

NTI Quarterly, Q2, 2011

<NTI-100>

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Foreword

Worldwide PCB output grew 23.8% in 2010 from 2009 fueled by China's growth of 37%. Considering the current and near future expansion taking place in China, China's PCB output will outpace all other regions as forecasted below. World top 101 makers made approximately 80% of the total worldwide output in 2011. There is a definite trend that big makers get bigger and faster as stated many times in the past.

World PCB Production at Constant 2011 Exchange Rates (\$Million)

Region	2009	2010	2011	2012	2013	2014	09/14 AAGR
Americas	3,220	3,439	3,525	3,595	3,690	3,785	3.29%
Europe	2,539	2,801	3,070	3,100	2,980	2,900	2.87%
Others	186	162	205	210	220	230	5.20%
<i>Subtotal</i>	5,945	6,402	6,800	6,905	6,890	6,915	3.12%
China	16,200	22,185	25,240	27,250	29,300	31,450	14.70%
Japan	8,930	9,895	9,260	9,445	10,380	10,620	3.76%
Taiwan	5,646	7,076	7,320	7,510	7,740	7,920	7.35%
S. Korea	4,818	6,087	6,400	6,650	6,920	7,270	11.82%
Other Asias	2,965	3,437	3,670	4,105	4,520	4,860	10.24%
<i>Asia Total</i>	38,559	48,680	51,890	54,960	58,860	62,120	9.15%
World Production	44,504	55,082	58,690	61,865	65,750	69,035	9.50%
China Share	36.2%	40.3%	43.0%	44.0%	44.6%	45.6%	

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In this quarterly report, we shall present a list of world top 101 PCB makers in 2010 and try to understand the trend of top makers by analyzing the data from various angles.

Unlike previous years, we did not separate flex board assembly (FPCA) from the total because it is very difficult to separate FPCA value from the total output of FPC makers. Most large FPC makers obtain a major portion of their revenues from FPCA. There have been some major mergers and acquisitions that took place during 2010. Regardless of the dates of acquisition, these activities are assumed to have taken place on January 1. Fiscal year of AT&S and most Japanese makers ended on March 31.

Exchange Rates

Exchange rates play a major role in ranking assessment. Taiwan makers seem to convert their NTD-based output to USD every month. In this report, the author used “average exchange rates” to convert output in local currencies into USD in comparison purpose, which are listed below;

Average Yearly Exchange Rates 2008-2010

Country	Currency	2008	2009	2010
Euro	USD/EUR	1.4705	1.3933	1.3276
Canada	CND/USD	1.0668	1.1414	1.0301
Britain	USD/GBP	1.8522	1.5652	1.5465
Swiss	CHF/USD	1.0824	1.0861	1.0427
Japan	JPN/USD	103.34	93.60	87.70
China	RMB/USD	6.95	6.83	6.77
Hong Kong	HKD/USD	7.786	7.7514	7.7686
Taiwan	NTD/USD	31.52	33.02	31.49
S.Korea	KRW/USD	1100.5	1275.0	1155.4
Singapore	SGD/USD	1.4150	1.4542	1.3628
Malaysia	MRG/USD	3.3312	3.5225	3.2189
Thailand	TBT/USD	32.9696	34.3109	31.3985

(www.oanda.com/convert/fxhistory)

Some Chinese makers reported output value including VAT, which was deducted. The ranking is only “relative” and is not “absolute”. If readers are dissatisfied by the ranking in the tables which follow, please make your own corrections and judgment.

The author made maximum efforts to present as accurate a number as he can by working hard in the past 6 months, but he is not GOD. So, please excuse him if you find errors. However, he takes full responsibility for any errors present.

In China, there are close to 1,500 factories operated by more than 1,100 makers. Not understanding Chinese language, he may have missed some important makers which own multiple factories under different names. He will continue to improve his data by better understanding Chinese makers. Output value of makers such as Foxconn (FAT) is based on calculated guess because they do not present their revenues public. If you know, let this author know.

