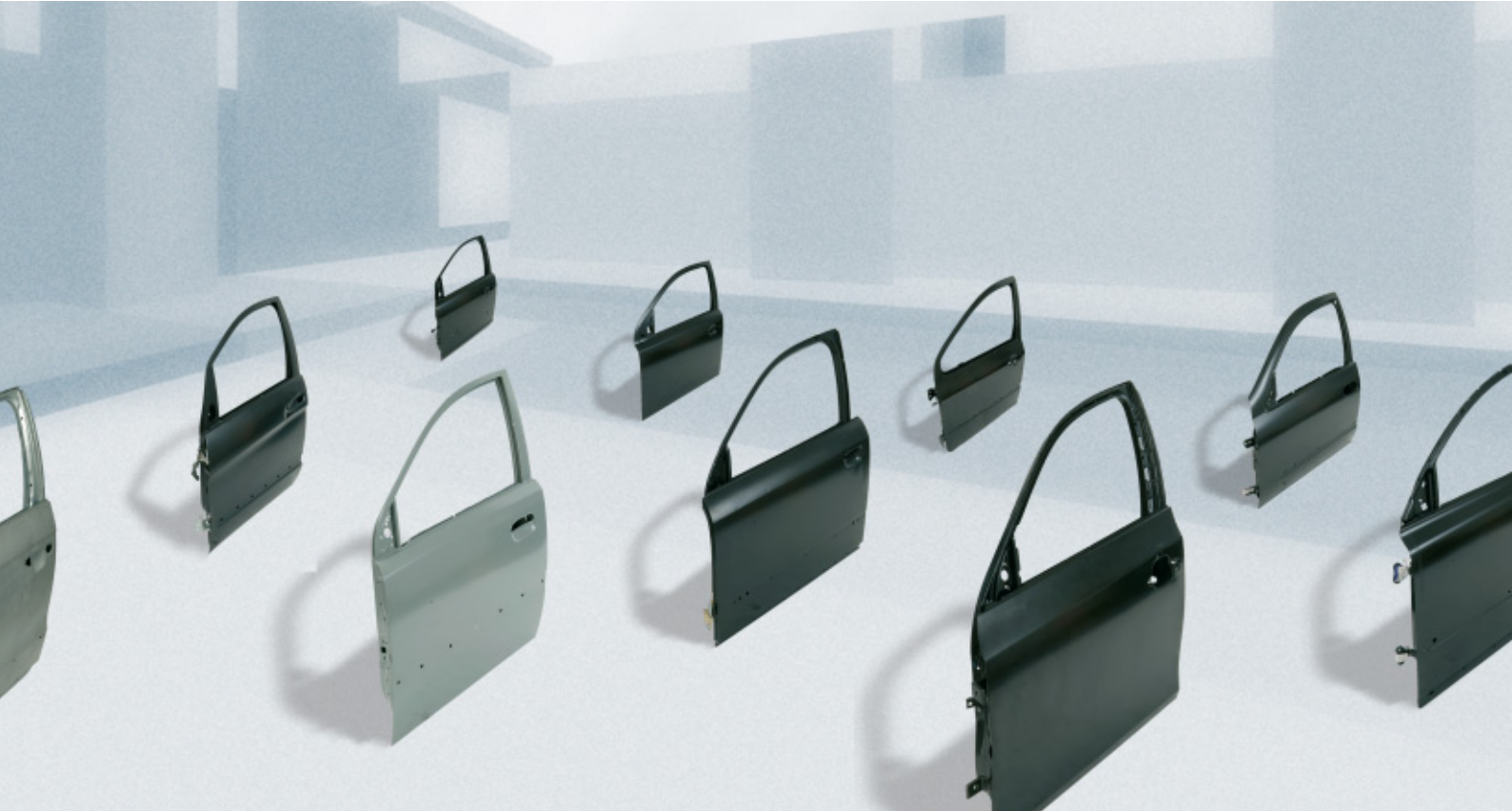


ThyssenKrupp Tailored Blanks – door benchmark study.



A company
of ThyssenKrupp
Steel

ThyssenKrupp Tailored Blanks



ThyssenKrupp

Door benchmark study.

The door benchmark study focused on doors of current vehicles which were compared from different aspects.

