



ArcelorMittal

Lightweighting steel

Atelier A3 : Nouveaux matériaux pour l'automobile : vers l'allègement ?

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Presentation Outline

- S-in motion
- New steel products
- Life Cycle Assessment



The world's number one steel company

- ArcelorMittal is the world's leading steel company, with operations in more than 60 countries. An industrial presence in over 20 countries exposes the company to all the key steel markets, from emerging to mature, positions it will be looking to develop in the high-growth Mercosur, Chinese and Indian markets.
- ArcelorMittal generated revenues of \$124.9 billion in 2008 and \$65.1 billion in 2009, with a crude steel production of 103.3 million tonnes in 2008 and 73.2 million tonnes in 2009.
- ArcelorMittal is leader in all major global steel markets, including automotive, construction, household appliances and packaging, with leading R&D and technology, as well as mining interest and downstream operations including distribution networks.
- Through its core values of sustainability, quality and leadership, ArcelorMittal commits to operating in a responsible way with respect to:
 - The global climate change challenge through its efforts to develop breakthrough steelmaking technologies and nature friendly steel-based technologies and solutions
 - The sustainable management of the environment and of finite resources
 - The health, safety and wellbeing of its employees, contractors and the communities in which it operates



ArcelorMittal steel solutions for light, safe and cheap vehicles

- Extensive use of AHSS (Advanced High Strength Steels) allows to reduce the weight of body in white, closures and chassis parts
- In general, the use of AHSS often allows to reduce the cost
- Example of a vehicle made with optimized steel solutions :

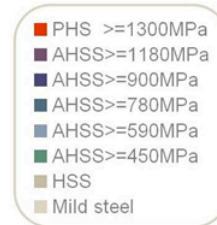
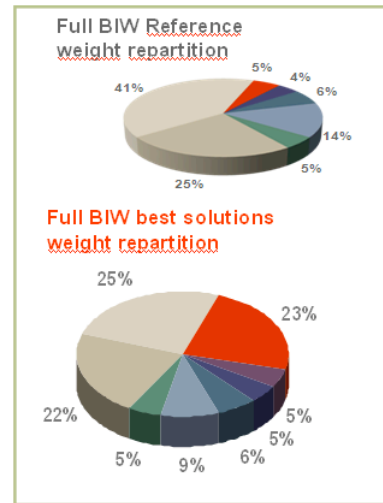
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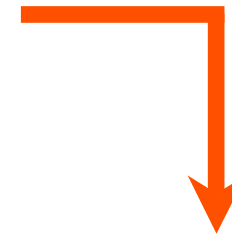
S-in motion: an example of Steel solutions to reduce weight with high crash performances

The extensive use of AHSS allows :

- to reduce the thickness of the steel used and therefore the weight
- to increase the crash behavior



48% mass AHSS >= 590 MPa Vs 29% on reference



Best solutions for BIW
 → **20% weight saving** on structural components
 Or **75 kg weight saving** for BIW closures and chassis

• **Some key points of the project:**

- C-segment reference vehicle
- All steel components
- Advanced High Strength Steels, Stainless, Tubes, LaserWelded Blanks, long products
- Partnerships with Magnetto, Gestamp
- Worldwide requirements
- Roll out from September 2010



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Crash requirements of Body In White