Top 1-20

NTI-100 World Top PCB Makers in 2010
(Top 1 to 20)

	Maker	Nationalit	2009	2010
1	Unimicron Group (>Subtron	Taiwan	1,734	2179
2	Ibiden	Japan	1,731	2110
3	Nippon Mektron	Japan	1,656	2106
4	Tripod	Taiwan	1,028	1370
5	TTM	USA	506	1366
6	SEMCO	S. Korea	895	1282
7	Nanya PCB	Taiwan	848	1158
8	Foxconn	Taiwan	750	1150
9	HannStar Board (+GBM)	Taiwan	596	1148
10	KB PCB Group	HK/China	923	1122
11	Shinko Denki	Japan	860	1003
12	Young Poong Group	S. Korea	887	978
13	CMK	Japan	978	968
14	Multek	USA	770	910
15	Meiko	Japan	704	817
16	Viasystems (+former Merix)	USA	350	806
17	Daeduck Group	S. Korea	694	800
18	Mflex	USA	764	791
19	Fujikura	Japan	684	778
20	Compeq	Taiwan	575	738
	Top Total		17,933	23,580

- 1 Unimicron includes substrate maker SUBTRON and German Ruwel International
- 2 Ibiden is investing more than \$650 in FY2011 to expand, especially in Malaysia
- 3 Nippon Mektron has probably PCBA somewhere between 20% and 25% (bareboard of 75-80%)
- 4 Tripod purchased Hiboard Electronics in Jiaying recently and is building new plants in Xiantao
- 5 TTM Technologies purchased Meadville Electronics in April of 2010
- 6 Nanya is building the third PCB plant in Kunshan to produce wire-bond BGA substrates
- 9 Hannstar Board and GBM Group are under the same management since March 2010
- 15 Meiko lost two plants in Japan due to 3/11 earthquake-tsunami and TOPCO nuclear disaster
- 16 Viasystems purchased Merix in February of 2010
- 17 MFlex built the third FPC manufacturing plant in Suzhou and a FPCA plant in Chengdu

Top 21-40

NTI-100 World Top PCB Makers in 2010
(Top 21-40)

	Maker	Nationalit	2009	2010
21	Sumitomo Denko PCB	Japan	626	700
22	Kinsus (+Piotek)	Taiwan	511	676
23	AT&S	Austria	515	670
24	Wus Group	Taiwan	422	663
25	Simmtech	S. Korea	424	576
26	Nitto Denko	Japan	545	573
27	Chin Poon	Taiwan	380	527
28	GCE	Taiwan	439	519
29	TPT	Taiwan	381	482
30	Hitachi Chemical	Japan	520	471
31	Panasonic ED	Japan	435	456
32	Kyoden	Japan	365	444
33	Unitech	Taiwan	332	407
34	Toppan-NEC	Japan	340	396
35	DYnamic	Taiwan	349	394
36	Ellington	HK/China	310	390
37	Sanmina-SCI	USA	290	380
38	3CEMS	Taiwan	279	368
39	MGC Group	Japan	286	340
40	Career Technology	Taiwan	245	325
	Top Total		7,994	9,757

- 22 Kinsus built a package substrate plant in Suzhou, China, in 2010 and started production in March
- 24 WUS in Kunshan is building new plants also in other area of Kunshan to start operation in early 2012
- 25 Simmtech is going to build an IC substrate manufacturing plant in Xian, China
- 28 GCE (Gold Circuit) has been increasing HDI capacity at one of its Changshu plants
- 29 TPT (Taiwan Techvest) is going to PCB plant in Chuangxin (Sichuan)
- 31 Panasonic Electronics Devices is building a plant in Tayuan, Taiwan, for ALIVH board production
- 33 Unitech is building a HDI plant in Yilan, Taiwan, and is going to move its Shanghai plant to Nanjing
- 34 Toppan-NEC moved its substrate business to Toppan Microelectronics
- 36 Ellington has plan to go public and expansion
- 37 Sanmina-SCI is going to build plant #2 in Wuxi next to the existing plant

