

Neutral (Maintain)

Industry Report
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Semiconductor

The increasing process complexity of 3D NAND

3D NAND manufacturing is becoming increasingly challenging

We believe equipment suppliers will benefit materially from 96-layer 3D NAND, as the current structure of 3D NAND manufacturing is likely to face limitations. The most advanced 3D NAND technology currently available for mass production is 64-layer. From the industry's first mass production of 24-layer 3D NAND in 2013 to the most recent production of 64-layer chips, Samsung Electronics (005930 KS, Trading Buy, TP: W2,700,000, CP: W2,528,000) has moved up the process curve with few issues. However, once the layer count reaches 96, chipmakers are likely to encounter a number of challenges. When depositing alternating layers of SiO₂ and Si₃N₄, even the tiniest defect on a film can impact overall uniformity. There is a higher risk of this happening as the layer count goes up. Furthermore, as the number of layers increases, so does their weight, potentially causing the structure to shift.

The bigger challenge lies in the hole etching process to form channels. At 64-layer, the aspect ratio for holes is already 60:1, and the holes are more than three microns deep. 3D NAND involves etching billions of high aspect ratio holes without a single error, which requires the use of carbon-based hard masks. But the holes for 96-layer 3D NAND are over six microns deep, and current hard masks are unable to etch holes that deep. Deeper holes require thicker hard masks, as the etching equipment's energy significantly drops at the hard mask, limiting the energy that reaches the hole.

Need for high-performance equipment or new processes

The industry has been searching for a number of ways to address the challenges of 96-layer and beyond. One potential solution is double stacking, a process that involves dividing the entire stack in two. For instance, a 96-layer chip would be created by stacking two 48-layer devices, analogous to setting up a base camp midway up a tall mountain. Double stacking addresses the problems of single stacking, but the downside is that the process is expensive, as the increase in strings requires 30% more wiring and costs much more to produce. Many chipmakers are weighing whether to choose the less costly but more challenging single stacking process or the more expensive but less complicated double stacking process. SEC and Toshiba (6502 TYO, JPY232.0) are likely to deploy single stacking at least for 96-layer chips; both companies are considering adopting double stacking from 128-layer. SK Hynix (000660 KS, Trading Buy, TP: W75,000, CP: W70,600) has decided to apply double stacking from 72-layer chips.

Equipment and materials suppliers to benefit

Whatever choice chipmakers make, equipment and materials suppliers look well-positioned to benefit. Single stacking would require high-performance hard masks that can be used in etching high aspect ratio holes. This should have a positive impact on related equipment suppliers like Tes (095610 KQ, Buy, TP: W38,000, CP: W30,050) and Applied Materials (AMAT, USD45.30). Single stacking would also need high aspect ratio etching equipment, which could benefit companies like Lam Research (LRCX, USD154.94).

Other beneficiaries include makers of atomic layer deposition (ALD) equipment. In 3D NAND, word lines are created by depositing tungsten on the walls of the etched holes. As the layer count goes up, the holes get thinner and the structure becomes more complex, increasing the need for ALD equipment. Domestic producers of related equipment include Jusung Engineering (036930 KQ, Buy, TP: W18,000, CP: W14,800), Wonik IPS (240810 KQ, Buy, TP: W37,000, CP: W30,200), and Eugene Technology (084370 KQ, Buy, TP: W25,000 CP: W18,500). Of note, Eugene Technology recently acquired the semiconductor equipment business of ALD manufacturer Aixtron.

If NAND makers opt for double stacking, equipment suppliers should benefit even more, as it would require doing the same process twice. While there may be no need for high-performance equipment, more equipment will need to be deployed for the same amount of output. More processes also mean more required materials; we think this could benefit materials suppliers that produce NF₃ and WF₆, such as SK Materials (036490 KQ, Buy, TP: W220,000, CP: W184,800).

I. 3D NAND manufacturing is becoming increasingly challenging

The process complexity for 3D NAND is likely to increase sharply in the 96-layer process or beyond. The most advanced 3D NAND technology currently available for mass production is 64-layer. While SEC and Toshiba began the mass production of 64-layer chips from 2Q, SK Hynix plans to begin volume producing 72-layer chips from 3Q. While the 72-layer 3D NAND-manufacturing process is similar to the 64-layer process, we expect process technologies to change markedly in 96-layer and beyond.

From the industry's first mass production of 24-layer 3D NAND in 2013 to the most recent production of 64-layer chips (in 2017), Samsung Electronics (SEC) has moved up the process curve with no marked technical changes. However, once the layer count reaches 96, chipmakers are likely to encounter a number of challenges, due to the limitations of the current structure of 3D NAND manufacturing. In our view, this could present new opportunities to relevant equipment and materials makers going forward. Indeed, the recent shift from 2D NAND to 3D NAND, the manufacture of which requires additional steps of deposition and etching, has benefited makers of relevant equipment and materials. Likewise, in the 96-layer or beyond 3D NAND process, which requires higher-performance deposition and etching equipment, relevant equipment makers should benefit materially.

The structure of 3D NAND is similar to that of high-rise buildings with dozens of floors and hundreds of rooms. NAND-manufacturing process technologies vary from company to company. SEC adopted the Terabit Cell Array Transistors (TCAT) technology, while Toshiba and Micron/Intel (MU, USD31.13/INTC, USD34.24) have opted for the Bit-Cost Scalable (BiCS) and floating gate methods, respectively. SEC's TCAT structure is based on TaN, Al₂O₃, Si₃N₄, and SiO₂ cells.

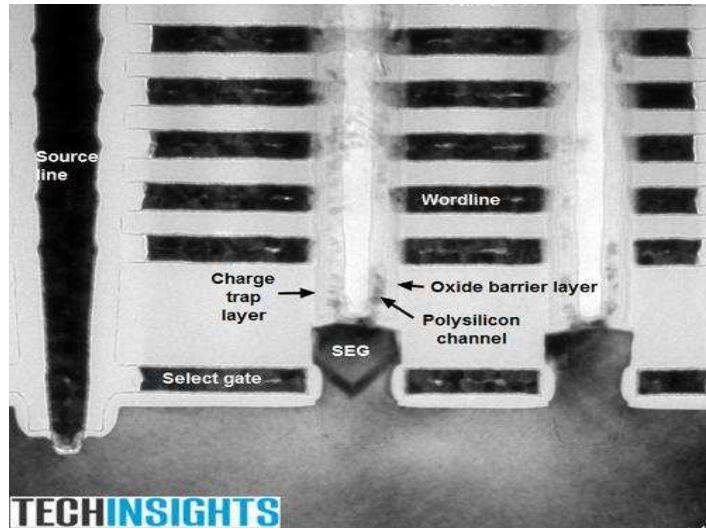
To build such a structure, chipmakers etch holes from top to bottom of alternating layers of SiO₂ and Si₃N₄. After depositing materials like TaN and Al₂O₃ on the walls of the holes, unnecessary materials are etched. Etching holes is the most challenging process.

As the layer count increases to 64 and over, chipmakers are more likely to encounter a number of challenges. When depositing layers of SiO₂ and Si₃N₄, even the tiniest defect on a film can impact overall uniformity in thickness. Any deterioration in uniformity could lead to a twisting of a film or difference in the properties of top and bottom layers. Moreover, there is a higher risk of this happening as the layer count goes up.

As the number of layers increases, the hole etching process becomes more challenging. On top of the layers of SiO₂ and Si₃N₄, carbon-based hard masks are deposited for the etching of uniform holes through the layers. Such a process is called high aspect ratio (HAR) etching. At 48-layer, the holes are more than three microns deep. The aspect ratio for holes is 60:1 at 64-layer. 3D NAND involves etching billions of HAR holes without a single error. In etching holes, chipmakers use plasma ions. The deeper the holes get, the fewer the number of ions reaching the bottom. Such an issue could lead to differences in thickness between the top and bottom layers.

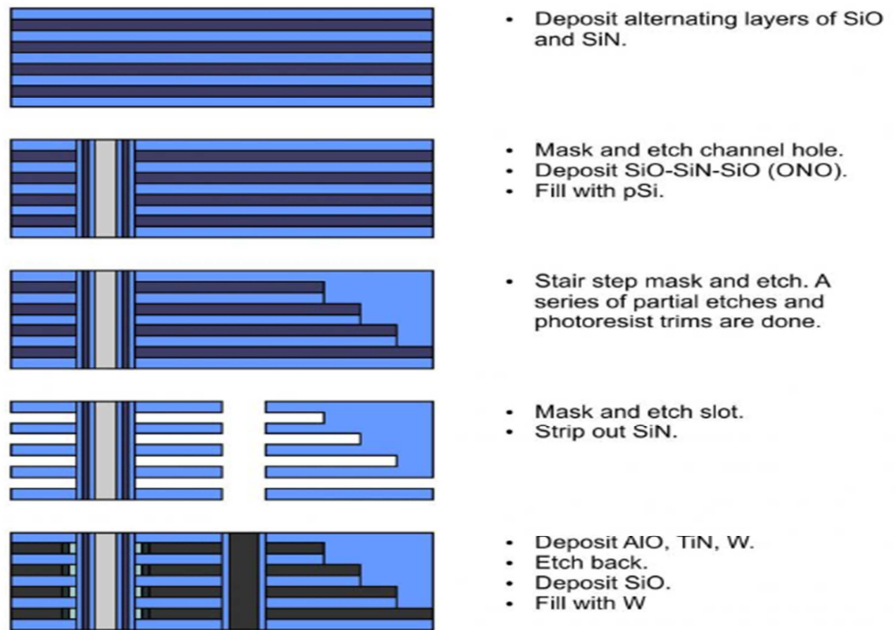
Lam Research (LRCX, USD154.94), the leading 3D NAND etching equipment producer in the world, stated that the current etching method would face limitations at layers of 96 or over. The holes for 96-layer 3D NAND are over six microns deep, and current hard masks are unable to etch holes that deep. Deeper holes require thicker hard masks, as the etching equipment's energy significantly drops at the hard mask, limiting the energy that reaches the hole.

