

[16/17 – 10] 3 year old domestic cars' corrosion at a similar level to 11 year or older imported cars'

- **Domestic cars' corrosion problems partially improved since 2007 but still more than 4 times imported cars'**
- **Distrust of domestic cars as a main reason for consumers to choose imported cars**
- **Likely hard for domestic cars to compete against imported cars unless effectively dealing with their corrosion problems**

Car corrosion is a fatal problem. It is a cancer of a car in that it spreads gradually, and it is like skin cancer in that it can be seen by eyes and touched by hand. The number of corrosion problems of domestic cars was basically more than four times that of imported cars and got worse off to be over six times the imported cars over time. Among the domestic brands, Renault Samsung had the least problems, and the other four companies were similar to one another. The most corroded areas in the domestic cars were the 'muffler' of the lower body and the 'door' and 'rear wheel fender' of the painted areas (external).

To all the consumers (42,000 people) who had bought their new cars more than 1 year ago, the survey asked about their car corrosion in the three parts (painted areas, bottom, others). The three parts were then broken into the total of 13 areas consisting of the 7 painted areas, 5 bottom areas, and one other part [See appendix]. The study averaged the number of corrosion problems per 100 cars (hereafter 'pph') for comparison. For the convenience sake, the study divided the years of car use into 'one to five years,' 'six to ten years,' and 'eleven years or longer' to look into any difference in the number of corrosion occurrences by the year of car use.

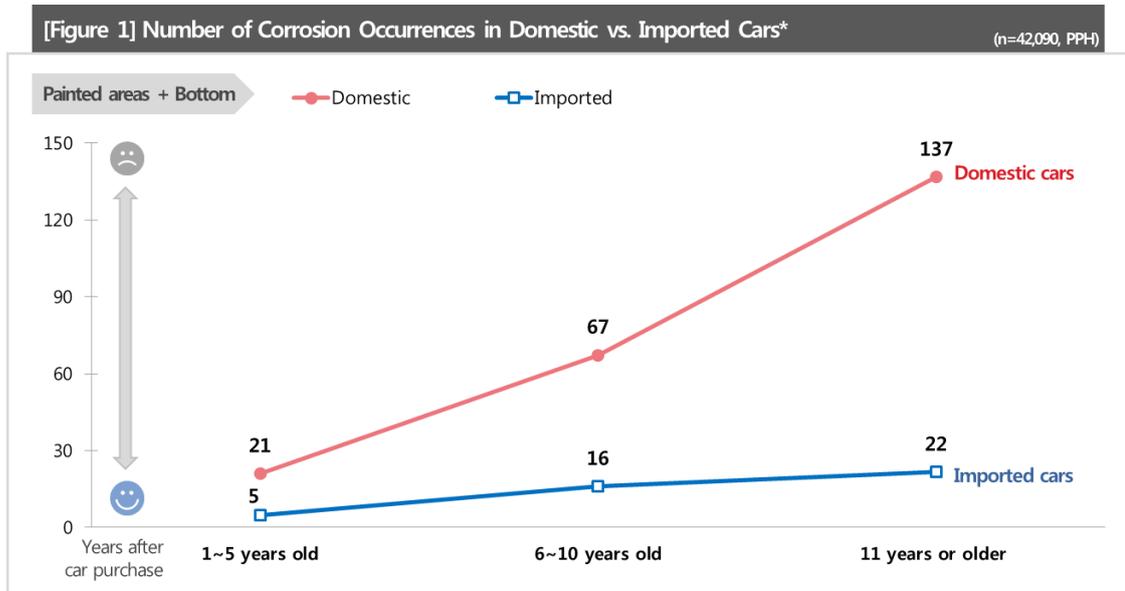
The number of corroded parts of the domestic cars tended to increase significantly from 21 pph for one to five year old cars, 67 pph for six to ten year old cars, and 137 pph for eleven year or older cars [Figure 1]. The 137 corrosion pph for eleven year or older cars meant that there were more than 1.3 corroded parts per 100 domestic cars that were eleven years and longer in use.