Top 41-60

NTI-100 World Top PCB Makers in 2010
(Top 41-60)

	Maker	Nationalit	2009	2010
41	ASE	Taiwan	230	320
42	SI Flex	S. Korea	260	314
43	Isu Petasys	S. Korea	230	307
44	Fujitsu Interconnet	Japan	290	296
45	FCI	France	200	277
46	Ichia	Taiwan	289	273
47	Dynamic Detail Inc	USA	220	265
48	Kyocera SLC	Japan	165	260
49	Founder Technology	China	200	258
50	Shirai Denshi	Japan	224	256
51	CCTC	China	225	255
52	Shennan Circuits	China	187	250
53	Elna	Japan	220	247
54	APCB (競国)	Taiwan	165	233
55	KCE	Thailand	178	230
56	3M	USA	215	230
57	Daisho Denshi	Japan	217	228
58	Micro Circuit System	Japan	270	220
59	Wuerth Electronics	Germany	151	219
60	Shye Feng Group	Taiwan	162	215
	Top Total		4,298	5,153

43 Isu-Petasys received Supply of the Year Award from CISCO

47 DDi purchased Canadian CORETEC in December of 2009

49 Founder Technology is going to build the second plant in Chongqing for high layer count MLB

50 Shirai Denshi commenced manufacture of DSB and MLB at its new plant in Zhuhai, near Z-Airport

52 Shennan Circuits is to build an IC substrate plant in Wuxi

54 APCB is to expand its Kunshan operation by building a second plant

56 KCE is to build a PCB plant in Klaban, south of Bangkok

60 Shye Feng Group has two plants in Thailand, one in China and one in Taiwan

Top 61-80

NTI-100 World Top PCB Makers in 2010
(Top 61-80)

	Maker	Nationalit	2009	2010
61	A-PLUS (Main Worth, 競華)	Taiwan	190	210
62	Boardtek	Taiwan	162	210
63	Eastern	Japan	149	210
64	Gul Technology	Singapore	146	196
65	Kyosha	Japan	149	187
66	DAP	S. Korea	165	180
67	Kinwong Electronics	HK/China	162	180
68	STEMCO	S. Korea	162	175
69	Wu Zhou Group	China	118	165
70	Hsiangkuo	Taiwan	120	160
71	Topsearch	HK/China	154	160
72	Hitachi Cable	Japan	200	156
73	Yang An	Taiwan	113	156
74	Cosmotech	S. Korea	102	153
75	Flexium	Taiwan	93	148
76	Schweizer	Germany	90	144
77	Red Board	HK/China	140	144
78	Liang Dar	Taiwan	90	143
79	Biloda	Taiwan	110	140
80	Tong Jiang	Taiwan	95	140
	Top Total		2,710	3,357

61 A-PLUS is former APCB Shenzhen

67 Kinwong build a FPC plant in Huizhou

68 STEMCO is a JV flexible substrate maker between Japan's Toray and S. Korea's Samsung E-M

69 Wuzhou Group build a HDI plant in Huizhou

72 Hitachi Cable quit manufacturing of COF products

74 Cosmotech is partly owned by Samsung Electro-Mechanics and Japan's Muromachi Techno

76 Schweizer Electronics came back to NTI-100 list, Congratulations

80 Tong Jiang is allied with Compeq

Top 81-100

NTI-100 World Top PCB Makers in 2010
(81-101)

