

Great Designs in

STEEL

2013!!

A Winner: Car Body Design Development of the Hyundai Sonata

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HYUNDAI

NEW THINKING.
NEW POSSIBILITIES.

New Thinking. New Possibilities.



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Product Concept

- Background
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- Customer proposition
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- Practicality
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BiW Concept

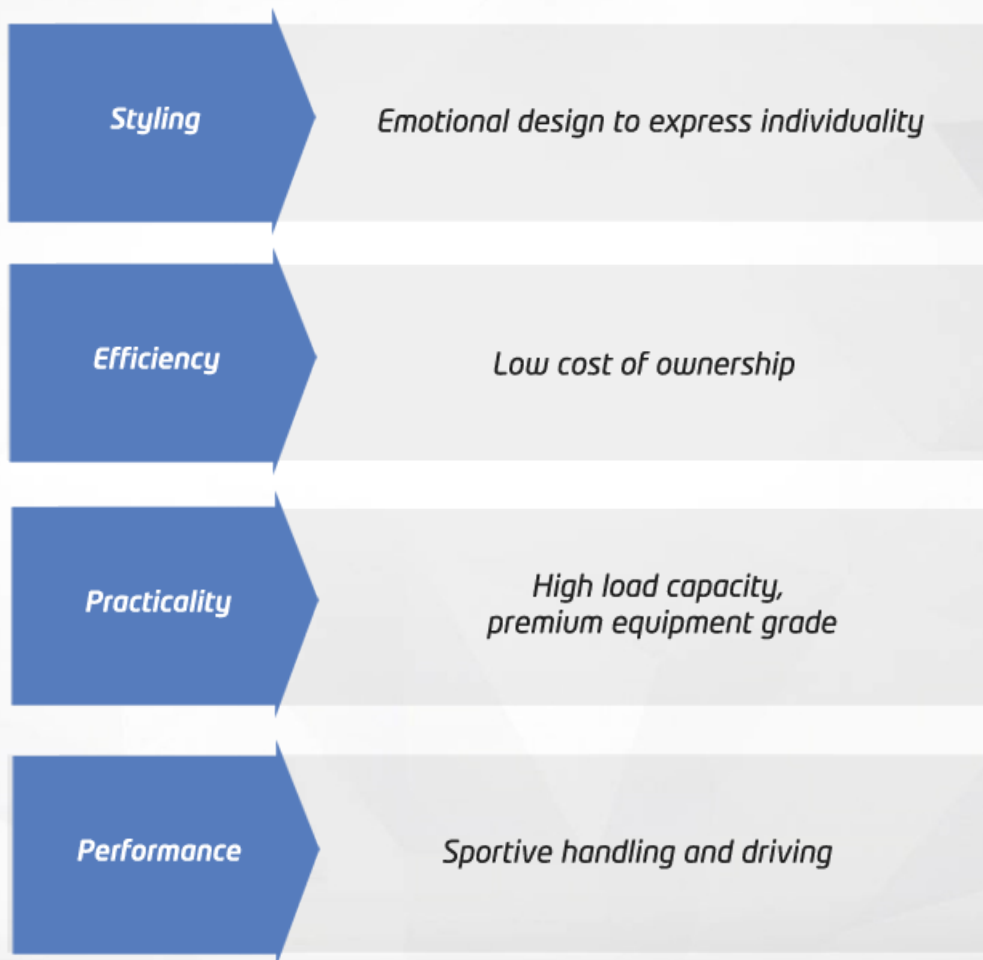
- Development process
- Weight optimization
- Stiffness
- Material
- Safety

