'TORAY'
Innovation by Chemistry

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

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Acquired Company	**TenCate Advanced Composites Holding B.V (hereafter, TCAC)** ➢ 100% subsidiary of Koninklijke Ten Cate B.V. (Netherlands) ➢ Manufacture and distribution of carbon fiber composite materials
Purchase Price	**930 million EURO** ➢ About 123 billion JPY （※1 EURO = 132 JPY ） ※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. ➢ EBITDA multiple＝EV（Purchase Price）/EBITDA(2018) ＝ 930 million EURO/47 million EURO＝ 19.8 x
Funds for the purchase	**Working / Commercial Capital**
Schedule	**Purchase of the share(closing)： 2nd half of 2018 (expected)** ➢ Has to be after the completion of fulfilling the premises related to the approval of involved regulatory authorities (including USA) and CFIUS.

2. Toray's Medium term Management Program

Toray's Medium term Management Program

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Basic Policy

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

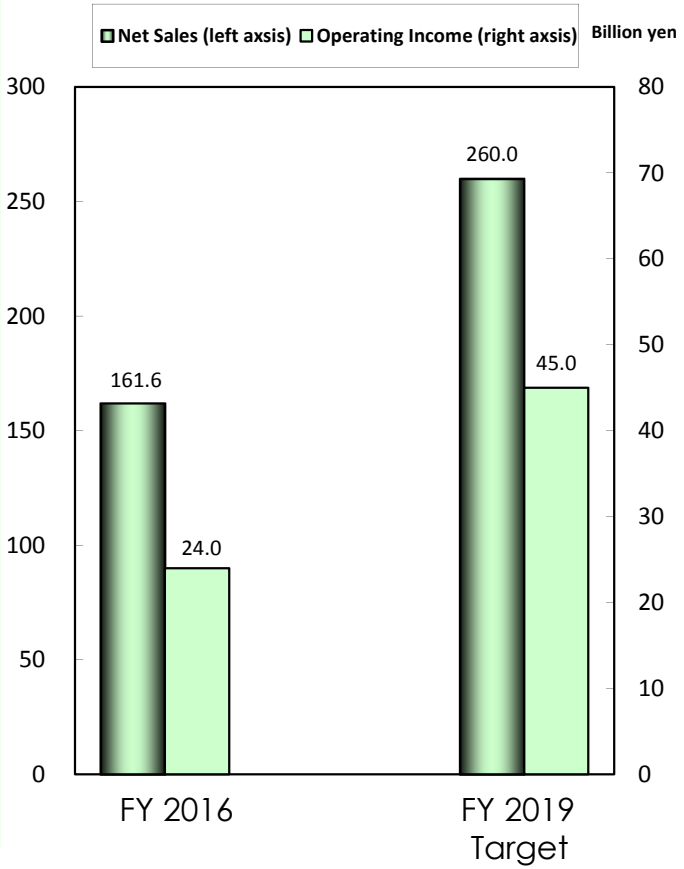
Basic Strategies

■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

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(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

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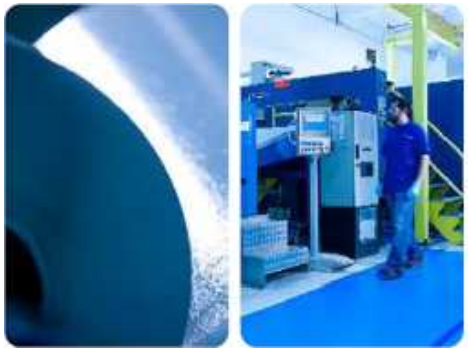
	Formats	Resins	
Thermo plastic composites	・UD Tape ・Fabric prepreg ・Laminates	・PEEK, PEKK ・PPS, PEI ・PC, PMMA ・PET, PA ・ABS, PP	
Thermoset composites	・Low temperature curing tooling prepregs ・Out-of-Autoclave epoxy prepregs ・Compatible film adhesives ・Composite surfacing films ・RTM resins	・Epoxy ・Cyanate ester ・BMI ・Polyimide	
Compression molded parts	・Highly complex, high tolerance parts ・Tool design	-	

