

RFCS Impact on EU Steelmaking

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RFCS

- Established in 2003 as follow on from ECSC
- 40 M euros annual allocation
- Annual call with deadline of 15th September, and startup following July
- Research Projects (60% funding, 'direct costs')
- Pilot and Demonstration (50% funding)
- 3.5 year duration of project (4.5yrs from initial concept)
- Average funding/project 1-2M Euros/project
- Separate from Horizon 20/20 Programme but complementary

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RFCS – benefits review 2003-2014

- 23 Steel projects reviewed in detail
- 100M euros to beneficiaries
- Projected 400M Euros benefit to all beneficiaries
- On average 1 Euro spent in RFCS is equivalent to 14Euros benefit

Based on published EU Commission report

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RFCS Steel Technical Groups

- TGS1 Ore Agglomeration and Ironmaking
- TGS2 Steelmaking Processes
- TGS3 Casting
- TGS4 Hot and cold rolling processes
- TGS5 Finishing and Coating
- TGS6 Physical Metallurgy and design of new generic steel grades
- TGS 7 Steel Products and applications in Automotive, Packaging, home appliances
- TGS8 Steel Products and applications for building, construction, and industry
- TGS9 Factory- wide control, social and environmental issues

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RFCS –TSG2 Project Categories 2003-2014



Generic (scrap, waste, environment, yield e.t.c.) - 23



Control systems/ monitoring - 12



Product quality/ advanced steels (mainly inclusions, low P, N) - 10

Primary 32  Secondary 13

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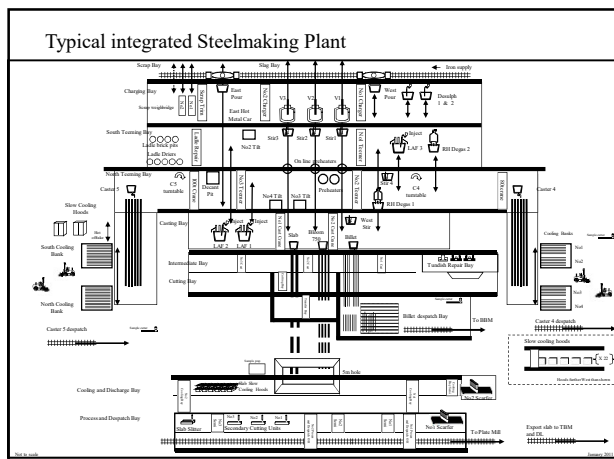
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RFCS impact on Steelmaking Performance

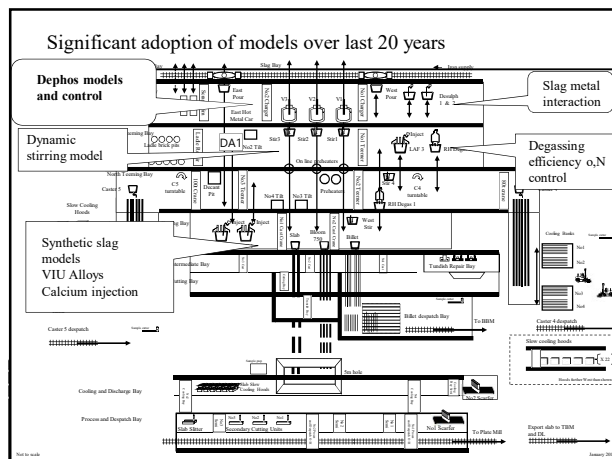
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Typical integrated Steelmaking Plant



Significant adoption of models over last 20 years



Impact of model development

Model	improvements	impact
DePhos	Improved phos control and consistency	Reduced treatment times, cost, product quality
Dynamic stirring	Increased effectiveness of stirring	Cleanness, yield, cost,
degassing	Control of O, N	AHSS processing,
Slopping	Reduced slopping and dynamic intervention	Yield, cleanliness
VAD/AOD for EAF	Increased control. Dynamic control	Reduced treatment, cost, VIU alloys, energy
Secondary Steel, LAF/CasOB	Optimal slag chemistry, slag metal interaction	Cleaness, alloy retention, O,N control
Scrap models	Increased scrap utilisation and Viu for BOS and EAF	Reduced cost, increased product quality,

