



## *Motivating the Indian Auto Industry to Use Galvanized Steel to meet Bharat VI Requirements*



# Galvanized in Indian Automobiles

*A joint initiative by*

*Hindustan Zinc Ltd*



*International Zinc Association*



*Car buyers in Europe, North America, South Korea and Japan have long benefitted from unique protection warranties for decades ...*

***It's time for Indian consumers to also benefit!***

1

India is the 6<sup>th</sup> largest car manufacturer in the world

2

Global Carmakers Offer : Anti perforation warranty for up to 12 yrs

3

Galvanizing : The Right Starting Material for Corrosion Warranties

4

Improves Safety Performance of the Car

5

Leads to Weight Reduction & Reduced Emissions

6

Improves Fuel Efficiency

7

**REDUCES TCO (LIFE CYCLE COST)**

# India's Automotive Landscape

2<sup>nd</sup>

2 Wheelers



China  
India

2<sup>nd</sup>

Buses



China  
India

3<sup>rd</sup>

Heavy Trucks



China  
Japan  
India

6<sup>th</sup>

Cars



China  
Japan  
USA  
Germany  
S Korea  
India

7<sup>th</sup>

Commercial Vehicles



USA  
China  
Thailand  
Canada  
Japan  
Mexico  
India

Ranking is for Production Data

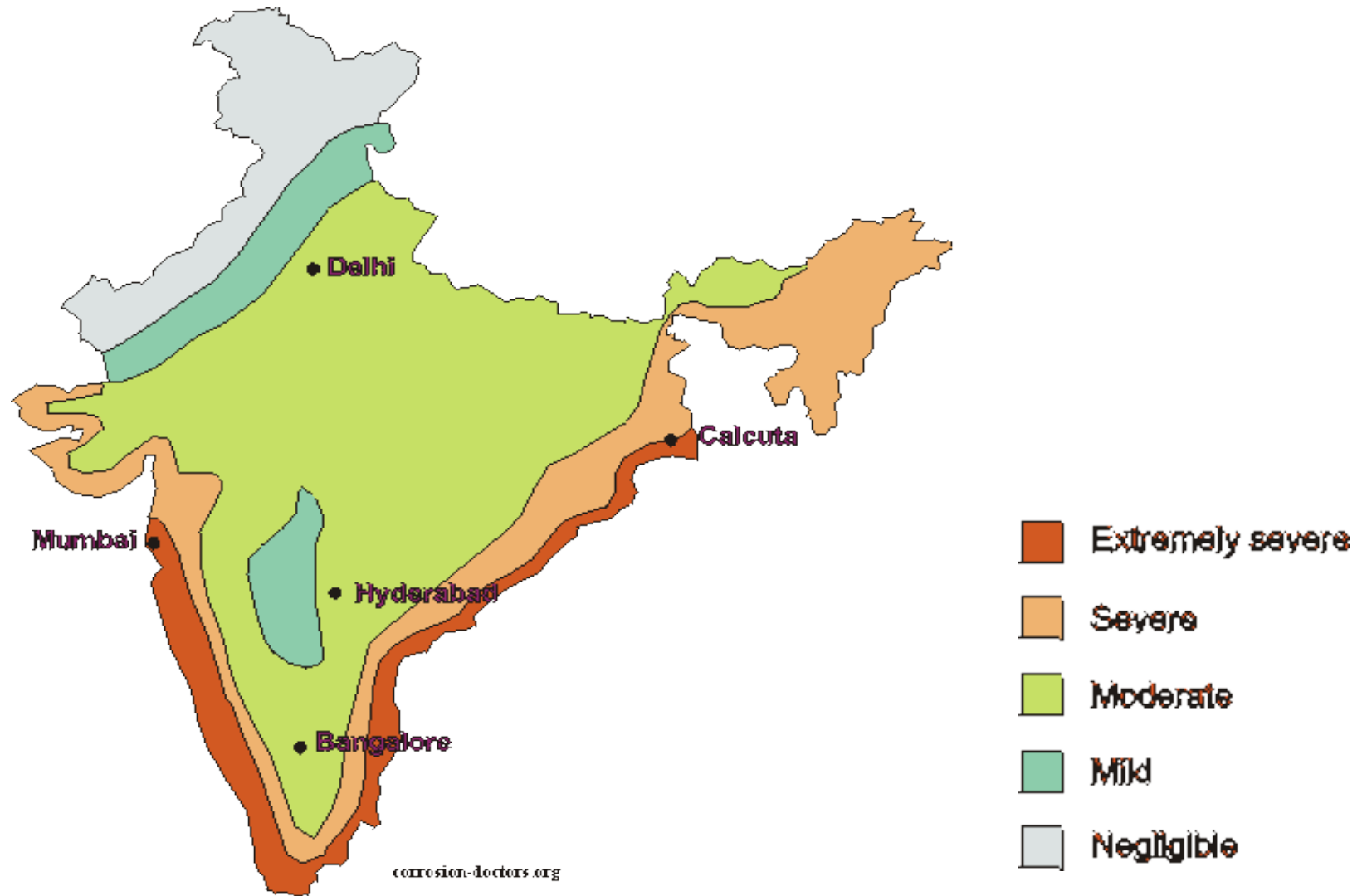
# *Indian Auto Production in 2015-16 and Growth History (million units)*