On the other hand, imported cars showed 5 pph for one to five year old cars, 16 pph for six to ten year old cars, and 22 pph for eleven year or older cars, proving that overall imported cars' corrosion pph is below one fourth domestic cars'. In particular, imported cars in eleven

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years or more in use were found to have less than one sixth domestic cars' corrosion pph, which was a similar level to one to five year old domestic cars'. The result translates as eleven year or older imported cars having the same corrosion pph as 3 year old domestic cars' on average. That is, domestic cars are way below their imported counterparts when it comes to corrosion.



* Number of corrosions in 13 areas (7 painted areas, 5 bottom areas, one other area, average per 100 cars, PPH)

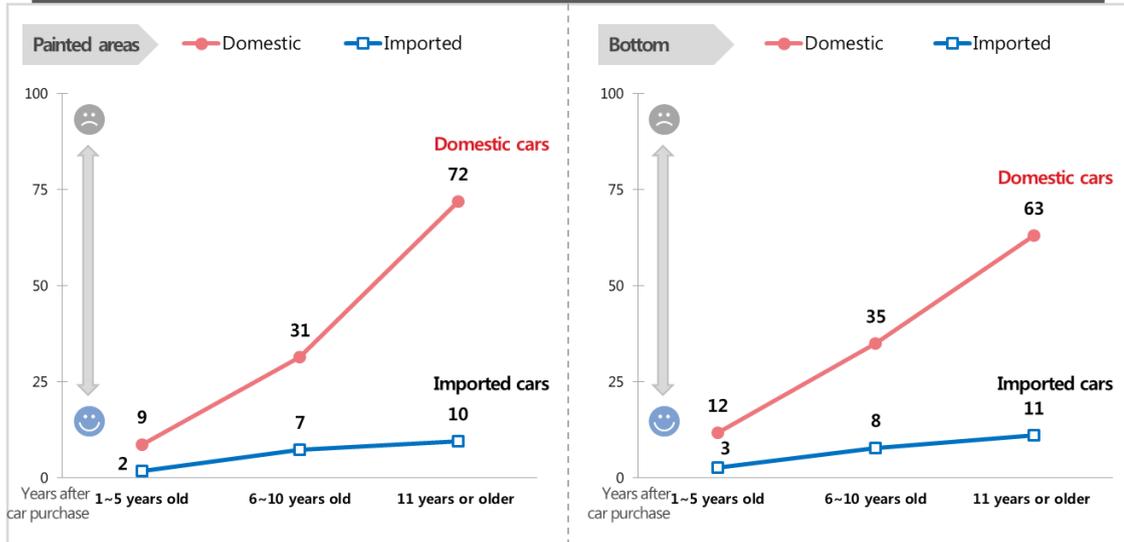
Corrosion occurrence areas were largely divided into the two main parts of the painted areas and bottom (the other one part excluded) and then compared similarly. The results of each main area were generally similar to the sum of the two's. ▲ There was a big difference between domestic and imported, ▲ the tendency of corrosion occurrence increase was clear, ▲ three year old domestic cars were similar to eleven year or older imported cars on corrosion pph. If any, the difference was that the corrosion in painted areas of the domestic cars increased greatly (72 pph) to reach 7.5 times the imported cars' (9.6 pph). The finding tells us that the painted areas of domestic cars are relatively weaker.