Product Concept

Background

European market demands

i40 development direction



History

Sonata (US)
2010 Sedan



i40 (EU)
2011 Sedan & Wagon



Sonata
2004



Sonata
1998



Customer Proposition



Fuel Efficiency

- Best in class with 113g CO2/km

Roominess Practicality

- Best in class roominess
- Class leading practicality

Equipment

- 3 USPs: rear seat reclining, auto defog, heated steering wheel

Design

- Sporty and emotional
- Modern interior

Value

- Target best in TCO
- Competitive pricing



Exterior Styling

**Eagle eye style
headlamp with LED DRL**

**Contact
Roof-garnish**

**Wing-shape style rear
combi lamp applied led
and light curtain**



**Hyundai family hexagon
radiator grill**

**Characteristic DLO
graphic**

**18 inch alloy wheel
in hypersilver color**

Interior Styling

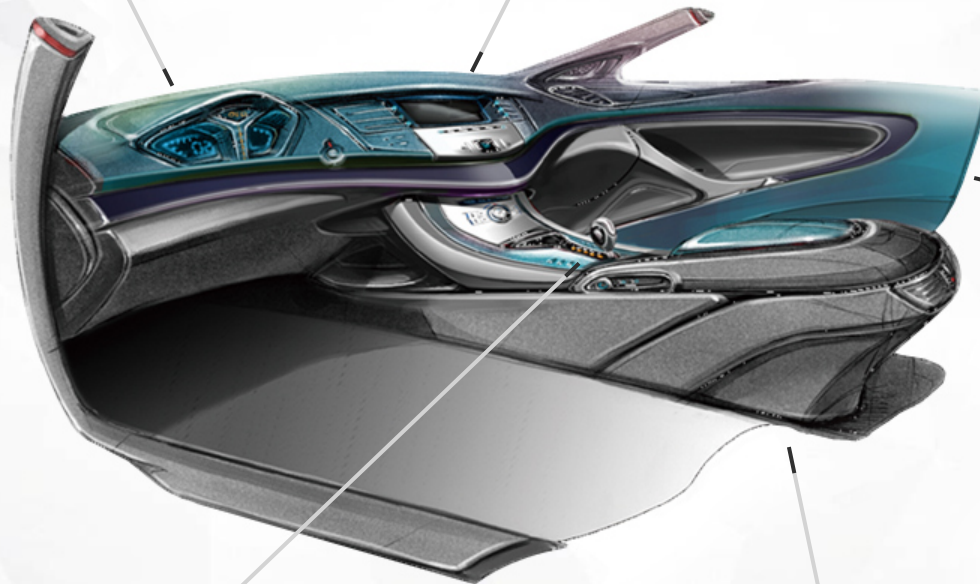
***2-circle digilog style
with center-digital display***

***Center-facia with
high-tech appeal***

***Dynamical
garnish***

Luxury gear-shift knob

Sleek consol box



Cargo capacity

- Cargo capacity **19.5 cu. ft.** (553 liters) with the rear seats occupied
- Up to **60.7 cu. ft.** (1718 liters) with the rear seats folded down



Efficiency

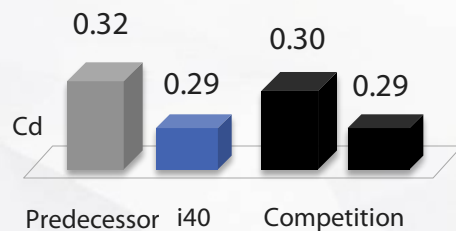


Strong TCO performance through:

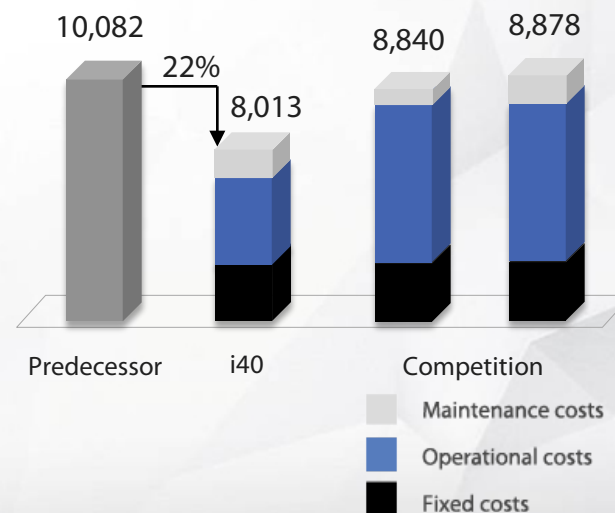
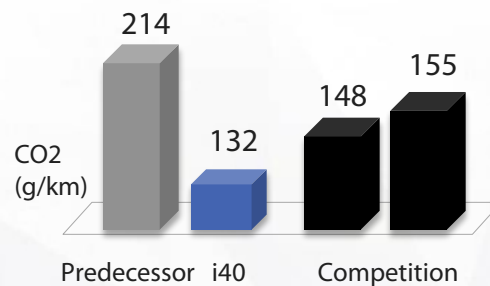
- High residual value
- 5-year triple care program
- Competitive RCAR performance

