



#goingforthefuture

The Key Factors for a successful transition from conventional to electric vehicles

BOI webinar / November 16th, 2021

The automotive of the future: like that?

21.10.2021



Cetim and the mobility of the future



21.10.2021



1st

Business sector
in 2020

22

sites
worldwide

50

years
automotive
experience

> 10 years

experience
in composites
& electric vehicles

60%

time saving
on durability testing
thanks to simulation-testing correlation

Main figures

22

Mains locations France & Worldwide...

1 100

Employees

150 M€

(Business activity: 80 M€)

18%

Export turnover

4 000+

active annual clients worldwide

Main locations

► 22 Multidisciplinary facilities to support international
manufactury industries...





Already more than 600 companies have chosen Cetim



AVON
AUTOMOTIVE



BUGATTI



DELPHI
Automotive Systems

faurecia



GRUPE RENAULT



INERGY
AUTOMOTIVE SYSTEMS

JTEKT
JTEKT CORPORATION

lisi AUTOMOTIVE
LINK SOLUTIONS FOR INDUSTRY



MAGNA



MAGNETI MARELLI

MAGGI COUTIER



MONTUPET



NTN



PSA
GRUPE

PUNCH

Powerglide

SAINT JEAN



INDUSTRIES

SINTERTECH

soGEFI FILTRATION

TEXELIS
POWER TRANSMISSION



TOYOTA

TRW
Automotive

Valeo



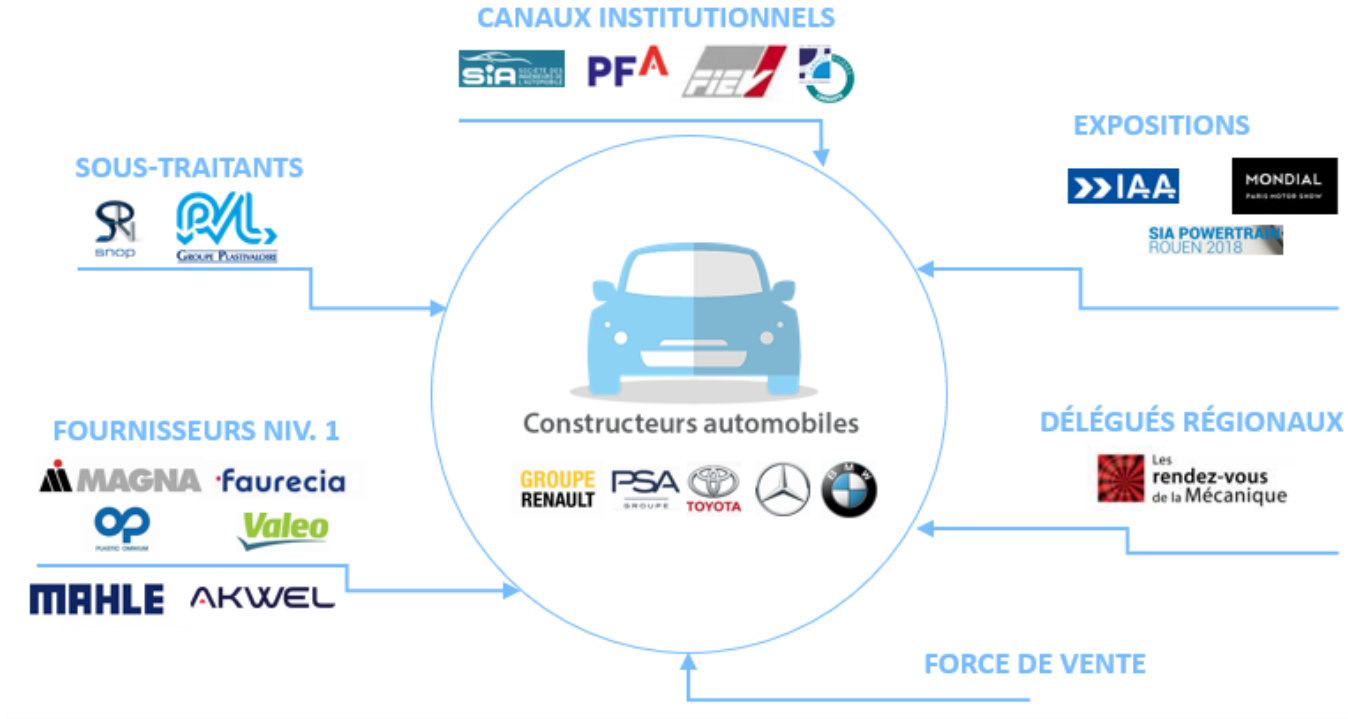
Visteon®



Volkswagen

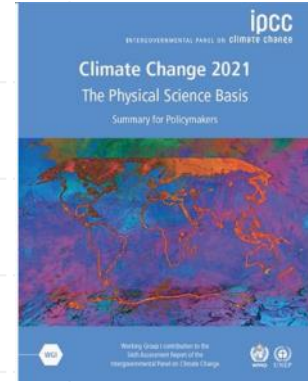
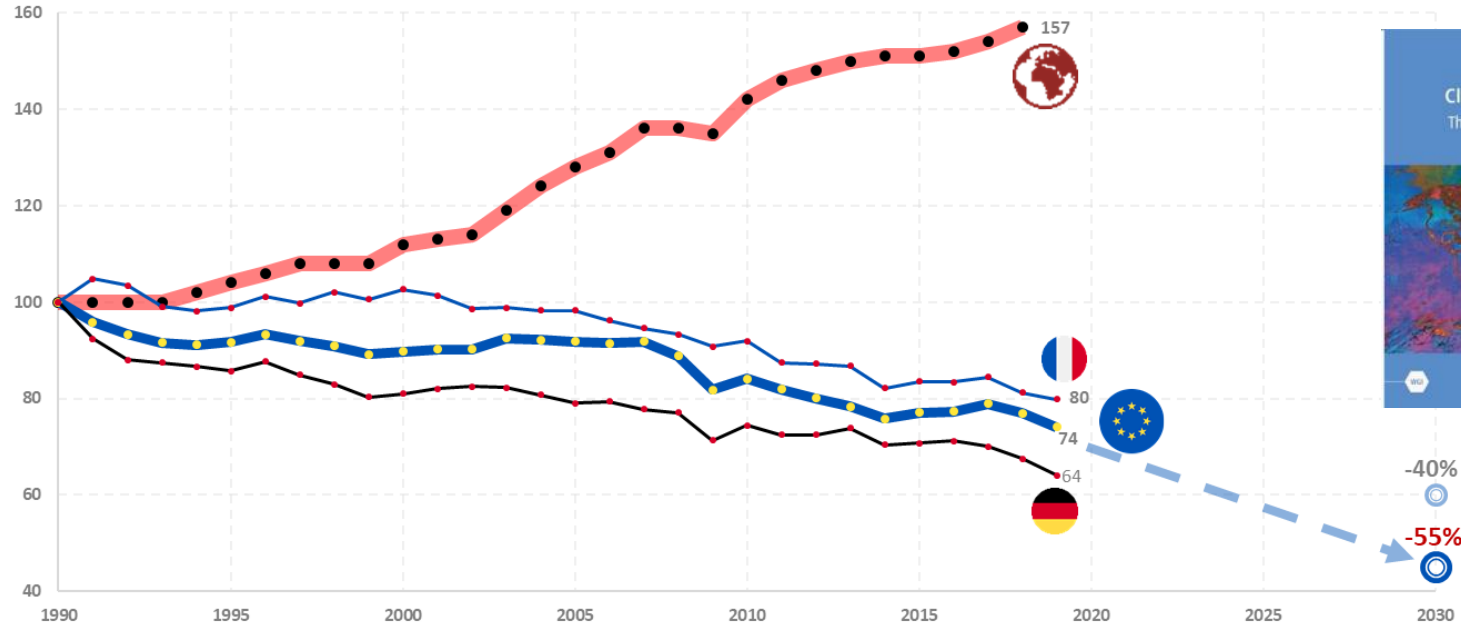
YAZAKI

A multi-channel strategy



- Expertise recognized by manufacturers to support the entire sector (Tier1, SMEs)

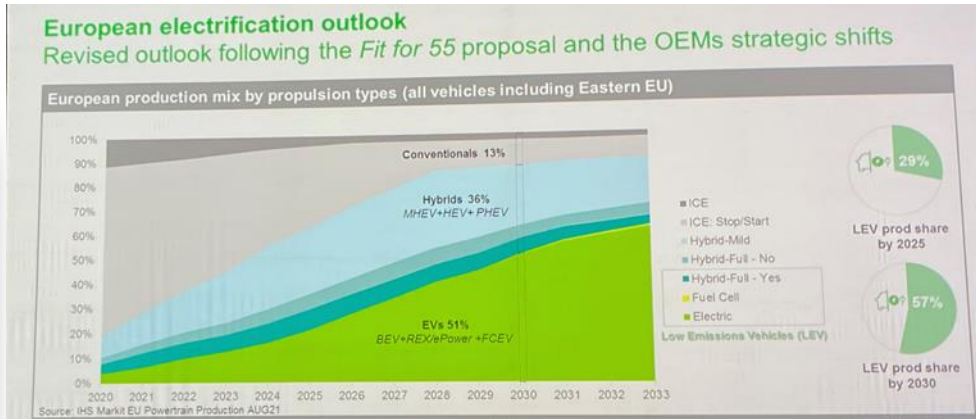
Worldwide greenhouse gas emissions evolution