Figure 1. SEC's 48-layer 3D NAND



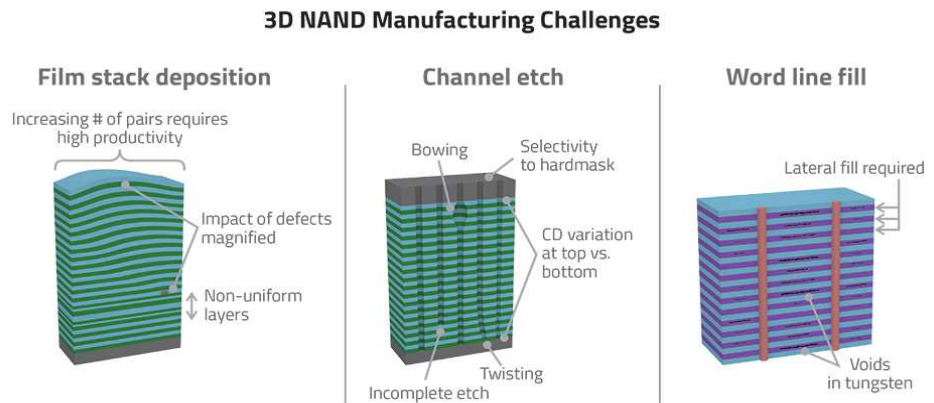
Source: TechInsights, Mirae Asset Daewoo Research

Figure 2. SEC's 3D NAND process



Source: Mirae Asset Daewoo Research

Figure 3. 3D NAND manufacturing challenges



Source: Lam Research, Mirae Asset Daewoo Research

Figure 4. Significant challenges expected for 96-layer or over 3D NAND

Significant Challenges in Scaling 3D NAND



22 | External Use



Source: AMAT, Mirae Asset Daewoo Research

II. Need for high-performance equipment or double stacking

The industry has been searching for a number of ways to address the challenges of 96-layer and beyond. One potential solution is double stacking, a process that involves dividing the entire stack in two. For instance, a 96-layer chip would be created by stacking two 48-layer devices (and a 128-layer chip by stacking two 64-layer devices). If double stacking becomes inadequate, triple stacking would be considered.

Double stacking addresses the problems of single stacking, but the downside is that the process is expensive. Single stacking (which is applied to up to 64-layer chips) includes only one string, thus involving simple wiring and low costs, while double stacking includes two strings, requiring 30% more wiring and costing much more to produce.

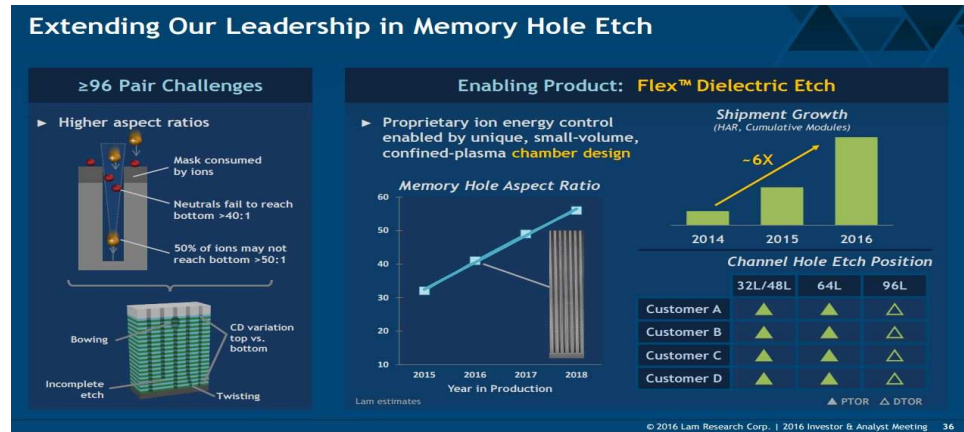
Many chipmakers are weighing whether to choose the less-costly-but-more-challenging single stacking process, or the more-expensive-but-less-complicated double stacking process. They will likely make decisions on which type of stacking to adopt in 96-layer-or-higher chips via various simulations and R&D efforts. SEC and Toshiba are likely to deploy single stacking at least for 96-layer chips; both companies are considering adopting double stacking from 128-layer. SK Hynix has decided to apply double stacking from 72-layer chips. Whatever choice chipmakers make, deposition and etching equipment and materials suppliers look well-positioned to benefit.

If chipmakers opt for single stacking, high-performance hard masks would be required to etch high aspect ratio holes. With the current hard masks, it is difficult to make holes with an aspect ratio of more than 80:1. Furthermore, high-performance PECVD equipment is also required for hard mask deposition. As such, Tes, which supplies hard-mask-use PECVD equipment to SEC, would benefit. Applied Materials is touting its precision CVD equipment as the best option for hard mask deposition. Single stacking would also require high-aspect-ratio etching equipment, which could benefit companies like Lam Research. As the layer count goes up, the number of SiO₂ and Si₃N₄ depositions would increase, benefitting Wonik IPS, a PECVD equipment maker.

Other beneficiaries include makers of ALD equipment. In 3D NAND, word lines are created by depositing tungsten on the walls of the etched holes. As the layer count goes up, the holes get thinner and the structure becomes more complex, increasing the need for ALD equipment. The amount of ALD equipment needed increases in line with the layer count. In Korea, Jusung Engineering supplies ALD equipment to SK Hynix, and Wonik IPS also produces ALD equipment. Of note, Eugene Technology is also likely to generate ALD equipment revenue soon, as it recently acquired the semiconductor equipment business of ALD manufacturer Aixtron.

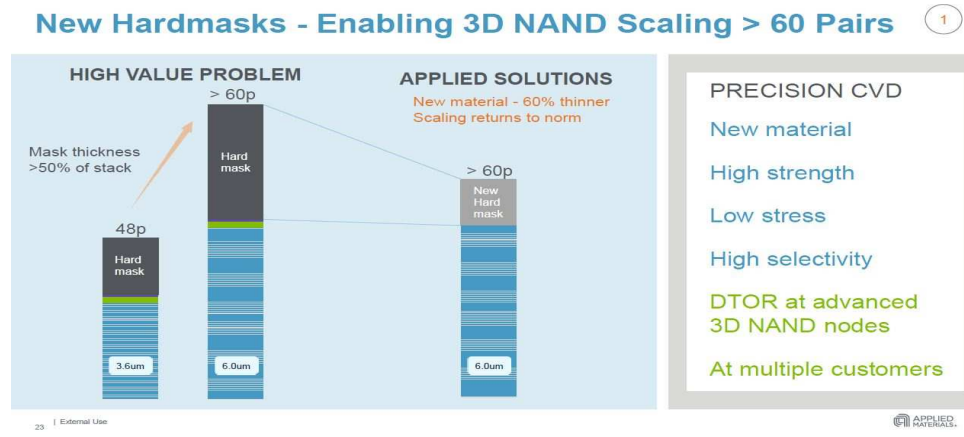
If NAND makers opt for double stacking, equipment/materials suppliers should benefit even more, as it would require doing the same process twice. More equipment will need to be deployed for the same amount of output. More processes also mean more required materials and wiring; we think this could benefit materials suppliers that produce NF₃ and WF₆, such as SK Materials.

