



## Taiyo Holdings / 4626

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## INDEX

**How to read a Shared Research report:** This report begins with the trends and outlook section, which discusses the company's most recent earnings. First-time readers should start at the business section later in the report.

<b>Executive summary</b>	<b>3</b>
<b>Key financial data</b>	<b>5</b>
<b>Recent updates</b>	<b>8</b>
Highlights	8
<b>Trends and outlook</b>	<b>9</b>
Quarterly trends and results	9
Medium-term outlook	16
<b>Business</b>	<b>22</b>
Business description	22
Market and value chain	40
Strengths and weaknesses	46
<b>Historical performance and financial statement</b>	<b>47</b>
Historical performance	47
Income statement	56
Balance sheet	57
<b>News and topics</b>	<b>60</b>
<b>Other information</b>	<b>62</b>
History	62
Major shareholders	63
Dividend policy	63
Top management	64
Employees	64
Corporate philosophy and CSR initiatives	65
Glossary	66
Profile	67

## Executive summary

### Business overview

- Taiyo Holdings' forerunner, Taiyo Ink Mfg., was established in 1953 as a printing ink manufacturer and marketer. In 1970 Taiyo made its first etching resist shipments and entered the resist ink field (resist ink: insulating film that covers printed wiring boards [PWBs] to protect circuit patterns). Taiyo was early to become an official supplier for many large manufacturing clients, leveraging its execution speed (thanks to its independence), R&D and marketing prowess, strategic foresight into technological requirement for end products, and rapid expansion in overseas operation. Taiyo has a global market share in solder resist of over 50% (fairly high share in high-function rigid products and about half in general rigid products). In particular, the company has an extremely high share of the semiconductor package materials market. The OPM has averaged around 20% since FY03/15. Taiyo has four focus areas: rigid board materials, semiconductor package substrate materials, build-up board materials, and flexible printed circuit (FPC) board materials.
- Under the new medium-term plan through FY03/20, the company aims to break free from its dependency on solder resist and transform into a comprehensive chemical company. As additional growth drivers, Taiyo is looking to new businesses in pharmaceuticals, energy, and food production. The company became an equity-method affiliate of DIC Corporation (TSE1: 4631), which paid about JPY24.8bn and now holds 19.5% of Taiyo's stock. This capital and business alliance will enable the acquisition of more technologies and reinforce Taiyo's financial position. As part of its M&A strategy, Taiyo is conducting more acquisitions to establish a pharmaceutical business. It is looking to improve its R&D capabilities (constantly invests over 5% of sales in R&D) while maintaining an overall OPM of at least 20%.

### Earnings

- FY03/18 results: In the electronic parts industry, the company's core market, demand for automotive components, smartphones, virtual currency servers, and automotive electronics-related materials was solid. Aided by both rising sales volumes and a weaker yen, sales rose 9.1% YoY to JPY52.2bn and operating profit rose 22.9% to JPY11.3bn; the OPM rose to 21.7% versus 19.3% the previous year. The company made a one-time write-off of goodwill of JPY3.3bn, booking it as an extraordinary loss. Q4 sales of JPY13.2bn were up 10.7% YoY and Q4 operating profit of JPY2.6bn was up 29.8%; the OPM rose to 20.0% versus 17.0% during the same period the previous year.
- Full-year company forecast for FY03/19: For FY03/19, the company forecasts sales of JPY60.2bn (+15.2% YoY) and operating profit of JPY9.8bn (-13.6% YoY), assuming an average exchange rate of JPY102/USD. Using the same exchange rate assumption (JPY111/USD) the company used for FY03/18, the company forecasts FY03/19 sales of JPY63.8bn (+22.1% YoY) and operating profit of JPY11.4bn (+0.6% YoY).
- The company's overseas sales are denominated half in US dollars and half in local currencies. Taiyo estimates the full-year impact of a JPY1/USD change in forex rates at over JPY380mn for sales and JPY180mn for operating profit. The forex impact has increased recently due to a rising share of overseas sales of high-function rigid materials and semiconductor package substrate materials made in Japan.
- The company is conducting M&A in the pharmaceutical field and acquired Micro Network Technologies Corp. (MNT) using low-interest loans and the funds earned from the capital and business alliance with DIC Corp (TSE1: 4631), maintaining its cash position (JPY446mn in cash equivalents at end-March 2018) as it plans for the next deal. Capital expenditures ended at a little over JPY1.5bn (JPY5.0bn in FY03/18 forecasts), and the company plans to spend JPY4.0bn in FY03/19 (around JPY2.0bn in depreciation expenses).

### Strengths and weaknesses

- Strengths: Rapid growth and high margins as the leading upstream specialist in the niche solder resist market; top management's decision speed and modern approach to financial management; and synergies from the capital and business alliance with DIC.

- Weaknesses: Dependence on solder resist, a mature product that lies in the shadow of the end-products it is used in; lack of personnel to stay ahead of technological innovation; and limited demonstrated ability to develop new businesses outside its core strength.

## Key financial data

Income statement (JPY mn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18	FY03/19
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Est.
<b>Sales</b>	<b>45,338</b>	<b>32,614</b>	<b>35,056</b>	<b>40,366</b>	<b>39,797</b>	<b>36,184</b>	<b>44,224</b>	<b>48,260</b>	<b>49,843</b>	<b>47,866</b>	<b>52,241</b>	<b>60,200</b>
YoY	8.1%	-28.1%	7.5%	15.1%	-1.4%	-9.1%	22.2%	9.1%	3.3%	-4.0%	9.1%	15.2%
Cost of sales	29,512	22,635	24,123	28,428	29,822	25,319	28,348	28,865	27,355	26,220	27,304	
YoY	8.8%	-23.3%	6.6%	17.8%	4.9%	-15.1%	12.0%	1.8%	-5.2%	-4.1%	4.1%	
Cost ratio	65.1%	69.4%	68.8%	70.4%	74.9%	70.0%	64.1%	59.8%	54.9%	54.8%	52.3%	
<b>Gross profit</b>	<b>15,826</b>	<b>9,979</b>	<b>10,932</b>	<b>11,938</b>	<b>9,974</b>	<b>10,864</b>	<b>15,875</b>	<b>19,394</b>	<b>22,487</b>	<b>21,645</b>	<b>24,937</b>	
YoY	6.7%	-36.9%	9.6%	9.2%	-16.5%	8.9%	46.1%	22.2%	15.9%	-3.7%	15.2%	
GPM	34.9%	30.6%	31.2%	29.6%	25.1%	30.0%	35.9%	40.2%	45.1%	45.2%	47.7%	
SG&A expenses	6,930	6,647	6,089	6,557	5,933	6,479	8,307	10,139	11,522	12,424	13,599	
YoY	0.9%	-4.1%	-8.4%	7.7%	-9.5%	9.2%	28.2%	22.1%	13.6%	7.8%	9.5%	
SG&A ratio	15.3%	20.4%	17.4%	16.2%	14.9%	17.9%	18.8%	21.0%	23.1%	26.0%	26.0%	
<b>Operating profit</b>	<b>8,896</b>	<b>3,332</b>	<b>4,843</b>	<b>5,380</b>	<b>4,040</b>	<b>4,385</b>	<b>7,568</b>	<b>9,254</b>	<b>10,964</b>	<b>9,221</b>	<b>11,337</b>	<b>9,800</b>
YoY	11.7%	-62.5%	45.3%	11.1%	-24.9%	8.5%	72.6%	22.3%	18.5%	-15.9%	22.9%	-13.6%
OPM	19.6%	10.2%	13.8%	13.3%	10.2%	12.1%	17.1%	19.2%	22.0%	19.3%	21.7%	16.3%
<b>Recurring profit</b>	<b>8,586</b>	<b>3,546</b>	<b>4,787</b>	<b>5,316</b>	<b>4,027</b>	<b>4,743</b>	<b>7,827</b>	<b>9,529</b>	<b>11,129</b>	<b>9,202</b>	<b>11,199</b>	<b>9,600</b>
YoY	3.9%	-58.7%	35.0%	11.1%	-24.2%	17.8%	65.0%	21.7%	16.8%	-17.3%	21.7%	-14.3%
RPM	18.9%	10.9%	13.7%	13.2%	10.1%	13.1%	17.7%	19.7%	22.3%	19.2%	21.4%	15.9%
<b>Net income attrib. to owners of parent</b>	<b>6,171</b>	<b>1,958</b>	<b>3,010</b>	<b>3,402</b>	<b>2,502</b>	<b>3,367</b>	<b>4,930</b>	<b>6,667</b>	<b>7,796</b>	<b>6,398</b>	<b>4,856</b>	<b>6,700</b>
YoY	11.1%	-68.3%	53.7%	13.0%	-26.5%	34.6%	46.4%	35.2%	16.9%	-17.9%	-24.1%	38.0%
Net margin	13.6%	6.0%	8.6%	8.4%	6.3%	9.3%	11.1%	13.8%	15.6%	13.4%	9.3%	11.1%
USD/JPY	114.1	100.6	93.0	85.8	79.3	83.2	100.0	110.0	120.1	109.0	111.0	102.0
<b>Per share data (JPY)</b>												
Shares issued (year end; '000)	27,464.0	27,464.0	27,464.0	27,464.0	27,464.0	27,464.0	27,464.0	27,464.0	27,485.6	28,841.1	28,865.2	
Treasury shares (year end; '000)	1,995.3	1,525.4	1,525.5	2,025.5	2,025.7	2,025.8	2,026.1	4,522.0	4,379.0	58.5	39.8	
Shares outstanding (average; '000)	25,468.7	25,938.6	25,938.5	25,821.9	25,438.4	25,438.3	25,438.0	25,249.4	23,066.8	24,014.6	28,812.1	
EPS	233.2	74.3	116.1	131.8	98.4	132.4	193.8	264.1	338.0	266.4	168.6	232.4
Dividend per share	115.0	90.0	90.0	115.0	90.0	90.0	120.0	90.0	110.0	120.1	160.2	130.2
Payout ratio	49.3%	121.2%	77.5%	87.3%	91.5%	68.0%	61.9%	34.1%	32.5%	45.1%	95.0%	56.0%
DOE	8.1%	6.5%	6.8%	8.6%	6.9%	6.6%	7.9%	5.5%	6.2%	5.5%	6.4%	
Book value per share	1,450.9	1,313.2	1,349.6	1,316.5	1,297.2	1,423.3	1,596.5	1,703.1	1,865.9	2,469.0	2,520.7	
<b>Balance sheet (JPY mn)</b>												
Total current assets	31,057	23,880	27,516	27,675	26,380	26,979	37,798	37,942	39,340	67,401	68,373	
Cash and cash equivalents	13,106	11,291	11,913	13,152	11,563	13,766	20,338	18,183	18,385	48,800	44,588	
Tangible fixed assets	15,889	14,644	13,954	13,050	12,546	12,664	14,375	16,865	19,644	18,389	17,923	
Intangible fixed assets	442	468	389	304	358	347	5,144	5,327	4,919	4,537	21,818	
Investments and other assets	1,520	1,876	1,843	1,821	1,417	4,032	1,050	1,106	1,561	2,057	3,374	
Total assets	48,938	40,869	43,704	42,851	40,703	44,023	58,369	61,241	65,464	92,386	111,490	
Total current liabilities	7,959	5,303	7,172	7,681	6,393	6,724	8,936	11,056	10,898	11,355	20,491	
Short-term liabilities	0	0	0	0	0	0	534	1,069	1,372	1,774	8,261	
Total fixed liabilities	1,839	981	845	983	833	488	6,776	8,872	9,315	9,184	17,975	
Long-term liabilities	0	0	0	0	0	0	5,658	7,685	7,413	7,169	15,923	
Total liabilities	9,798	6,285	8,018	8,664	7,227	7,213	15,713	19,929	20,214	20,540	38,467	
Total net assets	39,140	34,584	35,685	34,186	33,476	36,809	42,655	41,312	45,250	71,846	73,023	
<b>Cash flow statement (JPY mn)</b>												
Cash flows from operating activities	9,241	4,581	3,126	4,575	2,793	6,109	7,020	9,232	10,546	9,042	8,100	
Cash flows from investing activities	-3,390	-1,470	-70	758	-1,343	-2,477	-3,839	-2,913	-6,750	-1,063	-24,161	
Cash flows from financing activities	-1,969	-4,428	-2,366	-3,696	-2,978	-2,314	2,350	-9,919	-2,740	20,342	11,319	
<b>Financial ratios</b>												
Total interest-bearing debt	0	0	0	0	0	0	6,192	8,754	8,785	8,943	24,184	
Debt/equity ratio	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.5%	21.2%	19.4%	12.4%	33.1%	
ROA (RP-based)	17.8%	7.9%	11.3%	12.3%	9.6%	11.2%	15.3%	15.9%	17.6%	11.7%	11.0%	
ROE	16.5%	5.4%	8.7%	9.9%	7.5%	9.7%	12.8%	16.7%	19.0%	11.2%	6.8%	
Equity ratio	78.5%	83.3%	80.1%	78.2%	81.1%	82.2%	69.6%	63.8%	65.9%	76.9%	65.2%	
<b>Per employee data (JPY mn)</b>												
Number of employees	775	793	807	840	861	858	1,148	1,122	1,202	1,249		
Avg. temp. employees (not included in above)	123	61	-	-	-	-	-	-	-	-	-	
Sales per employee	50.5	38.2	43.4	48.1	46.2	42.2	38.5	43.0	41.5	38.3		
Operating profit per employee	9.9	3.9	6.0	6.4	4.7	5.1	6.6	8.2	9.1	7.4		
<b>Capital expenditures and others</b>												
Capital expenditures	1,414	1,238	445	527	682	605	2,555	3,321	4,055	1,722	1,565	4,000
Depreciation	1,529	1,396	1,261	1,127	1,046	1,003	1,181	1,411	1,891	2,485	1,941	2,000
Goodwill amortization	28	38	38	26	14	18	168	253	280	241	3,535	1,661
R&D expenses	877	979	1,016	995	963	1,199	1,594	2,213	2,441	3,235	3,089	3,000
% of sales	1.9%	3.0%	2.9%	2.5%	2.4%	3.3%	3.6%	4.6%	4.9%	6.8%	5.9%	5.0%

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

Note: Cash and cash equivalents are cash and deposit accounts listed on consolidated balance sheet excluding time deposits with a maturity over three months.

Note: Sales and operating profit per employee calculated including average temporary employee numbers. From FY03/10 onward, average temporary employee numbers account for less than 10% of total so are omitted.

Note: Does not include capex and amortization related to the marketing and manufacturing rights of 13 long-listed products.

## Segment performance

Performance by product and region (JPYmn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
<b>Sales</b>	45,338	32,614	35,056	40,366	39,797	36,184	44,224	48,260	49,843	47,866	52,241
PWB insulated materials	33,603	25,918	27,961	29,937	26,727	27,997	38,225	44,474	46,318	44,700	48,041
Rigid board materials	25,392	19,911	21,250	22,993	20,289	20,262	29,235	33,539	35,242	33,216	34,342
High-function								18,676	20,230	20,211	21,429
General								14,863	15,012	13,005	12,913
Substrates and flexible board materials	6,886	5,107	5,600	5,685	5,416	6,763	7,965	9,844	10,007	10,348	12,197
Package substrates								9,401	9,376	9,676	11,029
Flexible boards								443	631	672	1,168
Build-up board materials	1,325	900	1,111	1,259	1,022	972	1,025	1,091	1,069	1,136	1,502
FPD materials	10,238	5,683	6,099	9,455	12,307	7,316	4,554	1,976	292		
Other related products	1,378	952	994	972	760	869	1,443	1,808	3,231	3,165	4,199
Regional sales (incl. internal sales)											
Japan	26,866	18,970	20,379	18,491	11,787	13,065	14,005	15,786	17,002	17,917	19,807
China	30,804	21,596	10,361	11,911	10,636	10,834	17,791	20,421	21,820	20,618	21,539
Taiwan			4,083	4,414	3,706	3,936	8,398	9,614	9,854	10,042	9,116
South Korea			10,241	13,743	16,668	11,722	10,599	9,199	7,739	8,825	10,271
Others	1,419	1,205	2,972	3,061	2,618	2,854	3,524	4,140	4,451	4,076	4,979
Eliminations and company-wide	-13,751	-9,157	-12,980	-11,254	-5,618	-6,227	-10,093	-10,900	-11,023	-13,612	-13,471
Sales to external customers											
Japan	13,150	9,843	9,031	9,418	8,605	8,822	8,697	9,410	10,565	9,446	10,171
China	30,786	21,585	10,348	11,911	10,543	10,682	16,203	18,837	20,687	19,923	21,063
Taiwan			3,007	3,219	2,828	2,897	5,575	7,141	6,864	6,062	6,410
South Korea			9,709	12,784	15,233	10,985	10,312	8,835	7,385	8,459	9,771
Others	1,401	1,186	2,958	3,031	2,585	2,796	3,436	4,034	4,340	3,974	4,824
YoY	8.1%	-28.1%	7.5%	15.1%	-1.4%	-9.1%	22.2%	9.1%	3.3%	-4.0%	9.1%
PWB insulated materials	8.4%	-22.9%	7.9%	7.1%	-10.7%	4.8%	36.5%	16.3%	4.1%	-3.5%	7.5%
Rigid board materials	5.9%	-21.6%	6.7%	8.2%	-11.8%	-0.1%	44.3%	14.7%	5.1%	-5.7%	3.4%
High-function									8.3%	-0.1%	6.0%
General									1.0%	-13.4%	-0.7%
Substrates and flexible board materials	19.4%	-25.8%	9.7%	1.5%	-4.7%	24.9%	17.8%	23.6%	1.7%	3.4%	17.9%
Package substrates									-0.3%	3.2%	14.0%
Flexible boards									42.4%	6.5%	73.8%
Build-up board materials	6.3%	-32.1%	23.4%	13.3%	-18.8%	-4.9%	5.5%	6.4%	-2.0%	6.3%	32.2%
FPD materials	7.0%	-44.5%	7.3%	55.0%	30.2%	-40.6%	-37.8%	-56.6%	-85.2%		
Other related products	22.9%	-30.9%	4.4%	-2.2%	-21.8%	14.3%	66.1%	25.3%	78.7%	-10.2%	32.7%
Regional sales (incl. internal sales)											
Japan	2.6%	-29.4%	7.4%	-9.3%	-36.3%	10.8%	7.2%	12.7%	7.7%	5.4%	10.5%
China	17.2%	-29.9%	-52.0%	15.0%	-10.7%	1.9%	64.2%	14.8%	6.9%	-5.5%	4.5%
Taiwan				8.1%	-16.0%	6.2%	113.4%	14.5%	2.5%	1.9%	-9.2%
South Korea				34.2%	21.3%	-29.7%	-9.6%	-13.2%	-15.9%	14.0%	16.4%
Others	-18.4%	-15.1%	146.6%	3.0%	-14.5%	9.0%	23.5%	17.5%	7.5%	-8.4%	22.2%
Eliminations and company-wide											
Sales to external customers	-6.0%	-25.1%	-8.2%	4.3%	-8.6%	2.5%	-1.4%	8.2%	12.3%	-10.6%	7.7%
Japan	17.3%	-29.9%	-52.1%	15.1%	-11.5%	1.3%	51.7%	16.3%	9.8%	-3.7%	5.7%
China				7.1%	-12.1%	2.4%	92.4%	28.1%	-3.9%	-11.7%	5.7%
Taiwan				31.7%	19.2%	-27.9%	-6.1%	-14.3%	-16.4%	14.5%	15.5%
South Korea	-18.5%	-15.3%	149.4%	2.5%	-14.7%	8.2%	22.9%	17.4%	7.6%	-8.4%	21.4%
<b>Operating profit</b>	8,896	3,332	4,843	5,380	4,040	4,385	7,568	9,254	10,964	9,221	11,337
Japan	2,275	15	600	1,013	989	1,685	1,906	2,466	2,254	2,026	3,408
China	6,301	3,059	2,463	2,813	1,751	1,584	2,617	3,507	4,775	4,582	4,602
Taiwan			644	510	470	497	1,427	1,763	2,227	1,492	1,847
South Korea			988	979	649	591	1,073	1,212	1,414	1,275	1,663
Others	267	190	129	238	272	323	453	555	597	534	514
Eliminations and company-wide	51	66	19	-173	-91	-295	92	-249	-303	-688	-697
YoY	11.7%	-62.5%	45.3%	11.1%	-24.9%	8.5%	72.6%	22.3%	18.5%	-15.9%	22.9%
Japan	8.3%	-99.3%	3900.0%	68.8%	-2.4%	70.4%	13.1%	29.4%	-8.6%	-10.1%	68.2%
China	13.4%	-51.5%	-19.5%	14.2%	-37.8%	-9.5%	65.2%	34.0%	36.2%	-4.0%	0.4%
Taiwan				-20.8%	-7.8%	5.7%	187.1%	23.5%	26.3%	-33.0%	23.8%
South Korea				-0.9%	-33.7%	-8.9%	81.6%	13.0%	16.7%	-9.8%	30.4%
Others	3.5%	-28.8%	-32.1%	84.5%	14.3%	18.8%	40.2%	22.5%	7.6%	-10.6%	-3.7%
<b>OPM</b>	19.6%	10.2%	13.8%	13.3%	10.2%	12.1%	17.1%	19.2%	22.0%	19.3%	21.7%
Japan	8.5%	0.1%	2.9%	5.5%	8.4%	12.9%	13.6%	15.6%	13.3%	11.3%	17.2%
China	20.5%	14.2%	23.8%	23.6%	16.5%	14.6%	14.7%	17.2%	21.9%	22.2%	21.4%
Taiwan			15.8%	11.6%	12.7%	12.6%	17.0%	18.3%	22.6%	14.9%	20.3%
South Korea			9.6%	7.1%	3.9%	5.0%	10.1%	13.2%	18.3%	14.4%	16.2%
Others	18.8%	15.8%	4.3%	7.8%	10.4%	11.3%	12.9%	13.4%	13.4%	13.1%	10.3%

Source: Shared Research based on company data

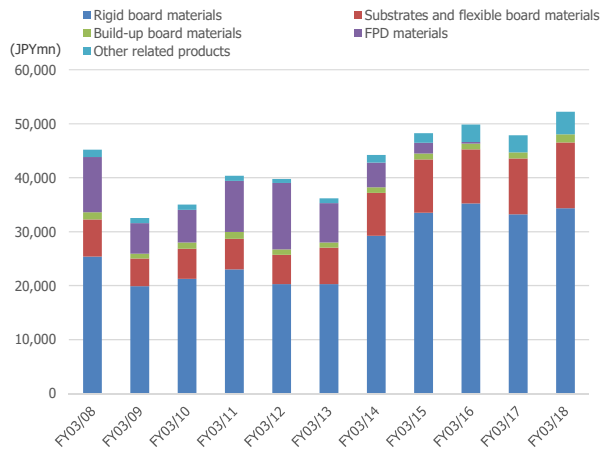
Note: Figures may differ from company materials due to differences in rounding methods.

Note: FY03/08 and FY03/09 sales figures for China are those for Asia including Taiwan and South Korea (figures for China alone from FY03/10).

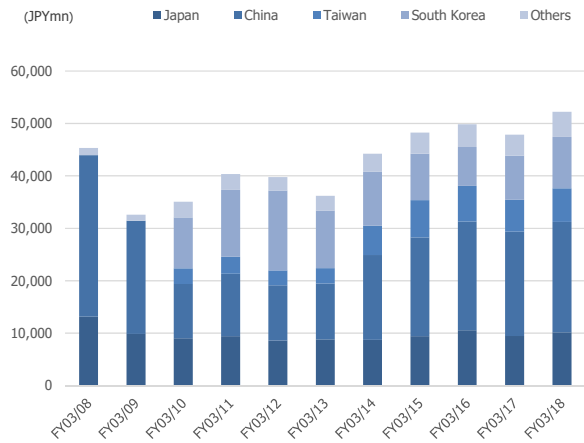
Note: From FY03/17, FPD is included in Other related products.

Note: Operating profit by product not disclosed.

### Sales for key products



### Sales by region



Source: Shared Research based on company data

Note: FY03/08 and FY03/09 sales figures for China are those for Asia including Taiwan and South Korea (figures for China alone from FY03/10).

## Recent updates

### Highlights

On **May 29, 2018**, Shared Research updated the report following interviews with Taiyo Holdings Co., Ltd.

On **May 2, 2018**, the company announced full-year results for FY03/18; see the results section for details.

On **March 23, 2018**, the company announced a revision to its dividend forecast and a plan to buy back shares.

#### Revision to dividend forecast

The company revised its FY03/18 year-end dividend forecast to JPY95.10 per share, adding JPY30.00 as commemorative dividend (commemorating the 65th anniversary since the company's founding) to the initial JPY65.10 forecast. The revision brings up the annual dividend for FY03/18 to JPY160.20 per share, which includes the interim dividend of JPY65.10 per share that has already been paid out.

#### Share repurchase

▷ Type of shares to be repurchased:	common shares of Taiyo Holdings
▷ Number of shares to be repurchased:	375,000 shares (upper limit; 1.30% of total shares issued excluding treasury stock)
▷ Total repurchase amount:	JPY1.5bn (upper limit)
▷ Repurchase period:	April 2, 2018 to March 22, 2019

**For previous releases and developments, please refer to the News and topics section.**



## Trends and outlook

### Quarterly trends and results

Cumulative (JPY mn)	FY03/16				FY03/17				FY03/18			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Sales	12,447	25,400	38,300	49,843	11,306	23,442	35,922	47,866	12,425	25,784	39,022	52,241
PWB insulated materials	11,679	23,672	35,607	46,318	10,516	21,919	33,549	44,700	11,554	23,996	36,326	48,041
Rigid board materials	8,756	18,061	27,122	35,242	7,971	16,523	25,030	33,216	8,506	17,540	26,255	34,342
High-function	4,939	10,320	15,496	20,230	4,802	10,123	15,172	20,211	5,287	10,903	16,318	21,429
General	3,817	7,741	11,626	15,012	3,169	6,400	9,858	13,005	3,219	6,637	9,937	12,913
Substrates and flexible board materials	2,666	5,065	7,680	10,007	2,270	4,861	7,688	10,348	2,704	5,706	8,941	12,197
Package substrates	2,522	4,746	7,187	9,376	2,109	4,531	7,163	9,676	2,490	5,144	8,021	11,029
Flexible boards	144	319	493	631	161	330	525	672	214	562	920	1,168
Build-up board materials	257	546	805	1,069	275	535	831	1,136	344	750	1,130	1,502
FPD materials	76	191	267	292								
Other related products	690	1,535	2,424	3,231	788	1,523	2,371	3,165	869	1,785	2,695	4,199
Regional sales (incl. internal sales)												
Japan	4,282	8,651	12,976	17,002	4,052	8,594	13,239	17,917	4,686	9,568	14,887	19,807
China	5,296	11,320	16,919	21,820	4,970	10,439	15,361	20,618	5,221	11,078	16,610	21,539
Taiwan	2,559	5,014	7,581	9,854	2,007	4,128	7,677	10,042	2,235	4,579	7,059	9,116
South Korea	1,992	3,889	5,922	7,739	1,837	4,073	6,453	8,825	2,369	5,035	7,629	10,271
Others	1,097	2,263	3,360	4,451	992	1,990	3,033	4,076	1,084	2,098	3,141	4,979
Eliminations and company-wide	-2,779	-5,737	-8,458	-11,023	-2,552	-5,782	-9,841	-13,612	-3,170	-6,574	-10,304	-13,471
Sales to external customers												
Japan	2,668	5,249	7,959	10,565	2,413	4,694	7,134	9,446	2,450	4,889	7,542	10,171
China	4,990	10,697	16,049	20,687	4,768	10,033	14,791	19,923	5,073	10,822	16,234	21,063
Taiwan	1,808	3,528	5,356	6,864	1,408	2,880	4,851	6,062	1,595	3,228	4,962	6,410
South Korea	1,908	3,718	5,659	7,385	1,746	3,896	6,189	8,459	2,254	4,799	7,255	9,771
Others	1,072	2,207	3,274	4,340	968	1,938	2,953	3,974	1,051	2,044	3,027	4,824
YoY	6.8%	2.5%	3.8%	3.3%	-9.2%	-7.7%	-6.2%	-4.0%	9.9%	10.0%	8.6%	9.1%
PWB insulated materials	13.8%	7.3%	6.0%	4.1%	-10.0%	-7.4%	-5.8%	-3.5%	9.9%	9.5%	8.3%	7.5%
Rigid board materials	14.4%	9.7%	7.7%	5.1%	-9.0%	-8.5%	-7.7%	-5.7%	6.7%	6.2%	4.9%	3.4%
High-function		14.0%	11.1%	8.3%	-2.8%	-1.9%	-2.1%	-0.1%	10.1%	7.7%	7.6%	6.0%
General		4.5%	3.6%	1.0%	-17.0%	-17.3%	-15.2%	-13.4%	1.6%	3.7%	0.8%	-0.7%
Substrates and flexible board materials	14.3%	0.5%	1.1%	1.7%	-14.9%	-4.0%	0.1%	3.4%	19.1%	17.4%	16.3%	17.9%
Package substrates		-1.4%	-1.0%	-0.3%	-16.4%	-4.5%	-0.3%	3.2%	18.1%	13.5%	12.0%	14.0%
Flexible boards		39.9%	45.4%	42.4%	11.8%	3.4%	6.5%	6.5%	32.9%	70.3%	75.2%	73.8%
Build-up board materials	-6.9%	-0.2%	-1.7%	-2.0%	7.0%	-2.0%	3.2%	6.3%	25.1%	40.2%	36.0%	32.2%
FPD materials	-92.1%	-89.6%	-86.0%	-85.2%								
Other related products	57.5%	72.9%	76.2%	78.7%	2.9%	-11.8%	-11.9%	-10.2%	10.3%	17.2%	13.7%	32.7%
Regional sales (incl. internal sales)												
Japan	10.5%	5.3%	5.5%	7.7%	-5.4%	-0.7%	2.0%	5.4%	15.6%	11.3%	12.4%	10.5%
China	19.4%	13.6%	10.3%	6.9%	-6.2%	-7.8%	-9.2%	-5.5%	5.1%	6.1%	8.1%	4.5%
Taiwan	13.2%	4.4%	3.7%	2.5%	-21.6%	-17.7%	1.3%	1.9%	11.4%	10.9%	-8.1%	-9.2%
South Korea	-21.9%	-26.7%	-19.2%	-15.9%	-7.8%	4.7%	9.0%	14.0%	29.0%	23.6%	18.2%	16.4%
Others	6.9%	11.8%	9.8%	7.5%	-9.6%	-12.1%	-9.7%	-8.4%	9.3%	5.4%	3.6%	22.2%
Cost of sales	7,016	13,981	21,093	27,355	6,311	13,160	19,739	26,220	6,544	13,551	20,563	27,304
YoY	-1.6%	-7.4%	-5.0%	-5.2%	-10.0%	-5.9%	-6.4%	-4.1%	3.7%	3.0%	4.2%	4.1%
Cost ratio	56.4%	55.0%	55.1%	54.9%	55.8%	56.1%	54.9%	54.8%	52.7%	52.6%	52.7%	52.3%
Gross profit	5,431	11,419	17,206	22,487	4,994	10,282	16,182	21,645	5,880	12,233	18,459	24,937
YoY	20.0%	18.1%	17.3%	15.9%	-8.0%	-10.0%	-6.0%	-3.7%	17.7%	19.0%	14.1%	15.2%
GPM	43.6%	45.0%	44.9%	45.1%	44.2%	43.9%	45.0%	45.2%	47.3%	47.4%	47.3%	47.7%
SG&A expenses	2,829	5,612	8,559	11,522	2,855	5,725	8,993	12,424	3,166	6,489	9,759	13,599
YoY	16.9%	14.2%	15.5%	13.6%	0.9%	2.0%	5.1%	7.8%	10.9%	13.3%	8.5%	9.5%
SG&A ratio	22.7%	22.1%	22.3%	23.1%	25.3%	24.4%	25.0%	26.0%	25.5%	25.2%	25.0%	26.0%
Operating profit	2,601	5,807	8,646	10,964	2,139	4,557	7,188	9,221	2,714	5,744	8,699	11,337
Japan	766	1,490	1,952	2,254	316	862	1,439	2,026	805	1,622	2,732	3,408
China	1,050	2,392	3,670	4,775	1,108	2,387	3,531	4,582	1,147	2,463	3,603	4,602
Taiwan	556	1,159	1,749	2,227	396	833	1,338	1,492	487	960	1,473	1,847
South Korea	339	727	1,109	1,414	318	605	964	1,275	368	846	1,295	1,663
Others	135	293	441	597	141	295	391	534	126	213	226	514
Eliminations and company-wide	-245	-254	-275	-303	-140	-425	-475	-688	-219	-360	-630	-697
YoY	23.7%	22.1%	19.1%	18.5%	-17.8%	-21.5%	-16.9%	-15.9%	26.9%	26.0%	21.0%	22.9%
Japan	22.2%	9.6%	-4.8%	-8.6%	-58.7%	-42.1%	-26.3%	-10.1%	154.7%	88.2%	89.9%	68.2%
China	45.4%	43.4%	39.1%	36.2%	5.5%	-0.2%	-3.8%	-4.0%	3.5%	3.2%	2.0%	0.4%
Taiwan	38.0%	32.0%	29.3%	26.3%	-28.8%	-28.1%	-23.5%	-33.0%	23.0%	15.2%	10.1%	23.8%
South Korea	17.3%	18.0%	16.6%	16.7%	-6.2%	-16.8%	-13.1%	-9.8%	15.7%	39.8%	34.3%	30.4%
Others	1.5%	2.4%	4.3%	7.6%	4.4%	0.7%	-11.3%	-10.6%	-10.6%	-27.8%	-42.2%	-3.7%
OPM	20.9%	22.9%	22.6%	22.0%	18.9%	19.4%	20.0%	19.3%	21.8%	22.3%	22.3%	21.7%
Japan	17.9%	17.2%	15.0%	13.3%	7.8%	10.0%	10.9%	11.3%	17.2%	17.0%	18.4%	17.2%
China	19.8%	21.1%	21.7%	21.9%	22.3%	22.9%	23.0%	22.2%	22.0%	22.2%	21.7%	21.4%
Taiwan	21.7%	23.1%	23.1%	22.6%	19.7%	20.2%	17.4%	14.9%	21.8%	21.0%	20.9%	20.3%
South Korea	17.0%	18.7%	18.7%	18.3%	17.3%	14.9%	14.9%	14.4%	15.5%	16.8%	17.0%	16.2%
Others	12.3%	12.9%	13.1%	13.4%	14.2%	14.8%	12.9%	13.1%	11.6%	10.2%	7.2%	10.3%
Non-operating income	61	131	255	265	74	134	203	234	53	91	156	214
Non-operating expenses	45	49	71	100	60	89	89	253	84	144	196	352
Recurring profit	2,616	5,889	8,831	11,129	2,153	4,602	7,302	9,202	2,683	5,690	8,659	11,199
YoY	21.2%	20.7%	18.3%	16.8%	-17.7%	-21.9%	-17.3%	-17.3%	24.6%	23.6%	18.6%	21.7%
RPM	21.0%	23.2%	23.1%	22.3%	19.0%	19.6%	20.3%	19.2%	21.6%	22.1%	22.2%	21.4%
Extraordinary gains	37	38	40	40	0	0	0	575	0	0	16	40
Extraordinary losses	33	33	32	32	0	0	0	1,021	19	19	19	3,298
Pre-tax profit	2,621	5,894	8,839	11,137	2,153	4,602	7,302	9,202	2,683	5,690	8,659	11,199
Income taxes	785	1,656	2,368	3,009	239	897	1,656	2,199	799	1,621	2,433	3,016
Income taxes-current	1,234	1,824	2,338	2,855	938	1,466	2,053	2,588	1,025	1,583	2,318	3,040
Income taxes-deferred	-457	-168	30	153	-698	-569	-397	-388	-225	44	115	-24
Imputed tax rate	30.0%	28.1%	26.8%	27.0%	11.1%	19.5%	25.7%	25.1%	30.0%	28.6%	28.1%	38.0%
Net income	1,835	4,238	6,470	8,128	1,913	3,705	4,777	6,557	1,865	4,043	6,223	4,925
Net income attributable to non-controlling interests	71	149	243	331	37	81	142	158	20	45	62	69
Net income attributable to owners of parent	1,764	4,088	6,226	7,796	1,876	3,623	4,635	6,398	1,844	3,998	6,160	4,856
YoY	20.6%	22.5%	17.9%	16.9%	6.3%	-11.4%	-25.6%	-17.9%	-1.7%	10.4%	32.9%	-24.1%
Net margin	14.2%	16.1%	16.3%	15.6%	16.6%	15.5%	12.9%	13.4%	14.8%	15.5%	15.8%	9.3%
USD/JPY	121.3	121.5	121.0	120.1	109.1	106.4	108.0	109.0	112.0	111.0	112.0	111.0