<i>Category</i>	<i>2011-12</i>	<i>2012-13</i>	<i>2013-14</i>	<i>2014-15</i>	<i>2015-16</i>
<b>Passenger Cars</b>	<b>3.146</b>	<b>3.231</b>	<b>3.088</b>	<b>3.221</b>	<b>3.414</b>
<b>Commercial Vehicles</b>	<b>0.929</b>	<b>0.833</b>	<b>0.699</b>	<b>0.698</b>	<b>0.783</b>
<b>3-Wheelers</b>	<b>0.879</b>	<b>0.840</b>	<b>0.830</b>	<b>0.949</b>	<b>0.934</b>
<b>2-Wheelers</b>	<b>15.428</b>	<b>15.744</b>	<b>16.883</b>	<b>18.489</b>	<b>18.830</b>
<i><b>Grand Total</b></i>	<i><b>20.382</b></i>	<i><b>20.648</b></i>	<i><b>21.500</b></i>	<i><b>23.358</b></i>	<i><b>23.960</b></i>

# *Agenda*

- ☐ *Current Status of Indian made Automobiles*
- ☐ *Value Proposition for Galvanizing*
- ☐ *Cost benefit*
- ☐ *What are Bharat VI Requirements*
- ☐ *Case Study : North American Light Weighting Challenge*
- ☐ *Hyundai Success Story*
- ☐ *Future Steel Vehicle & IZA GAP program*
- ☐ *Summary*

