

<FRP - () >

“ R&D ”

FRP (Fiber Reinforced Plastics)가 FRP

가 가 가 가 가 가 가 FRP가 FRP 1980 FRP 21 90% FRP가 FRP 1940 FRP 1940 FRP 1942 CFRP, KFRP FRP가 ,

FRP		(: 1000M/T, %)				
	1985	1990	1995	2000		
	2,035	2,752	3,344	4,268	5	
	1,025	1,361	1,678	2,142	2	

FRP		(: , %)					
		60	5	13	6	5	89
		33.0/67.4	18.5/5.6	43.3/14.6	33.3/6.8	15.2/5.6	30.7
		15	2	-	-	1	18
		8.3/83.3	7.4/11.1	-	-	3.0/5.6	6.2
		5	1	1	1	2	10
		2.7/50.0	3.7/10.0	3.3/10.0	5.6/10.0	6.1/20.0	3.4
		24	1	2	1	8	36
		13.2/66.7	3.7/2.8	6.7/5.5	536/2.8	24.2/22.2	12.4
		5	5	4	3	5	22
		2.7/22.7	18.5/22.7	13.3/18.2	16.6/13.7	15.2/22.7	7.6
		4	-	-	-	-	4
		2.2/100	-	-	-	-	1.4
		10	1	1	1	-	13
		5.5/76.9	3.7/7.7	3.3/7.7	5.6/7.7	-	4.5
		16	4	2	2	8	32
		8.8/50	14.8/12.5	6.7/6.3	-	24.2/25.0	11.0
		5	2	2	-	2	11
		2.7/45.4	7.4/18.2	6.7/18.2	-	6.1/18.2	3.8
		10	2	-	-	-	12
		5.5/83.3	7.4/16.7	-	-	-	4.1
		8	-	-	-	-	8
		4.4/100	-	-	-	-	2.8
		20	4	5	4	2	35
		11.0/57.2	14.9/11.4	16.7/14.3	22.2/11.4	6.0/5.7	12.1
		182	27	30	18	33	290
		62.7	9.3	10.4	6.2	11.4	100

1960 BFRP, CFRP가 , 1970 KFRP, SFRP
1970

FRP 가가 , 가가 가

FRP (,) () SMC, BMC 가 (CFRP), (ArFRP) (GFRP), (BrFRP) ArFRP, BrFRP

Hybrid FRP 1960 3 1972 가 FRP GFRP Matrix

FRP가

가 FRP , FRP 21

FRP가 가 90% FRP

가

FRP Matrix FRP

FRP

R&D

FRP 가

FRP , FRP FRP 가

FRP

가 가

BMC(Bulk Molding Compounding) SMC(Sheet Molding Compounding), Prepreg가

BMC

SMC/BMC 70
80 3 150 BMC , 가 83 DIC SMC
SMC , , FRP,
SMC
, Mud Guard, Cover Top,
BMC 92 3700 860 , 24.1%
93 4200 가 990 BMC
20 ~ 22%, (CaCo3 · Al2O3) 50%, G/F15%, 1.5 ~ 2% 11.0 ~ 11.3%

[illegible]

(:M/T, 10))											
			1989		1990		1991		1992		
			78.6	30.74	87.4	38.03	62.5	23.44	48.4	28.22	
			318	154.71	256	155.13	202	143.00	228	146.32	
			396.6	185.45	343.4	193.16	264.5	166.44	276.4	174.54	
			42.5	18.35	38.9	16.56	59.3	27.40	24.0	10.59	
			26.4	19.91	39.7	26.84	48.0	37.00	41.2	34.16	
			68.9	38.26	78.6	43.40	107.3	64.40	65.2	44.75	
			4634	939.04	4165	855.10	4449	1,096.40	4931	1,295.88	
			1,176.7	560.70	1214	577.13	1473	843.99	1683	1,011.76	
			116	22.33	99.7	21.33	102	29.65	73	26.34	
			5,926.7	1,522.07	5,478.7	1,453.56	6024	1,970.04	6687	2,333.98	
				20.6	4.85	8.0	3.77	23.2	3.78	52.3	9.11
				8.6	5.23	9.2	5.84	4.3	3.88	13.4	11.09
				1.8	1.01	1.4	0.46	4.8	0.96	1.2	0.75
				31.0	11.09	18.6	10.07	32.3	8.62	66.9	20.95
				6,423.2	1,756.87	5,919.3	1,700.19	6,428.1	2,209.50	7,095.5	2,574.2

FRP				
		HAND LAY UP	BMC	SMC
		가	가 가	가
	· ·	· UBR · · · · ·	Switch, Connector	· UBR · · · · ·
	가 FRP	, 가 가	RIB · BOSS 가 · 가	RIB · BOSS 가 · 가
			가 가	, 가 · 가

79 1200 UPE 92 360 BMC
 93 400
 86 BMC , 87 7 가 92 200 가
 5.4% 93 200
 94 93 가
 90 BMC
 BMC , 92 200 350
 BMC 80%
 가

SMC/BMC		
SMC-1		Glass Fiber 20~30% SMC
SMC-2		Glass Fiber 30~40% SMC SMC-1
SMC-3		Glass Fiber 40~70% SMC SMC-1, SMC-2
BMC-1		Glass Fiber 10~20% BMC
BMC-2		Glass Fiber 10~20% BMC BMC-1

SMC (: M/T)				
			UPE	G/F
FRP	30,000	DIC	/	NEG() vetrotex NEG
	10,000	HOXAN		
	10,000			
	3,600			
	4,000			
	1,500			

SMC (: M/T, %)								
	1991		1992		1993		1994	
		M/S		M/S		M/S		M/S
FRP	13,800	83.6	15,940	79.7	17,000	73.9	18,000	74
	800	4.8	1,000	5.0	1,100	4.8	1,200	4.9
	900	5.5	1,260	6.3	1,500	6.5	1,500	6.1
	1,000	6.1	1,200	6.0	1,400	6.1	1,400	6.0
	-	-	600	3.0	2,000	8.7	2,200	9.0
	16,500	100	20,000	100	23,000	100	24,300	100

3 1 , 1 , 3600 FRP 4000 1 5000
 3 93 1 7000 UPE G/F
 1 93 2000 HOXAN
 SMC 1 1000 4.8%
 89 8 UPE

92
 3700
 가
 2700
 700 ,
 860 ,
 70
 93
 4200 가
 2 4 0 0
 57%
 800 ,
 900
 100
 가
 SMC
 91 1
 6500 92
 2
 93
 92
 15%
 2 3000
 가
 SMC

3600 50% 가
G/F G/F

FRP 4000

SMC 92 2 가 83.8% 1 6760
1800 0.9%, 1440 7.2%
93 2 3000 가 1 9300 84%
2300 10%, 1380 6%
94 93 가 가

SMC 80%
20%

BMC

SMC BMC

BMC

SMC ()	(: M/T, %)									
	1990		1991		1992		1993		1994	
	9,350	85.0	13,942.5	84.5	16,760	83.8	19,300	84.0	20,000	83.3
	880	8.0	1,402.5	8.5	1,800	9.0	2,300	10.0	2,500	10.4
	770	7.0	1155	7.0	1,440	7.2	1,380	6.0	1,500	6.3
	11,000	100	16,500	100	20,000	100	23,000	100	2,400	100

) UBR

SMC 가
가 SMC가
SMC-R, SMC-C, SMC -D, XMC, SMC-
SMC C/R, SMC-D/R SMC

가 (Carrier Film)
SMC가 가 SMC

가
CFRP 가 (+
+) 가
가 가 가