Thermoset / Thermoplastic Prepreg

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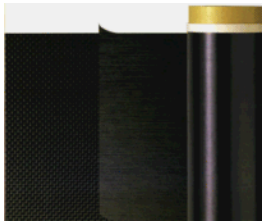
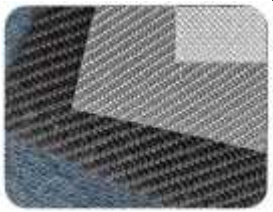
	Thermoset Prepreg	Thermoplastic Prepreg (tape)
Characteristics	-liquid at a low temperature. -hardens once it is heated and will not go back to liquid even if it is cooled afterwards.	-becomes soft when heated to the glass-transition temperature. -hardens when it is cooled.
Strength	-its rigidity(less 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)

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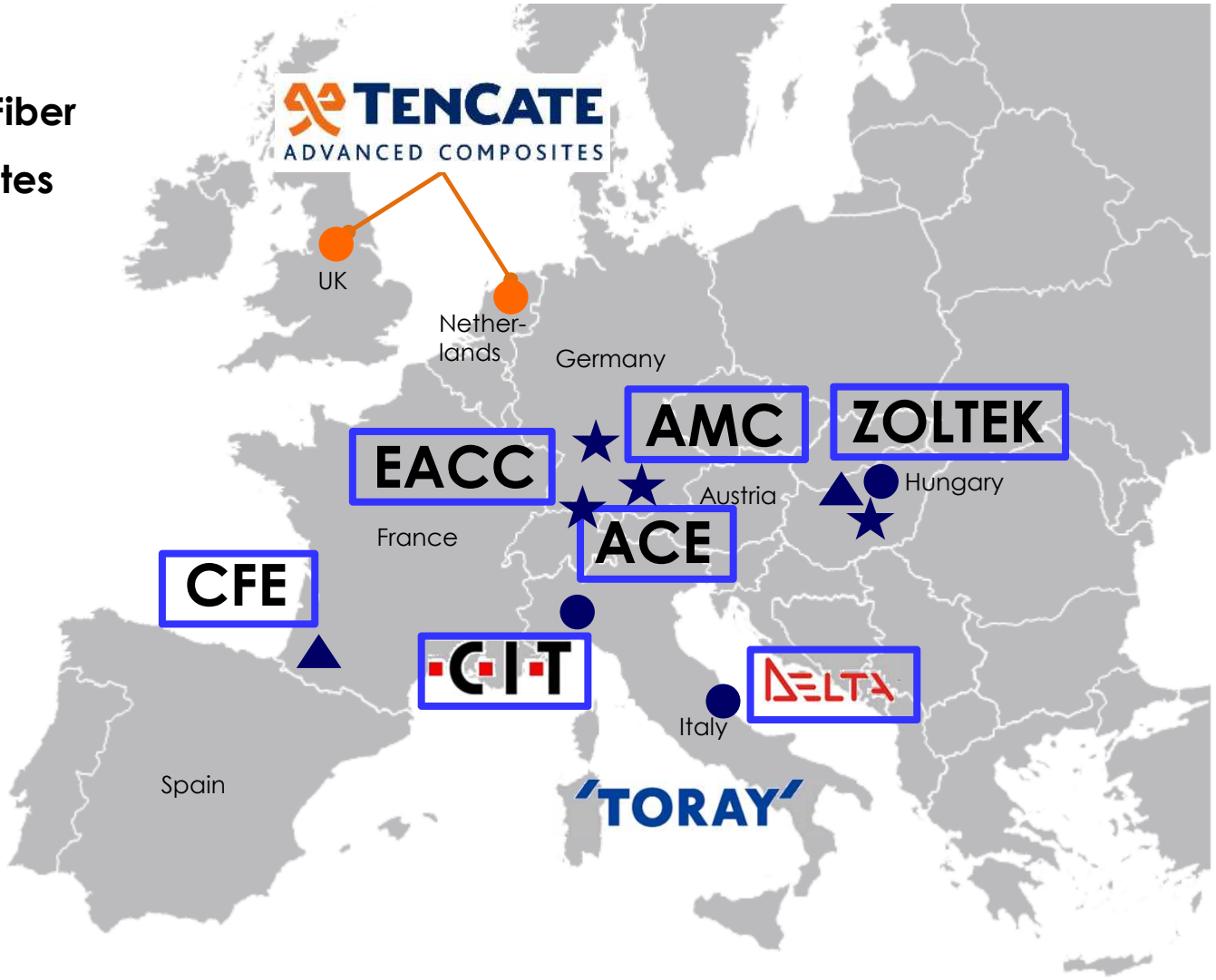
Blue : Toray Group
Orange : TCAC

