EDISON

Thin Film Electronics

Bringing it all together in 2018

Q3 results/forecast change

Tech hardware & equipment

Thin Film Electronics (Thinfilm; THIN) continues to report significant advances on an almost weekly basis. In October it took the keys to its new San Jose facility and recent milestones include new pilot orders in gemstones (Sarine Technology) and food (olive oil) and a partnership to produce combined hologram/NFC document authentication tags. We have cut our near-term earnings forecasts as THIN no longer intends to further de-bottleneck its existing plant (with short-term revenue implications), but our DCF valuation has risen 15% to NOK8.58/share, reflecting the expected boost to long-term cash flows from the greatly increased capacity/reduced cost expectations from the planned new roll-to-roll (R2R) production line.

Year end	Revenue ($m)	PBT* ($m)	EPS* (c)	DPS (c)	EV/sales (x)	EV/EBITDA (x)	Yield (%)
12/14	4.5	(24.2)	(4.9)	0.0	65.8	N/A	N/A
12/15	4.4	(28.3)	(5.3)	0.0	70.2	N/A	N/A
12/16e	3.7	(40.3)	(6.6)	0.0	84.2	N/A	N/A
12/17e	10.8	(43.7)	(6.4)	0.0	34.0	N/A	N/A
12/18e	158.4	0.6	0.1	0.0	2.4	50.0	N/A

Note: *PBT and EPS are normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments.

Q3 cash burn down helped by lower R&D

In Q316 Thinfilm's revenue dropped 20% y-o-y to $0.8m, reflecting a hiatus in EAS orders from Nedap's fashion clients. Helped by falling R&D costs, reported operating loss fell from $10.5m to $9.8m and, helped by slow growth in working capital, cash burn declined from $12.8m in Q2 to $9.9m. Net cash balances at end Q3 totalled $27.1m (end Q2: $36.8m), which we see as sufficient to last into Q217.

Earnings revised to reflect increased capacity plans

With the decision to move forward on implementing the new 5.0bn unit R2R line (previously expected to have a 1.0bn unit capacity) in late 2017, we have increased our longer-term earnings forecasts and amended our capex forecast. This reflects the opportunity arising from sharply lower (c 10x) production costs, lower price points and resulting prospective gains in market shares and revenues. Nevertheless, prior to the new line becoming fully operational in H218 we have cut earnings expectations, as debottlenecking plans for the existing plant that would have increased revenue generation potential in the short term have been shelved.

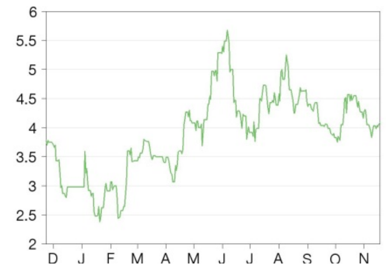
Valuation: DCF value up 15% to NOK8.58

We see the key driver of value as the coming together of a number of key influences as 2018 approaches. Most particularly, the likely increase in volume orders arising from the group's ability to quote in scale and at lower prices as a result of its planned capacity increase in 2018; the expected rapid growth in the number of NFC enabled phones, which should put THIN at the vanguard of a major new retail phenomenon; and the ongoing rise of the consumer in China and Asia, which THIN is planning to tap into with its focus on these markets. Following the above-mentioned revisions to our forecasts, our DCF valuation has increased 15% to NOK8.58 per share.

21 November 2016

Price	**NOK4.08**
Market cap	**NOK2780m**
	NOK8.542/US$
Net cash ($m) at 30 September 2016	27.1
Shares in issue	681.6m
Warrants in issue	119.5m
Free float	84.9%
Code	THIN
Primary exchange	Oslo
Secondary exchange	OTCQX

Share price performance



%	1m	3m	12m
Abs	(10.7)	(4.0)	11.2
Rel (local)	(12.3)	(9.3)	12.5
52-week high/low		NOK5.7	NOK2.4

Business description

Thin Film Electronics (Thinfilm) commercialises printed electronics and owns key patents for printing rewritable, non-volatile memory and printable NFC circuits. It also licenses technology from others to develop complete printed systems.

