11-13 September / Eylül 2014
TÜYAP Fair, Convention & Congress Center, İstanbul
7th International Ankiros Foundry Congress
7. Uluslararası Ankiros Döküm Kongresi

«Sustainable Induction Technology & Energy Saving»

«Sürdürülebilir İndüksiyon Teknolojisi & Enerji Tasarrufu”»

Yılmaz Yıldır
(ABP Induction)

2.Oturum: Döküm Teknolojileri Demir - Çelik

2nd Session: Casting Technologies Iron - Steel

Oturum Başkanı/Session Chairman: Hüseyin Yumak (Trakya Döküm San. Tic. A.Ş.)

Oturumlarda yer alan sunumlar 15 Eylül 2014 Pazartesi tarihinde kongre web sayfasına **(kongre.tudoksad.org.tr)** yüklenecektir.

17th International ABP Induction Conference
October 1st – 2nd 2013, Dortmund

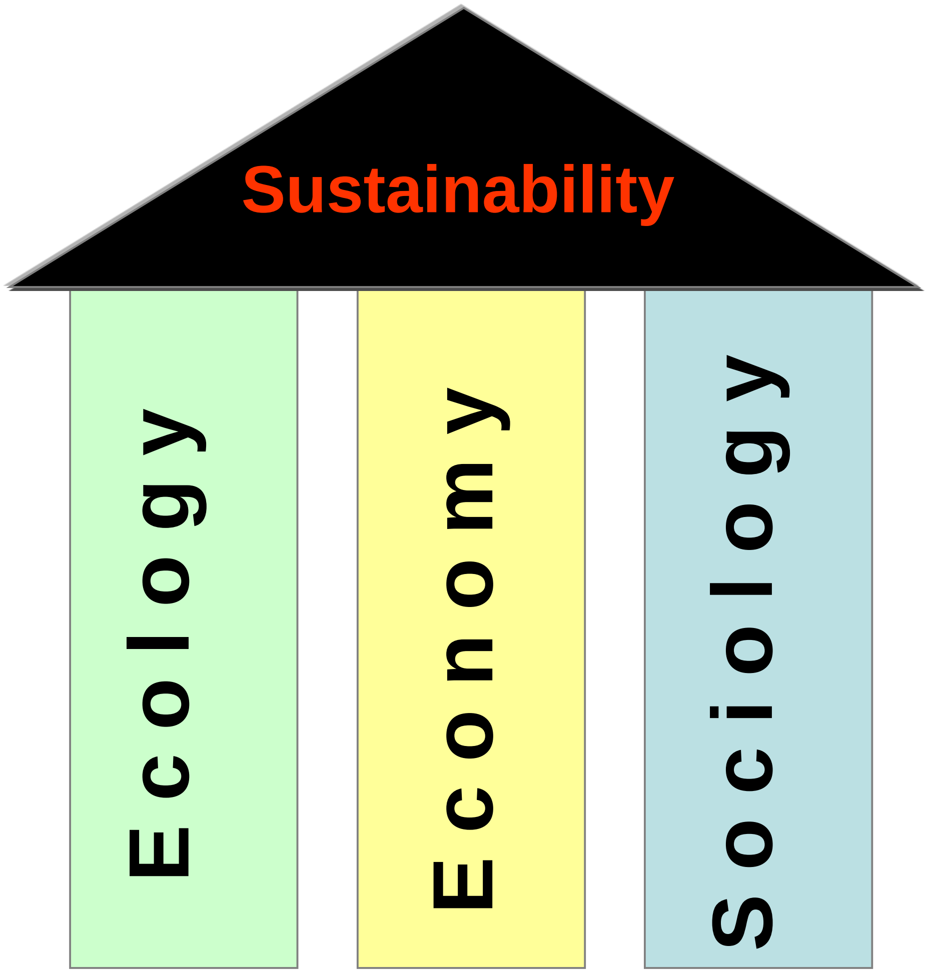
Sustainable Induction Technology

Yilmaz Yildir

SUSTAINABLE TECHNOLOGY
ABP
INDUCTION

1. Sustainable Induction Technology

- Three columns if sustainability



SUSTAINABLE TECHNOLOGY
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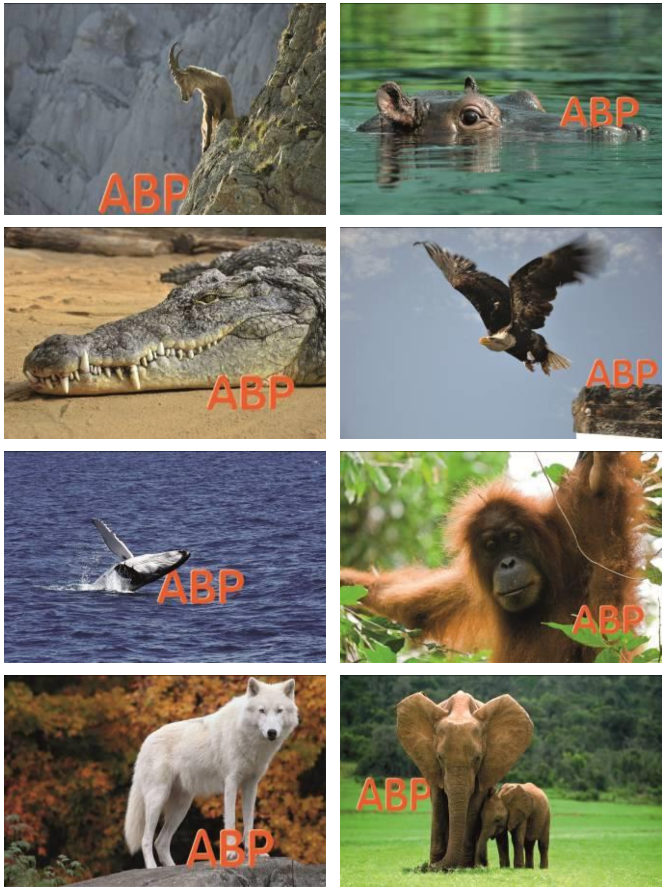

1. Sustainable Induction Technology
2. Ecology
   - 2.1 Reduction of CO2 emissions
   - 2.2 Energy saving
   - 2.2 No environmental critical material
   - 2.3 Recycling
3. Economy
4. Sociology
5. Summary