- ○ Prepreg
- △ Carbon Fiber
- ☆ Composites



Main Business Locations (USA/Mexico)

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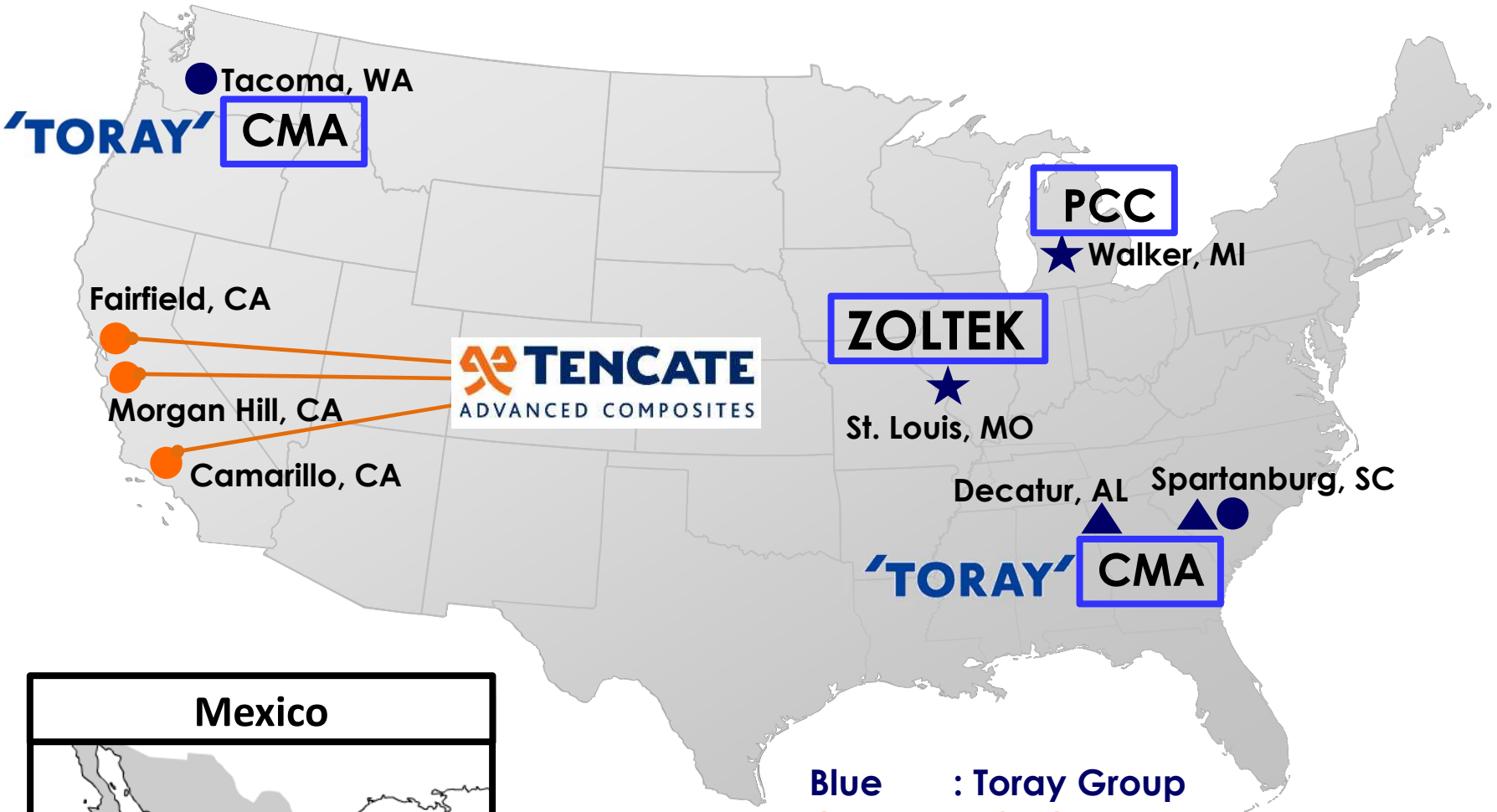

