Acquisition of TenCate Advanced Composites Holding B.V.

15th of March, 2018
Toray Industries, Inc.
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1. Outline of This Acquisition
### Outline of This Acquisition

<table>
<thead>
<tr>
<th>Acquired Company</th>
<th>TenCate Advanced Composites Holding B.V (hereafter, TCAC)</th>
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<tbody>
<tr>
<td></td>
<td>100% subsidiary of Koninklijke Ten Cate B.V. (Netherlands)</td>
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<tr>
<td></td>
<td>Manufacture and distribution of carbon fiber composite materials</td>
</tr>
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<table>
<thead>
<tr>
<th>Purchase Price</th>
<th>930 million EURO</th>
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<tbody>
<tr>
<td></td>
<td>About 123 billion JPY （※1 EURO = 132 JPY ）</td>
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<td></td>
<td>※The purchase price includes net debt amount in addition to the share purchase price. The purchase price will be adjusted in accordance with any adjustments stipulated in the share purchase agreement.</td>
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<tr>
<td></td>
<td>EBITDA multiple = EV (Purchase Price) / EBITDA (2018)</td>
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<tr>
<td></td>
<td>= 930 million EURO / 47 million EURO = 19.8 x</td>
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</table>

<table>
<thead>
<tr>
<th>Funds for the purchase</th>
<th>Working / Commercial Capital</th>
</tr>
</thead>
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<table>
<thead>
<tr>
<th>Schedule</th>
<th>Purchase of the share(closing): 2nd half of 2018 (expected)</th>
</tr>
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<tr>
<td></td>
<td>Has to be after the completion of fulfilling the premises related to the approval of involved regulatory authorities (including USA) and CFIUS.</td>
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</table>
2. Toray’s Medium term Management Program
Toray’s Medium term Management Program

Basic Policy

Further expand the business as a global leading manufacturer of carbon fibers.

Basic Strategies

■ Aerospace Applications
  - Further strengthen existing partnerships
  - Capture new programs

■ Industrial Applications
  - Reinforce the leading position in the market by leveraging comprehensive strength with lineups of regular tow and large tow products
  - Reinforce the position in the wind-turbine application market through strengthening alliance with major customers, supported by the cost competitiveness in large tow products
  - Develop intermediate products / molding technology and enhance the supply chain to meet the full-scale expansion of demand for automotive applications
3. Outline of Ten Cate and TCAC
Outline of Ten Cate and TCAC

(1) Company name: Koninklijke Ten Cate B.V. (Composites materials division: TCAC)
(2) Established: 19th April, 1947
(3) Head office: Almelo, Overijssel, the Netherlands
(4) Representative: J.H.L Albers (CEO), F.R.Spaan (CFO)
(5) Business profile (Composite materials division): Carbon fiber reinforced thermoplastic tape and high heat resistant thermoset prepregs
(6) Brief history (Composite materials division):
   - 1972 Started prepreg production
   - 1999 Acquired Bryte Technologies (U.S., composites for aerospace applications)
   - 2007 Acquired Phoenixx TPC (U.S., thermoplastic tapes)
   - 2008 Acquired YLA Inc. (U.S., prepregs for satellite applications)
     - Acquired CCS Composites (U.S., composites)
   - 2012 Acquired PMC Baycomp (composites)
   - 2013 Acquired Amber Composites (U.K., composites)
   - 2015 Delisted in March 2016 after accepting an acquisition proposal from Tennessee Acquisition B.V. (consortium headed by Gilde Buy Out Partners)
(7) Number of employees (Composite materials division): about 750
(8) Revenue (Composite materials division): 210 million EURO (2018 estimate)
## Product Line-up

<table>
<thead>
<tr>
<th>Formats</th>
<th>Resins</th>
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</table>
| **Thermo plastic composites** | • UD Tape  
• Fabric prepreg  
• Laminates | • PEEK, PEKK  
• PPS, PEI  
• PC, PMMA  
• PET, PA  
• ABS, PP |
| **Thermoset composites** | • Low temperature curing tooling prepregs  
• Out-of-Autoclave epoxy prepregs  
• Compatible film adhesives  
• Composite surfacing films  
• RTM resins | • Epoxy  
• Cyanate ester  
• BMI  
• Polyimide |
| **Compression molded parts** | • Highly complex, high tolerance parts  
• Tool design | - |
## Thermoset / Thermoplastic Prepreg