Figure 5. Input of materials and equipment to increase sharply in 96 layer-or-higher processes



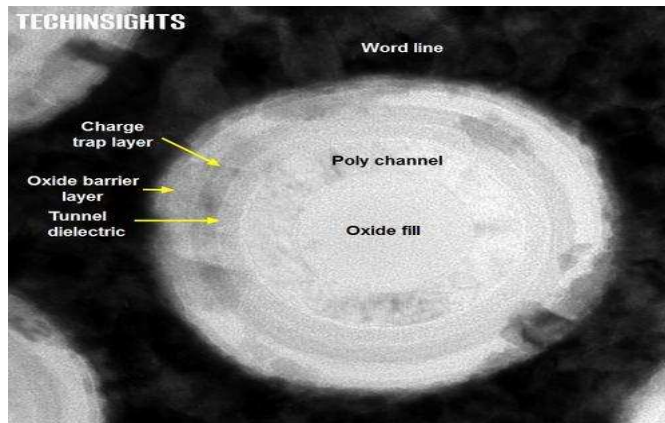
Source: Lam Research, Mirae Asset Daewoo Research

Figure 6. Equipment makers are touting their products as the best option: High-performance equipment is required, and input of equipment increases



Source: AMAT, Mirae Asset Daewoo Research

Figure 7. As the layer count goes up, the holes get thinner and the structure becomes more complex, increasing the need for ALD equipment



Source: TechInsights, Mirae Asset Daewoo Research



Source: Lam Research, Mirae Asset Daewoo Research

Jusung Engineering (036930 KQ)

2Q17 Preview: Growing importance of ALD equipment

Technology

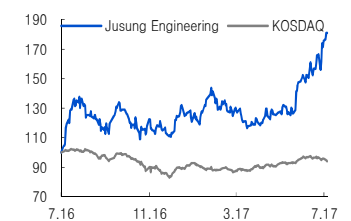
(Maintain)	Buy
Target Price (12M, W)	18,000
Share Price (07/12/17, W)	14,800
Expected Return	22%

OP (17F, Wbn)	52
Consensus OP (17F, Wbn)	54

EPS Growth (17F, %)	59.1
Market EPS Growth (17F, %)	39.6
P/E (17F, x)	13.8
Market P/E (17F, x)	10.0
KOSDAQ	651.10

Market Cap (Wbn)	714
Shares Outstanding (mn)	48
Free Float (%)	72.2
Foreign Ownership (%)	19.0
Beta (12M)	0.80
52-Week Low	8,560
52-Week High	14,800

(%)	1M	6M	12M
Absolute	22.8	48.6	72.9
Relative	25.4	44.4	85.7



2Q17F OP: W12.8bn (+1% QoQ)

For 2Q17, we forecast Jusung Engineering to post revenue of W76.9bn (+1% QoQ) and operating profit of W12.8bn (+1% QoQ). Investments in equipment by major customers increased. SK Hynix is due to begin producing 3D NAND at the upper floor of its M14 fab. LG Display (LGD; 034220 KS, Buy, TP: W40,000, CP: W36,700) invested in equipment for E6-1, a flexible OLED line.

Capex to continue through 2H

Major customers' aggressive capex will likely continue through 2H. SK Hynix will likely make additional 3D NAND investments. SK Hynix's 3D NAND technology was far inferior to its competitors, but has recently been improving sharply. SK Hynix plans to start the commercial production of 72-layer 3D NAND. Notably, SK Hynix's participation in a consortium to acquire Toshiba's memory business will likely drive up the chipmaker's NAND technology and investments.

As the layer count for 3D NAND increases, so does the importance of ALD equipment, benefitting Jusung Engineering, a major ALD equipment supplier for SK Hynix. In 3D NAND, word lines are created by depositing tungsten on the walls of the etched holes. As the layer count goes up, the holes get thinner and the structure becomes more complex, increasing the need for ALD equipment. The number of ALD equipment needed increases in line with the layer count.

Furthermore, OLED investments will also likely increase. In 2H, LGD is likely to place E6-2 equipment orders. The display maker could also place equipment orders for its large-sized OLED line (P10).

In addition, Chinese semiconductor and display makers are increasing capex. In particular, Chinese display makers, including GVO, BOE, and China Star, are currently placing equipment orders for small- and mid-sized OLED fabs. Chinese semiconductor makers, including YRST and Fujian Jin Hua, plan to place equipment orders next year.

Maintain Buy; raise TP to W18,000

We maintain our Buy rating on Jusung Engineering, and raise our target price to W18,000 (from W13,500) to reflect upward revisions to our earnings estimates and target P/E. We applied a target P/E of 17x, in light of global peers.

FY (12)	12/14	12/15	12/16	12/17F	12/18F	12/19F
Revenue (Wbn)	142	176	268	310	337	361
OP (Wbn)	10	15	38	52	58	63
OP margin (%)	7.0	8.5	14.2	16.8	17.2	17.5
NP (Wbn)	-21	8	33	52	52	54
EPS (W)	-462	160	676	1,075	1,082	1,127
ROE (%)	-20.5	7.0	24.9	30.0	23.3	19.6
P/E (x)	-	49.3	15.3	13.8	13.7	13.1
P/B (x)	1.5	3.3	3.4	3.6	2.9	2.3
Dividend yield (%)	0.0	0.0	0.0	0.0	0.0	0.0

Note: All figures are based on consolidated K-IFRS; NP refers to net profit attributable to controlling interests

Source: Company data, Mirae Asset Daewoo Research estimates

Table 1. Valuation

(W, x)

Component	
2017E EPS	1,075
Target P/E (global peer multiple)	17.0
Target price per share	18,000

Source: Mirae Asset Daewoo Research estimate

Table 2. Earnings forecast

(Wbn)

	1Q16	2Q16	3Q16	4Q16	1Q17	2Q17F	3Q17F	4Q17F	1Q18F	2Q18F	3Q18F	4Q18F	2016	2017	2018
Revenue	54.3	69.6	63	81.1	76.1	76.9	77.8	79.2	81.1	82.8	84.8	88.7	268	310	337.4
QoQ (%)	11.7	28.3	(9.5)	28.8	(6.2)	1	1.2	1.9	2.4	2.1	2.4	4.6			
YoY (%)	59.3	68.6	21.8	67	40.2	10.4	23.5	(2.3)	6.6	7.7	9	11.9	52.6	15.7	8.8
Semicon	41.8	28	19.1	22.9	33.2	28.6	27.1	26.6	27.9	28.5	29.9	31.1	111.9	115.5	117.4
FPD	8.8	38.1	36.3	50.3	41.5	46.9	49.2	51.2	51.7	52.8	53.3	55.9	133.5	188.8	213.7
Solar	3.6	3.5	7.7	7.9	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7	22.6	5.7	6.3
OP	8	9.3	8.3	12.1	12.6	12.8	13	13.8	13.1	13.4	14.7	16.5	37.7	52.2	57.7
QoQ (%)	103.5	16.3	(10.8)	45.8	4.1	1.2	2.3	6.1	(5.4)	2.3	9.9	12.3			
YoY (%)	983.1	389.1	(4.6)	207.8	57.5	37.1	57.1	14.3	3.9	5	12.8	19.4	146.8	38.5	10.5
OP margin (%)	14.7	13.4	13.2	14.9	16.6	16.6	16.8	17.5	16.1	16.2	17.4	18.6	14.1	16.8	17.1
Pretax profit	6.8	7.2	6.9	4.4	14.6	12.6	13.2	13.8	13.1	13.4	14.9	16.6	25.3	54.2	58
QoQ (%)	958.2	6.2	(4.2)	-36.1	231.9	-13.8	4.2	4.6	-4.6	1.9	11.7	10.9			
YoY (%)	TTB	1037	-9.5	588.9	116.1	75.3	90.6	212	-10.3	6	13.6	20.4	224.8	114.3	7.1
Net profit	6.8	6.7	6.7	12.4	13.9	12.1	12.6	13.2	11.8	12	13.5	14.9	32.6	51.9	52.2
QoQ (%)	1111.1	(1.1)	0	85	12.1	(12.8)	4.2	4.6	(10.5)	1.9	11.7	10.9			
YoY (%)	TTB	986.4	(12.1)	2115.2	105.1	80.8	88.5	6.6	(14.9)	(0.6)	6.5	12.9	323.0	59.2	0.7
Net margin (%)	12.5	9.6	10.6	15.3	18.3	15.8	16.2	16.7	14.6	14.5	15.9	16.8	12.2	16.7	15.5

Note: TTB stands for "Turn to Black"

Source: Mirae Asset Daewoo Research estimate

Jusung Engineering (036930 KQ/Buy/TP: W18,000)

Comprehensive Income Statement (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Revenue	268	310	337	361
Cost of Sales	158	170	179	190
Gross Profit	110	140	158	171
SG&A Expenses	72	88	101	107
Operating Profit (Adj)	38	52	58	63
Operating Profit	38	52	58	63
Non-Operating Profit	-13	2	0	1
Net Financial Income	-2	-1	0	0
Net Gain from Inv in Associates	0	0	0	0
Pretax Profit	25	54	58	64
Income Tax	-7	2	6	10
Profit from Continuing Operations	33	52	52	54
Profit from Discontinued Operations	0	0	0	0
Net Profit	33	52	52	54
Controlling Interests	33	52	52	54
Non-Controlling Interests	0	0	0	0
Total Comprehensive Profit	34	52	52	54
Controlling Interests	34	52	52	54
Non-Controlling Interests	0	0	0	0
EBITDA	50	65	71	76
FCF (Free Cash Flow)	40	44	57	58
EBITDA Margin (%)	18.7	21.0	21.1	21.1
Operating Profit Margin (%)	14.2	16.8	17.2	17.5
Net Profit Margin (%)	12.3	16.8	15.4	15.0

