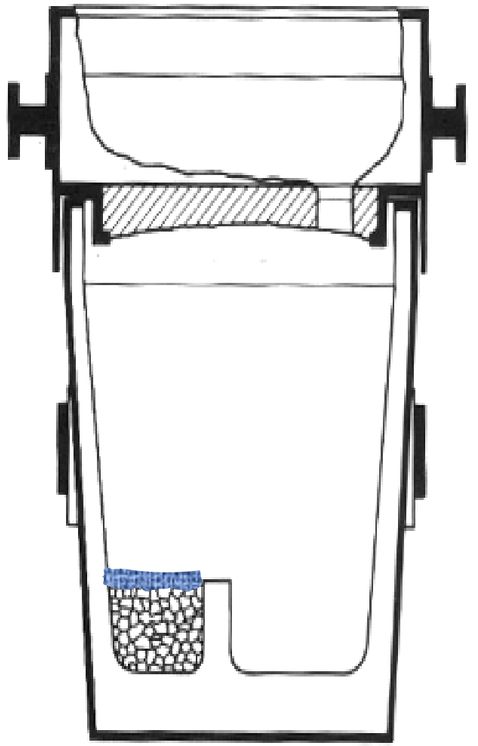


Tundish cover: Ladle design

- An optimised ladle design achieves the following advantages:
  - High recovery
  - Consistent reproducibility
  - Reliable process
  - No flare
  - ≈ 90% fume reduction
  - No metal splashing
  - Minimum C and temperature losses

Height : Diameter > 2:1

~80% Mg – Recovery is possible!



- Also important, an optimised pocket design:
  - Sufficient volume for alloys and additional safety space for build-up
  - Ratio of 1:1 up to 1:1,5 between height and diameter of the pocket
  - No sharp corners, easy to clean

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The History and Evolution of Inoculants

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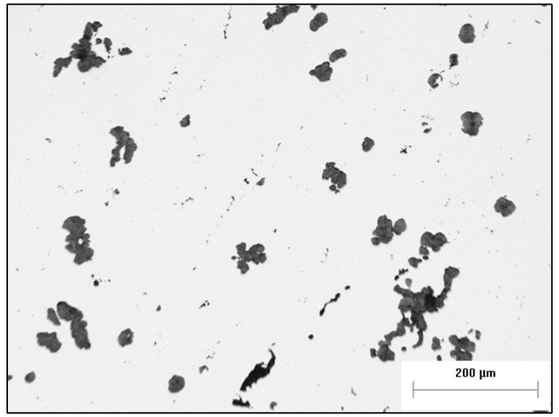
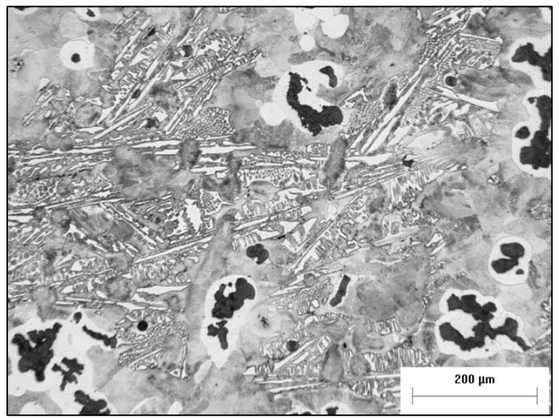
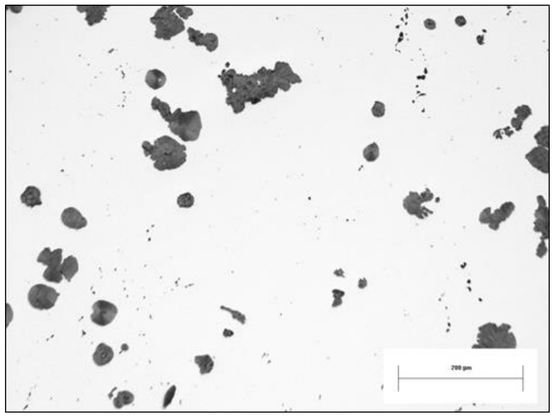
In Ductile Iron the Nucleation Potential is product of Mg-treatment