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[Figure2] Number of Corrosion Occurrences in Painted, Bottom Areas*

(n=42,090, PPH)



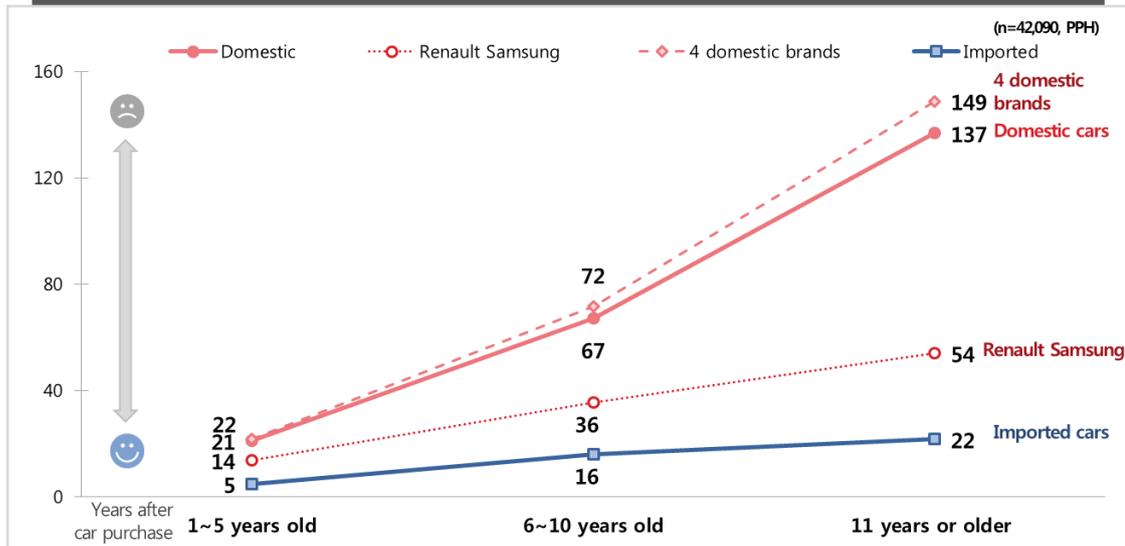
* Number of corrosions in 12 areas (7 painted areas, 5 bottom areas, except one other area, average per 100 cars, PPH)

Are all the five domestic brands similar on corrosion? The comparison of the five brands found that clearly Renault Samsung stood apart from the other 4 brands. The number of Renault Samsung' corrosion problems was not as small as imported cars' but a lot smaller than the other 4 domestic brands', putting Renault Samsung closer to the imported car side. Different from the 4 domestic brands whose corrosion pph ranged 4 times to 7 times the imported cars', Renault Samsung's corrosion pph was below 3 times imported cars'. For the eleven year or older cars, in particular, the brand showed one third the corrosion occurrences of the 4 domestic brands. This finding makes it hard for us to say that corrosion is all domestic brands' problem.

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[Figure3] Number of Corrosion Occurrences in Renault Samsung – 4 domestic brands – Imported cars



*Cracks, gaps in car body/Car body, External Painted Area conditions(rusting, corrosion)/Lower body corrosion

More specifically, the study also checked on what areas the corrosion occurred in more and how that differed by brand. For the convenience sake, the results were summarized only on the six to ten year old cars from domestic and imported, and the three groups of Hyundai-Kia, GM Korea-Ssangyong, and Renault Samsung [Table1]. First, the overall results showed that the number of investigated corrosion areas was 5 for the bottom, smaller than 7 for the painted areas, but the corrosion pph were found more in the bottom areas. Only GM Korea-Ssangyong were the exceptions that showed more corrosion occurrences in the painted areas.

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[Table 1] Number of Corrosion Occurrences in 6 to 10 year old cars

(PPH)

