November 17, 2016

Automotive Materials R&D at CanmetMATERIALS

Presentation to:

Standing Senate Committee on Energy,

the Environment and Natural Resources

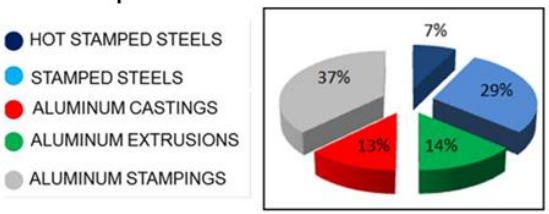
CanmetMATERIALS

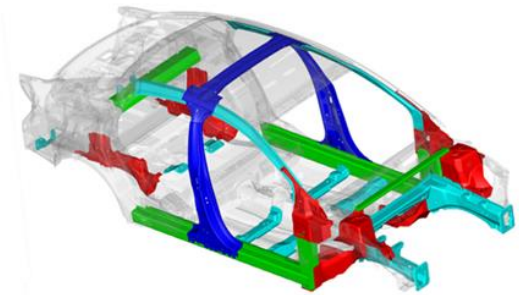
- **Mandate**: To develop and deploy technologies to improve all aspects of producing and using value-added products derived from metals and minerals
- Facilities in Hamilton, Ontario, and Calgary, Alberta
- **Research Areas**:
  - Clean Energy Production
  - Energy Distribution (pipelines)
  - Defence
  - Efficient Energy End-Use (transportation, industry)
- Pilot Scale Facilities

Automotive Materials Research at CMAT

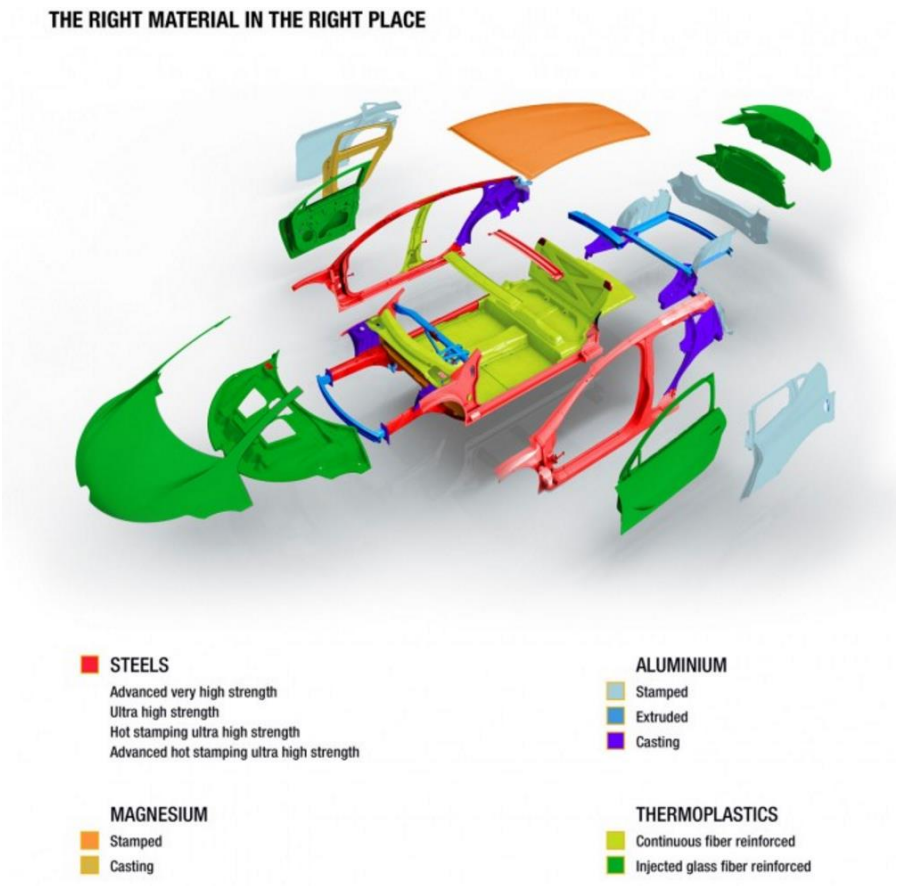
- Vehicle Lightweighting
  - Challenge: to obtain 50% reduction in structural mass
- Efficient Powertrain Materials
  - Challenge: to obtain 5% improvement in fuel efficiency
  - Challenge: to offset all emissions through electrification
- Energy Management Materials
  - Challenge: to obtain 5% improvement in fuel economy

