ROLE OF STEEL IN FUTURE MOBILITY

Hesham Ezzat
Steel Market Development Institute
Future Mobility

- A gradual shift in transportation sector towards more efficient and affordable vehicle sharing
- Will not exclude individual ownership as part of the bigger picture
- A catalyst for significant innovations within the automotive industry
- An opportunity to better the quality of life through enhanced mobility and reduced congestion and pollution

Broad Interactions

- Manufacturing Systems
- Societal Influence
- Energy Infrastructure
- Automotive Manufacturers
- ACES Vehicles
- Product Development
- Vehicle Ownership
- Components
- Supply Base
- Design
- Regulatory
- Communications Infrastructure
ACES Influence on Vehicle Development

- Manufacturing Systems
- Product Development
- Components
- Supply Base
- Design
- Vehicle Ownership

ACES Vehicles
Ownership Model Evolution

**Current**
- Individual owners/Drivers
- Safety/Reliability
- Aesthetics/Technology
- Vehicles operate a fraction of the day

**Future**
- Mobility providers/Fleet operators
- Safety/Reliability
- Pleasant interior/Comfortable ride
- Vehicles operate almost all day
**Design and Development**

**Current**
- Safety and occupant protection
- Durability and reliability
- Expressive exteriors/Crafted interiors
- Mass and cost efficiency

**Future**
- Safety and occupant protection
- Durability and reliability
- Economical to operate
- Ride experience
Manufacturing Systems

Current
- Dominated by high volume processes
- Established with incremental improvements
- Integrated supply base
- Capital intensive

Future
- More low volume processes
- Additive manufacturing
- Increased supplier integration
- Modular assembly
The steel industry has a long history of successfully partnering with global automakers to develop highly optimized, cost effective and mass efficient solutions to address:

- Stringent crash energy management and occupant protection requirements,
- Vehicle lightweighting for improved fuel economy and reduced tailpipe emissions

The resulting steel executions provided automotive partners with exceptional performance at an affordable cost.
Role of Steel in Future Mobility

Development Challenges
- New crash energy management strategies and restraint system designs
- Mass efficient and cost-effective design solutions
- Increased durability requirements and component fatigue life targets
Role of Steel in Future Mobility

Steel: The Material of Choice
The broad spectrum of steel grades enables automotive designers to develop mass and cost efficient solutions capable of meeting or exceeding,

- The future crash and occupant protection requirements
- The increased durability and fatigue targets
Role of Steel in Future Mobility

Steel: The Material of Choice
Innovations in steel forming technologies such as hydroforming, roll-forming, hot stamping, etc., as well as advancements in steel, and mixed material, joining technologies enable:
- More architectural creativity and freedom to address future integration and design challenges with superior structural performance
- Flexible modular architectures to accommodate different configurations, needs and uses
- Scalable production volumes
### Role of Steel in Future Mobility

#### Steel: The Material of Choice

<table>
<thead>
<tr>
<th>Material</th>
<th>kg CO₂e / kg</th>
<th>Estimated Part Weight (kg)</th>
<th>kg CO₂e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Steel</td>
<td>1.9</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>AHSS</td>
<td>1.9</td>
<td>75</td>
<td>143</td>
</tr>
<tr>
<td>Aluminum</td>
<td>8.9</td>
<td>67</td>
<td>596</td>
</tr>
<tr>
<td>Magnesium</td>
<td>30.5</td>
<td>50</td>
<td>1525</td>
</tr>
<tr>
<td>CFRP</td>
<td>22</td>
<td>45</td>
<td>990</td>
</tr>
</tbody>
</table>

*Current Average Greenhouse Gas Emissions North America Primary Production*

Material Production GHG Emissions for Common Body Structure and Closure
Materials Accounting for Estimated Part Mass Reduction

---


THANK YOU
Presentations will be available for download on SMDI’s website on Wednesday, May 22