Next events

2016 full year results	24 February 2017
AGM	10 May 2017

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Thin Film Electronics is a research client of Edison Investment Research Limited

Third quarter results update

Exhibit 1: Thinfilm quarterly results sheet summary

US$'000	Q316	Q315	Change y-o-y (%)	9M15	9M16	Change y-o-y (%)	Q216	Q116
Sales revenue	**248**	**494**	**(49.8)**	**1,225**	**995**	**23.1**	**597**	**150**
Other operating revenue	476	434	9.8	1,306	1,517	(13.9)	483	557
Other income	105	111	(5.4)	283	314	(9.9)	105	104
Total revenue	**829**	**1,039**	**(20.2)**	**2,814**	**2,826**	**(0.4)**	**1,186**	**811**
Payroll	(5,470)	(4,051)	35.0	(12,072)	(15,264)	(20.9)	(5,146)	(4,648)
Premises, supplies	(2,721)	(1,930)	41.0	(4,875)	(7,707)	(36.7)	(2,507)	(2,479)
Other operating costs	(1,338)	(2,749)	(51.3)	(6,270)	(5,746)	9.1	(2,492)	(1,916)
Total operating costs	**(9,802)**	**(8,925)**	**9.8**	**(23,805)**	**(29,590)**	**(19.5)**	**(10,558)**	**(9,229)**
of which expensed R&D	(3,949)	(2,233)	76.8	(6,317)	(11,865)	(46.8)	(5,266)	(2,650)
EBITDA	**(8,973)**	**(7,886)**	**13.8**	**(20,991)**	**(26,763)**	**(21.6)**	**(9,372)**	**(8,418)**
less share based payments	(273)	(195)	40.0	(588)	(872)	(32.6)	(413)	(186)
EBITDA (norm)	(8,700)	(7,691)	13.1	(20,403)	(25,891)	(21.2)	(8,959)	(8,232)
EBITDA (norm, excl expensed R&D)	(8,700)	(7,691)	13.1	(2,915)	(8,167)	(64.3)	(3,667)	(1,653)
D&A	(814)	(427)	90.6	(1,079)	(2,050)	(47.4)	(684)	(552)
Operating profit	**(9,787)**	**(8,313)**	**17.7**	**(22,070)**	**(28,813)**	**(23.4)**	**(10,056)**	**(8,970)**
Operating profit (norm)	(9,514)	(8,118)	17.2	(21,482)	(27,941)	(23.1)	(9,643)	(8,784)
Net financial items	111	1,925	(94.2)	2,038	(1,310)	NA	(454)	(967)
Profit before tax	**(9,676)**	**(6,388)**	**51.5**	**(20,032)**	**(30,123)**	**(33.5)**	**(10,510)**	**(9,937)**
Profit before tax (norm)	(9,403)	(6,193)	51.8	(19,444)	(29,251)	(33.5)	(10,097)	(9,751)
Tax	(1)	0	NA	0	(301)	NA	(1)	(299)
Profit after tax	**(9,677)**	**(6,388)**	**51.5**	**(20,032)**	**(30,424)**	**(34.2)**	**(10,511)**	**(10,236)**
Profit after tax (norm)	(9,404)	(6,193)	51.8	(19,444)	(29,552)	(34.2)	(10,098)	(10,050)
EPS - (norm) ($)	0.014	0.011	24.0	0.036	0.043	(16.8)	0.015	0.016
Earnings per ADR (norm) ($)	0.138	0.112	24.0	0.362	0.435	(16.8)	0.149	0.163
Net cash	**27,122**	**24,622**	**10.2**	**24,622**	**27,122**	**(9.2)**	**36,809**	**49,122**
Cash flow from operations	(9,436)	(6,146)	53.5	(18,257)	(27,205)	(32.9)	(11,516)	(6,253)
Cash burn (CF from ops and investments)	(9,858)	(9,538)	3.4	(23,631)	(30,710)	(23.1)	(12,828)	(8,024)
Purchases of PPE	(275)	(3,413)	(91.9)	(4,909)	(2,920)	68.1	(945)	(1,700)
Cash flow from investments	(422)	(3,392)	(87.6)	(5,374)	(3,505)	53.3	(1,311)	(1,771)

