STEEL PERSPECTIVES FOR THE AUTOMOTIVE INDUSTRY
Introduction

“You can have it any color, as long as it’s black.”

H. Ford
Introduction

Taub et al, 2007
Introduction

Material Choice

- Safety
- Production
- Performance
- Price
Introduction
Automotive Steel Consumption Outlook

- Production Trend
- Consumption Trend
- Alternatives
- Strategic Objectives
Production Trend 2000-2020

World Automotive Production & Forecast

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Mass Trend 2000-2020

Average Vehicle Mass - Data & Projection

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Composition

- Average European material weight distribution

2011

2020 - Estimation
Steel Consumption Trend

World Automotive Steel Demand

Thousands of tons

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Steel Demand by Regions

Share in steel demand for automobiles of the different regions

- European Union
- North America
- South America
- Asia (except China Japan & S.Korea)
- China
- Japan
- Europe (others)
- S. Korea
Mass reduction strategies

- 3 Technical paths to reduce mass:
  - Reduce thickness (e)
  - Reduce material density (\(\rho\))
  - Reduce Surface (S)

\[ \text{Mass} = e \cdot S \cdot \rho \]

Source: Ducker Worldwide
Priorities

High Strength Steels
Potential savings ~50-70kg

Use all the potential of steel technology

Aluminum Alloys
Potential savings ~150kg

Use more Aluminum

Polymers
Potential savings ~200kg

Study the possibilities

Practicality of implementation
Research & Development

![Diagram of car materials comparison]

Source: PSA Peugeot-Citroën

Source: Goede et al.
Recycling & Circular Economy

Recycle

Mining & Material manufacturing

Suppliers

Car Manufacturers

Sales & After Sales

Users

ElVs

Energy Recovery & Landfill

Reuse

Remanufacture

Maintenance
1. Weight of cars & Steel incorporation are decreasing

2. Stable Steel Demand

3. Multiple mass-optimization strategies

4. Design of new steel grades and recycling
‘Nothing is impossible, particularly if it is inevitable’

THANK YOU.
Weight Contributors
Detailed Composition

Average 2010 car mass composition

Steel 64%
Non Ferrous metals 7%
Fluids 5%
Glass 2%
Others 1%
Plastics 21%

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From U.S. EPA and NHTSA:

“the likely deleterious safety effects [...] may be close to zero, or possibly beneficial if mass reduction is carefully undertaken in the future”
Downsizing vs Mass Reduction

- **Downsizing**
  - Increased sales
  - Reduced sales

- **Mass reduction**
  - Both models redesigned with mass-reduction technology

Lutsey 2010.