



1.

가

1-3

가

21

가

가

가

. EU

2000

10

1980

가

2005

가

가

(EPR, Extended Pro -

ducer Responsibility)

가

4가



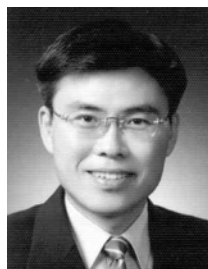
1989
1988
2001
2001

()



1991
1993
1993

()
()



1981
1983
1983

()
()

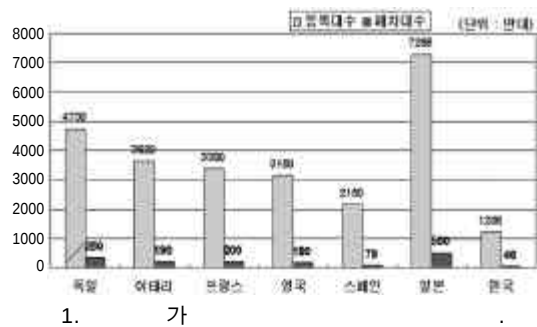
Recycling Technology for Polymeric Materials Used in Automobile

(Tae - Wook Yoo, Byeong - Kwon Hong, and John - Hee Hong, Polymeric Material Research Team, Advanced Technology Center, R & D Division for Hyundai Motor Company & Kia Motors Corporation, 772 - 1, Changduk - dong, Whasung - si, Kyunggi - do 445 - 706, Korea)

(ASR, automobile shredder residue)
200~300

가
가
1 70~75%

가



1. ()

(kg)	835	119	148	11	32	66	46	59	1316
(%)	63.5	9.1	11.2	0.8	2.4	5.0	3.5	4.5	100

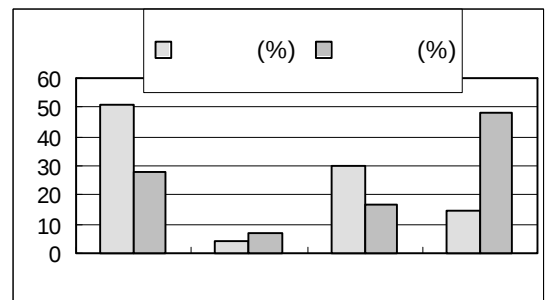
75 wt%
ASR

25%
2 ASR 27% 가
53%

ASR
가
가
가

grade PVC

가
ASR 가 ASR
가 가
가 가 EU
5 10%
ASR 가
가 가
ASR PVC
가



2. (ASR, automotive shredder residue)

가

가

147 210

EU

2002 4
가

3.

2005 85%
(5%) 2014

3.1 EU

95% (10%) /

EU

“ Parliament Council
(2000/53/EC)” 2000 9 18
2000 10 21

6
95%

3

2007

1

ASR 가

102

가

3. EU

, EU

		9 /
		3.5 /
	2002.7.1	2002 7 1
	2002.7.1	2007 7 1
(%)	2006.1.1.	Reuse Recovery 85% , Reuse Recycle 80%
	2015.1.1.	Reuse Recovery 95% , Reuse Recycle 85%
가	3	Reuse Recovery 95% , Reuse Recycle 85%
	2003.7.1.	6가 (13)
	6	
		1) Recyclability Recoverability 2) , 3) Reuse, Recycle, Recover 4) Recycle/Recover

*Reuse : (:)

Recycling : (:)

Recovery : +

, 6가
ASR

가

EU

, 6가 , PVC

, PBB (poly -
brominated biphenyl), PBDE (polybrominated di -
phenyl ethers), DOP (dioctyl phthalate)

가

가

가 7

3.2

가 1995

EU 가

10 6 가 1991 (EPR)

2000 5 “

”

가

1997 “

” 가 98 .7

“ ”

4

가 2002 “ 4.

