CHANG WAH TECHNOLOGY CO., LTD (6548)

November 22, 2018
Outline

A、Global Layout
B、Competitive Advantages & Business Overview
C、Market & Future Prospects
D、Q & A
E、Appendix (Pre-mold Technology)
A 、 Global Layout
Investment Structure

CWTC (6548)

- CWTS (Shanghai) 100%
- SHAP (Singapore) 100%
- OM (Japan) 49%
- CWTC-J (Japan) 100%

CWES (Shanghai)

- WSP 69%
  - SHEC (Chengdu) 70%
  - SHPC (Chengdu) 70%
  - SHS (Suzhou) 100%
  - MSHE (Malaysia) 100%
  - SHT (Taiwan) 100%
Plants and Factories

**Japan**
- OM, 1981

**China**
- SHEC, 1998
- SHPC, 2008
- SHS, 2003

**Taiwan**
- SHT, 1994
- CWTC, 2009

**Malaysia**
- MSHE, 1989
B、Competitive Advantages & Business Overview
Competitive Advantages

Manufacturing: The best lead frame etching factory in global

Customer: Major IDM manufacturers & OSATs in the world

Sales: Parent company CWE deep cultivation of packaging materials for nearly 30 years

Technology: Japanese partner full support
Income before Tax & Shareholders of the parent

- **2017/1Q**: 35 million NTD
- **2017/2Q**: 255 million NTD
- **2017/3Q**: 273 million NTD
- **2017/4Q**: 239 million NTD
- **2018/1Q**: 270 million NTD
- **2018/2Q**: 348 million NTD
- **2018/3Q**: 363 million NTD

Note: Record High
## Financial Results (Consolidated Income Statement)

<table>
<thead>
<tr>
<th></th>
<th>3Q 2018</th>
<th>2Q 2018</th>
<th>QoQ</th>
<th>3Q 2017 (After renumbering)</th>
<th>YoY</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>%</td>
<td>Amount</td>
<td>%</td>
<td>%</td>
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<tr>
<td>Revenues</td>
<td>2,539</td>
<td>100</td>
<td>2,558</td>
<td>100</td>
<td>(1)</td>
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<tr>
<td>Gross Profit</td>
<td>513</td>
<td>20</td>
<td>449</td>
<td>18</td>
<td>14</td>
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<tr>
<td>Operating Expenses</td>
<td>173</td>
<td>7</td>
<td>183</td>
<td>7</td>
<td>(5)</td>
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<tr>
<td>Operating Income</td>
<td>340</td>
<td>13</td>
<td>266</td>
<td>10</td>
<td>28</td>
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<tr>
<td>Non-operating Income</td>
<td>23</td>
<td>1</td>
<td>82</td>
<td>3</td>
<td>(72)</td>
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<tr>
<td>Income before Tax</td>
<td>363</td>
<td>14</td>
<td>348</td>
<td>14</td>
<td>4</td>
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<tr>
<td>Tax</td>
<td>106</td>
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<tr>
<td>Net Income</td>
<td>257</td>
<td>10</td>
<td>248</td>
<td>10</td>
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<tr>
<td>Shareholders of the parent</td>
<td>254</td>
<td></td>
<td>246</td>
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<td>3</td>
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<tr>
<td>EPS (NTD)</td>
<td>7.23</td>
<td></td>
<td>6.79</td>
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</table>
# Financial Results (Consolidated Income Statement)

