Overview: STEEL
Auto/Steel Partnership

Dr. Roger Heimbuch
Auto/Steel Partnership
OUTLINE OF PRESENTATION

• Overview of the Auto/Steel Partnership (A/SP).

• Connection to USAMP/Department of Energy.

• Strategy.
MEMBERS OF A/SP - Chartered in 1987

AK Steel
ArcelorMittal
GM
SeverStal North America
Chrysler
USS
Ford
Nucor
The vehicles produced by member OEMs will have best-in-world, cost-effective, lightweighting and safety performance through the use of optimized steel solutions developed with the member steel companies.
The Auto/Steel Partnership:

- Leverage the resources of the automotive, steel and related organizations.

- Develop solutions where steel remains the "competitive material of choice" in a changing automotive market.

- Use inter-company and inter-industry cooperative programs to ensure success.
To achieve the Vision, the Auto/Steel Partnership:

- Evaluate, prioritize and completes projects that meet the vision.
- Communicates the technical results and benefits to the automotive industry.
THE PARTNERSHIP LINKAGES

Chrysler LLC, Ford Motor Company, General Motors Corporation

AK Steel, ArcelorMittal, Nucor Corporation, Severstal North America, United States Steel Corp.

Contractors

Academia

AISI, IISI, WorldAutoSteel Consortia Partnerships

Department of Energy (DOE)

CANMET

National Laboratories

NSF
FreedomCAR Goals:

- Mass Reduction (50%).
- Affordable Cost (less to +5%).
- Durability/Life (same).
- Recyclability.
- Develop/Transfer Technology.
ULSAB SERIES OF PROJECTS
• A/SP approached USAMP for funding.

• DOE agreed to fund steel projects based on potential shown by ULSAB Projects.

• USAMP/DOE support is about $1.8 million/year.
USAMP CONE STAGES

- **Today** (Application Feasibility)
- **Tomorrow** (Technical Feasibility)
- **far out** (Concept Feasibility)

Input into OEM’s or Supplier’s cone

- Input to the USAMP cone
- Strategic Alignment - ties into Vision

Time

Technologic risk
OVERALL STRATEGY

STEEL

Materials
Manufacturing
Design
<table>
<thead>
<tr>
<th>University</th>
<th>Professor</th>
<th>Topic</th>
<th>Amount</th>
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<tr>
<td>Carnegie Mellon University</td>
<td>Warren Garrison</td>
<td>AHSS through microstructure and mechanical properties</td>
<td>$164,087/yr.</td>
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<tr>
<td>Case Western Reserve U.</td>
<td>Gary Michal</td>
<td>AHSS through C partitioning</td>
<td>$150,000/yr.</td>
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<tr>
<td>Catholic University of America</td>
<td>Abu Al-Rub Rashid</td>
<td>AHSS through particle size and interface effects</td>
<td>$88,687/yr.</td>
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<tr>
<td>Colorado School of Mines, Ohio State University</td>
<td>David Matlock (CSM) and Robert Wagoner (OSU)</td>
<td>Collaborative GOALI Project Formability and Springback of AHSS</td>
<td>$98,128/yr (CSM) $99,087/yr (OSU)</td>
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<td>Drexel University</td>
<td>Surya Kalidindi</td>
<td>FEM using crystal plasticity simulation modeling tools</td>
<td>$143,333/yr.</td>
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<td>Ohio State University</td>
<td>Ju Li</td>
<td>Multiscale modeling of deformation for design of AHSS</td>
<td>$142,277/yr.</td>
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<td>University of Missouri Rolla</td>
<td>David C. Van Aken</td>
<td>AHSS through nano-acicular duplex microstructures</td>
<td>$166,667/yr.</td>
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<td>Wayne State University</td>
<td>Susil K. Putatunda</td>
<td>High strength high toughness bainitic steel</td>
<td>$10,000/yr.</td>
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<td>$998,945/yr.</td>
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PROJECT STRATEGY

Lightweighting Initiatives

Enabling Projects

On-Going Activity
PROJECT STRATEGY

Lightweighting Initiatives

Enabling Projects

On-Going Activity

Strain Rate Characterization
PROJECT STRATEGY

Lightweighting Initiatives

Enabling Projects

On-Going Activity

Fatigue Characteristics

Strain Rate Characterization

Tribology
PROJECT STRATEGY

Lightweighting Initiatives

Enabling Projects
- Fatigue Characteristics
- Strain Rate Characterization
- Tribology
- Hydroforming
- High-Strength Steel Joining
- AHSS Stamping

On-Going Activity
- AHSS Application Guidelines
PROJECT STRATEGY

Lightweighting Initiatives
- Lightweight Chassis Structures
- Future Generation Passenger Compartment
- Mass Efficient Architecture for Roof Strength (MEARS)

Enabling Projects
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Lightweight Chassis Structures
Future Generation Passenger Compartment
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- Hydroforming
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- AHSS Stamping

On-Going Activity

- AHSS Application Guidelines
- Technology Transfer
SUCCESS AND FUTURE OPPORTUNITIES

Mass Reduction Opportunity

With Steel Strategy & DOE Support

Without DOE Support

FreedomCAR GOAL


Time

MILD STEELS

CONV HSS

AHSS with MASS COMPOUNDING

AHSS

3rd GENERATION

Technology Decision
**FreedomCAR & A/SP GOAL ALIGNMENT**

**FreedomCAR:**
- 50% Mass Reduction.
- Affordable Cost.
- Life/Durability.
- Develop/Transfer Technology.
- Recyclability.

**Auto/Steel Partnership:**
- 40% Mass Reduction.
- Affordable Cost.
- Life/Durability.
- Develop/Transfer Technology.
- Recyclability.