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

Quarterly (JPY mn)	FY03/16				FY03/17				FY03/18			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Sales	12,447	12,953	12,900	11,543	11,306	12,136	12,480	11,944	12,425	13,359	13,238	13,219
PWB insulated materials	11,679	11,993	11,935	10,711	10,516	11,403	11,630	11,151	11,554	12,442	12,330	11,715
Rigid board materials	8,756	9,305	9,061	8,120	7,971	8,552	8,507	8,186	8,506	9,034	8,715	8,087
High-function	4,939	5,381	5,176	4,734	4,802	5,321	5,049	5,039	5,287	5,616	5,415	5,111
General	3,817	3,924	3,885	3,386	3,169	3,231	3,458	3,147	3,219	3,418	3,300	2,976
Substrates and flexible board materials	2,666	2,399	2,615	2,327	2,270	2,591	2,827	2,660	2,704	3,002	3,235	3,256
Package substrates	2,522	2,224	2,441	2,189	2,109	2,422	2,632	2,513	2,490	2,654	2,877	3,008
Flexible boards	144	175	174	138	161	169	195	147	214	348	358	248
Build-up board materials	257	289	259	264	275	260	296	305	344	406	380	372
FPD materials	76	115	76	25								
Other related products	690	845	889	807	788	735	848	794	869	916	910	1,504
Regional sales (incl. internal sales)												
Japan	4,282	4,369	4,325	4,026	4,052	4,542	4,645	4,678	4,686	4,882	5,319	4,920
China	5,296	6,024	5,599	4,901	4,970	5,469	4,922	5,257	5,221	5,857	5,532	4,929
Taiwan	2,559	2,455	2,567	2,273	2,007	2,121	3,549	2,365	2,235	2,344	2,480	2,057
South Korea	1,992	1,897	2,033	1,817	1,837	2,236	2,380	2,372	2,369	2,666	2,594	2,642
Others	1,097	1,166	1,097	992	998	1,043	1,043	1,043	1,084	1,014	1,043	1,838
Eliminations and company-wide	-2,779	-2,958	-2,721	-2,565	-2,552	-3,230	-4,059	-3,771	-3,170	-3,404	-3,730	-3,167
Sales to external customers												
Japan	2,668	2,581	2,710	2,606	2,413	2,281	2,440	2,312	2,450	2,439	2,653	2,629
China	4,990	5,707	5,352	4,638	4,768	5,265	4,758	5,132	5,073	5,749	5,412	4,829
Taiwan	1,808	1,720	1,828	1,508	1,408	1,472	1,971	1,211	1,595	1,633	1,734	1,448
South Korea	1,908	1,810	1,941	1,726	1,746	2,150	2,293	2,270	2,254	2,545	2,456	2,516
Others	1,072	1,135	1,067	1,066	968	970	1,015	1,021	1,051	993	983	1,797
YoY	6.8%	-1.3%	6.6%	1.4%	-9.2%	-6.3%	-3.3%	3.5%	9.9%	10.1%	6.1%	10.7%
PWB insulated materials	13.8%	1.7%	3.4%	-1.6%	-10.0%	-4.9%	-2.6%	4.1%	9.9%	9.1%	6.0%	5.1%
Rigid board materials	14.4%	5.6%	4.0%	-2.9%	-9.0%	-8.1%	-6.1%	0.8%	6.7%	5.6%	2.4%	-1.2%
High-function			5.8%	0.2%	-2.8%	-1.1%	-2.5%	6.4%	10.1%	5.5%	7.2%	1.4%
General			1.8%	-6.9%	-17.0%	-17.7%	-11.0%	-7.1%	1.6%	5.8%	-4.6%	-5.4%
Substrates and flexible board materials	14.3%	-11.5%	2.3%	3.7%	-14.9%	8.0%	8.1%	14.3%	19.1%	15.9%	14.4%	22.4%
Package substrates			-0.2%	2.2%	-16.4%	8.9%	7.8%	14.8%	18.1%	9.6%	9.3%	19.7%
Flexible boards			56.8%	32.7%	11.8%	-3.4%	12.1%	6.5%	32.9%	105.9%	83.6%	68.7%
Build-up board materials	-6.9%	6.6%	-4.8%	-2.9%	7.0%	-10.0%	14.3%	15.5%	25.1%	56.2%	28.4%	22.0%
FPD materials	-92.1%	-86.9%	-1.3%	-61.5%								
Other related products	57.5%	87.8%	82.2%	86.8%	2.9%	-23.4%	-12.1%	-4.6%	10.3%	24.6%	7.3%	89.4%
Regional sales (incl. internal sales)												
Japan	10.5%	0.7%	5.8%	15.5%	-5.4%	4.0%	7.4%	16.2%	15.6%	7.5%	14.5%	5.2%
China	19.4%	8.9%	4.2%	-3.6%	-6.2%	-9.2%	-12.1%	7.3%	5.1%	7.1%	12.4%	-6.2%
Taiwan	13.2%	-3.4%	2.4%	-1.4%	-21.6%	-13.6%	38.3%	4.0%	11.4%	10.5%	-30.1%	-13.0%
South Korea	-21.9%	-31.0%	0.2%	-2.8%	-7.8%	17.9%	17.1%	30.5%	29.0%	19.2%	9.0%	11.4%
Others	6.9%	16.7%	5.9%	1.1%	-9.6%	-14.4%	-4.9%	-4.4%	9.3%	1.6%	0.0%	76.2%
Cost of sales	7,016	6,965	7,112	6,262	6,311	6,849	6,579	6,481	6,544	7,007	7,012	6,741
YoY	-1.6%	-12.7%	0.1%	-5.9%	-10.0%	-1.7%	-7.5%	3.5%	3.7%	2.3%	6.6%	4.0%
Cost ratio	56.4%	53.8%	55.1%	54.2%	55.8%	56.4%	52.7%	54.3%	52.7%	52.5%	53.0%	51.0%
Gross profit	5,431	5,988	5,787	5,281	4,994	5,288	5,900	5,463	5,880	6,353	6,226	6,478
YoY	20.0%	16.3%	15.8%	11.8%	-8.0%	-11.7%	2.0%	3.4%	17.7%	20.1%	5.5%	18.6%
GPM	43.6%	46.2%	44.9%	45.8%	44.2%	43.6%	47.3%	45.7%	47.3%	47.6%	47.0%	49.0%
SG&A expenses	2,829	2,783	2,947	2,963	2,855	2,870	3,268	3,431	3,166	3,323	3,270	3,840
YoY	16.9%	11.5%	18.1%	8.7%	0.9%	3.1%	10.9%	15.8%	10.9%	15.8%	0.1%	11.9%
SG&A ratio	22.7%	21.5%	22.8%	25.7%	25.3%	23.6%	26.2%	28.7%	25.5%	24.9%	24.7%	29.0%
Operating profit	2,601	3,206	2,839	2,318	2,139	2,418	2,631	2,033	2,714	3,030	2,955	2,638
Japan	766	724	462	302	316	546	577	587	805	817	1,110	676
China	1,050	1,342	1,278	1,105	1,108	1,279	1,144	1,051	1,147	1,316	1,140	999
Taiwan	556	603	590	478	396	437	505	154	487	473	513	374
South Korea	339	388	382	305	318	287	359	311	368	478	449	368
Others	135	158	148	156	141	154	96	143	126	87	13	288
Eliminations and company-wide	-245	-9	-21	-28	-140	-285	-50	-213	-219	-141	-270	-67
YoY	23.7%	20.9%	13.5%	16.1%	-17.8%	-24.6%	-7.3%	-12.3%	26.9%	25.3%	12.3%	29.8%
Japan	22.2%	-1.1%	-33.1%	-27.4%	-58.7%	-24.6%	24.9%	94.4%	154.7%	49.6%	92.4%	15.2%
China	45.4%	41.9%	31.8%	27.2%	5.5%	-4.7%	-10.5%	-4.9%	3.5%	2.9%	-0.3%	-4.9%
Taiwan	38.0%	26.9%	24.2%	16.6%	-28.8%	-27.5%	-14.4%	-67.8%	23.0%	8.2%	1.6%	142.9%
South Korea	17.3%	18.7%	14.0%	16.9%	-6.2%	-26.0%	-6.0%	2.0%	15.7%	66.6%	25.1%	18.3%
Others	1.5%	3.3%	8.0%	18.2%	4.4%	-2.5%	-35.1%	-8.3%	-10.6%	-43.5%	-86.5%	101.4%
OPM	20.9%	24.8%	22.0%	20.1%	18.9%	19.9%	21.1%	17.0%	21.8%	22.7%	22.3%	20.0%
Japan	17.9%	16.6%	10.7%	7.5%	7.8%	12.0%	12.4%	12.5%	17.2%	16.7%	20.9%	13.7%
China	19.8%	22.3%	22.8%	22.5%	22.3%	23.4%	23.2%	20.0%	22.0%	22.5%	20.6%	20.3%
Taiwan	21.7%	24.6%	23.0%	21.0%	19.7%	20.6%	14.2%	6.5%	21.8%	20.2%	20.7%	18.2%
South Korea	17.0%	20.5%	18.8%	16.8%	17.3%	12.8%	15.1%	13.1%	15.5%	17.9%	17.3%	13.9%
Others	12.3%	13.6%	13.5%	14.3%	14.2%	15.4%	9.2%	13.7%	11.6%	8.6%	1.2%	15.7%
Non-operating income	61	70	124	10	74	60	69	31	53	38	65	58
Non-operating expenses	45	4	22	29	60	29	0	164	84	60	52	156
Recurring profit	2,616	3,273	2,942	2,298	2,153	2,449	2,700	1,900	2,683	3,007	2,969	2,540
YoY	21.2%	20.4%	13.7%	11.3%	-17.7%	-25.2%	-8.2%	-17.3%	24.6%	22.8%	10.0%	33.7%
RPM	21.0%	25.3%	22.8%	19.9%	19.0%	20.2%	21.6%	15.9%	21.6%	22.5%	22.4%	19.2%
Extraordinary gains	37	1	2	0	0	0	0	575	0	0	16	24
Extraordinary losses	33	0	-1	0	0	0	0	1,021	19	0	0	3,279
Pre-tax profit	2,621	3,273	2,945	2,298	2,153	2,449	1,831	2,323	2,664	3,007	2,986	-716
Income taxes	785	871	712	641	239	658	759	543	799	822	812	583
Income taxes-current	1,234	590	514	517	938	528	587	535	1,025	558	735	722
Income taxes-deferred	-457	289	198	123	-698	129	172	9	-225	269	71	-139
Implied tax rate	30.0%	26.6%	24.2%	27.9%	11.1%	26.9%	41.5%	23.4%	30.0%	27.3%	27.2%	-81.4%
Net income	1,835	2,403	2,232	1,658	1,913	1,792	1,072	1,780	1,865	2,178	2,180	-1,298
Net income attributable to non-controlling interests	71	78	94	88	37	44	61	16	20	25	17	7
Net income attributable to owners of parent	1,764	2,324	2,138	1,570	1,876	1,747	1,012	1,763	1,844	2,154	2,162	-1,304
YoY	20.6%	24.0%	10.0%	13.3%	6.3%	-24.8%	-52.7%	12.3%	-1.7%	23.3%	113.6%	-174.0%
Net margin	14.2%	17.9%	16.6%	13.6%	16.6%	14.4%	8.1%	14.8%	14.8%	16.1%	16.3%	-9.9%

Source: Shared Research based on company data

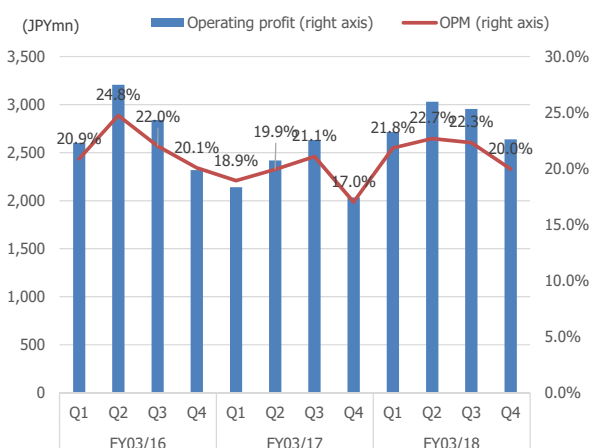
Note: Figures may differ from company materials due to differences in rounding methods.

### Quarterly performance

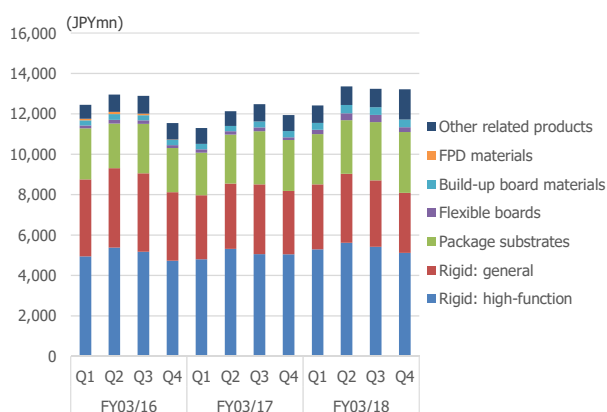


Source: Shared Research based on company data

### Operating profit and OPM

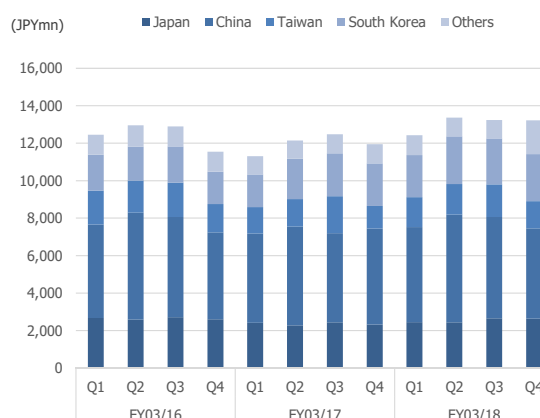


### Sales by product category



Source: Shared Research based on company data

### Sales by region



## FY03/18 results

### Markets

In the electronic parts industry, the group's core market, demand for automotive components, smartphones, virtual currency servers, and automotive electronics-related materials was solid. .

### Topics of interest

- The realized average exchange rate for the full year was JPY111/USD, in line with company's projection of JPY111/USD (announced February 2, 2018)
- Sales volume of general rigid board materials declined, but sales volume of dry film and flexible printed circuit (FPC) board materials rose YoY
- Completed transfer of the manufacturing and sales authorization, manufacturing and sales rights, and all related assets for 13 long-listed products to subsidiary Taiyo Pharma Co., Ltd. in January 2018
- Acquired systems engineering company Micro Network Technologies Corp., making it a consolidated subsidiary (announced April 6, 2018)

### Overview of company earnings

In FY03/18, sales rose 9.1% YoY to JPY52.2bn and operating profit rose 22.9% to JPY11.3bn; the OPM rose to 21.7% versus 19.3% the previous year. The company made a one-time write-off of goodwill of JPY3.3bn, booking it as an extraordinary loss.

Q4 sales of JPY13.2bn were up 10.7% YoY and operating profit of JPY2.6bn was up 29.8%; the Q4 OPM of 20.0% compares with 17.0% in Q4 FY03/17.

## Causes of YoY changes

Sales and operating profit grew YoY saw positive contributions from rising sales volume of dry film (+JPY1.1bn to sales, +JPY629mn to operating profit), foreign-exchange impact/changes in the product mix (+JPY2.9bn to sales, +JPY1.7bn to operating profit), and rising sales at the medical/pharmaceutical business (+JPY820mn to sales, +JPY9mn to operating profit, and +JPY353mn if the amortization of sales rights is included), which together easily offset the negative impact of a decline in sales volume of liquid solder resist for printed wiring boards (-JPY453mn to sales, -JPY223mn to operating profit).

## Sales by product category

Sales of high-function rigid board materials were JPY21.4bn(+6.0% YoY), general rigid board materials were JPY12.9bn (-0.7%), package substrate materials were JPY11.0bn (+14.0%), flexible printed circuit (FPC) board materials were JPY1.2bn (+73.8%), build-up board materials were JPY1.5bn (+32.2%), and other products were JPY4.2bn (+32.7%). Sales of general rigid board materials fell due to an intensifying price competition with local companies in the Chinese market.

## Segment (regional) performance

Sales to external customers by region: Japan, JPY10.2bn (+7.7% YoY, 19.5% of total); China, JPY21.1bn (+5.7%, 40.3%); Taiwan, JPY6.4bn (+5.7%, 12.3%); South Korea, JPY9.8bn (+15.5%, 18.7%); and Others, JPY4.8bn (+21.4%, 9.2%).

Sales by region including intragroup sales: Japan, JPY19.8bn (+10.5% YoY; 30.1% of total sales); China, JPY21.5bn (+4.5%; 32.8%); Taiwan, JPY9.1bn (-9.2%; 13.9%); South Korea, JPY10.3bn (+16.4%; 15.6%); and Others, JPY5.0bn (+22.2%; 7.6%).

Operating profit by region: Japan, JPY3.4bn (+68.2% YoY); China, JPY4.6bn (+0.4%); Taiwan, JPY1.8bn (+23.8%); South Korea, JPY1.7bn (+30.4%); and Others, JPY514mn (-3.7%).

OPM by region: Japan, 17.2%; China, 21.4%; Taiwan, 20.3% ; South Korea, 16.2%; and Others, 10.3%.

## Extraordinary losses: Booking JPY3.3bn on one-time amortization of goodwill (consolidated earnings)

Because of tax reforms in Taiwan, a tax deduction for distributing profit surplus which had built up after not distributing surplus in the previous year will no longer be valid as of end-December 2018. As such, the company decided to distribute the profit surplus Onstatic Technology Co., Ltd. (OTC) had built up in March 2018. Due to the decrease in net assets from this and a calculation of the real value of OTC based on the most recent business plan, the company booked JPY4.2bn in valuation losses on shares of an affiliate in its non-consolidated earnings and JPY3.3bn in one-time amortization of goodwill in the consolidated earnings.

**For details on previous quarterly and annual results, please refer to the Historical financial statements section.**

## FY03/19 full-year forecasts (at time of FY03/18 earnings announcement)

### Overview

In the electronics components industry, a market related to the company group, demand has continued to be solid for smartphones, servers for virtual currency, and automotive components. There have especially been a large number of inquiries from a set group of customers for servers for virtual currency, and the company expects that strong demand for these products will continue through the summer. According to the company, the sudden growth of flexible printed circuit board materials (FPCs) is driven by the spread of wearable devices. In automotive components, the company has gradually secured certification for its products in not only Japan, but also overseas, and deliveries appear to be progressing smoothly. Dry film has become more profitable as it became more cost competitive with outsourcers by steadily expanding in-house production at its Northern Kyushu factory (contributing to the significant profit growth in Japan). General liquid film struggled due to low prices from local manufacturers in the Chinese market, leading to lower market share. The company acknowledges that it must take some counter-measures during FY03/19 (costs related to these measures included in SG&A expenses).

For FY03/19, the company forecasts full-year sales of JPY60.2bn (+15.2% YoY) and an operating profit of JPY9.8bn (-13.6%), assuming an average exchange rate of JPY102/USD for the full year (and JPY105/USD for Q1, JPY103/USD for 1H, JPY100/USD for 2H).

Using the same exchange rate assumption of JPY111/USD as the company did for FY03/18, the company forecasts sales of JPY63.8bn (+22.1% YoY) and operating profit of JPY11.4bn (+0.6% YoY). The current exchange rate (as of the end of May 2018) is close to this assumption.

### YoY change factors analysis

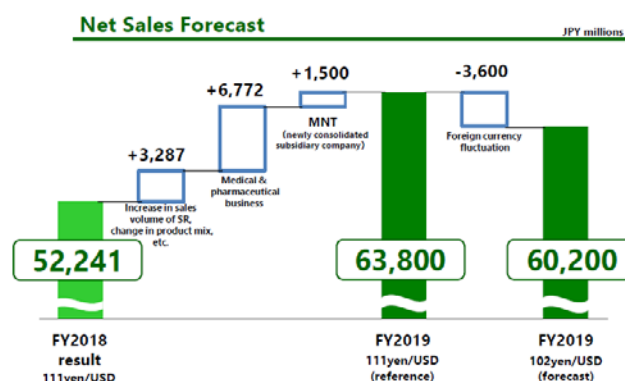
In an analysis of the factors leading to YoY changes in sales, the company expects increased volume of solder resist products for printed wiring boards and the impact of an improved sales mix to boost sales up JPY3.3bn (both dry and liquid film contributing half each), the pharmaceutical business to boost sales up JPY6.8bn, and the newly consolidated MNT to boost sales up JPY1.5bn. On the other hand, the company expects yen appreciation in the currency exchange to drive down sales JPY3.6bn (=JPY400mn x JPY9 appreciation).

In an analysis of the factors leading to YoY changes in operating profit, the company expects increased volume of solder resist products for printed wiring boards and the impact of an improved sales mix to boost profits by JPY1.2bn. However, the company expects several factors to have a negative impact on YoY operating profit, including SG&A expenses (-JPY700mn), the pharmaceutical business (-JPY343mn, including JPY1.4bn in depreciation expenses on sales rights), the newly consolidated MNT (-JPY100mn, including JPY250mn for amortization of goodwill), and fluctuations in the currency exchange (-JPY1.6bn = JPY178mn x JPY9 appreciation). Expenses required for counter-measures to respond to local companies in the Chinese market (third competitors) are included in the JPY700mn forecasted increase in SG&A expenses.

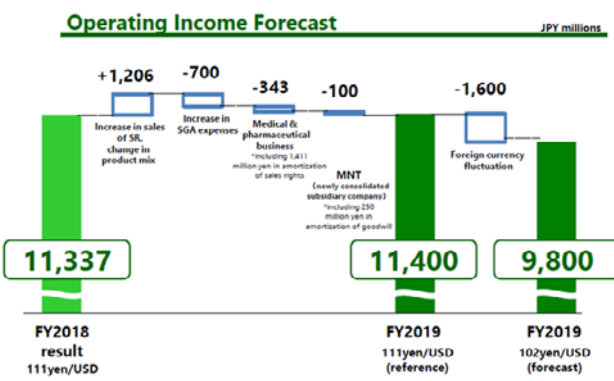
### Capital expenditures, M&A

The company is conducting M&A in the pharmaceutical field and acquired Micro Network Technologies Corp. (MNT) using low-interest loans and the funds earned from the capital and business alliance with DIC Corp (TSE1: 4631), maintaining its cash position (JPY446mn in cash equivalents at end-March 2018) as it plans for the next deal. Capital expenditures ended at a little over JPY1.5bn (JPY5.0bn in FY03/18 forecasts), and the company plans to spend JPY4.0bn in FY03/19 (around JPY2.0bn in depreciation expenses).

Factors impacting FY03/19 company forecasts for sales (YoY)



Factors impacting FY03/19 company forecasts for operating profit (YoY)



Full-year company forecasts for FY03/19

Income statement (JPYmn)	FY03/17			FY03/18			FY03/19			FY03/19 (reference)		
	1H	2H	FY	1H	2H	FY	1H Est.	2H Est.	FY Est.	1H Est.	2H Est.	FY Est.
Sales	23,442	24,424	47,866	25,784	26,457	52,241	30,500	29,700	60,200	31,900	31,900	63,800
YoY	-7.7%	-0.1%	-4.0%	10.0%	8.3%	9.1%	18.3%	12.3%	15.2%	23.7%	20.6%	22.1%
Gross profit	10,282	11,363	21,645	12,233	12,704	24,937						
YoY	-10.0%	2.7%	-3.7%	19.0%	11.8%	15.2%						
GPM	43.9%	46.5%	45.2%	47.4%	48.0%	47.7%						
SG&A expenses	5,725	6,699	12,424	6,489	7,110	13,599						
YoY	2.0%	13.4%	7.8%	13.3%	6.1%	9.5%						
SG&A ratio	24.4%	27.4%	26.0%	25.2%	26.9%	26.0%						
Operating profit	4,557	4,664	9,221	5,744	5,593	11,337	5,100	4,700	9,800	5,700	5,700	11,400
YoY	-21.5%	-9.6%	-15.9%	26.0%	19.9%	22.9%	-11.2%	-16.0%	-13.6%	-0.8%	1.9%	0.6%
OPM	19.4%	19.1%	19.3%	22.3%	21.1%	21.7%	16.7%	15.8%	16.3%	17.9%	17.9%	17.9%
Non-operating income	134	100	234	91	123	214						
Non-operating expenses	89	164	253	144	208	352						
Recurring profit	4,602	4,600	9,202	5,690	5,509	11,199	5,000	4,600	9,600	5,600	5,600	11,200
YoY	-21.9%	-12.2%	-17.3%	23.6%	19.8%	21.7%	-12.1%	-16.5%	-14.3%	-1.6%	1.7%	0.0%
RPM	19.6%	18.8%	19.2%	22.1%	20.8%	21.4%	16.4%	15.5%	15.9%	17.6%	17.6%	17.6%
Extraordinary gains		575	575			40						
Extraordinary losses		1,021	1,021	19	3,279	3,298						
Pretax profit	4,602	4,154	8,756	5,671	2,270	7,941						
Income taxes	897	1,302	2,199	1,628	1,388	3,016						
Income taxes—current	1,466	1,122	2,588	1,583	1,457	3,040						
Income taxes—deferred	-569	181	-388	44	-68	-24						
Implied tax rate	19.5%	31.3%	25.1%	28.7%	61.1%	38.0%						
Net income	3,705	2,852	6,557	4,043	882	4,925						
Net income attrib. to non-controlling interests	81	77	158	45	24	69						
Net income attrib. to owners of parent	3,623	2,775	6,398	3,998	858	4,856	3,500	3,200	6,700	3,900	3,900	7,800
YoY	-11.4%	-25.2%	-17.9%	10.4%	-69.1%	-24.1%	-12.5%	273.0%	38.0%	-2.5%	354.5%	60.6%
Net margin	15.5%	11.4%	13.4%	15.5%	3.2%	9.3%	11.5%	10.8%	11.1%	12.2%	12.2%	12.2%
USD/JPY	106.4	111.6	109.0	111.0	111.0	111.0	103.0	100.0	102.0	111.0	111.0	111.0

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

## Historical performance compared with company forecasts

### Historical performance compared with company forecasts

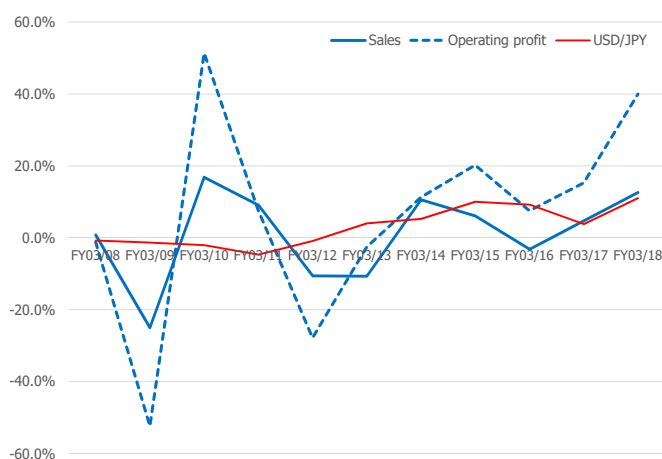
Results versus Initial Est. (JPYmn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
Sales (Initial Est.)	45,000	43,500	30,000	37,000	44,500	40,500	40,000	45,500	51,500	45,700	46,400
Sales (Results)	45,338	32,614	35,056	40,366	39,797	36,184	44,224	48,260	49,843	47,866	52,241
Results versus Initial Est.	0.8%	-25.0%	16.9%	9.1%	-10.6%	-10.7%	10.6%	6.1%	-3.2%	4.7%	12.6%
Operating profit (Initial Est.)	9,000	7,000	3,200	5,000	5,600	4,500	6,800	7,700	10,200	8,000	8,100
Operating profit (Results)	8,896	3,332	4,843	5,380	4,040	4,385	7,568	9,254	10,964	9,221	11,337
Results versus Initial Est.	-1.2%	-52.4%	51.3%	7.6%	-27.9%	-2.6%	11.3%	20.2%	7.5%	15.3%	40.0%
Recurring profit (Initial Est.)	9,000	7,300	3,300	5,000	5,600	4,500	6,800	7,700	10,300	7,800	8,000
Recurring profit (Results)	8,586	3,546	4,787	5,316	4,027	4,743	7,827	9,529	11,129	9,202	11,199
Results versus Initial Est.	-4.6%	-51.4%	45.1%	6.3%	-28.1%	5.4%	15.1%	23.8%	8.0%	18.0%	40.0%
Net income (Initial Est.)	6,000	4,700	2,000	3,500	3,800	3,200	4,700	5,000	7,000	5,500	5,600
Net income (Results)	6,171	1,958	3,010	3,402	2,502	3,367	4,930	6,667	7,796	6,398	4,856
Results versus Initial Est.	2.9%	-58.3%	50.5%	-2.8%	-34.2%	5.2%	4.9%	33.3%	11.4%	16.3%	-13.3%
USD/JPY (Initial Est.)	115.0	102.0	95.0	90.0	80.0	80.0	95.0	100.0	110.0	105.0	100.0
USD/JPY (Results)	114.1	100.6	93.0	85.8	79.3	83.2	100.0	110.0	120.1	109.0	111.0
Results versus Initial Est.	-0.8%	-1.3%	-2.1%	-4.7%	-0.9%	4.0%	5.3%	10.0%	9.2%	3.8%	11.0%

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

Excluding the impact of the global financial crisis in 2008, differences between actual results and initial company forecasts tend to move more or less in line with the differences between currency fluctuations and assumptions (JPY/USD rates).

