

GREAT DESIGNS IN STEEL

Presentations will be available for download on SMDI's website on Wednesday, May 22

GREAT DESIGNS IN **STEEL**

THE EVOLUTION AND OUTLOOK FOR STEEL IN NORTH AMERICAN LIGHT VEHICLES

Abey Abraham – Managing Director

May 15th 2019



DUCKER WORLDWIDE JOINS FRONTIER STRATEGY GROUP

On February 12, 2018 Frontier Strategy Group (FSG) officially announced the acquisition of Ducker Worldwide, a 58-year-old global business-to-business research and consulting firm.

FRONTIER STRATEGY GROUP



DUCKER WORLDWIDE

The combined company provides unrivalled market research and executive advisory services based on decades of experience supporting the strategic decisions of more than 700 companies. Client executives will benefit from the firm's broader expertise and geographic reach, robust cloud-based technology platforms, expanded insight into customer behavior, and award-winning data and analyst insights spanning the B2B, healthcare, consumer, and private equity industries.



This acquisition is designed to maximize the potential of our combined company to better serve our clients and accelerate growth. The demands of growth and forces of change facing multinational company executives and investment professionals get tougher every year, and by bringing together FSG and Ducker's highly complementary offerings, areas of expertise and global footprint, we can immediately provide a comprehensive set of solutions that address our clients' global strategic priorities and growth mandates.

- Richard Leggett, CEO

COMPREHENSIVE INSIGHTS FOR HIGH-STAKES MARKETS

Our combined business has the unique ability to deliver superior outcomes throughout all stages and aspects of our clients growth ambitions.

THE COMBINED BUSINESS MODEL ADDRESSES ALL STAGES OF A CLIENT'S GROWTH MANDATE



END-TO-END RESEARCH AND CONSULTING SOLUTIONS



Economic Forecasts



Thought Leadership



Market Insights



Consulting Solutions



Market Monitoring



Cloud-based Technology And Data

EXPANDED GLOBAL FOOTPRINT

Together Ducker Worldwide and Frontier Strategy Group serve multinational and investment professionals around the world via our nearly 200+ professionals across 9 global offices.



AMERICAS

Detroit
New York
Washington, DC

EUROPE

London
Paris
Berlin

ASIA

Bangalore
Singapore
Shanghai

SETTING THE STAGE

Several different yet related factors impact OEM decisions to go forward with the significant lightweighting of vehicle components. Regulations, competition, cost, capital, timing and other alternatives for achieving the OEM's business goals all come into play.



CRITICAL ISSUES

The steel industry has demonstrated its ability to work in a coordinated and highly responsive manner with customers to innovate, design, test, and support evolving needs.