	Maker	Nationalit	2009	2010
81	MFS	Singapore	99	138
82	Onpress	HK/China	109	138
83	Flexcom	S. Korea	119	137
84	Shinko Mfg	Japan	100	130
85	Jiangsu Suhang Elect	China	115	126
86	Brain Power	Taiwan	100	126
87	Yamamoto Mfg Co Ltd	Japan	75	123
88	Huading Group	China	97	120
89	Shenzhen Fast print	China	74	119
90	Plotech	Taiwan	97	119
91	Suntak	China	88	115
92	Tat Chun	HK/China	95	114
93	Santis Substrate	HK/China	90	110
94	Tigerbuilder	China	70	109
95	Aoshikang Group Co Ltd	HK/China	95	108
96	Xinda PCB Mfg	China	90	108
97	Kunshan Wanzheng PCB	China	90	107
98	Kunshan Huanxian PCB	China	86	105
99	Sanwa PCB	Japan	100	103
100	Dalian Pacific Electronics	China	60	100
101	Somacis	Italy	80	100
	Top Total		1,929	2,455

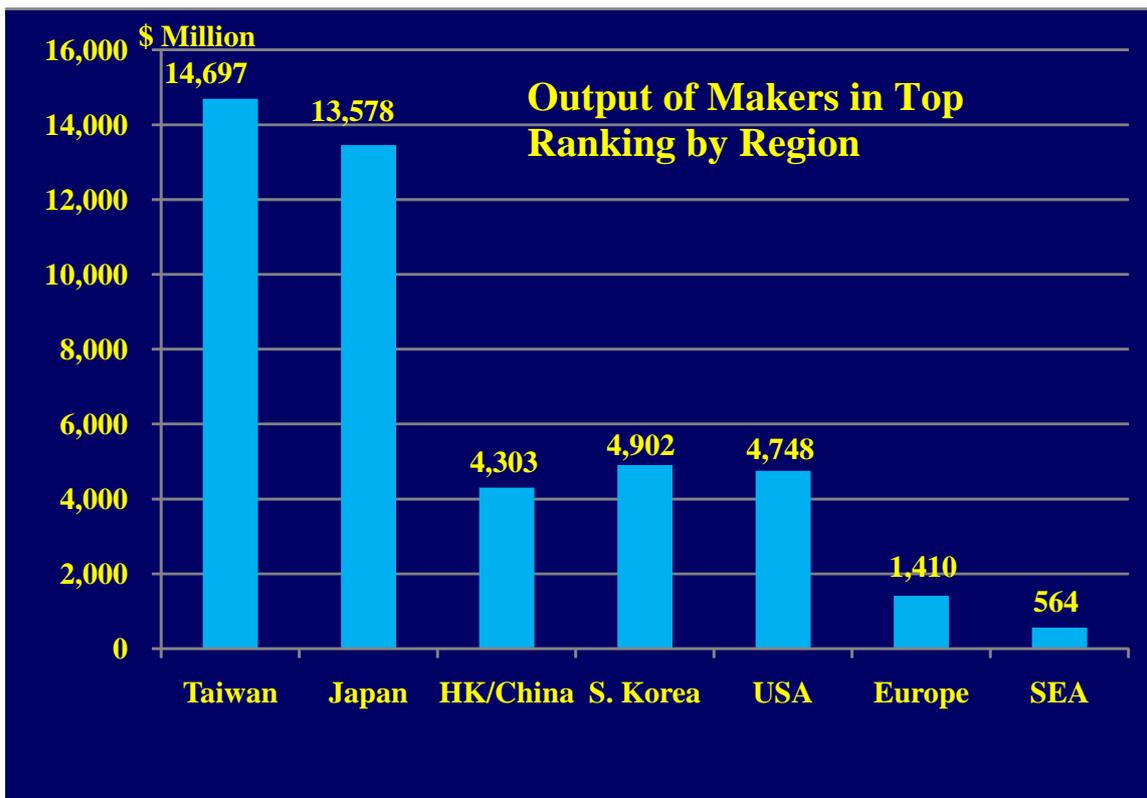
- 83 Flexcom (S. Korea) has a FPC plant in Vietnam
- 87 Yamamoto Mfg made it back, congratulations
- 88 Shenzhen Fast Print shut down its Nanshan plant (Shenzhen) and is now Guangzhou Fast Print.
It is going to build a new plant somewhere in China (the author forgot the name of town)
- 90 Shenzhen Suntak shut down its Nanshan plant and moved to a new plant in Shenzhen
- 99 Dalian Pacific made it into NTI-100 list. Congratulations.
- 100 Somacis also made it into NTI-100 list, Congratulations..