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Thermoset Prepreg</th>
<th>Thermoplastic Prepreg (tape)</th>
</tr>
</thead>
</table>
| **Strength**    | -liquid at a low temperature.  
                  -hardens once it is heated and will not go back to liquid even if it is cooled afterwards. | -becomes soft when heated to the glass-transition temperature.  
                  -hardens when it is cooled. |
|                 | -its rigidity (less deformable) and dimensional stability is high.  
                  -has high insulation, voltage endurance, heat tolerance and solvent resistance. | -it is superior in toughness and productivity given the shorter time required for molding.  
                  -can be molded over and over as long as it is heated, which makes recycling relatively easier. |
| **Weakness**    | -takes time to mold.  
                  -has low toughness and is fragile to impact.  
                  -as autoclave is expensive, initial investment at parts manufacturers is high. | -Its molding temperature is high, which makes it harder to handle.  
                  -It is relatively expensive.  
                  -It is difficult (more voids) to impregnate into small-diameter carbon fibers because its viscosity is high even if it is heated. |
Main Business Locations (EU)

Blue: Toray Group
Orange: TCAC

〇 Prepreg
△ Carbon Fiber
☆ Composites
Main Business Locations (China)

Blue : Toray Group
Orange : TCAC

〇 Prepreg
△ Carbon Fiber
☆ Composites
4. Objective and Strategies of this acquisition
Objective of This Acquisition

1. **Business trend:** Low cost + High cycle → Thermoplastic (“TP”) technology
   - Aircraft: twin aisle to single aisle → Increase in build rate → low-cost + high cycle
   - Space/Engine: metal → thermal resistance materials

2. **Recent changes in supply chain:** Further vertical integration

3. **Reinforce EU organization**
   - Strengthen EU supply chain
   - UK technical and marketing base
Strategies of This Acquisition

1. **Complimentary Relationship**
   Various carbon fibers (Toray) & Unique resin formulations (TCAC)

2. **Strong customer base**

3. **Geographical coverage by Toray & TCAC**
   With increased business bases, maximize customer services

4. **Human Resources**
   Opportunities to work with talented and motivated management and employees.
5. Thermoset CFRP for Aerospace
# Features and Categories of Resin Systems for Aerospace

<table>
<thead>
<tr>
<th>Properties</th>
<th>Aerospace</th>
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| Heat Resistance     | • more than approx. 90°C (mostly 125°C)  
                      • severe requirements like hot/wet properties  
                      • require reliability and experiences |
| Toughness           | • specific requirements like CAI and interlaminar fracture toughness, etc. |
| Requirements for productivity | • cost discussion is subject to achieve strict aerospace specification  
                      • production number of main structures is limited except small parts  
                      (Autoclave molding was accepted)  
                      ↓  
                      becoming mass production system  
                      (ex. press molding and welding assembling) |

| Resin system | Thermoset | Rigid polymer chain, high toughness type  
              | • Aircraft structure parts: Common system is Epoxy resin (High  
              | • Heat resistance (Space, etc.): BMI, Cyanate Ester          |
|-------------|-----------|----------------------------------------------------------|
|             | Thermoplastic | • PPS (for secondary structures)  
                              • PEEK, PEKK (for primary structures) |
TORAY has focused prepregs for aerospace primary structures which were mainly epoxy based. Obtained TCAC’s product line-up suitable for Space, Defense, Heat resistance applications.
6. Thermoplastic CFRP for Aerospace
The numbers in the circles show backlog of orders as of Sep 2017.

Trend shows more focus on mid to small airplanes.

Large Commercial Aircraft Development Plan

Enter into service

2010 2015 2020 2025 2030

Seats

300~

250

200

150

100

200

1471 Boeing 787

1056 Airbus A350 XWB

4325 Boeing 777X

4633 Boeing 737 MAX

573 CS100/300 (Canada)

273 ERJ190 (Brazil)

383 ERJ195 (Brazil)

730 MB-21 (Russia)

179 C919 (China)

387 Boeing NMA

100 SSJ100 (Russia)

200 ARJ21 (China)

2021 ERJ175 (Brazil)

2026~ C929 (China)

150~

100~

50~

20~

10~

0~
### Features of Mid to Small Airplane

<table>
<thead>
<tr>
<th>Boeing</th>
<th></th>
<th>Airbus</th>
<th></th>
<th>Next Generation Mid to Small Airplane</th>
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</thead>
<tbody>
<tr>
<td><strong>787</strong></td>
<td><strong>737MAX</strong></td>
<td><strong>NMA</strong></td>
<td><strong>A350 XWB</strong></td>
<td><strong>A320neo</strong></td>
</tr>
<tr>
<td><strong>Launch</strong></td>
<td>Apr 2004</td>
<td>Aug 2011</td>
<td>Undecided</td>
<td>Dec 2006</td>
</tr>
<tr>
<td><strong>Enter Into Service</strong></td>
<td>Oct 2011</td>
<td>May 2017</td>
<td>2025</td>
<td>Dec 2014</td>
</tr>
<tr>
<td><strong>Seats</strong></td>
<td>- 8 210-250</td>
<td>- 7 138-172</td>
<td>Undecided</td>
<td>- 900 325-400</td>
</tr>
<tr>
<td></td>
<td>- 9 250-290</td>
<td>- 8 162-200</td>
<td>-1000 366-440</td>
<td>A319neo 140-160</td>
</tr>
<tr>
<td></td>
<td>- 10 290-310</td>
<td>- 9 178-220</td>
<td>Undecided</td>
<td>Undecided</td>
</tr>
<tr>
<td><strong>Delivered Aircrafts</strong></td>
<td>644 (as of Jan 2018)</td>
<td>80 (as of Jan 2018)</td>
<td>-</td>
<td>146 (as of Jan 2018)</td>
</tr>
<tr>
<td><strong>Backlog of Orders</strong></td>
<td>650 (same as above)</td>
<td>4,648 (same as above) (including 737)</td>
<td>-</td>
<td>708 (same as above) (including 737)</td>
</tr>
<tr>
<td><strong>Build Rate</strong></td>
<td>12/month</td>
<td>52/month (including 737)</td>
<td>-</td>
<td>10/month</td>
</tr>
</tbody>
</table>