Innovation



Applications



Enabling
Solutions



Availability &
Support

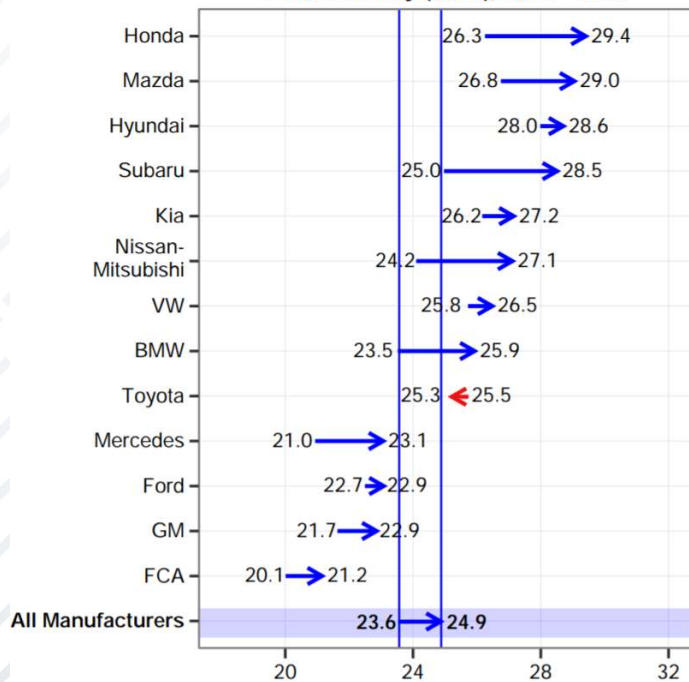


Sustainability
& Repair

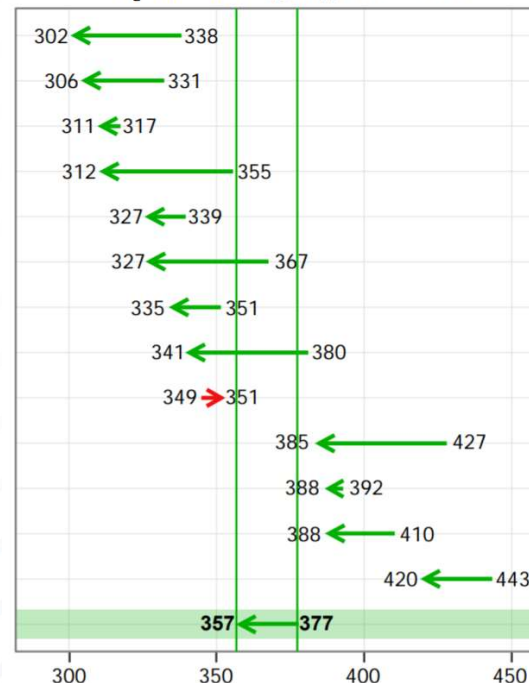
CO2 & MPG REGULATIONS ARE DEMONSTRATING SIGNIFICANT PROGRESS



Fuel Economy (MPG), 2012 – 2017



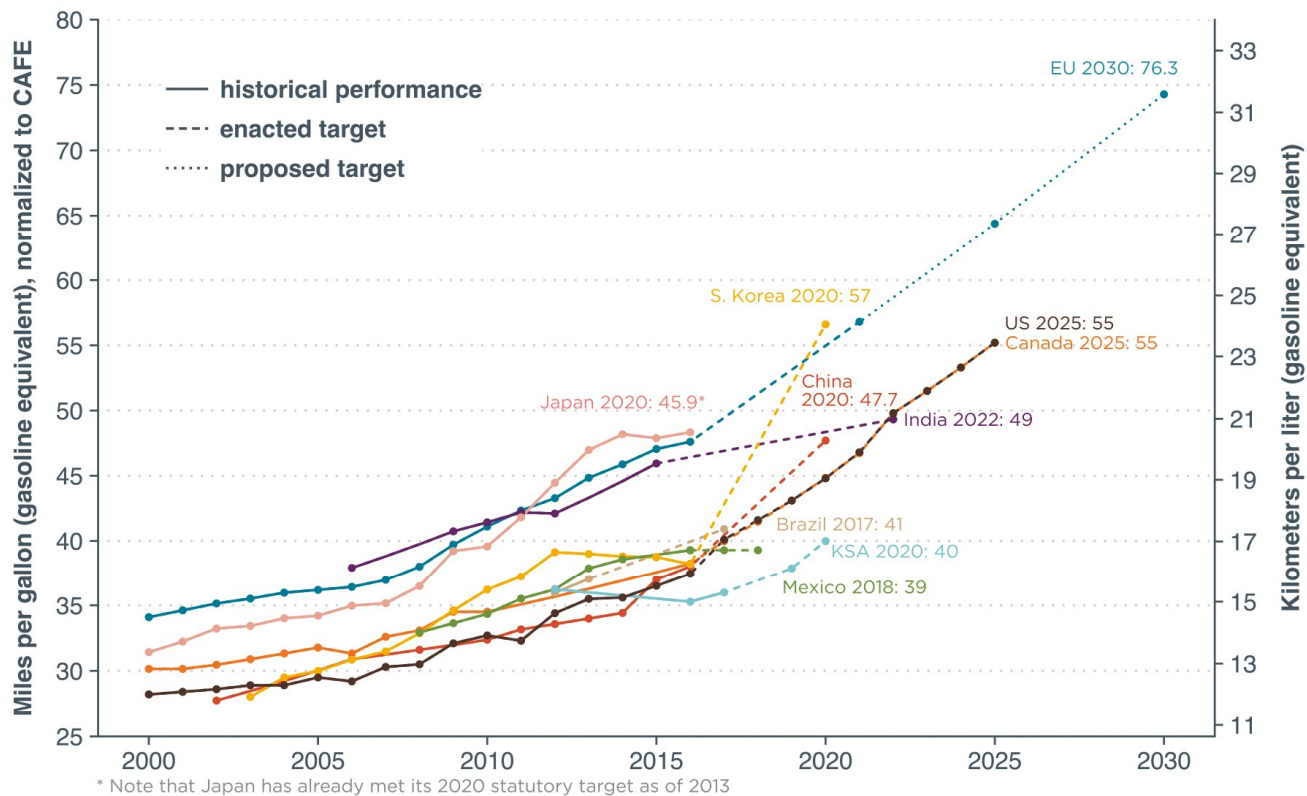
CO₂ Emissions (g/mi), 2012 – 2017



Source: 2018 EPA

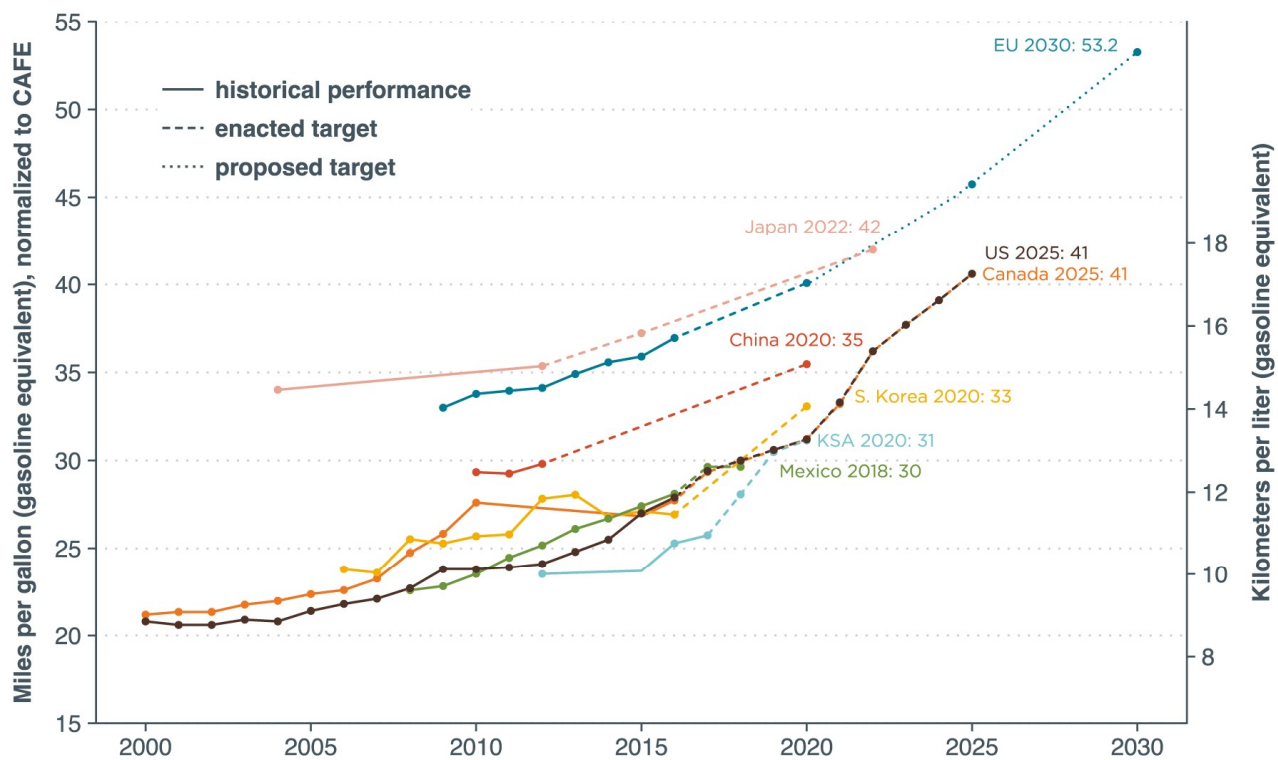