Main Business Locations (China)

'TORAY'
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Blue : Toray Group
Orange : TCAC

○ Prepreg
△ Carbon Fiber
☆ Composites

4. Objective and Strategies of this acquisition

Objective of This Acquisition

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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

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❶ **Complimentary Relationship**

Various carbon fibers(Toray) & Unique resin formulations(TCAC)

❷ **Strong customer base**

❸ **Geographical coverage by Toray & TCAC**

With increased business bases, maximize customer services

❹ **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

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		Aerospace
Properties	Heat Resistance	・more than approx. 90℃(mostly 125℃) ・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	・Aircraft structure parts:Common system is Epoxy resin (High modulus, heat resistance, solvent resistance) ・Heat resistance(Space, etc.): BMI, Cyanate Ester
	Thermoplastic	Rigid polymer chain, high toughness type ・PPS (for secondary structures) ・PEEK、PEKK (for primary structures)

Aerospace： the CFRP is one of core materials because light weighting is priority.

Increased line-up of Thermoset Prepregs for Aerospace

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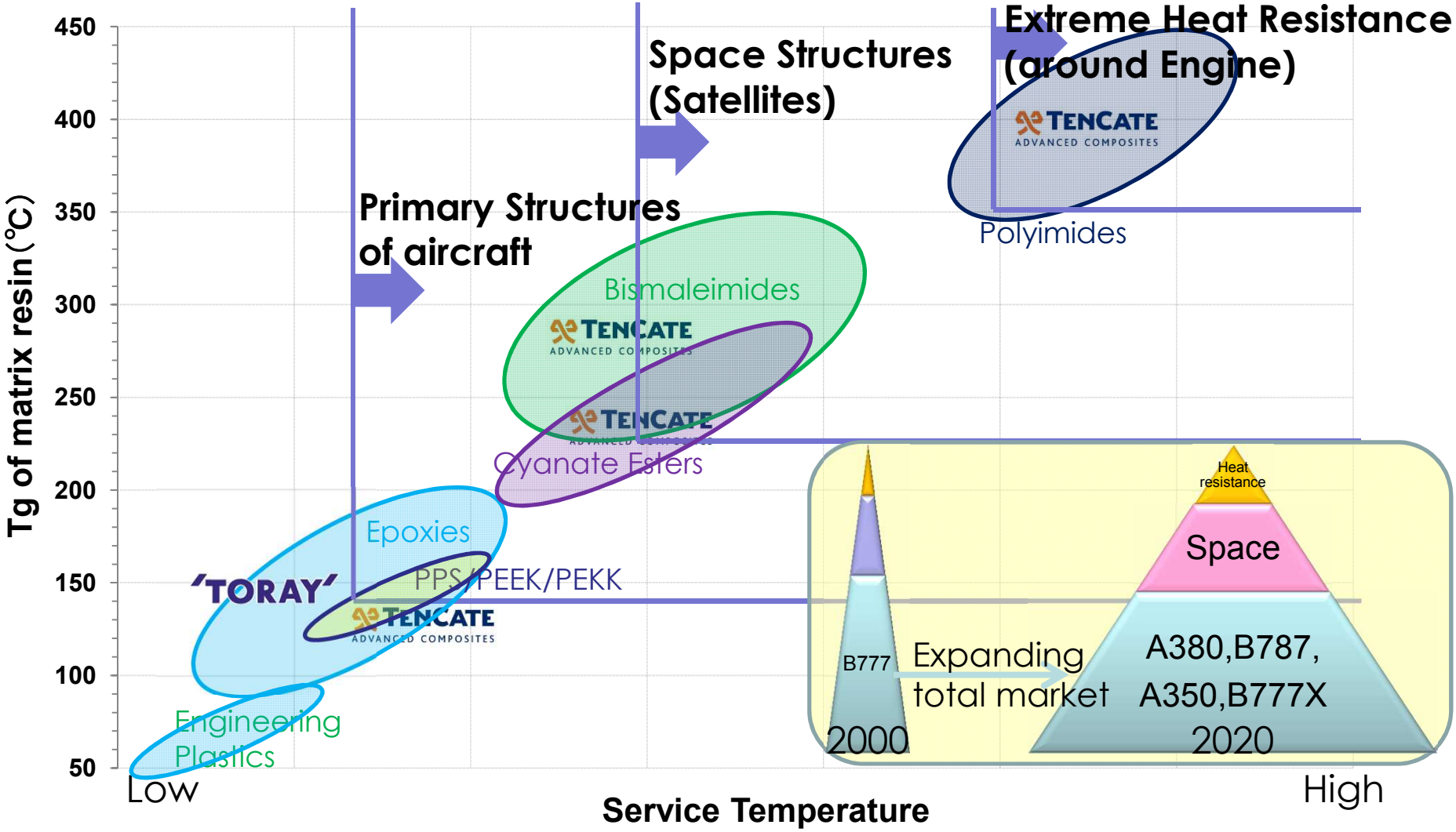