*In India up to 5% of GDP is lost every year to corrosion*

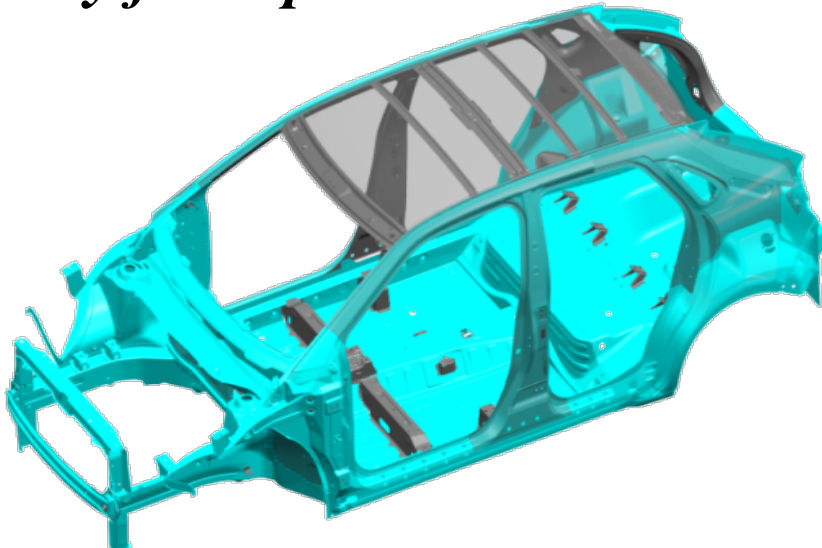


*Cars are susceptible to corrosion!*

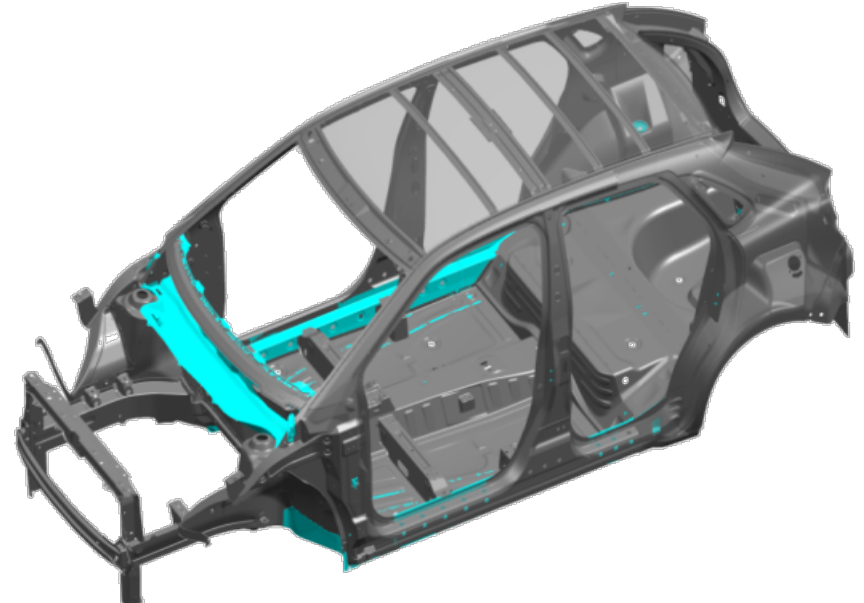


# *Automobile Industry: Present Scenario in India*

- *Galvanized steel has been used for decades in Europe, NA, Japan & South Korea for exterior and interior body panels. Anti perforation warranties are standard offerings*
- *When Indian cars are made from galvanized steel, they have the same look and feel as International cars. However, Indian car companies do not give anti perforation warranties*
- *India has started using galvanized and galvaneal steel for some body panels, but typically only for export models*



**For Export models, 70% of the body uses galvanized steel (blue)**



**For Domestic models, only 3% is galvanized; in some new models, up to 20% is galvanized**

# How Galvanizing leads to Anti-Perforation Warranties

- Galvanizing produces a controlled coating of Zinc in order to protect Steel from corrosion
- Zinc sacrifices itself to protect the strength, safety and life of steel in the automobile body

Honda



## 12 year anti-corrosion & perforation warranty

12 year unlimited mileage cover\* that protects against rust perforation affecting sheet metal body panels as a result of a manufacturing fault. This warranty can also be transferred to any future owner throughout the 12 year period.

\*Light commercial vehicles (Hilux and Proace) subject to 6 year anti-corrosion and perforation warranty.

***Galvanized Steel :  
The right  
STARTING  
MATERIAL for  
car bodies***

### Structural Corrosion Warranty (12 Years)

Honda warrants that the Honda car specified on your Warranty Certificate is free from corrosion from the inside to the outside of body panels for the period of 12 years unlimited mileage from the "Warranty Start Date" as specified on your Warranty Certificate.

*During this period Honda will rectify, free of charge, any such defects found on the car, subject to the Warranty conditions in your Service Book.*





# *All This .... At What Cost?*

***The overall benefit to the automaker to convert a 400 kilogram car body from cold rolled steel to galvanneal is estimated to more than offset the material and processing cost extra, and generate additional revenues of Rupees 10000 per vehicle sold.***