GLOBAL REGULATIONS DRIVE THE DEMAND FOR LIGHTWEIGHTING

Passenger car miles per gallon, normalized to CAFE



GLOBAL REGULATIONS DRIVE THE DEMAND FOR LIGHTWEIGHTING

Light truck miles per gallon, normalized to CAFE



THE ROAD TO COMPLIANCE IS A BALANCING ACT

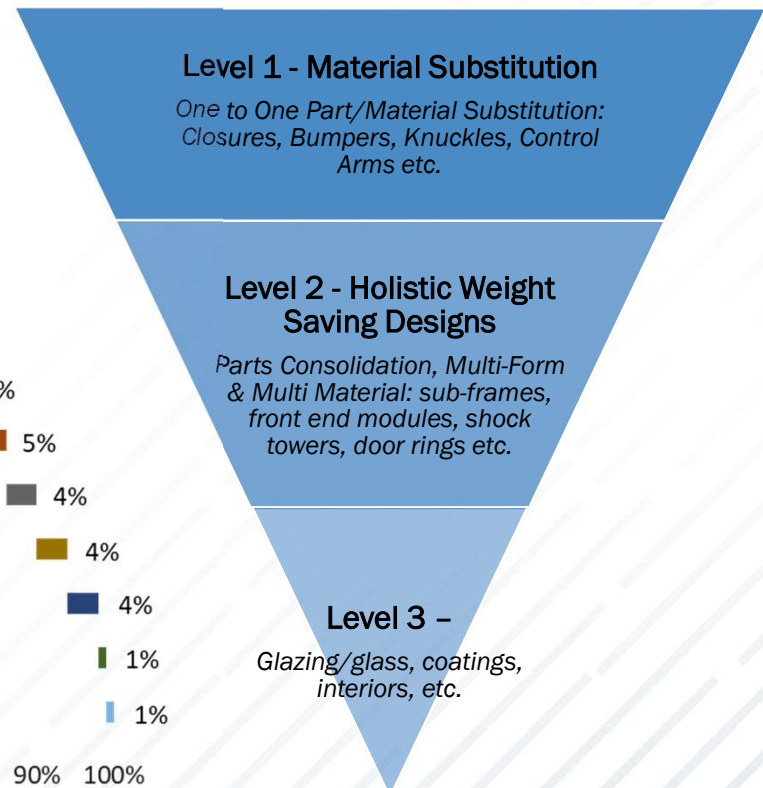
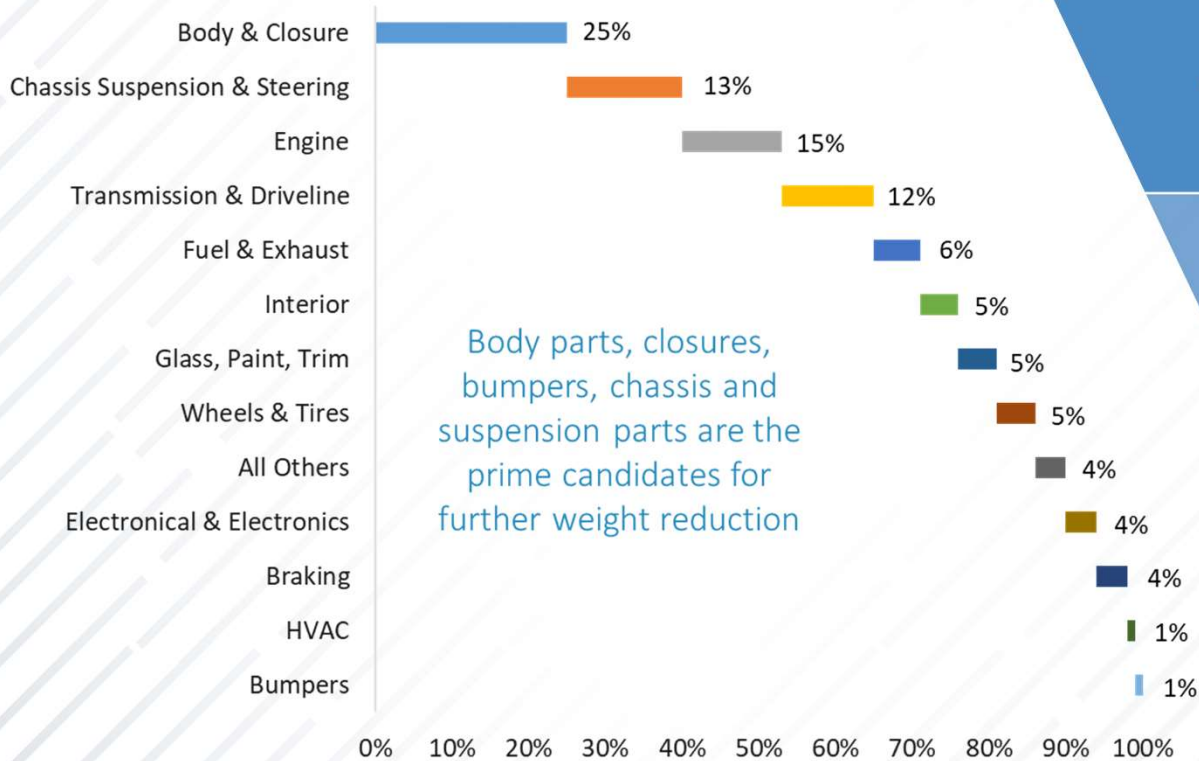
- Compliance - Gap
- Cost Targets
- Performance
- Customer Needs
- Global Goals
- Plant Issues/Union