Summary of Top 100

Distribution of Output in Top Ranking by Region

Region	1 to 20	21 to 40	41 to 60	61 to 80	81 to 100	Total
Taiwan	7,743	4,361	1,041	1,307	245	14,697
Japan	7,782	3,380	1,507	553	356	13,578
HK/China	1,122	390	763	649	1,479	4,403
S. Korea	3,060	576	621	508	137	4,902
USA	3,873	380	495	0	0	4,748
Europe	0	670	496	144	100	1,410
SEA	0	0	230	196	138	564
Total	23580	9757	5153	3357	2455	44,302

(N.T. Information Ltd)



The total (domestic and overseas) production by Taiwanese PCB makers in 2010 is estimated to have been \$17 billion while number two Japan had \$14 billion. These two countries account for 56% of the world production. One can see why from the

chart above. Their investment in China and South East Asia in FY2011 amounts to approximately \$2.5 billion, which makes these two countries continue to dominate the world production.

HK/China makers are coming into the list quickly as one can see from the table in the previous page (\$1,379 million in 81-100 ranks) and the table below (13 entries).

Distribution of Makers in Top Ranking by Region

Region	1 to 20	21 to 40	41 to 60	61 to 80	81 to 100	Total
Taiwan	6	9	4	8	2	29
Japan	6	7	6	3	3	25
HK/China	1	1	3	4	13	22
S. Korea	3	1	2	3	1	10
USA	4	1	2	0	0	7
Europe	0	1	2	1	1	5
SEA	0	0	1	1	1	3
Total	20	20	20	20	21	101

(N.T. Information Ltd)



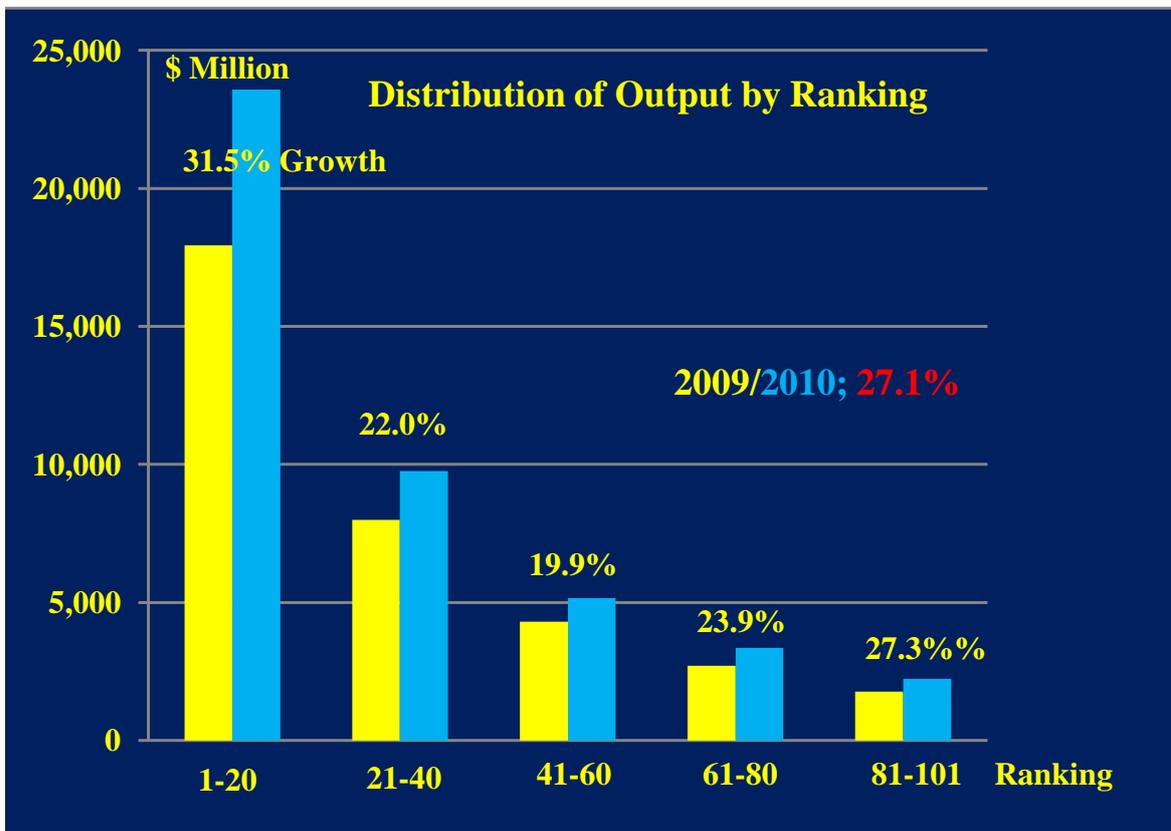
The U.S. domestic production was \$3.0 billion in 2010 by about 320 makers while only 6 makers produced \$3.1 billion overseas (TTM, VIASYSTEMS, MULTEK, MFLEX, SANMINA-SCI and 3M). Because of their vigorous investment overseas, U.S.