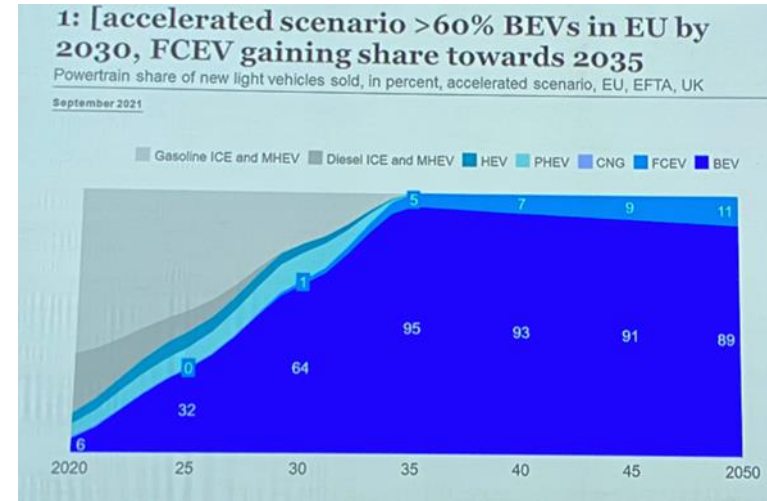
Source: [Commission européenne / Database EDGAR \(Monde\)](#), [EEA \(UE, DE, FR\)](#)

- Need to reduce drastically the emissions to limit the earth average temperature rise $< 2^{\circ}\text{C}$

Electrical vehicle : where do we go ?



IHS Markit

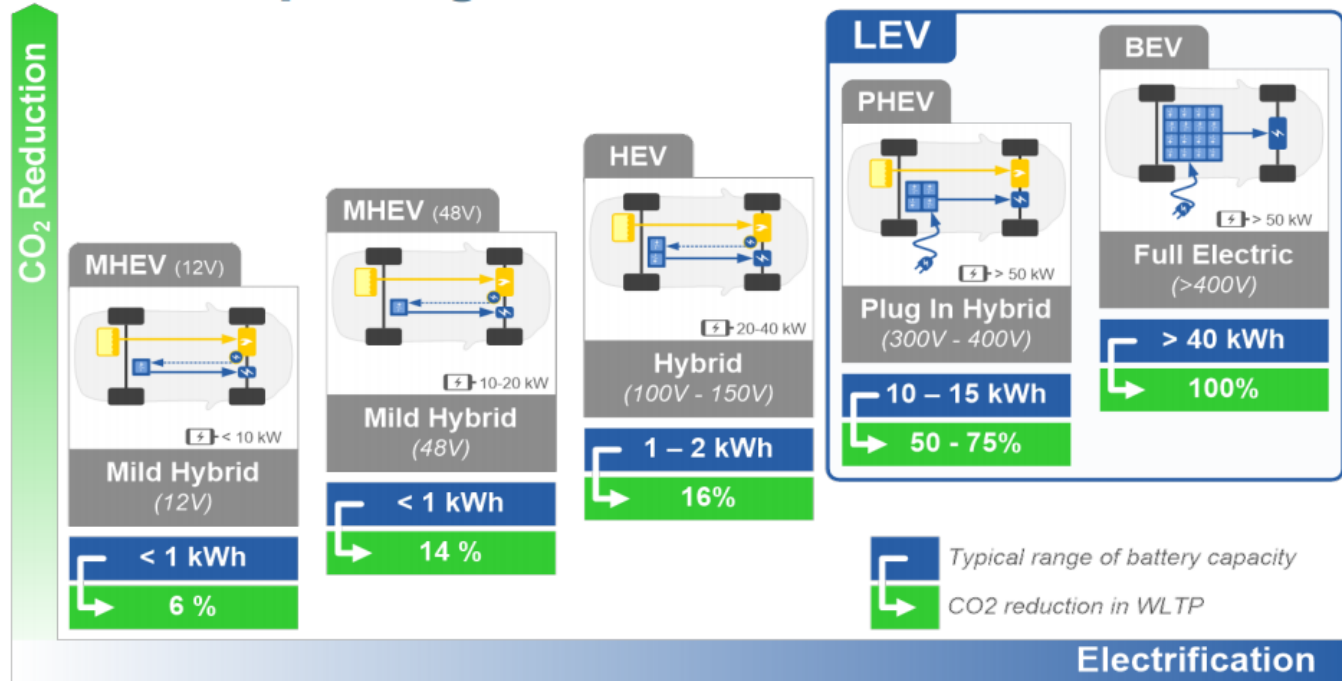


IHS Markit

- Many scenarii for the future but electrification will be unavoidable
- The only question is the speed of change...

The architectures & CO2 savings

04.01.2021



Hybrid gains depend on the technology, the vehicles weight and power and the base powertrain (gasoline or diesel). Values for PHEV are given for ICE driving phases.