- Powertrain & Electrification
- Materials (Body structures/chassis)
- Design/Aerodynamic

UP TO **7%**
Mass Reduction Is
Needed

CLOSING THE REGULATORY COMPLIANCE GAP IS A MULTISTEP PROCESS

Where is the Weight: Light Vehicle Mass Distribution



RESEARCH OBJECTIVES & SCOPE

Objective

- 2017/2018 Flat Rolled Steel Content with a core focus on AHSS and emerging Ultra-high strength steel for the North American Light Vehicle
- Continue in-depth research and insights since the first iteration of this study completed in 2005 for the SMDI

Scope

- Flat Rolled Steel content to encompass the vehicle Body-in-White, closures, bumpers, sub-frames/cradles, suspension, and wheels
- The results are inclusive of over 90% of NA vehicles produced in 2017/2018
- The Ducker study utilized a top down and bottom up approach with OEM, supplier and steel mill inputs

RESULTS

The average North American light vehicle in 2018 is estimated to have 1,480 pounds of flat rolled steel – with nearly 90 pounds of AHSS/UHSS content growth from 2013.

- AHSS continues its growth trajectory with approximately 258 pounds per vehicle in 2018, surpassing our estimates in 2013 by ~4 pounds per vehicle
- The 2018 average light vehicle content of flat rolled steel versus the 2013 flat rolled content per vehicle for body-in-white, structures, closures, door beams, bumper beams, suspensions, sub-frames, fuel tanks and wheels in pounds per vehicle has changed as follows:

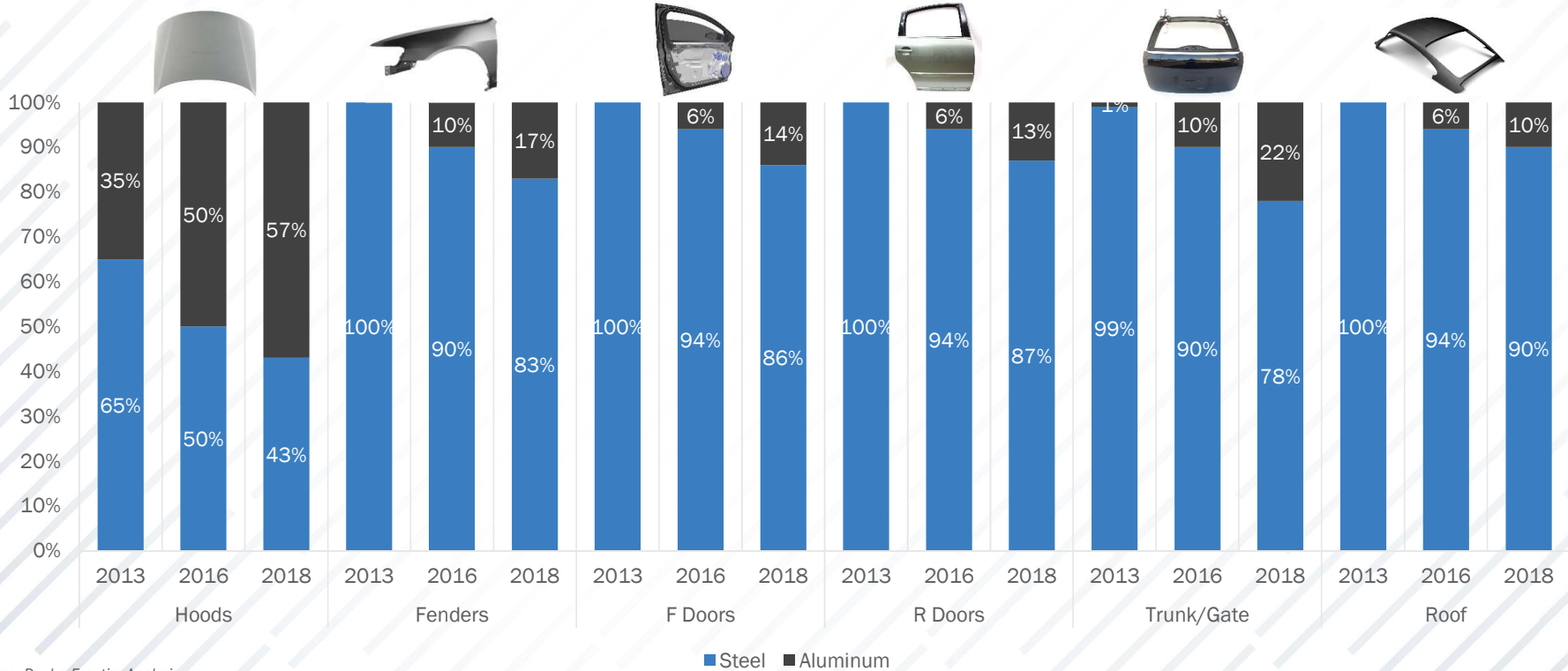
2013 vs. 2018 Average Net Change in Steel Content by Grade in Pounds / Vehicle