production outside of U.S. will continue to grow while its domestic production will oscillate up and down along \$3 billion level.

Distribution of Output (\$M) by Ranking

Top	2009	2010	Growth
1-20 Total	17,933	23,580	31.5%
21-40 Total	7,994	9,757	22.0%
41-60 Total	4,298	5,153	19.9%
61-80 Total	2,710	3,357	23.9%
81-100 Total	1,929	2,455	27.3%
Top 100 Total	34,864	44,302	27.1%

(N.T. Information Ltd)



The table above shows “Big Gets Bigger” trend. And, at the same time, the growth of smaller makers (\$80-150 million per annum revenues) is greater than mid-class makers. This is driven by China makers while mid-class makers in “the west” are stagnant from the viewpoint of revenue growth. Big makers continue to expand because their big customers do not wish to expand the number of suppliers. Small ones

have no fear. Middle-class makers are sandwiched between these two classes.

A. Nakahara

Note

Parlex should be in the list, but no data is available from the maker. So, it is excluded from the ranking.

NTI-100 World Top PCB Makers in 2010

(101 Makers ≥ \$100 million)

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62	Boardtek	Taiwan	162	210
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64	Gul Technology	Singapore	146	196
65	Kyosha	Japan	149	187
66	DAP	S. Korea	165	180
67	Kinwong Electronics	HK/China	162	180
68	STEMCO	S. Korea	162	175
69	Wu Zhou Group	China	118	165
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71	Topsearch	HK/China	154	160
72	Hitachi Cable	Japan	200	156
73	Yang An	Taiwan	113	156
74	Cosmotech	S. Korea	102	153
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85	Jiangsu Suhang Elect	China	115	126
86	Brain Power	Taiwan	100	126
87	Yamamoto Mfg Co Ltd	Japan	75	123
88	Huading Group	China	97	120
89	Shenzhen Fast print	China	74	119
90	Plotech	Taiwan	97	119
91	Suntak	China	88	115
92	Tat Chun	HK/China	95	114
93	Santis Substrate	HK/China	90	110
94	Tigerbuilder	China	70	109
95	Aoshikang Group Co Ltd	HK/China	95	108
96	Xinda PCB Mfg	China	90	108
97	Kunshan Wanzheng PCB	China	90	107
98	Kunshan Huanxian PCB	China	86	105
99	Sanwa PCB	Japan	100	103

100	Dalian Pacific Electronics	China	60	100
101	Somacis	Italy	80	100
Top Total			34,864	44302