” 2004

가

1 2 가

2001 4 가 4 (

, TV, ,) 2002

, 2004 가

.7

3.3

1,7

. 1992 12 8 “ 4.1

” 1993

6 1

4. “ ”

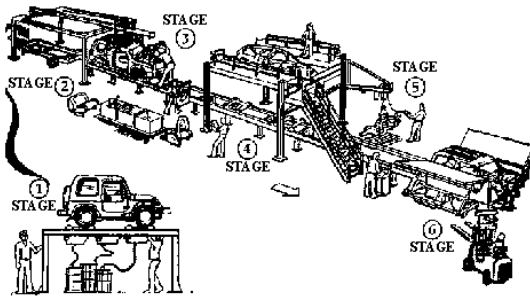
	'00	'02	'05	'15
가		90%		
		85%		95%
()	96 1/2		96 1/3	
ASR		96 3/5		96 1/5

가

(De Mosselaar BV)

6

DISMANLTING CENTER



3. De Mosselaar BV



4. ().



5. 가 가

가 가
500 800 가

가 가
가 가
(4).
가 가
가

Instrument Panel (In - panel),

(5).

30

8

15

95%

가 가

가 (6).

4.2

(IDIS), Marking

가



6.

가

Mar -

king

EU

VDA 260, ISO 11469, SAE J 1344

5

1992 7 , 1
가 100 g

가

가 가

가 가

(7).

(international

dismantling information system, IDIS)

가 1999

CD - Rom 8

CD - Rom 364 20,000

가 (8).

5.

Materials	Examples
Reservoirs	Windshield washer reservoir tank 
Basic polymers	PP basic polymer → > PP <
Basic polymer with Filler or reinforcing materials	PP with 30% talc → > PP - TD30 < PP with 30% talc & 25% glass fiber → > PP - (TD30 + GF25) <
Modifications of Basic polymers	Plasticized PVC → > PVC - P < High Density PE → > PE - HD < Expanded PUR → > PUR - E <
Blends	Blend of PC and PBT → > PC + PBT <
Copolymers	Polyamide 6 & 12 copolymer → > PA6 / 12 <
Compound assemblies (a different species adhesion materials, laminated materials)	Rear combination lamp assembly LENS > PMMA < HOUSING > ABS <
Polymers with Flame retardants	Polyamide with Flame retardants → > PA - FR (10) <



7.



8.

(IDIS).

5.

5.1 In - Panel

panel

In - panel

. In - panel

piece

panel 가

In - panel , cushion(pad) , 3

. Cu -

shion In - panel

In - panel 9
3가
full pad type, 가 half
pad type, padless type

(PVC sheet) + (PUR
foam) + (ABS) 3

3가 가 In - panel

가가

3가

가
가

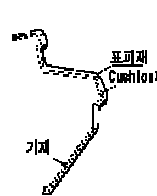
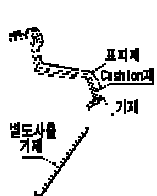
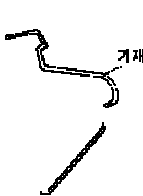
PVC , 2
가

In - panel 3가

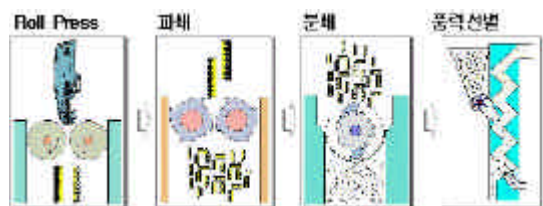
10

roll press, shredder, air separation

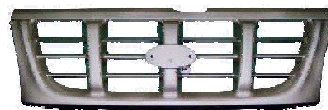
0.1%
가

Full Pad	Half Pad	Padless Type
 포미제 Cushion재 가재	 포미제 Cushion재 가재 별도사출 가재	 가재

9. In - panel



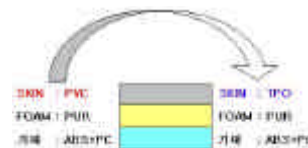
10. In - panel



11.



12. In - panel



가 가 가

PUR foam Roll press In - panel
PVC PUR foam
PC/ABS PUR foam

zigzag type 99.9%
PC/ABS

PVC (11).