Cash Flows (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Cash Flows from Op Activities	45	60	66	67
Net Profit	33	52	52	54
Non-Cash Income and Expense	27	14	19	21
Depreciation	8	11	12	11
Amortization	4	2	1	1
Others	15	1	6	9
Chg in Working Capital	-12	-3	1	1
Chg in AR & Other Receivables	-37	5	-5	-3
Chg in Inventories	6	1	-5	-3
Chg in AP & Other Payables	24	-4	7	4
Income Tax Paid	-1	-2	-6	-10
Cash Flows from Inv Activities	-4	-16	-11	-11
Chg in PP&E	-3	-17	-9	-10
Chg in Intangible Assets	-1	-1	-1	-1
Chg in Financial Assets	11	0	-1	-1
Others	-11	2	0	1
Cash Flows from Fin Activities	-38	-19	-5	-5
Chg in Financial Liabilities	-55	-19	-5	-5
Chg in Equity	0	-38	0	0
Dividends Paid	0	0	0	0
Others	17	38	0	0
Increase (Decrease) in Cash	2	27	50	51
Beginning Balance	30	31	58	108
Ending Balance	31	58	108	159

Source: Company data, Mirae Asset Daewoo Research estimates

Statement of Financial Condition (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Current Assets	164	187	253	313
Cash and Cash Equivalents	31	58	108	159
AR & Other Receivables	48	47	52	56
Inventories	46	45	51	54
Other Current Assets	39	37	42	44
Non-Current Assets	164	168	167	166
Investments in Associates	2	2	2	2
Property, Plant and Equipment	129	134	132	130
Intangible Assets	12	11	11	11
Total Assets	328	356	419	479
Current Liabilities	114	93	97	97
AP & Other Payables	70	69	77	82
Short-Term Financial Liabilities	40	20	16	11
Other Current Liabilities	4	4	4	4
Non-Current Liabilities	66	64	72	77
Long-Term Financial Liabilities	0	0	0	0
Other Non-Current Liabilities	66	64	72	77
Total Liabilities	180	157	169	174
Controlling Interests	148	198	250	305
Capital Stock	24	24	24	24
Capital Surplus	147	109	109	109
Retained Earnings	-36	54	106	160
Non-Controlling Interests	0	0	0	0
Stockholders' Equity	148	198	250	305

Forecasts/Valuations (Summarized)

	12/16	12/17F	12/18F	12/19F
P/E (x)	15.3	13.8	13.7	13.1
P/CF (x)	8.3	10.9	10.1	9.4
P/B (x)	3.4	3.6	2.9	2.3
EV/EBITDA (x)	10.2	10.4	8.8	7.5
EPS (W)	676	1,075	1,082	1,127
CFPS (W)	1,241	1,359	1,466	1,570
BPS (W)	3,062	4,107	5,190	6,316
DPS (W)	0	0	0	0
Payout ratio (%)	0.0	0.0	0.0	0.0
Dividend Yield (%)	0.0	0.0	0.0	0.0
Revenue Growth (%)	52.3	15.7	8.7	7.1
EBITDA Growth (%)	92.3	30.0	9.2	7.0
Operating Profit Growth (%)	153.3	36.8	11.5	8.6
EPS Growth (%)	322.5	59.0	0.7	4.2
Accounts Receivable Turnover (x)	8.5	6.9	7.2	7.0
Inventory Turnover (x)	5.5	6.8	7.1	6.9
Accounts Payable Turnover (x)	3.1	2.9	2.9	2.8
ROA (%)	10.3	15.2	13.5	12.1
ROE (%)	24.9	30.0	23.3	19.6
ROIC (%)	24.1	24.7	25.2	25.6
Liability to Equity Ratio (%)	121.7	79.5	67.5	57.2
Current Ratio (%)	143.8	201.2	260.6	321.3
Net Debt to Equity Ratio (%)	5.4	-19.0	-36.8	-48.6
Interest Coverage Ratio (x)	15.4	67.2	103.7	160.6

Wonik IPS (240810 KQ)

2Q17 preview: 3D NAND and foundry investments to increase

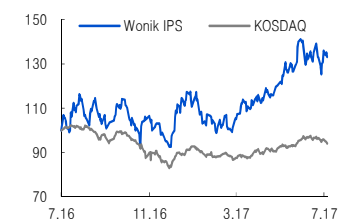
Technology

(Maintain)	Buy
Target Price (12M, W)	37,000
Share Price (07/12/17, W)	29,750
Expected Return	24%

OP (17F, Wbn)	130
Consensus OP (17F, Wbn)	124
EPS Growth (17F, %)	349.2
Market EPS Growth (17F, %)	39.6
P/E (17F, x)	12.0
Market P/E (17F, x)	10.0
KOSDAQ	651.10

Market Cap (Wbn)	1,228
Shares Outstanding (mn)	41
Free Float (%)	66.6
Foreign Ownership (%)	26.3
Beta (12M)	1.08
52-Week Low	20,700
52-Week High	31,550

(%)	1M	6M	12M
Absolute	2.6	17.1	25.8
Relative	4.8	13.8	35.1



2Q17F OP of W35.1bn

For 2Q17, we project Wonik IPS' revenue at W181.3bn (+32% QoQ) and operating profit at W35.1bn (+9% QoQ). In 2Q, SEC made investments in its new fab in Pyeongtaek. The company plans to produce 64-layer 3D NAND chips at the Pyeongtaek fab starting in 3Q17. Samsung Display also invested in its A3 line, which produces flexible OLED panels, in 2Q.

Customers to continue with aggressive capex in 2H

Wonik IPS' customers are expected to continue to expand investments in 2H, particularly in 3D NAND facilities. From 2013 to 1H 2017, SEC was the only player capable of mass-producing 3D NAND chips. Currently, however, several chipmakers have 3D NAND mass-production capacities. SK Hynix has launched the mass-production of 3D NAND chips at its M14 line, while Toshiba has also begun to produce 64-layer 3D NAND. To widen the gap with competitors, SEC is expected to further ramp up the capacities of its Pyeongtaek and Xian plants.

Investments in system LSI are also anticipated to increase. Competition between global foundries, including TSMC (2330 TPE, TWD213.00), GlobalFoundries (GF) and SEC, is intensifying. As SEC launched the 10nm process earlier than expected, TSMC and GF are speeding up the development of the 7nm process. Based on the expanded customer base from the 10nm process launch, SEC is expected to increase foundry capex in 2H. Wonik IPS stands to benefit from SEC's investment expansion, as the company supplies deposition equipment for foundries at SEC.

Globally, DRAM investments are also projected to increase, albeit to a limited extent. Amid a DRAM supply shortage resulting from the absence of meaningful investments from early-2016 to 1H17, DRAM producers are now increasing investments slightly. As DRAM investments will likely rise going forward, related equipment producers could see a steady growth in orders.

Maintain Buy and raise TP to W37,000

We maintain our Buy call on Wonik IPS and raise our target price to W37,000 from W32,000, in light of upward revisions to our earnings forecast. We derived the target price based on the cost of equity of 7.4% and 2017-2019F ROE of 35%. Currently, the stock is undervalued, compared with global peers, trading at a 2017F P/E of 12.1x and P/B of 3.9x.

FY (12)	12/14	12/15	12/16	12/17F	12/18F	12/19F
Revenue (Wbn)	0	0	244	603	690	814
OP (Wbn)	0	0	29	130	167	224
OP margin (%)	-	-	11.9	21.6	24.2	27.5
NP (Wbn)	0	0	23	102	132	178
EPS (W)	0	0	552	2,478	3,195	4,310
ROE (%)	0.0	0.0	10.3	37.9	34.1	32.9
P/E (x)	-	-	47.5	12.0	9.3	6.9
P/B (x)	-	-	4.9	3.8	2.7	1.9
Dividend yield (%)	-	-	0.0	0.0	0.0	0.0

Note: All figures are based on consolidated K-IFRS; NP refers to net profit attributable to controlling interests
Source: Company data, Mirae Asset Daewoo Research estimates

Table 3. Valuation

(W)

Notes		
Sustainable COE	Risk free 2.8%, beta 0.8, risk premium 6.1%	7.4%
Sustainable ROE	3-year average (2017~2019)	35.0%
Terminal G		0.0%
Target PBR	(ROE-terminal g)/(COE-terminal g)	4.7
BPS	Expectation 2017	7,768
Fair value per share	Target PBR * BPS	37,000

Source: Mirae Asset Daewoo Research estimate

Table 4. Earnings forecast

(Wbn)