- » The study looked at concepts, designs, functionality and performance level. In addition a cost comparison was carried out for all doors under identical parameters.

All doors were subjected to extensive physical tests. These included door sag, over-opening and window-frame and beltline stiffness. The load definition was based on OEM specifications.

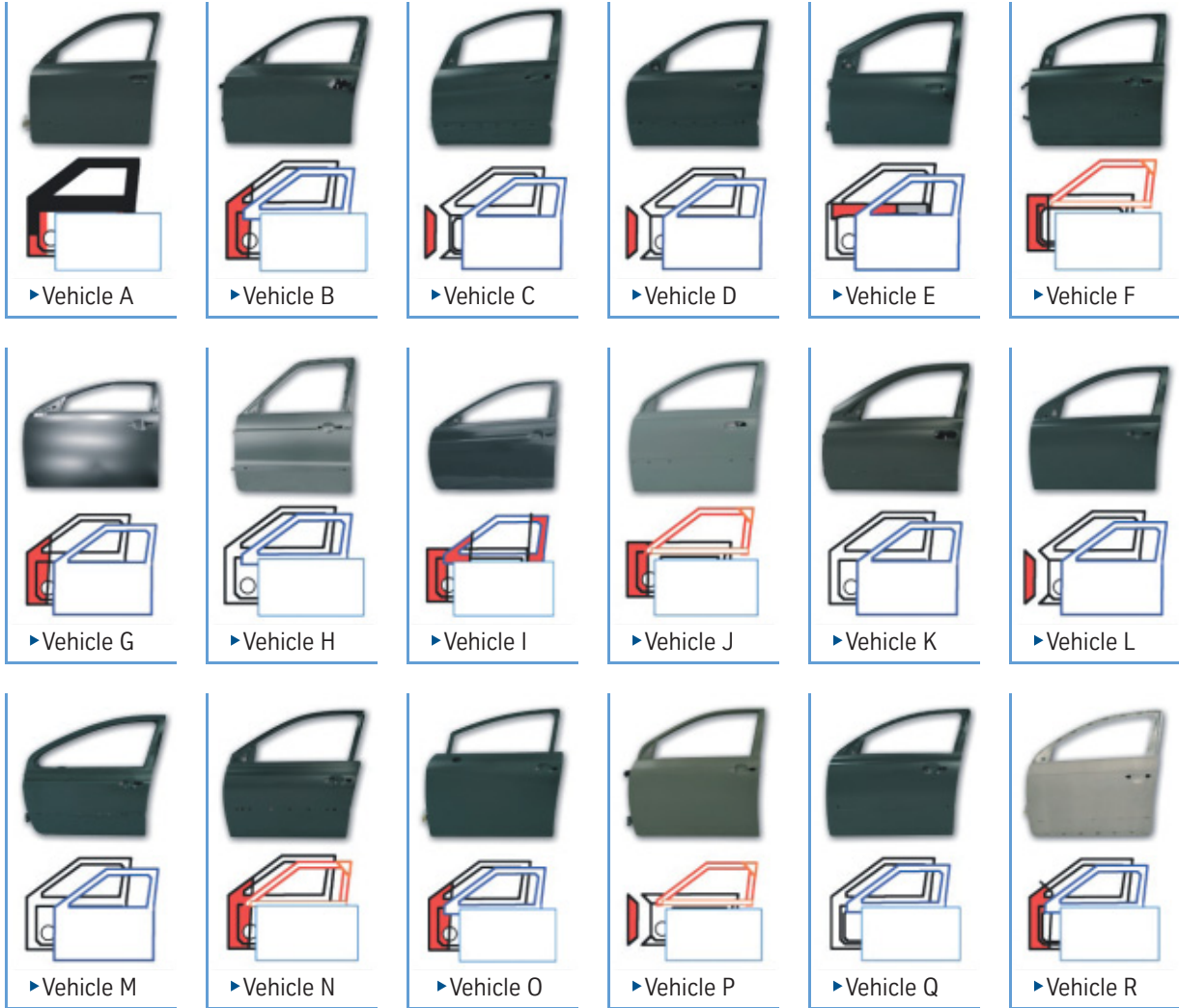
For cost analysis an individual body-in-white plan was drawn up for each door, resulting in comparability of manufacturing costs based on identical parameters.