Total cost of ownership:

Aerodynamics

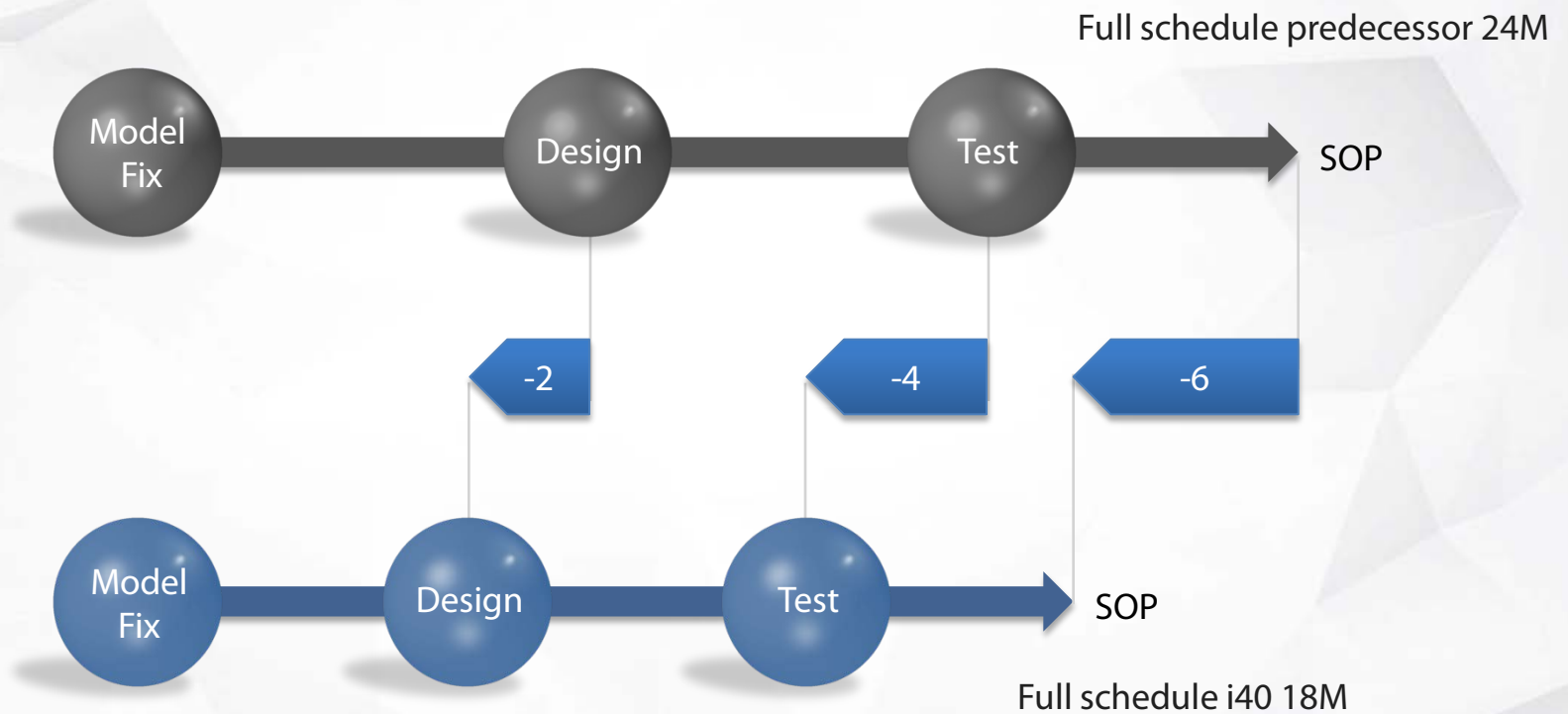


Fuel efficiency



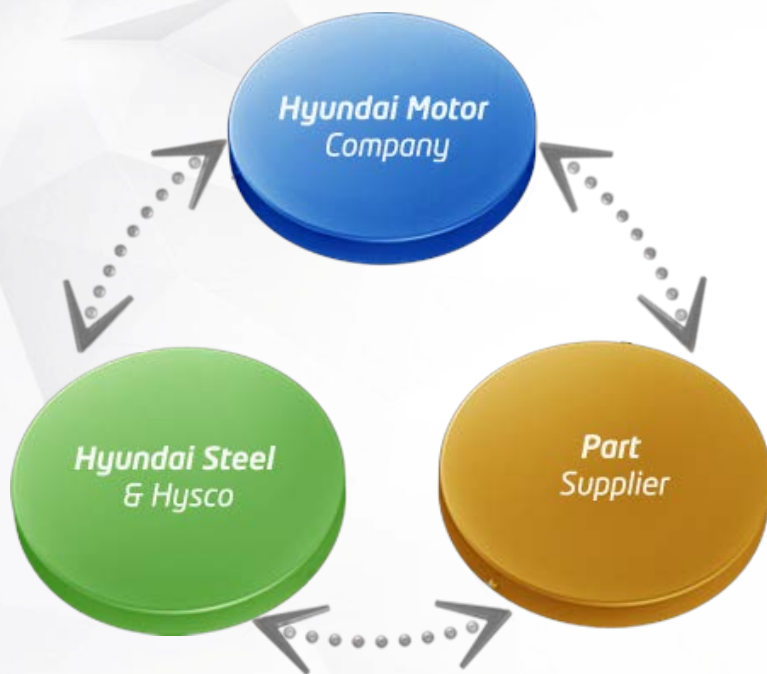
BIW Concept

Development Process

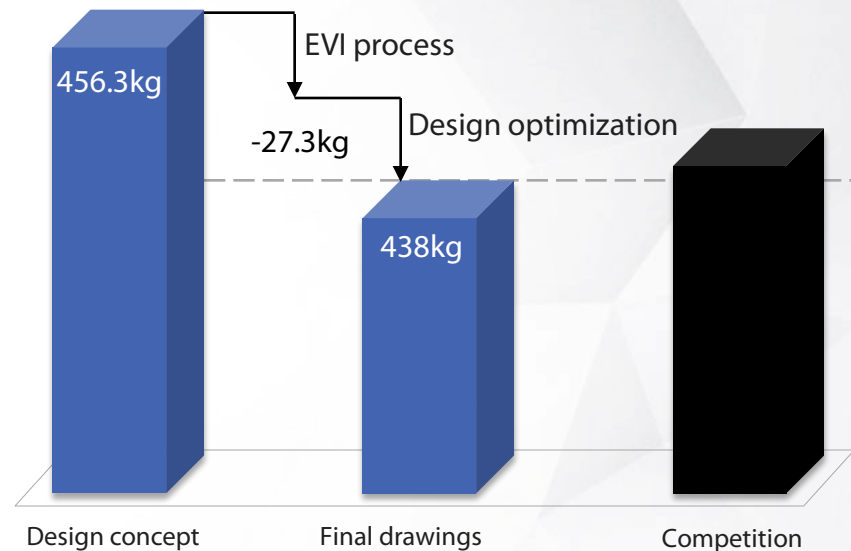


Weight optimization

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



EVI (Early Vendor Involvement)



Part optimization Center floor



- Rearranging the part assembly allowed for a reduction of the material thickness
- From single part with uniform thickness to three parts with different, optimized thickness



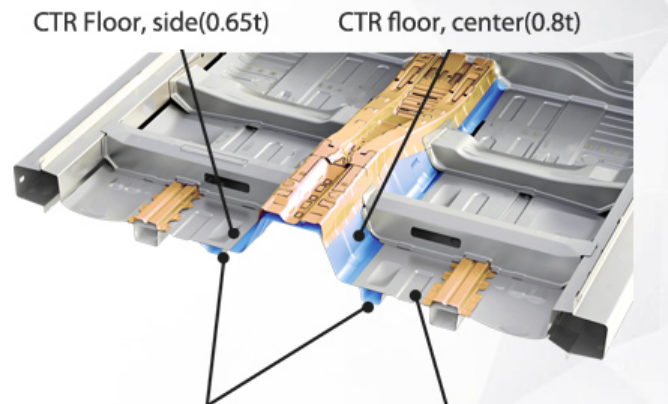
CTR Floor (0.7t)