	1Q16	2Q16	3Q16	4Q16	1Q17	2Q17F	3Q17F	4Q17F	1Q18F	2Q18F	3Q18F	4Q18F	2016	2017F	2018F
Revenue	92.1	52.5	95.6	95.9	138	181	136	148	154	171	179	186	336	603	690
QoQ (%)	(59.20)	(43.00)	82.00	0.30	43.30	31.90	(25.00)	9.00	4.00	10.70	4.90	3.60			
YoY (%)	(54.50)	(66.20)	(12.60)	(57.50)	(12.40)	96.70	158.90	55.10	60.80	24.30	(1.20)	36.50	(48.10)	79.40	14.40
Semicon	87	35.9	62.6	73.9	122	160	120	132	136	150	158	164	259	532	608
Display	5.1	14	32.9	21.9	15.6	21.7	16.2	16.6	18.6	20.2	21	21.2	73.9	70	81.1
Solar	0.1	2.7	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	3	0.6	0.6
OP	19.3	3.7	10.6	14.5	32.3	35.1	27.8	34.7	37.2	44.5	42.7	42.4	48.1	130	167
QoQ (%)	39.10	(80.80)	185.90	36.30	123.50	8.70	(20.70)	24.70	7.30	19.40	(4.00)	(0.70)			
YoY (%)	(33.60)	(70.90)	(75.60)	4.00	67.10	846.60	162.60	140.30	15.30	26.60	53.30	22.10	(51.50)	170.30	28.30
OP margin (%)	21.00	7.10	11.10	15.10	23.50	19.40	20.50	23.40	24.20	26.00	23.80	22.80	14.30	21.60	24.20
Pretax profit	18.5	4	10.5	13.4	32.6	35.1	28.1	34.9	37.5	44.2	43	42.8	46.4	131	168
QoQ (%)	399.90	(78.40)	162.20	27.90	142.90	7.80	(19.90)	24.20	7.40	18.00	(2.70)	(0.50)			
YoY (%)	(38.50)	(76.70)	(76.80)	262.50	76.20	778.20	168.10	160.20	15.00	26.00	53.10	22.60	(51.70)	181.80	28.20
Net profit	15.7	2.8	8.8	11	24.9	27.4	22.5	27.5	29.3	34.9	34	33.7	38.3	102	132
QoQ (%)	2311.90	(82.10)	213.40	25.20	126.40	10.20	(18.10)	22.50	6.60	18.80	(2.50)	(0.80)			
YoY (%)	(30.10)	(80.30)	(75.40)	1589.80	58.60	878.40	155.80	150.40	17.90	27.10	51.20	22.40	(47.60)	167.30	28.90
Net margin (%)	17.00	5.30	9.20	11.50	18.10	15.10	16.50	18.60	19.00	20.40	19.00	18.10	11.40	17.00	19.10

Source: Mirae Asset Daewoo Research estimate

Wonik IPS (240810 KQ/Buy/TP: W37,000)

Comprehensive Income Statement (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Revenue	244	603	690	814
Cost of Sales	151	353	385	428
Gross Profit	93	250	305	386
SG&A Expenses	64	120	138	163
Operating Profit (Adj)	29	130	167	224
Operating Profit	29	130	167	224
Non-Operating Profit	-1	1	1	2
Net Financial Income	0	0	1	3
Net Gain from Inv in Associates	0	0	0	0
Pretax Profit	28	131	168	226
Income Tax	5	28	36	48
Profit from Continuing Operations	23	102	132	178
Profit from Discontinued Operations	0	0	0	0
Net Profit	23	102	132	178
Controlling Interests	23	102	132	178
Non-Controlling Interests	0	0	0	0
Total Comprehensive Profit	23	101	132	178
Controlling Interests	23	101	132	178
Non-Controlling Interests	0	0	0	0
EBITDA	40	145	183	243
FCF (Free Cash Flow)	6	61	95	146
EBITDA Margin (%)	16.4	24.0	26.5	29.9
Operating Profit Margin (%)	11.9	21.6	24.2	27.5
Net Profit Margin (%)	9.4	16.9	19.1	21.9

Cash Flows (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Cash Flows from Op Activities	19	78	120	174
Net Profit	23	102	132	178
Non-Cash Income and Expense	20	43	51	64
Depreciation	10	13	14	17
Amortization	2	2	2	2
Others	8	28	35	45
Chg in Working Capital	-23	-47	-27	-20
Chg in AR & Other Receivables	7	-32	-14	-10
Chg in Inventories	-24	-22	-26	-19
Chg in AP & Other Payables	3	2	8	6
Income Tax Paid	0	-21	-36	-48
Cash Flows from Inv Activities	-15	-23	-28	-31
Chg in PP&E	-13	-18	-24	-29
Chg in Intangible Assets	-1	-3	-3	-4
Chg in Financial Assets	-6	-3	-2	-2
Others	5	1	1	4
Cash Flows from Fin Activities	8	1	1	1
Chg in Financial Liabilities	12	2	1	1
Chg in Equity	196	0	0	0
Dividends Paid	0	0	0	0
Others	-200	-1	0	0
Increase (Decrease) in Cash	12	57	92	144
Beginning Balance	27	39	96	188
Ending Balance	39	96	188	332

Source: Company data, Mirae Asset Daewoo Research estimates

Statement of Financial Condition (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Current Assets	159	270	406	582
Cash and Cash Equivalents	39	96	188	332
AR & Other Receivables	36	69	86	99
Inventories	80	102	128	147
Other Current Assets	4	3	4	4
Non-Current Assets	122	130	143	158
Investments in Associates	0	0	0	0
Property, Plant and Equipment	105	109	119	131
Intangible Assets	11	13	14	16
Total Assets	281	400	549	740
Current Liabilities	53	60	73	83
AP & Other Payables	32	35	43	50
Short-Term Financial Liabilities	12	14	15	16
Other Current Liabilities	9	11	15	17
Non-Current Liabilities	9	19	24	28
Long-Term Financial Liabilities	0	0	0	0
Other Non-Current Liabilities	9	19	24	28
Total Liabilities	62	79	97	110
Controlling Interests	219	320	452	630
Capital Stock	21	21	21	21
Capital Surplus	175	175	175	175
Retained Earnings	23	125	257	434
Non-Controlling Interests	0	0	0	0
Stockholders' Equity	219	320	452	630

Forecasts/Valuations (Summarized)

	12/16	12/17F	12/18F	12/19F
P/E (x)	47.5	12.0	9.3	6.9
P/CF (x)	25.3	8.4	6.7	5.1
P/B (x)	4.9	3.8	2.7	1.9
EV/EBITDA (x)	26.4	7.9	5.8	3.8
EPS (W)	552	2,478	3,195	4,310
CFPS (W)	1,037	3,527	4,422	5,871
BPS (W)	5,309	7,768	10,963	15,273
DPS (W)	0	0	0	0
Payout ratio (%)	0.0	0.0	0.0	0.0
Dividend Yield (%)	0.0	0.0	0.0	0.0
Revenue Growth (%)	-	147.1	14.4	18.0
EBITDA Growth (%)	-	262.5	26.2	32.8
Operating Profit Growth (%)	-	348.3	28.5	34.1
EPS Growth (%)	-	348.9	28.9	34.9
Accounts Receivable Turnover (x)	8.8	14.6	11.2	11.0
Inventory Turnover (x)	3.0	6.6	6.0	5.9
Accounts Payable Turnover (x)	5.8	12.6	11.4	10.6
ROA (%)	8.0	30.1	27.8	27.6
ROE (%)	10.3	37.9	34.1	32.9
ROIC (%)	11.9	45.8	49.0	57.0
Liability to Equity Ratio (%)	28.2	24.7	21.4	17.5
Current Ratio (%)	300.0	449.4	557.1	703.8
Net Debt to Equity Ratio (%)	-12.3	-25.7	-38.4	-50.2
Interest Coverage Ratio (x)	333.5	533.8	624.7	774.5

SK Materials (036490 KQ)

2Q17 preview: Earnings improvement

Technology

(Maintain)	Buy
Target Price (12M, W)	220,000
Share Price (07/12/17, W)	181,700
Expected Return	21%

OP (17F, Wbn)	166
Consensus OP (17F, Wbn)	172
EPS Growth (17F, %)	8.6
Market EPS Growth (17F, %)	39.6
P/E (17F, x)	16.3
Market P/E (17F, x)	10.0
KOSDAQ	651.10

Market Cap (Wbn)	1,917
Shares Outstanding (mn)	11
Free Float (%)	45.9
Foreign Ownership (%)	12.7
Beta (12M)	1.07
52-Week Low	130,200
52-Week High	205,000

(%)	1M	6M	12M
Absolute	-5.4	-2.8	34.6
Relative	-3.4	-5.6	44.6



2Q17 operating profit estimated at W36.2bn

For 2Q17, we expect SK Materials to report operating profit of W36.2bn (+9% QoQ). We attribute the QoQ improvement in earnings to: 1) increased NF3 gas shipments following the start of operation of SEC's new 3D NAND fab in Pyeongtaek, despite a slight decline in NF3 gas prices; and 2) rising shipments of WF6, backed by growing production of 3D NAND.