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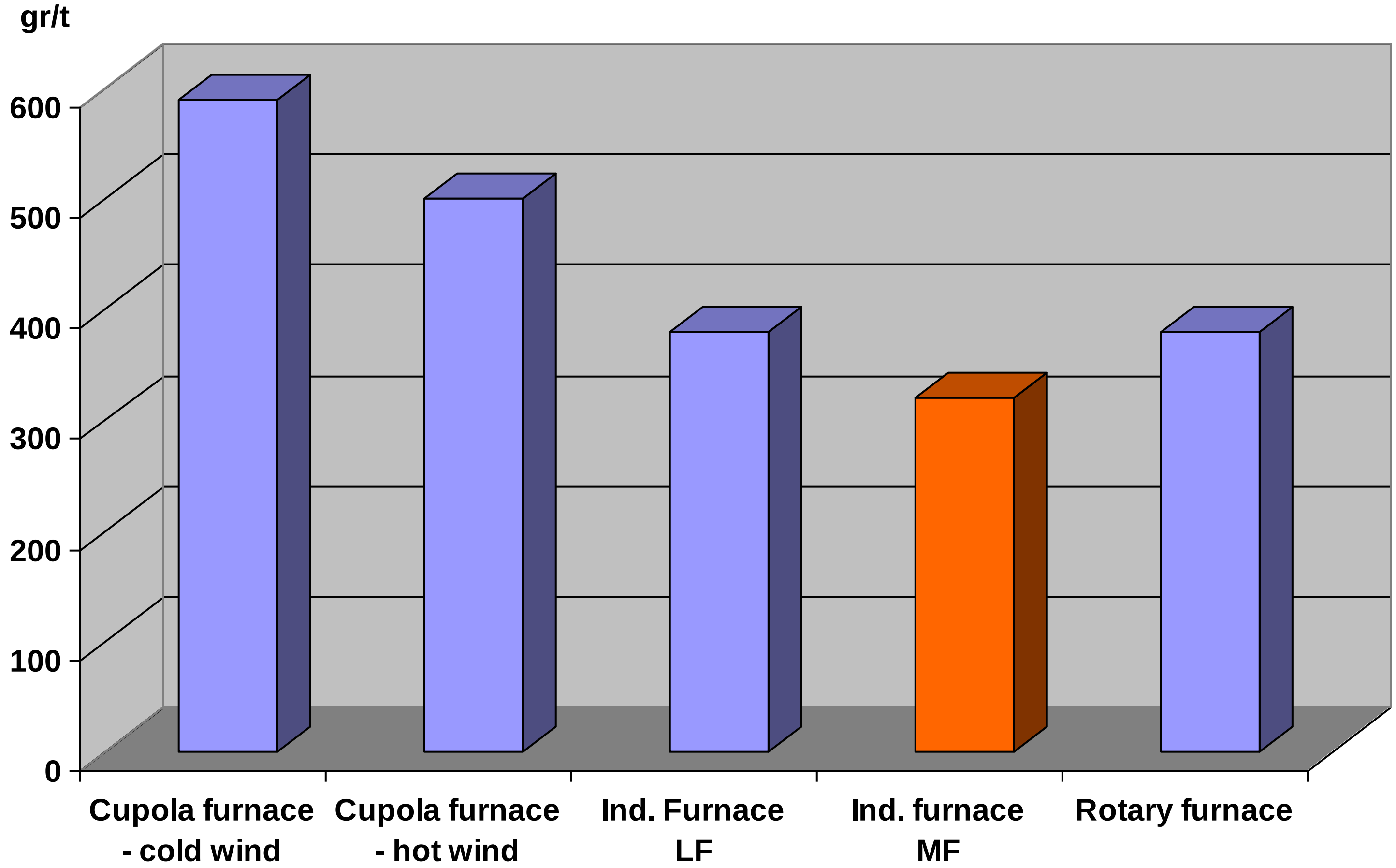
2. Ecology:

Specific CO_2 Emissions

- Including the emission of power plants with today's energy mix



Source University of Hannover

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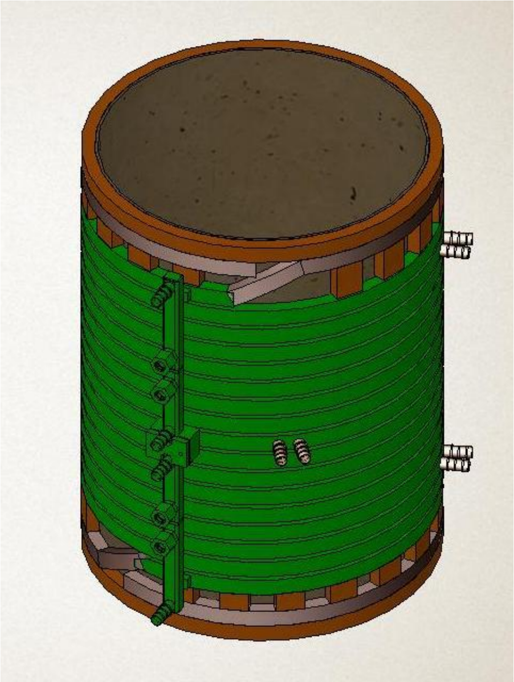
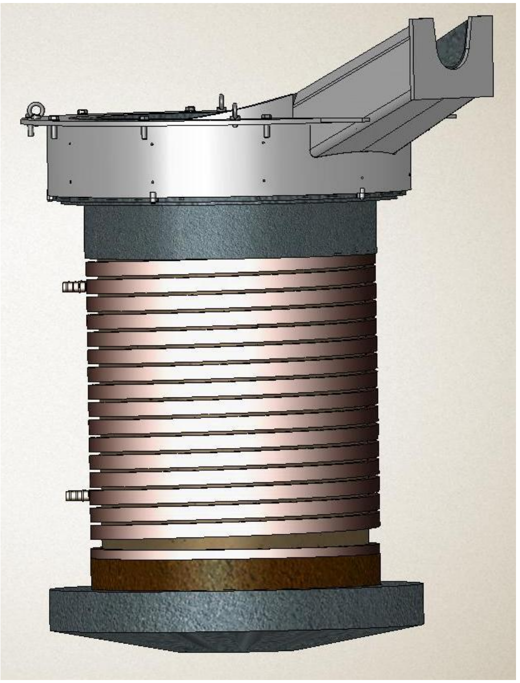
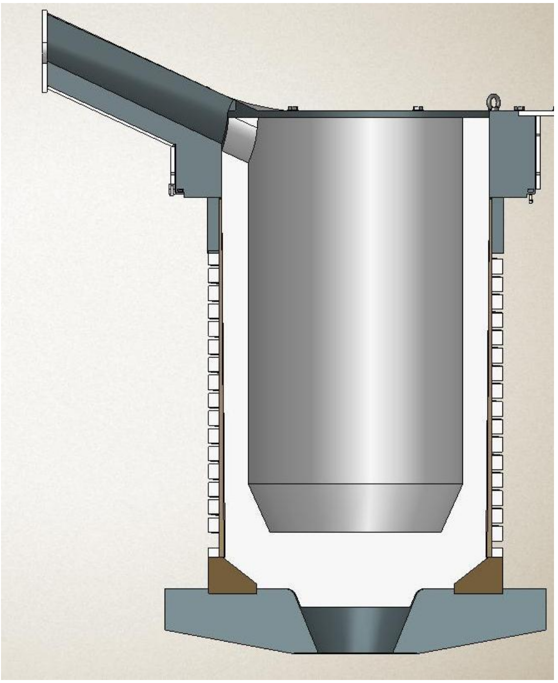
2. Ecology:

Energy saving – coil design

- Coil losses are approx. 70% of total electrical losses
- By substitution of upper and lower cooling windings, losses should be reduced by up to 5%







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2. Ecology:
Energy saving – coil design

- expected energy and cost savings:
  - Annual production: 40.000 t
  - Energy consumption (standard coil): 525 kWh/t
  - Coil losses (total): 89 kWh/t
  - Reduction of coil losses: 4,45 kWh/t = 5,0 %
  - Electricity rate (industrial): 8,95 ct / kWh [#1]

  - Savings in energy consumption: 40.000 t/year x 4,45 kWh/t = **178.000 kWh/year**

