

READY ?

COMMAND

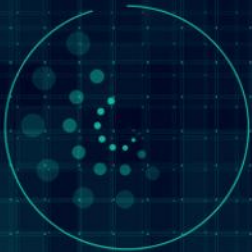
FILE

EDIT

COMPOSITION

LAYER

EFFECTS



THE SPENT RESOURCES
431 435

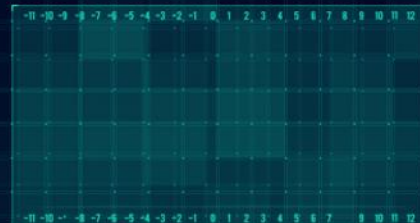
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H I L S



902357
2345656
7809690
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0214340



COMMAND

FILE

EDIT

COMPOSITION

LAYER

EFFECTS

WINDOW



THE SPENT RESOURCES
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B1 CDFZAD1 234



Challenges? new Opportunities!

- mobility

THE TECHNYL[®] FORCE



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2345656
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2462452
0214340

STW2465

REGHV07

Hill GU

Solvay Performance Polyamides



SOLVAY

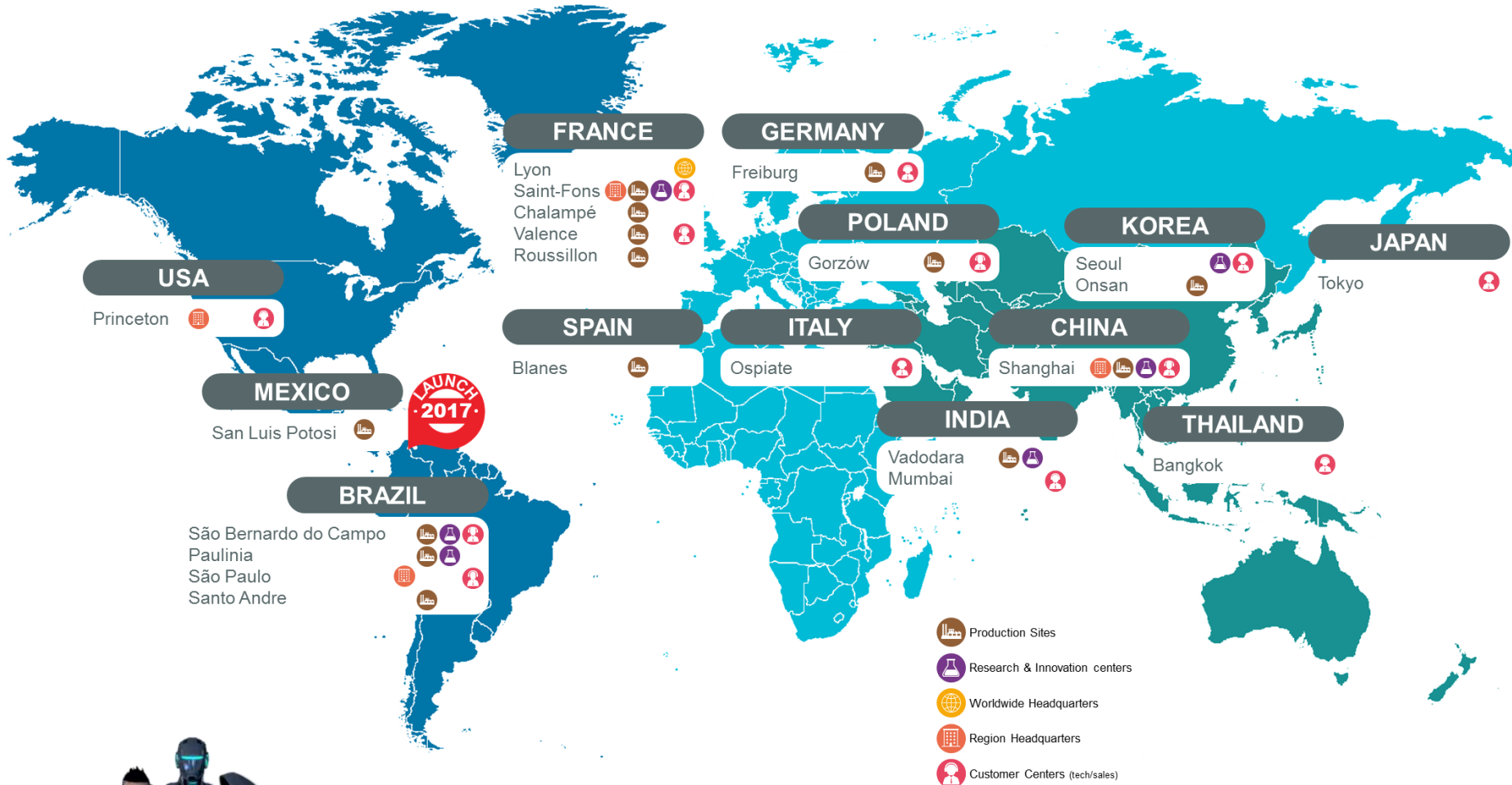
Solvay Performance Polyamides, a global player

...close to its customers

AMERICAS

EUROPE, MIDDLE-EAST & AFRICA

ASIA-PACIFIC



2500
PEOPLE

14
PRODUCTION SITES

6
R&I CENTERS

13
CUSTOMER CENTERS (TECH/SALES)





METAL REPLACEMENT by **TECHNYL**

Optimize your part design
while achieving significant weight reduction

THERMAL MANAGEMENT by **TECHNYL**

Maintain systems components
at optimal operating temperatures

FIRE PROTECTION by **TECHNYL**

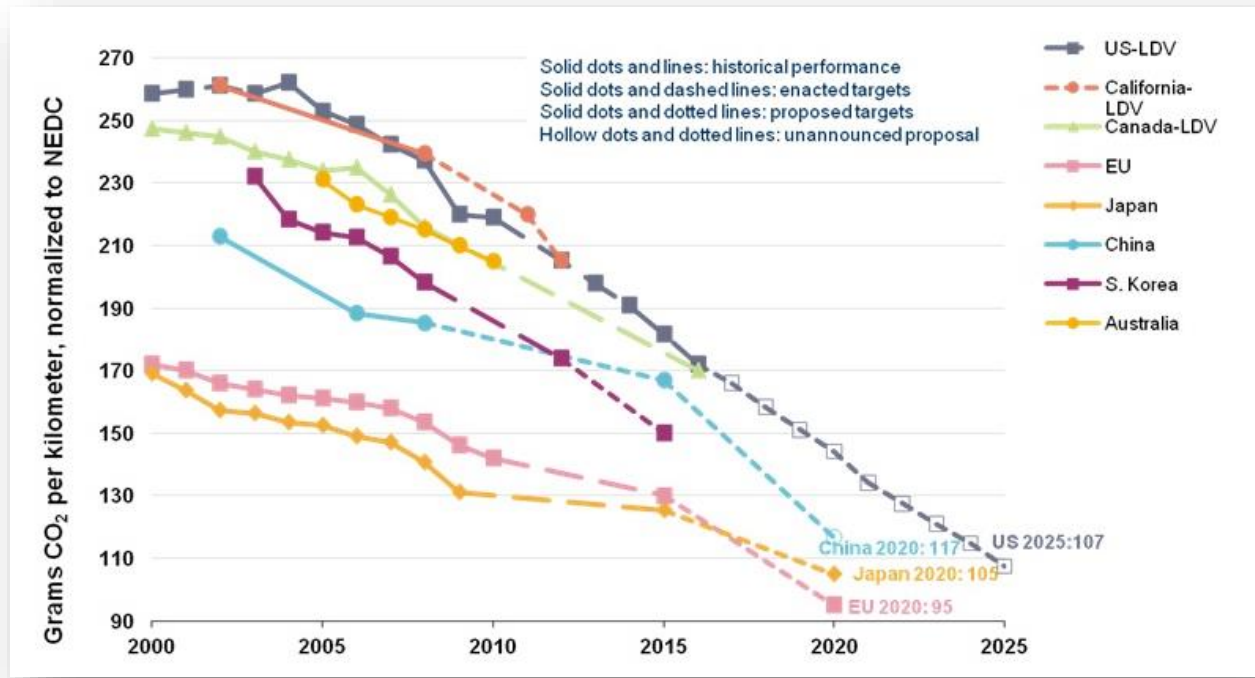
Meet the most stringent standards
for maximum safety performance