Earnings to improve in 2H

SK Materials will likely post solid earnings for 2H, supported by fresh revenue from a new division. With subsidiary SK Trichem (a joint venture with Japan-based Tri Chemical Laboratories) slated to begin the production of precursors in 2H, we expect consolidated revenue to rise to W7bn in 2017, and W25.9bn in 2018. The firm plans to ramp up capacity for flagship products (+1,500 tonnes/year for NF3; +600 tonnes/year for WF6). Key customers will also expand their production capacity in 2H. SEC began the operation of its new 3D NAND fab (Pyeongtaek) in July and plans to further expand its capacity in 2H. For SK Hynix, the new 3D NAND facility, which was converted from its flagship M14 fab, is likely to come online soon. The firm also plans to add capacity in 2H.

The likely increase in the number of layers in 3D NAND (48 → 64 in 2H) should drive up demand for special gases (e.g. WF3 and WF6) and precursors. Moreover, double stacking, a process that has been adopted by SK Hynix for the production of 72-layer chips, requires more input of NF3 and WF6. SEC is considering adopting double stacking from 96-layer. In our view, chipmakers' growing adoption of double stacking should benefit SK Materials.

The increased production of flexible OLED should also benefit SK Materials. Samsung Display recently began the supply of flexible OLED panels for a key customer. With major smartphone makers set to significantly expand their adoption of flexible OLED panels in 2018, display panel makers (e.g. Samsung Display and LG Display) will likely aggressively ramp up their capacity, which should boost demand for key materials, such as NFS.

Maintain BUY and target price of W220,000

We maintain our BUY rating and target price of W220,000 for SK Materials. Our target price is based on global peers' average 2017F P/E of 20x. Currently, the stock is trading at a 2017F P/E of 16.8x and P/B of 4.2x.

FY (12)	12/14	12/15	12/16	12/17F	12/18F	12/19F
Revenue (Wbn)	212	338	461	562	701	735
OP (Wbn)	26	113	154	166	217	229
OP margin (%)	12.3	33.4	33.4	29.5	31.0	31.2
NP (Wbn)	14	66	109	118	159	171
EPS (W)	1,289	6,270	10,299	11,181	15,082	16,201
ROE (%)	4.3	18.9	27.2	29.6	36.5	30.2
P/E (x)	39.7	18.6	17.4	16.3	12.0	11.2
P/B (x)	1.7	3.3	4.5	4.1	3.2	2.6
Dividend yield (%)	2.0	2.2	2.0	2.0	2.0	2.0

Note: All figures are based on consolidated K-IFRS; NP refers to net profit attributable to controlling interests
Source: Company data, Mirae Asset Daewoo Research estimates

Table 5. Valuation

(W, x)

Component	
2017E EPS	11,181
Target P/E (global peer multiple)	20.0
Target price per share	220,000

Source: Mirae Asset Daewoo Research estimate

Table 6. Earnings forecast

(Wbn)

	1Q16	2Q16	3Q16	4Q16	1Q17	2Q17F	3Q17F	4Q17F	1Q18F	2Q18F	3Q18F	4Q18F	2016	2017F	2018F	2019F
Revenue	97.3	117	124	124	116	133	150	163	164	173	185	179	461	562	701	735
QoQ (%)	0.4	19.7	6.2		(5.9)	14.1	13.2	8.3	0.9	5.2	7.1	(3.4)				
YoY (%)	56.6	55.0	64.3	36.7	20.1	36.4	29.0	31.6	32.6	48.5	39.5	19.1	36.5	21.8	24.7	4.8
Gas (NF3, SiH4, WF6, Si2H6), Etc	97.3	96.5	103	104	95.4	109	123	145	139	147	158	161	401	473	606	632
Gas (O2, N2, Ar)	0	20	20.6	20.2	21	23.7	27	17.8	25.2	25.7	26.9	17.5	60.8	89.6	95.3	103
Precursor	0	0	0	0	0	0.4	1.8	4.8	6.8	7	7.3	4.8	0	7	25.9	28
OP	34.4	38.8	40.6	40.2	33.1	36.2	46.4	50.6	47.7	53.9	61.4	53.9	154	166	217	229
QoQ (%)	(5.0)	12.8	4.8	(1.1)	(17.7)	9.2	28.4	9.1	(5.9)	13.1	14.1	(12.2)				
YoY (%)	58.5	72.9	25.1	11.0	(3.8)	(6.8)	14.2	25.9	44.0	49.0	32.4	6.6	36.5	7.9	30.5	5.7
OP margin (%)	35.3	33.3	32.9	32.4	28.4	27.2	30.9	31.1	29.0	31.2	33.2	30.2	33.4	29.6	30.9	31.2
Pretax profit	32.9	35.1	36.1	36.1	29.9	33.2	43.8	48.1	44.8	51.3	59.5	52.1	140	155	208	223
QoQ (%)	81.5	6.6	3.0	(0.0)	(17.1)	10.9	32.0	9.8	(6.8)	14.5	16.0	(12.5)				
YoY (%)	63.8	65.9	26.6	99.3	(9.1)	(5.4)	21.2	33.1	49.7	54.6	35.9	8.3	59.6	10.5	34.0	7.3
Net profit	24.5	26.7	27	32.2	21.8	26	34.5	38.4	34.7	40.3	46.8	40.9	110	121	163	175
QoQ (%)	102.3	9.0	1.2	19.2	(32.2)	18.9	32.9	11.2	(9.5)	16.2	16.1	(12.5)				
YoY (%)	56.3	58.5	25.6	165.7	(10.9)	(2.8)	27.7	19.1	58.9	55.3	35.7	6.7	66.9	9.3	34.9	7.4
Net margin (%)	25.2	22.9	21.8	26.0	18.8	19.6	23.0	23.6	21.1	23.3	25.3	22.9	23.9	21.5	23.2	23.8

Source: Mirae Asset Daewoo Research estimate

SK Materials (036490 KQ/Buy/TP: W220,000)

Comprehensive Income Statement (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Revenue	461	562	701	735
Cost of Sales	269	331	400	418
Gross Profit	192	231	301	317
SG&A Expenses	39	65	84	88
Operating Profit (Adj)	154	166	217	229
Operating Profit	154	166	217	229
Non-Operating Profit	-14	-11	-9	-6
Net Financial Income	-8	-11	-9	-6
Net Gain from Inv in Associates	0	0	0	0
Pretax Profit	140	155	208	223
Income Tax	30	34	45	48
Profit from Continuing Operations	110	121	163	175
Profit from Discontinued Operations	0	0	0	0
Net Profit	110	121	163	175
Controlling Interests	109	118	159	171
Non-Controlling Interests	2	3	4	4
Total Comprehensive Profit	109	116	163	175
Controlling Interests	107	113	158	170
Non-Controlling Interests	2	3	5	5
EBITDA	222	241	293	307
FCF (Free Cash Flow)	82	186	148	158
EBITDA Margin (%)	48.2	42.9	41.8	41.8
Operating Profit Margin (%)	33.4	29.5	31.0	31.2
Net Profit Margin (%)	23.6	21.0	22.7	23.3

Cash Flows (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Cash Flows from Op Activities	208	269	238	252
Net Profit	110	121	163	175
Non-Cash Income and Expense	115	121	130	132
Depreciation	67	74	75	77
Amortization	1	1	1	1
Others	47	46	54	54
Chg in Working Capital	17	76	-1	-1
Chg in AR & Other Receivables	-3	-26	-9	-6
Chg in Inventories	-16	-24	-10	-6
Chg in AP & Other Payables	46	9	3	2
Income Tax Paid	-28	-35	-45	-48
Cash Flows from Inv Activities	-209	-82	-91	-96
Chg in PP&E	-125	-83	-90	-95
Chg in Intangible Assets	-4	-1	-1	-1
Chg in Financial Assets	-1	-1	0	0
Others	-79	3	0	0
Cash Flows from Fin Activities	19	-165	-149	-147
Chg in Financial Liabilities	118	80	-111	-111
Chg in Equity	-33	0	0	0
Dividends Paid	-30	-27	-37	-36
Others	-36	-218	-1	0
Increase (Decrease) in Cash	19	21	-2	9
Beginning Balance	41	60	82	79
Ending Balance	60	82	79	89

Source: Company data, Mirae Asset Daewoo Research estimates

Statement of Financial Condition (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Current Assets	217	288	306	329
Cash and Cash Equivalents	60	82	79	89
AR & Other Receivables	79	104	114	120
Inventories	74	98	107	114
Other Current Assets	4	4	6	6
Non-Current Assets	686	703	718	735
Investments in Associates	0	0	0	0
Property, Plant and Equipment	661	679	694	712
Intangible Assets	7	7	7	7
Total Assets	903	991	1,024	1,064
Current Liabilities	284	396	320	239
AP & Other Payables	72	94	103	109
Short-Term Financial Liabilities	168	244	153	62
Other Current Liabilities	44	58	64	68
Non-Current Liabilities	182	196	180	162
Long-Term Financial Liabilities	150	154	133	113
Other Non-Current Liabilities	32	42	47	49
Total Liabilities	466	592	500	401
Controlling Interests	421	376	497	632
Capital Stock	5	5	5	5
Capital Surplus	34	34	34	34
Retained Earnings	383	436	558	693
Non-Controlling Interests	16	23	27	31
Stockholders' Equity	437	399	524	663