TORAY has focused prepregs for aerospace primary structures which were mainly epoxy based. Obtained TCAC's product line-up suitable for Space, Defense, Heat resistance applications.

6. Thermoplastic CFRP for Aerospace

Commercial Aircraft Development Plan

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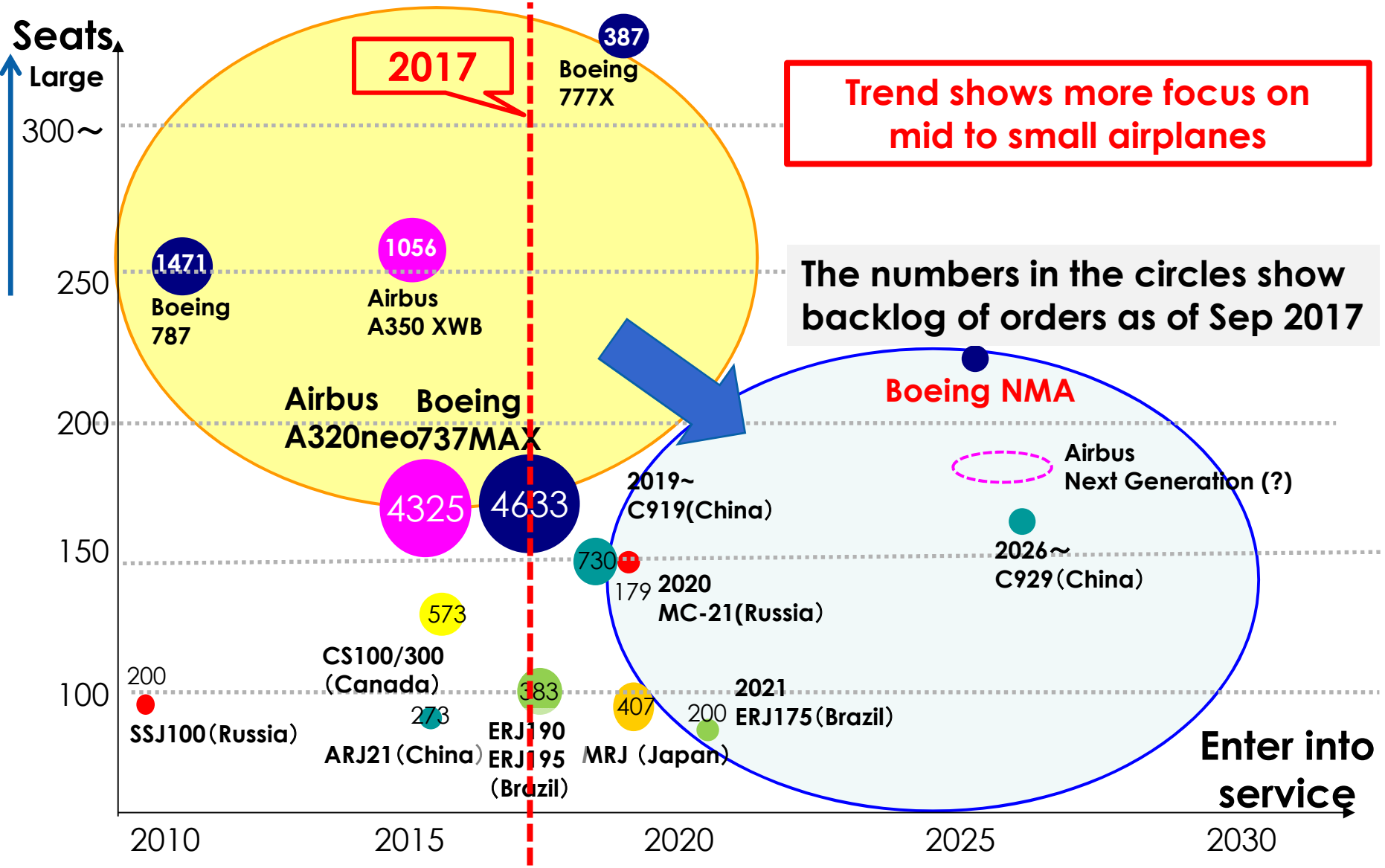