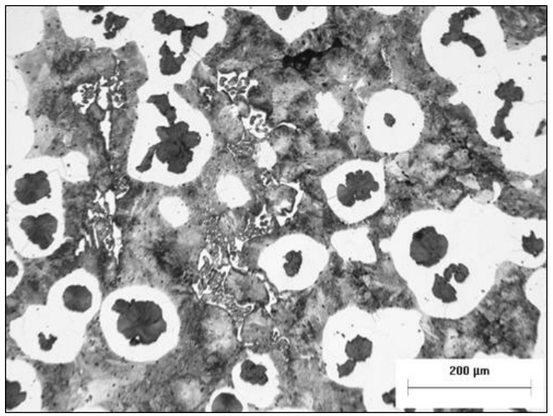
MgFeSi without RE



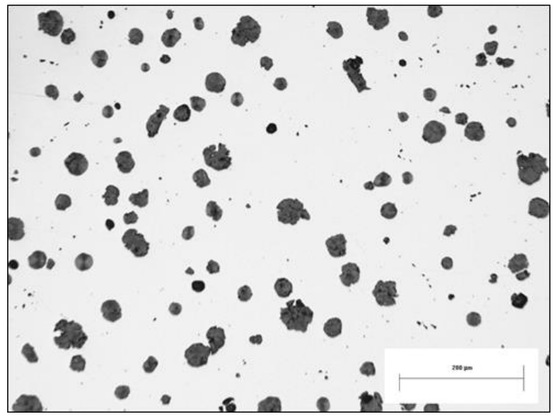


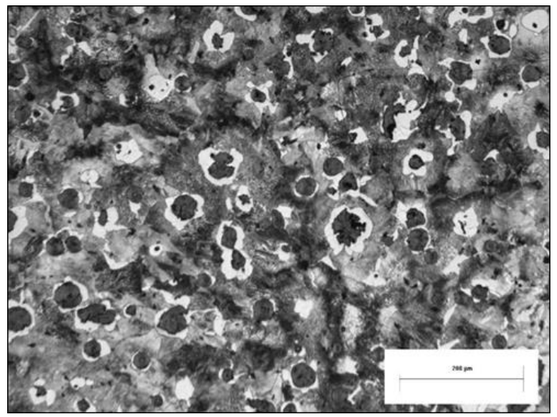
MgFeSi with RE





MgFeSi with La





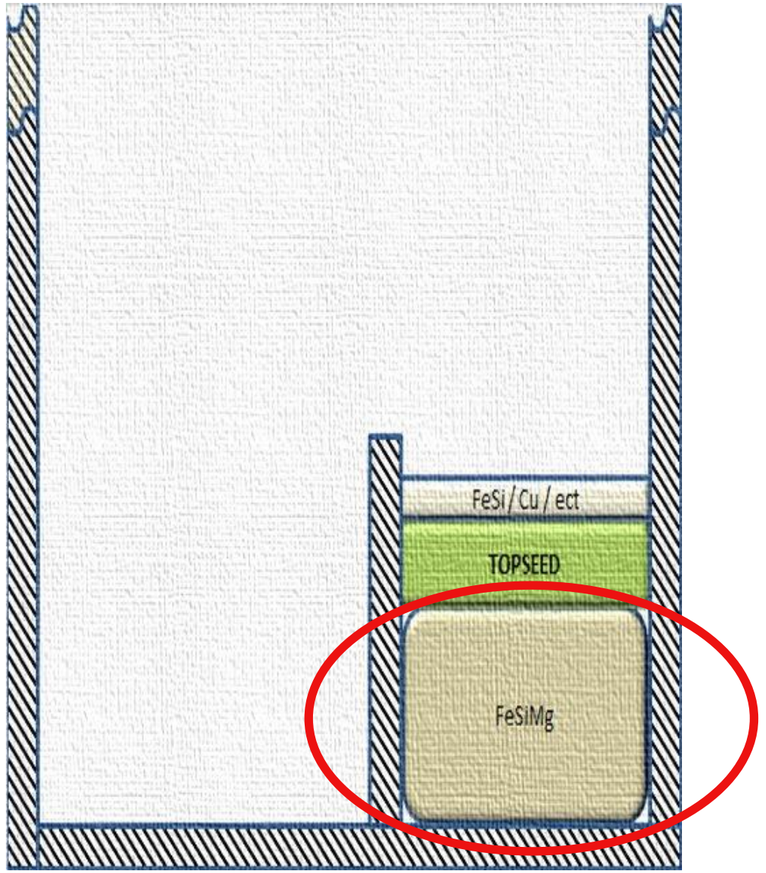
Composition of MgFeSi can significantly affect nucleation condition in ductile iron and need for inoculation

(The micrographs are showing uninoculated iron.)