Source: Thinfilm, Edison Investment Research

The key points from Thinfilm's third quarter results are:

- Revenues fell 20% y-o-y, affected by a lack of EAS sales to Nedap, which had boosted H1 revenues. Thinfilm has submitted quotes to Nedap for higher volume orders and is currently stockpiling production of EAS units in anticipation of a resumption in demand and to cover production downtime in 2017.
- Payroll costs rose 35% y-o-y to $5.5m, reflecting a 14% y-o-y increase in staff numbers to 128. Key growth took place in production and marketing, with particular emphasis on the US. The current focus is on software staff to build cloud based platforms for marketing and big data applications.
- Research and development expenses rose 13% y-o-y to $3.9m, but were significantly down on Q2 levels of $5.3m. A major area of spend was R2R process research, which should fall in 2017 as the new plant comes online. We also see prospects for spending on R&D in printed batteries and displays – principally for sensor tags – to fall as these products are completed.
- Helped by falling R&D costs, the reported operating loss fell from $10.1m to $9.8m. Cash burn contracted from $12.8m to $9.9m, helped by the improving operating results and a significant reduction in working capital use, down from $2.4m to $0.8m. Cash balances at end Q3 totalled $27.1m, down from $36.8m, which we see as sufficient to last into Q217, taking into account the likely need to commence down-payments on the new R2R plant in Q416. Funding may come in the form of bank loans or warrant conversions, although at present the 40m warrant holding by Woodford Capital, which has an exercise price of NOK4.50, remains out of the money.

Evolving strategy: China and software platforms

Over the last quarter Thinfilm's strategy has been further refined, reflecting greater clarity about its production plans and plans to enter new markets and tender for larger order sizes. This gives the company greater access to blue-chip companies, and it is now able to engage with companies already indicating minimum order sizes of 100m tags.

In recent months THIN has also set out plans to more closely target the Chinese and other Asian markets with the recent founding of a marketing subsidiary in China. Management believes that the market has the potential to supply one-third to one-half of Thinfilm's future sales in the long term as well as playing a role within the supply chain. Although we forecast revenues based on target share of global markets (and not by country), we agree that China and greater Asia have the potential to contribute the greater share to revenues. This is based on the following:

- The dominant position of Android (phones) in China alongside the rapid growth in smartphone ownership. In this situation China is likely to be a global leader in consumer use of NFC in coming years, leading to early adoption of NFC enabled tags.
- The very large counterfeiting problem in alcoholic beverages in China, which presents significant opportunities for NFC OpenSense (see our note of 8 April 2016 for a discussion of the market).
- The very large addressable market for tobacco products in Asia (Chinese cigarette sales alone total 2.5trn pa), while the market faces major counterfeiting/illicit sales challenges. The Vietnamese government estimates that 25% of the 4bn packets sold pa are counterfeit or illegal, while BAT quotes research showing annual sales of illicit cigarettes at 600bn or 12% of global consumption. THIN recently announced a six-figure (unit) NFC OpenSense pilot order from an unnamed Asian packaging group operating in the tobacco vertical.
- The growing spending power of Chinese consumers and Chinese producers in international markets.

Thinfilm is also working to build a team to offer highly customisable platforms for data collection from the group's NFC enabled tags. Company management sees the potential for such software to contribute 20-30% of revenue. We have yet to factor in any material contribution to our forecasts from software sales but see it as a potential substantial source of forecast upside once there is more visibility on likely sales and pricing.

New document authentication vertical: Hologram/NFC

On 5 November, Thinfilm announced a new partnership with Holoptica, a Silicon Valley based brand protection and document-security holographic company, in order to create a new printed anti-counterfeiting solution for authenticating government documents. The product will combine NCF SpeedTap and a hologram on a label for protecting documents such as visas, passports and other ID credentials against counterfeiting.

Users of the documents will tap the tag with their NFC-enabled smartphone (which includes all new Android phones) and be able to view the document's certified digital "twin" and verify the document's authenticity. With both a hologram and encrypted read-only tag connected to the cloud via NFC, the protected documents will have several layers of authentication functionality and can be rendered unusable in the event of theft. Figures cited by the companies put the market for illicit documents on the black market at $10bn pa while the broader counterfeiting market generates approximately $600bn pa.