FLUID BARRIER by **TECHNYL**

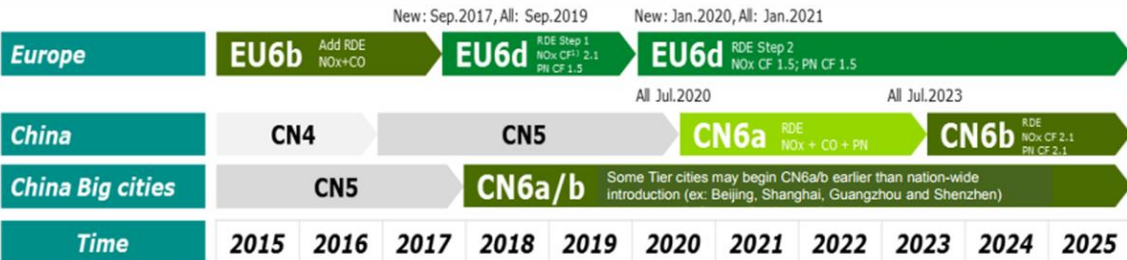
Ensure excellent chemical resistance in highly demanding environments



Automotive Industry is shaped by ever-stricter emissions regulations....



Road map for Chinese light vehicle emission standard (gasoline)

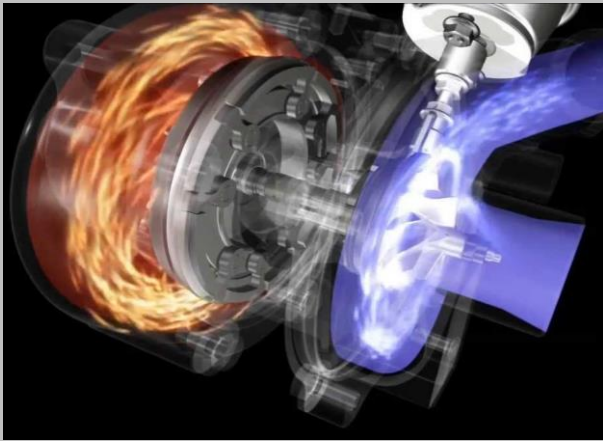


Source: ICCT, IHS





Powertrain efficiency



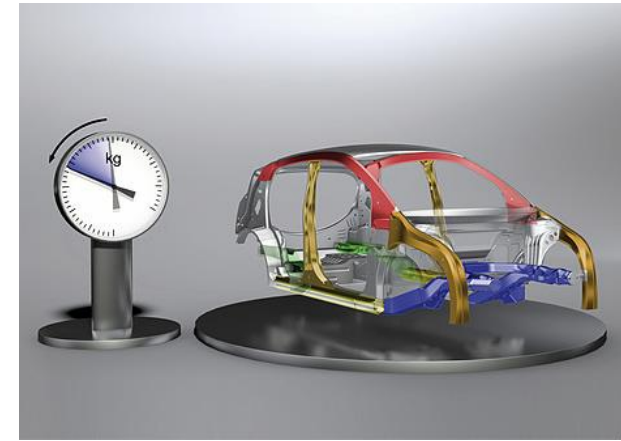
- Turbo charging system
- Exhaust Gas Recirculation
- Fuel Injection Technologies
- Waste Heat Recovery
-

Electrification



- Start-stop, 48V mild hybrid
- Full hybrid
- Plug-in hybrid
- BEV
- FCEV

Lightweighting



- Aluminum
- Magnesium
- Plastics
- Composites
-



HOW TO

turn the

CHALLENGES

into OPPORTUNITIES



€ BATTERY COSTS

SAFETY

RANGE

WEIGHT

BATTERY LIFETIME

ELECTRICAL PROTECTION



To support you in E - Mobility we offer more...

More
LIGHTWEIGHTING

More
EFFICIENCY

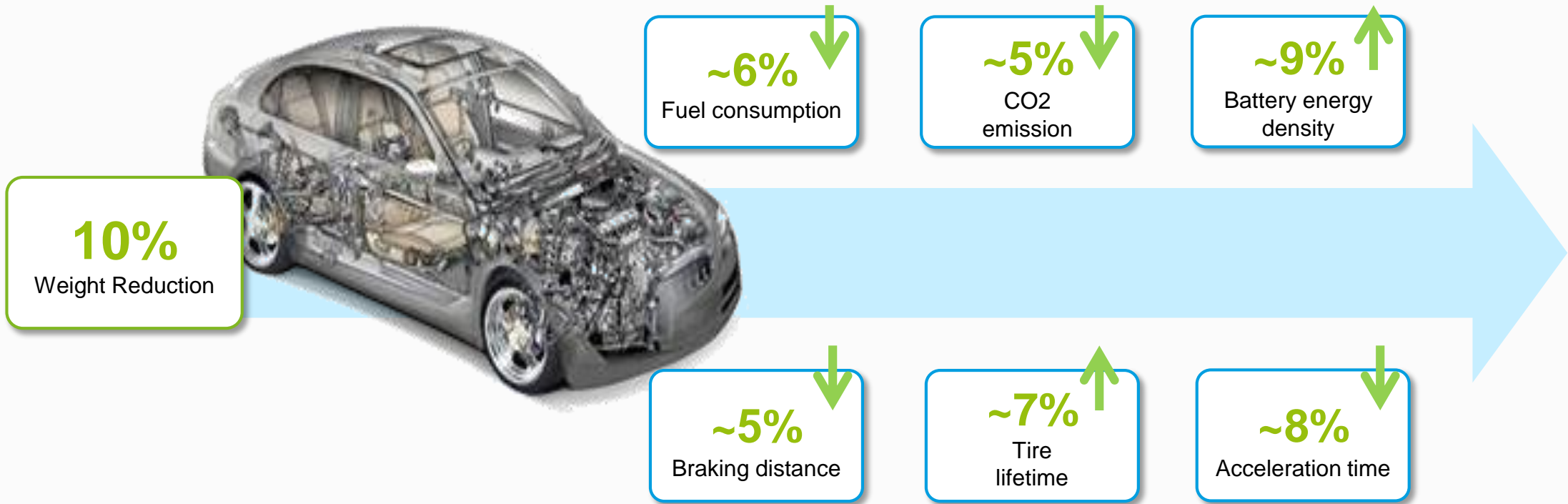


More
SAFETY

More
SUSTAINABILITY



Lightweighting improve the dynamic and driving performance



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240230





Weight reduction

- Low intrinsic density of plastic
- Optimization with predictive simulation
- Appropriate re-design of the part

1

Cost saving

- Lower tool cost and longer lifetime
- Part cost saving (mass reduction, post operation elimination, energy saving)

4

Function Integration

- Design freedom & space optimization
 - parts number reduction
 - assembly simplification

2



Easy processing

- Excellent surface without surface finish required
- No post operation, even for complex shapes

3

NVH and thermal insulation

- Noise reduction
- Thermal insulation & improved damping behavior

5





PERFORMANCE

MAX Range (in development)



- High modulus (> 20 GPa)
- Mechanical & fatigue strength
- Reduced anisotropy
- Good flowability & dimension stability

TechnylStar® Range



- PA66: AF & AFX; PA6: S & SX
- 30 to 60% GF
- Less cycle time, excellent flowability, great surface aspect

Standard Technyl® Range



- PA66 and PA6
- 20 to 50 % GF
- Balanced properties for standard applications

SERVICES

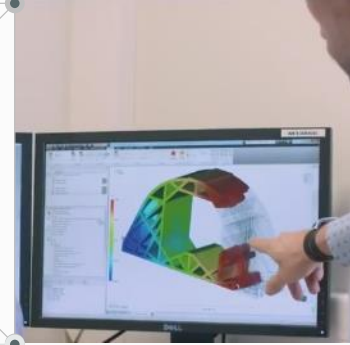
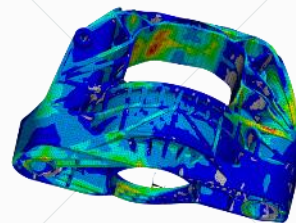


- Material database.
- Design and simulation support.
- Advanced simulation.
- Part testing.





