Weichenstellung für morgen | Setting the course for tomorrow

Future requirements from environmental, climate and resource policy

Substitute Building Materials Ordinance, Ordinance on Installations for the Handling of Substances Hazardous to Water, ProgRess – are resource efficiency and recycling politically desirable?

Dr. Henning Schliephake
CTO, Georgsmarienhütte GmbH
Content:

- The Georgsmarienhütte GmbH
- Steel in Germany
- Resource efficiency in steel making
- Legal situation
- Steel industries needs for suitable framework conditions
- Conclusion
Facts & Figures

- Manufacturer of quality and engineering steels
- Leading manufacturer in Germany
- Among Europe's top manufacturers

<table>
<thead>
<tr>
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<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tr>
<td>Turnover</td>
<td>644.000</td>
<td>632.000</td>
<td>610.000</td>
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<tr>
<td>Rolled products</td>
<td>644.000</td>
<td>682.000</td>
<td>678.000</td>
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<td>Employed</td>
<td>1.352</td>
<td>1.316</td>
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<td>(Annual mean</td>
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<td>without</td>
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<tr>
<td>apprentices)</td>
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STAHL 2015

Certification and Awards

1990 FORD "Q1" Award
1997 VW "Value to the Customer" Award
2002 FORD "Q1" Award

Quality

1990 DIN EN ISO 9001
1997 QS-9000
1999 VDA 6.1
2002 ISO/TS 16949

Environment

1990 DIN EN ISO 14001

Energy

1990 EN 16001
2005 Arbeitsschutzpreis „Euro-Cup 2005”
2011 Arbeitsschutzpreis „Schlauer Fuchs”

Safety

1990 Arbeitssicherheitssystem
1994 Unsere Hütte – meine Sicherheit

1997 today

2010
2012
2013

2010
2013

2013 Klimaschutz-unternehmen

2013 ISO 50001

2013 Klimaschutz-unternehmen

2013 ISO 50001
## Main products

### Ingots
- **Weight:** 3.5 t to 44 t
- **Molds:** square, octagonal, 16-sided

Additional ingot molds are available from Stahlwerk Bous GmbH.

### Steel Bars
- **Dimensions:**
  - 23 to 126 mm rd.
  - Incl. Special tolerances
- **Lengths:**
  - 6 to 10 m
  - Other lengths by arrangement
  - Shorts <100 mm

### Continuously Castings
- **Dimensions:**
  - 165 x 165 mm square
  - 240 x 240 mm square
- **Lengths:**
  - 3.5 to 7 m
  - Other lengths by arrangement

Additional continuously cast formats are available from Stahlwerk Bous GmbH.

### Bright Bars
- **Dimensions**
  - Peeled, polished and straightened as per: DIN EN 10278
  - Peeled, polished, straightened and ground up to tolerance band h6
- **Lengths:**
  - 3 to 10 m
  - Other lengths and short lengths by arrangement.
Main Applications

Market

ENGINE
- Fracture-split conrod
- Camshaft
- Common-Rail Injector Nozzle
- Gear shaft
- Steering rack
- Wheel hub

TRANSMISSION
- Piston
- Crankshaft
- Cardan shaft
- Knuckle
- Ball bearings
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World Production 1970/2014 (Million t/a)

- Steel is by far the most frequently used industrial basic material.
- The use of materials such as Magnesium or Titan has relatively increased, but it will remain on low level in medium term.
- Steel will keep its position as most important basic material because of its positive properties and a significant price advantage.
The biggest steel intensive sectors in Germany account for almost 4 bn employees, which is more than half of the jobs in overall Germany industry.
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The Role of Steel in Circular Economy CE:

- Steel is a **permanent material** => indefinitely recycling without losing the inherent properties.
- Steel is **never consumed but continuously transformed** => pressure on natural resources is lowered
- Steel can be **repaired, reused, remanufactured, recovered and recycled**
- Steel scrap can be **easier collected and separated** than others
- Steel scrap replaces natural resources
- Steel is multi-functional and **helps** to improve efficiency and environmental impacts

» **Steel as Enabler: making the CE happening**

**Resource efficiency by using steel scrap:**
Share of total crude steel production in Germany

- **Source:** Statistisches Bundesamt and own calculations
Main by-products sources in steel making (BF/BOF and EAF)

Iron ores
- Lump ores
- Fines

Coal

Coke

Sinter

Pellets

Blast Furnace

Oil, Gas or Coal

O₂

Hot blast

Hot Metal (27.1 Mio t)

Scrap (5.0 Mio t)

DRI* 0.4 Mio t

Crude steel

Portion: 68.8 % 29.5 Mio t 31.2 % 13.4 Mio t

* Direct reduced Iron

Source: Steel Institute VDEh

Dust from waste gas cleaning
Dust fine
Dust core

Dusts
EAF Slag

Metallurgical slags
Home scrap
Tinder/scale/cinder (iron oxid)
Pickling acids
Spent acids, bases & liquors
Spent refractories
Spent oils

Core dust
Sludge/fine dust
Dust from secondary dusting
BF slag (BFS)
Granulated BF slag (GBFS)