Source SIA

Source : DATA BIPE based on
Groupe PSA format

➤ Different solutions for different applications

Automotive challenges



04.01.2021

DIGITALIZATION

Environmental regulations

- Lightening
- Reduction of emissions
- Performance Improvement

New demand for mobility

- Electromobility/autonomous vehicle

Investment and profitability

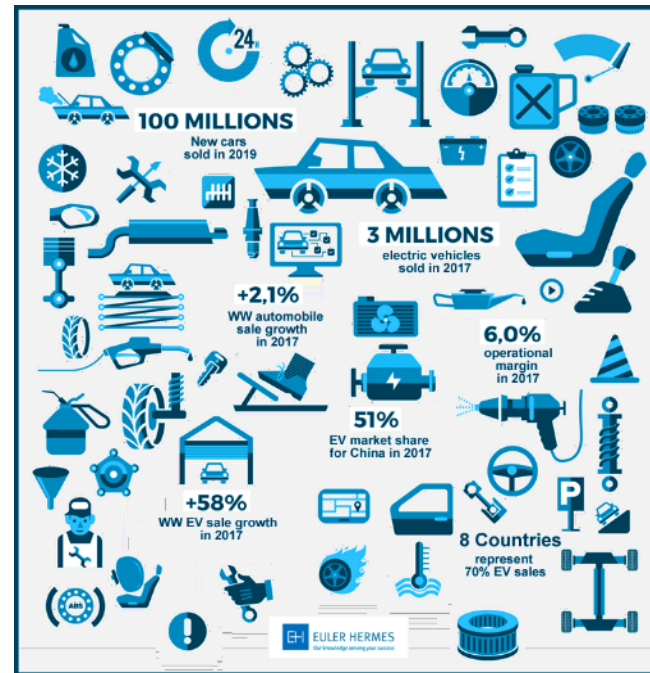
- Cost reduction
- Time to market
- Perceived quality

Looking for new directions (rows 2 & 3)