Features of Mid to Small Airplane

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	Boeing			Airbus		
	787	737MAX	NMA (New Mid-Market Airplane)	A350 XWB	A320neo (new engine option)	Next Generation Mid to Small Airplane
Launch	Apr 2004	Aug 2011	Undecided	Dec 2006	Dec 2010	Undecided
Enter Into Service	Oct 2011	May 2017	2025	Dec 2014	Jan 2016	Undecided
Seats	- 8 210-250 - 9 250-290 -10 290-310	- 7 138-172 - 8 162-200 - 9 178-220 -10 188-230	Undecided	- 900 325-400 -1000 366-440	A320neo 165-195 A319neo 140-160 A321neo 206-240	Undecided
Delivered Aircrafts	644 (as of Jan 2018)	80 (as of Jan 2018)	-	146 (as of Jan 2018)	233 (as of Jan 2018)	-
Backlog of Orders	650 (same as above)	4,648(same as above) (including 737)	-	708 (same as above)	6,135 (same as above) (whole A320 family)	-
Build Rate	12/month	52/month (including 737)	-	10/month	50/month (whole A320 family)	-

Build rates of mid to small aircrafts are expected to be higher in the future.

Expanding Thermoplastic Composite Structures in Aircraft

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

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

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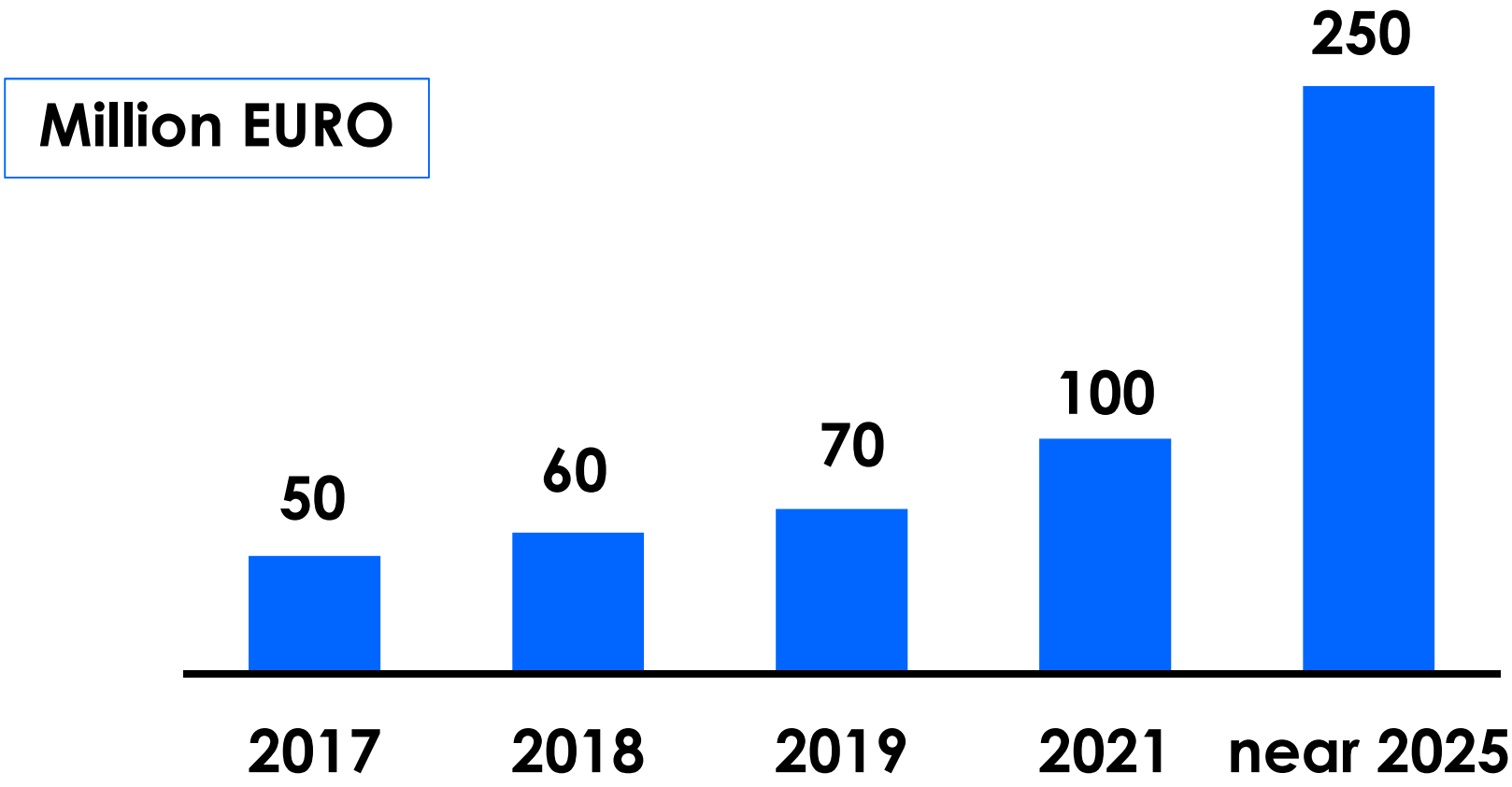