**A predictive simulation solution
and services package
for modeling the behavior
of thermoplastic parts**





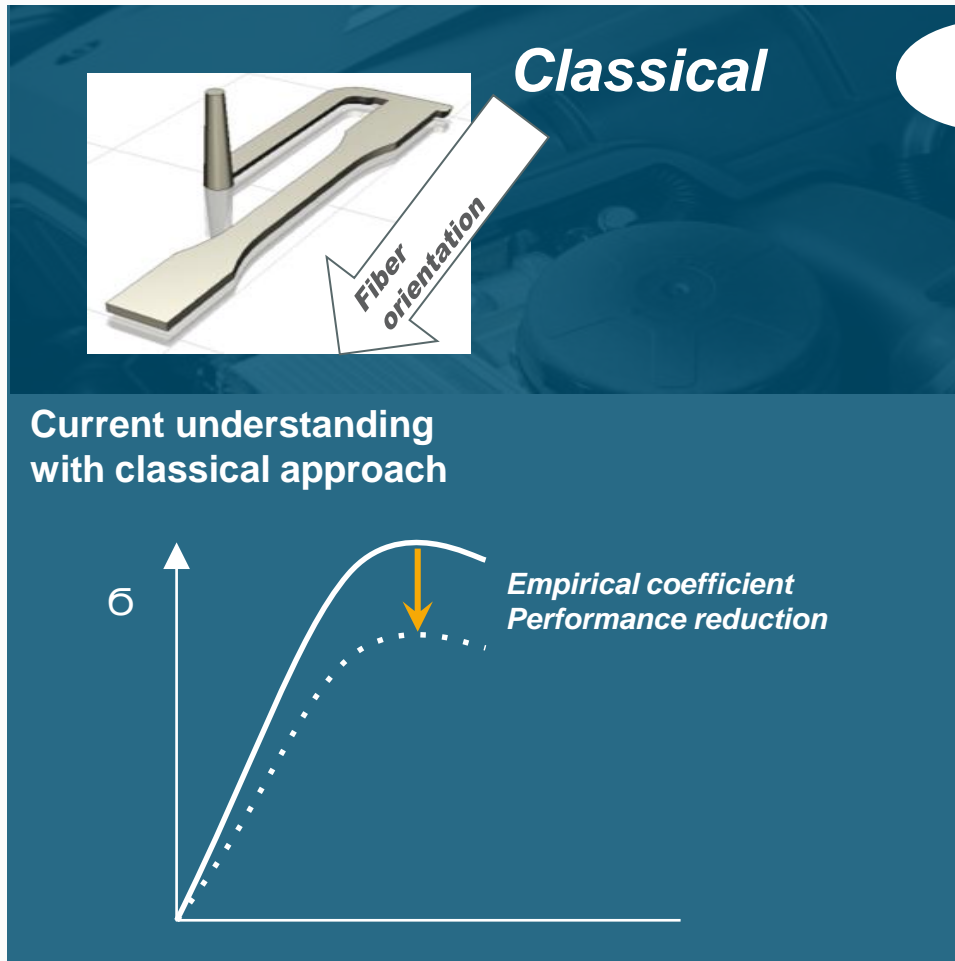
Classical approach

- ▶ Empirical coefficient
- ▶ Misuse of material potential
- ▶ Multiple simulation loops
- ▶ Unoptimized weight

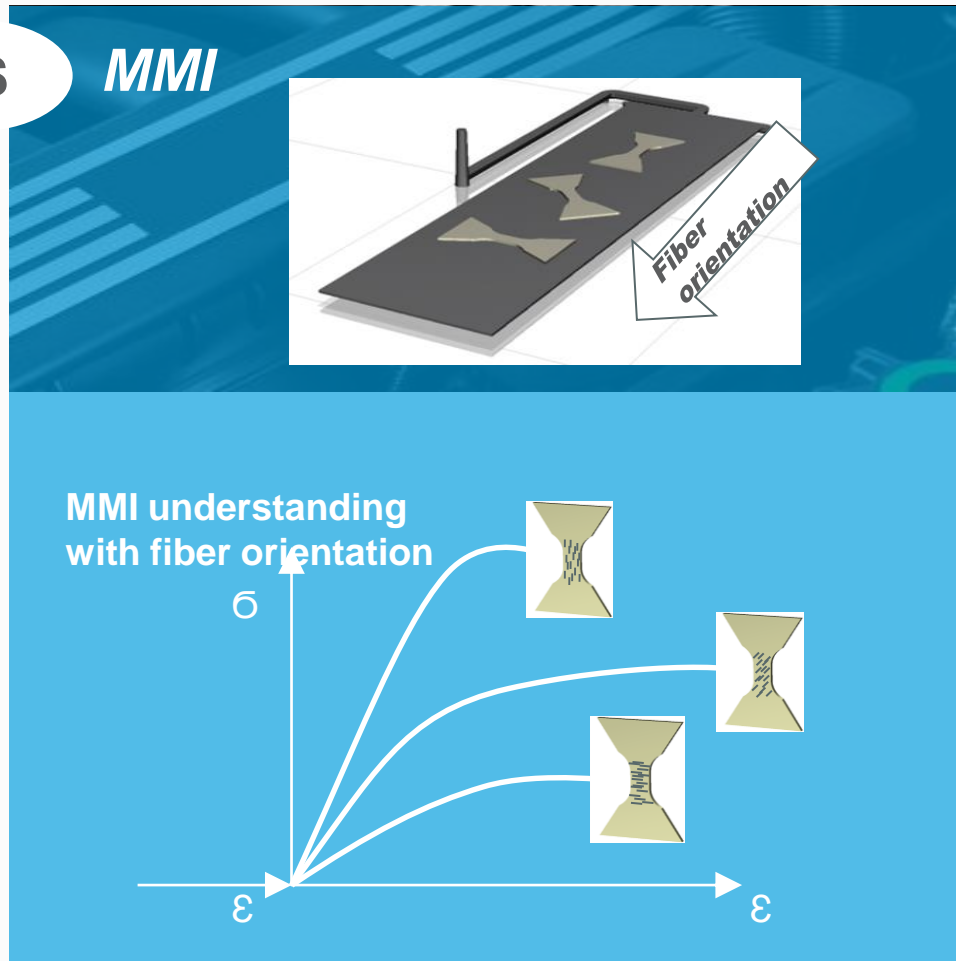


- ▶ Predictive simulation
- ▶ Maximize TECHNYL potential
- ▶ Fast to market
- ▶ Light weight design





VS

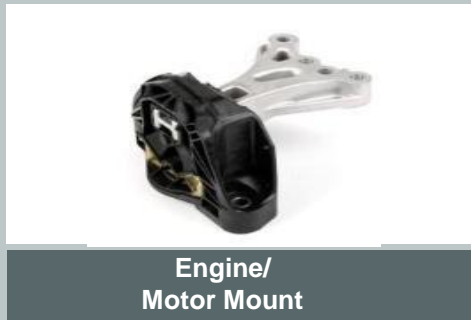
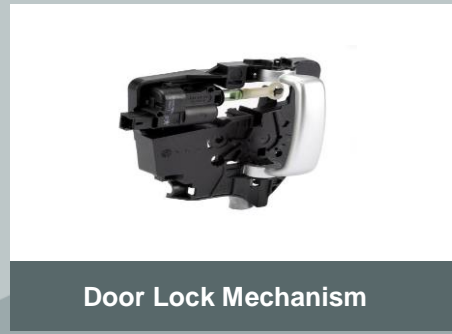
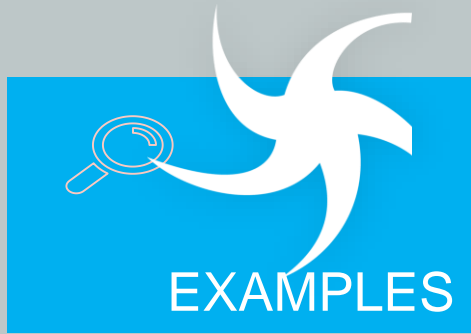


Technyl® polyamides clearly helps to save weight....