High performance Magnesium treatment: Elmag™/Lamet™ + Topseed™

- Elmag™ nodularisers
  - Available in an extensive range of chemistries and sizes to suit every ladle and final iron requirement
  - Speciality treatment alloys for specific applications in the foundry industry
  - Narrow product specifications for highest consistency
  - Improved nodule counts, nodularity and structures
  - Cost effective

- Lamet™ nodularisers
  - The use of lanthanum as the source of rare earth in the alloy gives minimal shrinkage when compared to RE-free or Ce / La based MgFeSi additions.
  - Further increased nodule count and nodularity
  - Low chill tendency
  - Minimised shrinkage
  - Reduced costs by reduced reject rates



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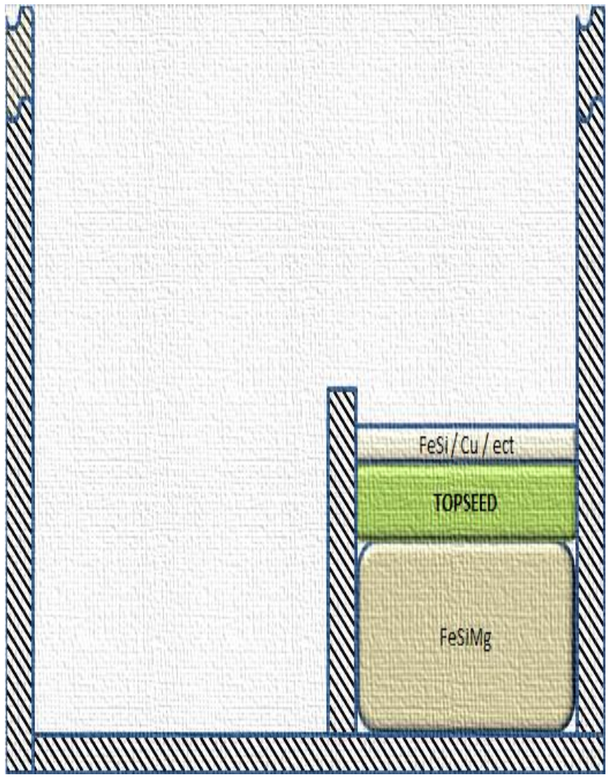
Topseed™ Conditioner

TOPSEED™ is a ladle conditioner (or Pre-inoculant)

- developed to promote the performance of MgFeSi in the treatment process.
- based on a high density FeSi containing a balanced amount of active elements, calcium, barium and aluminium.

The main advantages of Topseed™ conditioner are:

1. Pre-inoculation of iron
2. Increasing Mg recovery
3. Management of slag behaviour



Topseed™ is used mainly in the treatment ladle on top of MgFeSi.

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Management of Slag Behaviour

Liquid slag coagulated with unexpanded perlite before removal. Environmentally unfriendly, labour intensive and difficult operation.

Topseed® used as the MgFeSi cover gives a “popcorn” like slag which can easily be skimmed without the need for coagulants. As exogenous slags are precipitated in the ladle, there is less possibility of slag inclusions in castings.