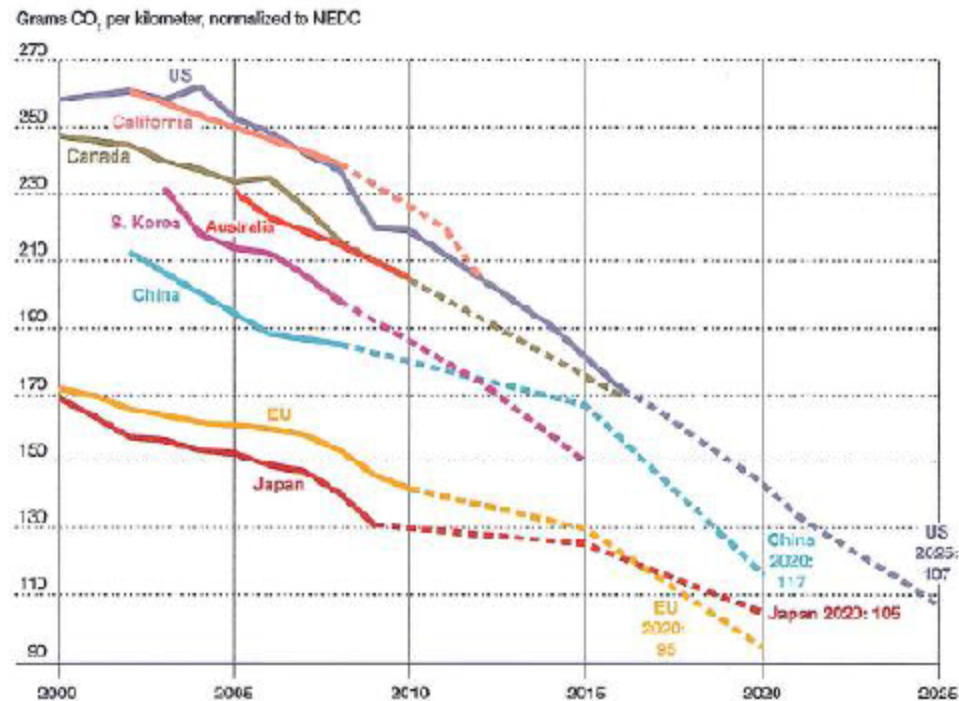
Factor	Cost estimate (INR/car)
50G/50G coated steel for entire BIW	4,500
Shorter welding tip life & tip dressing	2,500
Higher utility costs for welding (kwh)	2,000
More frequent die maintenance	4,350
Additional body shop finishing	1,000
Extra Zn phosphate consumption	500
<b>TOTAL COST EXTRA</b>	<b>14,850</b>

Factor	Cost Benefit (INR)
Resale of large offal (body sides, doors) to appliance, IT & construction	600 (25%)
50% reduction in warranty claims	750
Reduced usage of waxes, sound absorption epoxies, and lower housekeeping costs	240
Warranty extension marketing opportunity	Potential revenue stream
Market share protection	Soft benefit
CAFÉ improvement through lighter BIW as a result of item 3	240
Improved car inventory control at assembly line (no difference in domestic vs. export models	200
Opportunity to generate new revenues by eliminating need by consumer to buy aftermarket undercoating, UV “Permashine” paint protection	20,000
No annual inspection requirements by car buyer	2500
<b>TOTAL COST BENEFIT</b>	<b>24,530</b>

# *What are the Bharat VI Requirements for Indian Automobiles*

- ☐ *Emission Control Limits to reduce air pollutants by 2020*
- ☐ *Based on European regulations (Euro Norms)*
- ☐ *Covers CO, HC, NOx, PM for diesel and gasoline engines*
- ☐ *Bharat IV is currently in effect in 33 Indian cities, but Bharat VI will become the law in 2020*
- ☐ *Most car companies in India should have no problem meeting Bharat VI requirements. Diesel Particulate Filters (DPF) or Selective Catalytic Reduction (SCR) modules will have to be installed on all cars*
- ☐ *Costs will increase to become compliant (weight reduction becomes even more critical)*