It was shown that “simple” doors with few parts, for example with tailored blanks, tend to cost less to produce than comparable doors with more parts showing similar performance.

Another aim of the benchmark study was to deepen the understanding of ThyssenKrupp Steel and ThyssenKrupp Tailored Blanks for low-cost designs and cost relationships to allow them to tap new weight reduction potential for doors together with customers.



18 doors of current production vehicles compared.



Performance, cost and weight comparison.

Performance comparison – four load cases were analyzed

Stiffness, plastic deformation and hinge influence were measured and analyzed.

The doors, including hinges and check straps were tested for four typical load cases:

- ▶ Door sag
- ▶ Window-frame stiffness
- ▶ Beltline stiffness
- ▶ Over-opening

The doors were procured via various auto service shops.

Results: Example door sag and stiffness:
Most of the doors offer similar performance in this important load case, with isolated exceptions. The doors with welded hinges display the highest stiffness.

Performance summary:
Consistently good performance across all load cases results in the best overall rating. Many doors display pronounced strengths and weaknesses.

Cost comparison – identical parameters

To allow comparison of the costs of the door concepts, identical parameters were used for each scenario.

The scenario for the cost comparison was the same for all doors – 200,000 vehicles per year. Part weights and sheet metal thicknesses were determined by disassembly, and identical material prices were used. Material use was estimated by dividing the parts into nesting groups. Tooling costs were determined by derivation from reference parts.

Individual body-in-white plans to determine assembly costs were carried out separately for each door.

Result of the cost comparison:
Two of the three lowest-cost doors contain tailored blanks.

Weight comparison – all doors at a similar level

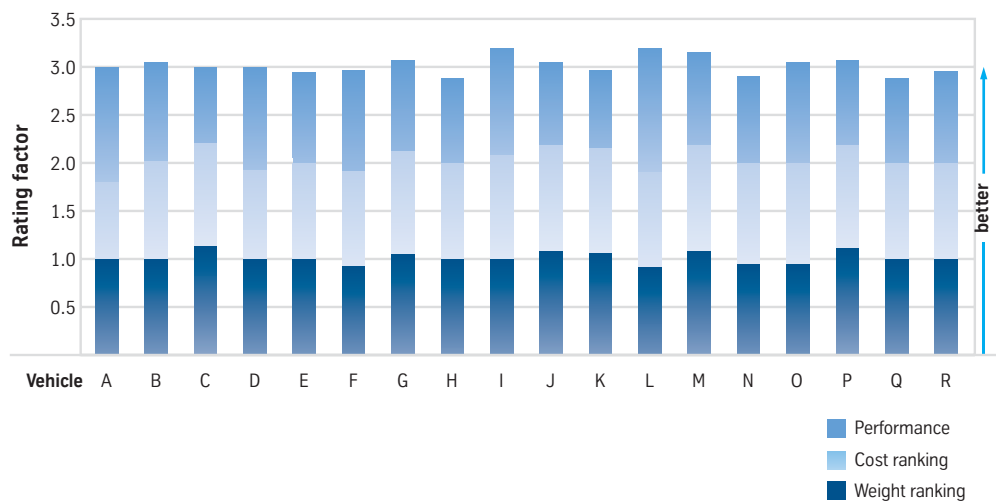
Weight was measured based on hardware doors procured via the customer service of various auto service shops.

The average weight per unit area of all 18 doors was roughly the same at 14 kg/m².

Overall rating and conclusion.

The overall rating was determined by adding the individual scores. The different priorities of the car manufacturers in terms of weight, performance and cost were noticeable. The highest-scoring door concept contains a high share of tailored blanks.

Overall rating at a glance



- ▶ The overall rating of a door takes into account performance, weight and cost.
- ▶ Performance was determined for the system of door and hinge.
- ▶ Highest rating of overall system for door with welded hinge.
- ▶ The best door concept has a high share of tailored blanks.
- ▶ Interactions with the body concept and differing customer requirements are taken into account in the rating.
- ▶ The cost calculation depends on the selected parameters.
- ▶ No single optimal door concept.
- ▶ Relationships between door concept and cost/weight/performance are observable.
- ▶ Door concepts with tailored blanks are among the best-scoring doors.

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