  - Savings in costs: 178.000 kWh/year x 8,95 ct/kWh = **15.931 €/year**

[#1] Source: Eurostat; Average Electricity Rate Germany 2012

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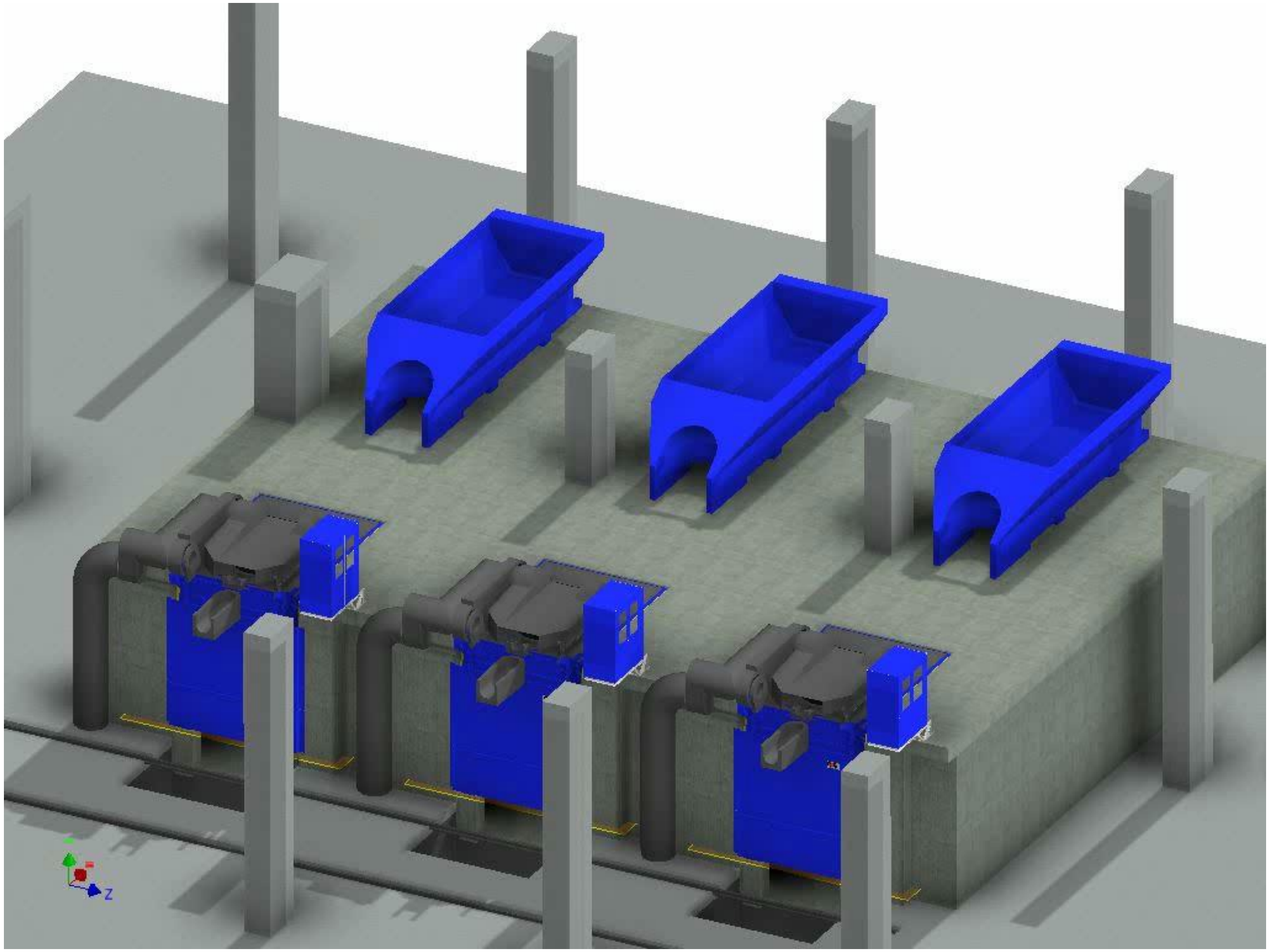
2. Ecology:

Energy saving – process optimization

- Extension of the ABP simulation tool up to complete process between charging area and liquid metal transport to the molding line
- Possible to simulate the process also for complete melt shop including existing furnaces
- Realization of bottle necks

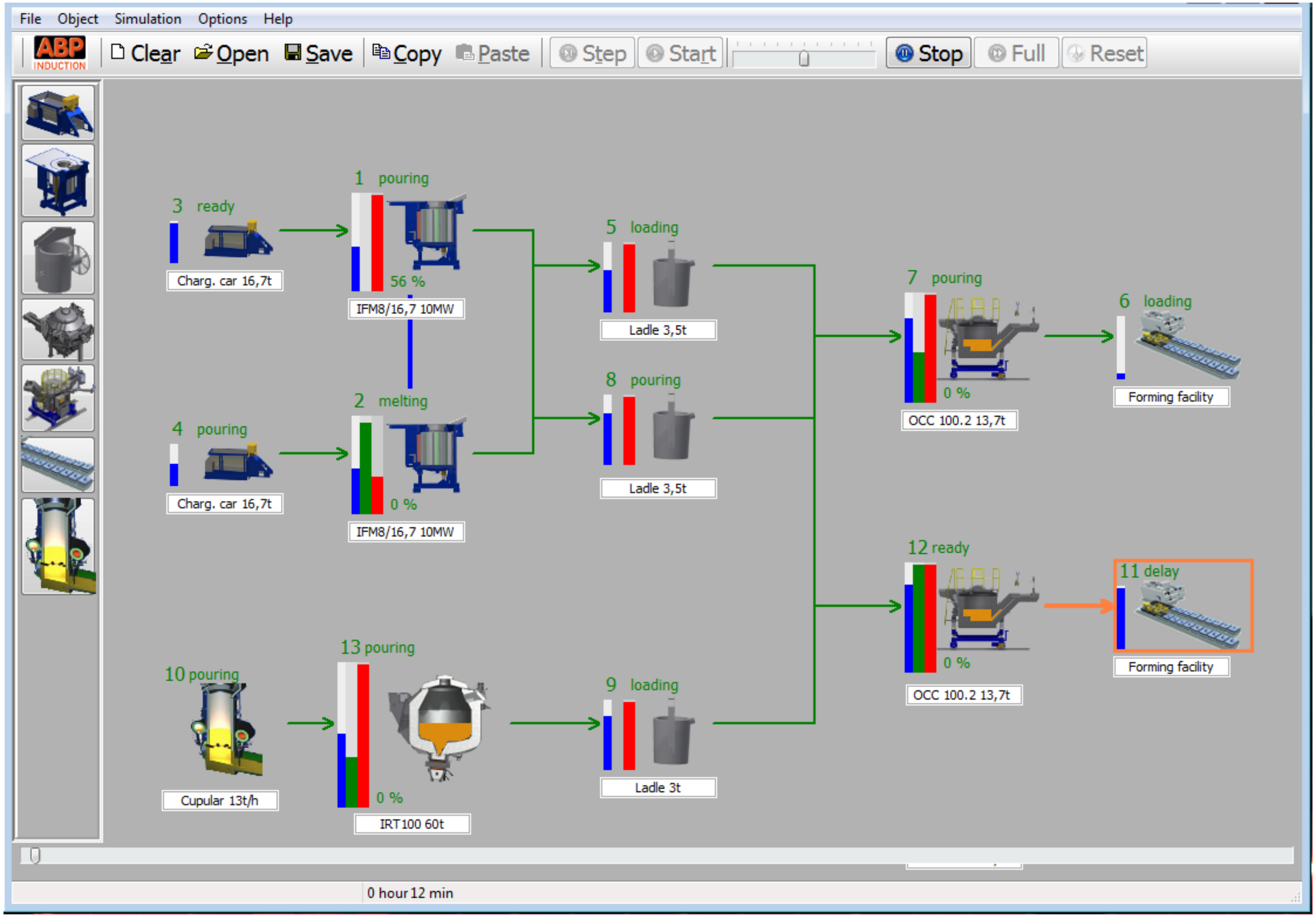


SUSTAINABLE TECHNOLOGY ABP INDUCTION

2. Ecology:

Energy saving – process optimization

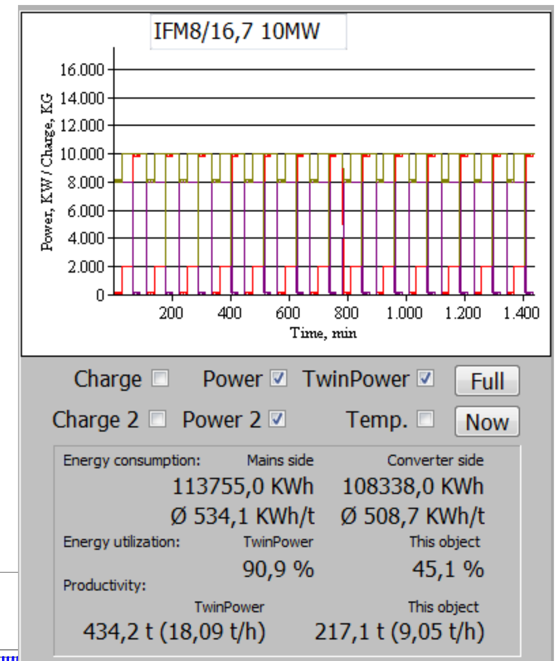
- Simulation of complete liquid metal transport to different sources