7. CFRP for Industrial Applications

Strategies for Thermoplastic Composites for Industrial Applications

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❶ **Replacement of Thermoset by Thermoplastic**

- PC Housing, Medical

❷ **Application Development taking advantages of Thermoplastic materials**

- Sporting goods, Shoes
- Automobiles (2020 onwards)

Thermoplastic Composites for Industrial Applications (PC Housing)

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<Thermoset CFRP Housing> <Thermoplastic CFRP Housing>

Products

Lenovo X1 Carbon (Display Cover)

HP Spectre (Bottom Cover)

Material Usages in Ultra Mobile (light weight, thin notebook PC)

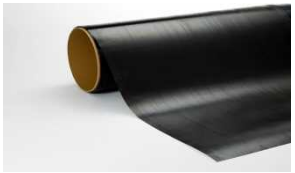
Total 50 million pieces/year

PC housing Demand

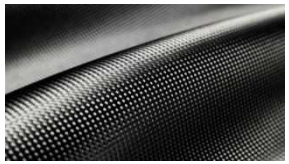
3.5 million pieces/year

2.5 million pieces/year

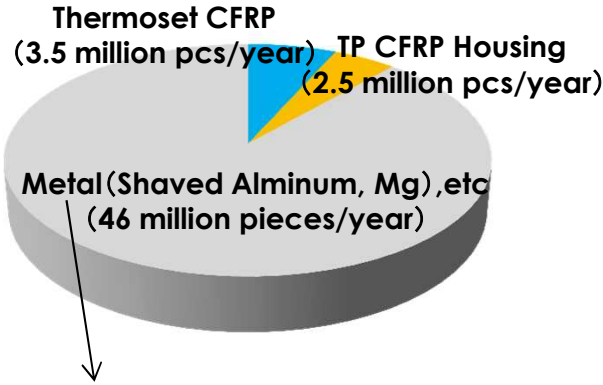
Materials



Thermoset Prepreg (TS)