### Difference in historical performance compared with initial company estimates



Source: Shared Research based on company data

## Medium-term outlook

### Medium-term management plan: become a “comprehensive chemical company”

In June 2017, Taiyo unveiled a new medium-term management plan covering the three years from FY03/18 through FY03/20. This new plan does not include sales or profit targets, but instead sets minimum target ratios: OPM of at least 20%, ROE of at least 11%, DOE of at least 5%, and record high operating profit. It flags a shift from an emphasis on earnings quantity to quality. The company achieved an OPM in the 20% range in FY03/16, but this figure is the minimum, and all group companies target higher OPM. (Note: this is the first medium-term management plan in seven years. The last medium-term plan was announced in October 2010.)

Taiyo did not release medium-term sales and operating profit targets because three-year targets are not optimal for the five- to ten-year business cycle of printed wiring board materials (solder resist), its core business. It worried that three-year sales and earnings targets would lead to short-termism at the management level.

The company has released this new medium-term plan to reduce its dependency on solder resist products. Taiyo already has a market share of over 50% for solder resist materials. As overseas sales make up 80% of its solder resist business, it is vulnerable to macroeconomic factors including currency movements and changes in markets for end products such as smartphones and servers. In addition, the company withdrew from the flat panel display (FPD) materials business, previously its second core business, and has yet to develop successful new businesses. To break free of its dependency on solder resist products, Taiyo plans to transform into a comprehensive chemical company and has set targets accordingly.

The new medium-term plan has the following nine objectives.

- Strengthen the profitability of solder resist products
- Expand printed wiring board (PWB) products other than solder resist
- Establish the pharmaceutical business as an eventual second earnings driver
- Make profitable businesses in energy and food production (such as a solar power plant business and a plant factory), for which it has already established subsidiaries
- Strengthen research capabilities by building an efficient R&D structure; invest over 5% of sales in R&D while maintaining OPM of at least 20% (acquired Chugai Kasei to help strengthen its R&D capabilities)
- Strengthen balance sheet and access new technologies through capital and business alliance with DIC (DIC paid JPY24.8bn to hold a 19.5% stake in Taiyo)
- Conduct M&A to launch the pharmaceutical and other businesses
- Enhance CSR activities
- Invest in developing and utilizing proactive personnel, and continue to create a work environment that helps retain talented employees



**Key points of new medium-term business plan**

**NEXT STAGE 2020**

**Targets**

1. Earnings structure	OP: over 20%
2. Profitability	ROE: over 11%
3. Shareholder returns	DOE: over 5%
4. Management performance	Exceed its historical high OP

\* The company's historical high OP was JPY11bn in FY03/16

**Objectives**

1. Strengthen the profitability of solder resist products
2. Expand non-SR business related to printed wiring board (PWB)
3. Establish pharmaceutical business
4. Make energy and food businesses profitable
5. Enhance fundamental research capability
6. Business alliance with DIC Corporation
7. Execute M&A strategies
8. Expand CSR activities
9. Develop and utilize proactive personnel

Source: Shared Research based on company data

**Capital and business alliance with DIC**

On February 10, 2017, DIC paid JPY24.8bn to acquire a 19.5% stake in Taiyo (Taiyo is now an equity-method affiliate of DIC). The objectives and overview of the tie-up are as follows.

- Joint development of new PWB materials such as MIDs (molded interconnect devices) using technology possessed by both the Taiyo Group and DIC
- Joint development of PWB materials using DIC's advanced resin development technology and pigment dispersion technology
- In new businesses involving electronics products that DIC is considering entering, improved products that match market needs and swift launch of these products using the Taiyo Group's established links with the industry and assessment technology
- Outsourced solder resist production to DIC's plants overseas to reduce production costs and improve operating rates at overseas plants

DIC is a veteran of the Japanese ink industry with a history of over 100 years. Its FY12/16 sales were 16x those of Taiyo in FY03/17, and operating profit was nearly 6x larger. If this capital and business alliance had taken place between two ink companies it might have been seen as a larger company swallowing the smaller one, but this deal is between companies in different industries, and is a mutually beneficial relationship as Taiyo offers experience in the electronic materials sector (an area DIC is interested in entering). The relationship with DIC is similar to the mutually beneficial capital alliances IBM entered with Intel and Microsoft in the US. Whereas DIC's OPM is just above 7%, Taiyo is significantly more profitable with an OPM of around 20%. Of the roughly JPY24.8bn in funds acquired from the capital alliance, Taiyo plans to spend around JPY8.2bn on M&A and R&D.

**Uses of funds**

	(JPYbn)
Rebuilding the plant in Taiwan and improving productivity (consolidation with OTC Taiwan)	7.5
Dry film line at the Kitakyushu Plant	2.5
Making Onstatic Technology (OTC) a wholly owned subsidiary	2.5
Rebuilding core IT system	3.0
Improving productivity at the plants in Saitama and in South Korea	1.0
Expanding existing businesses to PWB-related areas through R&D and M&A	Approx. 8.2
<b>Total</b>	<b>Approx. 24.7</b>

Source: Shared Research based on company data

## Company comparison

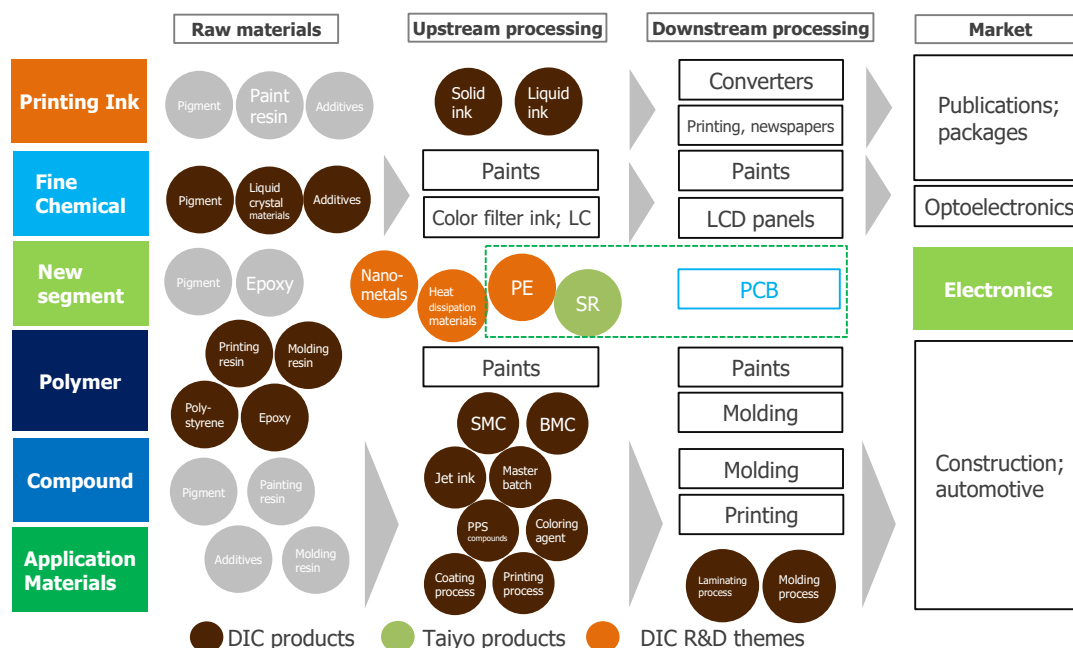
Income statement (JPYmn)	Taiyo Holdings (4626)			DIC (4631)		
	FY03/16	FY03/17	FY03/18	FY12/15	FY12/16	FY12/17
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
<b>Sales</b>	<b>49,843</b>	<b>47,866</b>	<b>52,241</b>	<b>819,999</b>	<b>751,438</b>	<b>789,427</b>
YoY	3.3%	-4.0%	9.1%	-1.2%	-8.4%	5.1%
<b>Operating profit</b>	<b>10,964</b>	<b>9,221</b>	<b>11,337</b>	<b>51,068</b>	<b>54,182</b>	<b>56,483</b>
YoY	18.5%	-15.9%	22.9%	24.3%	6.1%	4.2%
OPM	22.0%	19.3%	21.7%	6.2%	7.2%	7.2%
<b>Recurring profit</b>	<b>11,129</b>	<b>9,202</b>	<b>11,199</b>	<b>48,995</b>	<b>55,797</b>	<b>56,960</b>
YoY	16.8%	-17.3%	21.7%	22.7%	13.9%	2.1%
RPM	22.3%	19.2%	21.4%	6.0%	7.4%	7.2%
<b>Net income attributable to owners of parent</b>	<b>7,796</b>	<b>6,398</b>	<b>4,856</b>	<b>37,394</b>	<b>34,767</b>	<b>38,603</b>
YoY	16.9%	-17.9%	-24.1%	48.4%	-7.0%	11.0%
Net margin	15.6%	13.4%	9.3%	4.6%	4.6%	4.9%
<b>Per share data (JPY)</b>						
EPS	338.0	266.4	168.6	389.4	366.7	407.6
Dividend per share	110.0	120.1	160.2	80.0	100.0	120.0
Payout ratio	32.5%	45.1%	95.0%	20.5%	27.3%	29.4%
DOE	6.2%	5.5%	6.4%	3.0%	3.5%	
Book value per share	1,865.9	2,469.0	2,521	2,768.4	2,938.1	3,329.6
<b>Balance sheet (JPYmn)</b>						
Total assets	65,464	92,386	111,490	778,857	764,828	832
Net assets	45,250	71,846	73,023	289,857	307,017	344
<b>Cash flow statement (JPYmn)</b>						
Cash flows from operating activities	10,546	9,042	8,100	29,113	62,504	54,196
Cash flows from investing activities	-6,750	-1,063	-24,161	-9,973	-32,202	-58,938
Cash flows from financing activities	-2,740	20,342	11,319	-24,801	-26,852	11,375
<b>Financial ratios</b>						
Cash and cash equivalents	18,385	46,661	41,816	15,113	16,671	17,651
ROA (RP-based)	17.6%	11.7%	11.0%	6.2%	7.3%	7.1%
ROE	19.0%	11.2%	6.8%	14.6%	12.9%	13.0%
Equity ratio	65.9%	76.9%	65.2%	33.7%	36.4%	37.9%
<b>Per employee data (JPYmn)</b>						
Number of employees	1,202	1,249		20,264	20,481	20,628
Sales per employee	41.5	38.3		40.5	36.7	38.3
Operating profit per employee	9.1	7.4		2.5	2.6	2.7
<b>Other metrics (JPYmn)</b>						
R&D expenses	2,441	3,235		26,844	26,178	
% of sales	4.9%	6.8%		3.3%	3.5%	
<b>Established</b>	September 1953			February 1908		

Source: Shared Research based on company data

Note: Figures may differ from company data due to differences in rounding methods.

## Capital and business alliance with DIC

# Business portofolio of Taiyo HD and DIC



Source: Shared Research based on company data

## Overview of capital alliance with DIC

Type and number of shares	New shares issued (common stock)	1,312,600
	Treasury shares disposed (common stock)	4,304,700
	Total number of shares	5,617,300
Amount paid	JPY4,428 per share	
Total amount paid	Approx. JPY24.8bn	
Increase in capital stock	Approx. JPY2.9bn	
Increase in capital surplus	Approx. JPY2.9bn	

**Regarding price per share:** Issue price set at JPY4,428, a 10% discount compared to JPY4,920, the closing price on the business day prior to the resolution concerning the third-party allotment.

Note: this is more than 90% of the one-month, three-month, and six-month averages. This complies with the Japan Securities Dealers Association's "Guidelines Concerning Treatment of Capital Increase by Allotment to a Third Party" and is not considered a "favorable issue."

**Becoming an equity-method affiliate of DIC:** DIC will hold 19.5% of the voting rights of Taiyo, making Taiyo Holdings an equity-method affiliate. Further, DIC will dispatch one director to the company (proposal submitted to and approved by June 2017 ordinary general meeting of shareholders).

Source: Shared Research based on company data

## Pharmaceutical business strategy

On January 5, 2018, the company announced that it had completed a transfer of assets to receive the manufacturing and sales rights of 13 long-listed products from Chugai Pharmaceutical Co. (Chugai Pharmaceutical) for a price of JPY21.3bn, excluding inventories.

### 13 long-listed products

	Brand Name	Therapeutic Category
1	BACTRAMIN®	Synthetic Antibacterial Agent / Agent for the treatment of Pneumocystis Pneumonia
2	DIGOSIN®	Digitalis Glycoside
3	EUGLUCON®	Oral Hypoglycemic Agent
4	FURTULON®	Anti-Tumor Agent
5	GLYCEOL®	Drug for the treatment of Intracranial Hypertension and Intracranial Edema / Ocular Hypotensive Agent
6	KYTRIL®	5-HT <sub>3</sub> receptor antagonist for the treatment of Nausea and Vomiting
7	MADOPAR®	Agent for the treatment of Parkinson's disease
8	PROCARBAZINE HYDROCHLORIDE	Anti-Tumor Agent
9	PYDOXAL®	Active Form of Vitamin B <sub>6</sub>
10	RESPLEN®	Antitussive and Mucolytic Agent
11	RIVOTRIL®	Anti-epileptic Agent
12	ROCEPHIN®	Cephalosporin Antibiotic
13	TIGASON®	Agent for the treatment of Hyperkeratosis

Source: Company data

### Medium-term forecasts for 13 long-listed products (five-year performance forecasts)

	FY03/18	FY03/19	FY03/20	FY03/21	FY03/22	FY03/23
	Aug-Mar	Apr-Mar	Apr-Mar	Apr-Mar	Apr-Mar	Apr-Mar
(JPY mn)	(Year 0)	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
Sales	820	7,592	9,113	8,634	8,362	7,732
Gross profit	820	3,816	4,053	3,920	4,626	4,093
SG&A expenses	811	4,151	3,701	3,388	3,363	2,961
Operating profit	9	-334	351	532	1,263	1,132
Amortization of sales rights	353	1,411	1,411	1,411	1,411	1,411
OP before amortization of sales rights	361	1,077	1,763	1,943	2,674	2,543

Source: Company data

\* Sales for the three months before the transfer of the manufacturing and sales rights (January to March 2018) is the amount after subtracting the manufacturing unit price for Chugai Pharmaceutical and Roche, sales expenses, and processing fees from sales of the 13 long-listed products.

\* The transfer of manufacturing and sales rights will be conducted in stages from April 2018 and is planned to be completed by December 2018.

\* FY03/19 SG&A expenses include initial expenses of JPY500mn for costs related to manufacturing transfers.

\* The period of the amortization of goodwill (purchasing price: JPY21.3bn) is 15 years (no generics exist) and 10 years (generics exist).

## Medium-term strategy

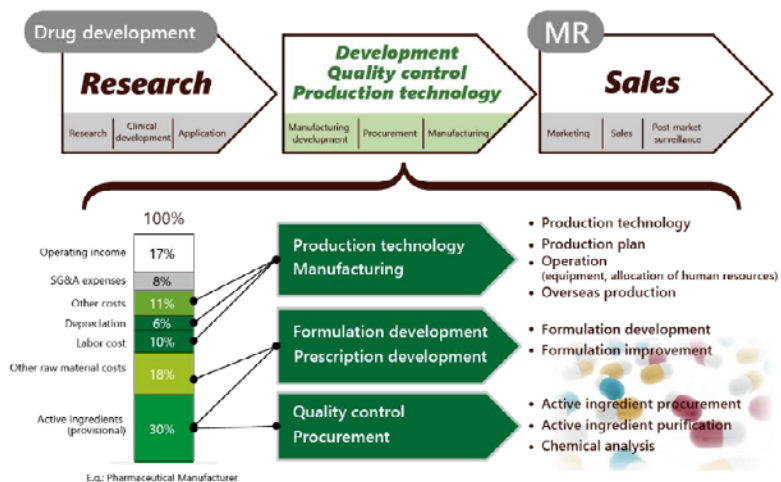
Long-listed products: Acquire additional manufacturing and sales rights

Regarding manufacturing factories, the company intends to acquire manufacturing factories to shift from outsourcing to in-house production for the company's long-listed products, compile pharmaceutical manufacturing know-how and develop personnel, manufacture products from other companies, and establish factories overseas. In R&D, the company intends to begin R&D at either purchased or company established facilities, and develop in-house products, such as new pharmaceuticals

As the purchasing price of long-listed products has fallen due to revisions in pharmaceutical prices, the market is becoming more favorable to purchasers, such as the company, which aims to acquire additional manufacturing and sales rights for long-listed products. The company is aiming for deals worth about JPY20bn. The market for long-listed products will continue to grow as Japanese pharmaceutical companies are focused on discovering new pharmaceuticals. According to the company, there is a high possibility that the pharmaceutical industry may experience a full shift from vertical integration to horizontal division of businesses, a trend which was also seen in the semiconductor industry. In FY03/19, the company plans to acquire factories (both Japanese and overseas factories are being considered) and establish R&D facilities to develop pharmaceuticals.

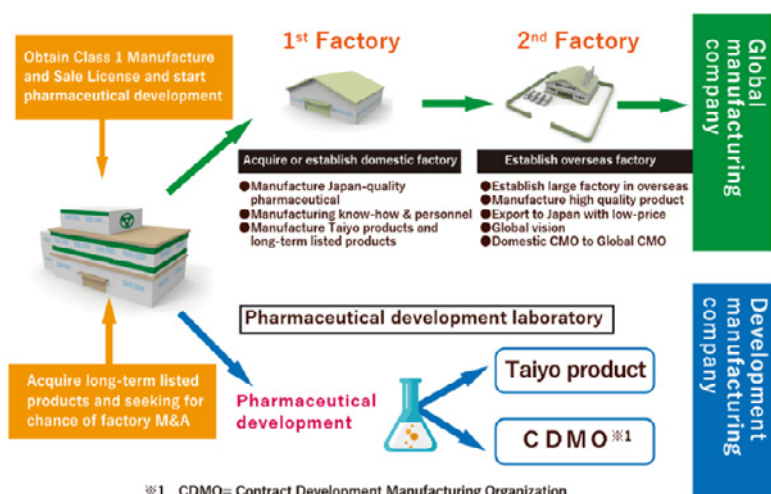
## Areas where the company should utilize its strengths

### Pharmaceutical Value Chain



Source: Company data

## Future plans



※1 CDMO= Contract Development Manufacturing Organization

Source: Company data

## Taiyo Holdings makes systems company a consolidated subsidiary

On April 6, 2018, the company announced that it had acquired all shares of Micro Network Technologies Corp. (MNT), making it a consolidated subsidiary. MNT develops software for many industries, from core systems to contracted development of smartphone apps. MNT runs a technology support business using its own systems engineers and a network design and construction business to provide services in the infrastructure realm for servers and networks. By making MNT a consolidated subsidiary, the company was able to establish an environment in which it can dispatch necessary IT personnel at the necessary time. The company also believes that it can increase the speed of new system construction as well as reform IT systems, important business topics for the company, through MNT.

### Overview of share acquisition

One external factor to the share acquisition is the chronic labor shortage for IT personnel. Internally, the company expects rising risks of malfunctions and higher maintenance and operational costs for both hardware and software as 20 years have passed since the company's last large-scale investment in its IT systems. The company identifies IT systems renovation and the construction of new systems as urgent needs.

### Impact expected from acquisition of systems company

At the company group, Taiyo Holdings expects to be able to promptly renovate IT systems and construct new systems, areas of importance for the business, and to acquire knowledge related to software, including IoT, big data, and AI, which had been lacking. At MNT, the company expects strengthened business foundation and proactive investments, as well as an improvement in sales value by acquiring operational knowledge of chemicals manufacturers.

### Overview of Micro Network Technologies Corp.

**Company information**  Micro Network Technologies 「人 × 社会 × 技術」 未来を想遣し “デザイン” する Global Gateway Company

Company	Micro Network Technologies Corp., (“MNT”)
Japanese	株式会社マイクロネットワークテクノロジーズ
Head Office	18F, Otemachi Financial City Grand Cube, 1-9-2 Otemachi Chiyoda-ku, Tokyo
Stockholders	Taiyo Holdings Co., Ltd. 100%
Capital	59,000 thousand yen
Established	March, 2013
Number of Employee	232 (193 engineers) *as of January 2018
Sales	1,240,810 thousand yen (FY17/7)
Company Description	Micro Network Technologies Corp. is a Japanese company that engages in software development, network systems design, and provision of system engineering services.



Source: Company data

## Business

### Business description

#### Growth drivers

The company's forerunner, Taiyo Ink Mfg., was established in 1953 as a manufacturer and marketer of printing ink. In 1970 Taiyo entered the resist ink field with its first shipment of etching resist products. In 1972 the company succeeded in developing an odorless solder resist using epoxy resin to replace the traditional melamine resin (which emitted formaldehyde when curing). The new product was rated highly for the hardness of the coating film and for being odorless. At the end of 1975 the company's UV curable solder resist (UVR-150G) passed the supplier evaluation of Sony Corp. (TSE1: 6758) and subsequently was adopted by Sony and other major electronics manufacturers including Toshiba Corporation (TSE2: 6502) and Matsushita Electronic Components Co., Ltd. (currently Panasonic Corp; TSE1: 6752), leading to a growth spurt for the company. In 1976, Taiyo decided to drastically shift its business strategy to make solder resist its core growth driver instead of printing ink.

**What is solder resist?** : Protects circuits by preventing shorts due to solder bridges by covering the portion of printed circuit (wiring) boards that do not have solder. In this case, the product is not removed after soldering, but is used as an insulating film. Green is a common color, but in recent years other colors have been used as well. Also known as SR or solder mask, varieties include LPSM (liquid photoimageable solder mask) and DFSM (dry film photoimageable solder mask).

The company leverages its execution speed (thanks to its independence), prowess in R&D and marketing, strategic foresight into technological requirement for end products, and rapid expansion in overseas operation, and has received supplier qualifications from multiple large client companies. As a result, for solder resist products, Taiyo has a global market share of over 50% (fairly high share in high-function products, and about half in general products). End products using solder resist include digital consumer electronics, flat-panel TVs, personal computers, semiconductors, smartphones, and automobiles. As use of these products has spread, there has been an increasing need for high-density mounting and improved reliability, and in response the company has been producing a widening variety of increasingly high-function solder resist.

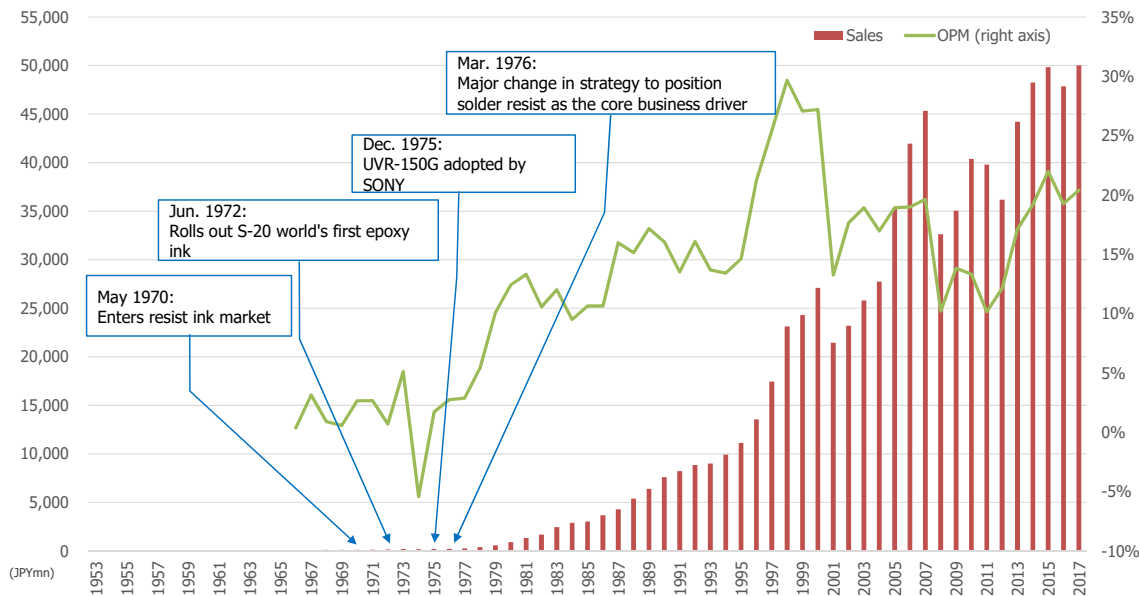
Taiyo has an extremely high market share for solder resist materials used to protect semiconductor package surfaces. However, the industry of package substrate materials for semiconductors is seeing rapid technological innovation, such as the FOWLP (Fan Out Wafer Level Package). A single misstep and the company could be easily left behind.

Solder resist will remain a growth driver, but there is diminishing scope for Taiyo to increase market share with just a single core product. CEO Eiji Sato recognizes the need to expand beyond solder resist to sustain long-term growth, and has been making preliminary moves to enter other businesses (solar power, food production, and pharmaceuticals). He spearheaded the acquisition of a competitor (Onstatic Technology Co., Ltd. or OTC, based in Taiwan) and an upstream company (Chugai Kasei Co., Ltd.), and also brokered a capital and business alliance with DIC. Still, the company does not yet know which business will become its second core earnings driver.

The new medium-term plan drafted by CEO Sato does not include sales or profit targets. Instead, it lays out base figures for margins and capital efficiency: OPM of at least 20%, ROE of at least 11%, DOE of at least 5%, and record high operating profit. By aggregating a number of businesses that meet these criteria, even if they are small, the company aims to create an organization resilient to economic fluctuations and unforeseen events.

CEO Sato says that the company works to develop proactive employees and sees that Taiyo's true growth driver is its employees. The company's history embodies the principle that "building things requires developing people." The company enjoys a high retention rate; in the company's Suzhou China subsidiary, only a few of its 250 employees leave every year and there is almost zero turnover at its Taiwan subsidiary.

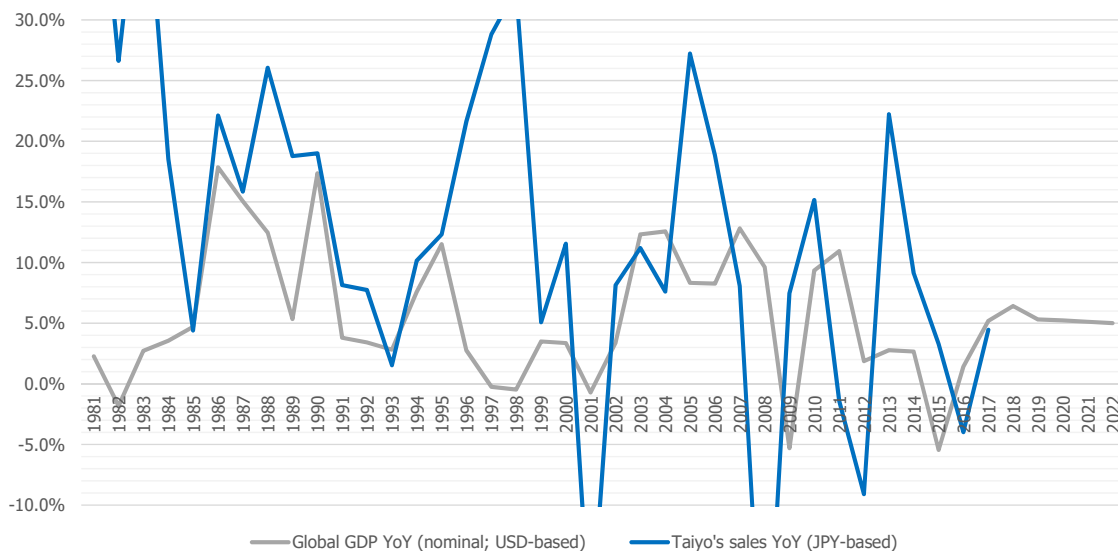
**Sales and OPM, major business shifts**



Source: Shared Research based on company data  
Note: Sales and OPM figures are for fiscal years (e.g., 2016 means FY03/17)

**Reference: correlation with macro indicators:** Plotting the company's YoY sales growth against nominal global GDP growth shows a high degree of correlation. When global GDP growth is positive the company's sales grow at roughly twice the rate of global GDP, and when growth is zero, sales fall by a multiple. The IMF forecasts global GDP growth from 2018 to 2022 to average over 5% per annum in nominal terms (over 3.5% in real terms). If the hypothesis holds, the company can expect sales growth of 7–10% per annum. (Note: the Market and value chain section later in this report discusses the correlation between the company's sales and Japanese companies' printed wiring board production, as well as global electronic information industry production.)

**YoY growth in Taiyo's sales and global GDP**



Source: Shared Research based on company materials and IMF data  
Note: Sales are for fiscal years (e.g., 2016 means FY03/17)



## Overview of key products

The company regularly reviews its product categorization based on sales. Currently, Taiyo divides products broadly into two groups: insulating materials for PWBs (printed wiring boards) and other related products. The company further breaks down PWB materials into four categories: rigid board materials, semiconductor package substrate materials, FPC (flexible printed circuit board) materials, and build-up wiring board materials. The company then further divides the rigid board category into high-function (PSR-4000 series) and general (such as the PSR-2000 series).

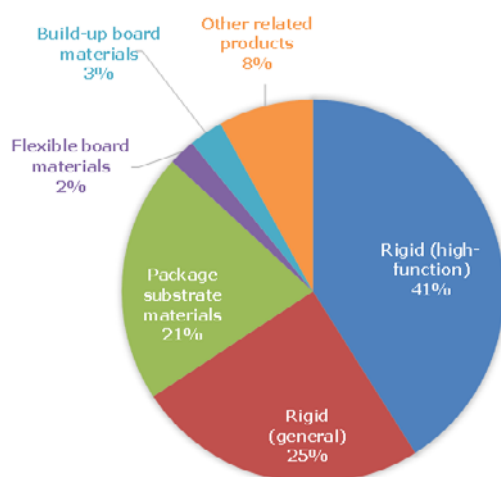
### Product classifications

Field	Category		Characteristics	Application
PWB insulating materials	Rigid	High-function	Liquid	SR materials for surface protection and insulation
		General		
	Package		Liquid, dry film	Build-up materials for interlayer insulation and hole-plugging
	Flexible		Liquid, dry film	
	Build-up		Liquid, dry film	
Other related products	Other		Liquid	Materials for marking, etching, and plating flux, solvent, conductive silver paste

Source: Shared Research based on company data

In FY03/18, rigid board materials accounted for 65.7% of sales (high-function 41.0%, general 24.7%). High-function rigid board materials are used mainly in high-end smartphones, Japanese cars, and tablets. General rigid board materials are used mainly in PCs, LCD TVs, office automation equipment, and industrial equipment.

### Sales by product (JPY52.2bn in FY03/18)



Source: Shared Research based on company data

Sales of package substrate materials exceeded JPY11.0bn, and are now a mainstay product accounting for 21.1% of sales. Over half of package solder resist sales are dry film, rather than liquid, and have the benefit of uniform thickness measured in microns. Dry film was originally supplied by DuPont (US), but when photoimageable solder resists emerged, there was no technology to affix the dry film to the substrates, so it was supplanted by liquid. Then, around 2000, vacuum laminators for IC card manufacturing emerged, and dry film became used in substrate production as well. At that time, Taiyo launched dry resist products, used in smartphones and tablets. Further, it moved quickly to mass produce a next-generation product (AUS SR1) following qualification by major semiconductor manufacturers. For Taiyo, dry film sales have grown faster than liquid, and have higher margins.

Recently, Apple Inc. (US) and other final-stage manufacturers often bypass midstream manufacturers to qualify components themselves. As such, component makers positioned closest upstream risk being left behind if they only meet the standards required by their direct customers. The key to success is constantly anticipating developments at the final-stage manufacturing level and emerging technology trends while enhancing marketing power.