Build rates of mid to small aircrafts are expected to be higher in the future.
## Expanding Thermoplastic Composite Structures in Aircraft

<table>
<thead>
<tr>
<th>TCAC’s Qualified materials</th>
<th>Examples of structures</th>
</tr>
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<tbody>
<tr>
<td>CF/PEI</td>
<td>Interiors of aircraft Engine nacelles</td>
</tr>
<tr>
<td>CF/PPS</td>
<td>Small parts like stiffeners (Airbus, B787) A350 Clips in fuselage Empennage of small aircraft (Gulfstream etc.)</td>
</tr>
<tr>
<td>CF/PEKK</td>
<td>expecting replacement of some thermoset or metal primary structures (from small parts)</td>
</tr>
<tr>
<td>GF reinforced, etc.</td>
<td>A380 wing leading edges</td>
</tr>
<tr>
<td><em>(the near future)</em> CF/PEEK</td>
<td><em>(the near future)</em> Integral panel structures by thermoplastic welding assembling (large structure parts without fasteners)*</td>
</tr>
</tbody>
</table>

### Clips
(Fitting member among Skin / Stringers / Frames)
- About 8,000 Clips are utilized in A350 fuselage.
- Rapid molding by stamping-press.
  (complex shape rapid molding is advantage.)
Estimated Revenue of Thermoplastic for Commercial Aviation

Estimated revenue in Million EURO:
- 2017: 50 Million EURO
- 2018: 60 Million EURO
- 2019: 70 Million EURO
- 2021: 100 Million EURO
- Near 2025: 250 Million EURO
7. CFRP for Industrial Applications
Strategies for Thermoplastic Composites for Industrial Applications

1. Replacement of Thermoset by Thermoplastic
   - PC Housing, Medical

2. Application Development taking advantages of Thermoplastic materials
   - Sporting goods, Shoes
   - Automobiles (2020 onwards)
Thermoplastic Composites for Industrial Applications (PC Housing)

<<Thermoset CFRP Housing>> <<Thermoplastic CFRP Housing>>

**Products**
- **Lenovo X1 Carbon** (Display Cover)
- **HP Spectre** (Bottom Cover)

**PC housing Demand**
- 3.5 million pieces/year
- 2.5 million pieces/year

**Materials**
- Thermoset Prepreg (TS)
- Thermoplastic Prepreg (TP)

**Production Process**

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**Material Usages in Ultra Mobile**
- (light weight, thin notebook PC)
  - Total 50 million pieces/year

- Thermoset CFRP (3.5 million pcs/year)
- TP CFRP Housing (2.5 million pcs/year)
- Metal (Shaved Aluminum, Mg), etc (46 million pieces/year)

**Apple MacBook**
- (Shaved Aluminum)
TCAC’s Thermoplastic Composites for Industrial Applications (consumer products)

1. Sole of Shoes

2. Medical

3. Sporting goods
8. TCAC’s Business Plan
TCAC’s Business Plan

210 Million EURO
(Estimate, FY2018)

- 24%
- 45%
- 31%

EBITDA: 47 Million EURO *

560 Million EURO
(Estimate, Near FY2025)

- 58%
- 16%
- 27%

Aerostructures
Space & Communications
High-Performance Industrial

*One time cost for this acquisition is not taken into account
Create Synergies

1. **Capture Large Thermoplastic projects**
   - Next generation mid to small aircrafts
   - Automobiles

2. **Carbon Fiber Development for TCAC**
   - Development of next generation carbon fiber suitable for thermoplastic resins and de facto standardization.
   - More opportunities for Toray’s carbon fiber
Travel light with Toray carbon fiber.

Light, strong, corrosion-resistant Toray carbon fiber composite materials are expanding the horizons for next-generation wind power generators, automobiles, ships and aircraft like the Boeing 787 and Airbus A380. The world leader in carbon fiber composite materials, Toray continues to develop mold-breaking technologies to meet the global energy challenge and bring new value to life. The right chemistry, the right answers.