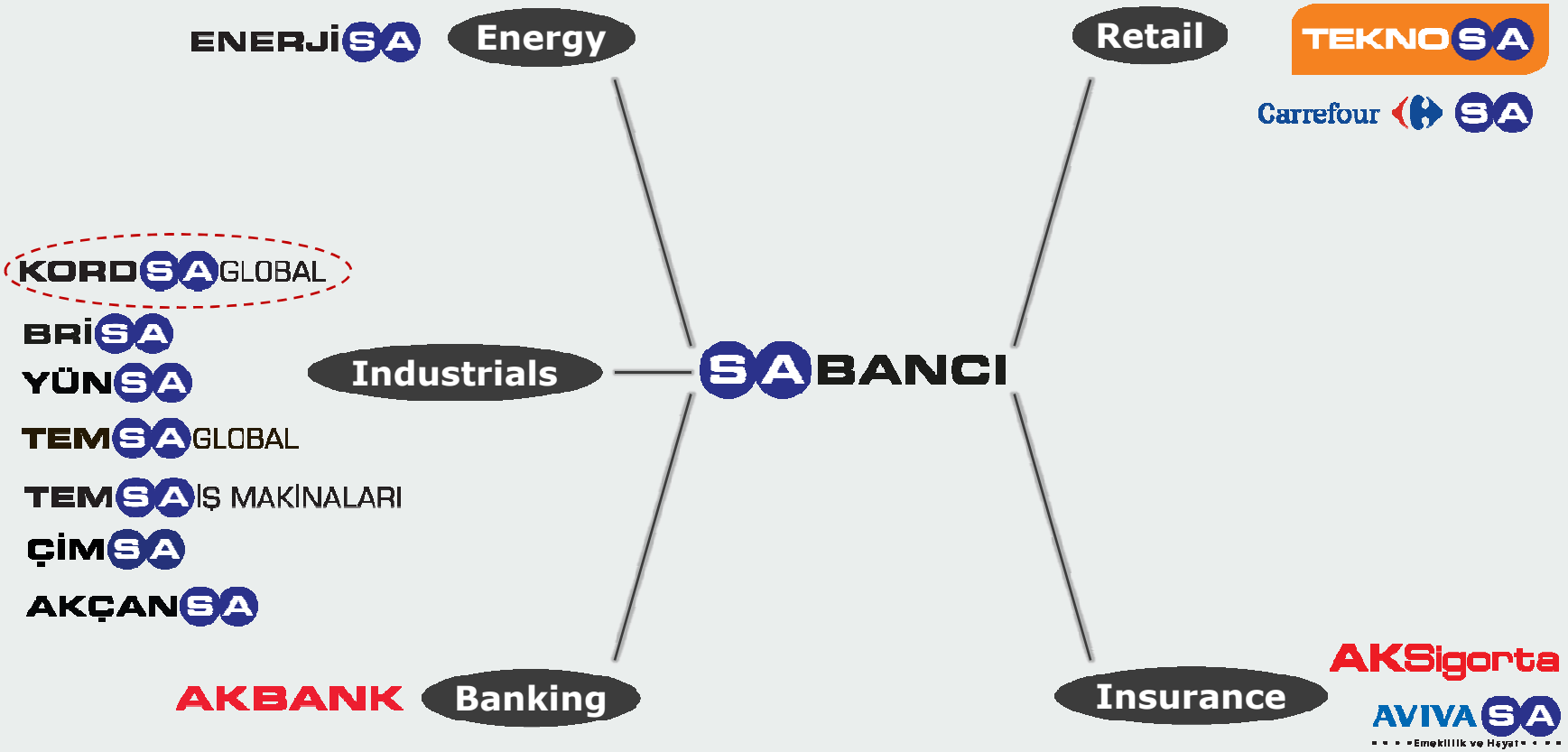

THE
REINFORCER
KORDSA GLOBAL

We are part of Sabancı Family



In 2015, the consolidated revenue of Sabancı Holding was **US$ 12.5 billion** with operating profit of **US$ 2.3 billion.**

Overview of Kordsa Global

A global leading enterprise that serves the rubber, composite, and construction markets by providing reinforcing products…

KordSA Global product portfolio

	Tire cord fabrics ("TCF")	Next generation fabrics	Composite Technologies	Construction Reinforcement Technologies
Description	• **Nylon** ("NY") and **polyester** ("PET") based tire reinforcement fibers and fabrics for tires • **World's leader** for Nylon 6,6 & 2nd for PET.	• Textile reinforcement materials for green tires • High performance **monofilaments** • Highly engineered **hybrid cords** with superior properties Fast growing company	• Carbon fiber, aramid, hybrid **fabrics** • **Thermoset prepregs** for automotive and industrial applications • Thermoplastic prepregs	• Macro and micro fibers to reinforce concretes used for tunnels and floor. • Reinforcement materials against earthquakes
End markets	     		   	   Industrial floors Tunnels Concrete roads