Although FPC (flexible printed circuit) and build-up board materials account for only 2.2% and around 2.9% of sales respectively, they are showing fast growth in recent years. There are many FPC applications including smartphones, camera modules, and precision equipment, so it is a growth market, but competition is fierce and the company's market share is still low. The



company's build-up board materials are mainly used for plugging holes and have not yet penetrated the interlayer insulation market. Ajinomoto Fine-Techno Co., Inc., a wholly owned subsidiary of Ajinomoto Co., Inc. (TSE1: 2802), has a virtual monopoly in interlayer insulation materials, as it has made its product the de facto standard by being the first to acquire qualification from manufacturers. Taiyo is aware from its own experience of taking the leading share of the solder resist market how difficult it is to penetrate a stronghold such as this.

Flat panel display or FPD materials (conductive silver paste used in plasma display panel [PDP] TVs) sales peaked in FY03/12 at JPY12.3bn and have declined in recent years, so in FY03/17 the company included them in its other related products group. Product prices for PDP materials are linked to the price of silver, a raw material. The price of silver rose by a factor of seven, from USD4.9/Troy ounce in 2003 to USD35.2 in 2011. Accordingly, this pushed up the company's FPD sales in FY03/12. Still, even if sales expand, it is difficult to improve margins for this product.

The company does not disclose OPM by product, but from highest to lowest the order is estimated as package substrate materials, high-function rigid, and general rigid products. This order is the same as the company's global market share: package substrates have an extremely high market share, high-function rigid fairly high share, and general rigid at roughly half.

#### Taiyo's market share (estimates)

Field	Category	Application	Global market share	Main end products
PWB insulating materials	Rigid	High-function	Fairly high	Smartphones (high-end), cars (Japanese), tablets
		General	High (Around half)	PC, LCD TVs, electronic office equipment, industrial equipment
	Package		Extremely high	Semiconductors
	Flexible		Rather low	Smartphones, cameras, precision equipment, others
	Build-up		(Monopoly by Ajinomoto Fine-Techno)	Semiconductors

Source: Shared Research based on company data

#### Sales by product

Sales by product (JPYmn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
<b>Sales</b>	45,338	32,614	35,056	40,366	39,797	36,184	44,224	48,260	49,843	47,866	52,241
PWB insulated materials	33,603	25,918	27,961	29,937	26,727	27,997	38,225	44,474	46,318	44,700	48,041
Rigid board materials	25,392	19,911	21,250	22,993	20,289	20,262	29,235	33,539	35,242	33,216	34,342
High-function								18,676	20,230	20,211	21,429
General								14,863	15,012	13,005	12,913
Substrates and flexible board materials	6,886	5,107	5,600	5,685	5,416	6,763	7,965	9,844	10,007	10,348	12,197
Package substrates								9,401	9,376	9,676	11,029
Flexible boards								443	631	672	1,168
Build-up board materials	1,325	900	1,111	1,259	1,022	972	1,025	1,091	1,069	1,136	1,502
FPD materials	10,238	5,683	6,099	9,455	12,307	7,316	4,554	1,976	292		
Other related products	1,378	952	994	972	760	869	1,443	1,808	3,231	3,165	4,199
<b>% of sales</b>											
PWB insulated materials	74.1%	79.5%	79.8%	74.2%	67.2%	77.4%	86.4%	92.2%	92.9%	93.4%	92.0%
Rigid board materials	56.0%	61.1%	60.6%	57.0%	51.0%	56.0%	66.1%	69.5%	70.7%	69.4%	65.7%
High-function								38.7%	40.6%	42.2%	41.0%
General								30.8%	30.1%	27.2%	24.7%
Substrates and flexible board materials	15.2%	15.7%	16.0%	14.1%	13.6%	18.7%	18.0%	20.4%	20.1%	21.6%	23.3%
Package substrates								19.5%	18.8%	20.2%	21.1%
Flexible boards								0.9%	1.3%	1.4%	2.2%
Build-up board materials	2.9%	2.8%	3.2%	3.1%	2.6%	2.7%	2.3%	2.3%	2.1%	2.4%	2.9%
FPD materials	22.6%	17.4%	17.4%	23.4%	30.9%	20.2%	10.3%	4.1%	0.6%		
Other related products	3.0%	2.9%	2.8%	2.4%	1.9%	2.4%	3.3%	3.7%	6.5%	6.6%	8.0%
<b>YoY</b>	8.1%	-28.1%	7.5%	15.1%	-1.4%	-9.1%	22.2%	9.1%	3.3%	-4.0%	9.1%
PWB insulated materials	8.4%	-22.9%	7.9%	7.1%	-10.7%	4.8%	36.5%	16.3%	4.1%	-3.5%	7.5%
Rigid board materials	5.9%	-21.6%	6.7%	8.2%	-11.8%	-0.1%	44.3%	14.7%	5.1%	-5.7%	3.4%
High-function									8.3%	-0.1%	6.0%
General									1.0%	-13.4%	-0.7%
Substrates and flexible board materials	19.4%	-25.8%	9.7%	1.5%	-4.7%	24.9%	17.8%	23.6%	1.7%	3.4%	17.9%
Package substrates									-0.3%	3.2%	14.0%
Flexible boards									42.4%	6.5%	73.8%
Build-up board materials	6.3%	-32.1%	23.4%	13.3%	-18.8%	-4.9%	5.5%	6.4%	-2.0%	6.3%	32.2%
FPD materials	7.0%	-44.5%	7.3%	55.0%	30.2%	-40.6%	-37.8%	-56.6%	-85.2%		
Other related products	22.9%	-30.9%	4.4%	-2.2%	-21.8%	14.3%	66.1%	25.3%	78.7%	-10.2%	32.7%

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

Note: From FY03/17, FPD is included in Other related products

Note: Operating profit by product category not disclosed.

#### Liquid solder resist

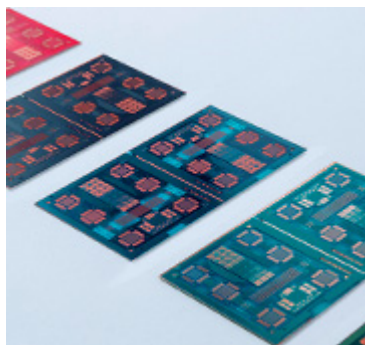


Source: Company data

#### Dry film solder resist

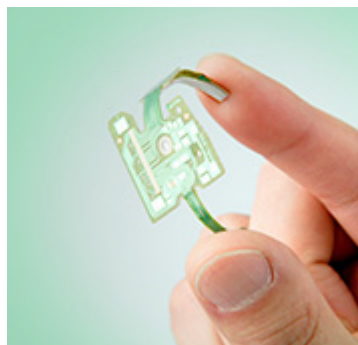


#### Rigid board

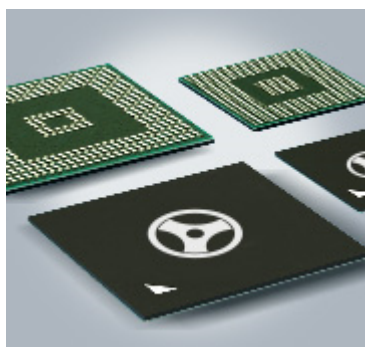


Source: Company data

#### Flexible printed circuit board

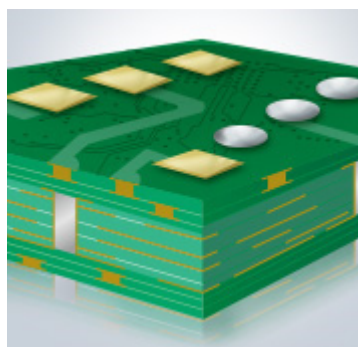


#### Semiconductor package substrate



Source: Company data

#### Build-up substrate



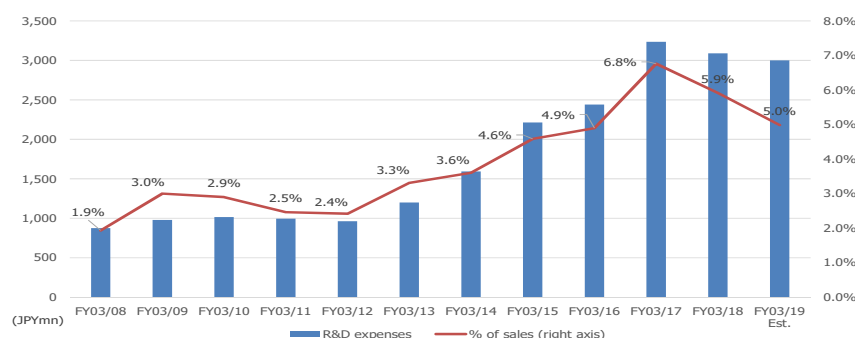
Other related products include marking, etching, and plating materials, flux, solvent, conductive silver paste, and FPD (flat panel display) materials. The company also has new businesses including solar power and food production. Sales from the acquisition of Chugai Kasei contributed around JPY1.1bn (11 months) in FY03/16 and JPY1.2bn (12 months) in FY03/17. Chugai Kasei makes and markets resins and pigments, so is more upstream than Taiyo. The company said Chugai Kasei's pigments are used in LCD color filters and recently have been used in aluminum exteriors for major brand smartphones. Taiyo acquired Chugai Kasei for its R&D capabilities.

Taiyo spent 2.4% of its sales on R&D in FY03/12, and has steadily increased this ratio every year to reach 6.8% in FY03/17 (5.9% in FY03/18). The company looks to spend at least 5% of sales on R&D while maintaining a high OPM and aims to build a structure where the fruits of its R&D efforts are efficiently used to launch products.

The company's subsidiary Taiyo Green Energy Co., Ltd., operates the solar power business, which is a stable source of earnings that generates sales of several tens of millions of yen per annum due to Japan's feed-in tariff (FIT) scheme, which is based on a system of purchasing all output at a fixed price.

On August 2, 2017, the company established a subsidiary, Taiyo Pharma Co., Ltd., to enter the pharmaceutical market. The company's internal project team is the core of the new company for now. On November 14, 2017, the company announced that it entered a contract for the transfer of marketing and manufacturing rights of 13 long-listed products from Chugai to Taiyo Pharma.

#### R&D expenses, % of sales



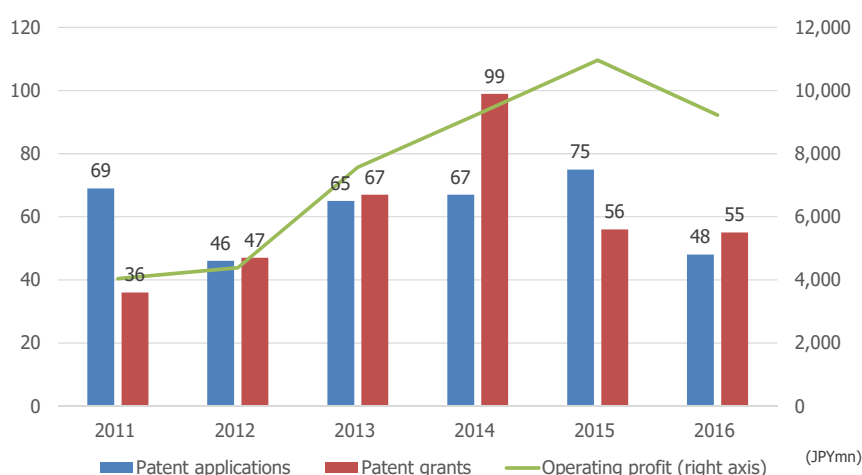
Source: Shared Research based on company data

## R&D and new development areas

### Patents and intellectual property strategy

Patents can be used to measure how effectively R&D results are being utilized in product launches. The company is focusing on patent acquisition, and employees who submit outstanding patents receive special bonuses. Having a web of patents enables the company to enter cross-licensing agreements with competitors, part of its intellectual property strategy. Looking at patent applications and approvals versus operating profit from 2011 until 2014 (see the following chart), patent approvals rose sharply and operating profit also increased (with a one- or two-year lag). Patent approvals have declined since a peak in 2014, but this seems to be due to the company strengthening its R&D capabilities through acquisitions and alliances, such as acquiring Chugai Kasei and entering an alliance with DIC.

#### Patent applications and acquisitions, and operating profit



Source: Shared Research based on company materials and interviews  
 Note: Aggregate number of patents for Taiyo Holdings and Taiyo Ink Mfg.  
 Note: OP figures are for fiscal years (e.g., 2016 means FY03/17)

Acquiring patents under the intellectual property strategy prevents other companies from obtaining the patent rights. The following box shows extracts of a survey by Patent Result Co., Ltd., a patent analysis company. Ajinomoto Fine-Techno, a

subsidiary of Ajinomoto Co., Inc. (TSE1: 2802), has a virtual monopoly in interlayer insulation materials used in build-up substrates. The difficulty of breaching this stronghold is underscored by the survey.

Based on its own food industry classifications, Patent Result compiled a 2016 ranking of food companies by their ability to prevent other companies from obtaining patent rights in patent review process. Patent Result compiled cases where existing patents by other companies were reasons to reject patent applications in 2016. The data clearly show which companies hold numerous leading-edge technologies as competitors work to secure rights for recent technological developments. In order of number of citations, the 2016 rankings were: 1) Ajinomoto (353 cases), 2) Kirin Holdings Co., Ltd. (243), and 3) Meiji Holdings Co., Ltd. (183). Ajinomoto's most cited patent was that for a resin composition used in multilayer printed wiring boards (Patent No. 5786327), and was the reason for rejection in 10 cases, including four for Sumitomo Bakelite and two for Taiyo Ink Mfg. Another patent often cited was No. 5596902 regarding production of metabolites using bacteria. The companies most affected by Ajinomoto's patents in 2016 were Kao Corporation and CJ Cheiljedang Corporation (South Korea) with nine cases each, followed by Hitachi Chemical Co., Ltd. and Kirin Holdings (eight cases each).

Source: Patent Result website

## R&D activities

According to the company's FY03/17 annual securities report, Taiyo's R&D focus areas and results are as follows.

### Solder resist

Key focus areas in rigid board materials

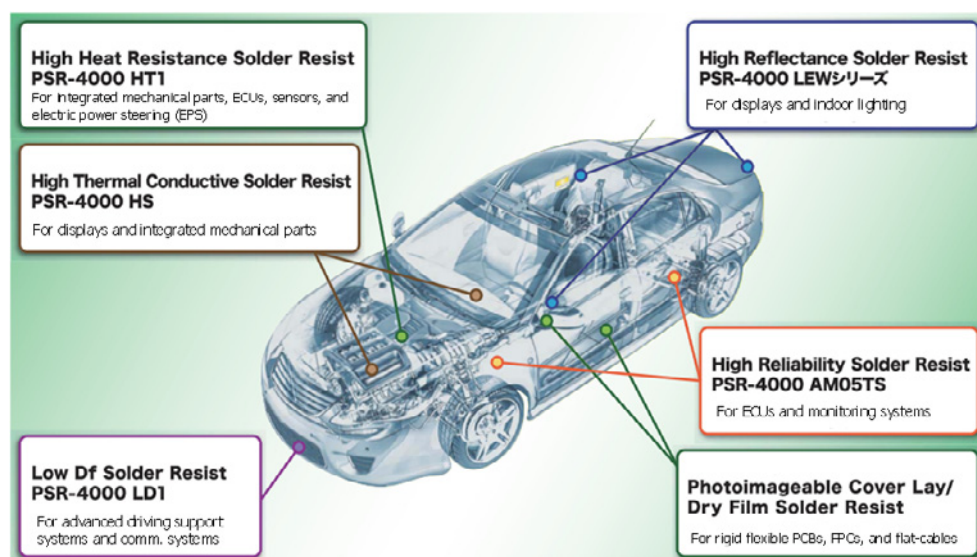
HDI (High Density Interconnection) substrates used in smartphones

The adoption of the MSAP (Modified Semi-Additive Process) as a method for manufacturing HDI substrates sparked demand for greater-than-ever positioning accuracy, making direct imaging exposure systems using digital exposure mainstream. Also, at the request of large smartphone manufacturers, colors for solder resist used in HDI substrates other than green, such as black and blue, are being used. The Taiyo Group has also been developing high-function solder resist in these colors that can work with direct imaging exposure systems. Shared Research understands that many large manufacturers including Apple and Samsung have adopted it.

### Automotive substrates

There is demand for increasingly diverse characteristics in solder resist for automotive substrates with the emergence of hybrid and electric vehicles. Automotive substrate solder resist must withstand harsh conditions, and its performance in high temperatures is particularly important. The company was able to produce the desired characteristics in solder resist by improving the resin composition. Currently, Taiyo is working toward qualification by the end customer of next-generation solder resist for automotive substrates. The company's solder resist is in wide use after receiving qualification from Japanese automakers, but non-Japanese auto manufacturers have yet to increase uptake. The product life of automobiles is around 10 years, and safety is paramount, so once a product is qualified there is little room for other companies to supply their product.

### Automotive solder resist



Source: Shared Research based on company data

### Solder resist for package substrates

The company's solder resist for package substrates is commonly used in CSPs (chip scale packages) for SSD memory media as well as memory and application processors for smartphones. The reliability of connections between semiconductor chips and package substrates is an important element in solder resist for package substrates, and demand for dry film is growing each year due to its superior smoothness. Following are specific examples of product development.

- I. The company developed a matte finish for the solder resist surface in dry film, which was thought to be difficult. It is working to acquire customer qualification.
- II. The company is developing solder resist that can be used in a variety of sensor types.
- III. The company is developing solder resist that can effectively dissipate heat generated in the components where it is mounted, which customers are currently evaluating.
- IV. The company is developing a new solder resist suitable for high-speed telecommunications substrates, which require accurate signal transmission.

### Interlayer insulating material

- I. The company has developed a dry film interlayer insulating material used in package substrates, and has made concerted approaches to customers in the Chinese market. Customer evaluation is currently in progress.
- II. The company is evaluating material for use in passive components as a new market, and is working on uptake among customers.
- III. As an interlayer insulating material, the company is developing not just dry film but a film with copper foil that can meet new customer needs.

### Photoimageable coverlay

Amid the trend to make smaller and lighter smartphones and tablets, the internal space where circuit boards are installed is shrinking, leading toward growth in demand for soft, flexible substrates and away from the traditional rigid substrates that predominated. The Taiyo Group has developed photoimageable coverlay to simultaneously meet market needs for mechanical properties such as fine processing, heat resistance, and flexibility.

### Conductive adhesives

The company developed anisotropic conductive adhesives, which can be cured quickly at low temperatures, for bonding substrates used in devices such as smartphones and tablets. Using soldering powder in the conductive particles gives greater



bonding reliability, and altering the solder powder's particle diameter enables it to deal with the shift to fine pitch. The company has also developed a product that bonds at lower temperatures for materials that are not as heat-resistant.

#### Materials for wearable devices

The market for wearable devices has spread beyond accessories such as smart watches and smart glasses, to those that come in direct contact with the body such as activity-measuring devices and conducting textiles used in sports and health care, and biosensors used in medical equipment such as electronic skin devices. As wearable devices are used in close contact with the body, materials used not only need to be flexible, but also stretchable. The company is developing such stretchable conductive materials.

#### Inkjet solder resist

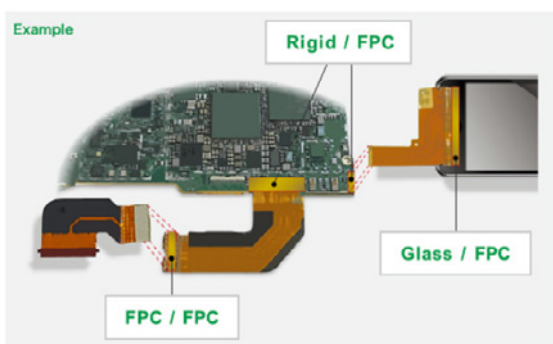
The company has developed solder resist for inkjet coating machines, and is conducting assessments with inkjet coating machine manufacturers and customers. Solder resist coating using inkjet coaters is an environmentally friendly way to manufacture substrates. It shortens the drying, exposure, and developing processes, and enables selective coating of necessary areas in a limited space. The company is developing applications other than for solder resist with the same equipment, including plating and etching resist materials, insulating materials for QFPs (Quad Flat Packages), and flexible materials.

#### Photoimageable overlay

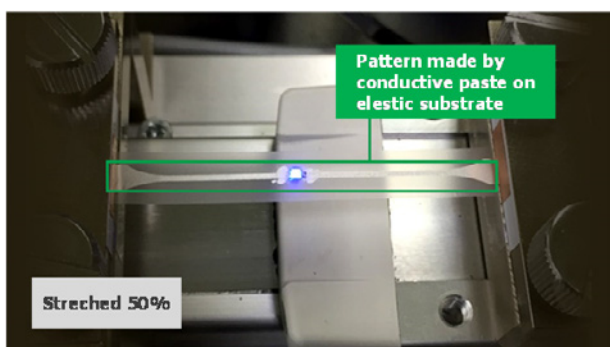


Source: Shared Research based on company data

#### Anisotropic conductive adhesive

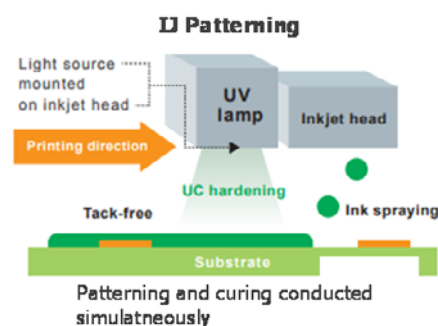


#### Stretchable conductive paste



Source: Shared Research based on company data

#### Inkjet solder resist



## Sales by region

Trends in the company's sales by region over the past decade can be summed up by "shift to China." This coincides with the period where China emerged as the world's electronics workshop. Taiyo purchased Taiwan's OTC (Onstatic Technology Co., Ltd.) in May 2013 and made it a consolidated subsidiary. Following this, the company's sales to China (external customers) grew from 29.5% of the total (FY03/13) to 36.6% (FY03/14), and subsequently reached 41.6% of total sales in FY03/17. This does not mean domestic sales are declining. Domestic sales are still nearly 20% of sales as the company focuses on high-function rigid board materials, package substrate materials, and new materials. OPMs have stayed in the 20% range in China and Taiwan over the past few years (except for Taiwan in FY03/17, which was 14.9%). Note: the company discloses three types of figures for sales by region: external sales only, inter-segment sales or transfers, and regional sales (see the company's annual securities report for details).

## FY03/18 earnings by segment (by region)

Sales to external customers by region: Japan, JPY10.2bn (+7.7% YoY, 19.5% of total); China, JPY21.1bn (+5.7%, 40.3%); Taiwan, JPY6.4bn (+5.7%, 12.3%); South Korea, JPY9.8bn (+15.5%, 18.7%); and Others, JPY4.8bn (+21.4%, 9.2%).

Sales by region including intragroup sales: Japan, JPY19.8bn (+10.5% YoY, 30.1% of total); China, JPY21.5bn (+4.5%, 32.8%); Taiwan, JPY9.1bn (-9.2%, 13.9%); South Korea, JPY10.3bn (+16.4%, 15.6%); and Others, JPY5.0bn (+22.2%, 7.6%).

Operating profit by region: Japan, JPY3.4bn (+68.2% YoY); China, JPY4.6bn (+0.4%); Taiwan, JPY1.8bn (+23.8%); South Korea, JPY1.7bn (+30.4%); and Others, JPY514mn (-3.7%).

OPM by region: Japan, 17.2%; China, 21.4%; Taiwan, 20.3%; South Korea, 16.2%; and Others, 10.3%.

## Segment information (by region)

Segments (regions) (JPY mn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
<b>Sales</b>	45,338	32,614	35,056	40,366	39,797	36,184	44,224	48,260	49,843	47,866	52,241
Japan	26,866	18,970	20,379	18,491	11,787	13,065	14,005	15,786	17,002	17,917	19,807
China	30,804	21,596	10,361	11,911	10,636	10,834	17,791	20,421	21,820	20,618	21,539
Taiwan			4,083	4,414	3,706	3,936	8,398	9,614	9,854	10,042	9,116
South Korea			10,241	13,743	16,668	11,722	10,599	9,199	7,739	8,825	10,271
Others	1,419	1,205	2,972	3,061	2,618	2,854	3,524	4,140	4,451	4,076	4,979
Eliminations, company-wide expenses	-13,751	-9,157	-12,980	-11,254	-5,618	-6,227	-10,093	-10,900	-11,023	-13,612	-13,471
<b>% of sales</b>											
Japan	45.5%	45.4%	42.4%	35.8%	26.0%	30.8%	25.8%	26.7%	27.9%	29.1%	30.1%
China	52.1%	51.7%	21.6%	23.1%	23.4%	25.5%	32.8%	34.5%	35.8%	33.5%	32.8%
Taiwan			8.5%	8.6%	8.2%	9.3%	15.5%	16.3%	16.2%	16.3%	13.9%
South Korea			21.3%	26.6%	36.7%	27.6%	19.5%	15.5%	12.7%	14.4%	15.6%
Others	2.4%	2.9%	6.2%	5.9%	5.8%	6.7%	6.5%	7.0%	7.3%	6.6%	7.6%
<b>YoY</b>	8.1%	-28.1%	7.5%	15.1%	-1.4%	-9.1%	22.2%	9.1%	3.3%	-4.0%	9.1%
Japan	2.6%	-29.4%	7.4%	-9.3%	-36.3%	10.8%	7.2%	12.7%	7.7%	5.4%	10.5%
China	17.2%	-29.9%	-52.0%	15.0%	-10.7%	1.9%	64.2%	14.8%	6.9%	-5.5%	4.5%
Taiwan				8.1%	-16.0%	6.2%	113.4%	14.5%	2.5%	1.9%	-9.2%
South Korea				34.2%	21.3%	-29.7%	-9.6%	-13.2%	-15.9%	14.0%	16.4%
Others	-18.4%	-15.1%	146.6%	3.0%	-14.5%	9.0%	23.5%	17.5%	7.5%	-8.4%	22.2%
<b>Operating profit</b>	8,896	3,332	4,843	5,380	4,040	4,385	7,568	9,254	10,964	9,221	11,337
Japan	2,275	15	600	1,013	989	1,685	1,906	2,466	2,254	2,026	3,408
China	6,301	3,059	2,463	2,813	1,751	1,584	2,617	3,507	4,775	4,582	4,602
Taiwan			644	510	470	497	1,427	1,763	2,227	1,492	1,847
South Korea			988	979	649	591	1,073	1,212	1,414	1,275	1,663
Others	267	190	129	238	272	323	453	555	597	534	514
Eliminations, company-wide expenses	51	66	19	-173	-91	-295	92	-249	-303	-688	-697
<b>YoY</b>	11.7%	-62.5%	45.3%	11.1%	-24.9%	8.5%	72.6%	22.3%	18.5%	-15.9%	22.9%
Japan	8.3%	-99.3%	3900.0%	68.8%	-2.4%	70.4%	13.1%	29.4%	-8.6%	-10.1%	68.2%
China	13.4%	-51.5%	-19.5%	14.2%	-37.8%	-9.5%	65.2%	34.0%	36.2%	-4.0%	0.4%
Taiwan				-20.8%	-7.8%	5.7%	187.1%	23.5%	26.3%	-33.0%	23.8%
South Korea				-0.9%	-33.7%	-8.9%	81.6%	13.0%	16.7%	-9.8%	30.4%
Others	3.5%	-28.8%	-32.1%	84.5%	14.3%	18.8%	40.2%	22.5%	7.6%	-10.6%	-3.7%
<b>OPM</b>	19.6%	10.2%	13.8%	13.3%	10.2%	12.1%	17.1%	19.2%	22.0%	19.3%	21.7%
Japan	8.5%	0.1%	2.9%	5.5%	8.4%	12.9%	13.6%	15.6%	13.3%	11.3%	17.2%
China	20.5%	14.2%	23.8%	23.6%	16.5%	14.6%	14.7%	17.2%	21.9%	22.2%	21.4%
Taiwan			15.8%	11.6%	12.7%	12.6%	17.0%	18.3%	22.6%	14.9%	20.3%
South Korea			9.6%	7.1%	3.9%	5.0%	10.1%	13.2%	18.3%	14.4%	16.2%
Others	18.8%	15.8%	4.3%	7.8%	10.4%	11.3%	12.9%	13.4%	13.4%	13.1%	10.3%
<b>Depreciation</b>			1,261	1,127	1,046	1,003	1,181	1,411	1,891	2,485	2,284
Japan			848	524	284	193	242	398	832	1,068	914
China			181	167	164	186	210	237	288	252	253
Taiwan			122	128	132	149	193	207	189	474	125
South Korea			86	90	82	103	203	154	134	118	142
Others			23	16	13	12	15	14	16	93	393
Eliminations, company-wide expenses			0	199	368	357	316	399	429	479	454
<b>Increase in tangible and intangible fixed assets</b>			445	527	682	605	2,555	3,321	4,055	1,722	22,513
Japan			170	151	140	164	1,266	2,033	2,586	526	542
China			16	107	99	97	275	414	348	272	250
Taiwan			66	127	80	91	171	98	94	48	110
South Korea			189	61	178	154	443	108	74	98	123
Others			3	16	1	10	10	16	8	20	21,109
Eliminations, company-wide expenses			0	61	182	86	388	649	941	756	375
<b>Number of employees</b>	775	793	807	840	861	858	1,148	1,122	1,202	1,249	
Avg. temporary employees (not included in above)	123	61	-	-	-	-	-	-	-	-	
Japan				222	219	207	238	232	302	326	
China				274	290	298	464	437	422	418	
Taiwan				108	107	111	224	223	234	249	
South Korea				102	108	111	114	108	118	124	
Others				41	40	39	41	42	46	47	
Company-wide				93	97	92	67	80	80	85	
<b>Sales per employee</b>	50.5	38.2	43.4	48.1	46.2	42.2	38.5	43.0	41.5	38.3	
<b>Operating profit per employee</b>	9.9	3.9	6.0	6.4	4.7	5.1	6.6	8.2	9.1	7.4	

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

Note: FY03/09 and FY03/10 sales figures for China are those for Asia including Taiwan and South Korea.

## Key manufacturing locations, capex, and utilization by product (as of end-FY03/18)

The company's principal manufacturing site is located in Ranzan (Hiki-gun, Saitama Prefecture), where it manufactures high-function rigid solder resist products, package substrate materials, and new products. The location has a technological development building and serves as the company's R&D center. The head office has also been relocated to Ranzan.



In order to avoid risks of concentrating domestic production, the company completed another plant, the Kitakyushu Plant, in September 2015 (investment of roughly JPY3.6bn, annual capacity of 1,500 tons of liquid materials, 2.8mn sqm dry film, and expected IRR of 15.4%). The aim was to disperse geographic risk from a BCP (business continuity planning) viewpoint, reducing risk of earthquakes and other disasters, and to be closer to key shipment destinations such as China and South Korea.

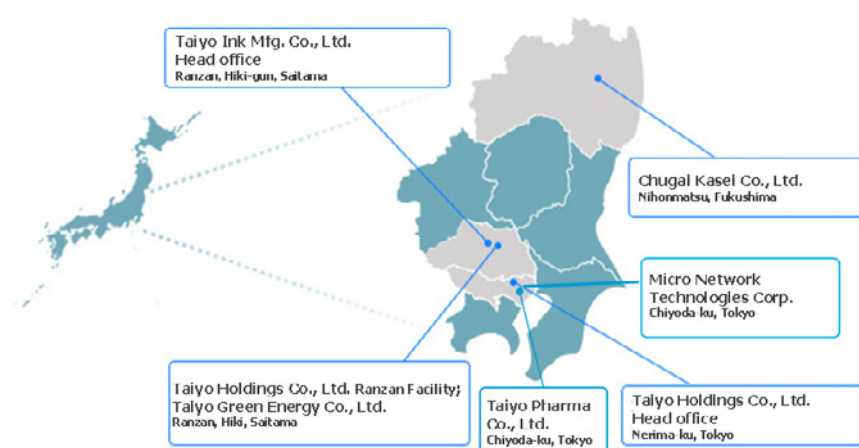
Subsidiary Taiyo Green Energy has completed a mega-solar project with an investment of roughly JPY400mn (expected IRR: 5.1%). The company has also started cultivating vegetables at a plant factory. Taiyo aims to retain employees by improving the work environment and offering attractive benefits, such as employee cafeterias at three locations and a daycare center in Japan.

From FY03/16, Chugai Kasei became a consolidated subsidiary, bringing with it its Nihonmatsu Factory and Urawa Factory as well as R&D facilities. The subsidiary makes and markets dyes (for textiles and leather), functional colorings such as pigments, and specialty chemicals.