We believe that this belt and braces approach is likely to appeal to government agencies by extending the ability to fully verify documents using encrypted technology to third parties, such as private landlords, thereby improving controls over immigration, etc.

Bedford partnership to lower barriers in FMCG market

On 17 November Thinfilm announced a high potential partnership with Bedford Industries, which will see the two companies integrate Thinfilm's NFC SpeedTap into Bedford's ElastiTag hang-tag product. Bedford's hang-tags serve as marketing and promotional aids and come in a variety of shapes and sizes, consisting of a colourful elastomer loop attached to a custom-printed label.

The key advantage of the partnership is that it presents producers of fast-moving consumer goods with a turnkey solution for integrating Thinfilm's tags into their packaging, thereby cutting the costs and barriers to implementation of NFC SpeedTap into their products. This is especially true for those already incorporating ElastiTags into their packaging.

Larger companies already using Bedford's ElastiTag products include Unilever (Dove), Procter & Gamble (Downey), Diageo (Baileys), Bayer (Coppertone), Nestle, Colgate-Palmolive, L'Oréal, Method, Dole and Hershey's.

Earnings forecast revisions: New R2R assumptions

We have revised our current year earnings forecasts principally to reflect a reduction in our forecasts of EAS and NFC OpenSense sales, reflecting the hiatus in the Nedap sales of EAS tags and a slower than expected progression to volume orders in NFC OpenSense. Fourth quarter operating expenses excluding depreciation and amortisation are expected to reach $11.8m in Q4 vs $9.8m in Q3, reflecting the impact on employee costs of growth in employee numbers, seasonal increases in share-based remuneration expenses and non-recurrence of the Q3 one-off expense reclassification.

We have revised our earnings expectations from 2017 principally to reflect the evolution of Thinfilm's plans concerning the launch of roll-to-roll production at its new Junction Avenue plant in San Jose. The key changes in our assumptions are as follows:

- **Increased production capacity:** The most significant change to our forecast arises from the planned increase in annual production capacity of the new roll-to-roll line, which is expected to come on stream in late 2017. Until recently this line was expected to have peak capacity of 1bn OpenSense equivalent (OSE) units (the number of different types of tags that can be produced using the capacity of one OpenSense label – currently 4.5 for EAS tags and 0.25 for sensor tags). Following engineering work, this has now been expanded to an effective 5.3bn units. This comprises 5.0bn OSE units, which will include NFC capabilities (from H218) and a further 1.5bn EAS tags, equivalent to 0.3bn OSE units based on their 78% smaller size vs OpenSense tags, which will come on-stream at end-2017. The engineering innovations have included widening the bed-width of the production line and shrinking the die sizes (ie the size) for each tag. We foresee further expansion in plant capacity in coming years as die sizes are likely to continue to shrink in a similar process to Moore's law of computing power. On this basis we have assumed that THIN will be able to increase plant capacity by a further 10% (500m units) in 2020 with minimal additional capex.