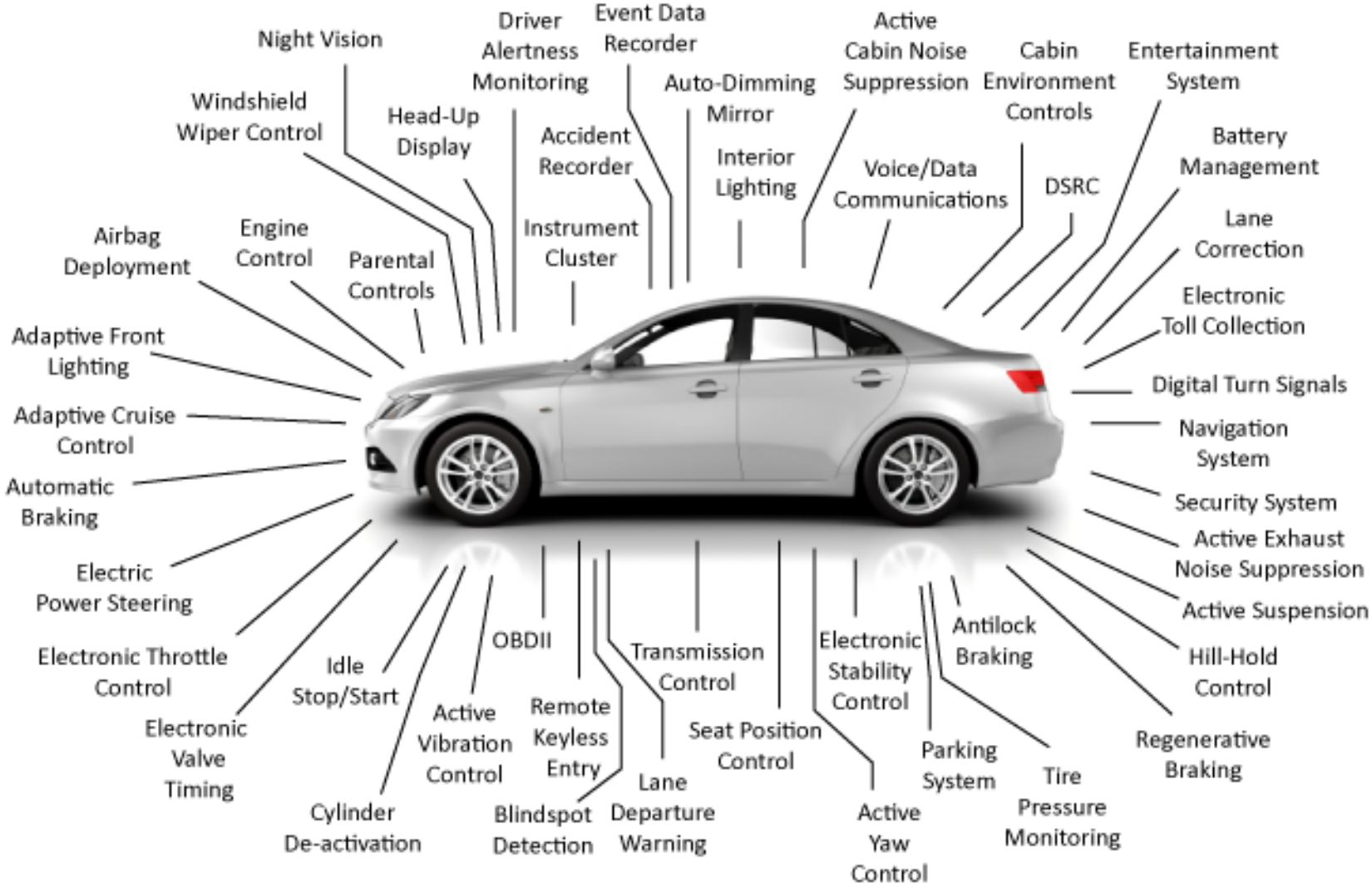
NEW MATERIALS FOR
NEW CHALLENGES

WEIGHT
SAVING

Here are some examples for metal replacement



Automotive electronics systems are becoming increasingly complex and essential to the proper and safe operation of cars



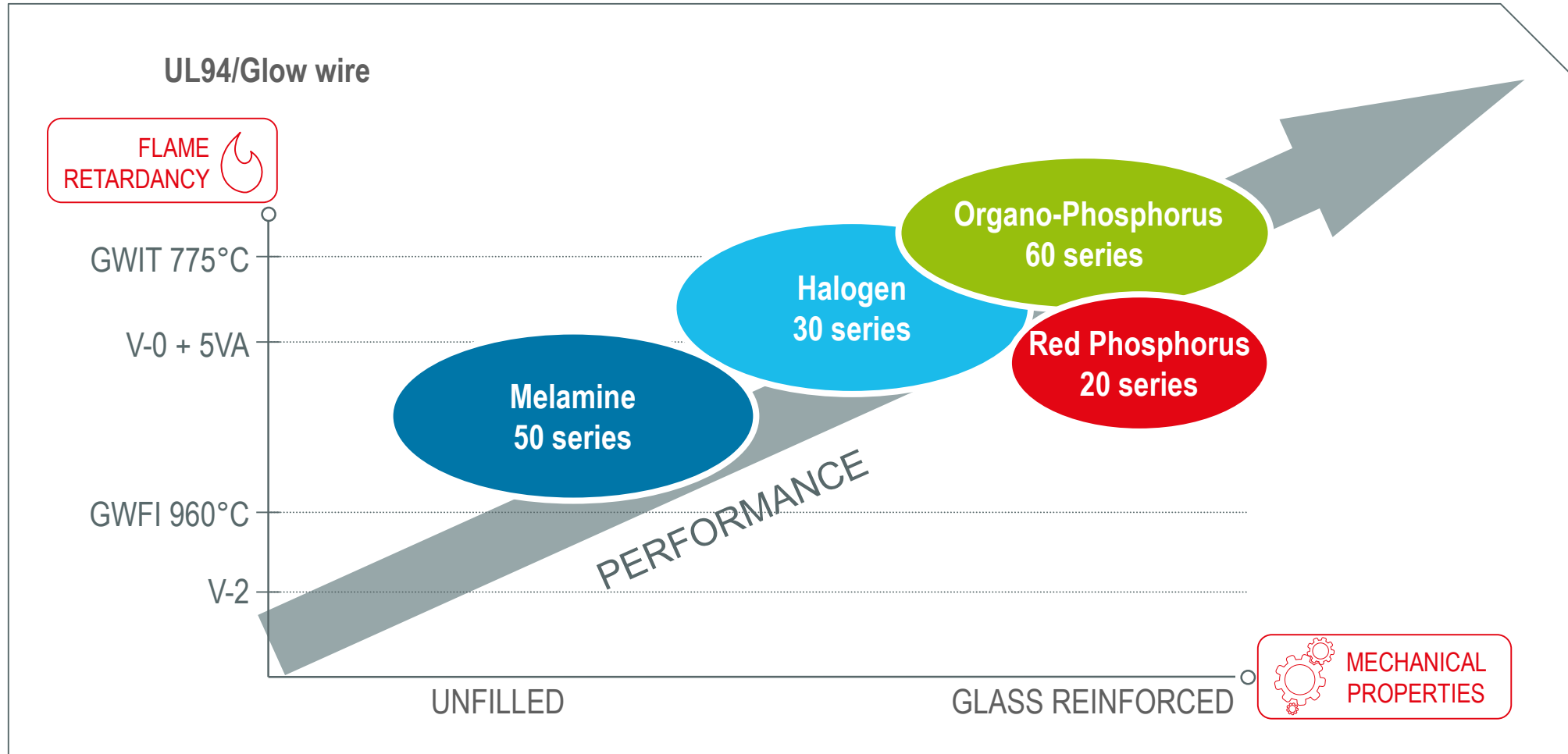
When failures may lead to dangers...