- Innovation
- Supplier of complete modular technological blocks

Strategic alliances *for obtaining competitive advantages on WW market*

- Local presence for foreign subsidiaries of French groups



Cetim proposes a complete set of solutions adapted to the mobility industry

04.01.2021

Mobility expectations

Our solutions

**Innovation
Emission reduction**

Green
& e-mobility

**Innovation,
Perceived quality**

Smart Life
on-board

**Time to market
reduction**

Optimized test
solutions

**Manufacturing
costs reduction**

Excellence in
realization

**Evolution of the
industrial base**

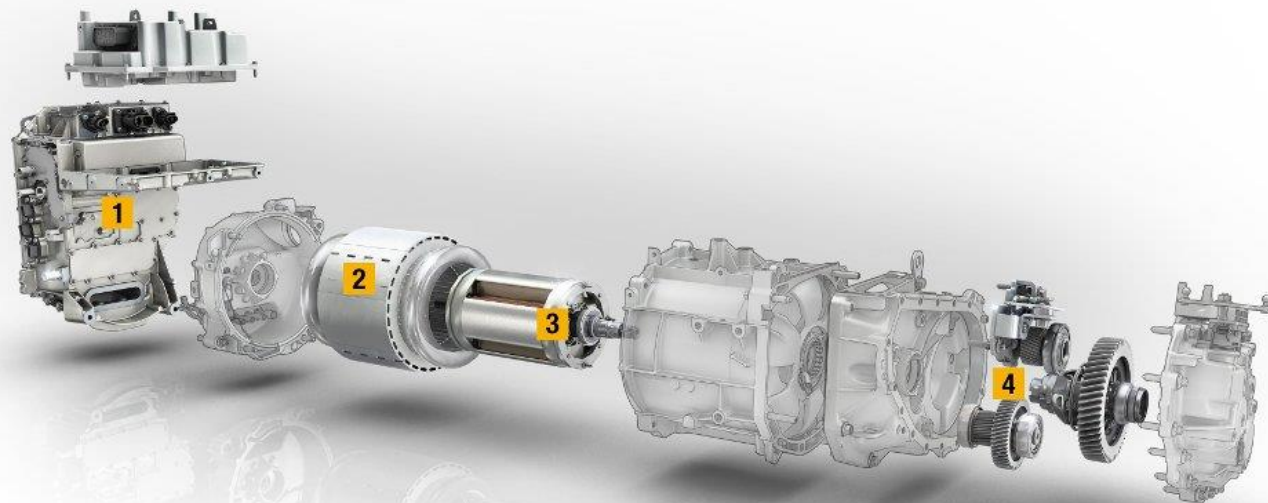
The factory of the
future



Green Automotive & e-mobility

The strategy & solutions for e-Powertrain

04.01.2021



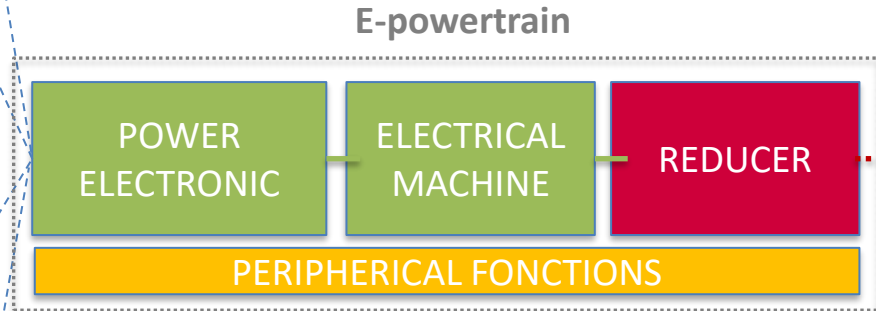
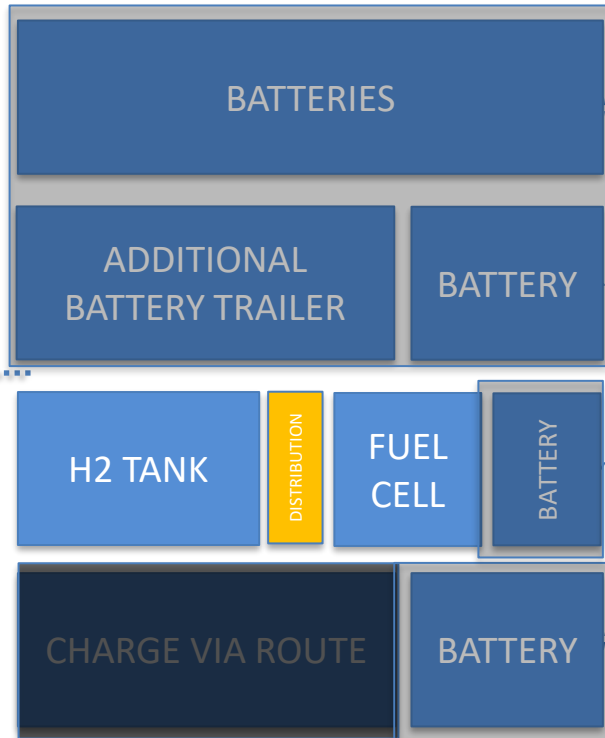
- 1** ÉLECTRONIQUE DE PUISSANCE / POWER ELECTRONIC CONTROLLER
- 2** STATOR / STATOR
- 3** ROTOR / ROTOR
- 4** REDUCTEUR / REDUCER

Green Automotive & e-mobility

► Electrical powertrain structure at 

04.01.2021

INFRASTRUCTURES



AUTOMOTIVE THERMICAL SYSTEMS

CHARGER

AC/DC CONVERTER

...

MOTOR

ROTOR

ELECTRICAL TURBO

Full faisability

Partial faisability

Out of scope

DRIVE LINE

Green Automotive & e-mobility

▶ Entire e-powertrain validation at 

➤ Our traditional activity:

- Rotors testing & validation
- Differential testing
- Gearbox testing with analysis after tests

➤ New activities:

- 48V hybrid gearbox testing
- High speed reducer testing and validation/20 000 rpm
- High Power electrical motors testing 250 kW/20 000 rpm
- Multiphysical testing on power electronics
- Support in gaz tank development (H2, LNG...)



1. ELECTRONIQUE DE PUISSANCE / POWER ELECTRONIC CONTROLLER
 2. INVERSEUR / INVERTER
 3. MOTEUR / MOTOR
 4. REDUCTEUR / GEARBOX

Source Renault



Source Faurecia

Cetim realize all e-powertrain testing & validation

Green Automotive & e-mobility

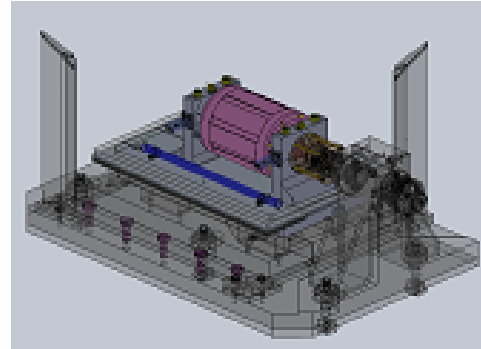
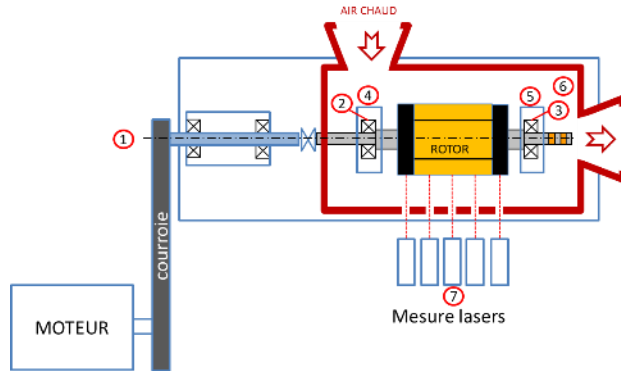
▶ Rotor testing & validation at

Elastical deformation of electrical motors rotors measurement

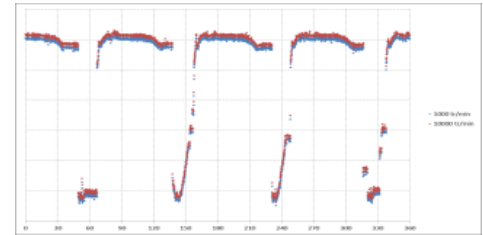


Source l'argus pro

Goal: minimize the gap between the rotor & the stator in order to improve the motor efficiency.