<table>
<thead>
<tr>
<th></th>
<th>1~3Q 2018</th>
<th></th>
<th>1~3Q 2017</th>
<th></th>
<th>YoY</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>%</td>
<td>Amount</td>
<td>%</td>
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</tr>
<tr>
<td>Revenues</td>
<td>7,484</td>
<td>100</td>
<td>5,189</td>
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<td>44</td>
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<tr>
<td>Gross Profit</td>
<td>1,421</td>
<td>19</td>
<td>1,000</td>
<td>19</td>
<td>42</td>
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<tr>
<td>Operating Expenses</td>
<td>530</td>
<td>7</td>
<td>389</td>
<td>7</td>
<td>36</td>
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<tr>
<td>Operating Income</td>
<td>891</td>
<td>12</td>
<td>612</td>
<td>12</td>
<td>46</td>
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<tr>
<td>Non-operating Income</td>
<td>90</td>
<td>1</td>
<td>221</td>
<td>4</td>
<td>(59)</td>
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<tr>
<td>Income before Tax</td>
<td>981</td>
<td>13</td>
<td>833</td>
<td>16</td>
<td>18</td>
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<tr>
<td>Tax</td>
<td>303</td>
<td>4</td>
<td>190</td>
<td>4</td>
<td>59</td>
</tr>
<tr>
<td>Net Income</td>
<td>678</td>
<td>9</td>
<td>643</td>
<td>12</td>
<td>5</td>
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<tr>
<td>Shareholders of the parent</td>
<td>671</td>
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<td>256</td>
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<td>162</td>
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<tr>
<td>EPS (NTD)</td>
<td>18.70</td>
<td></td>
<td>8.77</td>
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</table>
# Consolidated Balance Sheet Summary

<table>
<thead>
<tr>
<th>Amount NTD in MN</th>
<th>2016.12.31 (IFRSs) (After renumbering)</th>
<th>2017.12.31 (IFRSs)</th>
<th>2018.9.30 (IFRSs)</th>
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</thead>
<tbody>
<tr>
<td>Cash &amp; Short-Term Investments</td>
<td>637</td>
<td>2,131</td>
<td>1,833</td>
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<tr>
<td>Accounts Receivable</td>
<td>523</td>
<td>1,825</td>
<td>2,040</td>
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<tr>
<td>Current Assets</td>
<td>1,625</td>
<td>5,350</td>
<td>5,476</td>
</tr>
<tr>
<td>Long-Term Investments</td>
<td>292</td>
<td>146</td>
<td>304</td>
</tr>
<tr>
<td>Current Liabilities</td>
<td>295</td>
<td>2,150</td>
<td>3,266</td>
</tr>
<tr>
<td>Long-Term Liabilities</td>
<td>299</td>
<td>3,970</td>
<td>4,444</td>
</tr>
<tr>
<td>Shareholders' Equity</td>
<td>966</td>
<td>5,064</td>
<td>4,900</td>
</tr>
<tr>
<td>Total Assets</td>
<td>2,333</td>
<td>9,100</td>
<td>9,414</td>
</tr>
<tr>
<td>Book Value Per Share (NT$)</td>
<td>39</td>
<td>140</td>
<td>135</td>
</tr>
<tr>
<td>Current Ratio</td>
<td>550%</td>
<td>249%</td>
<td>168%</td>
</tr>
<tr>
<td>Debt Ratio</td>
<td>13%</td>
<td>44%</td>
<td>47%</td>
</tr>
</tbody>
</table>
Products Percentage (Process)

2017
- Etched: 34%
- Stamped: 66%

2018 Q3
- Etched: 38%
- Stamped: 62%

*Classified by sales amount (US$)
**Products Percentage (Application)**

2017
- **IC**: 59%
- **QFN**: 8%
- **Discrete**: 24%
- **Power**: 4%

2018 Q3
- **IC**: 56%
- **QFN**: 14%
- **Discrete**: 22%
- **Power**: 1%

*Classified by sales amount (US$)*

IC: SOP, TSSOP, TSOP, QFP
Discrete: SOT
Lead Frame Application

2017
- 3C: 41%
- Automotive: 26%
- Industrial: 23%
- Medical: 8%
- Others: 2%

2018 Q3
- 3C: 53%
- Automotive: 26%
- Industrial: 15%
- Medical: 4%
- Others: 2%
C 、Market & Future Prospects
Semiconductor packaging market continues to grow

Source: IEK(2017/10)
The lead frame grows faster than the substrate

Source: IEK(2017/10)
QFN is still the main source of growth for leadframes

Source: IEK(2017/10)
Market Status

- 4Q/18~1Q/19: Customers reduced finished goods inventory and reduced stock inventory days, but terminal demand did not decline.