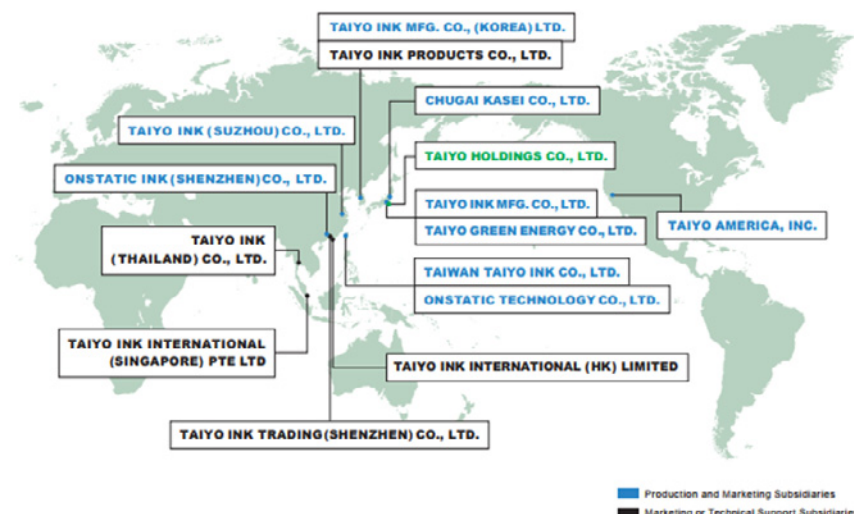
Capex in Japan: JPY1.3bn in FY03/14; JPY2.0bn in FY03/15; JPY2.6bn in FY03/16; JPY526mn in FY03/17; and JPY542mn in FY03/18.

The company's main production facilities overseas are in China (Suzhou), Taiwan, South Korea, and the US (Nevada). Overseas, Taiyo mainly produces high-function rigid products, general rigid products, and customized solder resist products.

#### Domestic locations



#### Overseas locations



Source: Shared Research edited based on company data

#### Forex impact

Half of the company's overseas sales are denominated in US dollars and half in local currencies. Taiyo estimates the full-year impact of a JPY1/USD change in forex rates at over JPY380mn for sales and JPY180mn for operating profit. It said the impact of

forex on earnings was increasing because overseas sales of domestically produced high-function rigid and semiconductor materials are taking up an increasing portion of total sales.

Taiyo has shifted its production of general solder resist overseas and is working to procure raw materials locally. The company has confined its package substrate material production to Japan to avoid the risk of being copied by overseas competitors.

Even if exchange rates and raw material prices (excluding silver) fluctuate, Taiyo's earnings are not affected. This is because the company's products are core components and it has the leading market share, particularly for high-function rigid products, meaning it can set prices to be relatively stable due to qualification from final-stage manufacturers and midstream board manufacturers.

Determinants of forex impact as follows.

Share of sales in foreign currencies: about 80%

Share of expenses in foreign currencies: about 50%

Main reasons foreign currency expenses have a smaller share than sales:

1) Advanced R&D is carried out in Japan

2) Advanced products are manufactured in Japan

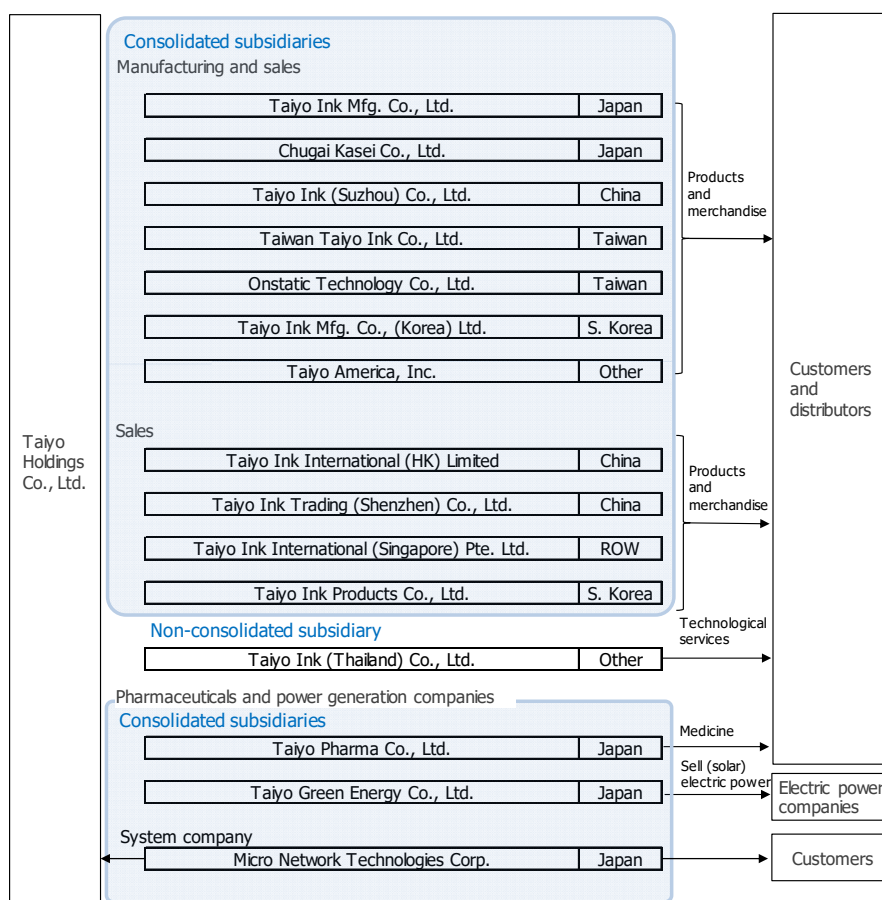
Forex: transactions occur primarily in USD and CNY, but also in other currencies (KRW, NTD, HKD). As currency movements (versus JPY) are primarily from currencies that fluctuate in line with the US dollar, forex sensitivity is calculated using just USD.

Source: Shared Research based on company interviews

## Main group companies (as of May 2018)

The Taiyo Group consists of Taiyo Holdings (the company), 17 subsidiaries, and one affiliate. In May 2013 Taiyo purchased its Taiwanese competitor OTC (Onstatic Technology Co., Ltd.) and in June 2015 it acquired Chugai Kasei Co., Ltd., making them consolidated subsidiaries. In December 2014 the company established Taiyo Green Energy Co., Ltd., a solar power generation subsidiary, and in August 2017 established Taiyo Pharma Co., Ltd., a subsidiary to develop and market drugs, to set up new businesses in these areas. In April 2018, the company acquired all shares of Micro Network Technologies Corp (MNT), making it a consolidated subsidiary.

## Major subsidiaries



Source: Shared Research based on company data

## Fundamental technologies

### Technology sources, origin

Taiyo started out as a manufacturer and marketer of black ink for letterpress printing. Major ink makers, who are also pigment manufacturers, did not produce carbon, the key ingredient in black ink. As such, in raw materials it was possible for the company to compete with these large ink manufacturers just with technical ability and product quality. The company's first encounter with resist ink (the forerunner of solder resist) was in July 1963. At that time, a user of Taiyo's plate-making chemicals, Fuji Gosei Kagaku Kenkyujo, made a request for acid resistant ink. The request was for Mylar film to be immersed in concentrated sulfuric acid at 80 degrees Celsius, with only the printed area not dissolved. Manufacturing ink and solder resist are similar in many ways, as they involve taking a wide variety of fine powder materials, mixing them with solvents or resins, kneading, and homogenizing. Expertise and fundamental technologies from these products can be applied to other areas.

There are several hundred varieties of solder resist. As such, Taiyo handles multiple products, operating end-to-end production processes from raw material procurement through shipment. The basic manufacturing expertise is in compounding (formulation) and dispersion techniques. The manufacturing process entails weighing and inputting 10 to 20 varieties of raw materials in line with the formulation prescription, pre-mixing in a mixer, using a rolling mill to make the product finer and more homogenous, and finally packaging the product. Using different materials changes the insulation, conductivity, adhesion, heat conduction, UV curing, and thermosetting functions.

The company's raw materials are fine powder particles with a diameter of a few microns. While the uses differ, powder particles are handled similarly to those in pharmaceutical and cosmetic manufacturing. Fuji Film Corporation, the subsidiary of Fujifilm Holdings Corp. (TSE1: 4901), saw some success in the pharmaceutical and cosmetics industries because it had the base

technologies and the core technologies and manufacturing expertise gained from its manufacture of silver halide photographic film. Similarly, Taiyo is aiming to enter the pharmaceutical industry by leveraging its existing competencies.

The company acquired Chugai Kasei for its R&D capabilities. Chugai Kasei develops and manufactures functional pigments including dyes for electronic materials, photosensitive dyes, and specialty pigments. By having a company further upstream under its corporate umbrella, Taiyo has widened its business territories.

#### Fundamental technologies

##### Taiyo Group Accumulated Technology

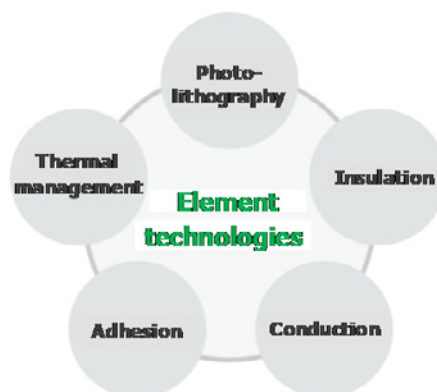
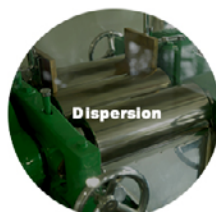


#### Formulation Technology

"Formulation Technology" refers to the accurate, efficient, and prompt development of the optimal combination of materials from amongst countless prospective candidates (e.g. synthetic resins, fillers, etc.) in order to achieve the various characteristics and performance required by products.

#### Mixing and Dispersion Technology

"Mixing and Dispersion Technology" refers to the manufacture of uniformly-dispersed and precisely-balanced ink formulations. In recent years, in conjunction with the ever-decreasing size of electronics, finer ink dispersions have become increasingly more critical and required.



Source: Shared Research based on company data

## Comparison with similar and benchmark companies

### A shift in comparable companies, as Taiyo is on the brink of a third growth period

As Taiyo shifts from its second to third growth phase, it should be compared against a different set of companies. During its second growth phase, Taiyo changed course and narrowed its focus to the solder resist industry. Investors who favor growth were interested in Taiyo due to it being an innovation stock and involved in basic materials. An innovation stock is one that creates a market through business renewal and is a leading company in its niche area. In Japan, many of these are upstream (resources and raw materials) companies. Over the past three years Taiyo has had an OPM of around 20%, and at the same time both sales and operating profit were growing by double digits. After the company became the market share leader in the solder resist industry, profit growth rates have plateaued. Still, the company is on the brink of a third growth spurt in light of the aggressive M&A, tie-up with DIC, and move into different business fields spearheaded by CEO Sato.

### Similar companies to the current Taiyo

Similar companies to Taiyo during its second growth phase include JCU (TSE: 4975), Japan Pure Chemical (TSE: 4973), and MEC (TSE: 4971). Each of these companies is in an upstream industry, has one core product, high margins, and an electronic material product with a leading market share. Compared with Taiyo, which is already poised to move into its third phase, these companies are still growing, with relatively shorter histories and lower sales.

## Comparison with similar companies

	Taiyo Holdings (4626)			JCU (4975)			Japan Pure Chemical (4973)			MEC (4971)		
Income statement (JPYmn)	FY03/16	FY03/17	FY03/18	FY03/16	FY03/17	FY03/18	FY03/16	FY03/17	FY03/18	FY03/16	FY03/17	FY12/17
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Parent	Parent	Parent	Cons.	Cons.	Cons.
<b>Sales</b>	<b>49,843</b>	<b>47,866</b>	<b>52,241</b>	<b>19,818</b>	<b>20,760</b>	<b>23,120</b>	<b>8,429</b>	<b>8,229</b>	<b>10,668</b>	<b>9,078</b>	<b>9,259</b>	<b>9,641</b>
YoY	3.3%	-4.0%	9.1%	0.1%	4.8%	11.4%	-11.8%	-2.4%	2.9%	0.2%	2.0%	
<b>Operating profit</b>	<b>10,964</b>	<b>9,221</b>	<b>11,337</b>	<b>4,906</b>	<b>5,500</b>	<b>6,948</b>	<b>957</b>	<b>900</b>	<b>1,078</b>	<b>2,185</b>	<b>1,887</b>	<b>1,993</b>
YoY	18.5%	-15.9%	22.9%	6.5%	12.1%	12.7%	-13.7%	-6.0%	4.4%	8.8%	-13.6%	
OPM	22.0%	19.3%	21.7%	24.8%	26.5%	30.1%	11.4%	10.9%	10.1%	24.1%	20.4%	20.7%
<b>Recurring profit</b>	<b>11,129</b>	<b>9,202</b>	<b>11,199</b>	<b>4,926</b>	<b>5,502</b>	<b>6,972</b>	<b>1,047</b>	<b>1,002</b>	<b>1,179</b>	<b>2,207</b>	<b>1,888</b>	<b>2,063</b>
YoY	16.8%	-17.3%	21.7%	1.9%	11.7%	11.8%	-10.9%	-4.3%	2.7%	3.7%	-14.5%	
RPM	22.3%	19.2%	21.4%	24.9%	26.5%	30.2%	12.4%	12.2%	11.1%	24.3%	20.4%	21.4%
<b>Net income attributable to owners of parent</b>	<b>7,796</b>	<b>6,398</b>	<b>4,856</b>	<b>3,410</b>	<b>4,124</b>	<b>4,906</b>	<b>708</b>	<b>716</b>	<b>829</b>	<b>1,514</b>	<b>1,642</b>	<b>1,567</b>
YoY	16.9%	-17.9%	-24.1%	6.4%	20.9%	9.1%	-7.8%	1.1%	1.9%	12.7%	8.4%	
Net margin	15.6%	13.4%	9.3%	17.2%	19.9%	21.2%	8.4%	8.7%	7.8%	16.7%	17.7%	16.3%
Per share data (JPY)												
EPS	338.0	266.4	168.6	120.9	147.6	176.3	121.3	124.4	144.1	76.3	84.4	81.8
Dividend per share	110.0	120.1	160.2	120.0	130.0	85.0	80.0	80.0	80.0	18.0	20.0	22.0
Payout ratio	32.5%	45.1%	95.0%	24.8%	22.0%	24.1%	65.9%	64.3%	55.5%	23.6%	23.6%	26.9%
DOE	6.2%	5.5%	6.4%	5.8%	5.4%	5.7%	5.4%	5.2%	4.5%	2.9%	3.0%	3.1%
Book value per share	1,865.9	2,469.0	2,521	553.7	661.1	823.7	1,443.2	1,649.9	1,911.2	632.4	683.9	760.9
Balance sheet (JPYmn)												
Total assets	65,464	92,386	111,490	22,208	26,095	32,266	9,619	11,153	13,420	15,715	17,993	19,247
Net assets	45,250	71,846	73,023	15,704	18,457	22,996	8,494	9,548	11,101	12,250	13,110	14,587
Cash flow statement (JPYmn)												
Cash flows from operating activities	10,546	9,042	8,100	3,123	4,847	5,255	650	478	699	1,796	1,633	1,591
Cash flows from investing activities	-6,750	-1,063	-24,161	-1,057	-1,579	-1,061	-69	-44	27	-1,372	-2,461	-832
Cash flows from financing activities	-2,740	20,342	11,319	-1,510	-1,188	-870	-454	-676	-430	-912	1,128	-885
Financial ratios												
Cash and cash equivalents	18,385	46,661	41,816	6,799	8,764	12,234	4,039	3,797	4,093	3,422	3,723	3,664
ROA (RP-based)	17.6%	11.7%	11.0%	22.5%	22.8%	23.9%	10.3%	9.7%	9.6%	14.5%	11.2%	11.1%
ROE	19.0%	11.2%	6.8%	23.4%	24.3%	23.7%	8.1%	8.0%	8.1%	12.5%	13.0%	11.3%
Equity ratio	65.9%	76.9%	65.2%	70.4%	70.5%	71.1%	87.6%	85.0%	82.0%	78.0%	72.9%	75.8%
Per employee data (JPYmn)												
Number of employees	1,202	1,249		528	544		51	47		320	342	
Avg. temporary employees (not included in above)				11	15		6	6				
Sales per employee	41.5	38.3		36.8	37.1		147.9	155.3		28.4	27.1	
Operating profit per employee	9.1	7.4		9.1	9.8		16.8	17.0		6.8	5.5	
Other												
R&D expenses	2,441	3,235	3,089	1,145	1,075		235	220		798	902	
% of sales	4.9%	6.8%	5.9%	5.8%	5.2%		2.8%	2.7%		8.8%	9.7%	
Established	September 1953			April 1968			July 1971			May 1969		

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

## Benchmark companies

Taiyo benchmarks itself against companies that represent its near-term future, such as Nissan Chemical Industries Ltd. (TSE1: 4021) and Nippon Kayaku Co., Ltd. (TSE1: 4272). Both of these are in the chemical industry and have a history of over 100 years, sales of more than three times that of Taiyo, high R&D-to-sales ratios and OPMs, and several major sources of earnings such as pharmaceuticals. Both have lasted for more than 100 years, one of Taiyo's goals, and are also prime examples of where the company hopes to see itself in the future.

## Companies Taiyo looks to as examples

Taiyo is just starting to transition from a leading company in a niche area to a comprehensive chemicals manufacturer. That said, being a member of the DIC group positions Taiyo at roughly fifth in the chemical industry, in line with Asahi Kasei Corp. (TSE1: 3407) and Nitto Denko Corp. (TSE1: 6988). We will see whether CEO Sato can use its alliance with DIC to grow the company, similar to how Intel and Microsoft grew thanks to alliances with IBM.

CEO Sato says there is much to learn from overseas companies. Regarding human resources, he looks at the way 3M Company (US) treats its employees (refer to the comments in the following box). Further, in order to anticipate the direction of final demand, the company looks at the business development of upstream materials companies and downstream companies such as Google and Apple, and aims to enhance its marketing strategies to reach these companies.

3M is a long-established company known for numerous innovative products including Post-it® Notes and Scotch® Tape. The hit-producing company has a "15% culture," under which engineers can spend up to 15% of their working hours studying a field of interest. The company also has management indicators such as new products' share of total sales and numerous other value creating arrangements. The company's technological capabilities can be seen in the sheer number of products it handles (currently around 55,000 types). 3M has roughly 90,000 employees worldwide, around 8,300 in R&D, which gives a good indication of how many products the company develops. 3M's policies and track record are also widely lauded, and in Booz & Co.'s 2013 Global Innovation 1000 Study, 3M was ranked fifth, following the renowned companies of Apple, Google, Samsung (South Korea), and Amazon. Of these top five companies, only 3M has a history of over 100 years.

Source: HR Tech, 3M Japan

## Benchmark companies

FY (consolidated) Income statement (JPYmn)	Taiyo Holdings (4626)			Nissan Chemical (4021)			Nippon Kayaku (4272)		
	FY03/16 Cons.	FY03/17 Cons.	FY03/18 Cons.	FY03/16 Cons.	FY03/17 Cons.	FY03/18 Cons.	FY03/16 Cons.	FY03/17 Cons.	FY03/18 Cons.
<b>Sales</b>	<b>49,843</b>	<b>47,866</b>	<b>52,241</b>	<b>176,894</b>	<b>180,289</b>	<b>193,389</b>	<b>162,922</b>	<b>159,117</b>	<b>167,888</b>
YoY	3.3%	-4.0%	9.1%	3.3%	1.9%	7.3%	0.7%	-2.3%	5.5%
<b>Operating profit</b>	<b>10,964</b>	<b>9,221</b>	<b>11,337</b>	<b>28,606</b>	<b>31,438</b>	<b>34,988</b>	<b>21,713</b>	<b>19,646</b>	<b>22,606</b>
YoY	18.5%	-15.9%	22.9%	12.9%	9.9%	11.3%	-2.6%	-9.5%	15.1%
OPM	22.0%	19.3%	21.7%	16.2%	17.4%	18.1%	13.3%	12.3%	13.5%
<b>Recurring profit</b>	<b>11,129</b>	<b>9,202</b>	<b>11,199</b>	<b>29,531</b>	<b>31,713</b>	<b>36,235</b>	<b>21,016</b>	<b>19,947</b>	<b>22,471</b>
YoY	16.8%	-17.3%	21.7%	11.9%	7.4%	14.3%	-16.5%	-5.1%	12.7%
RPM	22.3%	19.2%	21.4%	16.7%	17.6%	18.7%	12.9%	12.5%	13.4%
<b>Net income attributable to owners of parent</b>	<b>7,796</b>	<b>6,398</b>	<b>4,856</b>	<b>22,350</b>	<b>24,026</b>	<b>27,142</b>	<b>17,291</b>	<b>15,635</b>	<b>15,472</b>
YoY	16.9%	-17.9%	-24.1%	22.8%	7.5%	13.0%	10.5%	-9.6%	-1.0%
Net margin	15.6%	13.4%	9.3%	12.6%	13.3%	14.0%	10.6%	9.8%	9.2%
<b>Per share data</b>									
EPS	338.0	266.4	168.6	143.4	157.0	180.3	96.1	90.2	89.4
Dividend per share	110.0	120.1	160.2	44.0	52.0	68.0	30.0	30.0	30.0
Payout ratio	32.5%	45.1%	95.0%	30.7%	33.1%	37.7%	31.2%	33.2%	33.6%
DOE	6.2%	5.5%	6.4%	4.5%	5.0%	6.1%	2.8%	2.7%	2.6%
Book value per share	1,865.9	2,469.0	2,521	1,006.6	1,067.8	1,168.1	1,075.6	1,120.7	1,203.1
<b>Balance sheet (JPYmn)</b>									
Total assets	65,464	92,386	111,490	228,169	231,748	249,043	272,679	272,791	287,565
Net assets	45,250	71,846	73,023	156,924	163,707	176,364	200,492	205,866	220,602
<b>Cash flow statement (JPYmn)</b>									
Cash flows from operating activities	10,546	9,042	8,100	29,989	32,491	37,691	19,603	31,390	20,121
Cash flows from investing activities	-6,750	-1,063	-24,161	-8,416	-13,152	-15,244	-5,090	-11,913	-16,171
Cash flows from financing activities	-2,740	20,342	11,319	-17,317	-19,042	-20,268	-9,432	-14,103	-6,241
<b>Financial ratio</b>									
Cash and cash equivalents	18,385	46,661	41,816	35,335	35,701	37,702	47,464	51,785	50,532
ROA (RP-based)	17.6%	11.7%	11.0%	13.1%	13.8%	15.1%	7.8%	7.3%	8.0%
ROE	19.0%	11.2%	6.8%	14.6%	15.1%	16.1%	9.2%	8.2%	7.7%
Equity ratio	65.9%	76.9%	65.2%	68.1%	69.9%	70.1%	69.3%	71.1%	72.1%
<b>Per employee data (JPYmn)</b>									
Number of employees	1,202	1,249		2,371	2,402		5,188	5,517	
Avg. temporary employees (not included in above)				345	313		830	822	
Sales per employee	41.5	38.3		65.1	66.4		27.1	25.1	
Operating profit per employee	9.1	7.4		10.5	11.6		3.6	3.1	
<b>Others (JPYmn)</b>									
R&D expenses	2,441	3,235	3,089	15,778	16,078		13,000	13,900	
% of sales	4.9%	6.8%	0.1	8.9%	8.9%		8.0%	8.7%	
<b>Established</b>	September 1953			February 1887			June 1916		

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.



## Earnings analysis

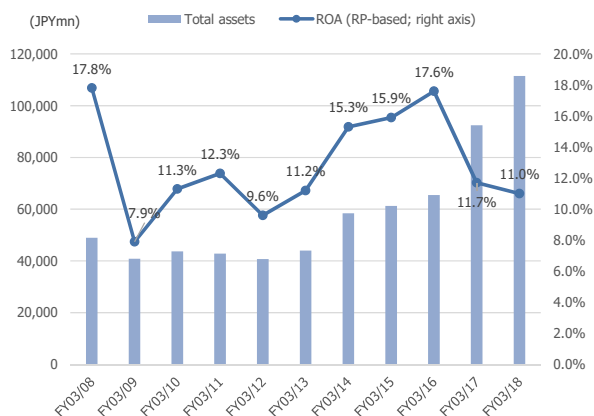
Profitability (JPYmn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
Sales	45,338	32,614	35,056	40,366	39,797	36,184	44,224	48,260	49,843	47,866	52,241
Cost of sales	29,512	22,635	24,123	28,428	29,822	25,319	28,348	28,865	27,355	26,220	27,304
Cost ratio	65.1%	69.4%	68.8%	70.4%	74.9%	70.0%	64.1%	59.8%	54.9%	54.8%	52.3%
Gross profit	15,826	9,979	10,932	11,938	9,974	10,864	15,875	19,394	22,487	21,645	24,937
Cost ratio	34.9%	30.6%	31.2%	29.6%	25.1%	30.0%	35.9%	40.2%	45.1%	45.2%	47.7%
Operating profit	8,896	3,332	4,843	5,380	4,040	4,385	7,568	9,254	10,964	9,221	11,337
OPM	19.6%	10.2%	13.8%	13.3%	10.2%	12.1%	17.1%	19.2%	22.0%	19.3%	21.7%
EBITDA	10,453	4,766	6,142	6,533	5,100	5,406	8,917	10,918	13,135	11,947	16,813
EBITDA margin	23.1%	14.6%	17.5%	16.2%	12.8%	14.9%	20.2%	22.6%	26.4%	25.0%	32.2%
Net income attributable to owners of parent	6,171	1,958	3,010	3,402	2,502	3,367	4,930	6,667	7,796	6,398	4,856
Net margin	13.6%	6.0%	8.6%	8.4%	6.3%	9.3%	11.1%	13.8%	15.6%	13.4%	9.3%
<b>Financial ratios</b>											
ROA (RP-based)	17.8%	7.9%	11.3%	12.3%	9.6%	11.2%	15.3%	15.9%	17.6%	11.7%	11.0%
ROE	16.5%	5.4%	8.7%	9.9%	7.5%	9.7%	12.8%	16.7%	19.0%	11.2%	6.8%
Total asset turnover	0.9	0.8	0.8	0.9	1.0	0.8	0.8	0.8	0.8	0.5	0.5
Working capital (JPYmn)	7,896	6,585	7,536	7,586	7,848	7,398	10,845	11,975	11,087	11,592	13,686
Current ratio	390.2%	450.3%	383.7%	360.3%	412.6%	401.2%	423.0%	343.2%	361.0%	593.6%	333.7%
OCF / Current liabilities	1.2	0.9	0.4	0.6	0.4	0.9	0.8	0.8	1.0	0.8	0.4
Net debt / Equity	24.7%	22.5%	21.2%	23.0%	19.4%	18.9%	39.2%	55.9%	48.3%	29.3%	54.0%
OCF / Total liabilities	0.9	0.7	0.4	0.5	0.4	0.8	0.4	0.5	0.5	0.4	0.2
Cash conversion cycle (days)	68	77	70	63	68	74	71	81	76	75	77
Change in working capital	-2,209	-1,311	951	50	262	-450	3,447	1,130	-888	505	2,094

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

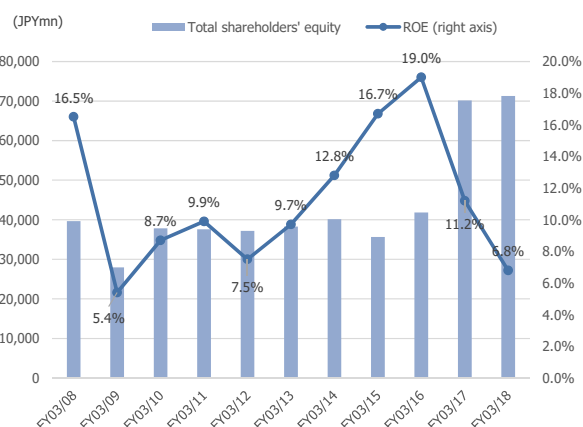
EBITDA = operating profit + depreciation + goodwill amortization

### Total assets and ROA (RP-based)

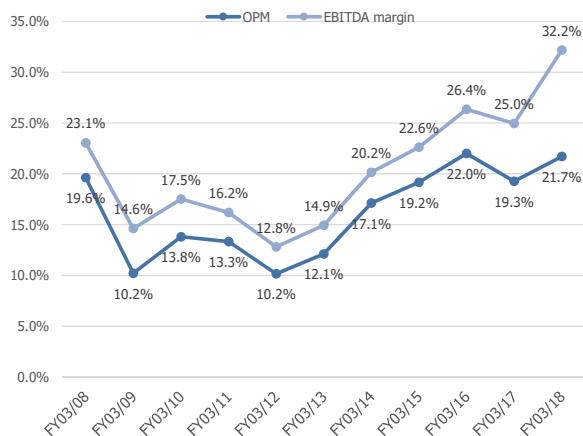


Source: Shared Research based on company data

### Shareholders' equity and ROE

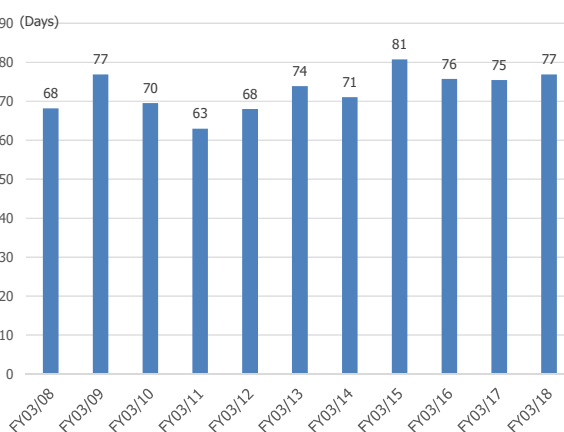


### Operating profit margin and EBITDA margin



Source: Shared Research based on company data

### Cash conversion cycle



## Market and value chain

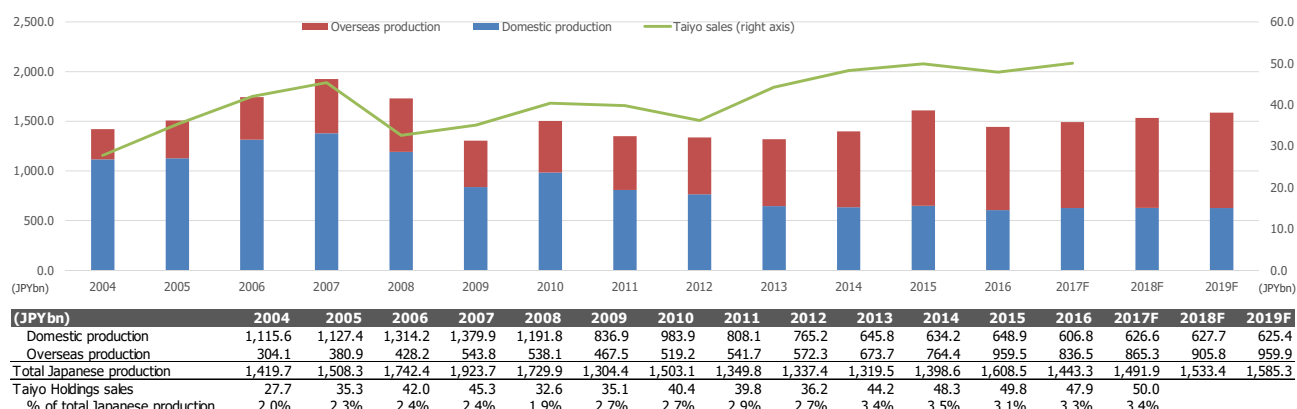
### Size of target markets

The company's mainstay product, solder resist, is a basic material essential to protect the surface of printed wiring boards, the heart of all devices in the electronic information industry. The market drivers have moved from personal computers, digital consumer electronics, and flat-panel displays, to smartphones. In recent years applications for printed wiring boards have spread to automobiles, robots, and medical equipment. The industry is growing, and facing a growing variety of requirements in terms of cost and functionality demanded by the market.

In terms of the industry value chain, Taiyo is positioned upstream (resources and raw materials). Compared with midstream (product development and manufacturing) and downstream (marketing and sales) companies, upstream companies are niche companies that single-handedly supply certain resources and raw materials and reap benefits from the added value.

As shown in the following graph, printed wiring board (PWB) production by Japanese companies and Taiyo's sales move in close step. Compared to the 2007 peak, domestic production of PWBs by Japanese corporations has more than halved, while overseas production has doubled. Total value has trended sideways and has not topped the peak levels of 2007. The company has developed production centers in Asia, brought a Taiwanese competitor under its corporate umbrella, and progressively shifted to overseas production. Taiyo has also cultivated overseas customers and entered other industries, and is working to transform its structure so that it does not rely on the PWB market alone.