Ford Multi-Material concept





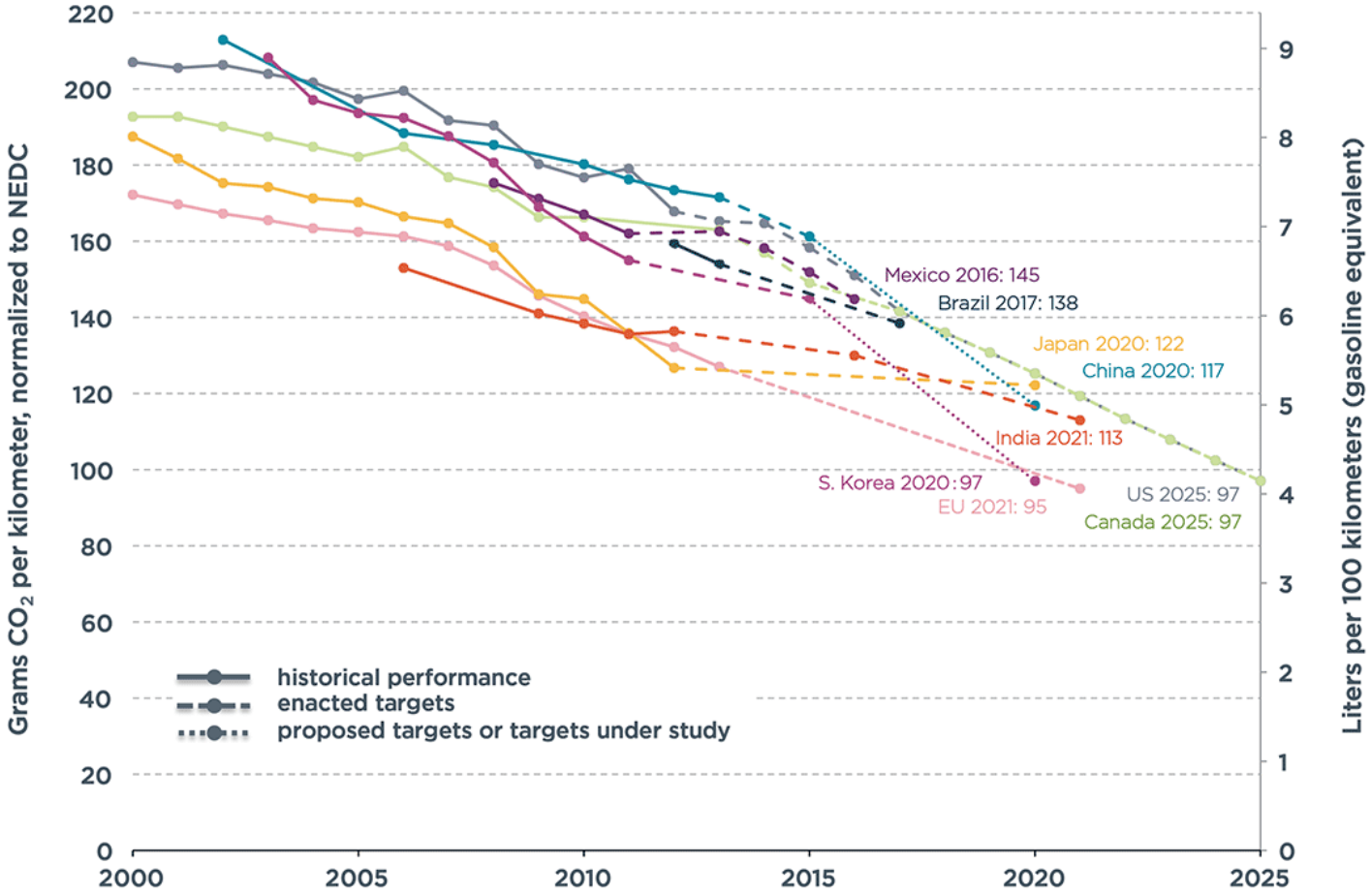
Advanced Materials for Transportation



Source: Car & Body Design

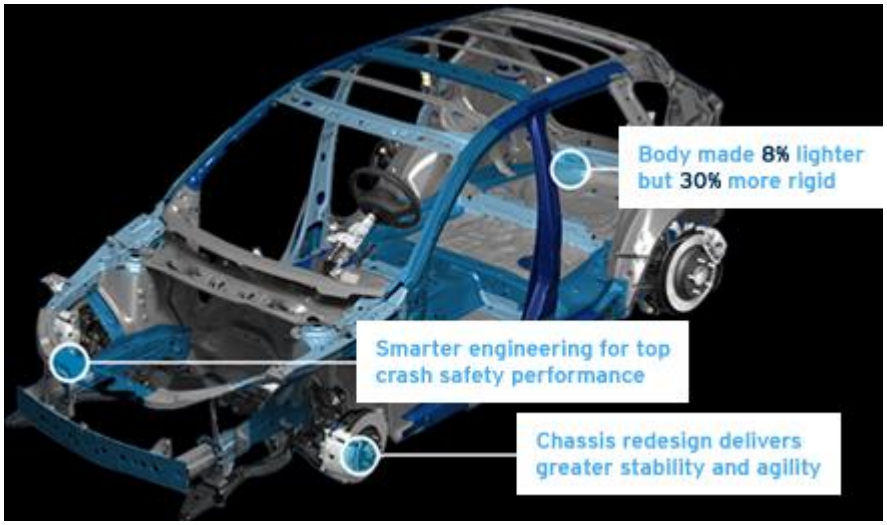
- A multi-material structural solution is required **(weight reduction potential %)**
  - Advanced High-Strength Steels
    10-28% 0.8-1.5x cost
  - Aluminum
    30-60% 1.3-2x cost
  - Magnesium
    30-70% 1.5-2.5x cost
  - Polymer Composites
    50-70% 1.5-5x cost
- Near-net shape parts
  - Casting
  - Additive Manufacturing

Why is this R&D Needed Now?



Source: International Council on Clean Transportation

Fuel Efficient Vehicles – Collaborative Technology Development

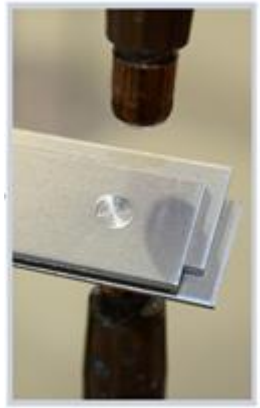


Collaborative Research and Development

- Highly integrated research with academia
- Share facilities and expertise
- Support development of next generation of automotive engineers