Major Performance Polyamides **Flame Retardant Technologies**

NEW MATERIALS FOR
NEW CHALLENGES

FLAME RETARDANT
PRODUCT



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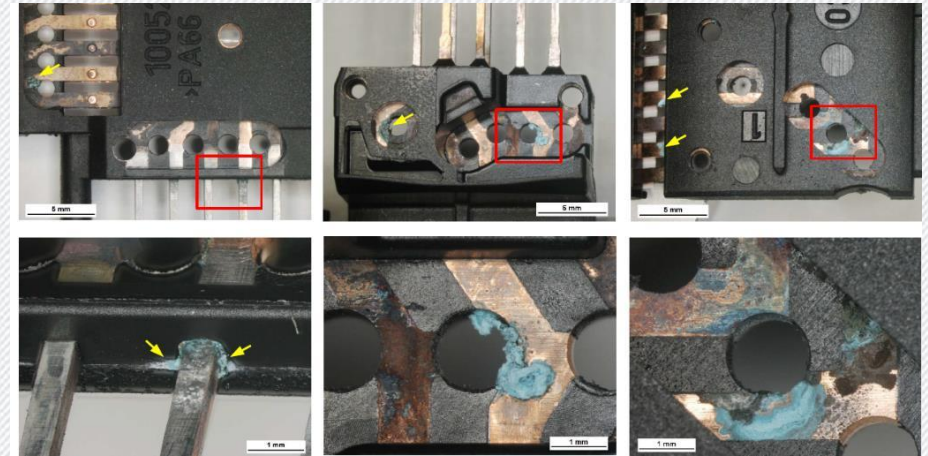


MINIATURISATION

(Thinner wall, more serious corrosion consequences)

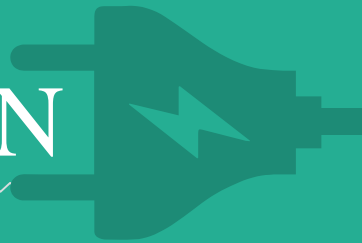


Material related electrical part defects



ELECTRIFICATION

(More and safer electrified functions and electronic devices, Higher voltage up 400V to 800V)



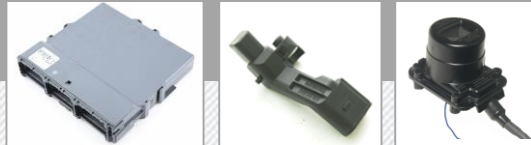
Halogens and other corrosive additives trigger these defects



Housing or over moulded automotive electronic and electrical components

ELECTRONIC SAFETY & CONTROL DEVICES

- ↳ Sensors
- ↳ ECU/TCU



NEW ELECTRIFIED FUNCTIONS

(overmolded wire, direct contact with fluids)

- ↳ E-Water pump
- ↳ E- thermostats housing
- ↳ E-Valve



HIGH VOLTAGE PART

(with possible future FR/orange needs):

- ↳ Connectors
- ↳ Bus bars
- ↳ Charging devices (Induction)

