

Breakthrough of High Strength Steels in Construction

Ilkka Sorsa, Ruukki Construction

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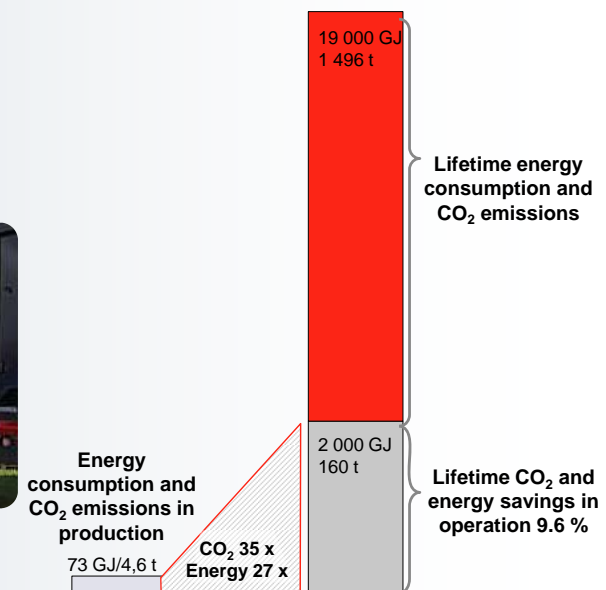


Energy-efficient steel solutions for better **LIVING. WORKING. MOVING.**

Benefits of HSS in vehicles are based on savings in life cycle costs (LCC)

By using HSS in container during life time of container

- 60 000 litres less fuel used
- 160 t less emissions of CO₂



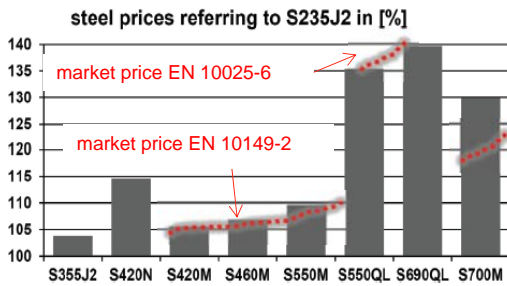
* Tandem trailer, 150,000 km/a, lifetime 10 a



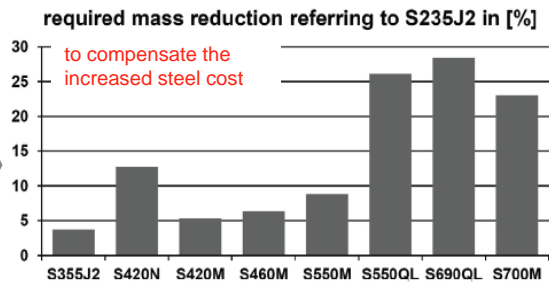
Benefits of HSS in Steel Construction are based on savings in value chain



- Steel price and processing costs will guide the selection of steels
- Weight and costs savings in order of 20-40% and 10-20% respectively can be reached



R. Stroetmann: High Strength Steel for improvement of sustainability, EUROSTEEL 2011, Budapest, Hungary

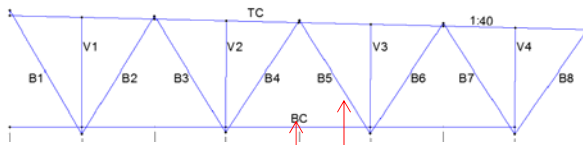


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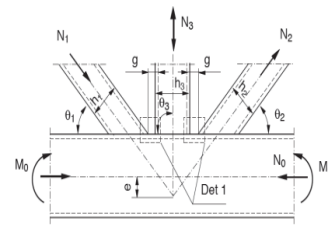
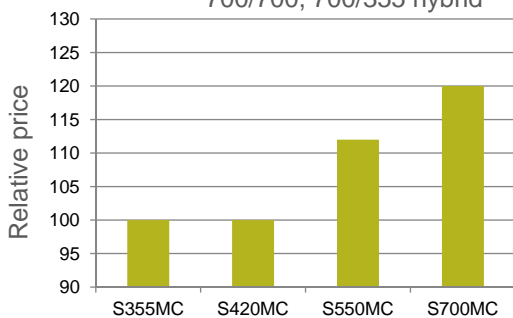