	Industry average	Imported cars	Domestic cars	Hyundai/Kia	GM Korea/Ssangyong	Renault Samsung
(BASE)	(14,833)	(837)	(13,995)	(10,158)	(2,176)	(1,661)
▶ Painted Area + Whole bottom areas	64.4	16.0	67.3	70.9	74.8	35.5
▷ Painted Area	30.1	7.4	31.4	32.3	40.7	13.8
Door	9.3	2.2	9.7	9.9	12.6	4.7
Rear wheel fender(Tire wrapping area)	9.0	1.2	9.5	9.8	13.3	2.4
Front wheel fender(Tire wrapping area)	4.9	1.7	5.1	5.3	5.9	2.2
Hood(Bonnet)	3.0	1.0	3.2	3.3	3.7	1.9
Tailgate (Trunk)	2.4	0.7	2.5	2.4	3.8	1.7
Pillars (A, B, C pillar)	0.8	0.4	0.9	0.9	1.1	0.4
Roof	0.6	0.1	0.7	0.8	0.3	0.4
▷ Lower body	33.4	7.9	35.0	37.7	32.7	21.2
Exhaust pipe(muffler)	11.2	1.6	11.8	12.8	11.5	6.4
Lower frame (Steel structure supporting the car)	6.5	2.0	6.7	7.3	6.1	4.2
Suspension part	5.9	2.7	6.1	6.4	5.0	5.1
Side Seal panel (part below doors)	5.6	0.7	5.8	6.2	6.6	2.7
Gas tank	4.3	0.9	4.5	5.0	3.4	2.9
▷ Other parts	0.9	0.6	0.9	0.9	1.4	0.5

The areas with more corrosion occurrences for imported cars were bottom-suspension (2.7pph), followed by door (2.2pph) and bottom frame (2.0 pph). No area had 3 or more pph. On the other hand, the domestic cars had the most corrosion pph in the exhaust pipes with 12 pph, followed by door (9.7pph) and rear wheel fender (9.5pph).

The imported cars did not have any areas with 3 or more pph while the domestic cars had 3 or more pph in the nine out of the twelve corrosion check areas. It appears that the inferiority of the domestic cars lies in the painting and the whole bottom areas rather than any particular areas. Renault Samsung was ahead of the other 4 domestic brands across the most areas with its corrossions less than half of the 4 domestic brands in the most areas and only one fourth of the 4 brands' in the rear wheel fender.

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Corrosion is a problem that must be solved. How can we explain this big difference between domestic and imports? We cannot believe that Korean car manufacturers export these cars as they are and that many foreign car makers are exporting their cars without corrosion only to Korea. Corrosion is like skin cancer. The incidence rate of this disease clearly indicates problems with Korean cars for domestic sales. It will be a matter of course that consumers will distrust manufacturers if the manufacturers do not admit these problems and will not take due responsibilities. Behind the rapid growth of the imported cars, there is a feeling of rejection against domestic car companies, or especially Hyundai. There is deep rooted distrust at the bottom of this rejection, and corrosion is the core evidence that accompanies the distrust. Without a clear solution to this problem, the future of the domestic cars cannot help but be depressing.

The survey results came from the 16th Annual Automobile Syndicated Study with over 100,000 respondents which was fielded in July 2016 and analyzed by Consumer Insight, an automotive research firm.