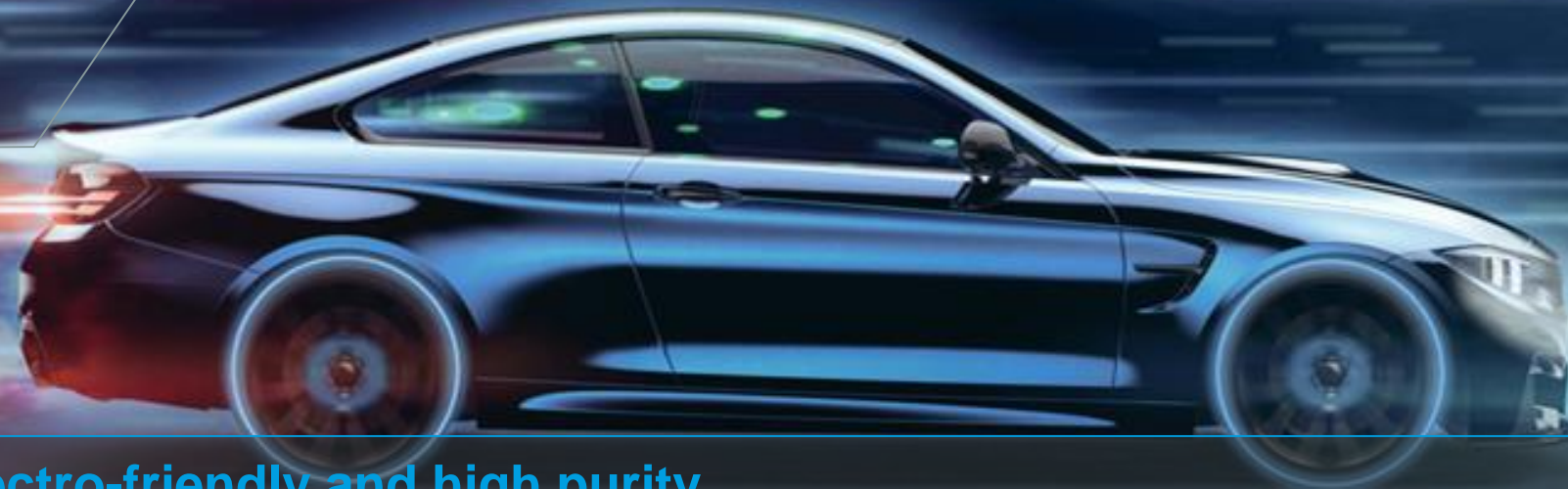


For FC system **efficiency**
and E&E applications **safety**

PURITY *is* **KEY**

CORROSION

phenomenons can already
be observed using very simple tests

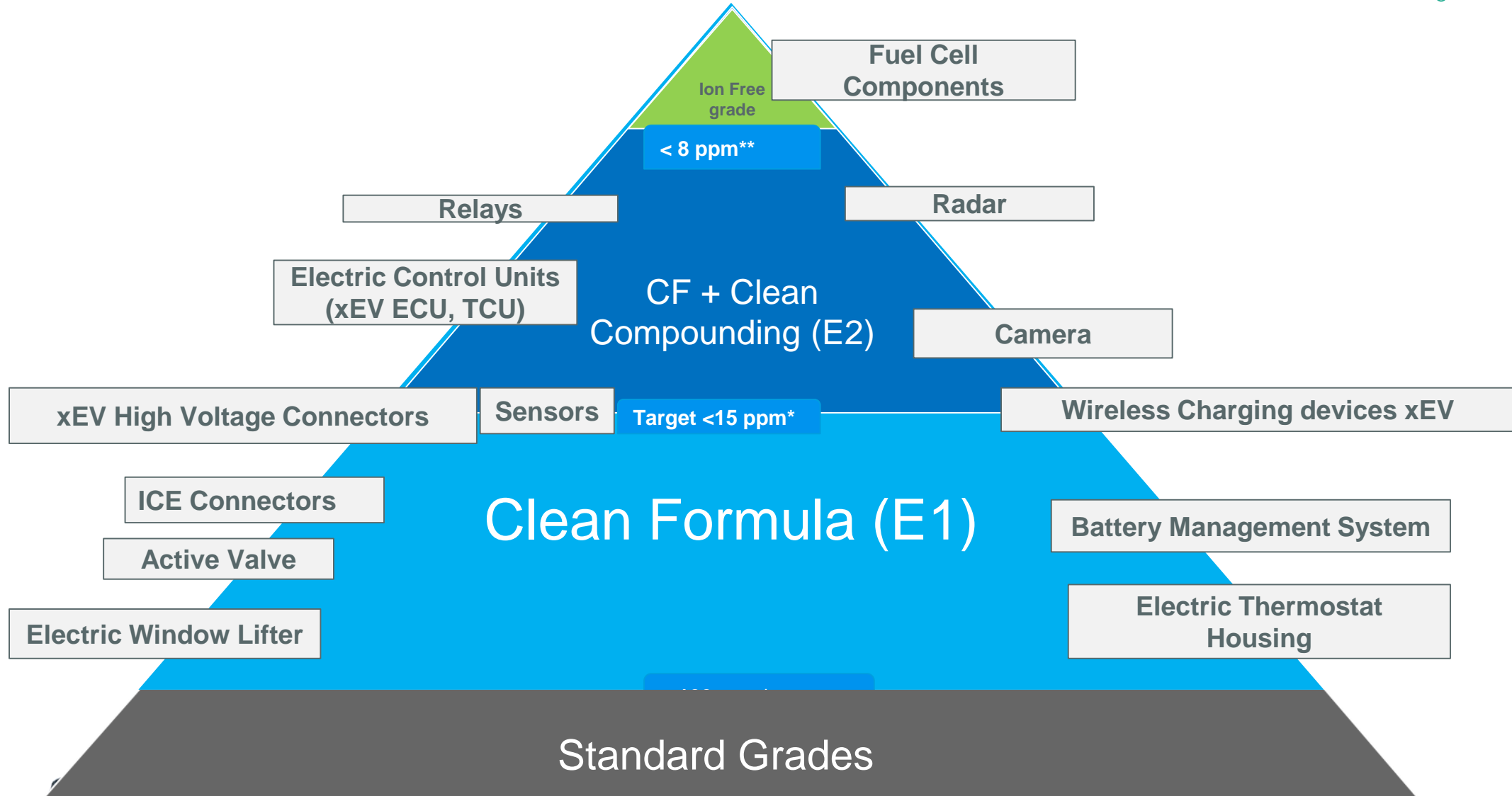


Electro-friendly and high purity

TECHNYL® range products are formulated and produced
to meet the most stringent requirements



Automotive E&E applications are requiring different levels of purity



*Internal elution test on halogen content

**Internal Elution Test on Cations content

To support you in E - Mobility we offer more...

More
LIGHTWEIGHTING

More
EFFICIENCY



More
SAFETY

More
SUSTAINABILITY



IC Engines

Hybrid

Full Electric

Oil filter modules



EGR cooler



Battery cooling



Thermostat housing

Thermal management Module



e-motor
Water or Oil
cooling



Mechanical
water pump



All powertrain usage

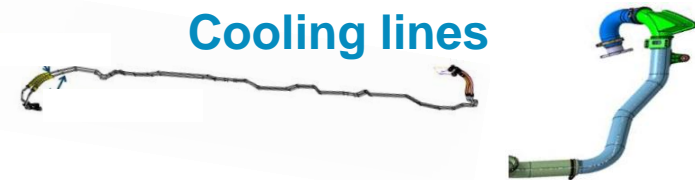
Electrical
water pump



Control
electric
Valve



Cooling lines

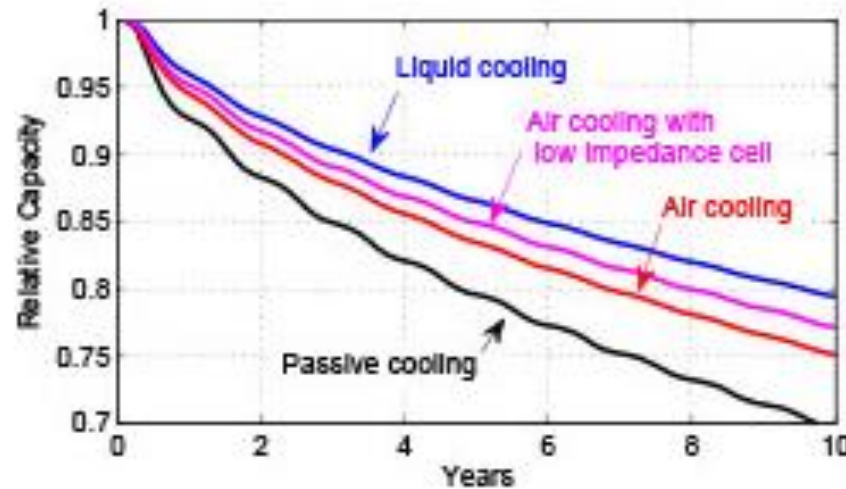
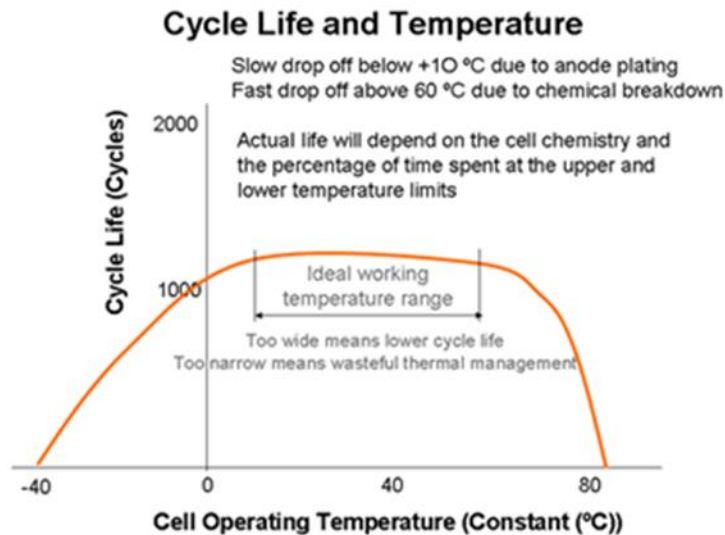


Battery thermal management is critical to its lifetime and efficiency

- Ideal working conditions between 35°C and 60°C
- after 80°C thermal runaway

Liquid cooling remains the most efficient

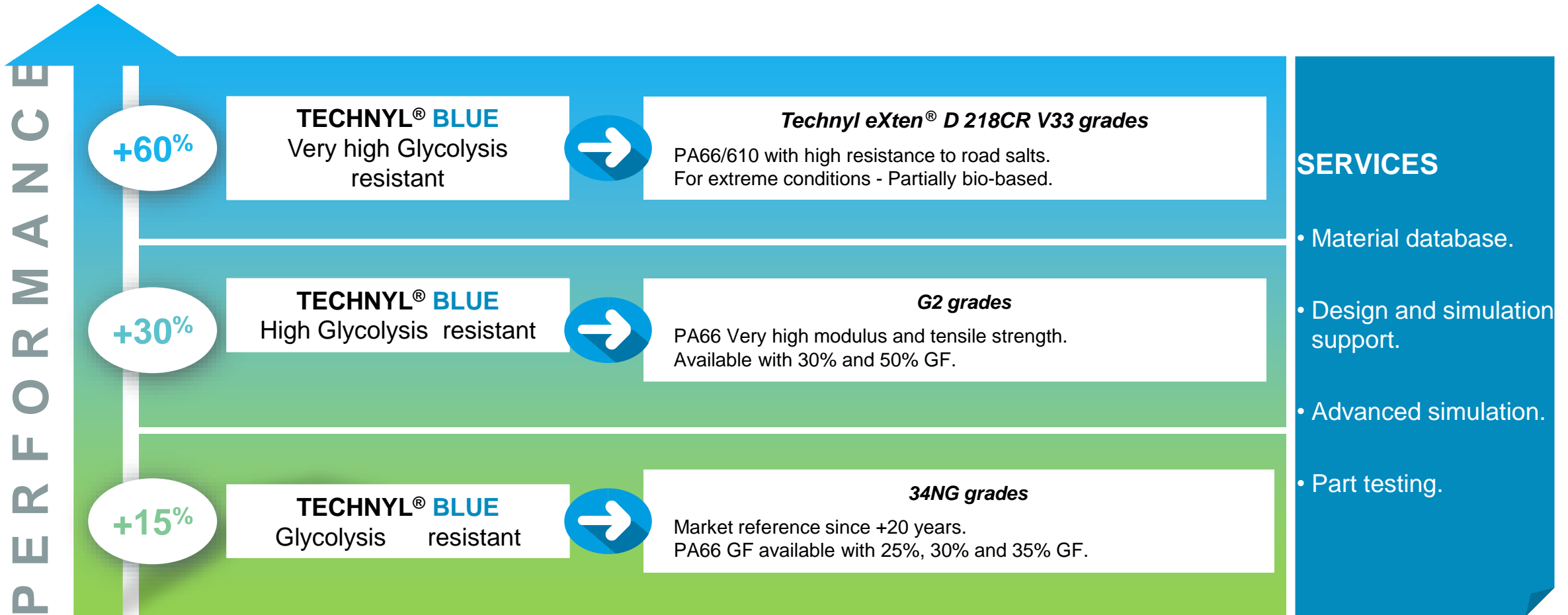
High performance thermal management allows many benefits