- Leverage funding to create larger, more impactful projects

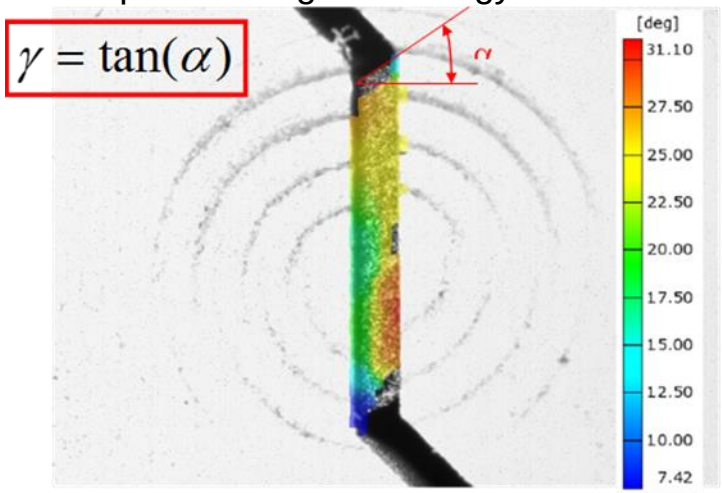
Recent Examples

GM's new resistance spot welding process



Source: Motor Authority

CMAT's contribution to the GM Al Spot Welding Technology



9-speed valve body cast at CMAT

Questions

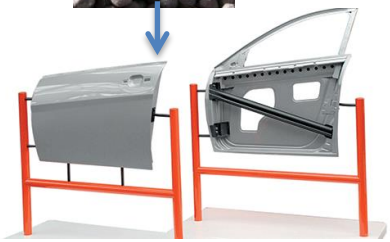
Annex

Collaborative R&D

Crude ore supply - Mont-Wright Mine (ArcelorMittal)

Pellet Plant – Port Cartier (ArcelorMittal)

Steel Mill (ArcelorMittal Dofasco)



Tiered Supply Chain or Auto Assemblers – Ford Canada - Oakville

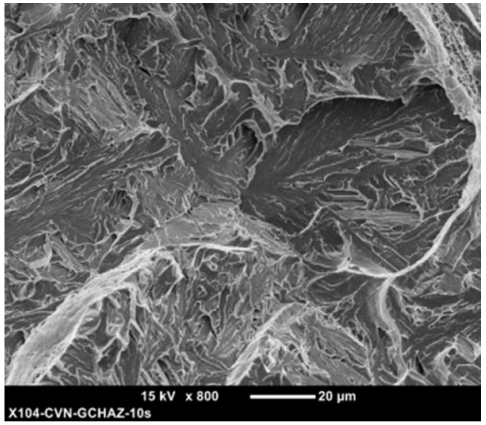
Facilities and Capabilities – Melt, Roll, Form, Test

Vacuum Induction Melting Furnace

500-ton, 600-hp Rolling Mill

500-ton Hydro/Gas Forming

75-ton Sheet Forming



Fracture surface of a Charpy tested specimen, t_{8-5}= 10s