Exhibit 2: Revised earnings forecasts

Amounts in $m	2015	2016e	2016e old	Chg (%)	2017e	2017e old	Chg (%)	2018e	2018e old	Chg (%)	2019e
Production											
NFC OpenSense (m units)	0.0	0.8	2.4	(67.5)	8.0	82.3	(90.3)	466.2	506.2	(7.9)	840.6
NFC SpeedTap (m units)	0.0	0.3	0.3	0.0	12.0	3.0	300.0	550.0	15.2	3,518.4	1,891.4
EAS labels (m units)	11.2	2.3	5.8	(60.3)	15.0	5.8	158.6	317.2	151.5	109.3	501.6
Total OpenSense equivalent (OSE) units, m units)	3.2	1.8	6.1	(69.8)	27.3	90.0	(69.6)	1,130.4	644.6	75.4	3,011.6
Average unit price/OSE (c)	68.4	68.6	56.0	22.4	31.4	40.4	(22.3)	13.8	30.1	(54.1)	11.9
Sales revenue	**2.2**	**1.3**	**3.4**	**(63.0)**	**8.6**	**36.4**	**(76.4)**	**156.3**	**194.1**	**(19.5)**	**357.7**
Total revenue	**4.4**	**3.7**	**6.0**	**(38.4)**	**10.8**	**38.6**	**(71.9)**	**158.4**	**196.2**	**(19.2)**	**359.8**
Gross profit	N/A	(1.9)	(1.1)	66.1	1.0	8.9	(89.2)	48.7	62.5	(22.1)	107.5
Gross profit margin (%)	N/A	neg.	neg.	N/A	8.8	23.0	N/A	30.7	31.8	N/A	29.9
Payroll	(16.7)	(21.3)	(19.5)	9.4	(23.1)	(20.0)	15.6	(25.1)	(22.1)	13.3	(29.2)
Premises, supplies	(7.6)	(10.4)	(9.8)	6.4	(10.7)	(10.2)	4.9	(7.9)	(9.5)	(17.2)	(8.1)
Total operating costs	**(34.7)**	**(41.4)**	**(40.9)**	**1.3**	**(52.1)**	**(69.1)**	**(24.7)**	**(152.4)**	**(175.8)**	**(13.3)**	**(300.7)**
EBITDA	**(30.3)**	**(37.7)**	**(34.8)**	**8.1**	**(41.2)**	**(30.5)**	**35.1**	**6.0**	**20.3**	**(70.5)**	**59.1**
EBITDA margin (%)	neg.	neg.	neg.	N/A	neg.	neg.	N/A	3.8	10.4	N/A	16.4
Less share-based payments	(1.1)	(1.4)	(1.1)	25.7	(1.6)	(1.4)	15.6	(1.7)	(1.5)	13.3	(2.0)
EBITDA (norm)	(29.2)	(36.3)	(33.8)	7.5	(39.6)	(29.2)	36.0	7.7	21.9	(64.7)	61.1
D&A	(1.5)	(2.7)	(2.2)	25.6	(3.0)	(3.7)	(18.7)	(4.8)	(4.8)	1.3	(5.4)
Operating profit	**(31.8)**	**(40.4)**	**(37.0)**	**9.1**	**(44.2)**	**(34.2)**	**29.2**	**1.2**	**15.6**	**(92.3)**	**53.7**
Operating profit (norm)	(30.7)	(39.0)	(35.9)	8.6	(42.7)	(32.9)	29.8	2.9	17.1	(83.0)	55.6
Profit before Tax	(29.4)	(41.7)	(36.7)	13.5	(45.3)	(35.0)	29.4	(1.1)	13.7	(107.9)	52.4
Profit before Tax (norm)	(28.3)	(40.3)	(35.6)	13.1	(43.7)	(33.7)	29.9	0.6	15.2	(95.9)	54.4
Tax	0.0	(0.3)	0.0	N/A	0.0	0.0	N/A	0.0	0.0	N/A	0.0
Profit after tax	**(29.4)**	**(42.0)**	**(36.7)**	**839.0**	**(45.3)**	**(35.0)**	**29.4**	**(1.1)**	**13.7**	**(107.9)**	**52.4**
EPS - (norm) (c)	(5.3)	(6.6)	(5.8)	12.5	(6.4)	(4.9)	29.9	0.1	2.2	(95.9)	8.0
EPS - (IFRS) (c)	(5.5)	(6.8)	(5.9)	14.3	(6.7)	(5.1)	29.4	(0.2)	2.0	(107.9)	7.7
Capex	(4.8)	(6.4)	(16.1)	(61.3)	(17.0)	(17.0)	0.0	(14.0)	(8.0)	75.0	(3.5)
Cash generation (burn)	(31.4)	(43.6)	(48.8)	(10.6)	(57.1)	(50.6)	12.7	(17.1)	3.4	(595.7)	51.9
Net cash/(debt)	**15.9**	**14.1**	**8.9**	**57.6**	**(43.0)**	**(41.7)**	**3.1**	**(60.0)**	**(38.2)**	**57.0**	**(8.2)**

