Confidential

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MARKETS FOR AROCLOR
in Japan

TRANSFORMERS

CONDENSERS (CAPACITORS)

PLASTICIZERS

FLUIDS

HEAT TRANSFER

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1. Transformer market

Demand for electricity increasing at a rate of approximately 10% per year in Japan. Demand for transformers should increase at least same rate.

Askarel transformers have only been produced for 10 - 15 years. There are no national requirements or regulations for safety transformers, but every manufacturer predicts that Askarel transformers will grow faster than the other types. They expect some local regulations in the future.

Petroleum oil, dry type and Askarel are three primary type transformers produced in Japan. Percentage of production and approximate selling prices are

	% Production	Ratio of Selling Prices
Petroleum oil	90%	1.00
Open dry	7	1.80
Askarel	3	1.50

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I.

(unit: T/Y)

year / company	1966	1969	MMK	(M/I)	1971	MMK	(M/I)
Hitachi	100	135	40	(30%)	160	80	(50%)
Fuji Electric	40	50	0	(0)	65	0	(0)
Osaka Transformer	25	35	10	(20%)	45	15	(35%)
Mitsubishi Electric	100	135	95	(70%)	160	145	(90%)
Meidensha Electric	15	20	5	(20%)	25	10	(35%)
Aichi Electric	10	10	0	(0))	15	0	(0)
Toshiba	100	135	15	(10%)	160	50	(30%)
Others	50	60	10	(15%)	80	15	(20%)
Total (Aroclors)	440	580	175	(30%)	710	315	(44%)
Total (Blend)	730	960	290	(30%)	1,200	525	(44%)
Price (Y/kg)	210	190			180		
MMK Sales (Y百)		55			95		

Comments

1. Product will be sold on blend of 60% Aroclor (1254 or 1260) & 40% Trichlorobenzol.
2. Prices estimated to decrease from Y210/kg in 1966 to Y180/kg in 1971.
3. Need market concentration on three major accounts.
4. Need a source of electrical grade trichlorobenzol (TCB), maybe Asahi Chemical.

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11. Condensers

(Unit: T/Y)

Year / Company	1965	1966	1969	MMK (M/I)	1971	MMK (M/I)
Toshiba Electric	210	300	400	40(10%)	480	150(30%)
Matsushita Electric	330	470	580	350(60%)	690	550(80%)
Nichicon Capacitor	420	410	610	125(20%)	720	360(50%)
Nissin Electric	40	60	70	0(0)	80	0(0)
Teikoku Condenser	60	80	100	20(20%)	130	65(50%)
Fuji Kenkyusho	100	120	150	15(10%)	190	60(30%)
Shizuki Electric	240	340	450	270(60%)	550	440(80%)
Tokyo Denki	5	10	15	0(0)	20	10(50%)
Others	275	275	375	40(10%)	440	175(40%)
Total (Aroclors)	1,680	2,055	2,750	860(31%)	3,300	1,810(55%)
Price (¥/kg)		175	167		188	
MMK Sales(¥M)			140		285	

Comments

1. In 1968 total materials used were:

Pet. oil	10,000t/y	(¥35/kg)
Wax	1,000t/y	(¥130/kg)
Aroclor	2,000t/y	

Above projection assumes no additional penetration of wax & oil markets. With heavy technical effort and expected price charges we could add another 1,000t/y of Aroclor by 1971.

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2. Prices are assumed to be

1966	¥175/kg
1969	¥160-165/kg
1971	¥155-160/kg

3. Major end use markets are

   Power Correction, Fluorescent Lighting, Air Conditioning.

4. Export of condensers now about 12% and is expected to increase.

6. Since four target accounts have about 80% of business, marketing job should be simplier. Matsushita (30%) insist on buying through Matsushita-Boeki.

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III. Plasticizers

(Unit: T/Y)

1) Carbonless paper

	Carbon-less paper	Carbon paper*	Total	Aroclor(4%)	MMK Sales
1966	4,800	-	4,800	200	-
1967	6,000	-	6,000	240	-
1968	7,500	1,000	8,500	340	-
1969	9,500	3,000	12,500	480	250
1970	12,000	6,000	18,000	720	390
1971	15,000	9,000	24,000	960	570

* which will be replaced by carbonless paper.

