SETTING THE STAGE FOR THE LIGHTWEIGHTING OF PASSENGER CARS AND LIGHT TRUCKS

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Ducker gathers unique market, customer and competitive insights when others cannot. Leveraging industry expertise and research capabilities, Ducker develops sound strategies to win in existing and new markets.

Ducker’s transaction advisors assist clients with searching and researching acquisition targets, and provide best-in-class diligence to de-risk M&A transactions. It’s a natural extension of our consulting and research services.

With a dynamic fact-based and advanced business analytics, Ducker works with management to develop actionable strategies and detailed go-to-market plans that represent best-fit solutions.
SETTING THE STAGE
Several different yet related factors impact OEM decisions to go forward with the significant light weighting of vehicle components. Regulations, competition, cost, capital, timing and other alternatives for achieving the OEM’s business goals all come into play.
Even though the U.S. regulations beyond 2020 are in a state of uncertainty, there is a tailwind behind emission and fuel economy improvements that will continue well into the next decade.
The ability of a variety of old and new materials to reduce vehicle weight without sacrificing safety and performance is not a mystery. There is no doubt that we know how to save weight!

**Specific Strength Versus Elongation With Equal Thickness**

Source: GM

**Commonly Accepted Auto Material Substitution Ratios**

Source: Toray, Ducker Analysis
The 7% mass reduction by 2025 spelled out by NHTSA and the EPA in the 2016 Technical Assessment Report can be achieved with materials currently available. Adding nearly 270 pounds of new steels with tensile strengths over 590 MPa and 179 pounds of structural aluminum over the 2015 mix can save 220 pounds per mass per vehicle.

Achieving a 270 pound 7% Mass Reduction Requires a Multi-material Approach

2015 to 2025 Changes in Average Light Vehicle Material Mix

Source: Ducker Analysis
This results in some significant mix changes. Total aluminum content would go from 10% to 16% and total ferrous content would go from 64% to 55%. AHSS and UHSS sheet, however, would go from 8% to 16%; while polymers would grow from 8% to nearly 12%

Material Mix Changes for a Curb Weight Reduction of 7% or 270 Pounds

Source: Ducker Analysis
Determining the direct costs per pound of weight saved excluding assembly and capital costs can be estimated from this diagram. Our estimate is less than a $600 dollars per vehicle penalty to save 7% or 270 pounds with a direct cost of $2 per pound saved. $2 per pound saved may not be the lowest cost solution, but it is very close.

Source: Ducker Analysis
How much CO2 will 7% save? The answer is 16 to 17 adjusted grams per mile or 1.2 to 1.5 adjusted miles per gallon. That is the equivalent of an EV penetration of 4% to 5%. At current battery costs, saving weight is more cost effective than electrification.

The Relationship Between CO2 Emissions, Fuel Economy, and Mass Reduction

CO2 Reduction from Mass Reduction

Source: Ducker Analysis
Mass savings will play a significant role along with conventional powertrain improvements, significant EV penetration, 48volt systems, conventional hybrids, drag and friction reduction to save over 100 grams of real world CO2 emissions from 2018 to sometime next decade.
I will end on an interesting note. If and when the penetration of battery electric vehicles and plug in hybrids reach 15% of sales, the need for additional weight savings other than those to overcome safety and performance creep will be superfluous. A 15% penetration for electric vehicle sales is far into the future in the U.S, but in China it could occur next decade.

**CO2 g/mile Saved 2018 - 2025**

- 60, 51%
- 32, 27%
- 16.4, 14%
- 10, 8%

**Powertrain Technologies other than EVs**
- Electric Vehicles PHEV 5% BEV 10.3%
- Increased Penetration of Powertrain Technologies other than EVs
- Only 2% of sales in 2018

**CO2 g/mile Saved 2018 - 2025**

- 59, 49%
- 60, 51%

**8.5% EV and 7% Curb Weight Reduction**

**15.3% EV with No Curb Weight Reduction Required**
THANK YOU.

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