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Case Study

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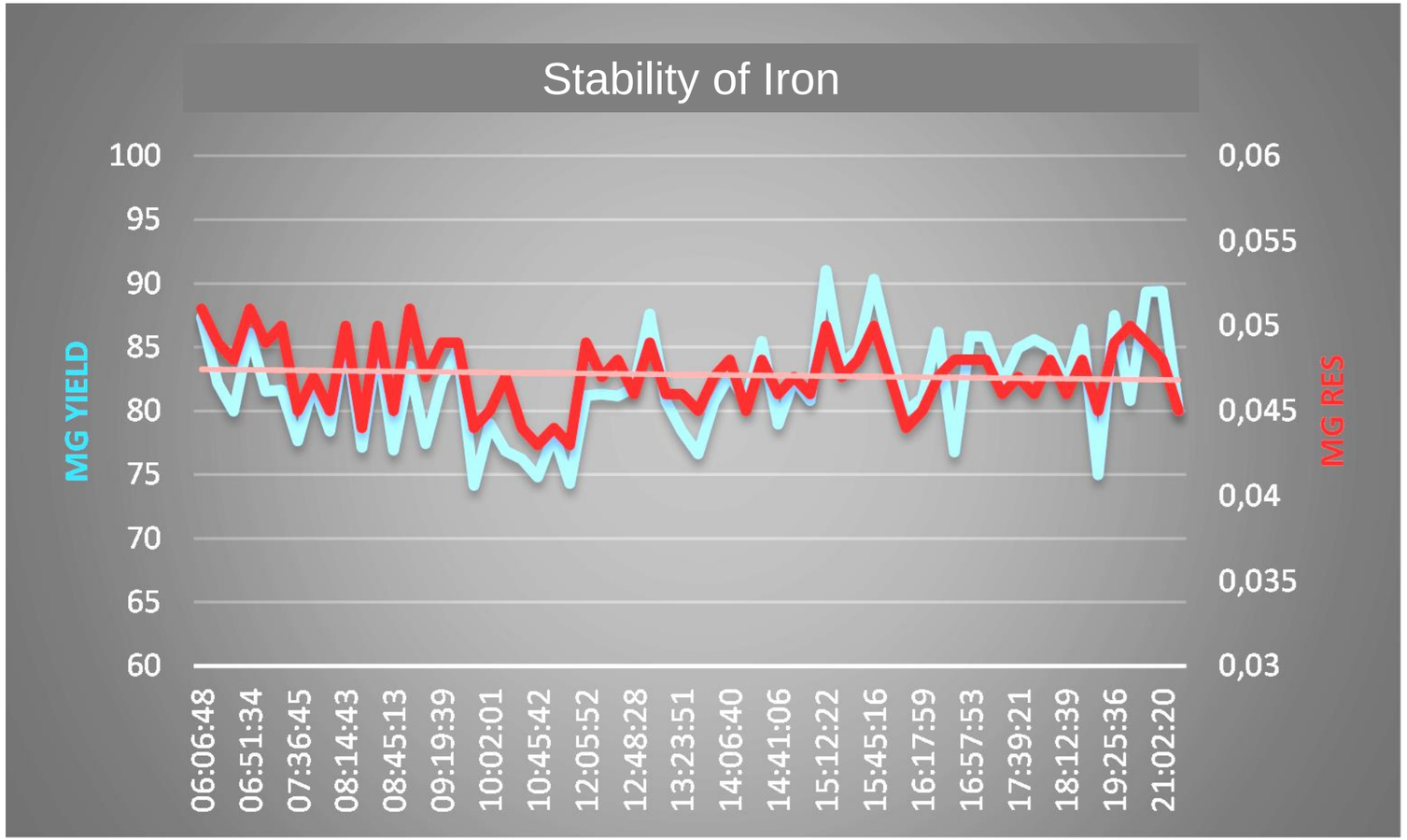
Task: Stabilise the production process Topseed™ 2005

Improvement Trials:

- Using the same base iron coming from several furnaces
- Same final chemical composition
- Automated Dosing Equipment introduces ferroalloys in sequence:
  - Lamet™
  - Topseed™ 2005

0.040% < Residual Mg < 0.050%

75% < Mg Yield < 90%



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Conclusion

Advantages of using speciality Mg-treatment alloys for specific applications

- Stable processes
- Optimised Mg recovery
- Improved nucleation and improved properties through better nucleated iron
- Consistent slag conditioning
- Cleaner iron in auto-pours / castings
- Reduced production costs

Thank you very much for your attention!

For further information please visit us at the

Expert booth: Hall 2 B-110

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Delivering your potential