Bench concept



Deformation measurement

Cetim design the test bench and realize the tests.

Green Automotive & e-mobility

- ▶ High speed high power e-powertrain test bench
 - For e-motors, reducers testing
 - Bench designed & optimized by Cetim
 - Located in Senlis
 - Power : 100 kW (250kW optional)
 - Modular battery simulator: 500 V
 - Tension, Intensity and DC/AC power measurement
 - CAN communication
 - Max speed : 15 000 rpm (25000 rpm optional)
 - Cooling system : water (5kW) & oil (20kW)



A modular bench dedicated to e-powertrain testing

Green Automotive & e-mobility

- ▶ Environnemental multiphysical testings on Automotive peripherals at 

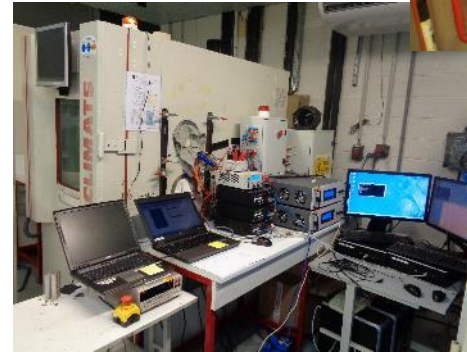
Functional test bench design & realization
Entire validation plan realization