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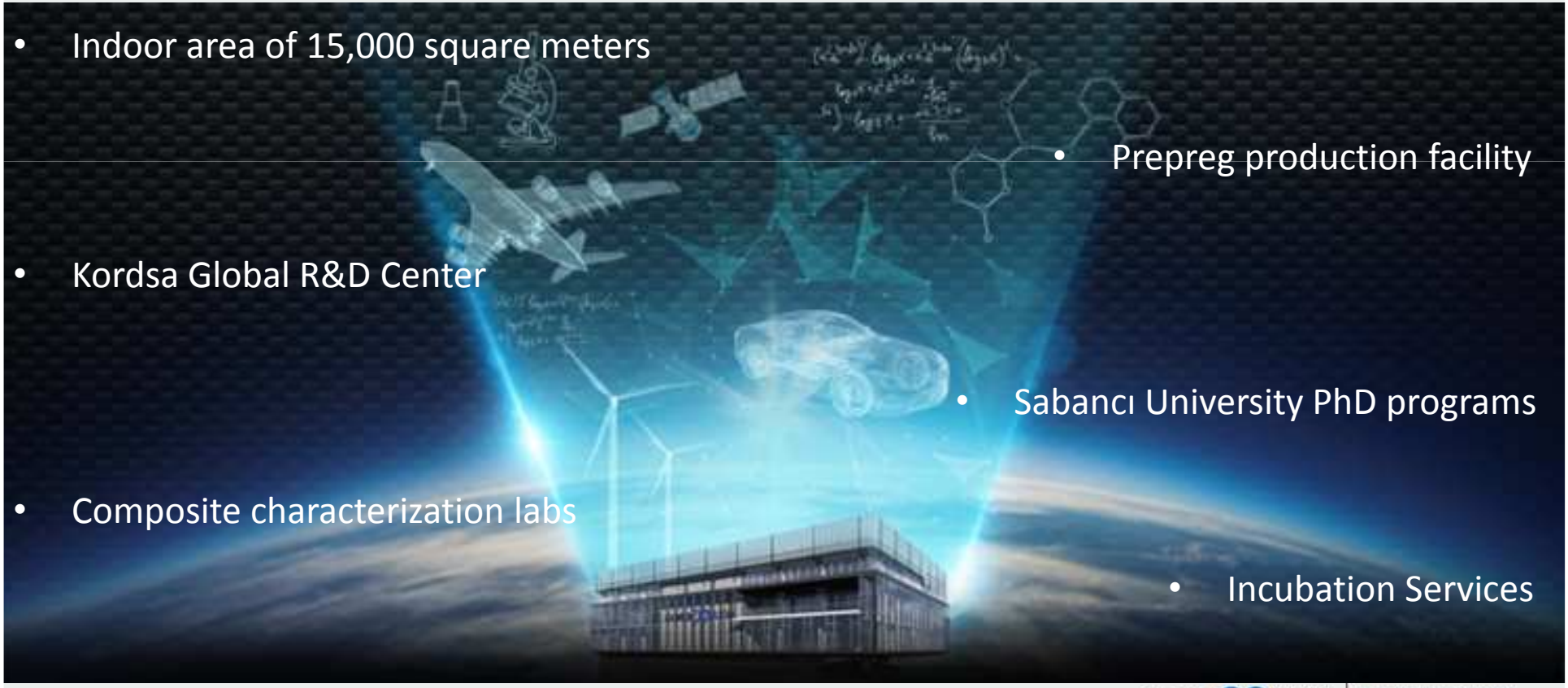
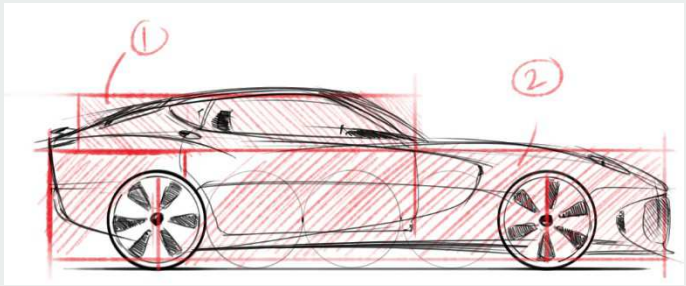
COMPOSITE TECHNOLOGIES CENTER OF EXCELLENCE

A platform that will combine production, advanced materials, R&D and academic structure in the same ecosystem



Kordsa Global's End to End Approach

Requirements ?



Which Part ?


Parken
am Freistuhl
VORWEG FAHREN
MIT RWE AUTOSTROM.
E-V 4001


TEMSA
MARATON

Which Vehicle ?