- Higher efficiency, recoverable power and capacity
- Longer battery lifetime/better reliability
- Allows fast charging
- Prevent thermal runaway
- Compact system

<http://www.mpoweruk.com/thermal.htm>





SERVICES

- Material database.
- Design and simulation support.
- Advanced simulation.
- Part testing.

Typical **tensile strength improvement** vs. standard PA66 material after 1000h ageing in water/glycol hot mixtures at 130°C.



To support you in E - Mobility we offer more...

More
LIGHTWEIGHTING

More
EFFICIENCY



More
SAFETY

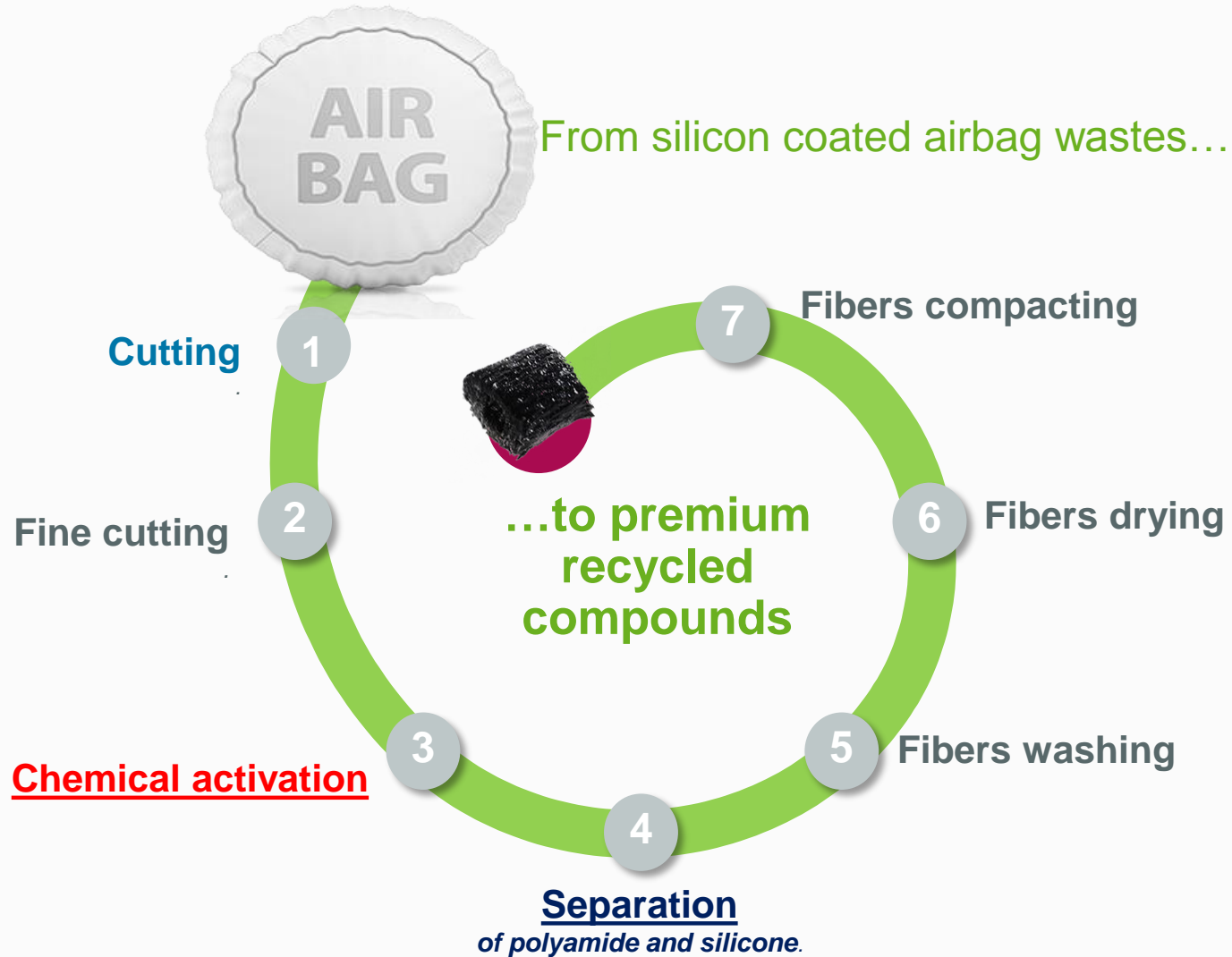
More
SUSTAINABILITY