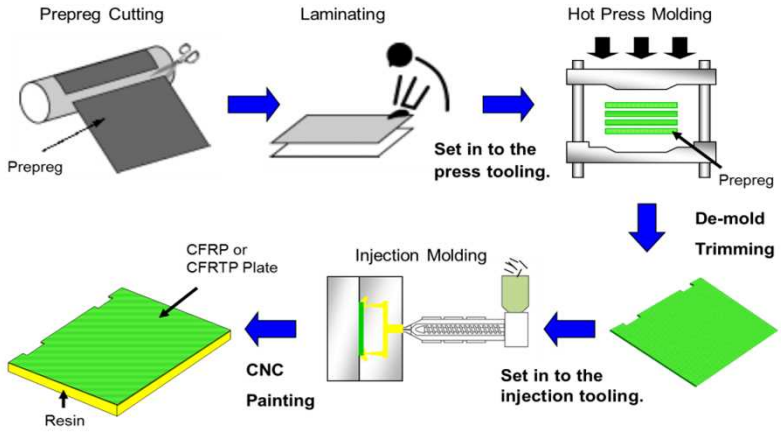


Thermoplastic Prepreg (TP)



Apple MacBook (Shaved Alminum)

Production Process



TCAC's Thermoplastic Composites for Industrial Applications (consumer products)

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1. Sole of Shoes
2. Medical
3. Sporting goods

8. TCAC's Business Plan

TCAC's Business Plan

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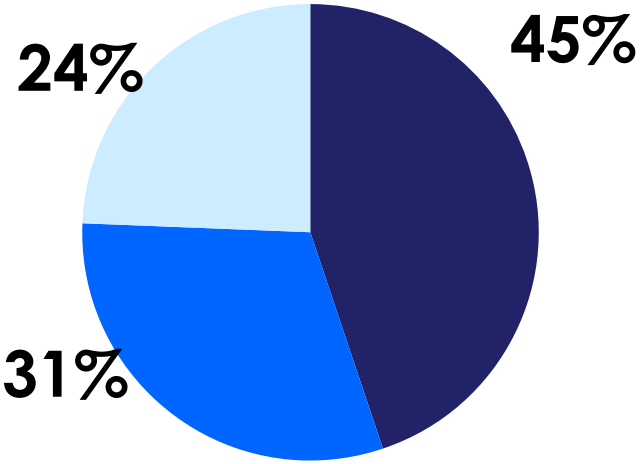
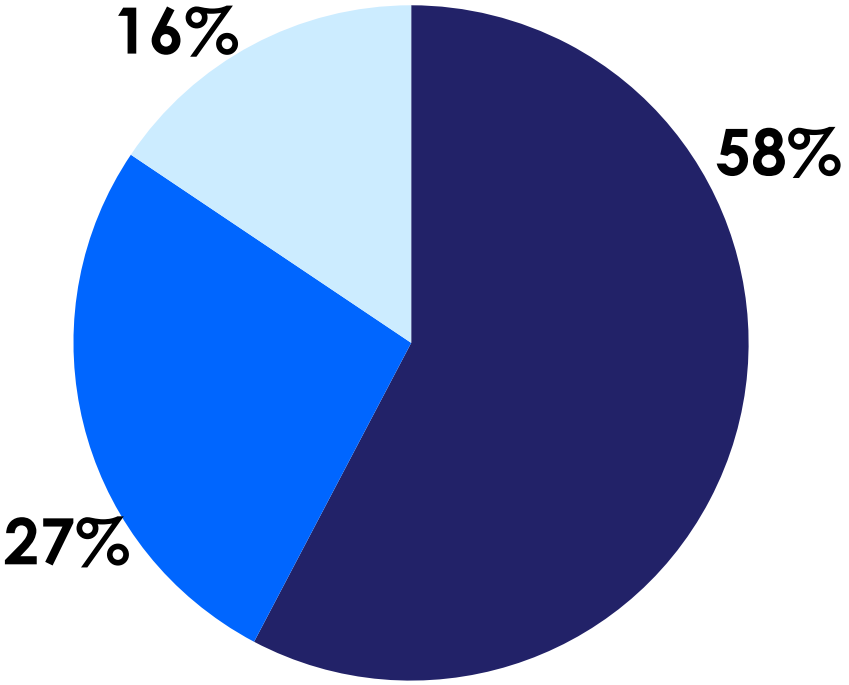
210 Million EURO (Estimate, FY2018)



EBITDA :47 Million EURO *

560 Million EURO (Estimate, Near FY2025)



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

Create Synergies

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❶ Capture Large Thermoplastic projects

- Next generation mid to small aircrafts
- Automobiles

❷ 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


Innovation by Chemistry
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.
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Thank You