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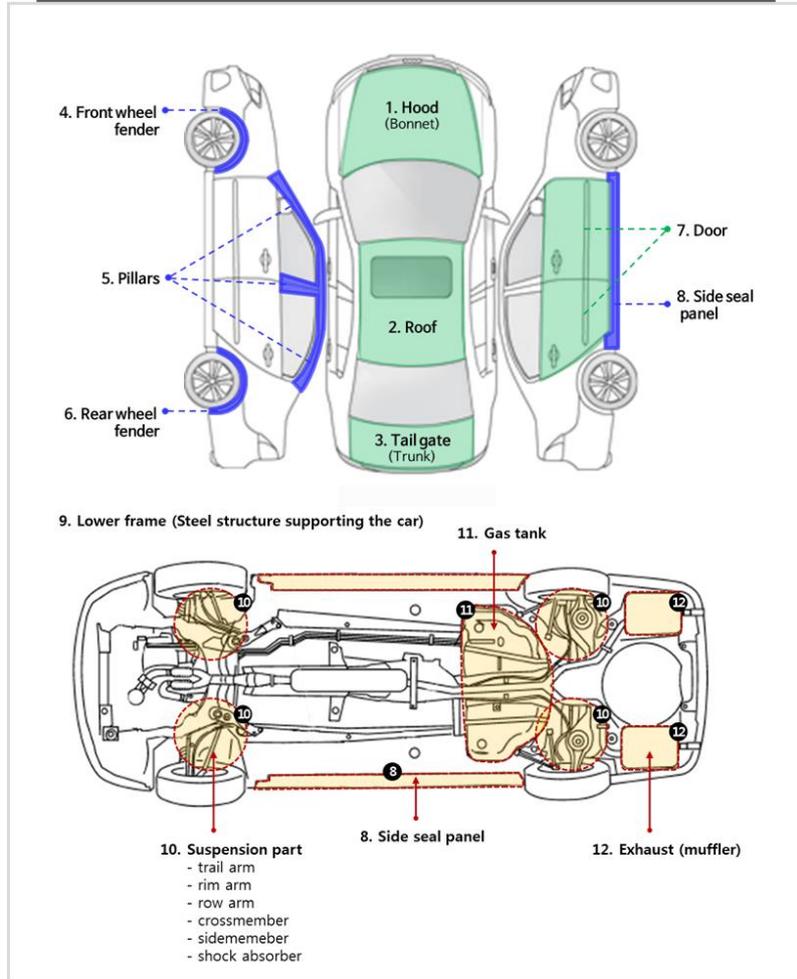
[Appendix 1] Explanation Image for Rusting/corrosion

[Rusting]	[Corrosion]
 <p>Reddish surface on metal due to Oxidation</p>	 <p>State of metal wearing out or getting holes or crumbling due to severe oxidation</p>

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[Appendix 2] Showcard for Corrosion Areas



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◆ **Reference: 「Consumer Insight」 'Annual Automobile Syndicated Study Outline**

「Consumer Insight」has been conducting 'Annual Automobile Syndicated Study' with over 100,000 respondents since 2001. The study is fielded in July every year and the detailed study design is as follows;

Respondent	Car owners/purchase intenders within next 2 years	<table border="1"> <thead> <tr> <th>Total</th> <th>1,791,733</th> </tr> </thead> <tbody> <tr><td>2016</td><td>100,788</td></tr> <tr><td>2015</td><td>105,672</td></tr> <tr><td>2014</td><td>101,821</td></tr> <tr><td>2013</td><td>101,701</td></tr> <tr><td>2012</td><td>95,012</td></tr> <tr><td>2011</td><td>97,356</td></tr> <tr><td>2010</td><td>106,291</td></tr> <tr><td>2009</td><td>91,129</td></tr> <tr><td>2008</td><td>95,472</td></tr> <tr><td>2007</td><td>105,149</td></tr> <tr><td>2006</td><td>106,088</td></tr> <tr><td>2005</td><td>139,825</td></tr> <tr><td>2004</td><td>171,499</td></tr> <tr><td>2003</td><td>118,195</td></tr> <tr><td>2002</td><td>129,277</td></tr> <tr><td>2001</td><td>126,458</td></tr> <tr> <td>(Year)</td> <td>(persons)</td> </tr> </tbody> </table>	Total	1,791,733	2016	100,788	2015	105,672	2014	101,821	2013	101,701	2012	95,012	2011	97,356	2010	106,291	2009	91,129	2008	95,472	2007	105,149	2006	106,088	2005	139,825	2004	171,499	2003	118,195	2002	129,277	2001	126,458	(Year)	(persons)
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Recruiting Panel	Random quota sampling from Consumer Insight's IBP(Invitation Based Panel) & other major portal site members																																					
Sampling	Quota sampling by gender/age																																					
Data Collection	E-mail survey																																					
Sample Size	Yearly average of 100,000 persons																																					
Study Contents	U&A(Usage and Attitude) & CEQ(Consumer Experienced Quality)																																					
Fieldwork Period	Every July																																					

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