The answer to the recycling challenges: **Technyl4Earth**[®] compounds

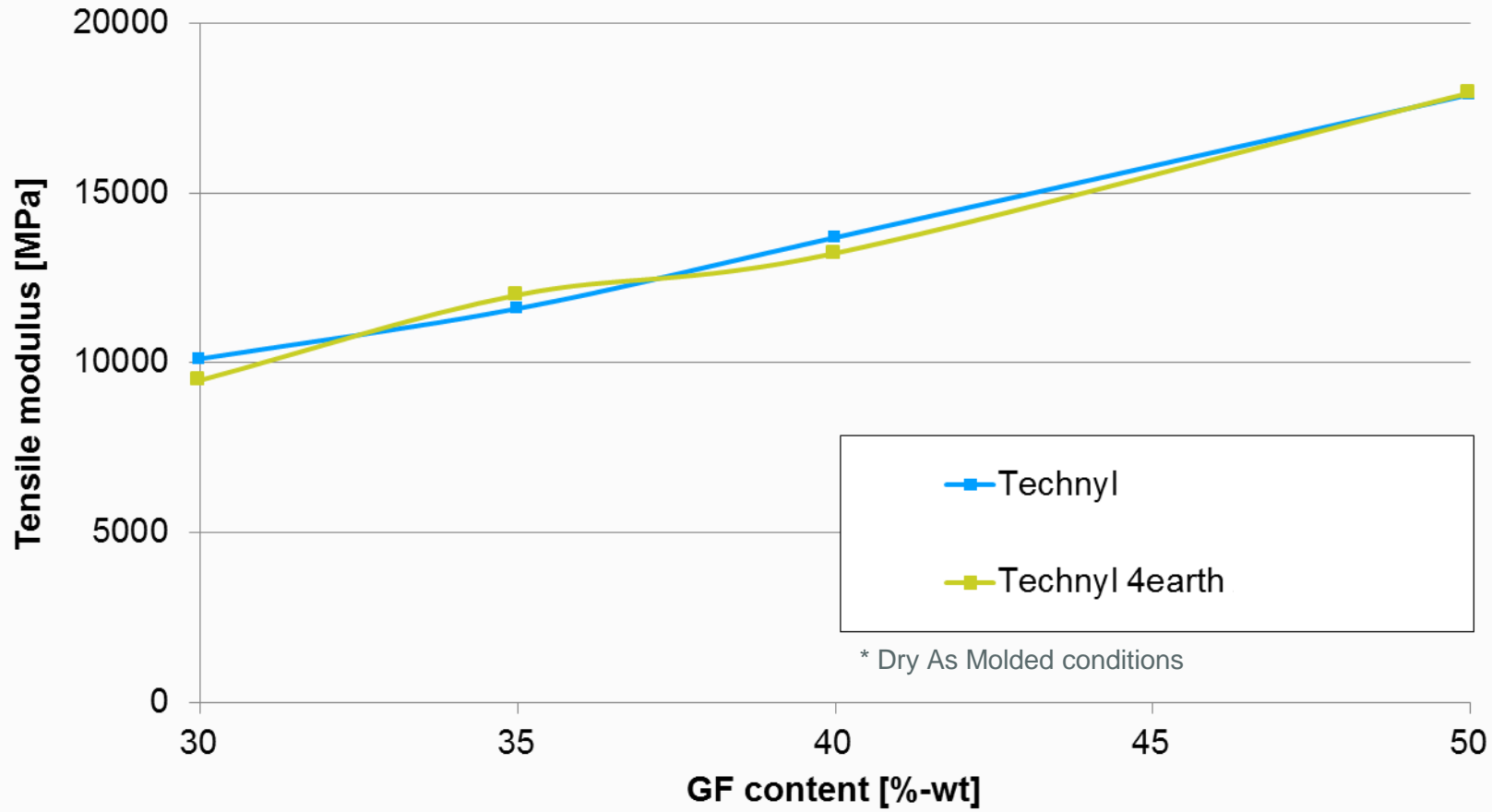


exclusively made out of waste **coated fabrics from Air Bags** by a breakthrough recycling technology

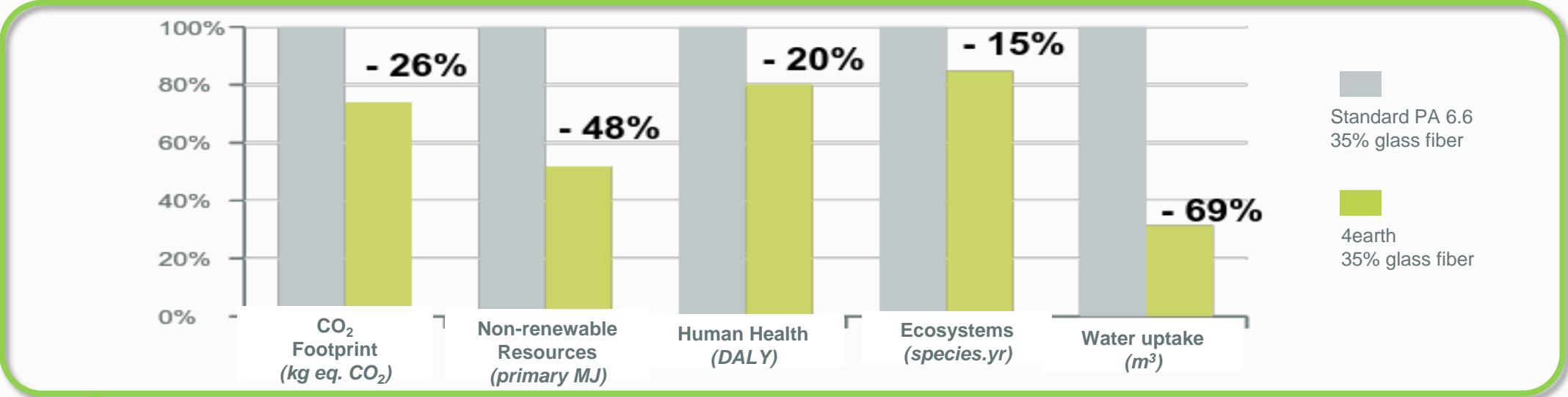


Supported by:





Reduction over each indicator * (percentages)



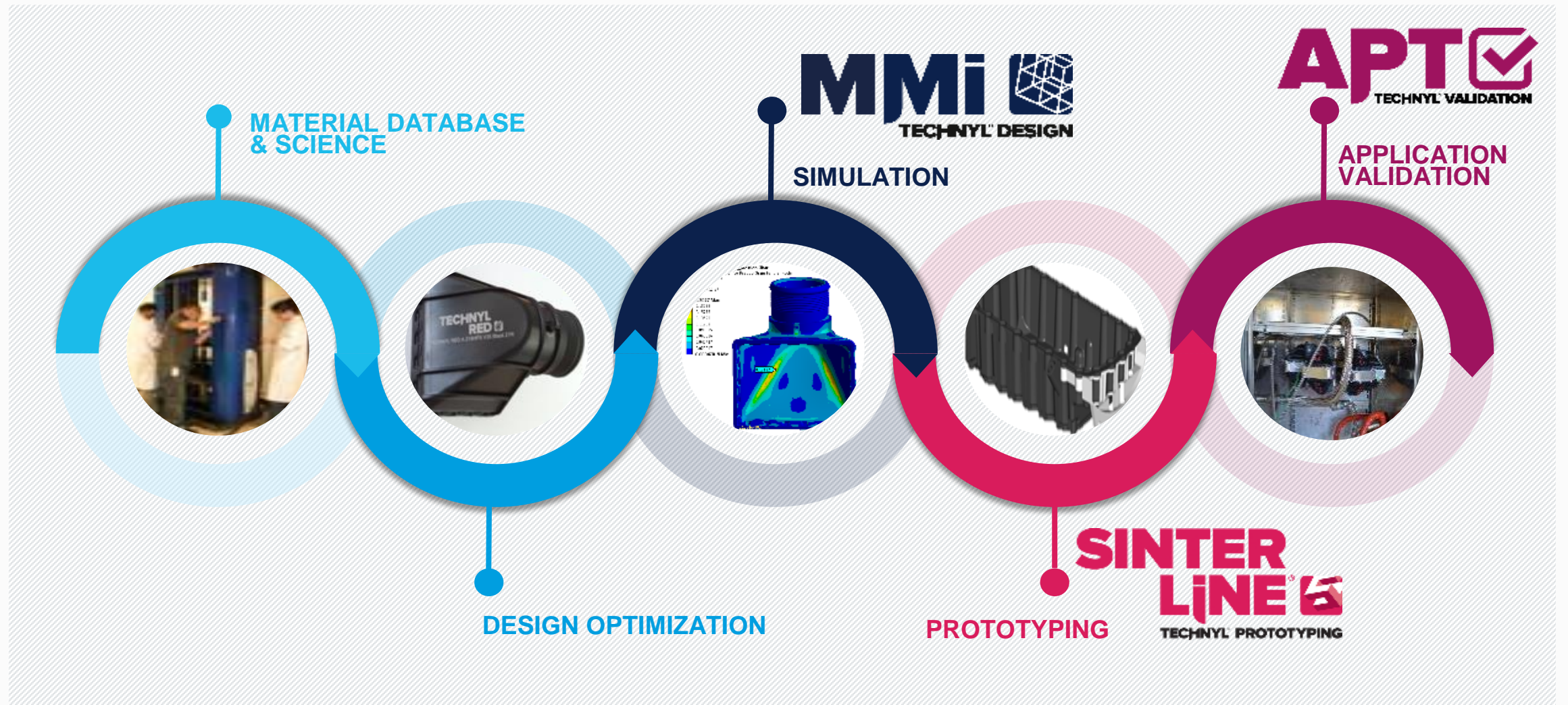
The cradle-to-gate environmental footprint is significantly reduced as compared to primary PA 6.6, in all fields monitored

* Preliminary LCA results from internal Solvay analysis



A unique service offer

↳ From material expertise to part testing



Thank You!