Forecasts/Valuations (Summarized)

	12/16	12/17F	12/18F	12/19F
P/E (x)	17.4	16.3	12.0	11.2
P/CF (x)	8.4	7.9	6.5	6.2
P/B (x)	4.5	4.1	3.2	2.6
EV/EBITDA (x)	9.8	9.3	7.3	6.6
EPS (W)	10,299	11,181	15,082	16,201
CFPS (W)	21,370	22,879	27,778	29,129
BPS (W)	40,078	44,723	56,259	69,088
DPS (W)	3,550	3,550	3,550	3,550
Payout ratio (%)	33.9	29.5	21.9	20.3
Dividend Yield (%)	2.0	2.0	2.0	2.0
Revenue Growth (%)	36.4	21.9	24.7	4.9
EBITDA Growth (%)	31.4	8.6	21.6	4.8
Operating Profit Growth (%)	36.3	7.8	30.7	5.5
EPS Growth (%)	64.3	8.6	34.9	7.4
Accounts Receivable Turnover (x)	7.3	6.7	7.1	6.9
Inventory Turnover (x)	7.0	6.5	6.8	6.7
Accounts Payable Turnover (x)	15.2	13.1	13.3	12.8
ROA (%)	14.1	12.7	16.2	16.7
ROE (%)	27.2	29.6	36.5	30.2
ROIC (%)	19.5	17.8	22.6	23.3
Liability to Equity Ratio (%)	106.6	148.5	95.4	60.5
Current Ratio (%)	76.6	72.7	95.6	137.4
Net Debt to Equity Ratio (%)	58.6	78.8	39.1	12.6
Interest Coverage Ratio (x)	15.4	15.3	23.4	35.0

Tes (095610 KQ)

Beneficiary of increasing process complexity of 3D NAND

LCD and Semiconductor Equipment

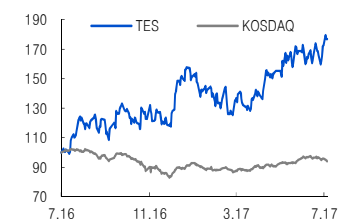
(Maintain)	Buy
Target Price (12M, W)	38,000
Share Price (07/12/17, W)	30,050
Expected Return	26%

OP (17F, Wbn)	62
Consensus OP (17F, Wbn)	55

EPS Growth (17F, %)	60.8
Market EPS Growth (17F, %)	39.6
P/E (17F, x)	10.7
Market P/E (17F, x)	10.0
KOSDAQ	651.10

Market Cap (Wbn)	591
Shares Outstanding (mn)	20
Free Float (%)	68.5
Foreign Ownership (%)	17.1
Beta (12M)	1.54
52-Week Low	16,850
52-Week High	30,500

(%)	1M	6M	12M
Absolute	10.5	19.5	75.2
Relative	12.8	16.1	88.2



Maker of front-end process for 3D NAND production

Tes is engaged in the manufacture of front-end process equipment, including plasma-enhanced chemical vapor deposition (PECVD) systems and gas phase etchers. PECVD system is used to deposit thin films from a gas state (vapor) to a solid state on a substrate. Key customers include SEC and SK Hynix. For 2017, we expect Tes' revenue and operating profit to jump 53% YoY (to W273.3bn) and 69% YoY (to W61.5bn), respectively, fueled by chipmakers' capacity ramp-up. For 2Q, we estimate operating profit at W24.9bn (+58% QoQ).

Chipmakers' investments in 3D NAND to accelerate

Recently, memory makers have been competitively expanding capacity for 3D NAND. While up until 1H, SEC had been the only chipmaker to mass produce 3D NAND, most other chipmakers are now capable of volume producing 3D NAND. SK Hynix converted parts of its flagship M14 fab to produce 3D NAND, with the aim of initiating the production of 72-layer 3D NAND in 2H. Toshiba spun off its memory business into a separate company, and the new subsidiary recently began volume producing 64-layer 3D NAND. Micron and Intel also began to produce 3D NAND from their respective 3D NAND-dedicated fabs in Singapore and Dalian. In order to widen its lead through scale effects, SEC recently began volume producing 3D NAND at its new Pyeongtaek fab. In our view, intensifying competition among NAND makers should drive further capacity additions, thus benefiting makers of relevant equipment makers, such as Tes.

Notably, the increase in the number of layers in 3D NAND should drive up demand for PECVD system, which is used for hard mask deposition. The key process of manufacturing 3D NAND is to etch deep holes (by using hard masks) to form channels. As the layer count goes up, deeper holes need to be etched on glass. As current hard masks are unable to etch deep holes uniformly, chipmakers would need higher-performance deposition equipment. This should benefit hard mask deposition equipment makers, including Tes. Especially in the double stacking process, which is expected to be used in 96-layer and beyond, additional hard mask deposition will likely be needed.

Initiate with Buy and target price of W38,000

We initiate coverage of Tes with a BUY rating and target price of W38,000, which reflects our 2017-19F average ROE (28%) and cost of equity of 7.4%. The stock is currently trading at a 2017F P/E of 10.8x and P/B of 3.1x.

FY (12)	12/14	12/15	12/16	12/17F	12/18F	12/19F
Revenue (Wbn)	110	100	179	273	299	323
OP (Wbn)	16	9	36	62	71	83
OP margin (%)	14.5	9.0	20.1	22.7	23.7	25.7
NP (Wbn)	15	13	31	55	61	72
EPS (W)	943	772	1,752	2,817	3,088	3,647
ROE (%)	19.9	14.1	25.9	32.0	27.0	25.0
P/E (x)	12.2	13.1	15.3	10.7	9.7	8.2
P/B (x)	2.2	1.8	3.5	3.0	2.3	1.8
Dividend yield (%)	1.4	2.1	0.8	0.7	0.7	0.7

Note: All figures are based on consolidated K-IFRS; NP refers to net profit attributable to controlling interests
Source: Company data, Mirae Asset Daewoo Research estimates

Table 7. Valuation

(₩)

Notes		
Sustainable COE	Risk free 2.8%, beta 0.8, risk premium 6.1%	7.4%
Sustainable ROE	3-year average (2017~2019)	28.0%
Terminal G		0.0%
Target PBR	(ROE-terminal g)/(COE-terminal g)	3.8
BPS	Expectation 2017	9,997
Fair value per share	Target PBR * BPS	38,000

Source: Mirae Asset Daewoo Research estimate

Table 8. Earnings forecast

(Wbn)

	1Q16	2Q16	3Q16	4Q16	1Q17	2Q17F	3Q17F	4Q17F	1Q18F	2Q18F	3Q18F	4Q18F	2014	2015	2016	2017F	2018F
Revenue	45.7	35	41.3	56.9	63.8	90.8	60.9	57.9	65.7	72.5	79	82	110	100	179	273	299
QoQ (%)	389.0	(23.5)	18.1	37.7	12.2	42.1	(32.9)	(4.9)	13.6	10.3	8.9	3.9					
YoY (%)	70.1	24.8	14.5	508.5	39.7	159.4	47.3	1.7	3.0	(20.1)	29.7	41.7		(8.5)	78.3	52.8	9.5
Semicon, Display equipment	38.9	30.7	38.5	53.1	58.8	84.1	56.4	53.6	60.5	67.2	73.2	76.1	102	81.4	161	253	277
Others	6.8	4.2	2.8	3.8	5	6.6	4.5	4.3	5.2	5.3	5.8	5.9	8	19	17.7	20.4	22.2
OP	10.3	6.1	9.1	10.8	15.8	24.9	11.5	9.4	13.4	16.5	19.1	21.5	16.3	9.5	36.4	61.5	70.6
QoQ (%)	TTB	(40.1)	48.6	18.3	45.7	57.8	(53.9)	(17.6)	42.3	23.1	15.4	12.8					
YoY (%)	177.2	48.7	67.8	TTB	53.4	304.3	25.3	(12.7)	(14.7)	(33.5)	66.7	128.1		(42)	283.6	69.1	14.8
OP margin (%)	22.5	17.6	22.1	19.0	24.7	27.4	18.8	16.3	20.4	22.8	24.2	26.3	14.9	9.4	20.3	22.5	23.6
Pretax profit	10.9	6.1	10	10	18	25.1	11.6	9.6	13.7	16.6	19.4	21.8	15.6	13.9	37	64.3	71.4
QoQ (%)	TTB	(43.8)	63.5	0.6	79.2	39.3	(53.8)	(16.6)	41.6	21.6	16.6	12.5					
YoY (%)	136.0	(32.0)	208.0	TTB	65.6	310.5	15.9	(4.0)	(24.1)	(33.7)	67.3	125.8		(10.8)	165.8	73.7	11.1
Net profit	9.3	5.4	8.6	7.9	15.8	21.4	9.8	8.1	11.7	14.1	16.4	18.5	14.7	12.5	31.3	55.1	60.7
QoQ (%)	TTB	(41.3)	58.0	(7.7)	98.9	35.7	(54.3)	(17.0)	43.8	20.8	16.4	12.6					
YoY (%)	129.9	(20.9)	218.7	TTB	70.3	293.7	13.8	2.4	(26.0)	(34.2)	67.8	127.5		(15.0)	150.9	76.4	10.1
Net margin (%)	20.3	15.6	20.8	14.0	24.7	23.6	16.1	14.0	17.8	19.5	20.8	22.5	13.4	12.4	17.5	20.2	20.3