Mild Steel	BH	AHSS (DP)	UHSS/3 rd Gen. AHSS
▼ Decline	▼ Decline	▲ 70.0	▲ 19.9

STEEL COMPONENT PENETRATION - CLOSURES

Besides hoods, the remaining closure components remain primarily in steel.

Steel Closure Unit Penetration: 2013-2018



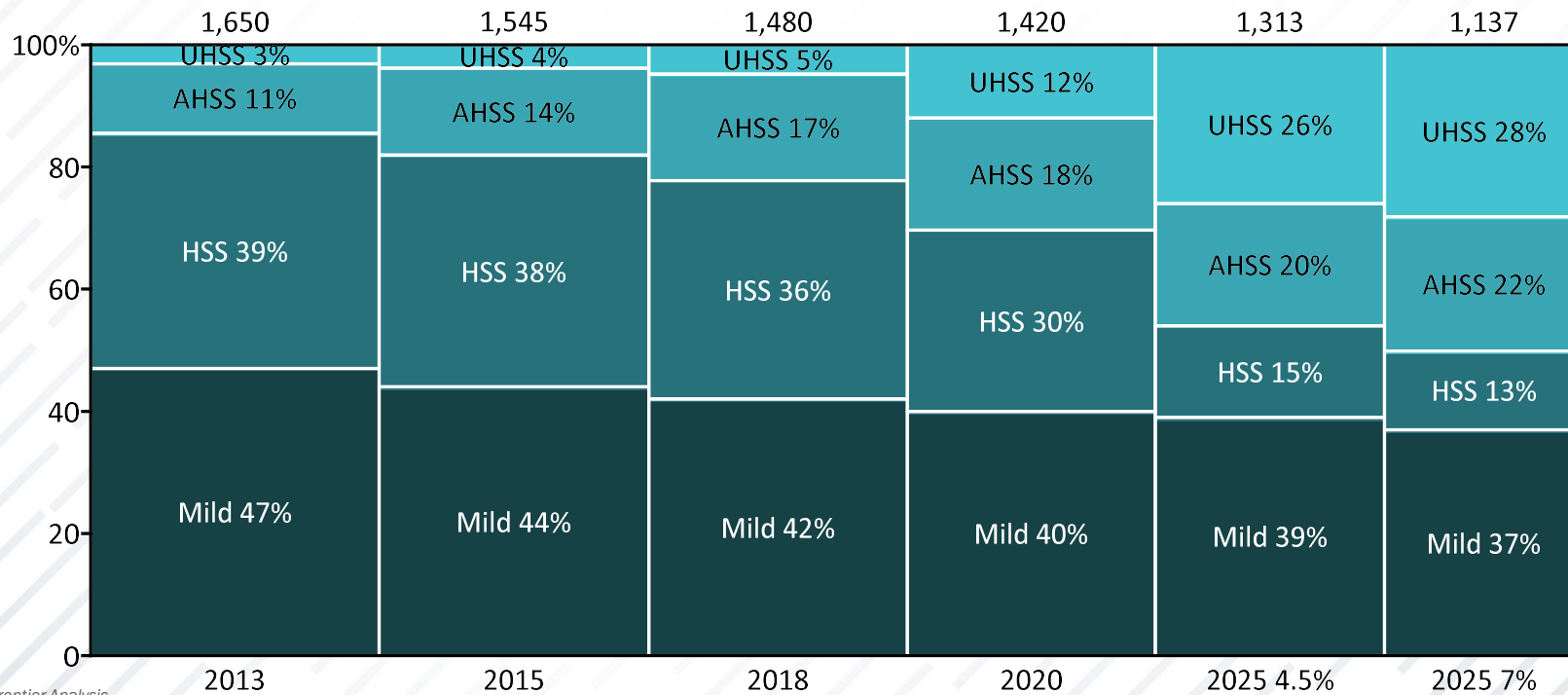
Source: DuckerFrontier Analysis

STEEL GRADE MIX

Net steel content for body in white and closures will see declines; however, AHSS, UHSS and 3rd Gen AHSS materials will grow at a tremendous pace.