, foam, PP

가
PP

PVC

TPO sheet

12 In - panel TPO sheet

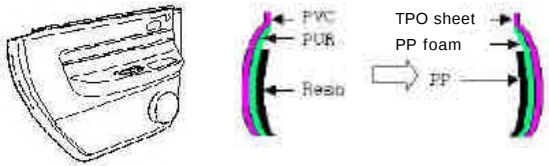
5.2 Door Trim

Door door trim In - panel

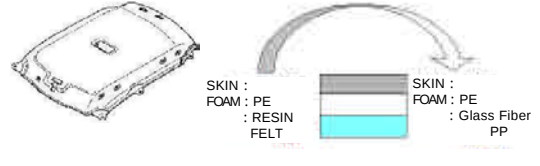
가 , In - panel
, cushion ,

, cushion

Door trim 가 가



13. Door Trim



14.

5.4

가 가가
가 Door Trim

(PVC), Pad, 3
In - panel 가
In - panel

13 TPO sheet
foam TPO
PP PVC

5.3 Head Lining

Head lining

3 가
In - panel 가

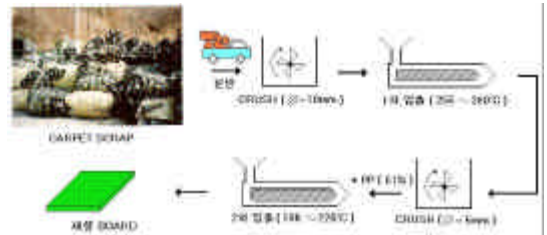
head lining
resin felt
가

(14).

/PE foam/resin felt
가 가

PP Skin TPO
glass fiber가
PP

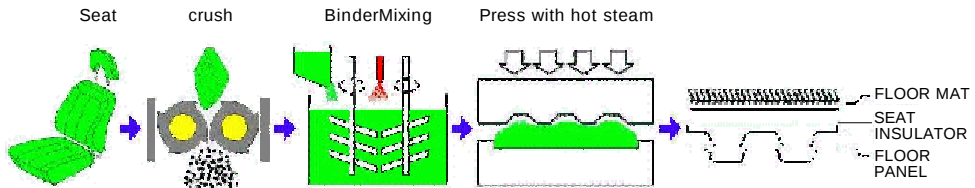
가



15.



16.



17.

15
10 mm
가 1
mm
가 ,
sheet
trim (16).
5.5



18. (Floor).

foam,
foam
chip mold



19. (Water Jet).

17
chip mold
foam ,
chip mold foam , floor mat insulation
(18). chip mold foam
cloth 가 ,
8 , EIN

가가

가

5.6

100%

가
가 가

19

가

가

가



(가 :)

20.

2

(20).

5.7

(rear combination lamp)

,
lens, housing

가

lens PMMA(polymethyl methacrylate) , hou-
sing PP ABS(acrylonitrile butadiene -
styrene copolymer)

lens housing

가

hot melt

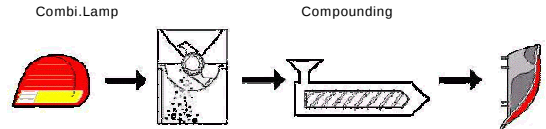
lamp

housing

(21).

5.8

Trim



21. Rear Combination Lamp

In - panel , meter hood,
glove box, console box, steering column cover,
front/center/rear pillar trim, cowl side trim, door
scuff trim . ABS PP

/

ABS PP grade

PP , grade

yota . To -
16

grade

PP

TSOP(To -
yota Super Olefin Polymer)

1가

(TSOP - 7)

가

2가

TSOP

PP

가

PP

가

PP

가

3가 grade

console pillar trim

PP

bumper PP,

In - panel

PP

. Toyota 가

grade

가

5.9

“가 ”

“ ” 가

15 20 kg 가

가 가 가 21 가 2000 가 2005

가 가

가 glass run thermo - 가 가

channel 가 TPE 가 , Toyota

weather strip EPDM

weather strip

6.

1. , “ ” , 12 , 1999.
2. BMW, *BMW Environmental Report*, 1997/98 2001.
3. 自工會, “ ”, 「JAMA Report」, p. 53 (1999).
4. , 「 」, 6 , 2000.
5. , 2001.
6. EU, “DIRECTIVE 2000/53/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL” (2000).
7. , “ ”, 2000 Korea-Japan Recycling Symposium on plastics, p.105. 2000,
8. Toyota, *Toyota News*, Japan, 1996 1998.