Comments

1. 1969-----MMK will have all of the NCR business plus 30% rest.
2. 1971 ---- All NCR business plus 40% rest.
3. Major accounts are

   NCR, Jujyo paper, Fuji Film, Kanzaki paper, Nihon Kakoshi, Hosokawa printing.

4. Four of these companies have installed capacity for 12,000t/y paper.
5. Price estimate:

   1966 ¥225/kg

   1969 ¥200/kg

   1971 ¥175/kg

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2) Other PLS market

(unit: T/Y)

	Paint Volume			Aroclor Potential			Probable sales			MMK sales		
	1968	1969	1971	1968	1969	1971	1968	1969	1971	1968	'69	'71
Total marine and traffic paints (PVC, CL-Rubber use Aroclor)	37,000	43,000	60,000	440	700	1,000	200	350	500	0	100	300
All other paints and adhesives - Epoxy, PVAc adhesives, Hotmelts, etc.		-		50	75	100	0	30	50	0	10	30
Electrical Hotmelts and Wax casting				?	?	?	70	90	100	0	30	50

Comments

1. Estimated Prices:

1968	W330/kg
1969	W300/kg
1971	W190/kg

2. The plasticiser market has not been developed by Kanegafuchi. With aggressive development by MMK and some price incentive to compete selectively with DOP, DBP, etc. (about W160/kg). It could be possible to achieve sales of 1,000t/y by 1971.

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IV. Industrial Fluids (Pydraul)

	Sales of Fluids	Aroclor required	
1967	10,000gal.	5,000gal.	25t.
1969	40,000gal.	20,000gal.	100t.
1971	150,000gal.	75,000gal.	375t.

Comments

1. Based on Monsanto development of Pydraul market in Japan.
   MMK to supply 100% of Aroclor when we start to blend in Japan ---- price about ¥175/kg.

2. Miscellaneous markets in cutting oils, Extreme pressure gear oils, ATF seal swelling additives, vacuum pump fluids, etc. Might add 100 tons by 1971.

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V. Heat Transfer

	Total market	Kanechlor	MMK share
1966	1,800t/y	300t/y	0
1969	1,800t/y	400t/y	50
1971	2,100t/y	500t/y	250

Comments

1. Price estimates

1966	¥275/kg
1969	¥250/kg
1971	¥230/kg

2. This market has not been developed by Kanegafuchi. With aggressive development by MMK could sell 500t/y by 1971.
   Monsanto has much technical informations to contribute.

3. Market dev. program would concentrate on New applications in heating & cooling ships, buildings, etc. And processing of resins, food, rubber, etc.

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Chlorinated biphenyl demand and MMK's share forecast in Japan

(unit: T/Y)

		Electric Market			Plasticisers					Industrial Fluids (Pydraul)	Heat Transfer (Thermanol)	Miscellaneous	Grand Total
		Condenser	Transformer	Total	Marine & Traffic Paint	Other Paint Adhesive Hot melt	Electrical Hot melt, Wax Casting	Carbonless paper	Total				
1966	Total	2,088	440	2,496	300	0	70	300	470	-	300	-	3,265
	MMK (M/T)												
1967	Total	2,270	480	2,750	240	0	80	340	560	35	320	30	3,675
	MMK (M/T)												
1968	Total	2,800	530	3,030	390	15	90	340	735	80	350	30	4,145
	MMK (M/T)												
1969	Total	2,750	580	3,330	350	30	90	480	950	100	400	50	4,83
	MMK (M/T)	880 31	175 30	1,035 31	100 29	10 33	30 33	350 83	390 41	100 100	50 13	15 30	1,5 3
1970	Total	3,000	640	3,640	420	40	90	730	1,270	225	450	100	5,80
	MMK (M/T)	1,350 45	350 39	1,600 44	190 45	20 50	35 39	390 54	635 50	225 100	135 30	50 50	2,6 4
1971	Total	3,300	710	4,010	500	50	100	660	1,010	275	500	200	6,05
	MMK (M/T)	1,810 55	315 44	2,125 53	300 60	30 60	50 50	570 86	950 59	275 100	250 50	100 50	3,4 5

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