ArcelorMittal

**High energy absorption
(front/rear impacts)**

**Crash stiffness
(front or side impacts)**

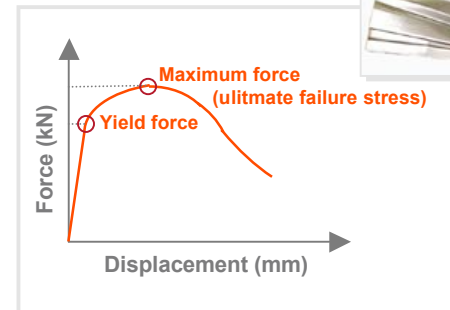
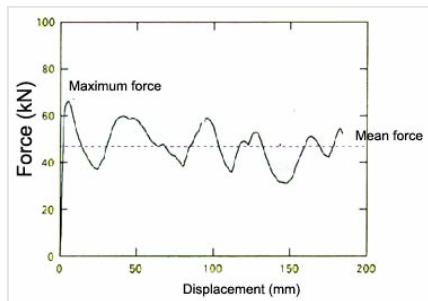
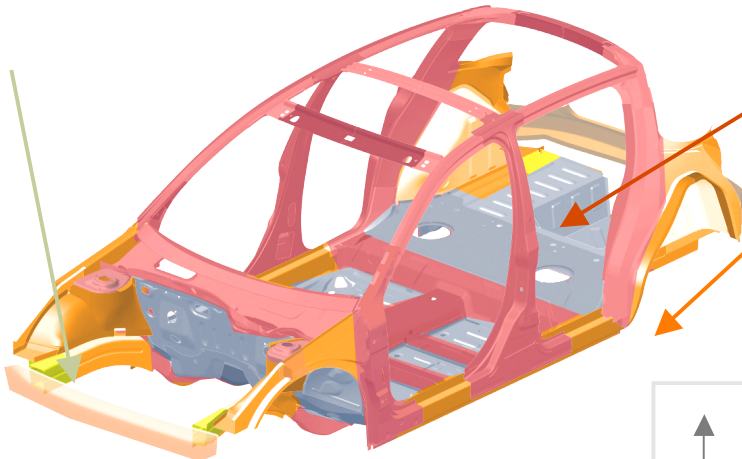
Energy Absorption
During Axial
Compression test

Stiffness
Low Absorbed Energy
Controlled Deformation

Axial
Compression test

Controlled Deformation

Stiffness 3D
bending test



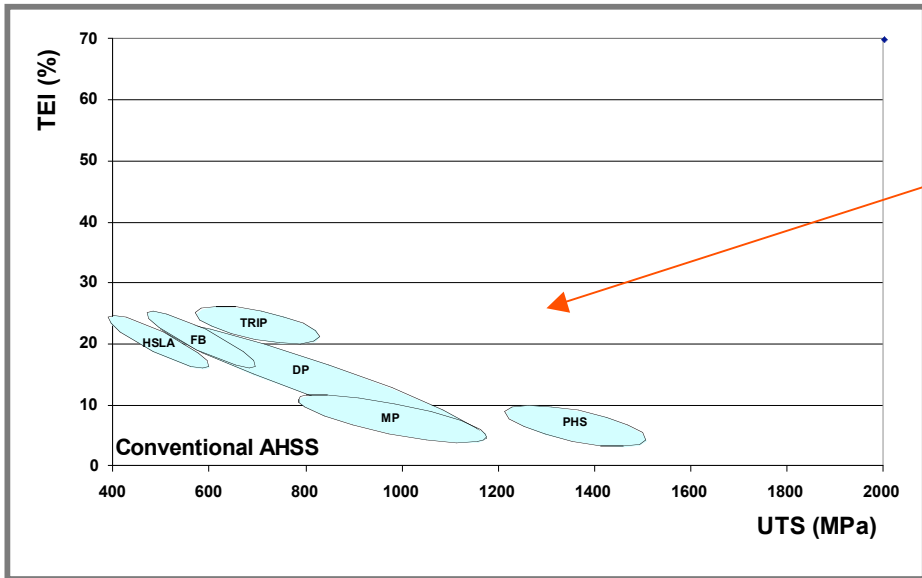
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High efficiency of new ArcelorMittal steel grades for crash management

New products crash characterization and processing guidelines at ArcelorMittal R&D labs