## Tailpipe Emissions Standards More Stringent Globally



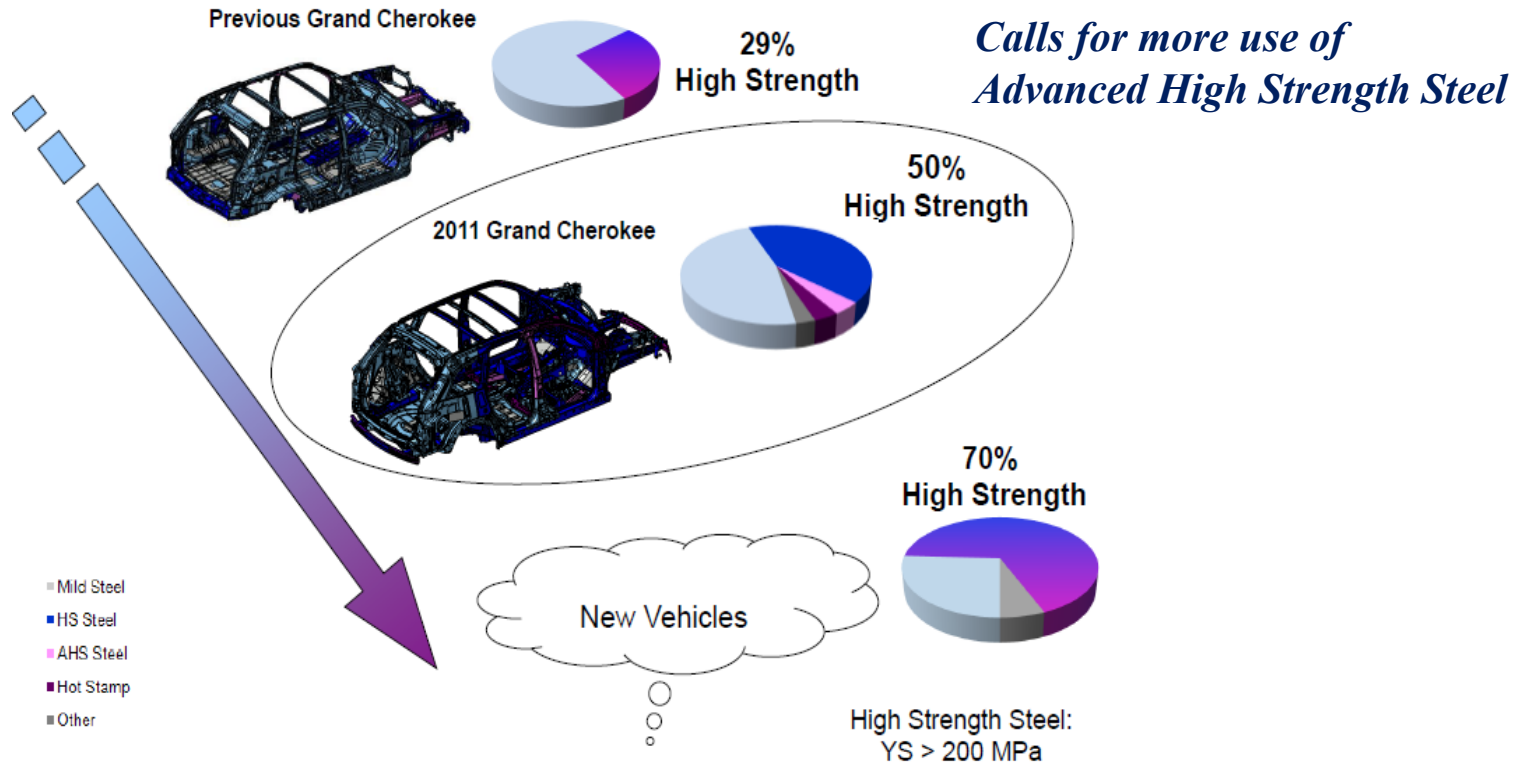
Source: International Council on Clean Transportation August 2011



[www.worldautosteel.org](http://www.worldautosteel.org)

# *Reduction in Emissions & Light weighting Go Hand in Hand*

USA CAFE regulations (54.5 mpg by 2025)  
Similar for Europe: 95g/km of emissions by 2021