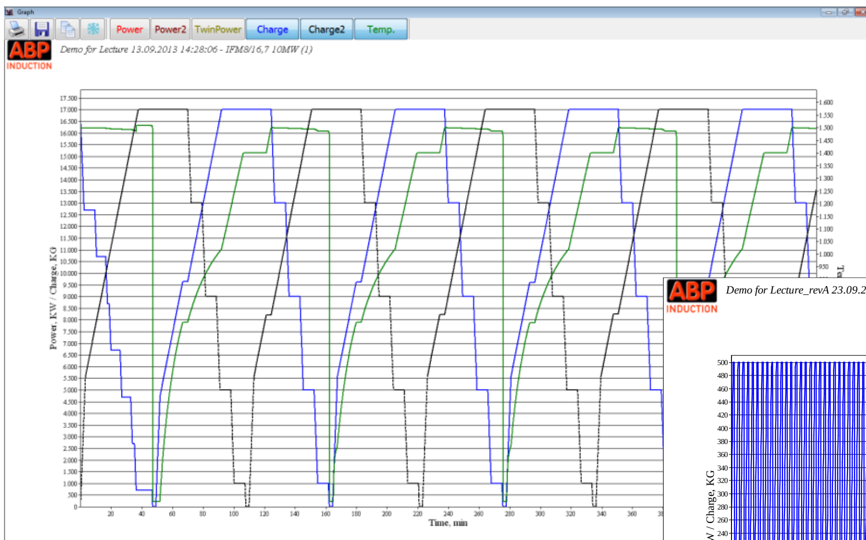


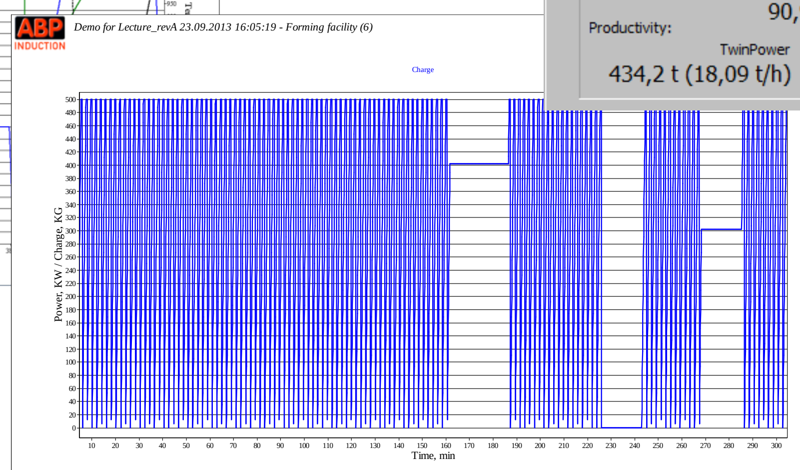
SUSTAINABLE TECHNOLOGY

2. Ecology:
Energy saving – process optimization

- Evaluation of simulation shows potential for improvements, e.g.:
  - Time management (process etc.)
  - Furnace design (content and power)
  - Melt transportation (ladle sizes etc.)
  - Energy savings via high process efficiency







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2. Ecology

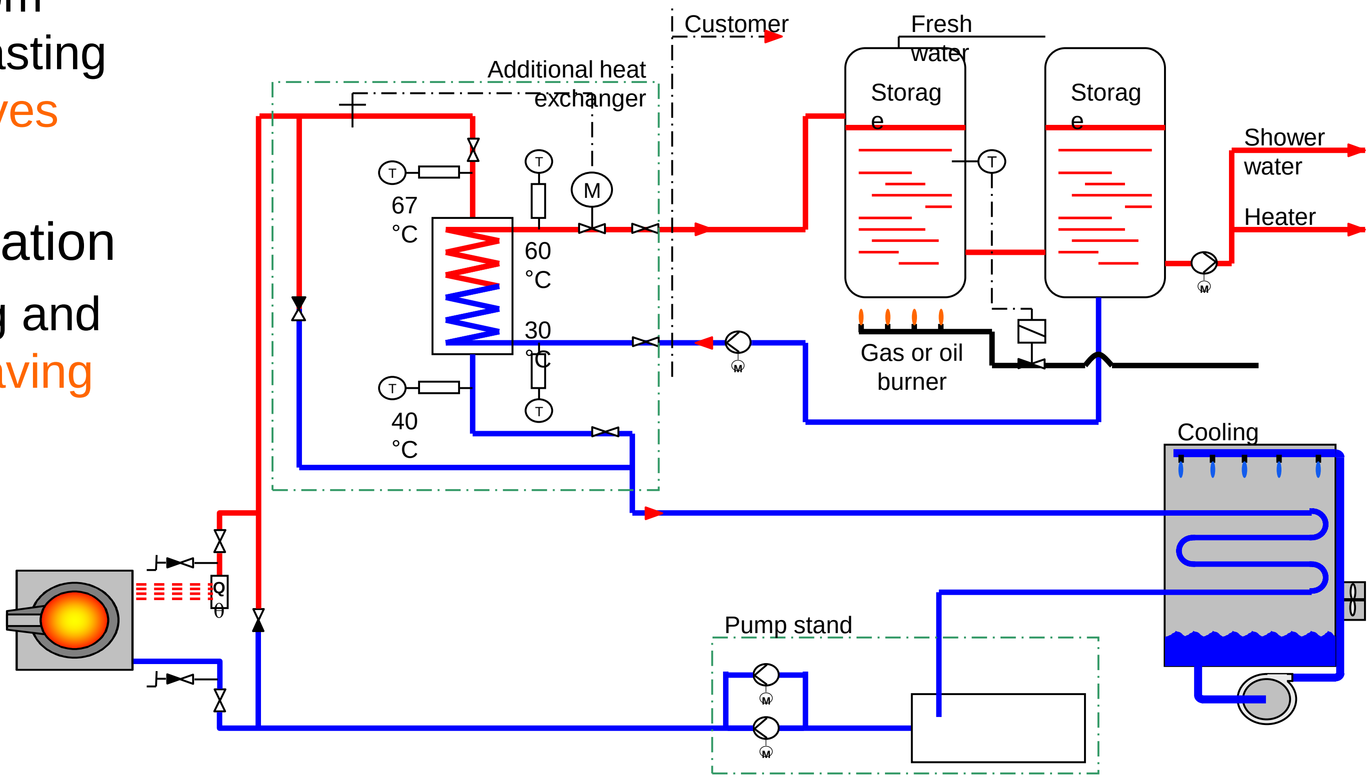
No environmental critical material

- Product design without usage of environmental critical material
- No usage of environmental critical material
  - NO glycol etc.
- No use of health critical material
  - NO asbestos
  - NO PCB etc.