BIW & Closure Steel Content Pounds Per Vehicle By Grade

Grade Percentage & Total Pounds



Source: DuckerFrontier Analysis

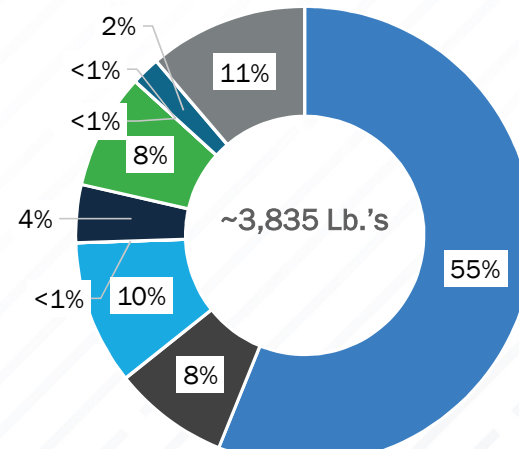
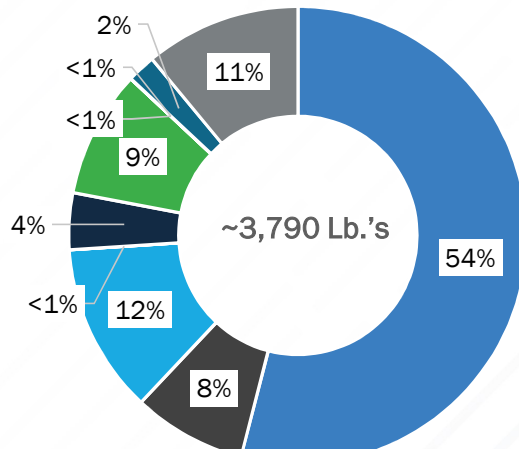
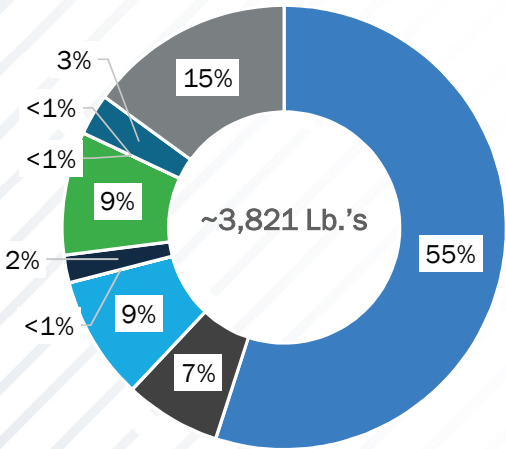
2018 NA LV MATERIAL CONTENT

Steel remains the primary share of automotive materials; however, from a content perspective, steel declines by approximately 55 pounds between 2013 and 2018 due to the increased use of thinner gage AHSS and UHSS as opposed to Mild or HSS

2013 Material Share of Curb Weight

2018 Material Share of Curb Weight

2015 Material Share of Curb Weight



- Steel
- Aluminum
- Other Metals
- Conventional SMC/Fiberglass
- Glass
- Iron
- Magnesium
- Polymers
- CFRP SCM >1.25G
- Other Materials, Rubber, Fluids, Etc.

Source: American Chemistry Council & DuckerFrontier Analysis

APPLICATIONS OF UHSS (PH & 3RD GEN AHSS)

Controlled deformation, high rigidity (limited deformation) and associated weights savings are the fundamental properties driving the growth and proliferation of advanced grades of steel.

(UHSS) Press Hardened Steels/Hot Stamping

High Tensile Strengths

Deformation Resistance

Medium Part Complexity
(improving however)

Current Applications

- A- Pillar
- B- Pillar
- Door Ring
- Door Header
- Door Beam
- Rocker Support / Reinforcement
- Tunnel Rail's
- Bumper Beams
- Floor Sills
- Hinge post / Cantrails
- Others

APPLICATIONS OF UHSS (PH & 3RD GEN AHSS)

Controlled deformation, high rigidity (limited deformation) and associated weights savings are the fundamental properties driving the growth and proliferation of advanced grades of steel.

(UHSS) Generation 3 Steels

High Tensile Strengths

Controlled (zoned)
Deformation

High Parts Complexity
(advanced geometries)

Projected Applications

- Replacing select or adding adjacent parts to current Press Hardened Steel
- *"If 3rd Gen. AHSS can deliver the performance characteristics of PH Steels, our strategy would be to replace as much as we can"*
OEM

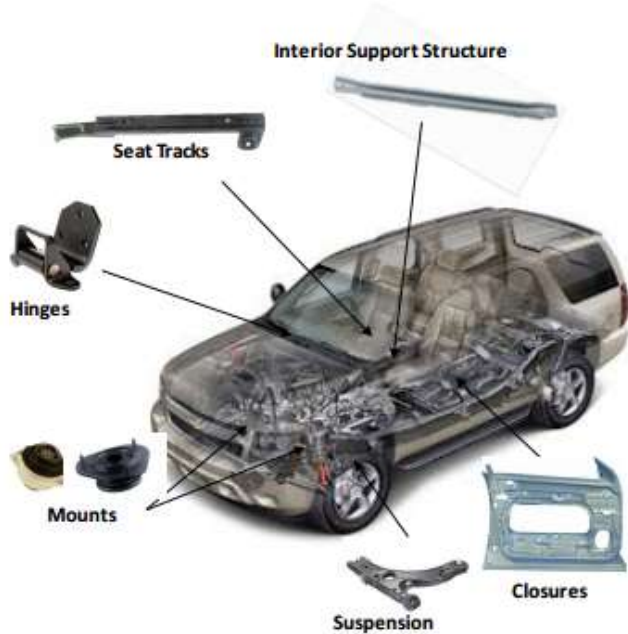
Additional Applications

- Applications that would prove significant weight savings opportunity within the Chassis and Body of the vehicle: suspension arms/links, sub-frames and cross members, IP structures etc.
- *"The products elongation and formability make further replacement of HSS or DP steels"* 3rd Gen. AHSS Material Supplier