Note: TTB stands for "Turn To Black"

Source: Mirae Asset Daewoo Research estimate

Tes (095610 KQ/Buy/TP: W38,000)

Comprehensive Income Statement (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Revenue	179	273	299	323
Cost of Sales	131	183	193	201
Gross Profit	48	90	106	122
SG&A Expenses	12	29	36	39
Operating Profit (Adj)	36	62	71	83
Operating Profit	36	62	71	83
Non-Operating Profit	1	2	0	1
Net Financial Income	0	1	1	1
Net Gain from Inv in Associates	0	0	0	0
Pretax Profit	37	64	71	84
Income Tax	6	9	11	13
Profit from Continuing Operations	31	55	61	72
Profit from Discontinued Operations	0	0	0	0
Net Profit	31	55	61	72
Controlling Interests	31	55	61	72
Non-Controlling Interests	0	0	0	0
Total Comprehensive Profit	31	55	61	72
Controlling Interests	31	55	61	72
Non-Controlling Interests	0	0	0	0
EBITDA	41	67	78	93
FCF (Free Cash Flow)	11	35	34	59
EBITDA Margin (%)	22.9	24.5	26.1	28.8
Operating Profit Margin (%)	20.1	22.7	23.7	25.7
Net Profit Margin (%)	17.3	20.1	20.4	22.3

Cash Flows (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Cash Flows from Op Activities	22	53	55	81
Net Profit	31	55	61	72
Non-Cash Income and Expense	12	15	17	21
Depreciation	3	4	6	7
Amortization	2	2	2	2
Others	7	9	9	12
Chg in Working Capital	-21	-9	-14	-1
Chg in AR & Other Receivables	-25	-2	-13	-1
Chg in Inventories	-6	0	-10	-1
Chg in AP & Other Payables	6	0	6	0
Income Tax Paid	0	-9	-11	-13
Cash Flows from Inv Activities	-22	-17	-45	-30
Chg in PP&E	-11	-10	-20	-22
Chg in Intangible Assets	-4	-7	-7	-7
Chg in Financial Assets	-6	-1	-18	-1
Others	-1	1	0	0
Cash Flows from Fin Activities	17	-2	-4	-4
Chg in Financial Liabilities	-7	0	0	0
Chg in Equity	25	0	0	0
Dividends Paid	-2	-2	-4	-4
Others	1	0	0	0
Increase (Decrease) in Cash	17	33	5	47
Beginning Balance	11	28	61	66
Ending Balance	28	61	66	112

Source: Company data, Mirae Asset Daewoo Research estimates

Statement of Financial Condition (Summarized)

(Wbn)	12/16	12/17F	12/18F	12/19F
Current Assets	127	162	208	257
Cash and Cash Equivalents	28	61	66	112
AR & Other Receivables	30	31	43	44
Inventories	24	25	35	35
Other Current Assets	45	45	64	66
Non-Current Assets	58	72	95	114
Investments in Associates	2	2	3	3
Property, Plant and Equipment	33	42	56	71
Intangible Assets	10	14	19	24
Total Assets	185	233	303	371
Current Liabilities	35	35	48	49
AP & Other Payables	16	16	23	23
Short-Term Financial Liabilities	5	4	4	4
Other Current Liabilities	14	15	21	22
Non-Current Liabilities	2	2	2	2
Long-Term Financial Liabilities	1	1	1	1
Other Non-Current Liabilities	1	1	1	1
Total Liabilities	37	37	50	51
Controlling Interests	148	197	253	320
Capital Stock	10	10	10	10
Capital Surplus	56	56	56	56
Retained Earnings	83	131	188	255
Non-Controlling Interests	0	0	0	0
Stockholders' Equity	148	197	253	320

Forecasts/Valuations (Summarized)

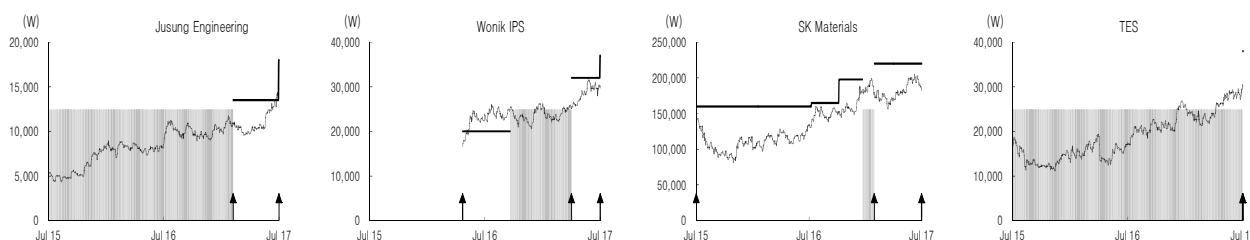
	12/16	12/17F	12/18F	12/19F
P/E (x)	15.3	10.7	9.7	8.2
P/CF (x)	11.2	8.4	7.6	6.4
P/B (x)	3.5	3.0	2.3	1.8
EV/EBITDA (x)	11.3	7.4	6.1	4.6
EPS (W)	1,752	2,817	3,088	3,647
CFPS (W)	2,397	3,586	3,969	4,724
BPS (W)	7,636	9,997	12,868	16,296
DPS (W)	220	220	220	220
Payout ratio (%)	13.7	7.8	7.1	6.0
Dividend Yield (%)	0.8	0.7	0.7	0.7
Revenue Growth (%)	79.0	52.5	9.5	8.0
EBITDA Growth (%)	215.4	63.4	16.4	19.2
Operating Profit Growth (%)	300.0	72.2	14.5	16.9
EPS Growth (%)	126.9	60.8	9.6	18.1
Accounts Receivable Turnover (x)	9.3	9.1	8.1	7.4
Inventory Turnover (x)	7.8	11.2	10.1	9.2
Accounts Payable Turnover (x)	11.2	11.9	10.3	9.1
ROA (%)	20.5	26.4	22.6	21.3
ROE (%)	25.9	32.0	27.0	25.0
ROIC (%)	44.3	60.5	54.0	51.0
Liability to Equity Ratio (%)	24.8	18.7	19.8	15.9
Current Ratio (%)	361.6	459.2	432.3	526.1
Net Debt to Equity Ratio (%)	-39.2	-46.8	-44.0	-49.5
Interest Coverage Ratio (x)	146.0	710.2	825.3	972.8

APPENDIX 1

Important Disclosures & Disclaimers

2-Year Rating and Target Price History

Company (Code)	Date	Rating	Target Price	Company (Code)	Date	Rating	Target Price
Jusung Engineering(036930)	07/11/2017	Buy	18,000	SK Materials(036490)	02/09/2017	Buy	220,000
	02/17/2017	Buy	13,500		No Coverage		
	No Coverage					10/17/2016	Buy
Wonik IPS(240810)	07/11/2017	Buy	37,000		07/20/2016	Buy	165,000
	04/12/2017	Buy	32,000		07/01/2015	Buy	160,000
	No Coverage			Tes (095610)	07/11/2017	Buy	38,000
	05/02/2016	Buy	20,000	No Coverage			



Stock Ratings

- Buy : Relative performance of 20% or greater
- Trading Buy : Relative performance of 10% or greater, but with volatility
- Hold : Relative performance of -10% and 10%
- Sell : Relative performance of -10%

Industry Ratings

- Overweight : Fundamentals are favorable or improving
- Neutral : Fundamentals are steady without any material changes
- Underweight : Fundamentals are unfavorable or worsening

Ratings and Target Price History (Share price (—), Target price (—), Not covered (■), Buy (▲), Trading Buy (■), Hold (●), Sell (◆))

* Our investment rating is a guide to the relative return of the stock versus the market over the next 12 months.

* Although it is not part of the official ratings at Mirae Asset Daewoo Co., Ltd., we may call a trading opportunity in case there is a technical or short-term material development.

* The target price was determined by the research analyst through valuation methods discussed in this report, in part based on the analyst's estimate of future earnings.

* The achievement of the target price may be impeded by risks related to the subject securities and companies, as well as general market and economic conditions.

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Buy	Trading Buy	Hold	Sell
69.67%	17.06%	13.27%	0.00%

* Based on recommendations in the last 12-months (as of June 30, 2017)

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