Source: Thinfilm accounts, Edison Investment Research

- **Sharp fall in production (and capex) costs:** With the planned sharp increase in unit capacity (from 40m to 5.3bn) and the step change in automation represented by the move from sheet based to roll-to-roll printing, management is looking for the cost per die to fall in the order of a factor of 10 on the new line. With the expected dramatic fall in unit labour costs, material costs will come to make up by far the largest component of cost.
- **Capex cost savings** from the new plant also have a significant impact on our longer-term forecasts. The current plan to create over 5bn unit capacity with a $32m capex outlay compares very favourably with the c $25m capex outlay planned for the 1.0bn unit capacity line.
- **…enabling much lower pricing points at higher margins:** With the expected reduction in front-end unit production costs from the new line of c 90% we have reduced our average selling prices (ASP) per OSE in 2018 from 30.1 cents to 13.8 cents. These pricing expectations are in line with management's guidance of a 12-15 cents ASP for its OpenSense and SpeedTap sales in 2018. We have also cut our forecast of **EAS** prices from 6.4c in 2016 to 3.6c per unit in 2017, which compares with current prices for RFID 96-bit EPC inlay (chip and antenna mounted on a substrate) costs of 7c to 15c cents (source RFID Journal).
- **…which should stimulate demand:** With the increase in capacity and more attractive product prices we now forecast total product sales to reach 3.0bn OSE in 2019, up from our previous forecast of 1.6bn. We have also increased our forecast of THIN's global EAS market share from our earlier forecast of 0.3% in 2018 to 1.0% and from 1.0% in 2019 to 1.5%.
- **Debottlenecking capex shelved in 2016:** We previously assumed that debottlenecking of the existing sheet based plant would increase capacity from 40m to 120m units in 2017 at a capex

cost of $8m. Management has shelved this plan, leading us to cut our capex assumption by $8m in 2016, as well as our capacity estimates back to 40m units until late 2017 when the company expects to commence production of EAS units on the R2R plant. The R2R line is expected to be ready to produce NFC enabled products by H218. This reduced capex during 2017 had a negative impact on our earnings assumptions; the benefit of these changes is first felt in our 2019 earnings forecasts.

- We have assumed **gross margins on production** revenues of 30% in line with management's new guidance. It should be noted that the total group gross margin is elevated above this level (see Exhibit 2) by higher margined other income streams such as licensed product sales and project revenues.
- **Funding requirement:** Our forecasts now indicate that Thinfilm will require funding of c $65m before becoming strongly cash generative in 2019. This translates into an assumption for our model that the group takes on $50m in debt in 2017 and a further $15m in 2018.