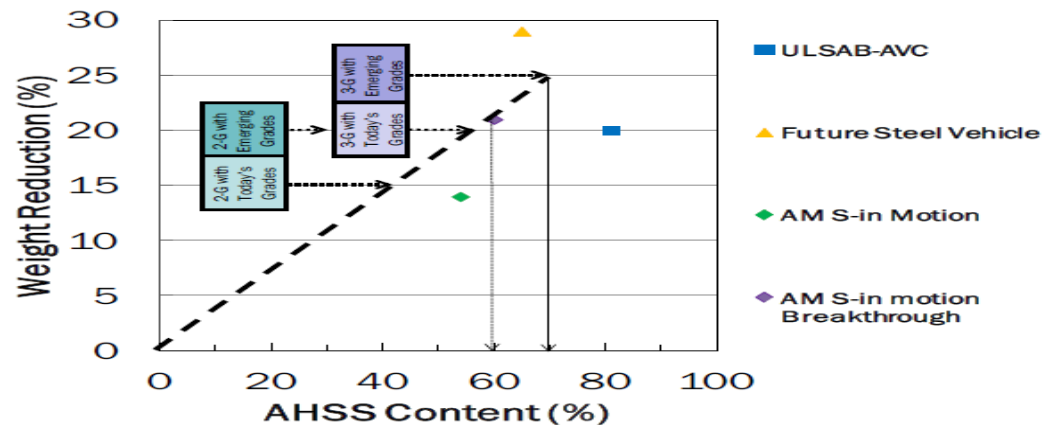
# Reduction in Emissions & Light Weighting Go Hand in Hand

Material Production GHG comparison for a functionally equivalent component - **example**

	Mid-Range CO <sub>2</sub> e	Estimated Part Weight (kg)	(kg CO <sub>2</sub> e)
Mild Steel	2.3	100	230
Advanced High-Strength Steel	2.3	75	173
Aluminium	11.3	67	757
Magnesium	46.0	50	2300
Carbon FRP	22.0	45	990

*Use of Advanced High Strength Steel (AHSS) leads to significantly lower emissions*

*How much weight reduction can steel provide?*



# Hyundai Sonata Success Story



HYUNDAI

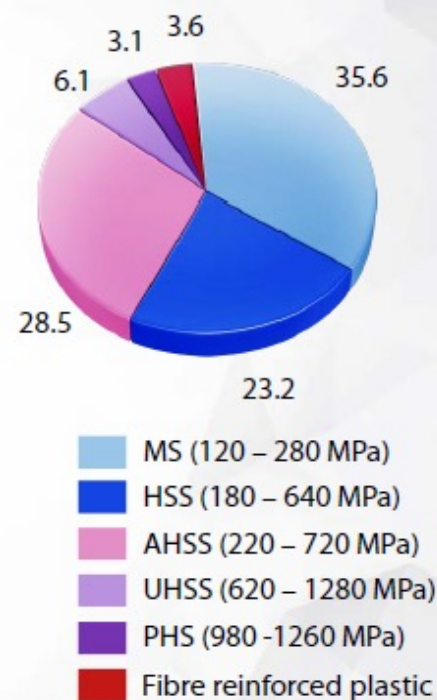
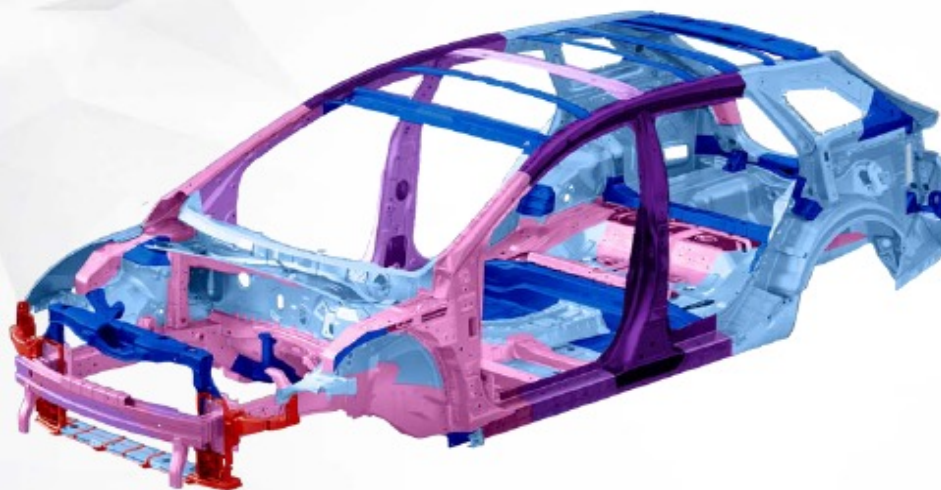
NEW THINKING.  
NEW POSSIBILITIES.

i40

Product Concept / BIW Concept

## Weight optimization

- Achieved a 7.6% reduction in BIW weight compared to predecessor.