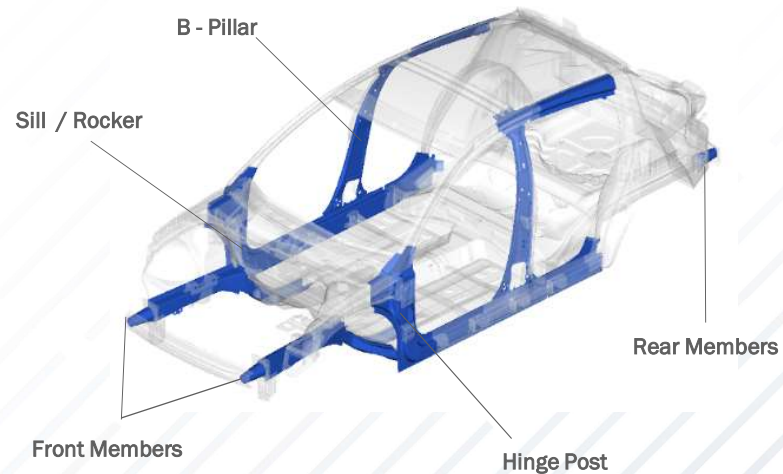
APPLICATIONS OF AHSS AND UHSS (PH & 3RD GEN AHSS)

3rd Gen AHSS have a dual pathway of automotive utilization, the first and more near term would take advantage of 3rd Gen AHSS's higher strength and elongation to replace heavier HSS and HSLA applications. Eventually, 3rd Gen AHSS will augment and/or replace PH steel applications.

3rd Gen AHSS Applications Replacing HSS & HSLA



3rd GEN.AHSS Applications Augmenting PH/AHSS

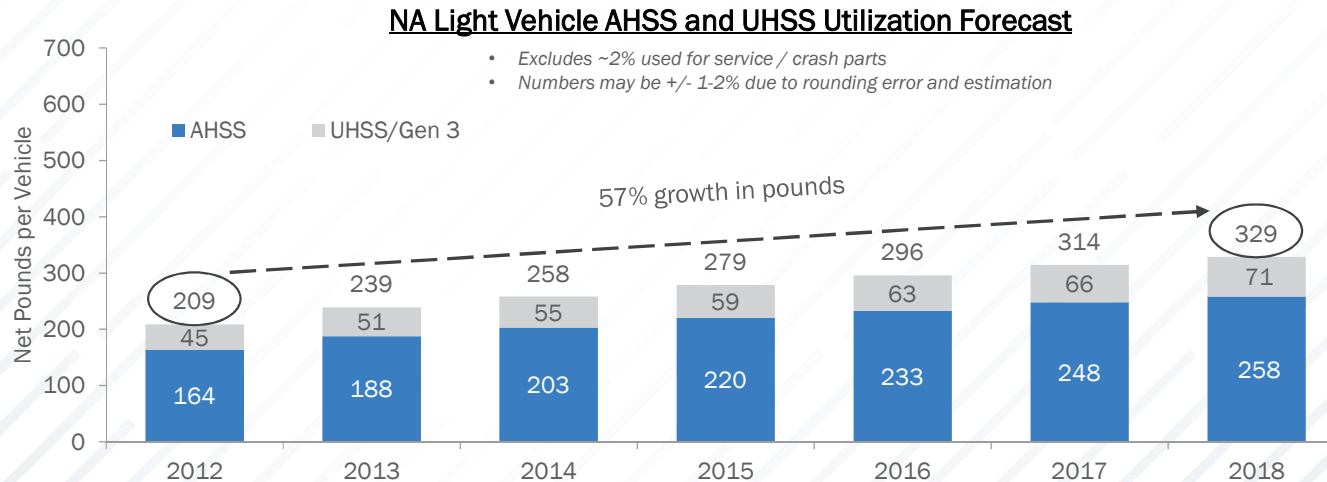


Source: DuckerFrontier Analysis, Nano-Steel, Arcelor Mittal, SMDI

2018 NA LV STEEL CONTENT - MATERIAL MIX

The 2018 AHSS and UHSS use in North American produced light vehicles is 329 pounds per vehicle, a significant increase from 2013, translating to an additional 90 pounds or a 38% growth from 2013.