Valuation

Exhibit 3: DCF valuation model

$m	2016e	2017e	2018e	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e
Revenue by product line											
Brand protection	0.0	2.2	3.2	4.5	6.3	6.7	7.1	7.4	9.8	13.0	17.4
Electronic Article Surveillance	0.1	0.6	11.5	17.5	35.6	48.6	47.4	45.9	46.2	46.6	47.0
NFC OpenSense	0.2	1.9	76.1	127.7	214.5	302.8	427.5	517.7	488.8	470.5	451.9
NFC SpeedTap	0.1	2.2	59.8	191.6	303.8	239.1	133.3	72.4	104.3	104.0	138.0
Sensor labels	0.0	0.8	0.9	1.4	4.0	3.8	3.6	3.3	3.2	3.1	3.0
NFC Smart sensor labels	0.0	-	3.9	13.8	45.9	47.8	47.8	80.0	91.2	93.6	95.0
Other	0.8	0.8	0.9	1.2	1.3	1.4	1.6	1.7	1.9	2.2	2.4
Sales revenue	**1.3**	**8.6**	**156.3**	**357.7**	**611.4**	**650.2**	**668.2**	**728.4**	**745.5**	**733.1**	**754.8**
Total unit sales own production (m)	3	36	1,344	3,276	5,840	6,389	6,234	6,249	6,096	6,023	5,944
NFC OpenSense price (c/unit)	27.0	23.9	16.3	15.2	14.2	13.2	12.3	11.4	10.9	10.3	9.7
ASP own production (c/unit)	12.8	15.3	11.3	10.7	10.1	9.6	9.7	10.2	9.9	9.5	9.0
Share units produced in-house (%)	75.8	2.3	31.4	31.6	34.5	36.6	35.6	31.6	22.7	17.2	13.0
Average licence fee/price (%)	12.0	11.1	10.3	9.4	8.6	7.7	6.9	6.0	6.0	6.0	6.0
Production revenue	0.4	5.5	152.2	352.1	591.9	611.1	605.4	640.3	603.7	572.6	537.8
License revenue	0.0	2.2	3.2	4.5	18.2	37.7	61.2	86.3	139.9	158.3	214.5
Other revenue	3.3	3.1	3.0	3.3	3.4	3.6	3.7	3.9	4.1	4.4	4.7
Total revenue	**3.7**	**10.8**	**158.4**	**359.8**	**613.5**	**652.3**	**670.3**	**730.6**	**747.7**	**735.3**	**757.0**
Growth (%)		193.3	1,360.2	127.2	70.5	6.3	2.8	9.0	2.3	(1.7)	3.0
Gross margin (%)	N/A	(23.1)	29.9	29.3	31.3	30.5	30.1	30.1	28.1	27.5	25.3
EBITDA	**(37.7)**	**(41.2)**	**6.0**	**59.1**	**140.5**	**156.6**	**173.7**	**205.7**	**226.8**	**225.0**	**249.7**
EBITDA Margin (%)	N/A	N/A	3.8	16.4	22.9	24.0	25.9	28.2	30.3	30.6	33.0
Depreciation	(2.7)	(3.0)	(4.8)	(5.4)	(4.1)	(4.3)	(4.5)	(4.7)	(4.9)	(5.0)	(5.1)
EBIT	(40.4)	(44.2)	1.2	53.7	136.4	152.3	169.2	201.0	221.9	220.1	244.7
Notional tax	0.0	0.0	0.0	0.0	(34.1)	(38.1)	(42.3)	(50.2)	(55.5)	(55.0)	(61.2)
Tax rate (%)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
EBITDA after tax	**(37.7)**	**(41.2)**	**6.0**	**59.1**	**106.4**	**118.5**	**131.4**	**155.4**	**171.3**	**170.0**	**188.6**
Change in working capital	(0.2)	.7	(8.5)	(4.4)	(13.4)	(2.7)	(2.9)	(5.3)	(3.5)	.3	(4.1)
Capex	(6.4)	(17.0)	(14.0)	(3.5)	(5.9)	(6.1)	(6.1)	(6.4)	(6.0)	(5.7)	(5.4)
Capex/revenue (%)	173.7	156.7	8.8	1.0	1.0	.9	.9	.9	.8	.8	.7
Free cashflow	**(44.3)**	**(57.6)**	**(16.5)**	**51.1**	**87.1**	**109.7**	**122.5**	**143.7**	**161.8**	**164.6**	**179.1**
Terminal value											1,492
NPV of future cash flows	**(44.3)**	**(50.1)**	**(12.5)**	**33.6**	**49.8**	**54.6**	**53.0**	**54.0**	**52.9**	**46.8**	**413.2**
Value of future cash flows	651		WACC		15%						
Net debt/(cash)	(58)		Terminal growth rate		3%						
Equity value	709		TV as % of total EV		52.1						
Per share value (NOK)	8.58		US$/NOK		8.2356						

Source: Thinfilm, Edison Investment Research

Exhibit 3 shows our DCF valuation model. Revenue forecasts by product line are the sum of revenue from own production and licensing revenues in each product line, with revenues typically showing a rapid slowdown as output switches to licensed manufacture. As a result of changes to our forecasts, our DCF valuation for Thinfilm is currently NOK8.58 per share ($10.42/ADR), compared with the value of NOK7.44/share ($9.07/ADR) in our update note of August 2016.