# Hyundai Sonata Redesign Resulted in Lower TCO and Improved Fuel Efficiency



**HYUNDAI**

NEW THINKING.  
NEW POSSIBILITIES.

**i40**

Product Concept / BIW Concept

## Efficiency

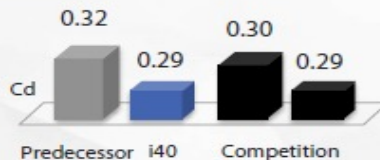


### Strong TCO performance through:

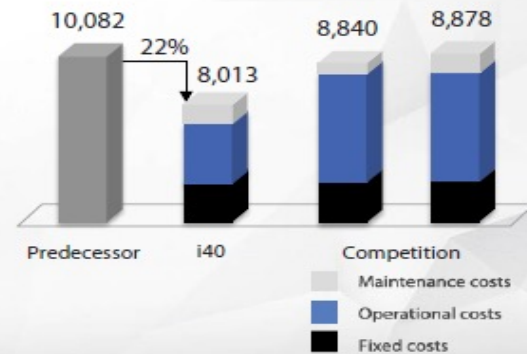
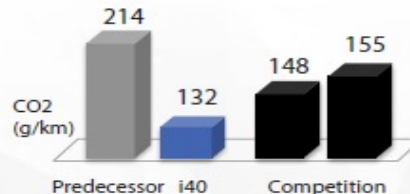
- High residual value
- 5-year triple care program
- Competitive RCAR performance

### Total cost of ownership:

#### Aerodynamics



#### Fuel efficiency



Hyundai Sonata at GDHS Conference 2013

Product Concept



# *The Road Ahead*

## *Learning from International Auto makers*

Cooperative Initiatives:

- ❑ World Steel Future Steel Vehicle
- ❑ IZA Galvanized Auto body Partnership (GAP)

### FutureSteelVehicle

1. State-of-the-future development process
2. 177 kg body structure mass - *39% mass reduction*
3. 97% use of HSS and AHSS
4. Nearly 50% are GigaPascal steels
5. Enables 5-star safety ratings
6. Nearly 70% Total Lifetime Emissions Reduction
7. Mass savings at no cost penalty
8. Near-term production-applicable solutions