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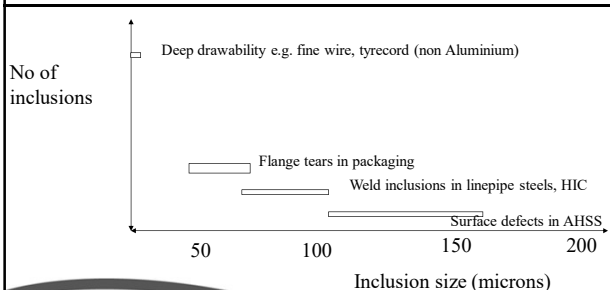
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Clean Steel initiatives

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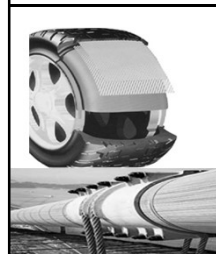
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Inclusion impact on products

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Rod and Wire - Fine wire down to <0.175 diameter



Grade	Status	Tensile Strength (MPa)
Normal Tensile	Current	2850
High Tensile	Current	3350
Super Tensile	Current	3600
Ultra HighTensile	current	4000
	Future	4600-4800

Bridge steels reduction in strain ageing

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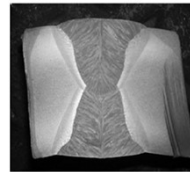
Packaging

- 20 years ago projection that steel packaging would move to emerging steel markets
- Threat remains including from alternative materials
- Improvements in steelmaking quality and cost have mitigated this threat, and packaging remains a significant volume generator for the EU steel industry

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Linepipe steels



- Significant growth in linepipe steels last 20 years
- Significant penetration of Accelerated Cooling process requiring controls on segregation, low SPO₂N, cleanliness (HIC)

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Automotive steels

GI FF Quality surfaces	GI FF+ High quality surfaces	GI FF++ Premium surfaces Reduced galling	Premium surfaces Optimized pressing
<ul style="list-style-type: none"> • RPc >60 cm⁻¹ • Wa_{0.8} 0.35–0.53 μm • Ra typical 1–1.5 μm 	<ul style="list-style-type: none"> • RPc >75 cm⁻¹ • Wa_{0.8} <0.47 μm(formed) • Ra typical 0.9–1.4 μm 	<ul style="list-style-type: none"> • RPc >90 cm⁻¹ • Wa_{0.8} <0.42 μm(formed) • Ra typical 0.9–1.4 μm • Zn layer tol. 15 g/m² 	<ul style="list-style-type: none"> • RPc >75 cm⁻¹ • Wa_{0.8} <0.47 μm(formed) • Ra typical 0.9–1.4 μm
XF lubrication			

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Automotive

- Massive growth in AHSS for automotive
- Thinner lighter stronger impacts steelmaking and particularly inclusion morphology and type
- Surface quality rate controller
- Significant impact on secondary steelmaking requirements

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RFCS Impact

- Work in RFCS on Steelmaking has enabled the sustainability and competitiveness of the EU steel Industry, mitigating financial crisis and Imports from China
- Has enabled the growth in differentiated product strategy
- Significant adoption of models enabling greater control, reduced treatment, reduced reverts,
- Reduction in emissions and waste

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RFCS Impact - Collaboration

- Consolidation in EU steel Industry in last 20 years
- Reduction in traditional Corporate R&D model promotes collaboration
- Loss of experience and knowledge across the industry: collaboration necessary to sustain knowledge, and create critical mass

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RFCS Future Impact?

Theme	Steelmaking
Industry 4	Connect models in closed loop
Instrumentation	Online measurement of inclusions
Circular economy	Increased scrap segregation and utilisation. VIU alloys, innovate to zero waste, zero emissions
Cost	Eliminate secondary steelmaking? Continuous process

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Thankyou!!

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