Exhibit 4: DCF sensitivity

		Terminal growth rate						
		1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%
WACC	13%	10.23	10.48	10.76	11.06	11.40	11.77	12.19
	14%	9.06	9.26	9.47	9.70	9.95	10.23	10.54
	15%	8.08	8.24	8.40	**8.58**	8.77	8.98	9.22
	16%	7.25	7.37	7.50	7.64	7.79	7.96	8.13
	17%	6.54	6.63	6.74	6.85	6.97	7.10	7.24

Source: Thinfilm, Edison Investment Research

Exhibit 5: Financial summary

US$000s	2014	2015	2016e	2017e	2018e	2019e
Year end 31 December	IFRS	IFRS	IFRS	IFRS	IFRS	IFRS
PROFIT & LOSS						
Revenue	4,479	4,413	3,699	10,848	158,404	359,816
EBITDA (norm)	(23,550)	(29,187)	(36,295)	(39,645)	7,716	61,060
Operating Profit (before amort. and except.)	(24,855)	(30,724)	(39,041)	(42,666)	2,900	55,646
Intangible Amortisation	0	0	0	0	0	0
Exceptionals	0	0	0	0	0	0
Share-based payments	(941)	(1,064)	(1,372)	(1,572)	(1,706)	(1,984)
Operating Profit	(25,796)	(31,788)	(40,413)	(44,237)	1,194	53,662
Net Interest	701	2,406	(1,249)	(1,074)	(2,280)	(1,241)
Profit Before Tax (norm)	(24,155)	(28,318)	(40,290)	(43,739)	620	54,405
Profit Before Tax (FRS 3)	(25,096)	(29,382)	(41,662)	(45,311)	(1,086)	52,421
Tax	0	0	(303)	0	0	0
Profit After Tax (norm)	(24,155)	(28,318)	(40,593)	(43,739)	620	54,405
Profit After Tax (FRS 3)	(25,096)	(29,382)	(41,965)	(45,311)	(1,086)	52,421
Average Number of Shares Outstanding (m)	493.5	535.4	617.9	680.3	680.3	680.3
EPS - normalised (c)	(4.9)	(5.3)	(6.6)	(6.4)	0.1	8.0
EPS - (IFRS) (c)	(5.1)	(5.5)	(6.8)	(6.7)	(0.2)	7.7
Dividend per share (c)	0.0	0.0	0.0	0.0	0.0	0.0
EBITDA Margin (%)	N/A	N/A	N/A	N/A	4.9	17.0
Operating Margin (before GW and except.) (%)	N/A	N/A	N/A	N/A	1.8	15.5
BALANCE SHEET						
Fixed Assets	7,189	10,390	14,630	28,609	37,793	35,899
Intangible Assets	2,319	2,602	2,828	2,828	2,828	2,828
Tangible Assets	4,870	7,788	11,802	25,781	34,965	33,071
Investments	0	0	0	0	0	0
Current Assets	33,870	19,425	17,686	11,286	36,354	67,038
Stocks	451	367	799	1,281	1,021	1,051
Debtors	2,565	3,118	2,787	2,972	30,379	59,148
Cash	30,854	15,940	14,099	7,033	4,955	6,839
Other	0	0	0	0	0	0
Current Liabilities	(4,748)	(5,170)	(5,100)	(56,419)	(90,051)	(64,437)
Creditors	(4,748)	(5,170)	(5,100)	(6,419)	(25,051)	(49,437)
Short term borrowings	0	0	0	(50,000)	(65,000)	(15,000)
Long Term Liabilities	0	0	0	0	0	0
Long term borrowings	0	0	0	0	0	0
Other long term liabilities	0	0	0	0	0	0
Net Assets	36,311	24,645	27,216	(16,524)	(15,904)	38,500
CASH FLOW						
Operating Cash Flow	(24,079)	(26,036)	(36,466)	(38,993)	(798)	56,646
Net Interest	569	146	119	(1,074)	(2,280)	(1,241)
Tax	0	0	(303)	0	0	0
Capex	(3,217)	(4,751)	(6,426)	(17,000)	(14,000)	(3,521)
Acquisitions/disposals	(2,700)	(799)	(560)	0	0	0
Financing	16,477	16,527	41,796	0	0	0
Dividends	0	0	0	0	0	0
Net Cash Flow	(12,949)	(14,914)	(1,840)	(57,067)	(17,078)	51,884
Opening net debt/(cash)	(43,803)	(30,854)	(15,940)	(14,099)	42,967	60,045
HP finance leases initiated	0	0	0	0	0	0
Other	0	0	(1)	0	0	0
Closing net debt/(cash)	(30,854)	(15,940)	(14,099)	42,967	60,045	8,161

Source: Thinfilm, Edison Investment Research

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