**PWB production by Japanese companies and Taiyo Holdings sales**



Source: Shared Research, based on JPCA statistics and company data (including estimates)

Note: JPCA statistics are for calendar years, excluding Taiyo Holdings sales, which are for its fiscal year (e.g., 2015 means FY03/16)

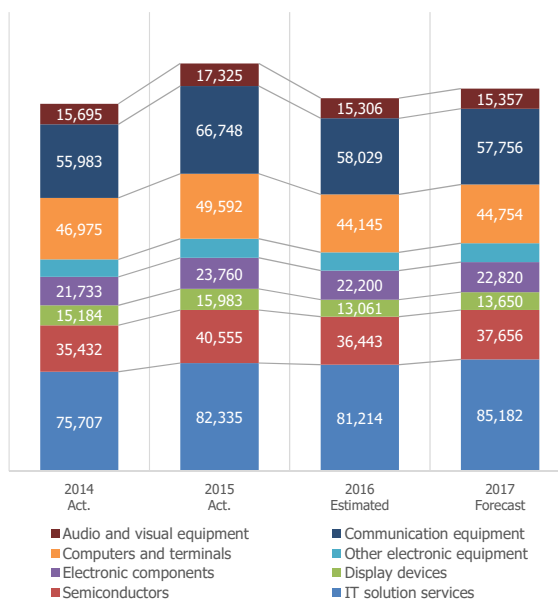
Note: Definition and scope of overseas production for Japanese companies does not cover only consolidated entities but also those where Japanese companies have management rights, regardless of shareholding percentage.

In 2016, global electronic information industry production in yen terms was JPY284.2tn (-8.6% YoY). This was due to slowing growth in smartphones, which had been the driver in developed economies and in China, and the effect of yen strength when sales figures were translated into yen. Japanese PWB manufacturing also declined to JPY1.5tn (-10.3% YoY). Meanwhile, Taiyo's FY03/17 sales were JPY47.9bn (-4.0%). For 2017, the Japan Electronics and Information Technology Industries Association (JEITA) forecast 2.6% YoY growth in global electronic information industry production value, due to rising demand for cars with driver assist technology, as well as moves to apply AI, sensors, and actuators in a variety of industrial fields. Meanwhile, the Japan Electronics Packaging and Circuits Association (JPCA) forecast Japanese PWB production value to rise by 3.4% YoY in 2017 and the company's FY03/18 sales forecast is +4.5% YoY. Taiyo's sales basically follow PWB production by Japanese companies and global electronic information industry production. Recently, fluctuations in Taiyo's sales have been less drastic than the YoY fluctuations of sales in relevant industries. This can be assumed to be because the company's products are basic materials used in upstream processes, meaning it does not directly feel the impact of changes in downstream demand. Long-term contracts with customers mean price movements are relatively small.



**Global electronic information industry production (Japanese companies' PWB production value vs Taiyo Holdings' sales) (JPY100mn, %)**

(JPYbn)	2014 Act.	2015 Act.	2016 Estimated	2017 Forecast
IT solution services	75,707	82,335	81,214	85,182
Semiconductors	35,432	40,555	36,443	37,656
Display devices	15,184	15,983	13,061	13,650
Electronic components	21,733	23,760	22,200	22,820
Other electronic equipment	13,322	14,563	13,848	14,439
Computers and terminals	46,975	49,592	44,145	44,754
Communication equipment	55,983	66,748	58,029	57,756
Audio and visual equipment	15,695	17,325	15,306	15,357
Total (global electronic equipment production)	280,029	310,861	284,245	291,613
Japanese companies' production of PWB	1,399	1,608	1,443	1,492
% of global electronic equipment production	0.5%	0.5%	0.5%	0.5%
Taiyo Holdings sales	48.3	49.8	47.9	50.0
% of total Japanese PWB production	3.5%	3.1%	3.3%	3.4%
YoY				
IT solution services	8.0%	8.8%	-1.4%	4.9%
Semiconductors	19.5%	14.5%	-10.1%	3.3%
Display devices	11.2%	5.3%	-18.3%	4.5%
Electronic components	10.8%	9.3%	-6.6%	2.8%
Other electronic equipment	7.4%	9.3%	-4.9%	4.3%
Computers and terminals	1.5%	5.6%	-11.0%	1.4%
Communication equipment	19.6%	19.2%	-13.1%	-0.5%
Audio and visual equipment	-3.2%	10.4%	-11.7%	0.3%
Total (global electronic equipment production)	10.0%	11.0%	-8.6%	2.6%
Japanese companies' production of PWB	6.0%	15.0%	-10.3%	3.4%
Taiyo Holdings sales	9.1%	3.3%	-4.0%	4.5%



Source: Shared Research, based on JEITA and JPCA statistics and company data (includes estimates)

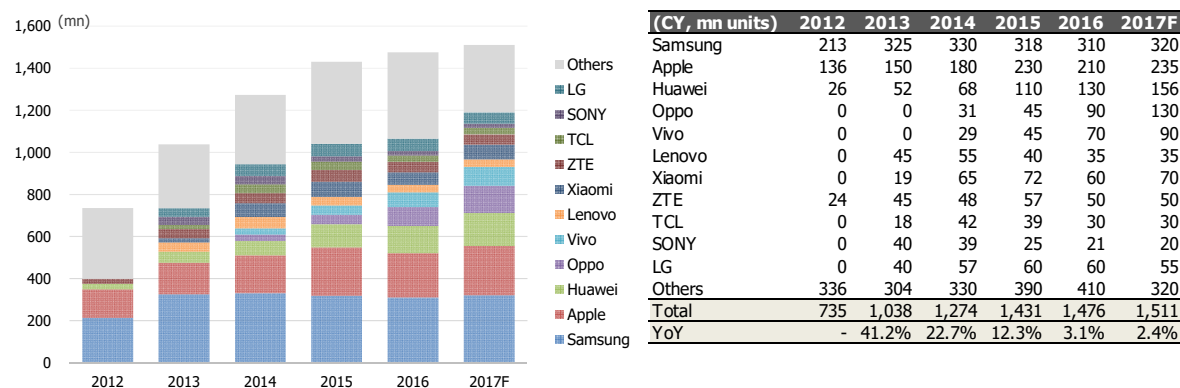
Note: All figures are for calendar years, excluding Taiyo Holdings sales, which are for its fiscal year (e.g., 2015 means FY03/16)

## Market growth potential

### Smartphone market growth potential

In 2016, there were 1.5bn global smartphone shipments (+3.1% YoY), a sudden deceleration from the double-digit growth seen through 2015. This was due to a slump by leading companies Apple and Samsung. Sales of Apple's new iPhone 7 and iPhone 7 Plus stagnated, while phones catching fire hurt Samsung's sales. Smartphone companies from Greater China still have some momentum. There is expected to be some impact from new product launches in 2017, but the smartphone market is facing a structural issue of near saturation (penetration is 79.0% in China, 74.0% in the UK, 72.0% in the US, and 67.0% in Nigeria). Of the 38 countries surveyed, 36 had penetration rates of over 50%. (Source: AUN Consulting, Inc.) The market is now primarily replacement demand, making it difficult to generate new demand.

### Global smartphone shipments (mn units)



Source: Shared Research based on data from *Electronic Device Industry News*

### Technological trends for smartphone PCBs

#### FOWLP (Fan Out Wafer Level Package)

In 2016 there was a major development in smartphone substrates. Previously, smartphone processors used Flip Chip Chip Scale Packages (FCCSPs), which were seen as the new battlefield for semiconductor package substrates, instead of personal computer CPUs. However, iPhone 7 and iPhone 7 Plus employed InFO (Integrated Fan-Out), a Fan Out Wafer Level Package (FOWLP) developed by Taiwan Semiconductor Manufacturing Company Limited (TSMC), the largest semiconductor foundry. This positioned the semiconductor package industry at a crossroads. In other words, FOWLP made the traditional semiconductor package substrate unnecessary, as it enabled simultaneous formation of packages for semiconductors with a redistribution layer

(RDL) with a chip on top of a silicon wafer. In fact, Ibiden Co., Ltd. (TSE1:4062), which had been supplying FCCSP substrates for Apple's application processors, was forced to respond through modified semi additive process (MSAP) methodology (see the following paragraph). InFO is a means for TSMC, a semiconductor manufacturer, to make inroads in its core wafer foundry business. (Previously, TSMC and Samsung Electronics Co., Ltd. split contract manufacturing of Apple's application processors (APs), but it appears that TSMC has become the sole supplier for iPhone 7, iPhone 7 Plus, iPhone 8, iPhone 8 Plus, and iPhone X.)

### Switch to MSAP (Modified Semi Additive Process)

Production methods for the main substrate of the new iPhones released at the end of 2017 (iPhone 8, iPhone 8 Plus, and iPhone X) appear to have changed dramatically. Instead of the traditional subtractive method, an MSAP is employed to create plated circuits. MSAP enables a 30% reduction in main substrate area via miniaturization of the circuits. The new iPhone (iPhone X) uses organic LED (OLED) on its main screen. As battery capacity increases, it has been necessary to shrink the main substrate area. In the HDI substrate manufacturing process using MSAP, positioning accuracy is more important than before so direct exposure systems (which use digital exposure) have come into general use.

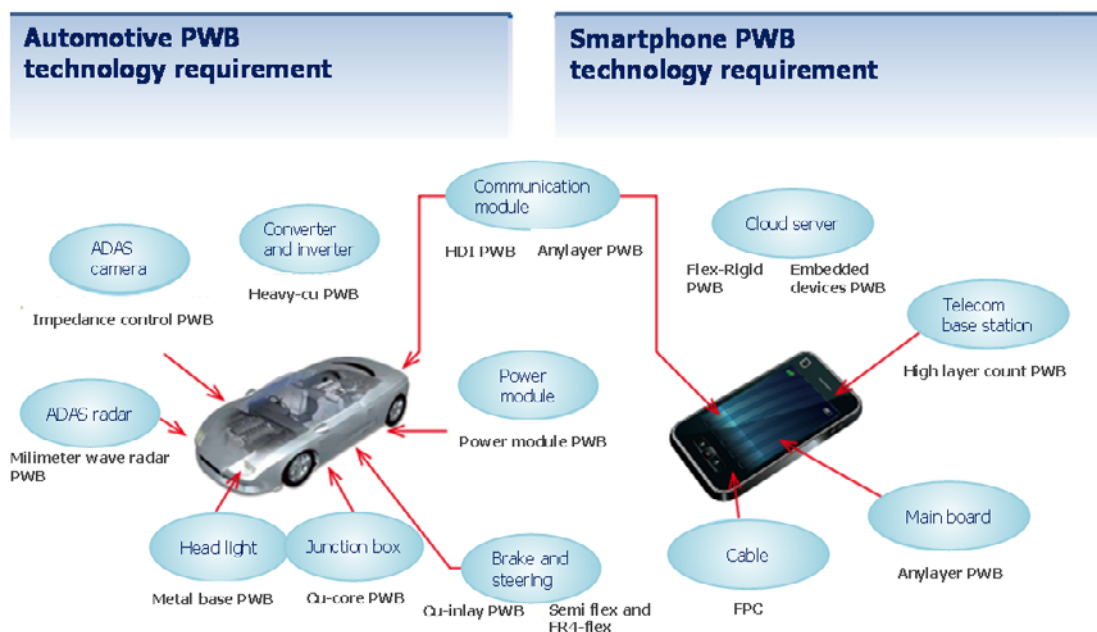
**Printed wiring board manufacturing processes:** The subtractive process starts with copper clad laminate, and then removes the unneeded copper foil by dissolving it with a chemical, leaving the desired pattern. Dissolving the copper foil with chemicals is also known as etching, and is the mainstream printed wiring board manufacturing process.

The additive process starts with a laminate without copper foil, then involves precipitating and fixing the conductive material to form the pattern.

There are also conductive paste printing and semi-additive processes (a combination of both the subtractive and additive processes).

Source: OK Print Corporation

### Printed wiring board technology required for automotive, smartphone, and wearable applications

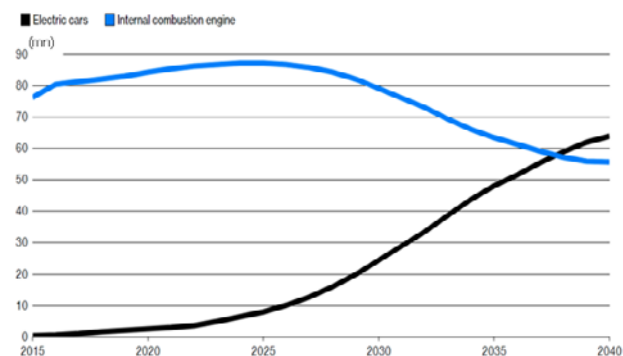


Source: Shared Research based on Meiko Electronics Co., Ltd. data

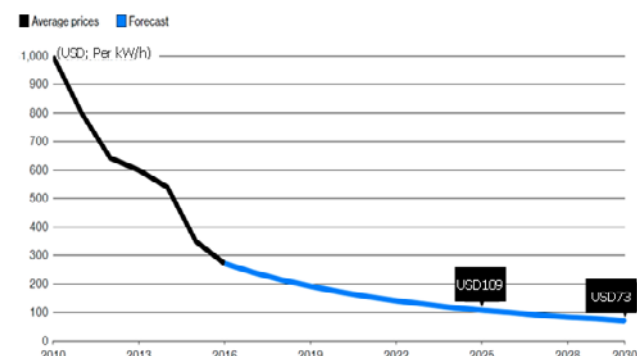
### Automobile market growth potential

Automobile penetration rates per 1,000 people are 846 in US, 714 in Australia, 611 in Japan, and 598 in Germany; that is, over 50% of the population own automobiles in developed economies in the West and Japan. On the other hand, motorcycle penetration is high in emerging markets: one of every three people in Thailand and Malaysia, one of every six in Greece, and one of every 15 in China (as of end-2015, source: Japan Automobile Manufacturers Association). Automobiles, like smartphones, are mainly seeing replacement demand, but forecasts are for a rapid switch to electric vehicles amid mounting environmental concerns and falling battery prices. Also, for conventional fossil fuel-powered (internal combustion) vehicles, the spread of advanced driver assist systems such as automatic brakes and automated driving systems is forecast to lead to acceleration in installed electronics. For the printed wiring board industry, automobile demand is still an untapped area, unlike the mature smartphone market.

Due to several factors, electric vehicles look likely to close the gap with conventional fossil fuel automobiles in the near future in terms of driving range, convenience, and price. As battery technology advances, driving ranges are becoming longer and charging times shorter. Furthermore, battery prices are dropping. Bloomberg New Energy Finance forecasts that sales of electric vehicles will outstrip those of fossil fuel-powered vehicles by 2040.

**Global electric vehicle sales forecasts (mn units)**


Source: Shared Research based on Bloomberg New Energy Finance

**Electric vehicle battery price forecasts**


Recently, the UK and France have announced bans on fossil fuel-powered automobile sales from 2040. The Indian government announced its intention to regulate the sale of fossil fuel-powered automobiles from 2030. The Chinese government also appears to be considering when to switch to new energy vehicles (NEVs). Automobile makers and conglomerate auto parts manufacturers will have to respond, and Toyota Motor Corporation (TSE1: 7203), which had been hesitant regarding electric vehicles, announced its entry into the market and appears ready to install its high-function solid-state battery currently under development in automobiles in 2020–22. Fully solid-state batteries are similar to lithium-ion batteries in structure, but have a solid, not liquid, electrolyte (such as ceramics). Furthermore, they do not require separators, so there is a smaller risk of fluid leaks or abnormal ignition, and opportunities in terms of major reductions in charging times and further driving ranges.

### Technological issues in automotive printed wiring boards

Printed wiring boards (PWBs) for automotive applications need to be much more durable than for smartphones and tablets. Requirements include the ability to withstand high temperatures and impacts and a longer product life. Furthermore, automobiles must clear safety and environmental regulatory hurdles. Accordingly, automobile manufacturers subject component makers to rigorous, conservative qualification processes. Once a company is qualified, automobile manufacturers are unlikely to switch to another manufacturer for 10 years or so. Car prices are 10–100x those of smartphones, and have a much longer product life. Electrical equipment is used in a number of applications, including information systems, the body, powertrain, and driving safety. With forecasts of increasing electronics use in cars, this is the most important new frontier for electronics components and PWB manufacturers to seize the first mover advantage.

## Technological trends

PWBs are used in all electronic equipment including smartphones, PCs, servers, and audiovisual equipment. They play an important role in making electrical connections between the semiconductors, electronic components, sensors, and other components that are installed in these electronic devices and help them function as system circuitry. They are akin to the capillaries and neural circuits that extend throughout the body in humans. Solder resist that insulates and protects the wiring parts from the external environment can be compared to skin or mucous membranes.

As electronic equipment such as smartphones and wearable devices gets smaller and more sophisticated, PWBs face increasing requirements to be compact, thin, and supple. The Apple watch does not have a main substrate similar to a motherboard, but rather something called S1 (SiP, System in Package), a highly integrated module substrate just 2.5sq cm. This is a coreless substrate with a bare chip semiconductor and passive components directly installed and sealed with resin. Further, to prevent parts from interfering with each other, it is covered with sputtered metal material.

In 2016 the value of domestic PWB production growth by product category was as follows: flexible and module PWBs fell by double digits YoY and multilayer PWBs fell by a single digit YoY, primarily in build-up board products. Meanwhile, rigid flexible, ceramic, and metal core PWBs grew by double digits YoY. From 2017 onward, the JPCA forecast build-up module and flexible PWBs to resume growing, and for multilayer wiring boards also to return to growth, driven by build-up PWBs with 10 layers or more. In the past, amid constant change in the computer and information device industry, the key driver shifted from general purpose computers to minicomputers, office computers, personal computers, and smartphones. The printed wiring board industry also faced continuous demand for new technology. The upstream solder resist industry felt the effects of these constant changes in the downstream and midstream sectors. Recently, an increasing number of downstream companies are directly qualifying materials of companies further upstream. The key to survival is increasingly keeping an eye on the direction of technological trends and always staying one step ahead.

#### Domestic PWB production by category and forecasts

(JPYbn)		2012	2013	2014	2015	2016	2017F	2018F	2019F
Printed wiring board (PWB)	Single sided PWB	15.9	15.4	14.3	14.6	14.0	13.9	14.0	13.8
	Double sided PWB	95.1	86.2	90.5	84.5	78.4	79.2	78.4	78.5
	Four layers	88.6	80.7	78.0	70.0	69.2	69.9		
	Six layers	63.6	56.4	53.0	47.7	46.3	48.0		
	Eight layers	47.4	35.6	32.6	32.8	28.0	29.6		
	Ten layers or more	58.8	52.0	42.3	43.3	39.9	43.1		
	SUM	258.3	224.7	205.9	193.8	183.4	190.5	192.5	191.5
	Multilayer PWB								
	Build-up								
	SUM								
	Build-up, % of multilayer								
Printed wiring board (PWB)	Single sided	23.5	16.4	15.9	20.9	18.4	17.9		
	Double sided	55.0	42.9	39.7	43.4	37.1	40.6		
	Multilayer	27.1	21.8	19.3	26.0	24.4	22.7		
	Build-up boards	5.9	5.0	4.7	6.2	4.7	4.9		
	Build-up, % of flex	5.6%	6.2%	6.3%	6.8%	5.9%	6.1%		
	SUM	105.6	81.1	74.9	90.3	79.9	81.3	82.3	83.5
	Flex rigid	14.3	10.0	9.0	8.9	9.3	9.9		
	Ceramics	15.8	16.2	16.4	16.3	18.9	18.7		
	Metal core	11.0	11.0	10.6	10.4	12.0	12.1		
	Others	3.0	2.4	2.8	3.0	2.5	2.2		
	Total	519.0	447.0	424.4	421.8	398.3	407.8	410.6	410.6
Module boards	Rigid	206.3	170.6	181.1	197.4	177.4	187.3		
	Tape	14.9	6.9	6.0	6.0	6.7	6.7		
	Ceramics	25.1	21.3	22.8	23.8	24.5	24.8		
	Build-up	158.0	143.7	143.1	159.6	138.9	147.6		
	Build-up, % of module	64.2%	72.3%	68.2%	70.3%	66.6%	67.4%		
	Total	246.2	198.8	209.8	227.1	208.6	218.8	217.1	214.8
	Total PWB and module boards	765.2	645.8	634.2	648.9	606.9	626.6	627.7	625.4
Total build-up	Total build-up	244.3	215.2	201.8	224.2	189.0	200.2		
	% of total PWB and module boards	31.9%	33.3%	31.8%	34.5%	31.1%	31.9%		

Source: Shared Research based on JPCA data

Note: Build-up figures are totals for build-up products in the PWB and module board categories

## Barriers to entry

As with the chemical and pharmaceutical industries, building barriers to entry in the solder resist industry with an intellectual property strategy via patents is fundamental. Taiyo has high market share in high-function liquid resist products for rigid PWBs and dry film for package substrates using its patents. Meanwhile, in interlayer insulating materials for build-up circuit boards, the company is blocked by other companies' (Ajinomoto Fine-Techno) patents. In this environment, with a web of patents a company can aim for cross licensing agreements with competitors.

A major barrier to entry is handling high-function materials in addition to general materials. Taiyo was previously involved in a fierce market share war with OTC in Taiwan. CEO Sato visited OTC's largest shareholder, Unimicron Technology Corp., and made a direct takeover proposal to the CEO of OTC. The offer was immediately rebuffed, but two years later OTC caved in and Taiyo succeeded in bringing its largest competitor under its umbrella. CEO Sato saw that Taiyo was highly profitable and had a high share in high-function products, which OTC did not have. Taiyo was not going to lose to low-priced general products. As such, the company's M&A strategy was a success.

## Competitive environment

In solder resist alone, Taiyo has a global market share of over 50%. However, solder resist is merely one variety of the company's insulating materials for PWBs. For insulating materials overall, the company's market share is around 20–40%. As new technologies emerge, instead of looking at solder resist as a single market, the definition of the market can be broadened to include interlayer insulating materials and other insulating materials for electronics. As such, there are no concerns from the viewpoint of antimonopoly law, and the company's acquisition of OTC did not violate Taiwan's antimonopoly legislation.

Following is a list of companies involved in solder resist. Huntsman International LLC is a major US chemical manufacturer. In May 2017, it agreed to buy Clariant in a share swap deal, giving rise to a giant chemical manufacturer. Huntsman has qualification from a wide range of overseas car manufacturers and is the supplier of solder resist for automotive printed wiring boards for Bosch. Ajinomoto Fine-Techno is a subsidiary of the major food manufacturer Ajinomoto. Until now Taiyo has effectively built up its market share as the leading independent player in the niche market of solder resist, but if considering insulating materials overall, the market is several times larger, leaving more room for major corporations to enter. The alliance with DIC is partly to give Taiyo more strength to handle competition with major corporations.

**Japanese manufacturers:** Asahi Chemical Research Laboratory Co., Ltd., Ajinomoto Fine-Techno, Ube Industries Ltd. (TSE1: 4280), Goo Chemical Co., Ltd. (TSE2: 4962), San-ei Kagaku Co., Ltd., Sanwa Chemical Industrial Co., Ltd., Tamura Corporation (TSE1: 6768), Toagosei Co., Ltd. (TSE1: 4045), Nikko-Materials Co., Ltd., Nippon Polytech Corp., Hitachi Chemical (TSE1: 4217), Fujifilm (wholly owned subsidiary of Fujifilm Holdings Corp. [TSE1: 4901]), Taiyo Ink Mfg. (wholly owned subsidiary of Taiyo Holdings)

**Non-Japanese manufacturers:** E. I. du Pont de Nemours and Company, Electra Polymers Ltd, Elga Europe S.R.L., MacDermid, Inc. (MacDermid Enthone Electronics Solutions), Eternal Chemical Co., Ltd., Huntsman International LLC (Huntsman Advanced Materials LLC), Jiang Su Kuangshun Photosensitivity New-material Stock Co., Ltd., Lackwerke Peters GmbH & Co. KG, LG Chem Ltd., Nan Ya Plastics Corporation, Rogers Corporation, Seoul Chemical Research Laboratory Co., Ltd., Sun Chemical Corporation (wholly owned subsidiary of DIC), Onstatic Technology (wholly owned subsidiary of Taiyo Holdings)

Source: Shared Research based on Japan Marketing Survey data

## Strengths and weaknesses

### Strengths

- Rapid growth and high margins as the leading upstream player in niche solder resist business:** Taiyo has fully leveraged the speed enabled by being independent, as well as its development and marketing prowess and strategic foresight. It has received supplier qualifications from large domestic manufacturers by anticipating final demand and expanding rapidly overseas. Taiyo has a global market share of over 50% for solder resist (fairly high share for high-function rigid products and about half for general products). It has an extremely high share of the market in materials for semiconductor packages. OPM has trended at around 20% since FY03/15. When a final-stage manufacturer or board manufacturer qualifies a product, prices and supply become relatively stable. Industry leaders such as Taiyo are well-placed to win customer loyalty, enabling them to maintain high market share and margins, as well as negotiate favorable prices in procuring raw materials through economies of scale.
- Speed of top-management decisions and a modern approach to financial management:** After his appointment in April 2011, CEO Sato made a series of bold moves: purchased Taiwanese competitor OTC, acquired Chugai Kasei, brokered an alliance with DIC, and established subsidiaries in new business areas. With a background in consulting and accounting, he emphasizes the financial perspective in management, which has unified the company, as well as HR development, which enables swift decision-making. In a rapidly changing market, delegating authority to subsidiaries is crucial for nimble decision-making. Still, to avoid a loss in group cohesiveness stemming from too much delegation, Taiyo is streamlining global communications by developing proactive employees and by recruiting non-Japanese to work at the head office (over 8% of HQ employees are non-Japanese). Retention rates at overseas subsidiaries are high (in the Suzhou China subsidiary, only a few out of 250 employees quit every year, and almost none quit in Taiwan). Shuichi Omi, who holds CPA qualifications in Japan and Vietnam, acts as a kind of CFO in his capacity as executive officer and general manager, administration division.
- Synergies from a proactive capital and business alliance:** The company's balance sheet was already strong, but the capital alliance with DIC generated about JPY24.8bn, which Taiyo is using to strengthen existing businesses and enter new businesses. If this alliance had taken place between two ink companies, it might have been seen as DIC, the larger company, swallowing Taiyo. But this deal is across different industries and is a mutually beneficial relationship, as Taiyo has experience in the electronic materials sector, an area that DIC wants to enter.

### Weaknesses

- Dependence on solder resist, a mature product that lies in the shadow of the end-products it is used in:** Solder resist, the company's main product, is subject to external factors including forex and market trends of smartphones and other end-products. The company has exited the FPD business, formerly its second core business, making it even more reliant on solder resist. Taiyo aims to escape this reliance and become a comprehensive chemical company by entering the energy, food production, and pharmaceuticals markets, but it is still at the starting point in these areas.
- Lack of personnel to stay ahead of technological innovation:** Market development and technological innovation is accelerating, amid a shift in the core products that use PWB materials and trends toward miniaturization and sophistication. Taiyo has established a solid position in solder resist used as a protective film, but lags in interlayer insulating materials. It also has yet to receive qualifications from overseas car manufacturers. The company is focusing on training proactive personnel, but unlike larger, more general companies, it does not have as many employees to stay ahead of the trends in technological innovation.
- Limited demonstrated ability to develop new businesses outside of its core strength:** An overly successful existing business makes the company a victim of its own success. Taiyo sets high hurdles when trying to develop new core businesses, meaning new businesses are lagging. The company's number of patent approvals has been declining from a peak of 99 in 2014, to 56 in 2015 and 55 in 2016. We assume this is because Taiyo was focusing on enhancing R&D through the acquisition of Chugai Kasei and the alliance with DIC. Still, relying on others can be a double-edged sword.



## Historical performance and financial statement

### Historical performance

#### Q3 FY03/18 results

##### Markets

In the electronic parts industry, the group's core market, demand for automotive components, smartphones, and servers increased.

##### Topics of interest

- The yen, at JPY112/USD was weaker than the expected rate of JPY108/USD
- Sales volume of general rigid board materials declined, but sales volume of dry film and flexible printed circuit (FPC) board materials rose YoY
- Taiyo revised up consolidated full-year forecasts
- Taiyo Pharma announced the acquisition of 13 long-listed products

##### Overview of company earnings

Aided by both rising sales volumes and a weaker yen, sales for cumulative Q3 rose 8.6% YoY to JPY39.0bn and operating profit rose 21.0% YoY to JPY8.7bn; the OPM rose to 22.3% versus 20.0% during the same period last year. In cumulative Q3 the forex rate fell by JPY4 to JPY112/USD from JPY108/USD during the same period last year.

For Q3 alone, sales of JPY13.2bn were up 6.1% YoY and operating profit of JPY3.0bn was up 12.3% YoY; the OPM rose to 22.3% versus 21.1% during the same period last year.

##### Progress

Sales have reached 76.1%, operating profit has reached 80.5%, recurring profit has reached 80.9%, and net income attributable to owners of parent has reached 81.1% of the company's forecasts.

##### Causes of YoY changes

Sales and operating profit grew YoY on increased sales volume of dry film (contributed +JPY554mn to sales and +JPY304mn to operating profit) and foreign-exchange impact and changes in the product mix (contributed +JPY2.7bn to sales and +JPY1.3bn to operating profit), despite the negative impact of a decline in sales volume of liquid solder resist for printed wiring boards (-JPY126mn to sales and -JPY65mn to operating profit).

##### Sales by product category

Sales of high-function rigid board materials were JPY16.3bn (+7.6% YoY), general rigid board materials were JPY9.9bn (+0.8%), package substrate materials were JPY8.0bn (+12.0%), flexible printed circuit (FPC) board materials were JPY920mn (+75.2%), build-up board materials were JPY1.1bn (+36.0%), and other products were JPY2.7bn (+13.7%).

##### Segment (regional) performance

Sales to external customers by region: Japan, JPY7.5bn (+5.7% YoY, 19.3% of total); China, JPY16.2bn (+9.8%, 41.6%); Taiwan, JPY5.0bn (+2.3%, 12.7%); South Korea, JPY7.3bn (+17.2%, 18.6%); and Others, JPY3.0bn (+2.5%, 7.8%).

Sales by region including intragroup sales: Japan, JPY14.5bn (+12.4% YoY, 30.2% of total); China, JPY16.6bn (+12.4%, 33.7%); Taiwan, JPY7.1bn (-8.1%, 14.3%); South Korea, JPY7.6bn (+18.2%, 15.5%); and Others, JPY3.1bn (+3.6%, 6.4%).

Operating profit by region: Japan, JPY2.7bn (+89.9% YoY); China, JPY3.6bn (+2.0%); Taiwan, JPY1.5bn (+10.1%); South Korea, JPY1.3bn (+34.3%); and Others, JPY226mn (-42.2%).

OPM by region: Japan, 18.4%; China, 21.7%; Taiwan, 20.9%; South Korea, 17.0%; and Others, 7.2%.

- In Japan and China, rigid printed wiring board (PWB) materials for automotive and other applications were solid, and semiconductor package substrate materials performed well, primarily for high-end smartphones
- In Taiwan, rigid printed wiring board materials for automotive components performed well
- In South Korea, package substrate materials performed well, primarily for high-performance smartphones and servers
- In Others, rigid printed wiring board materials performed in line with last year but profits fell below those of last year due to increased expenditure involved in the initiation of the pharmaceutical business

Source: the company's securities report

## Key points

- Sales of general rigid board materials declined due to loss of market share resulting from initiatives of competitors (local businesses in the Asia region). Taiyo Holdings' policy is to work on countermeasures that involve the introduction of new products at reduced cost, rather than lowering the price of existing products. The company recognizes the need to halt the erosion of its market share of general, as local businesses are more likely to advance into high-end products if they develop capability in general purpose products.
- Sales of dry film for package substrates are increasing steadily in terms of volume and value. That the company has a very high market share is a driver of growth, with the increasing usage of dry film for package substrate. Increased volume and smooth production at the company's Kitakyushu Plant were major factors contributing to increased profit. The large increases in profit in Japan and South Korea are largely attributable to dry film.
- "Others" include Taiyo America, Inc., Chugai Kasei Co., Ltd., Taiyo Green Energy Co., Ltd., and Taiyo Pharma Co., Ltd.
- In December 2017 Taiyo Green Energy Co., Ltd. began operating the Ranzan Onuma Floating Solar Power Plant. All of the electricity generated by the plant is used for the operation of Taiyo Ink Mfg.'s Saitama Plant, and corresponds to approximately 5% of the total electricity used by that plant. This approach follows the intent and policy of major clients to preferentially procure materials from businesses that actively implement environmental policies. The company is also bolstering various other ESG initiatives, such as donating solar power equipment regionally in response to emergency, operating a plant factory from which it sells locally, and taking local children into its office nursery.
- Taiyo Pharma Co., Ltd. recorded expenses (investigation, consultation, etc.) in relation to the execution of the transfer of the marketing and manufacturing rights of 13 long-listed products from Chugai Pharmaceutical. As manufacture and marketing approvals will be transferred sequentially between April 2018 and December 2018, the substantial recording of sales will be from FY03/19.
- The company is progressing concrete arrangements relating to one of the objectives of the capital and business alliance with DIC, namely outsourcing solder resist production to DIC's plants overseas to reduce production costs and improve operating rates at overseas plants. It seems that it is not only the production of solder resist that is to be outsourced to DIC's plants overseas, but also the production of pharmaceutical products.