LD dust fine
LD dust core
Dust
LD Slag

Tar
Raw benzene
Sulphur
Sulfuric acid

Lump ores
Fines

Dust from waste gas cleaning
Dust fine
Dust core

Dusts
EAF Slag

Metallurgical slags
Home scrap
Tinder/scale/cinder (iron oxid)
Pickling acids
Spent acids, bases & liquors
Spent refractories
Spent oils

Core dust
Sludge/fine dust
Dust from secondary dusting
BF slag (BFS)
Granulated BF slag (GBFS)
**Result for the evaluation of several circuits in life cycle assessment**
(e.g.: Global Warming Potential)

- With each life cycle, the result converges closer to an asymptotic value.
- With this approach the result of the global warming potential after 6 cycles is <1000 kg CO₂ per ton of hot rolled steel.

**Graph:**

- Global Warming Potential (GWP) over LCs
- Even with conservative calculation of only 6 life cycles:
  - Real global warming potential: <1.000 kg CO₂-Eq./t Steel

Source: TU Berlin
Slag use Germany 2014

**Use of blast furnace slag, 2014**
- Granulated slag for cement: 85%
- HOS-B (mineral mixture): 12%
- HOS-B (special grades): <1%
- Other uses: 2%
- Internal consumption: 2%

**Use of steelworks slag, 2014**
- Circulation: 14%
- Landfill: 14%
- Fertilizer: 8%
- Construction works: 64%
Since 1946 about 1 billion tons of iron and steel slag have been produced in Germany. This is equal to:

- a volume of 322 Mio m³
- or
- 124 Cheops Pyramids
- a mountain nearly as high as 2 Eiffel Towers (325m)

Photo source: Nina Aldine Thune
Application of slag
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Examples for threats to slags in the iron and steel industry

EU

- Resource efficiency programme
- Circular Economy:
  - 1. draft 2014 on legal measures -> withdrawn
  - 2. draft *announced for End of 2015*, including wide basket of measures for further legal development

National

- German Resource Efficiency Programme (ProgRess) II
- Alternative Construction Material Ordinance
- Ordinance on installations handling materials hazardous to water
Keypoints on Circular Economy (CE) from Steel Industry’s point of view

- Enforce and harmonize EU waste legislation and national implementation
- A Permanent materials concept should become basis of CE, including an improved recycling definition
- Integrated approach:
  Recycling must be holistically feasible in terms of environmental benefits, economic profitability and technical feasibility
- Producer responsibility should take the full life cycle of products into account
- Industrial by-products should be privileged and supported in proven applications
Review of German Resource Efficiency Programme (ProgRess II)

ProgRess II will **enlarge the scope** to fossil and biotic energies and streaming resources

But it further on does not tackle …

- a holistic approach
- interdependencies, double regulation or an assessment of needs
- (multiple) recycling and its advantages
- Interactions with European and national initiatives (e.g. alternative constructional material)
- problems with indicators.

Nor does it mention by-products such as **slags**
MS may jeopardize EU aims: e.g. German Ordinances

- on alternative construction material

- Aim: nation wide unique regulation on the use of alternative construction material
- Present draft still requested limit values for leachates
- Federal States request additional limits for solid contents
- In total up to 50% of slag applications are at risk in Germany

- on installations handling substances hazardous to water

- Aim: Nation wide ordinance for nationally standardized execution generally supported but
- Problems with solid mixtures classified as „hazardous to water
- Solution for most slags realised by extraordinary and costly examinations
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Explanations:

• EU-Roadmap on Resource efficiency
• Directive on Industrial Emissions (IED)
• German Ordinance on Alternative Building Material (EBV)
• Waste Framework Directive (WFD)
• German Resource Efficiency Program (ProgRes)
• German Closed Substance Cycle Act (KrWG)
• Directive on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
• Ordinance on installations handling materials hazardous to water (AwSV)
• Regulation on Classification, Labeling and Packaging of Substances and Mixtures /Globally Harmonized System (CLP/GHS)
• European Regulation establishing criteria determining when certain substances cease to be waste (End of waste)
Framework conditions to promote Circular Economy:

- Politian's commitment to industrial activities and acceptance promotion
- Holistic approach in politics
- Clear legislation to avoid overlaps (e.g. REACH/WFD), mis-interpretation or incompatibilities
- Support by-products and their usage (e.g. public procurement)
- Achievable limits and specifications for by-products and waste application
- Don’t jeopardize sustainability by single-sided environmental requirements
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Conclusions

• Scrap and slags are valuable materials and guarantee sustainable use of resources
• Nevertheless, both terms are often saddled with negative associations
• The society doesn’t see the steel industry as modern, clean and innovative
• In contrary, terms like recycling, permanent material, efficiency, enabler or problem solver – which stand for steel properties - raise positive emotions and associations
• Thus, politicians and industry are requested to work together for acceptance and image improvement
• Else: No output – no production
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Future requirements from environmental, climate and resource policy

THANK YOU FOR YOUR ATTENTION

Dr. Henning Schliephake
CTO, Georgsmarienhütte GmbH