Carbon Composites

20,3 B$ in 2016 %11 growth rate

nearly 64% of them are Carbon Reinforced Plastics

2021 → 33,6 B$ (21,5 B$ CRP)

Average price
- 123 $/kg
- 87 $/kg in automotive industry

PAN 7-8 $/kg

Non-aero grade CF 20-30 $/kg

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Automotive

%21 by volume
%11 by revenue

} Automotive

in 2017

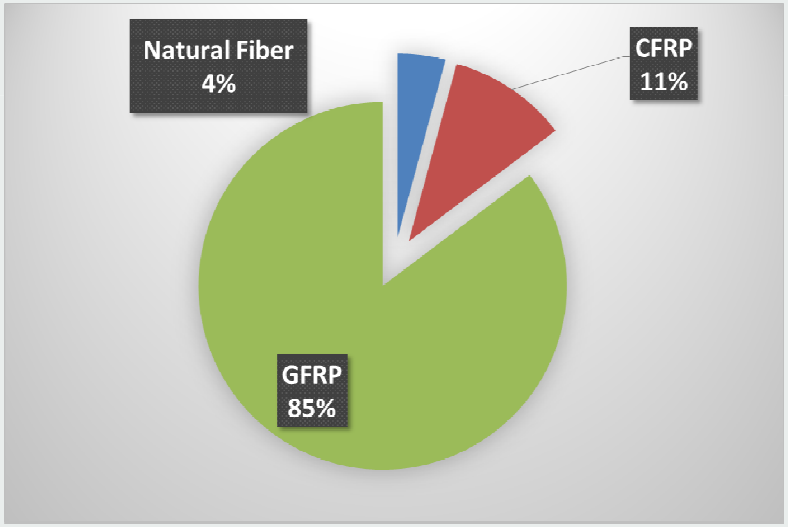
- Supercars → 100% penetration — 6.000 units
- Luxury cars → 10 % penetration — 450.000 units
- Other regular → 1% penetration — ~1.000.000 units

Usage

- 75% of CF consumption (3.700 tons) in 2013

  BMW i projects

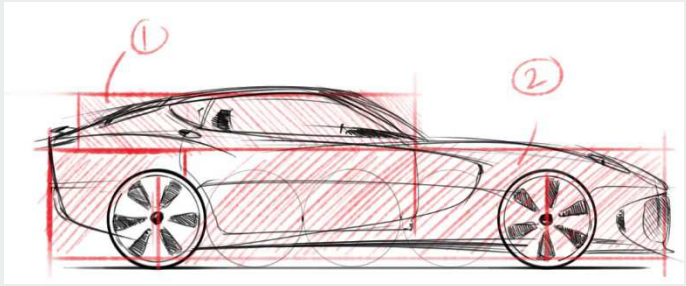
- ~10.000 tons CF will be used in 2018 (CAGR ~20 %)



EV Composites Segment: Percent Sales by Composite Type, Europe and North America, 2015

Competitive Factors

OEM



- Light-weight
- Fuel economy
- Price competitiveness
- Brand equity
- Global presence
- Quality
- Compliance to standards and certification processes
- Extensive and exhaustive documentation of material properties

Component Manufacturer

- Product portfolio
- Consultative approach
- Rapid processing
- Optimum price performance index
- Supply security, faster lead time
- Design flexibility
- Superior physical, chemical and mechanical properties

Industry Boosters

- Recycling carbon fibers → medium to long term

- Regulations → short / medium term

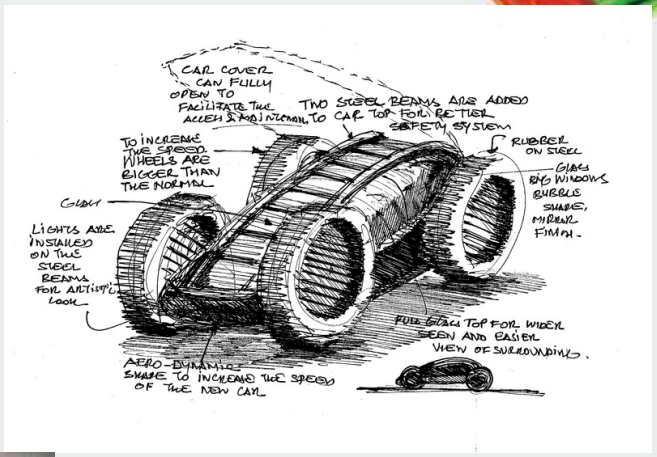
(However, the high cost of carbon fibers is limiting its wide-scale adoption)

Primary Application Areas

- Continuous fiber composites based on epoxy resins have proven to be an ideal material for structural applications.

- Primary applications
  - Body panels
    - Structural
      - B pillar
        - C pillar
          - Beams
            - Wheels

Key Points



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Thank you