2. Ecology:

Recycling

- Melting of Returns and Chips
  - using chips from subsequent casting treatments saves resources
- Waste heat utilization
  - for hall heating and warm water saving energy



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ABP INDUCTION

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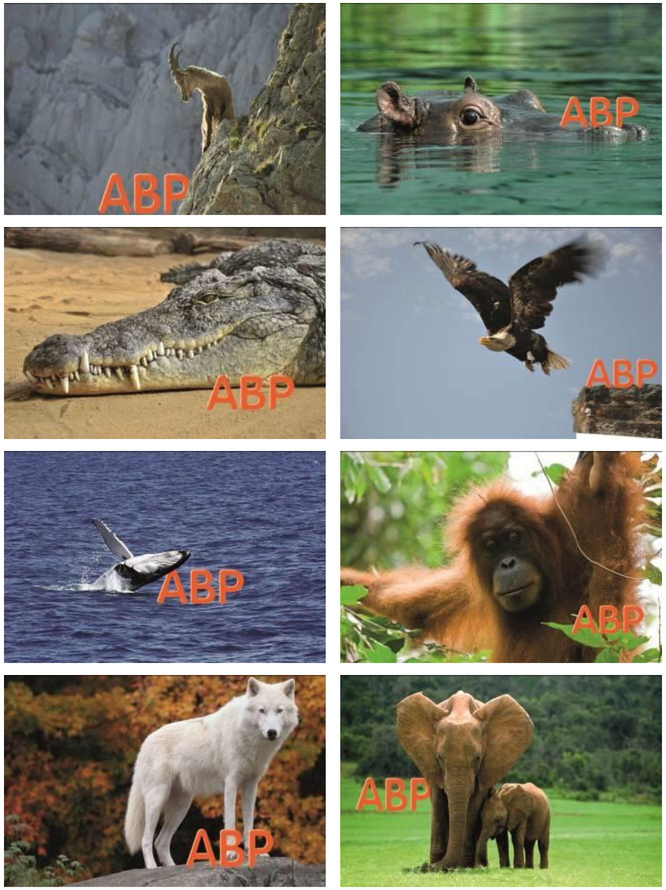

1. Sustainable Induction Technology
2. Ecology
3. Economy
   - 3.1 Reliable Equipment design
   - 3.2 Reliable Power supply
4. Sociology
5. Summary

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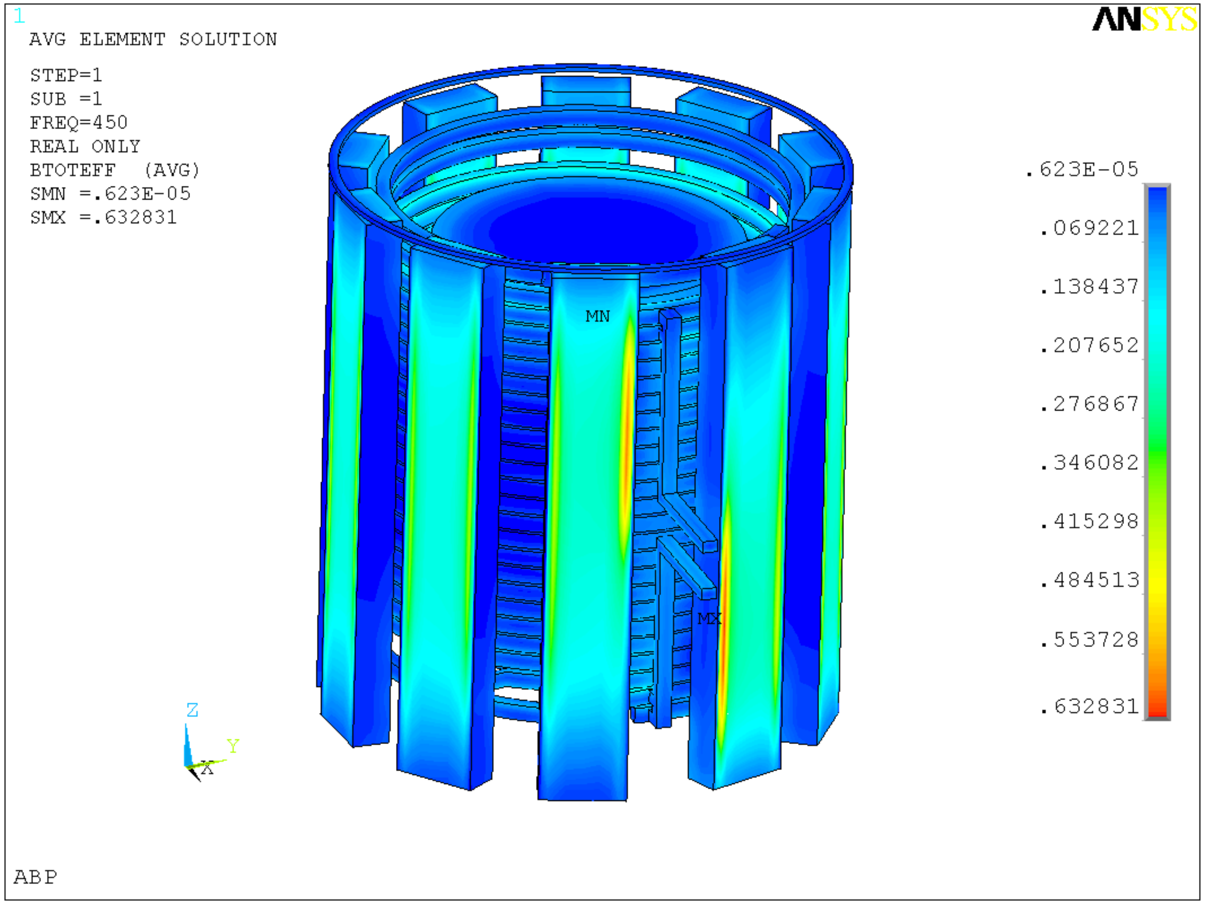
3. Economy:
Furnace design

- Customers request more and more specific furnace designs for their application:
  - Mechanical design
  - Stirring issues
  - Superheating issues
  - Etc.

- For furnace designs with max. efficiency, reliability, and mechanical stability, 3D calculations are used by ABP



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3. Economy:

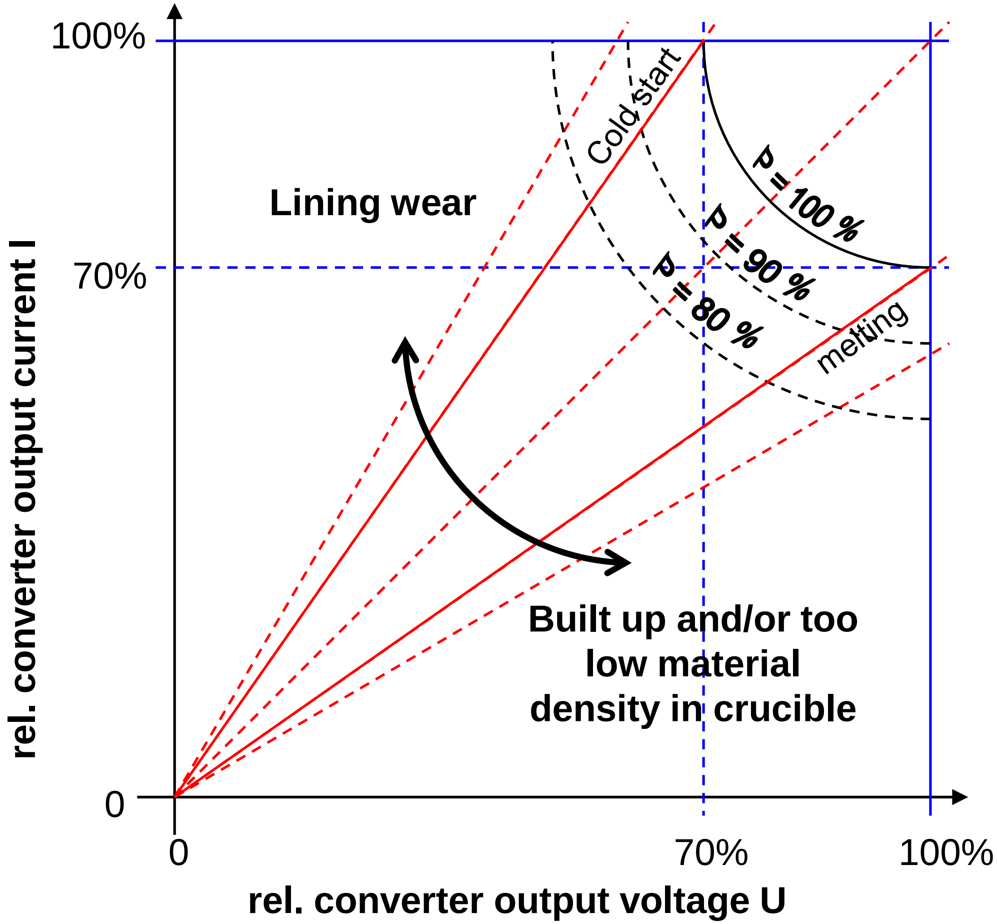
Power supply – constant power supply

Praxis shows:

- Furnaces are not always operated at nominal point
  → Power losses, Production losses are the consequence

ABP Solution:

- ABP converters are designed for 30 % higher power, getting full power also with not optimal filled crucible
  (= low material density)
- High power supply reliability based on overdesigned power parts



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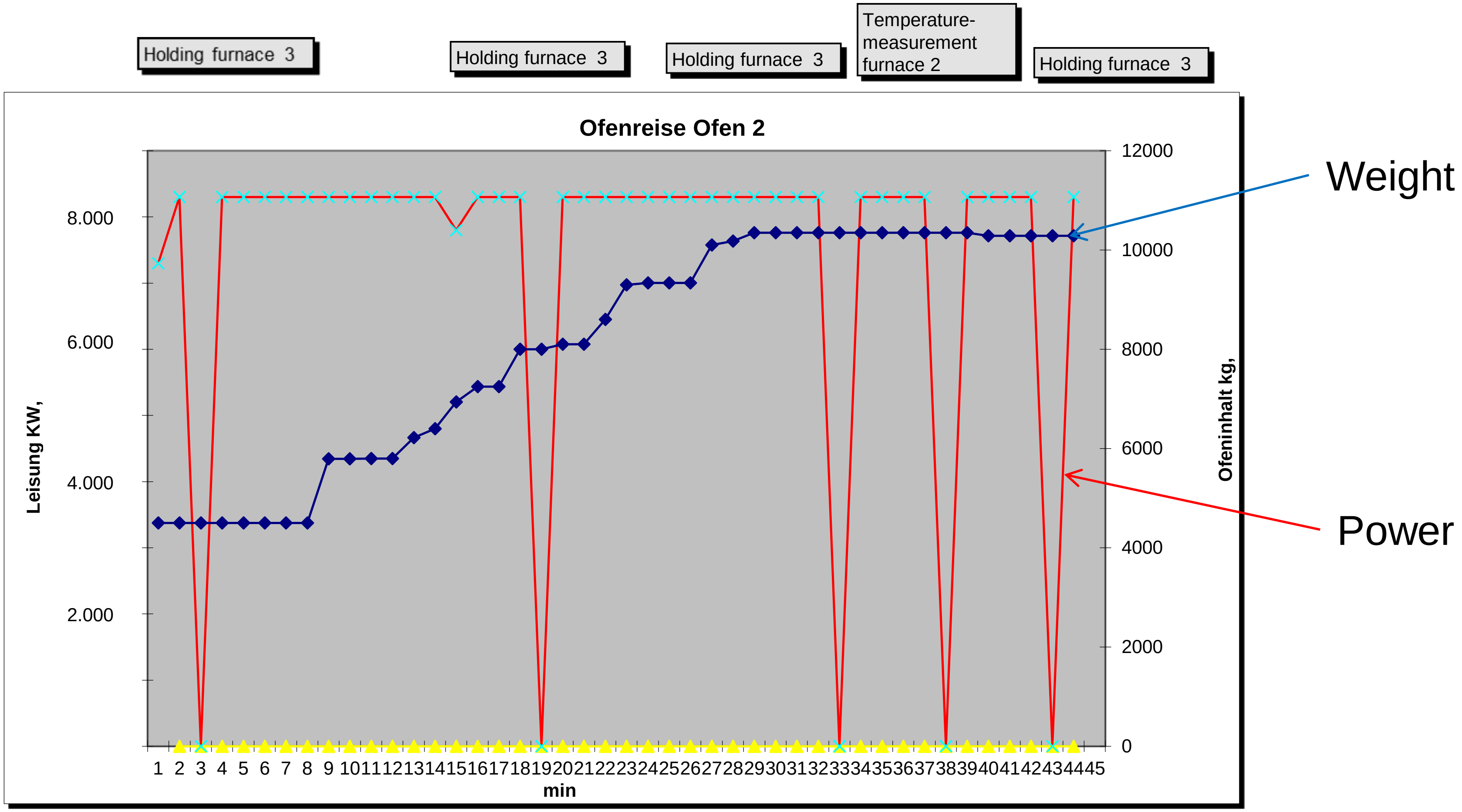
3. Economy:

Power supply – constant power supply

Renault power and weight monitoring, 3 furnaces (10 to), one melting, two holding mode, one power supply (8,3 MW)