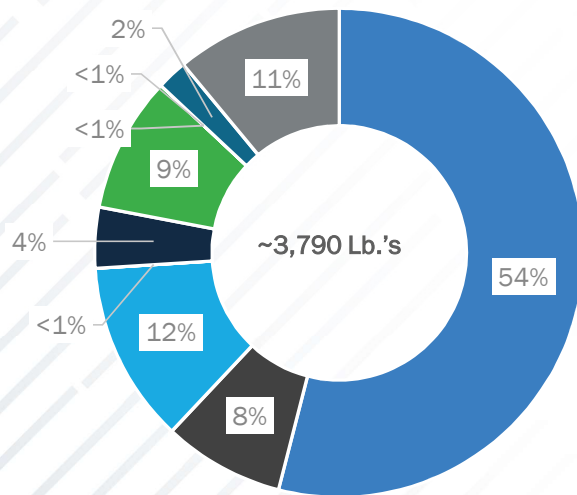
- Between 2012 and 2018, there has been a net increase of AHSS/UHSS grades of steel of ~120 pounds per vehicle. This translates to an annual average growth of 20 lbs. per year



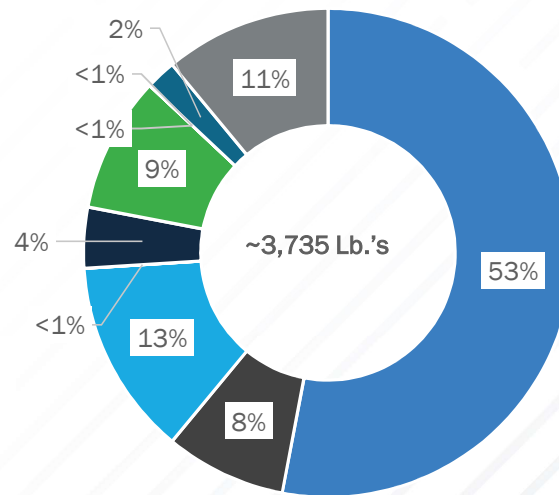
2018 - 2020 NA LV MATERIAL CONTENT

Steel remains the primary share of automotive materials; however, from a content perspective, steel will decline by approximately 65 pounds between 2018 and 2020 due to the increased use of thinner gage AHSS and UHSS as opposed to Mild or HSS.

2018 Material Share of Curb Weight



2020 Material Share of Curb Weight



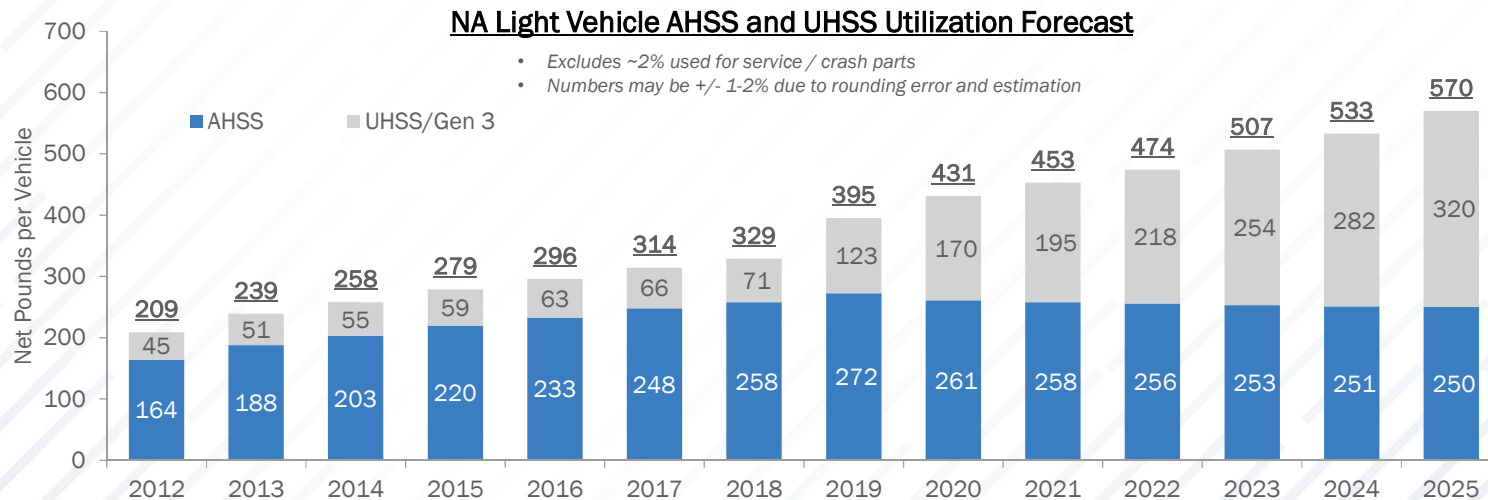
- Steel
- Aluminum
- Other Metals
- Conventional SMC/Fiberglass
- Glass
- Iron
- Magnesium
- Polymers
- CFRP SCM >1.25G
- Other Materials, Rubber, Fluids, Etc.

Source: American Chemistry Council & DuckerFrontier Analysis

2020+ NA LV STEEL CONTENT - MATERIAL MIX

The 2015 AHSS use in North American produced light vehicles is 279 pounds and expected to grow significantly to 570 pounds by 2025.

- Adoption rates and estimates vary by OEM; however, beyond 2020, AHSS pounds per vehicle will decline, while UHSS continues to grow
- Growth of advanced grades of steel has increased since the 2013 report, where 2019 was 351 pounds, and 2025 was 483 pounds



Source: DuckerFrontier Analysis

THANK YOU



DUCKER**FRONTIER**

GREAT DESIGNS IN STEEL

Presentations will be available for download on SMDI's website on Wednesday, May 22