- 2Q/19: Market conditions may have the opportunity to return to the first half of 2018.
Future Prospects

• Expand Pre-mold QFN customers

• Etching elements for other applications

• New Factory

• M&A Opportunity
D、Q & A
E、Appendix
(Pre-mold Technology)
Table of Processes and Advantages:

<table>
<thead>
<tr>
<th>Process</th>
<th>Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer Mold</td>
<td>Auto</td>
</tr>
<tr>
<td>De-flashing</td>
<td>Auto</td>
</tr>
<tr>
<td>Plating</td>
<td>Auto- Strip</td>
</tr>
<tr>
<td>AOI Inspection</td>
<td>Auto</td>
</tr>
</tbody>
</table>

New process (Post Plating)
Structure

X-Section View

Conventional QFN L/F Unit

QFN Pre-mold L/F Unit

Metal (copper)

EMC Filled
Features

• No need of back side tape

No flash issue on back side when packing

• Good wire bondability

Solid support for wire bond process

• Reliable Flip Chip bondability

Solid support for solder joint in F/C application

1. No more yield loss by mold flash!
2. Increase W/B UPH
3. FC Bonder /UPH ++
   No more bump crack during handling!!!
Customized Process

- Copper plate
- 1st Etching
- 1st molding
- Plating

Process Simplification

- Copper plate
- 1st Etching
- 1st molding
- 2nd Etching
- Plating

Wettable Frank QFN
### Process Simplification

**• Conventional LF Packing Process**

1. LF
2. D/B W/B → Back side Taping → De-flashing → Molding → Tape Removing
3. Back side Plating → Singulation

**• Pre-mold LF Packing Process** (Remove plating process in Customer side)

1. PMLF (Ni/Pd/Au Post Plated)
2. D/B W/B → Molding → Singulation

**Reducing Process, Minimize Yield Loss**

**No Wasted water/chemical treatment**
Process Comparison (Wettable Frank QFN)

**Step saw process flow**

- Conventional lead frame
- Molding
- First saw
- De-burr
- Plating
- Package saw
- Inspection (AVI)

**Pre-mold LF process flow (PPF)**

- Pre mold LF with 2nd etching
- Molding
- First saw
- De-burr
- Plating
- Package saw
- Inspection (AVI)

**Dimple design LF process flow**

- Conventional lead frame with dimple
- Molding
- De flash
- Water jet
- Plating
- Package saw
- Inspection (AVI)

!! Copper smear for 0.4 pitch

!! Mold flash in dimple
# Pre-mold Patent Layout

<table>
<thead>
<tr>
<th></th>
<th>TW</th>
<th>China</th>
<th>US</th>
<th>JP</th>
<th>Korea</th>
<th>Malasia</th>
<th>Germany</th>
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<tbody>
<tr>
<td>QFN</td>
<td>M521265</td>
<td>5334918</td>
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<tr>
<td>Tie-bar less L/F</td>
<td>M523189</td>
<td>5744144</td>
<td>Currently applying</td>
<td>3210520</td>
<td>Currently applying</td>
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<tr>
<td>Moat design L/F</td>
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<td>6003205</td>
<td>US9799613B1</td>
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<td>Routable Metal Substrate L/F</td>
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<td>6562112</td>
<td>US9984980B2</td>
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<tr>
<td><strong>SST L/F (Wettable Frank)</strong></td>
<td>M539698</td>
<td>6475513</td>
<td>Currently applying</td>
<td>3213791</td>
<td>—</td>
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<tr>
<td>LLGA</td>
<td>M541118</td>
<td>6458427</td>
<td>Currently applying</td>
<td>3211532</td>
<td>Currently applying</td>
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<tr>
<td><strong>Generic L/F</strong></td>
<td>M551755</td>
<td>6971552</td>
<td>has been passed</td>
<td>—</td>
<td>Currently applying</td>
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<td>—</td>
</tr>
<tr>
<td>Pre-formed lead frame with contact grooves</td>
<td>M556934</td>
<td>7670717</td>
<td>Currently applying</td>
<td>Currently applying</td>
<td>—</td>
<td>—</td>
<td>Currently applying</td>
</tr>
<tr>
<td>Preformed lead frame with tint groove with maximum viewing angle and its packaging component</td>
<td>M566910</td>
<td>Currently applying</td>
<td>Currently applying</td>
<td>Currently applying</td>
<td>Currently applying</td>
<td>Currently applying</td>
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