***100 kg weight reduction = 0.4 L/100km  
fuel improvement & less emissions***

# IZA GAP program & GAP Members

19 Global Steel Companies

7 Equipment Suppliers, 1 Automaker, and IZA Members

Funding of USD 1 Million



## *India has 3 domestic Automotive Exposed Quality galvanized steel suppliers*

Company	Location	# CGL's	Capacity MT	GI	GI / GA	AZ	T X W mm	Zinc Usad KT	AE Capability
Bhushan	Ghaziabad, Uttar Pradesh	4	400,000	3		1			No
Bhushan	Khopoli, Maharashtra	2	200,000	1		1			No
Essar	Hazira, Gujarat	2	500,000	2					No
Essar	Pune, Maharashtra	1	450,000	1					No
<b>JSW</b>	<b>Tarapur, Maharashtra</b>	<b>5</b>	<b>750,000</b>	<b>3</b>	<b>2</b>				<b>Yes - GA</b>
JSW	Vasind, Maharashtra	2	400,000	2					No
JSW	Kamleswar, Maharashtra	2	330,000	1		1			No
<b>POSCO</b>	<b>Mangaon, Maharashtra</b>	<b>1</b>	<b>400,000</b>		<b>1</b>				<b>Yes - GA</b>
SAIL	Bokaro, Jharkhand	1	170,000	1					No
SAIL	Rourkela, Odisha	1	290,000	1					No
<b>Tata</b>	<b>Jamshedpur, Jharkhand</b>	<b>2</b>	<b>450,000</b>	<b>1</b>	<b>1</b>		<b>1560 mm</b>	<b>15.5</b>	<b>Yes - GA</b>
Tata Bluescope	Jamshedpur, Jharkhand	1	200,000			1			No
Uttam Galva	Khopoli, Maharashtra	2	200,000	2			1250mm		No
Indian Steel		2	370,000	2					NoNo
Lloyds	Wardha, Maharashtra	1	125,000	1					No
Metalman	Pithampur, Madhya Pradesh	1	70,000	1				2.8	No
National	Sejwaya, Madhya Pradesh	1	280,000	1					No
RSAL (Ruchi)	Indore, Madhya Pradesh	1	55,000	1					No
Steelco	Palej, Gujarat	1	80,000	1					No
Shree Precoat	Sanaswadi, Maharashtra	2	500,000	2					No
Vardhman	Patiala, Punjab	1	50,000	1			.14 - .80; 1100mm		No
<b>TOTALS</b>		<b>36</b>		<b>28</b>	<b>4</b>	<b>4</b>			

## ***In Summary: India's Automobile Industry will Prosper***

- ***India is set to become the fourth largest automotive producer in the world by 2020***
- ***Automotive sector is the second largest market for steel, consuming about 10 million tons of steel and will grow significantly in the coming years***
- ***With the increasing demand for Indian made automobiles, there will be growing demand for high strength galvanized steel, which will account for nearly 70% of the total car body weight.***
- ***The performance and durability of Indian made cars will benefit from the use of galvanized steel***
- ***Consumers will benefit from better fuel efficiency, lower emissions and safer vehicles with anti perforation warranties***

Reference: 1) Steel perspectives for the automotive industry, P. Blain

2) Metals and Mining Sector Report, 2015, India Brand and Equity foundation



**ZINC**  
ZINC

**Thank You**

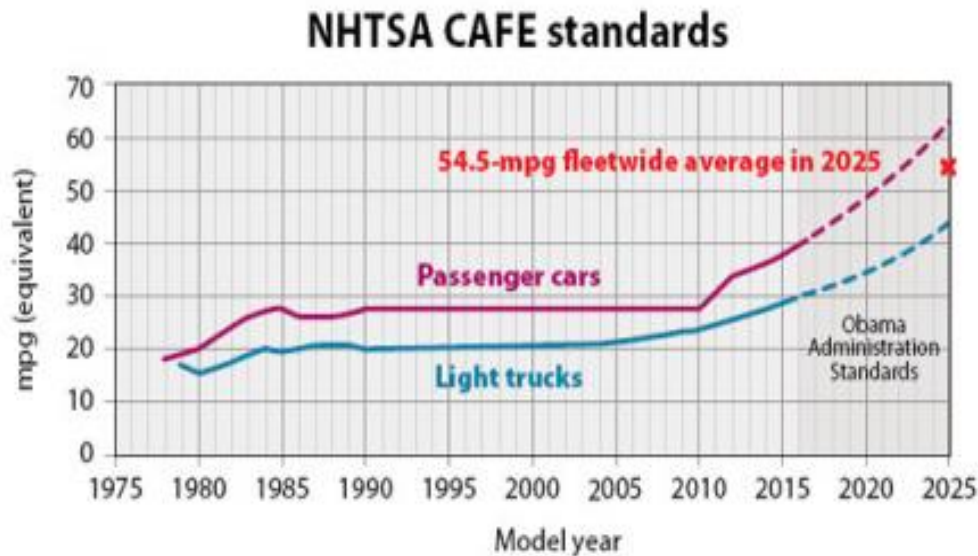
**Namasté**



## US Case Study: The Light weighting Challenge

USA CAFE regulations (54.5 mpg by 2025)

Similar for Europe: 95g/km of emissions by 2021



CAFE fine is currently \$5.50 USD per 0.1 mpg under the standard, multiplied by the manufacturer's total production for the U.S. domestic market

## Steel Industry Response – Development of Advanced High Strength Steels (AHSS)