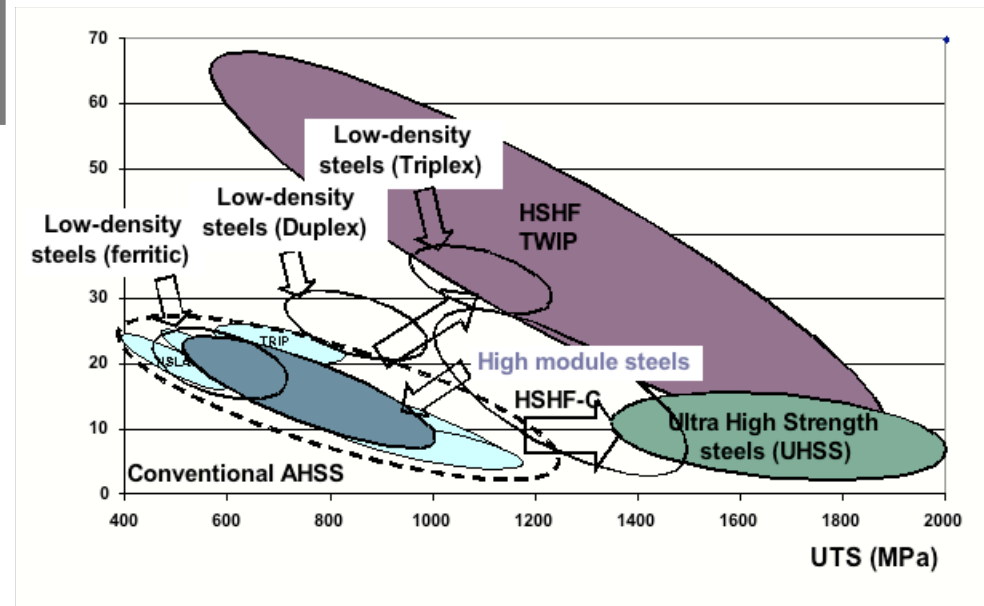
Advanced High Strength Steels New steels developments

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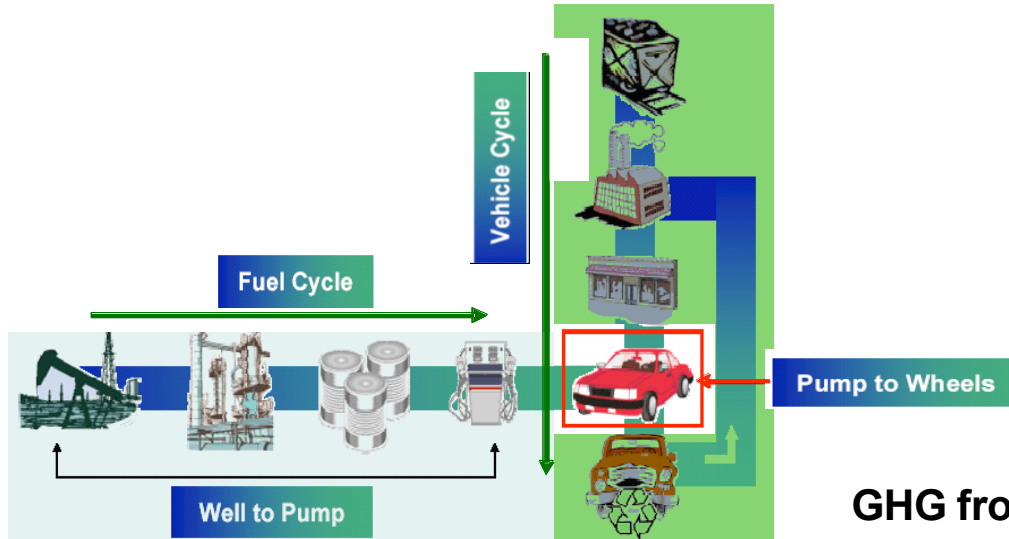
With ArcelorMittal current AHSS portfolio, we can reach 20% of lightweighting (see example of S-in motion)

The future AHSS offer is designed to reach further lightweighting



Life Cycle Assessment (LCA) of Greenhouse Gases

LCA is needed to avoid Unintended Consequences



GHG from Production (in kg CO₂e/kg of material)

Material	GHG from Production (kg CO ₂ e/kg)	Context
Steel	2.0 – 2.5	Current Average GHG Emissions Primary Production
Aluminium	11.2 – 12.6	
Magnesium	18 – 45	
Carbon FRP	21 – 23	

Validated Model: ISO Critical Review Panel:

- 2 university professors (Japan, U.S.)
- Automotive manufacturer (U.S.)
- International Aluminium Institute (Europe)

Footnotes:

- All steel and aluminium grades included in ranges.
- Difference between AHSS and conventional steels less than 5%
- Aluminium data - global for ingots; European only for process from ingot to final products.

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