Vibration test on power supply



Additional heating systems

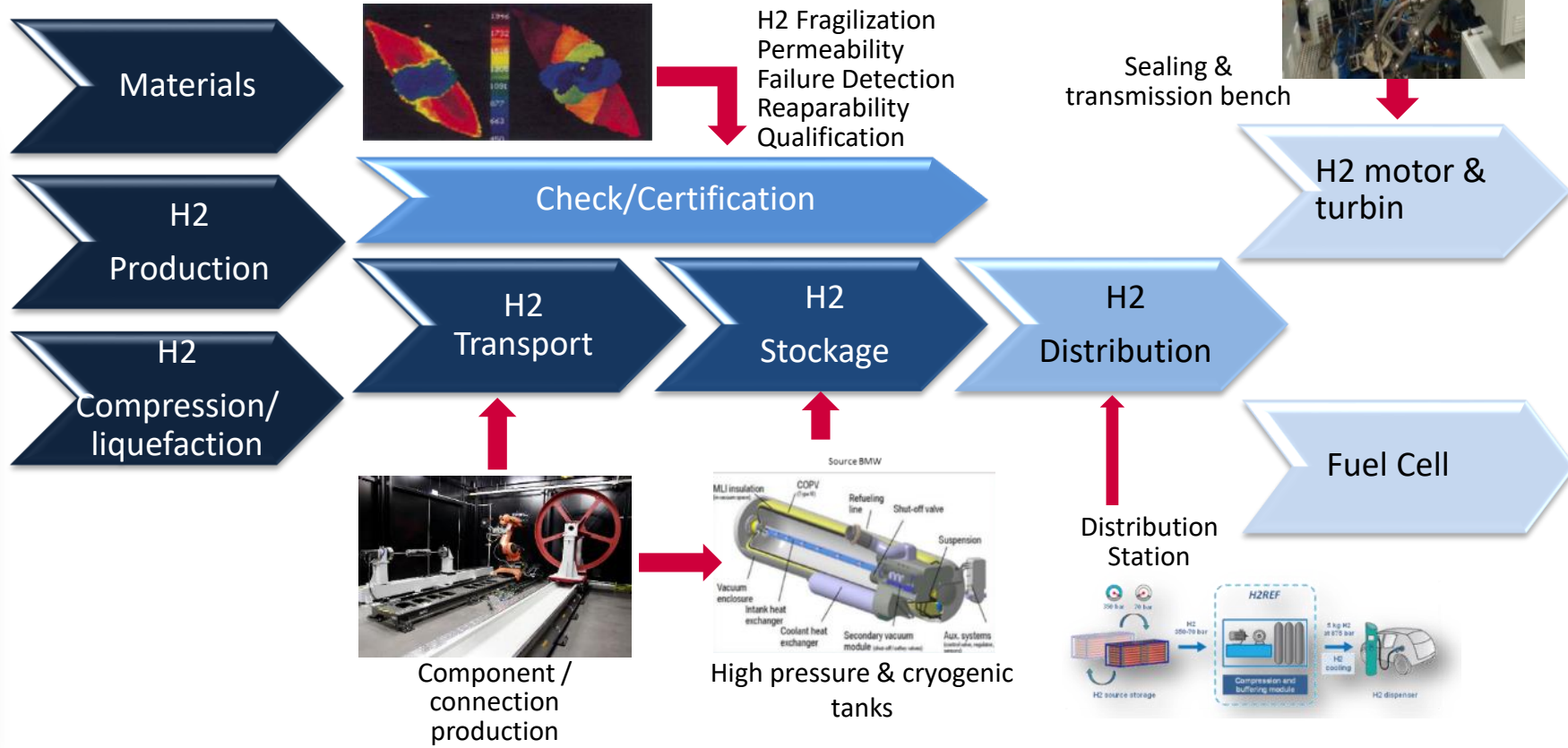


Combined climatic tests running under high voltage

Cetim design tailor-made benches for the power electronics & automotive thermal systems.

CETIM support in hydrogen development

- ▶ A multi-sector priority and across the entire value chain



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- ▶ Life time durability testing for chassis systems, battery packs...



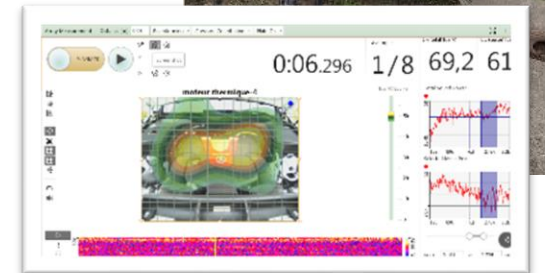
Life Quality on- board

“Perceived quality is more and more a selection key factor for car buyer !”



► How?

- NVH approach (testing and simulation),
- Sensory analysis of materials,
- Ageing test,
- Added Value thru industrial IOT (Comfort, safety...)