SUSTAINABLE TECHNOLOGY
ABP INDUCTION

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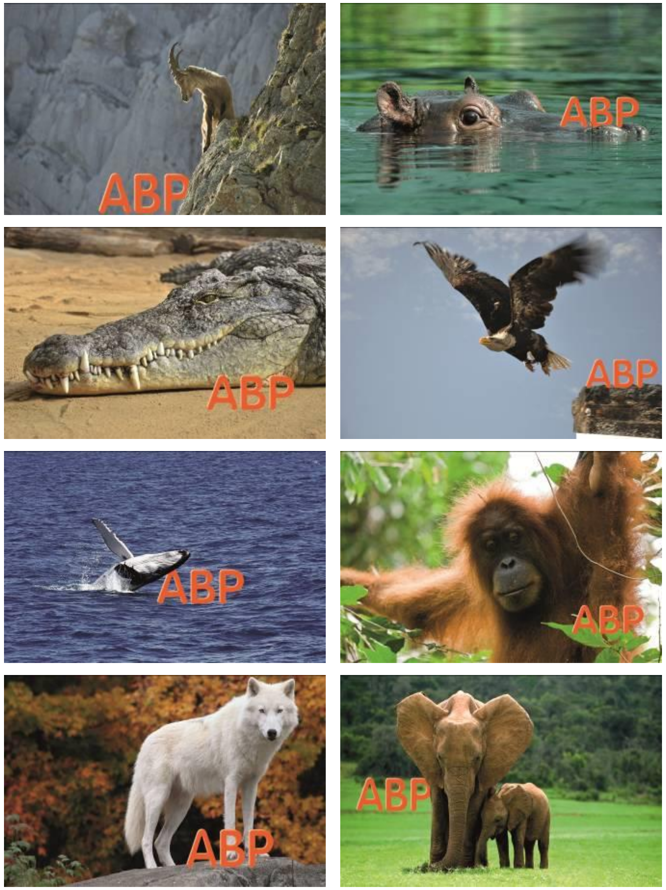
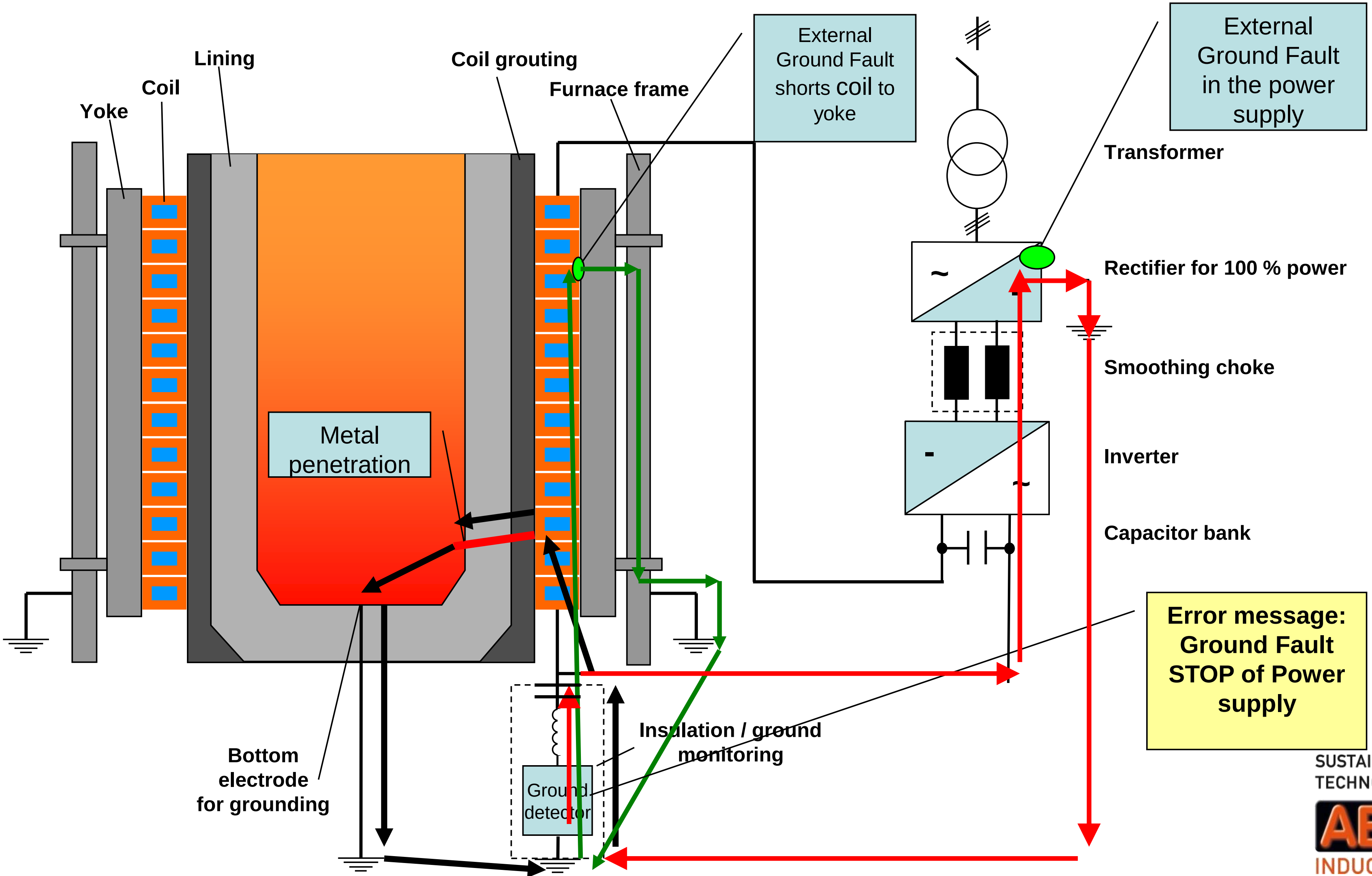


1. Sustainable Induction Technology
2. Ecology
3. Economy
4. **Sociology**
   - 4.1 Secured work place – ground fault detector
   - 4.2 Secured work place – Melt processor
5. Summary

4. Sociology:
Ground fault detection



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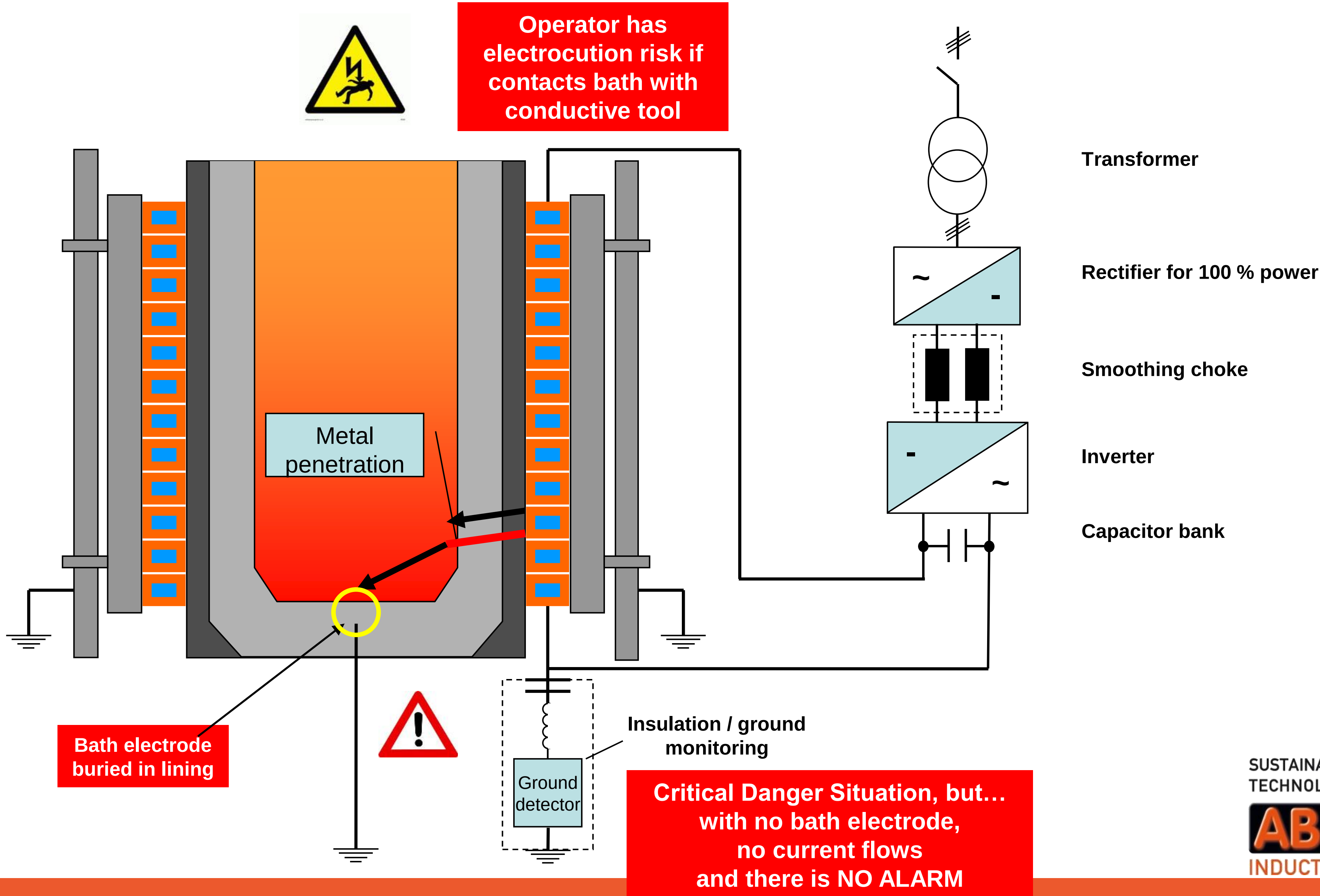
4. Sociology:

Ground fault detection – critical situation



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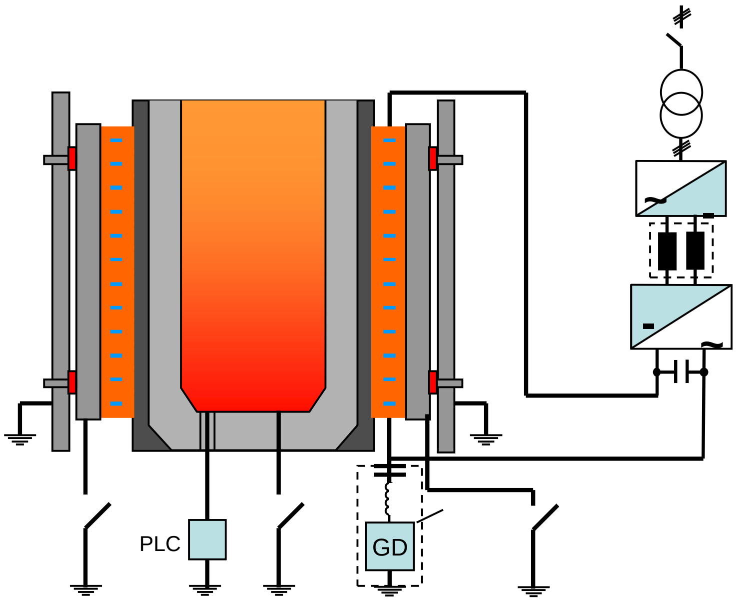
4. Sociology:
Ground fault detection

Improvements / Innovations:

- automatic activation after bypassing
  - e.g. after sintering of a wet crucible
- Automatic check of bath grounding
  - Instead of manual check
- Locating of ground faults
  - Decision-making support for operators for further measurements
- Hedgehog coil



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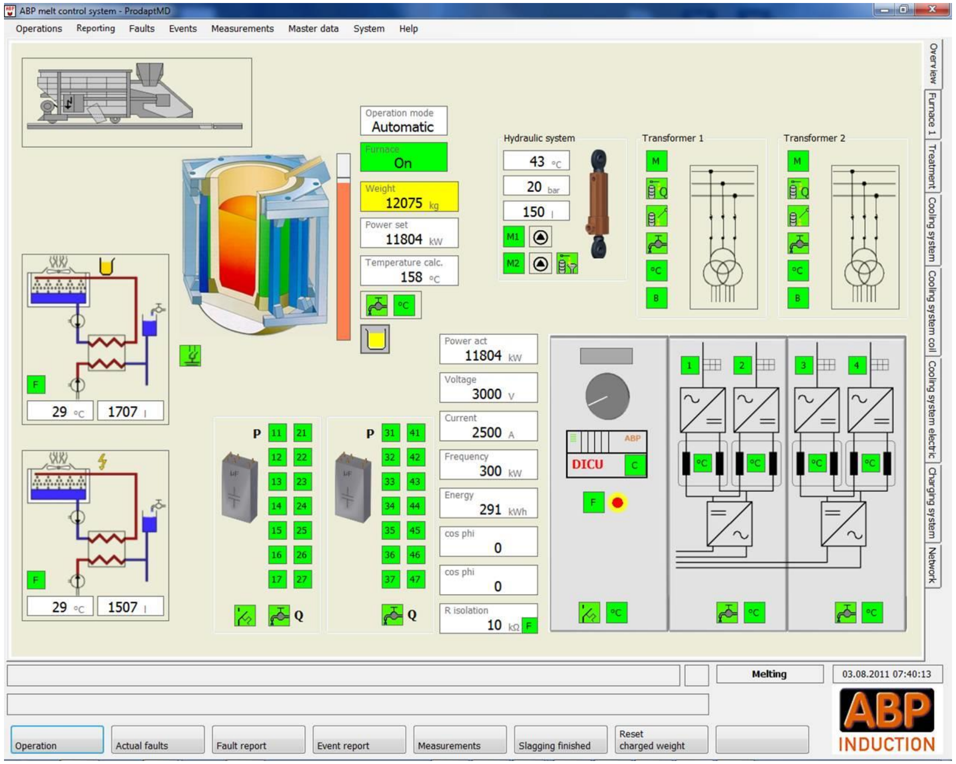
4. Sociology:

Melt processor

- Operation of melt processor systems
  - Save energy
  - Secure melt quality
  - Support operators
  - Reduce off-times



- Fully-fledged **PLC based** melt processors
  - For reduction of PC based breakdowns / errors
  - For enhancing workplace security via continuous monitoring of melting process

SUSTAINABLE
TECHNOLOGY

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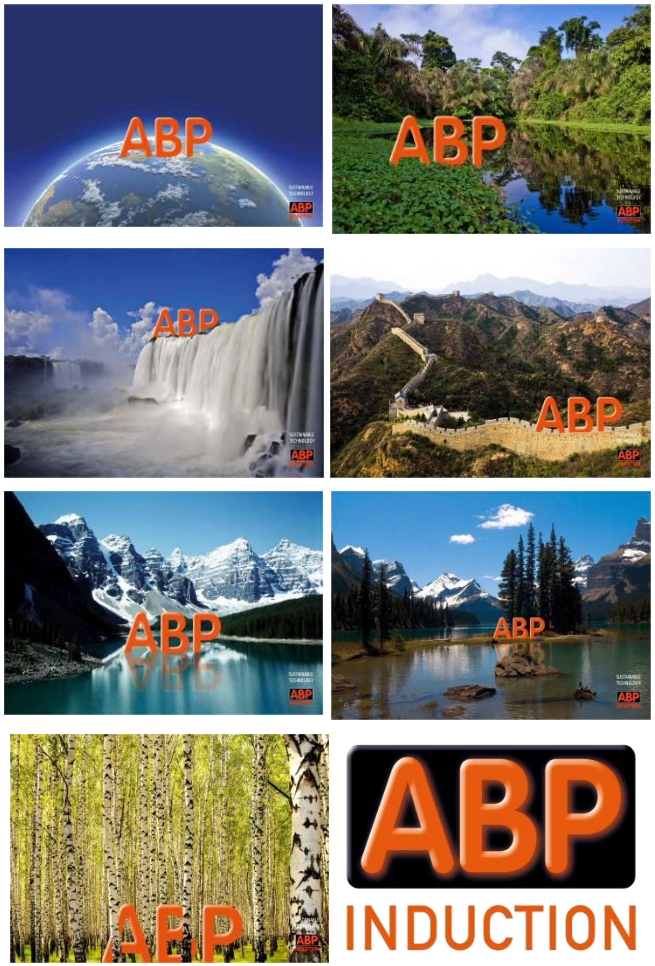

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5. Summary

Sustainable Induction Technology

Ecology

- Reduction of CO_2 emissions using induction furnaces as a melting aggregat
- Energy saving based on new coil design and process optimization
- No environmental critical material use such as PCB, Asbestos etc.
- Recycling by melting of chips

Economy

Reliable Equipment design using 3D simulation tools

Reliable Power supply – with constant power supply even under not optimal conditions

Sociology

Secured work place – ground fault detector protects the operator

Secured work place – Melt processor on SPS base

End