In steel constructions costs have to be optimized

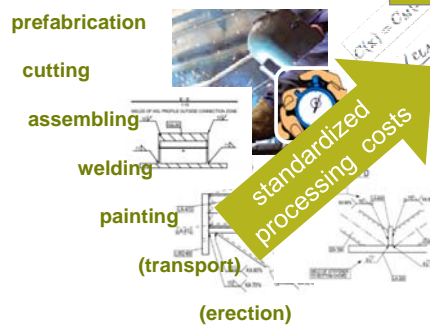
Case study tubular girder truss of 30m span



Materials studied:
 CFRHS 350/350, 420/355 hybrid
 550/550, 550/355 hybrid
 700/700, 700/355 hybrid



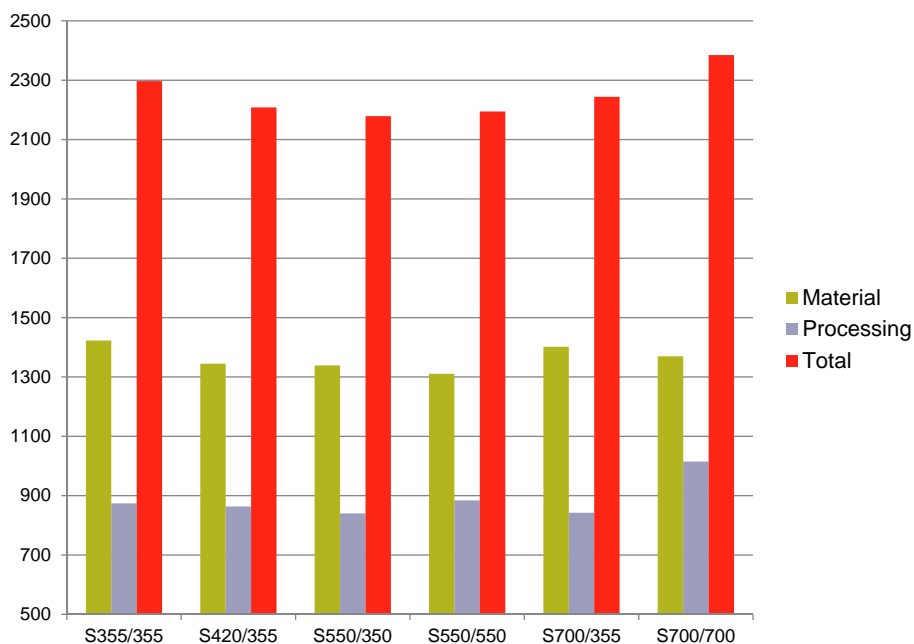
material costs → Cost optimization



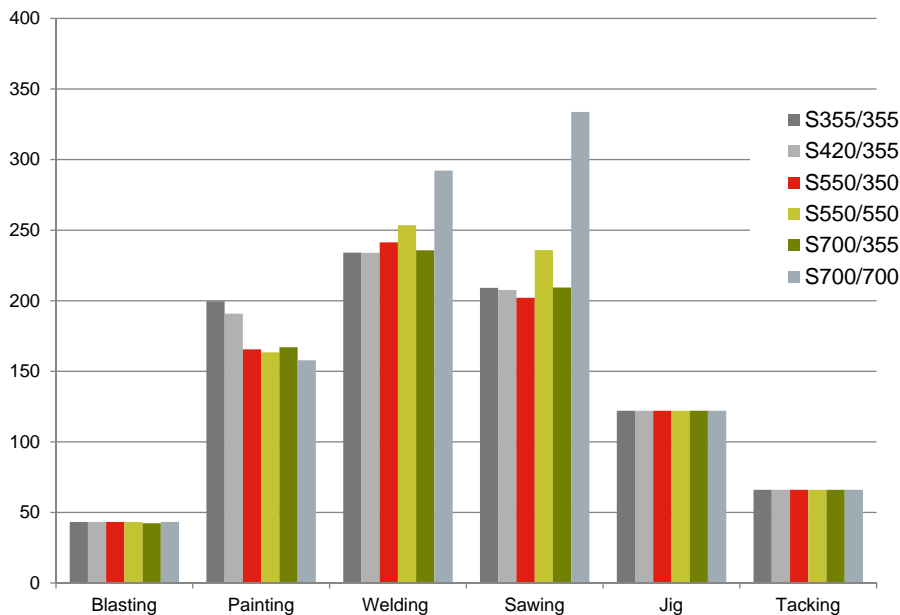
Relative cost and weight of 30 m span truss when total costs are optimized