## R&D expenses

R&D spending was JPY2.3bn (5.8% of sales, +5.6% YoY).

## 1H FY03/18 results

### Business environment

In the US, business conditions remained solid and a gentle economic recovery continued. The economy has stayed steady in Europe and kept up a mild recovery. However, the Chinese economy lacked vigor, with slowing growth in production, exports, investment, and consumption. In Japan, a mild recovery in personal consumption continued amid favorable employment and income conditions.



Real global GDP growth forecasts for 2017 and 2018 by the International Monetary Fund (IMF) released on October 10 call for +3.6% and +3.7% YoY growth, each up 0.1pp from the previous April and July forecasts. For the US, the IMF forecasts growth at +2.2% YoY in 2017 (up 0.1pp) and +2.3% in 2018 (up 0.2pp).

## Topics of interest

- Yen rate (JPY/USD) was in line with forecasts. 1H assumption: JPY111/USD
- Sales volumes increased YoY overall, driven by dry film
- Costs improved on enhanced negotiating clout in outsourcing due to increased operating rates at Kitakyushu Plant and bringing dry film production in-house
- Taiyo revised up consolidated full-year forecasts
- Taiyo established a subsidiary (Taiyo Pharma Co., Ltd.)

## Markets

Demand was solid for automotive components, smartphones, and servers in the electronic parts industry, the main area in which the group operates.

## Overview of company earnings

In 1H FY03/18, Taiyo's sales were JPY25.8bn (+10.0% YoY) and operating profit JPY5.7bn (+26.0%) on increased sales volume and a weaker yen. The OPM improved from 19.4% in 1H FY03/17 to 22.3%. The forex rate fell by JPY5 YoY from JPY106/USD to JPY111/USD.

## Causes of YoY changes

Sales and operating profit grew YoY on increased sales volume of liquid solder resist for printed wiring boards (contributed +JPY179mn to sales growth and +JPY91mn to operating profit); increased sales volume of dry film for semiconductor packages (+JPY395mn to sales, +JPY215mn to operating profit); and foreign-exchange impact and changes in the product mix (+JPY1.8bn to sales, +JPY881mn to operating profit).

## Sales by product category

Sales of high-function rigid board materials were JPY10.9bn (+7.7% YoY), general rigid board materials were JPY6.6bn (+3.7%), package substrate materials were JPY5.1bn (+13.5%), build-up board materials were JPY750mn (+40.2%), flexible printed circuit (FPC) board materials were JPY562mn (+70.3%), and other products were JPY1.8bn (+17.2%).

## Uses of the company's products

Main applications for the company's high-function rigid board materials are automotive, smartphones (high-end), and tablets. General rigid board materials are used in general consumer electronics such as LCD TVs and low-priced smartphones that do not require supplier qualification. Package substrate materials are used in semiconductors. The market for general rigid board materials has stagnated and the company's response to new competitors from China appears to have been too late, leading to a dip in market share. Build-up board materials used to plug holes (liquid product) are performing well, but dry film used in interlayer insulating has yet to establish a track record. Flexible printed circuit (FPC) board materials still make up a small share of sales, but liquid material used in high-end smartphones has grown strongly. The company has received qualification for its dry film FPC board materials. Small-scale shipments have started and the company expects further increase in shipments to get underway in 2H. Other product sales include sales by subsidiaries Chugai Kasei Co., Ltd. and Taiyo Green Energy Co., Ltd.

## Segment (regional) performance

Sales to external customers by region: Japan JPY4.9bn (+4.2% YoY, 19.0% of total sales); China JPY10.8bn (+7.9% YoY, 42.0% of sales); Taiwan, JPY3.2bn (+12.1% YoY, 12.5% of sales); South Korea, JPY4.8bn (+23.2% YoY, 18.6% of sales); and Others, JPY2.0bn (+5.5% YoY, 7.9% of sales).

Sales by region including intragroup sales: Japan, JPY9.6bn (+11.3% YoY, 29.6% of sales); China, JPY11.1bn (+6.1% YoY, 34.2% of sales); Taiwan, JPY4.6bn (+10.9% YoY, 14.2% of sales); South Korea, JPY5.0bn (+23.6% YoY, 15.6% of sales); and Others, JPY2.1bn (+5.4% YoY, 6.5% of sales).

OPM by region: Japan, 17.0%; China, 22.2%; Taiwan, 21.0%; South Korea 16.8%; and Others, 10.2%.

- In Japan, rigid printed wiring board (PWB) materials for automotive and other applications were solid, and semiconductor package substrate materials performed well, primarily for high-end smartphones
- In China and Taiwan, rigid PWB materials for automotive components performed well
- In South Korea, automotive rigid PWB materials slumped on declining market share of South Korean automobiles in China. However, package substrate materials performed well, primarily for high-end smartphones.

Source: the company's securities report

## R&D expenses

R&D spending was JPY1.6bn (6.0% of sales, +22.0% YoY).

## Forecast revisions released with Q2 earnings announcement

Taiyo revised up its full-year FY03/18 forecasts (for the second time, following revisions with the Q1 earnings announcement).

This reflected higher demand and a weaker yen versus initial forecasts. Taiyo revised its currency assumption for the full year from JPY106/USD to JPY108/USD. The company estimates the full-year impact of a JPY1/USD change in the forex rate at over JPY350mn on sales and over JPY150mn on operating profit.

The company increased its full-year sales forecasts by JPY1.8bn, from JPY48.2bn (+0.7% YoY) to JPY50.0bn (+4.5%). It raised full-year operating profit forecasts by JPY1.0bn, from JPY9.2bn (-0.2%) to JPY10.2bn (+10.6%). The company revised its currency assumption for 2H from JPY100/USD to JPY105/USD, sales from JPY23.2bn to JPY24.2bn, operating profit from JPY4.0bn to JPY4.5bn. The company has not revised 2H forecasts regarding volume.

Taiyo planned to use the funds (roughly JPY24.8bn) and improved R&D capability from the alliance with DIC (TSE1: 4631) to boost full-year capex to roughly JPY5bn and to maintain the R&D-to-sales ratio in line with the previous year at 6.6% (about JPY3.3bn), forecasting an OPM of 20.4%. The company expected depreciation expenses of roughly JPY2bn.

## Full-year company forecasts (as of Q2)

Income statement (JPYmn)	FY03/15	FY03/16	FY03/17			FY03/18					
	FY	FY	1H	2H	FY	1H Old Est.	1H New Est.	2H Old Est.	2H New Est.	FY Old Est.	FY New Est.
Sales	48,260	49,843	23,442	24,424	47,866	25,000	25,784	23,200	24,216	48,200	50,000
YoY	9.1%	3.3%	-7.7%	-0.1%	-4.0%	6.6%	10.0%	-5.0%	-0.9%	0.7%	4.5%
Gross profit	19,394	22,487	10,282	11,363	21,645		12,233		19,000		
YoY	22.2%	15.9%	-10.0%	2.7%	-3.7%						
GPM	40.2%	45.1%	43.9%	46.5%	45.2%		47.4%				
SG&A expenses	10,139	11,522	5,725	6,699	12,424		6,489				
YoY	22.1%	13.6%	2.0%	13.4%	7.8%		13.3%				
SG&A ratio	21.0%	23.1%	24.4%	27.4%	26.0%		25.2%				
Operating profit	9,254	10,964	4,557	4,664	9,221	5,200	5,744	4,000	4,456	9,200	10,200
YoY	22.3%	18.5%	-21.5%	-9.6%	-15.9%	14.1%	26.0%	-14.2%	-4.5%	-0.2%	10.6%
OPM	19.2%	22.0%	19.4%	19.1%	19.3%	20.8%	22.3%	17.2%	18.4%	19.1%	20.4%
Non-operating income	376	265	134	100	234		91				
Non-operating expenses	101	100	89	164	253		144				
Recurring profit	9,529	11,129	4,602	4,600	9,202	5,100	5,690	4,000	4,410	9,100	10,100
YoY	21.7%	16.8%	-21.9%	-12.2%	-17.3%	10.8%	23.6%	-13.0%	-4.1%	-1.1%	9.8%
RPM	19.7%	22.3%	19.6%	18.8%	19.2%	20.4%	22.1%	17.2%	18.2%	18.9%	20.2%
Extraordinary gains	406	40		575	575						
Extraordinary losses		32		1,021	1,021		19				
Pre-tax profit	9,920	11,137	4,602	4,154	8,756		5,671				
Income taxes	2,947	3,009	897	1,302	2,199		1,628				
Income taxes-current	2,670	2,855	1,466	1,122	2,588		1,583				
Income taxes-deferred	277	153	-569	181	-388		44				
Implied tax rate	29.7%	27.0%	19.5%	31.3%	25.1%		28.7%				
Net income	6,972	8,128	3,705	2,852	6,557		4,043				
Net income attrib. to non-controlling interests	305	331	81	77	158		45				
Net income attrib. to owners of parent	6,667	7,796	3,623	2,775	6,398	3,600	3,998	2,800	3,002	6,400	7,000
YoY	35.2%	16.9%	-11.4%	-25.2%	-17.9%	-0.6%	10.4%	0.9%	8.2%	0.0%	9.4%
Net margin	13.8%	15.6%	15.5%	11.4%	13.4%	14.4%	15.5%	12.1%	12.4%	13.3%	14.0%
JPY/USD	110.0	120.1	106.4	111.6	109.0	111.0	111.0	100.0	105.0	106.0	108.0

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

## Q1 FY03/18 results

### Business environment

In the US, corporate investment is slowing down, but a mild economic recovery continued amid a recovery in consumer spending due to an improved labor market. Europe was seeing a solid economic recovery against a backdrop of a mild recovery in consumer spending. Economic growth is slowing in China, although expansion continues. In Japan, personal consumption and the economy continued to recover gradually amid favorable employment and income conditions.

Forecasts for 2017 by the International Monetary Fund (IMF) released on July 24 call for global economic growth of +3.5% YoY, unchanged from the figures released in April, but with a wider difference among regions. Forecasts for the US were trimmed by 0.2pp from April to +2.1% YoY and those for the UK by 0.3pp to +1.7%. Meanwhile, forecasts for Japan were lifted by 0.1pp to +1.3% and those for the euro zone by 0.2pp to +1.9%. IMF forecasts maintained accelerating growth in China and in emerging and developing economies, with growth forecasts revised up by 0.1pp each to +6.7% and +4.6% respectively. (Note: on October 10, the IMF revised its 2017 and 2018 forecasts for global GDP growth, raising the forecasts by 0.1pp to 3.6% and 3.7% YoY growth, respectively.)

### Topics of interest

- Yen rate (JPY/USD) was weaker than assumed. Actual: JPY112/USD versus forecast of JPY100/USD (announced May 2, 2017)
- Sales volumes increased YoY overall, driven by dry film
- Taiyo revised up consolidated 1H and full-year forecasts
- Taiyo announced establishment of subsidiary (Taiyo Pharma Co., Ltd.)

### Markets

Demand was solid for automotive components and smartphones in the electronic parts industry, the main area in which the group operates.

### Overview of company earnings

In Q1 FY03/18, Taiyo's sales were JPY12.4bn (+9.9% YoY) and operating profit JPY2.7bn (+26.9%) on increased sales volume amid global economic expansion and a weaker yen. The OPM improved from 18.9% in Q1 FY03/17 to 21.8%. The JPY/USD rate depreciated by JPY3 YoY from JPY109/USD to JPY112/USD.

### Causes of YoY changes

Sales and operating profit grew YoY on increased sales volume of liquid solder resist for printed wiring boards (contributed +JPY251mn to sales growth and +JPY128mn to operating profit); increased sales volume of dry film for semiconductor packages (+JPY260mn to sales, +JPY141mn to operating profit); and foreign-exchange impact and changes in the product mix (+JPY608mn to sales, +JPY306mn to operating profit).

### Sales by product category

Sales of high-function rigid board materials were JPY5.3bn (+10.1% YoY), general rigid board materials were JPY3.2bn (+1.6%), package substrate materials were JPY2.5bn (+18.1%), build-up board materials were JPY344mn (+25.1%), flexible printed circuit (FPC) board materials were JPY214mn (+32.9%), and other products were JPY869mn (+10.3%).

### Uses of the company's products

Main applications for the company's high-function rigid board materials are smartphones (high-end), tablets, and automotive (Japanese car manufacturers). General rigid board materials are used in consumer electronics such as LCD TVs. Package substrate materials are used in semiconductors. Build-up board materials are mainly used to plug holes, not for interlayer insulating at this point. FPC board materials still make up a small share of sales, but applications are expanding amid the trend toward miniaturization. Other product sales include sales by subsidiaries Chugai Kasei Co., Ltd. and Taiyo Green Energy Co., Ltd.

## Segment (regional) performance

Sales to external customers by region: Japan JPY2.5bn (+1.5% YoY, 19.7% of total); China JPY5.1bn (+6.4%, 40.8%); Taiwan, JPY1.6bn (+13.3%, 12.8%); South Korea, JPY2.3bn (+29.1%, 18.1%); and Others, JPY1.1bn (+8.6%, 8.5%).

Sales by region including intragroup sales: Japan, JPY4.7bn (+15.7% YoY, 30.0% of total); China, JPY5.2bn (+5.1%, 33.5%); Taiwan, JPY2.2bn (+11.4% 14.3%); South Korea, JPY2.4bn (+29.0%, 15.2%); and Others, JPY1.1bn (+9.3%, 6.9%).

OPM by region: Japan, 17.2%; China, 22.0%; Taiwan, 21.8%; South Korea 15.5%; and Others, 11.6%.

- In Japan, rigid printed wiring board (PWB) materials for automotive and other applications were solid, and semiconductor package substrate materials performed well, primarily for high-end smartphones
- In China and Taiwan, rigid printed wiring board materials for automotive components performed well
- In South Korea, automotive rigid printed wiring board materials slumped on declining market share of South Korean automobiles in China. However, package substrate materials for semiconductors performed well, primarily those for high-end smartphones.

Source: the company's securities report

## R&D expenses

R&D spending was JPY741mn (6.0% of sales, +21.9% YoY).

## Forecast revisions released with Q1 earnings announcement

Taiyo revised up its 1H and full-year FY03/18 forecasts. This reflected higher demand and a weaker yen versus initial forecasts. Taiyo revised its 1H currency assumptions from JPY100/USD to JPY111/USD, and from JPY100/USD to JPY106/USD for the full year. The company estimates the full-year impact of a JPY1/USD change in the forex rate at over JPY350mn on sales and over JPY150mn on operating profit.

The company increased its 1H and full-year sales forecasts by JPY1.8bn, from JPY23.2bn (-1.0% YoY) to JPY25.0bn (+6.6%) for 1H and from JPY46.4bn (-3.1%) to JPY48.2bn (+0.7%) for the full year. It raised 1H and full-year operating profit forecasts by JPY1.1bn, from JPY4.1bn (-10.0%) to JPY5.2bn (+14.1%) for 1H and from JPY8.1bn (-12.2%) to JPY9.2bn (-0.2%) for the full year. This means Taiyo left its 2H assumptions unchanged (with the assumption of JPY100/USD also unchanged).

Taiyo planned to use the funds (roughly JPY24.8bn) from the alliance with DIC (TSE1: 4631) to boost full-year capex to roughly JPY5bn. The company also aimed to maintain the R&D-to-sales ratio in line with the previous year at 6.8% (about JPY3.3bn) and forecast an OPM of 19.1%. The company expected depreciation expenses of roughly JPY2bn.

R&D expenses: Until the Kitakyushu Plant (completed in October 2015) begins full-scale operations, the plant's expenses will be included in R&D spending, meaning temporarily higher R&D expenses. Full-scale shipments are expected by the end of FY03/18, so from FY03/19, these expenses (roughly JPY800mn) will be shifted from R&D to cost of sales.

Source: Shared Research through company interviews

## Full-year company forecasts (as of Q1)

Income statement (JPYmn)	FY03/15	FY03/16	FY03/17			FY03/18						FY		Ref. (Old Est.)
	FY	FY	1H	2H	FY	Q1	Q2 Est.	1H Old Est.	1H New Est.	2H Old Est.	2H New Est.	Old Est.	New Est.	
Sales	48,260	49,843	23,442	24,424	47,866	12,425	12,575	23,200	25,000	23,200	23,200	46,400	48,200	49,700
YoY	9.1%	3.3%	-7.7%	-0.1%	-4.0%	9.9%	3.6%	-1.0%	6.6%	-5.0%	-5.0%	-3.1%	0.7%	3.8%
Gross profit	19,394	22,487	10,282	11,363	21,645	5,880								
YoY	22.2%	15.9%	-10.0%	2.7%	-3.7%	17.7%								
GPM	40.2%	45.1%	43.9%	46.5%	45.2%	47.3%								
SG&A expenses	10,139	11,522	5,725	6,699	12,424	3,166								
YoY	22.1%	13.6%	2.0%	13.4%	7.8%	10.9%								
SG&A ratio	21.0%	23.1%	24.4%	27.4%	26.0%	25.5%								
Operating profit	9,254	10,964	4,557	4,664	9,221	2,714	2,486	4,100	5,200	4,000	4,000	8,100	9,200	9,700
YoY	22.3%	18.5%	-21.5%	-9.6%	-15.9%	26.9%	2.8%	-10.0%	14.1%	-14.2%	-14.2%	-12.2%	-0.2%	5.2%
OPM	19.2%	22.0%	19.4%	19.1%	19.3%	21.8%	19.8%	17.7%	20.8%	17.2%	17.2%	17.5%	19.1%	19.5%
Non-operating income	376	265	134	100	234	53								
Non-operating expenses	101	100	89	164	253	84								
Recurring profit	9,529	11,129	4,602	4,600	9,202	2,683	2,417	4,000	5,100	4,000	4,000	8,000	9,100	9,600
YoY	21.7%	16.8%	-21.9%	-12.2%	-17.3%	24.6%	-1.3%	-13.1%	10.8%	-13.0%	-13.0%	-13.1%	-1.1%	4.3%
RPM	19.7%	22.3%	19.6%	18.8%	19.2%	21.6%	19.2%	17.2%	20.4%	17.2%	17.2%	17.2%	18.9%	19.3%
Extraordinary gains	406	40		575	575									
Extraordinary losses		32		1,021	1,021	19								
Pre-tax profit	9,920	11,137	4,602	4,154	8,756	2,664								
Income taxes	2,947	3,009	897	1,302	2,199	799								
Income taxes-current	2,670	2,855	1,466	1,122	2,588	1,025								
Income taxes-deferred	277	153	-569	181	-388	-225								
Implied tax rate	29.7%	27.0%	19.5%	31.3%	25.1%	30.0%								
Net income	6,972	8,128	3,705	2,852	6,557	1,865								
Net income attrib. to non-controlling interests	305	331	81	77	158	20								
Net income attrib. to owners of parent	6,667	7,796	3,623	2,775	6,398	1,844	1,756	2,800	3,600	2,800	2,800	5,600	6,400	6,700
YoY	35.2%	16.9%	-11.4%	-25.2%	-17.9%	-1.7%	0.5%	-23%	-1%	1%	1%	-12%	0%	5%
Net margin	13.8%	15.6%	15.5%	11.4%	13.4%	14.8%	14.0%	12.1%	14.4%	12.1%	12.1%	12.1%	13.3%	13.5%
JPY/USD	110.0	120.1	106.4		109.0	112.0		100.0	111.0	100.0	100.0	100.0	106.0	109.0

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

## FY03/17 full-year results

### Business environment

In North America, a gentle economic recovery continued amid ongoing robust personal consumption and a rebound in corporate investment. In Europe, despite several terrorist incidents, personal consumption was solid, underpinning a mild economic recovery. Meanwhile in China, a decline in housing investment growth and strong pressure to reduce excess production capacity was cause for caution about the future, but solid personal incomes underpinned growth. In Japan, while improvements lagged in some areas, a moderate economic recovery continued.

### Topics

- The forex (JPY/USD) rate was in line with assumptions (as of the forecast revision on January 24, 2017) at JPY109/USD (JPY120.1/USD in FY03/16)
- Slight YoY increase in full-year sales volumes
- Cost increase following completion of Kitakyushu Plant in September 2015
- Impairment loss on appraised real estate value of JPY1.0bn as management functions consolidated and relocated, so headquarters land and buildings likely to be idle in the future
- Entered a capital and business alliance with DIC

### Markets

In the electronic components industry, smartphone demand lost its previous vigor, but there was solid demand for automotive components.

### Overview

FY03/17 sales were JPY47.9bn (-4.0% YoY) and operating profit JPY9.2bn (-15.9%) with the declines primarily due to yen appreciation. The OPM fell from 22.0% to 19.3%. The forex rate rose by JPY11 to JPY109.0/USD from JPY120.1/USD.

### Factors in YoY growth

Factors in YoY sales growth: increased volumes of liquid solder resist for PWBs (+JPY624mn) and increased volumes of dry film for semiconductor packages (+JPY814mn) pushed up sales by a total of +JPY1.4bn. Still, forex and the product mix pulled down sales by JPY3.4bn.

Factors in operating profit growth: increased volumes of liquid solder resist for printed wiring boards (+JPY300mn) and increased volumes of dry film for semiconductor packages (+JPY427mn) pushed up operating profit by a total of +JPY727mn. Forex and a less favorable product mix pulled down sales by JPY2.5bn.

## Sales by product category

Sales by product category: high-function rigid JPY20.2bn (flat YoY), general rigid JPY13.0bn (-13.4%), package substrate materials JPY9.7bn (+3.2%), build-up materials JPY1.1bn (+6.3%), FPC materials JPY672mn (+3.2%), and other JPY3.2bn (-10.2%).

## Use of the company's products

High-function rigid materials are used mainly in high-end smartphones, tablets, and automotive (Japanese car manufacturers). General rigid materials are used mainly in PCs and LCD TVs. Package substrate materials are used in semiconductor packages. Build-up materials are mainly used for plugging holes and have not yet penetrated the interlayer insulation market. The company's flexible PWB materials still have a small market share, but applications are increasing amid the trend toward miniaturization. Other sales include some FPD materials sales, which were disclosed separately through FY03/16, and sales from Chugai Kasei (since FY03/16) and Taiyo Green Energy (since FY03/15).

## Performance by region

### Sales to external customers

▷ Japan	JPY9.4bn (-10.6% YoY, 19.7% of sales)
▷ China	JPY19.9bn (-3.7%, 41.6%)
▷ Taiwan	JPY6.1bn (-11.7%, 12.7%)
▷ South Korea	JPY8.5bn (+14.5%, 17.7%)
▷ Other	JPY4.0bn (-8.4%, 8.3%)

### Sales including intragroup sales

▷ Japan	JPY17.9bn (+5.4% YoY, 29.1% of sales)
▷ China	JPY20.6bn (-5.5%, 33.5%)
▷ Taiwan	JPY10.0bn (+1.9%, 16.3%)
▷ South Korea	JPY8.8bn (+14.0%, 14.3%)
▷ Other	JPY4.1bn (-8.4%, 6.6%)

## OPM

▷ Japan	11.3%
▷ China	22.2%
▷ Taiwan	14.8%
▷ South Korea	14.4%
▷ Other	13.1%

## Capital expenditures, depreciation, and R&D expenses

While capital spending for the Kitakyushu Plant has run its course, Taiyo plans to continue spending to strengthen existing businesses and develop new businesses. In FY03/17, capex was JPY1.7bn (-57.5% YoY), and depreciation was JPY2.5bn (+31.4%). R&D expenses were JPY3.2bn (+32.5%), at 6.8% of sales.

Note about R&D expenses: Until the company's Kitakyushu Plant (completed in October 2015) begins full-scale operations, its expenses are included in R&D spending, boosting them temporarily in FY03/17. Full-scale shipments are expected by the end of FY03/18, so from FY03/19, these expenses (roughly JPY800mn) will be shifted from R&D to cost of sales.

Source: Confirmed by Shared Research through company interviews

## Extraordinary loss

There was impairment loss on real estate appraisal value of JPY1.0bn as management functions consolidated and relocated, so headquarters land and buildings are likely to be idle in the future.

## Balance sheet

Due to the capital and business alliance with DIC, cash and deposits rose by JPY27.4bn YoY to JPY48.8bn, capital by JPY3.0bn to JPY9.2bn, and capital reserves by JPY7.5bn to JPY14.8bn. As a result, total assets rose by JPY26.9bn to JPY92.4bn.

## Income statement

Income statement (JPYmn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
<b>Sales</b>	<b>45,338</b>	<b>32,614</b>	<b>35,056</b>	<b>40,366</b>	<b>39,797</b>	<b>36,184</b>	<b>44,224</b>	<b>48,260</b>	<b>49,843</b>	<b>47,866</b>	<b>52,241</b>
YoY	8.1%	-28.1%	7.5%	15.1%	-1.4%	-9.1%	22.2%	9.1%	3.3%	-4.0%	9.1%
Cost of sales	29,512	22,635	24,123	28,428	29,822	25,319	28,348	28,865	27,355	26,220	27,304
YoY	8.8%	-23.3%	6.6%	17.8%	4.9%	-15.1%	12.0%	1.8%	-5.2%	-4.1%	4.1%
Cost ratio	65.1%	69.4%	68.8%	70.4%	74.9%	70.0%	64.1%	59.8%	54.9%	54.8%	52.3%
<b>Gross profit</b>	<b>15,826</b>	<b>9,979</b>	<b>10,932</b>	<b>11,938</b>	<b>9,974</b>	<b>10,864</b>	<b>15,875</b>	<b>19,394</b>	<b>22,487</b>	<b>21,645</b>	<b>24,937</b>
YoY	6.7%	-36.9%	9.6%	9.2%	-16.5%	8.9%	46.1%	22.2%	15.9%	-3.7%	15.2%
GPM	34.9%	30.6%	31.2%	29.6%	25.1%	30.0%	35.9%	40.2%	45.1%	45.2%	47.7%
SG&A expenses	6,930	6,647	6,089	6,557	5,933	6,479	8,307	10,139	11,522	12,424	13,599
YoY	0.9%	-4.1%	-8.4%	7.7%	-9.5%	9.2%	28.2%	22.1%	13.6%	7.8%	9.5%
SG&A ratio	15.3%	20.4%	17.4%	16.2%	14.9%	17.9%	18.8%	21.0%	23.1%	26.0%	26.0%
<b>Operating profit</b>	<b>8,896</b>	<b>3,332</b>	<b>4,843</b>	<b>5,380</b>	<b>4,040</b>	<b>4,385</b>	<b>7,568</b>	<b>9,254</b>	<b>10,964</b>	<b>9,221</b>	<b>11,337</b>
YoY	11.7%	-62.5%	45.3%	11.1%	-24.9%	8.5%	72.6%	22.3%	18.5%	-15.9%	22.9%
OPM	19.6%	10.2%	13.8%	13.3%	10.2%	12.1%	17.1%	19.2%	22.0%	19.3%	21.7%
Non-operating income	381	343	234	139	132	382	299	376	265	234	214
Interest income	224	186	63	55	50	88	103	113	103	57	78
Dividends received	85	45	115	16	22	61	46	13	8	39	18
Foreign exchange gains						149	23	127	24	14	
Others	72	112	56	68	60	84	127	123	130	124	118
Non-operating expenses	690	129	289	203	145	24	40	101	100	253	352
Interest expenses	6	8	1	3	2	1	32	30	69	86	127
Commission fee	3	6	6							101	0
Foreign exchange losses	661	91	276	177	125						208
Others	20	24	6	23	18	23	8	71	31	66	17
<b>Recurring profit</b>	<b>8,586</b>	<b>3,546</b>	<b>4,787</b>	<b>5,316</b>	<b>4,027</b>	<b>4,743</b>	<b>7,827</b>	<b>9,529</b>	<b>11,129</b>	<b>9,202</b>	<b>11,199</b>
YoY	3.9%	-58.7%	35.0%	11.1%	-24.2%	17.8%	65.0%	21.7%	16.8%	-17.3%	21.7%
RPM	18.9%	10.9%	13.7%	13.2%	10.1%	13.1%	17.7%	19.7%	22.3%	19.2%	21.4%
Extraordinary gains	31	564	32	3	1	28	118	406	40	575	40
Extraordinary losses	47	1,653	9	111	467	73			32	1,021	3,298
<b>Pre-tax profit</b>	<b>8,571</b>	<b>2,457</b>	<b>4,811</b>	<b>5,208</b>	<b>3,561</b>	<b>4,698</b>	<b>7,593</b>	<b>9,920</b>	<b>11,137</b>	<b>8,756</b>	<b>7,941</b>
Income taxes	2,160	408	1,695	1,694	1,005	1,264	2,393	2,947	3,009	2,199	3,016
Income taxes—current	2,038	1,400	1,257	1,897	1,002	1,430	1,908	2,670	2,855	2,588	3,040
Income taxes—deferred	121	-992	438	-202	3	-166	485	277	153	-388	-24
Implied tax rate	25.2%	16.6%	35.2%	32.5%	28.2%	26.9%	31.5%	29.7%	27.0%	25.1%	38.0%
Net income	6,410	2,049	3,114	3,514	2,555	3,434	5,199	6,972	8,128	6,557	4,925
Net income attributable to non-controlling interests	239	91	104	111	52	67	269	305	331	158	69
<b>Net income attributable to owners of parent</b>	<b>6,171</b>	<b>1,958</b>	<b>3,010</b>	<b>3,402</b>	<b>2,502</b>	<b>3,367</b>	<b>4,930</b>	<b>6,667</b>	<b>7,796</b>	<b>6,398</b>	<b>4,856</b>
YoY	11.1%	-68.3%	53.7%	13.0%	-26.5%	34.6%	46.4%	35.2%	16.9%	-17.9%	-24.1%
Net margin	13.6%	6.0%	8.6%	8.4%	6.3%	9.3%	11.1%	13.8%	15.6%	13.4%	9.3%
USD/JPY	114.1	100.6	93.0	85.8	79.3	83.2	100.0	110.0	120.1	109.0	111.0
Per share data (JPY)	300	217	171	68	70	148	117	96	42	-91	-31
Shares issued (year end; '000)	-309	214	-55	-64	-13	358	259	275	165	-19	-138
Treasury shares (year end: '000)	-16	-1,089	23	-108	-466	-45	118	406	8	-446	-3,258

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

Following the slump triggered by the global financial crisis in FY03/09, it took seven years until Taiyo again posted record profits in FY03/16. The company's OPM has been steady at around 20% in the three years from FY03/15 due to a shift in the product mix to high value-added products and cost reductions following the shift to overseas production. Over this timeframe R&D spending increased by roughly 3x, employee numbers by around 50% (note: includes effect of consolidating OTC), and costs to improve the workplace environment increased, driving up SG&A expenses. Sales and operating profit per employee were not diluted and OPM improved. This is a result of R&D and progress in changing employee mindsets.

In May 2013, the company purchased its Taiwanese competitor OTC (Onstatic Technology), and in June 2015 it acquired Chugai Kasei, and both were made consolidated subsidiaries. The company and OTC had engaged in fierce price competition, but Taiyo said that selling prices stabilized after the acquisition. It acquired Chugai Kasei to access its R&D capabilities of upstream materials, and to streamline its R&D structure. In January 2017 Taiyo entered a capital and business alliance with DIC, and plans to use the funds from the tie-up for capex, acquisitions, and R&D.