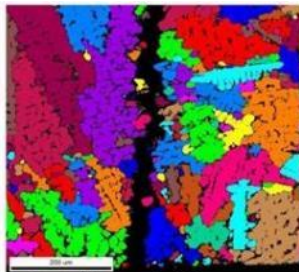


Raw materials: advanced characterization

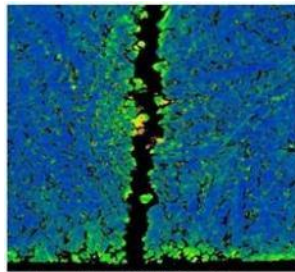
► 5 Electronic Scanning Microscopes

Possible analysis: EDS, WDS, EBSD

EBSD mapping, failure analysis

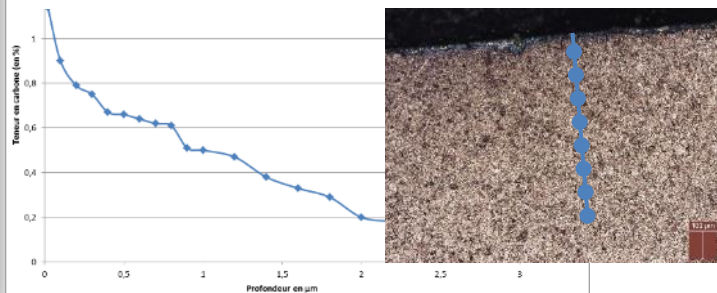


Cartographie de grain à 5°



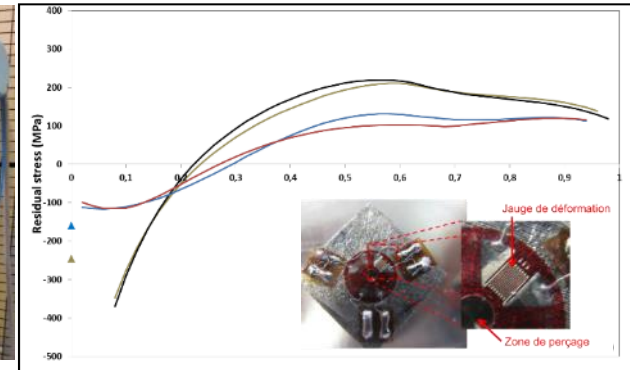
Cartographie de KAM 3° voisins

► WDS analysis: Carbon filiation



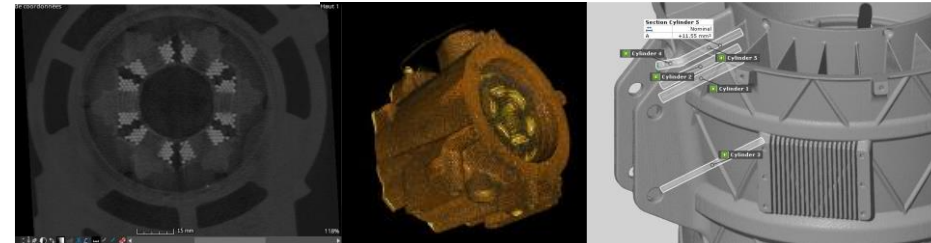
► Residual constraint measurement

DRX
Incremental drilling



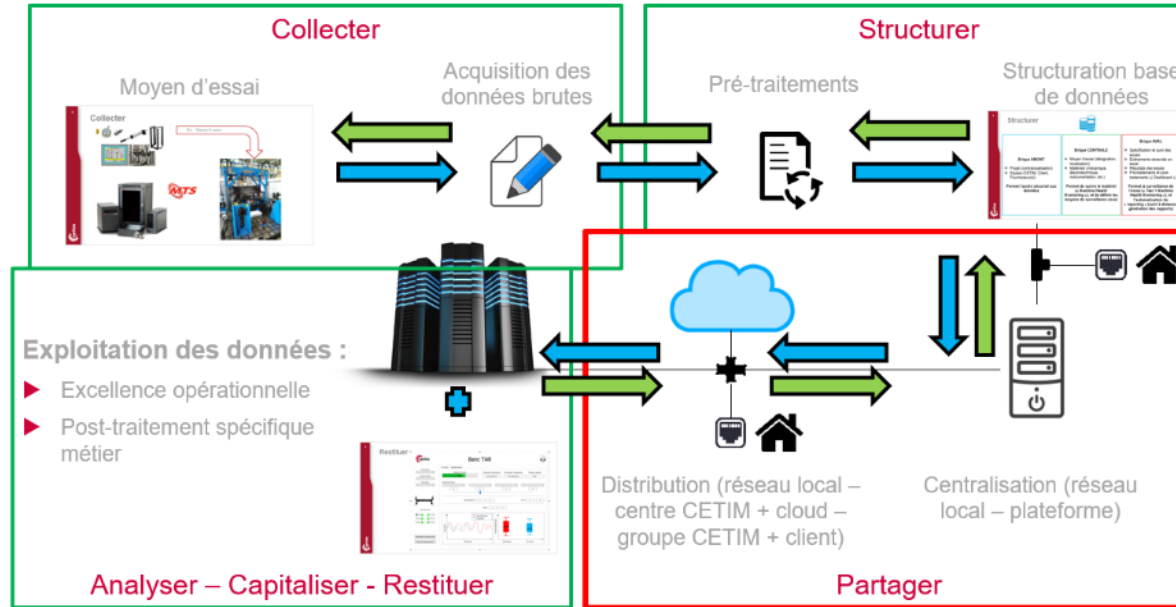
► Tomography

Failure detection: rotor / 3D print parts...



The factory of the future

► Smart testing: test benches digitalization



- ▶ Factories are also in transformation phase

Decarbonation of industries

Relocation, internalization ... needs of scanning and modeling (digital twin)

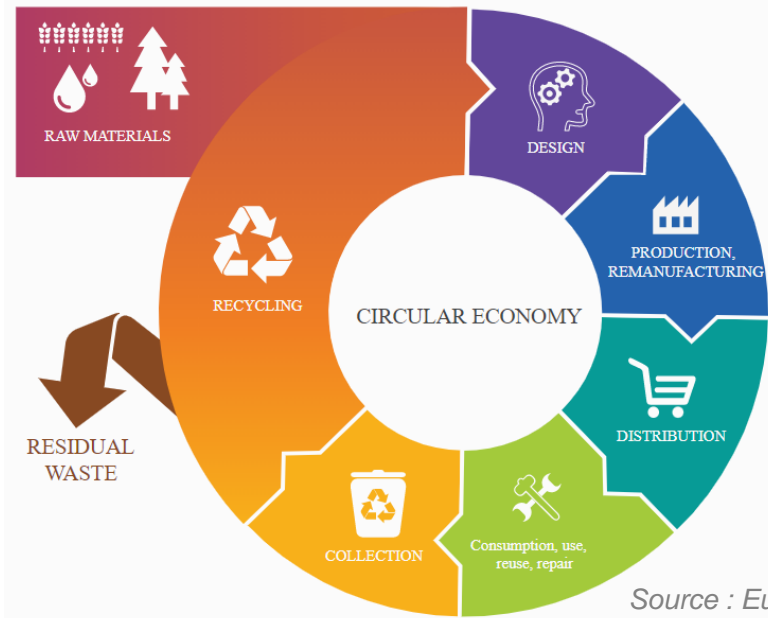
Lots of outsourcing of expert consulting as well (machining ...)



The next challenges: circular economy



- Reduce the dependance of raw materials and components availability
- Propose products & services aligned with social & environmental awareness
- Design differentiated solutions thanks to eco-innovation
- Consider new usages with smart mobility



Source : European Parliament



Cetim supports your approach in circular economy regarding the whole Life Cycle



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Visit our e-mobility testing facilities