Cost of 30 m span truss when total costs are optimized



Manufacturing costs of 30 m span truss when total costs are optimized



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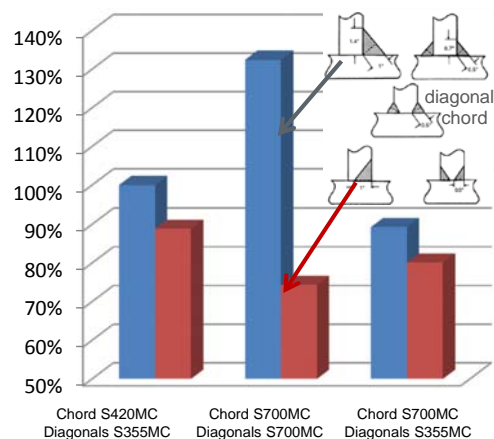
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Effective use of HSS calls for redesign of construction

- Reduction of the volumes of welded joints, e.g. joint type (see picture), bolted joints,...
- Introduction of low energy welding technologies, e.g. low energy MAG, laser welding,...
- Introduction of laser and plasma technologies, e.g. in cutting
- Redesign of manufacturing procedures, e.g. welding sequences
- Increasing automation in processing, e.g. mechanized welding, robotics,...

Effect of the joint type on truss welding cost



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Will HSS make a breakthrough in Steel Construction?

Steel market size in construction sector in EU 27 and CIS countries

Country / area	Steel usage / construction ¹⁾
	Mt
UK	3,9
Benelux	2,5
Rest of EU 15 ²⁾	3,7
GER	7,0
FRA	3,7
Italy	4,8
Spain	1,7
Poland	3,6
Other CE	4,1
CIS	10,5
TOTAL	45,5

Evolution drivers:

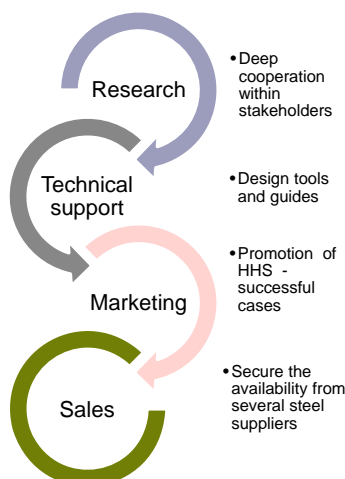
- new HSS production technologies and products
- improved HSS design knowledge and tools
- improved processing technologies of HSS
- availability of HSS

Value chain costs play the key role in evolution

but other factors like environmental footprint and improved architectural appearance can't be underestimated.

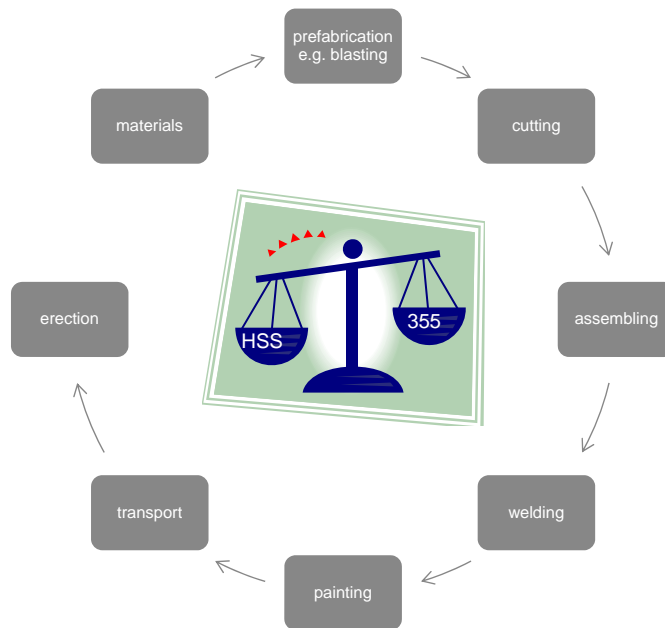
Research and promotion is needed

Despite of its necessity the evolution takes time because of need for updating standards responding to the latest research results, introduction of factual evidence of benefits and assurance of the availability of HSS



- more studies are required for validation of the results of HSS and to renew codes
- new generation manufacturing technologies have to be adopted in steel construction workshops
- design and processing guidelines and their training is needed
- successful case stories are needed to show benefits of HSS
- availability of HSS from several steel suppliers has to be assured

THANK YOU FOR YOUR ATTENTION!



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