## Balance sheet

Balance sheet (JPYmn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
<b>Assets</b>											
Cash and cash equivalents	16,440	13,812	14,174	13,972	12,964	14,652	21,150	19,766	21,408	48,800	44,588
Notes and accounts receivable	9,532	6,644	9,173	8,792	8,452	8,199	11,891	13,111	12,836	13,346	15,509
Merchandise and products	4,262	1,356	1,944	1,860	2,154	1,816	2,227	2,348	2,013	2,182	3,499
Work in process	0	187	255	185	199	195	319	291	410	437	405
Raw materials and supplies	0	1,403	1,646	2,075	1,894	1,674	1,841	1,886	1,593	1,797	2,042
Deferred tax assets	145	548	103	282	63	93	90	99	72		
Others	949	377	538	622	750	453	490	778	1,345	936	2,456
Allowance for doubtful accounts	-256	-450	-321	-177	-98	-105	-272	-341	-339	-99	-127
<b>Total current assets</b>	<b>31,057</b>	<b>23,880</b>	<b>27,516</b>	<b>27,675</b>	<b>26,380</b>	<b>26,979</b>	<b>37,798</b>	<b>37,942</b>	<b>39,340</b>	<b>67,401</b>	<b>68,373</b>
<b>Total tangible fixed assets</b>	<b>15,889</b>	<b>14,644</b>	<b>13,954</b>	<b>13,050</b>	<b>12,546</b>	<b>12,664</b>	<b>14,375</b>	<b>16,865</b>	<b>19,644</b>	<b>18,389</b>	<b>17,923</b>
Goodwill	124	85	47	20	48	29	4,745	4,849	4,432	4,104	674
Sales rights											20,555
Others	318	383	342	284	310	318	399	478	486	433	589
<b>Total intangible fixed assets</b>	<b>442</b>	<b>468</b>	<b>389</b>	<b>304</b>	<b>358</b>	<b>347</b>	<b>5,144</b>	<b>5,327</b>	<b>4,919</b>	<b>4,537</b>	<b>21,818</b>
Investment securities	997	640	572	529	497	587	748	361	656	1,058	2,231
Shares and investments in capital of affiliates	125	990	990	980	628	3,200	19	39	39	19	19
Deferred tax assets	7	10	38	88	56	72	16	63	97	230	264
Net defined retirement benefit asset	0	0	0	0	0	0	0	339	356	332	326
Others	537	271	413	580	607	578	267	302	413	570	677
Allowance for doubtful accounts	-148	-39	-171	-358	-373	-408	-1	-1	-1	-154	-144
<b>Investments and other assets</b>	<b>1,520</b>	<b>1,876</b>	<b>1,843</b>	<b>1,821</b>	<b>1,417</b>	<b>4,032</b>	<b>1,050</b>	<b>1,106</b>	<b>1,561</b>	<b>2,057</b>	<b>3,374</b>
<b>Total fixed assets</b>	<b>17,863</b>	<b>16,989</b>	<b>16,187</b>	<b>15,175</b>	<b>14,322</b>	<b>17,043</b>	<b>20,570</b>	<b>23,298</b>	<b>26,124</b>	<b>24,984</b>	<b>43,116</b>
<b>Total assets</b>	<b>48,938</b>	<b>40,869</b>	<b>43,704</b>	<b>42,851</b>	<b>40,703</b>	<b>44,023</b>	<b>58,369</b>	<b>61,241</b>	<b>65,464</b>	<b>92,386</b>	<b>111,490</b>
<b>Liabilities</b>											
Notes and accounts payable	5,898	3,005	5,482	5,326	4,851	4,486	5,433	5,661	5,765	6,170	7,769
Short-term debt	0	0	0	0	0	0	534	729	932	1,274	2,145
Current portion of long-term debt	0	0	0	0	0	0	0	340	440	500	6,116
Accounts payable-other and accrued expenses	848	1,726	705	1,193	896	921	1,633	2,345	1,697	1,210	1,853
Income taxes payable	748	249	400	608	190	508	562	1,139	776	884	1,448
Deferred tax liabilities	3	0	221	190	87	253	286	403	412		
Provision for bonuses	388	269	311	261	268	353	413	387	398	436	510
Others	70	51	51	100	97	198	71	48	476	877	648
<b>Total current liabilities</b>	<b>7,959</b>	<b>5,303</b>	<b>7,172</b>	<b>7,681</b>	<b>6,393</b>	<b>6,724</b>	<b>8,936</b>	<b>11,056</b>	<b>10,898</b>	<b>11,355</b>	<b>20,491</b>
Deferred tax liabilities	1,304	703	547	597	429	173	701	1,069	1,258	1,387	1,458
Long-term debt	0	0	0	0	0	0	5,658	7,685	7,413	7,169	15,923
Net defined retirement liabilities	529	271	288	318	307	226	326	10	116	127	116
Asset retirement obligations	0	0	0	52	53	54	54	55	331	352	397
Others	4	6	10	15	42	33	34	50	194	147	79
<b>Total fixed liabilities</b>	<b>1,839</b>	<b>981</b>	<b>845</b>	<b>983</b>	<b>833</b>	<b>488</b>	<b>6,776</b>	<b>8,872</b>	<b>9,315</b>	<b>9,184</b>	<b>17,975</b>
<b>Total liabilities</b>	<b>9,798</b>	<b>6,285</b>	<b>8,018</b>	<b>8,664</b>	<b>7,227</b>	<b>7,213</b>	<b>15,713</b>	<b>19,929</b>	<b>20,214</b>	<b>20,540</b>	<b>38,467</b>
<b>Net assets</b>											
Capital stock	6,134	6,134	6,134	6,134	6,134	6,134	6,134	6,134	6,188	9,171	9,232
Capital surplus	7,102	7,102	7,102	7,102	7,102	7,102	7,102	7,143	7,304	14,824	14,717
Retained earnings	32,519	27,985	28,661	29,724	29,301	30,379	32,257	36,997	42,490	46,308	47,415
Treasury stock	-6,137	-4,060	-4,060	-5,372	-5,372	-5,372	-5,373	-14,598	-14,141	-178	-121
<b>Total shareholders' equity</b>	<b>39,618</b>	<b>27,985</b>	<b>37,838</b>	<b>37,589</b>	<b>37,166</b>	<b>38,243</b>	<b>40,120</b>	<b>35,676</b>	<b>41,841</b>	<b>70,125</b>	<b>71,244</b>
Accumulated other comprehensive income	-1,215	-3,100	-2,832	-4,098	-4,168	-2,038	489	3,396	1,274	938	1,415
Non-controlling interests	737	522	679	696	478	604	2,045	2,238	2,135	782	363
<b>Total net assets</b>	<b>39,140</b>	<b>34,584</b>	<b>35,685</b>	<b>34,186</b>	<b>33,476</b>	<b>36,809</b>	<b>42,655</b>	<b>41,312</b>	<b>45,250</b>	<b>71,846</b>	<b>73,023</b>
<b>Total liabilities</b>	<b>48,938</b>	<b>40,869</b>	<b>43,704</b>	<b>42,851</b>	<b>40,703</b>	<b>44,023</b>	<b>58,369</b>	<b>61,241</b>	<b>65,464</b>	<b>92,386</b>	<b>111,490</b>
Capital expenditures	1,414	1,238	445	527	682	605	2,555	3,321	4,055	1,722	22,513
Depreciation	1,529	1,396	1,261	1,127	1,046	1,003	1,181	1,411	1,891	2,485	2,284
Amortization of goodwill	28	38	38	26	14	18	168	253	280	241	3,535
R&D expenses	877	979	1,016	995	963	1,199	1,594	2,213	2,441	3,235	
Working capital	7,896	6,585	7,536	7,586	7,848	7,398	10,845	11,975	11,087	11,592	13,686
Total interest-bearing debt	0	0	0	0	0	0	6,192	8,754	8,785	8,943	24,184
Net debt	-16,440	-13,812	-14,174	-13,972	-12,964	-14,652	-14,958	-11,012	-12,623	-39,857	-20,404

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

## Assets

Tangible fixed assets declined in the wake of the global financial crisis, but started growing again from FY03/13. Management has been proactive, buying OTC, constructing the Kitakyushu Plant, and establishing Taiyo Green Energy. The company has continued to operate effectively debt-free, and is cash-rich following the financial tie-up with DIC.

## Liabilities

Taiyo has USD-denominated assets, and in these past few years of low interest rates it has accumulated USD-denominated liabilities as a forex hedge.

## Net assets

Net assets have been on an uptrend in line with the company's business performance recovery. At end-FY03/17, following DIC's capital participation, net assets increased by JPY26.6bn YoY to JPY71.8bn. Shareholders' equity ratio was 76.9% at end-FY03/17.

## Statement of cash flows

Statement of cash flows (JPYmn)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
Cash flows from operating activities (1)	9,241	4,581	3,126	4,575	2,793	6,109	7,020	9,232	10,546	9,042	8,100
Cash flows from investing activities (2)	-3,390	-1,470	-70	758	-1,343	-2,477	-3,839	-2,913	-6,750	-1,063	-24,161
<b>Free cash flow (1+2)</b>	<b>5,851</b>	<b>3,111</b>	<b>3,056</b>	<b>5,333</b>	<b>1,450</b>	<b>3,632</b>	<b>3,181</b>	<b>6,319</b>	<b>3,796</b>	<b>7,979</b>	<b>-16,061</b>
Cash flows from financing activities	-1,969	-4,428	-2,366	-3,696	-2,978	-2,314	2,350	-9,919	-2,740	20,342	11,319
Depreciation and goodwill amortization (A)	1,557	1,434	1,299	1,153	1,060	1,021	1,349	1,664	2,171	2,726	5,819
Capital expenditures (B)	1,161	766	406	454	578	548	2,436	3,192	3,897	1,645	22,513
Change in working capital (C)	-2,209	-1,311	951	50	262	-450	3,447	1,130	-888	505	2,094
<b>Simple FCF (NI+A-B-C)</b>	<b>8,776</b>	<b>3,937</b>	<b>2,952</b>	<b>4,051</b>	<b>2,722</b>	<b>4,290</b>	<b>396</b>	<b>4,009</b>	<b>6,958</b>	<b>6,974</b>	<b>-13,932</b>
Working capital	7,896	6,585	7,536	7,586	7,848	7,398	10,845	11,975	11,087	11,592	13,686

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

## Cash flows from operating activities

Cash flows from operating activities move more or less in line with pretax profit and depreciation, but as fluctuations in pretax profit accompany fluctuations in sales, some of the correlation is offset by changes in working capital.

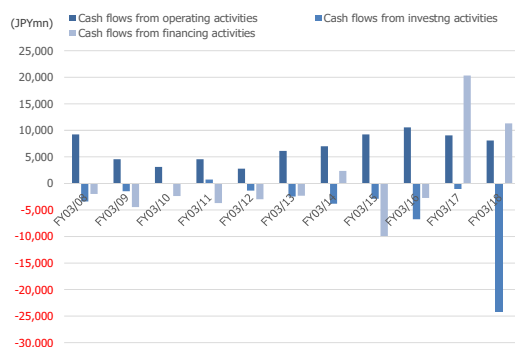
## Cash flows from investing activities

Taiyo has been investing actively in renewing existing facilities, building the Kitakyushu Plant, making acquisitions, and entering new businesses. Investments are expected to remain at high levels as the company uses M&A and other means to become a comprehensive chemical company.

## Cash flows from financing activities

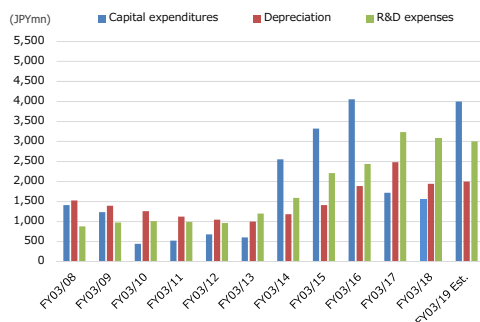
Cash inflows were JPY20.3bn in FY03/17 due to the disposal of treasury stock and share placement to DIC. As the company does not increase interest-bearing debt other than for USD-hedging purposes, net debt is negative (Taiyo has maintained a cash-rich position). As the company works to transform into a comprehensive chemical company, there will be increasing need to consider the balance between capital efficiency, investments, and returns to shareholders.

### Cash flows



Source: Shared Research based on company data

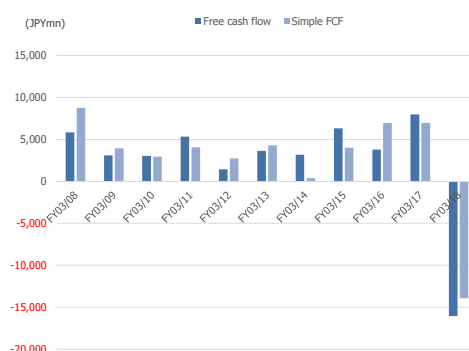
### Capital expenditures, depreciation, and R&D expenses



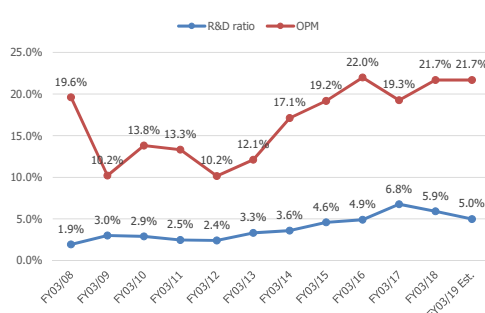
Source: Shared Research based on company data

Note: Does not include capex and amortization related to the marketing and manufacturing rights of 13 long-listed products (below left graph).

### FCF and simple FCF



### R&D ratio and OPM



## News and topics

### February 2018

On **February 2, 2018**, the company announced a revision to its full-year forecast, as detailed below:

- ▷ Sales: JPY51.3bn (versus JPY50.0bn previously)
- ▷ Operating profit: JPY10.8bn (JPY10.2bn)
- ▷ Recurring profit: JPY10.7bn (JPY10.1bn)
- ▷ Net income\*: JPY7.6bn (JPY7.0bn)
- ▷ EPS: JPY263.81 (JPY243.50)

\*Net income attributable to owners of parent

Explaining the revision, the company said demand is running ahead of its initial expectations and the yen is also weaker than expected.

The company said that the impact of the execution of the asset transfer (announced on January 5, 2018) under the agreement it had entered into with Chugai Pharmaceutical and F. Hoffmann-La Roche regarding the transfer of marketing and manufacturing rights of 13 long-listed products had not yet been determined and was therefore not reflected in the revisions to its full-year forecast.

### November 2017

On **November 14, 2017**, the company announced that it entered into an agreement with Chugai Pharmaceutical Co., Ltd. (TSE1: 4519) and F. Hoffmann-La Roche, Ltd. regarding the transfer of marketing and manufacturing rights of 13 long-listed products. Chugai and Roche will transfer the marketing authorizations including marketing and manufacturing rights of 13 long-listed products manufactured and marketed in Japan by Chugai, to Taiyo Pharma Co., Ltd., a wholly owned subsidiary of Taiyo Holdings. The manufacturing and marketing rights will be transferred to Taiyo Pharma for JPY21.3bn plus the value of inventories. Click [here](#) for the official press release.

### June 2017

On **June 22, 2017**, the company announced the establishment of a subsidiary, Taiyo Pharma, to develop, manufacture, and sell drugs and quasi-drugs.

On **June 21, 2017**, the company relocated headquarters. New headquarters location: 388 Ohkura, Ranzan-machi, Hiki-gun, Saitama.

On **June 7, 2017**, the company unveiled a new three-year management plan starting in FY03/18, entitled "Next Stage 2020."

### February 2017

On **February 10, 2017**, the company announced the completion of procedures for payment regarding new share issue by a third-party allotment and disposal of treasury stock.

### January 2017

On **January 25, 2017**, the company announced upward revision to forecast for year-end dividend per share.

On **the same day**, the company announced business and capital alliance with DIC, new share issue by third party allotment, and disposal of treasury stock.

## Other information

### History

1953	September	Taiyo Ink Mfg. Co., Ltd. established
1970	August	Starts sales of printed wiring board (PWB) materials
1973	May	Develops and sells epoxy resin thermal curable one-component solder resist
1976		Major change in strategy to position solder resist as the core business driver
1982	March	Establishes Ranzan Plant (current Ranzan Facility)
1984	June	Announced liquid photoimageable SR at a JPCA tradeshow
1988	September	Establishes Taiyo Ink Mfg. Co., (Korea) Ltd., a joint-venture in South Korea
		Starts overseas production
1990	March	Constructs Technology Development Center at the Ranzan Facility
	September	Listed as an over-the-counter (OTC) stock
	December	Establishes a sales subsidiary Taiyo America, Inc. in Nevada, US
1992	February	Starts research and development of PDP materials
	March	Relocates the head office to a new building in Nerima, Tokyo
	January	Develops and sells solder resist for package substrates (in particular, SR for BGA)
	November	Basic patent for alkaline photoimageable solder resist registered in Japan
1994	December	Obtains ISO 9001 certification for the head office and the Ranzan Facility
1995	February	Makes Taiyo America, Inc. a manufacturing and sales subsidiary, and starts production
1996	September	Establishes a production subsidiary Taiwan Taiyo Ink Co., Ltd.
1999	January	Establishes sales subsidiaries Taiyo Ink International (Singapore) Pte. Ltd. and Taiyo Ink International (HK) Ltd.
2000	January	Obtains certification of QS 9000 for the head office and Ranzan Facility, and ISO 14001 for Ranzan Facility
2001	January	Listed on the First Section of Tokyo Stock Exchange
	April	Opens Ranzan-Kitayama Facility as the main domestic production base
	July	Establishes a technology support subsidiary Taiyo Ink (Thailand) Co., Ltd.
	December	Establishes a production subsidiary Taiyo Ink (Suzhou) Co., Ltd. in China
2003	January	Obtains ISO 14001 certification for the head office and Ranzan Facility
	September	Observes the 50th anniversary
2005		Expand sales of PDP materials
2010	September	Establishes sales subsidiary Taiyo Ink Trading (Shenzhen) Co., Ltd.
	October	Implements a company split and changes the trading name to Taiyo Holdings Co., Ltd.
2013	May	Acquires shares of Onstatic Technology Co., Ltd. in Taiwan and makes it a subsidiary
2014	December	Establishes solar power generation subsidiary Taiyo Green Energy Co., Ltd.
2015	April	Establishes a Taiyo Ink Products Co., Ltd., a sales subsidiary of Taiyo Ink Mfg. Co., Ltd.
	June	Obtains shares of Chugai Kasei Co., Ltd. through a stock swap and makes it a subsidiary
	October	Opens Kitakyushu Facility in Kitakyushu, Fukuoka, as the second production base for Taiyo Ink Mfg. Co., Ltd.
2017	January	Enters a capital and business alliance with DIC Corporation
	August	Establishes pharmaceuticals development and sales subsidiary Taiyo Pharma Co., Ltd.
	November	Enters an agreement for the transfer of manufacturing and marketing rights of 13 long-listed products from Chugai to Taiyo Pharma

Source: Shared Research based on company data

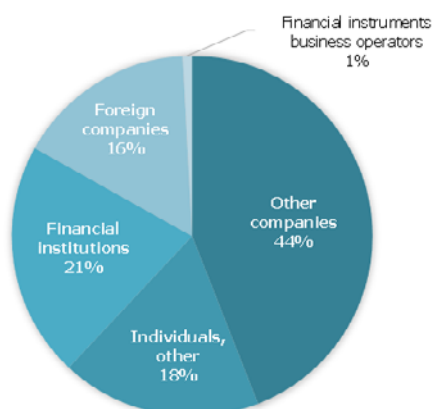
## Major shareholders

Major shareholders	Shares held ('000)	Shareholding ratio
DIC Corporation	5,617	19.46%
KOWA Co., Ltd.	5,136	17.79%
Japan Trustee Services Bank, Ltd. (Trust account)	1,475	5.11%
Japan Trustee Services Bank, Ltd. (Sumitomo Mitsui Trust Bank Retirement Benefit Trust Account re-entrusted by Sumitomo Mitsui Trust Bank)	1,116	3.86%
Misaki Engagement Master Fund	960	3.32%
The Master Trust Bank of Japan, Ltd. (Trust account)	919	3.18%
Shikoku Chemicals Corporation	745	2.58%
Toshin Yushi Co., Ltd.	538	1.86%
Mitsuo Kawahara	500	1.73%
Takato Kawahara	487	1.68%
<b>Total</b>	<b>17,496</b>	<b>60.61%</b>
Treasury shares	40	0.14%
<b>Total shares issued</b>	<b>28,865</b>	<b>100.00%</b>

Source: Shared Research based on company data as of September 30, 2017

Note: Figures may differ from company materials due to differences in rounding methods.

### Shareholders by investor type



Source: Shared Research based on company data as of September 30, 2017

## Dividend policy

Dividends (JPY)	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17	FY03/18
	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.	Cons.
DPS	115.0	90.0	90.0	115.0	90.0	90.0	120.0	90.0	110.0	120.1	160.2
Payout ratio	49.3%	121.2%	77.5%	87.3%	91.5%	68.0%	61.9%	34.1%	32.5%	45.1%	95.0%
DOE	8.1%	6.5%	6.8%	8.6%	6.9%	6.6%	7.9%	5.5%	6.2%	5.5%	6.4%

Source: Shared Research based on company data

Note: Figures may differ from company materials due to differences in rounding methods.

The company's medium-term management plan targets a DOE of at least 5%. This is because Taiyo aims to pay a stable dividend not subject to fluctuations in earnings. Taiyo does not have a particular payout ratio policy, but rather focuses on the DOE.

## Top management

### President and Representative Director, CEO, Eiji Sato

Born May 3, 1969

April 1992	Joins Tohmatsu (a DRT International company, now Deloitte Touche Tohmatsu LLC)
July 1995	Opens Eiji Sato Certified Public Accountant Office
October 1999	Establishes es Networks Co., Ltd., and becomes President and Representative Director
May 2001	Becomes the auditor for Taiwan Taiyo Ink Co., Ltd.
June 2008	Director, Taiyo Holdings Co., Ltd.
October 2009	Executive Officer and Group CFO of Taiyo Holdings Co., Ltd.
April 2010	Vice President and Representative Director, Taiyo Holdings Co., Ltd.
March 2011	Director, es Holdings Co., Ltd. (now es Networks Co., Ltd.; current position)
April 2011	President and Representative Director, Taiyo Holdings Co., Ltd. (present position) and Group CEO (current position)
April 2014	President and Representative Director, Taiyo Ink Co., Ltd. (current position)

Co-author of "Corporate Management by CFO" (with Shintaro Suhara), 2010 (published in Japanese)

Source: Shared Research based on company data

CEO Sato argues (in a book he co-authored called *Corporate Management by CFO*) that a CFO's financial perspective is crucial to cope with complexities dealing with all stakeholders. He states that companies should be managed by a unified CEO, COO, and CFO. The roles are clearly delineated as the CEO looks at finances from a business perspective, whereas the CFO looks at the business from a financial perspective. Sato also states that unlike a traditional finance manager or accounting manager, a CFO must maintain a longer-term outlook of the company's finances while also looking at the business.

Shuichi Omi, who holds CPA qualifications in Japan and Vietnam, acts as a kind of CFO in his capacity as executive officer and general manager, administration division.

## Employees

Per employee data	FY03/08	FY03/09	FY03/10	FY03/11	FY03/12	FY03/13	FY03/14	FY03/15	FY03/16	FY03/17
Number of employees	775	793	807	840	861	858	1,148	1,122	1,202	1,249
Avg. temporary employees (not included in above)	123	61								
Japan				222	219	207	238	232	302	326
China				274	290	298	464	437	422	418
Taiwan				108	107	111	224	223	234	249
Korea				102	108	111	114	108	118	124
Others				41	40	39	41	42	46	47
Company-wide				93	97	92	67	80	80	85
Sales per employee (JPYmn)	50.5	38.2	43.4	48.1	46.2	42.2	38.5	43.0	41.5	38.3
Operating profit per employee (JPYmn)	9.9	3.9	6.0	6.4	4.7	5.1	6.6	8.2	9.1	7.4

Source: Shared Research based on company materials.

Note: Employees noted as company-wide (shared) are those who work for the holding company (the company). Onstatic Technology (OTC) was consolidated in FY03/14.

Employee numbers have been growing consistently since FY03/08, even in the wake of the global financial crisis. The company boosted its workforce chiefly in Asia accompanying the shift to overseas production and increase in overseas sales offices. Taiyo said it hires personnel of various nationalities at the head office in Japan, and there were 85 non-Japanese employees at headquarters as of March 31, 2017, accounting for over 8% of head office employees.



## Corporate philosophy and CSR initiatives

### Speed and communication

CEO Sato prioritizes speed and communication. The market changes extremely quickly so swift decision-making is key, only made possible by delegating authority to subsidiaries. On the other hand, too much delegation puts group cohesiveness at risk. To prevent this, Taiyo emphasizes global communication, and was developing employees who can thrive in a global setting and recruiting non-japanese employees to work at the head office (85 non-japanese employees or over 8% as of March 31, 2017).

### Developing proactive human resources

CEO Sato says the company is working to develop proactive employees. The company's history has embodied the principle that building things requires developing people, and Taiyo sees employees as its true growth driver. At the company's Suzhou China subsidiary, only a few of its 250 employees leave every year, and there is almost zero turnover at the Taiwan subsidiary. This high retention rate is a reflection of the company's human resources management.

### Corporate social responsibility and quality control

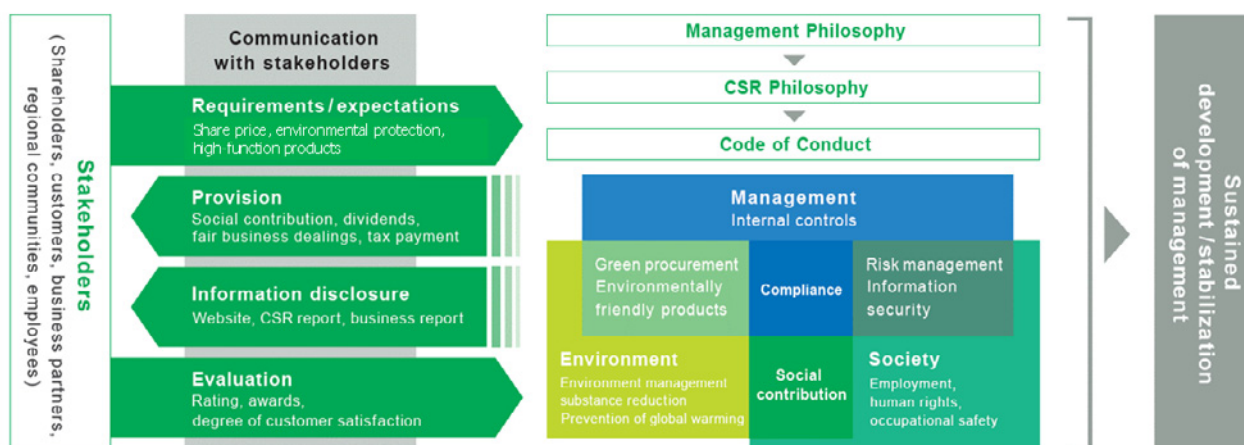
Because Taiyo is in the chemical industry, it pays special attention to protecting the environment for residents near its factories. The company is working to achieve a balance between the wealth generated by chemical substances and the impact on the global environment and human health by creating products that are high-function and do not put a heavy burden on the environment. Taiyo employs management systems based on ISO 9001:2008 and conducts quality assurance, quality control, and quality improvement activities.

**Corporate philosophy:** "Realize a pleasant society by further advancing every technology the Group has and creating a wide range of products to help fulfill the dreams for the whole world with our innovative products."

**CSR philosophy:** "We will discharge our corporate social responsibility with regard to the achievement of our management philosophy, including complying with the law, protecting the environment, ensuring thorough quality management, and contributing to society."

Source: Company materials

#### Corporate philosophy, CSR philosophy, and Code of Conduct



Source: Company materials. Refer to the company's annual report for further details on CSR initiatives: [http://www.taiyo-hd.co.jp/en/environment\\_csr/csr/](http://www.taiyo-hd.co.jp/en/environment_csr/csr/)

## Glossary

### Solder resist

Solder resist is a resist ink that covers the surface of printed wiring boards (PWBs) and protects the circuit patterns. A key role of solder resist is to prevent solder from adhering to areas where it is not needed when components are mounted on the substrate. At the same time, solder resist also acts as a permanent protective coating, protecting the circuit pattern from dust, heat, and moisture as well as insulating the circuitry. (Source: Company materials)

### FPD (Flat Panel Display)

A generic term for liquid crystal displays (LCDs) and other thin displays. (Source: Company materials)

### Rigid board

A printed wiring board (PWB) made with a rigid insulated substrate. A motherboard is a rigid board, primarily installed inside electronic devices, which is mounted with LSIs, resistors, capacitors, and other components. Marking ink, meanwhile, is printed onto a PWB to indicate the names and predetermined positions of the electronic components to be mounted. (Source: Company materials)

### Package substrate

A type of printed wiring board used as an interposer when mounting dies (blocks of semiconducting materials on which a circuit is fabricated) such as computer CPUs, smartphone APs (application processors), or memory. (Source: Company materials)

### Flexible printed circuit (FPC) board

A soft, flexible board made from polyester or polyimide film coated with copper foil. (Source: Company materials)

### Build-up

Build-up refers to a method of manufacturing heavily layered PWBs by alternately laminating insulated and conductive layers on a core board (or base board). The ink used to fill conductive holes in a core board is called hole-plugging ink. The laminated insulation is called interlayer insulation. (Source: Company materials)

### FOWLP (Fan Out Wafer Level Package)

A type of semiconductor component package that helps minimize the area required when mounting a highly integrated chip on a PWB. The predecessor of FOWLP was wafer level chip scale package (WLCSP), which had the same area for both the package area and the semiconductor die. In FOWLP, the package area is larger than the area for the semiconductor die. The terminals can be “fanned out” to the edges of the chip, enabling applications that require a larger number of terminals relative to the die area. In contrast to WLCSP, there is no package substrate in FOWLP, and instead, a redistribution layer is made in semiconductor manufacturing processes to connect chip terminals with external terminals. FOWLP is thinner, as package substrate is not needed, and the wiring is short so inductance and capacitance are low, leading to high-speed signal transmission. Manufacturing costs should be lower due to lack of package substrate.

### Printed wiring board processes

- **Subtractive process:** Starts with copper clad laminate, and then removes the unneeded copper foil by dissolving it with a chemical, leaving the desired pattern. Dissolving the copper foil with chemicals is also known as etching, and is the mainstream printed circuit board manufacturing process.
- **Additive process:** Starts with a laminate with no copper foil on it, then precipitating and fixing the conductive material to form the desired conductive pattern.

\*Other than these, there are conductive paste printing and semi-additive processes. (Source: Based on OK Print materials)

## Profile

Company Name	Head Office
Taiyo Holdings Co., Ltd.	2-7-1 Hazawa, Nerima-ku, Tokyo 176-8508, Japan
Phone	Listed On
+81-3-5999-1511	Tokyo Stock Exchange First Section
Established	Exchange Listing
September 29, 1953	January 18, 2001
Website	Fiscal Year-End
<a href="https://www.taiyo-hd.co.jp/en/">https://www.taiyo-hd.co.jp/en/</a>	March
IR Contact	IR Web
Planning Section, Accounting and Finance Department, Administrative Division	<a href="https://www.taiyo-hd.co.jp/en/investor/">https://www.taiyo-hd.co.jp/en/investor/</a>

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Axell Corporation	Intelligent Wave, Inc.	SHIP HEALTHCARE HOLDINGS, INC.
Azbil Corporation	istyle Inc.	Showcase-Tv Inc.
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Chiyoda Co., Ltd.	Kenedix, Inc.	Synchro Food Co., Ltd.
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cocokara fine Inc.	LAC Co., Ltd.	Takashimaya Company, Limited
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CREEK & RIVER Co., Ltd.	Medical System Network Co., Ltd.	TEAR Corporation
Daiseki Co., Ltd.	MEDINET Co., Ltd.	3-D Matrix, Ltd.
DIC Corporation	Milbon Co., Ltd.	TKC Corporation
Digital Arts Inc.	MIRAIT Holdings Corporation	TOKAI Holdings Corporation
Digital Garage Inc.	Monex Goup Inc.	Tri-Stage Inc.
Don Quijote Holdings Co., Ltd.	NAGASE & CO., LTD	VISION INC.
Dream Incubator Inc.	NAIGAI TRANS LINE LTD.	VISIONARY HOLDINGS CO., LTD.
EARTH CHEMICAL CO., LTD.	NanoCarrier Co., Ltd.	VOYAGE GROUP, INC.
Elcom Co., Ltd.	Net One Systems Co.,Ltd.	WirelessGate, Inc.
Emergency Assistance Japan Co., Ltd.	Nichi-Iko Pharmaceutical Co., Ltd.	YELLOW HAT LTD.
en-Japan Inc.	NIPPON PARKING DEVELOPMENT Co., Ltd.	YUMESHIN HOLDINGS CO., LTD.
euglena Co., Ltd.	Nisshinbo Holdings Inc.	Yume no Machi Souzou Iinkai Co., Ltd.
Ferrotec Holdings Corporation	NS TOOL CO., LTD.	Yushiro Chemical Industry Co., Ltd.
FIELDS CORPORATION	NTT URBAN DEVELOPMENT CORPORATION	ZAPPALLAS, INC.
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