1.4t

Active for tunnel side member
(2WAY LOAD PATH)

Predecessor

-0.6 Kg



CTR Floor, side(0.65t)

CTR floor, center(0.8t)

Active for tunnel side member
(2WAY LOAD PATH)

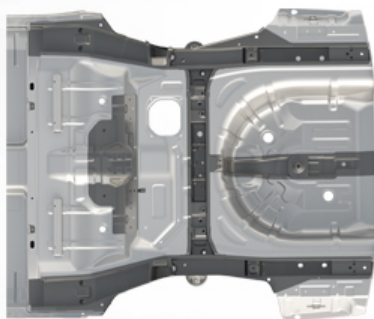
CTR floor, side(0.65t)

i40

Part optimization

Rear floor

- Change of the form from linear interior to radial interior lead to a material thickness reduction
- Divergence angle to improve airflow and NVH performance



Spare Member (1.0)

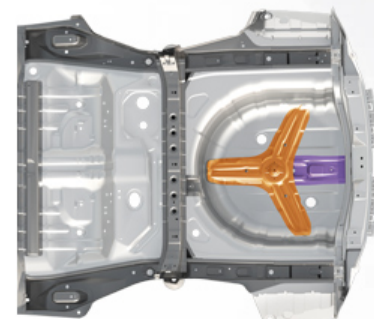


Rear Floor (0.7)

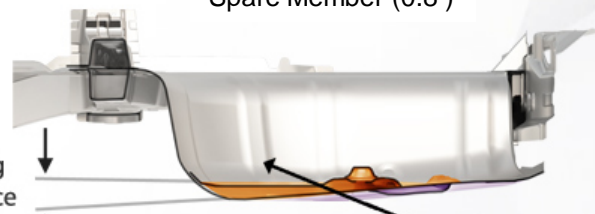
Predecessor



-1.4 Kg



Spare Member (0.8)



Applying
divergence
angle

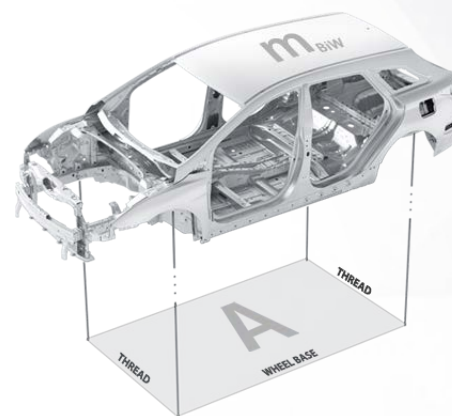
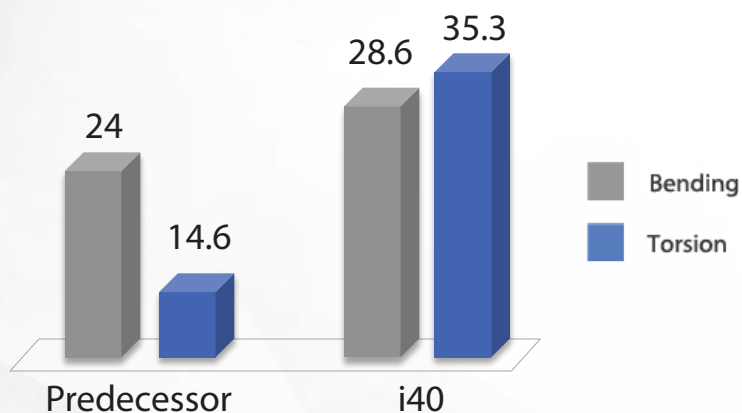
i40

Rear Floor (0.7)

Body stiffness & lightweight index

- Increased the torsional stiffness by **141%** and the bending stiffness by **19%**.
- Achieved **11%** more torsional and **23%** more bending stiffness compared to competition

	i40	Predecessor
LIGHTWEIGHT INDEX	2.09	4.41
BIW WEIGHT	325.6	302.3
TORSIONAL STIFFNESS	35.3	14.6
AREA	4.415	4.69



$$L = \frac{m_{BIW}}{C_T A} \times 10^3$$

L Body structure efficiency index
m_{BIW} BIW weight
C_T Body torsional static stiffness
A Body projection area considering vehicle spec.