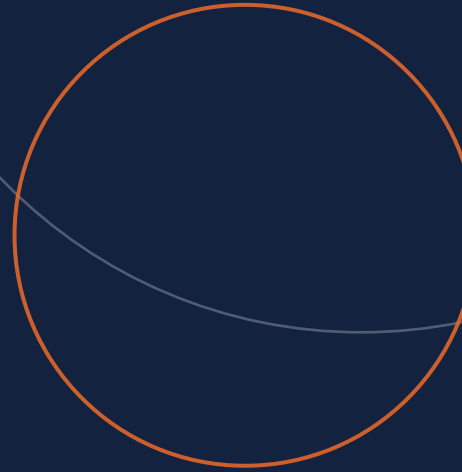


ELN

**CONFERENCE
SPAIN
2026**



6TH EDITION · 2026

ELN CONFERENCE SPAIN 2026

EUROPEAN LIGHTWEIGHTING NETWORK

Shaping Europe's lightweight future for sustainable mobility

7-8 OCTOBER 2026 · PALAU MACAYA · BARCELONA

ORGANISED BY



ORGANISED BY

The organisers



European Lightweighting Network

Brings together public
authorities to accelerate
lightweighting in Europe

european-lightweight.net



European Lightweight Cluster Alliance

Pan-European network of
industry hubs, research
institutions and
enterprises

elcanetwork.eu



ACCIÓ

Catalan Government
agency for business
competitiveness

accio.gencat.cat



Clúster MAV

The cluster driving
innovation in advanced
materials and
technologies in Catalonia

clustermav.com



Eurecat

The leading technology
centre of Catalonia

eurecat.org



Bax Innovation

Innovation consultancy ·
conference organisation
and ELCA secretariat

baxcompany.com

HELD ALONGSIDE



MAV Lightweight Expo

First edition · Rooms 3 & 4 · organised by Clúster MAV, Eurecat, ACCIÓ and BAX
Plus a B2B Brokerage Event in Rooms 5 & 6, via b2match

Organising Committee

The team behind the 6th ELN Conference

ELN CONFERENCE
SPAIN
2026



Riánsares López

ACCIÓ



Sofia Calvino

ACCIÓ



**Mª Eugenia
Rodríguez**

EURECAT



Ona Bombí

Clúster MAV



**Magdalena
Valldosera**

Clúster MAV



Ricardo del Valle

ELCA / BAX

Programme · Day 1

Wednesday 7 October 2026 · ELN Conference, Main Auditorium · Event moderator: Ona Bombí, Clúster MAV

ELN CONFERENCE
SPAIN
2026

08:30 *Registration*

09:00–09:20 **Welcome & Opening**

Joan Romero (ACCIÓ) · Boel Wadman & Nikolaj Zangenberg (RISE (SE) · DTI)

09:20–10:00 **Policy Session**

Moderator: **Riánsares López, ACCIÓ (ES)**

Julien Lecompgnon (BAM) · Alexander Pogány (BMIMI) · Johanna Scheper (BNN-ATIMA)

10:00 *Coffee break · foyer*

10:30–12:00 **Automotive I**

Moderator: **Katharina Schöps, RKW Sachsen (DE)**

Oriol Grau (BCIRCULAR) · Fabian Hofstätter (SAG Group) · Amaya Igartua (TEKNIKER) · Alberto Gómez (Ficosa)

12:00–13:30 **Aerospace**

Moderator: **Josep Costa, University of Girona (ES)**

Peter Glaser (FACC AG) · Christopher Wiednig (voestalpine AG) · Daniel Claret (Composites ATE) · Mate Gaal (BAM)

13:30 *Lunch · foyer*

14:30 *Afternoon: MAV Lightweight Expo, B2B meetings and Room 5 sessions (no auditorium sessions)*

IN PARALLEL TODAY

MAV Lightweight Expo

Rooms 3 & 4

All day

Brokerage Event

Rooms 5 & 6 · b2match

09:00–14:00 Rooms 5 & 6

14:00–18:00 Room 6 only

Room 5

Same space as Brokerage

14:00–15:30 Lightweight EU Project Workshop (ACCIÓ)

15:30–18:00 ELCA General Assembly (BAX)

Coffee breaks and lunch are served in the foyer next to the Main Auditorium.

Programme · Day 2

Thursday 8 October 2026 · ELN Conference, Main Auditorium · Event moderator: Ricardo del Valle, ELCA / BAX

ELN CONFERENCE
SPAIN
2026

08:30 *Registration*

09:00–09:30 **Welcome & Opening**

Welcome and opening of Day 2

09:30–11:00 **Railway**

Moderator: **Ignasi Gómez-Belinchón, IN MOVE cluster (ES)**

Francisco Javier Vallejo (IDEKO) · Jaime Casals (Refisa) · Robert Schlosser & Maximilian Denk (Leitz) · Stefanie Brickwede (Mobility goes additive)

11:00 *Coffee break · foyer*

11:30–13:00 **Automotive II**

Moderator: **Iker Arroyo, Eurecat (ES)**

Pierre Daniel (BTECH) · František Šimančík (IMMM-SAS) · Carlos Muñoz (Gestamp) · Herfried Lammer (HEAD)

13:00 *Lunch · foyer*

14:00–15:30 **Defence, Security and Dual-Use Technologies**

Moderator: **Stephany Rivero, AeroS Ecosystem (ES)**

Thomas Hipke (Fraunhofer IWU) · Manuel García (2M Engineering) · Samanta Simon (Airbus GeoTech) · Stanislav Landa (DTI)

15:30 **Closure of the conference**

IN PARALLEL TODAY

MAV Lightweight Expo

Rooms 3 & 4

All day

Brokerage Event

Rooms 5 & 6 · b2match

09:00–15:30 Rooms 5 & 6

15:30–17:30 Room 6 only

Room 5

Same space as Brokerage

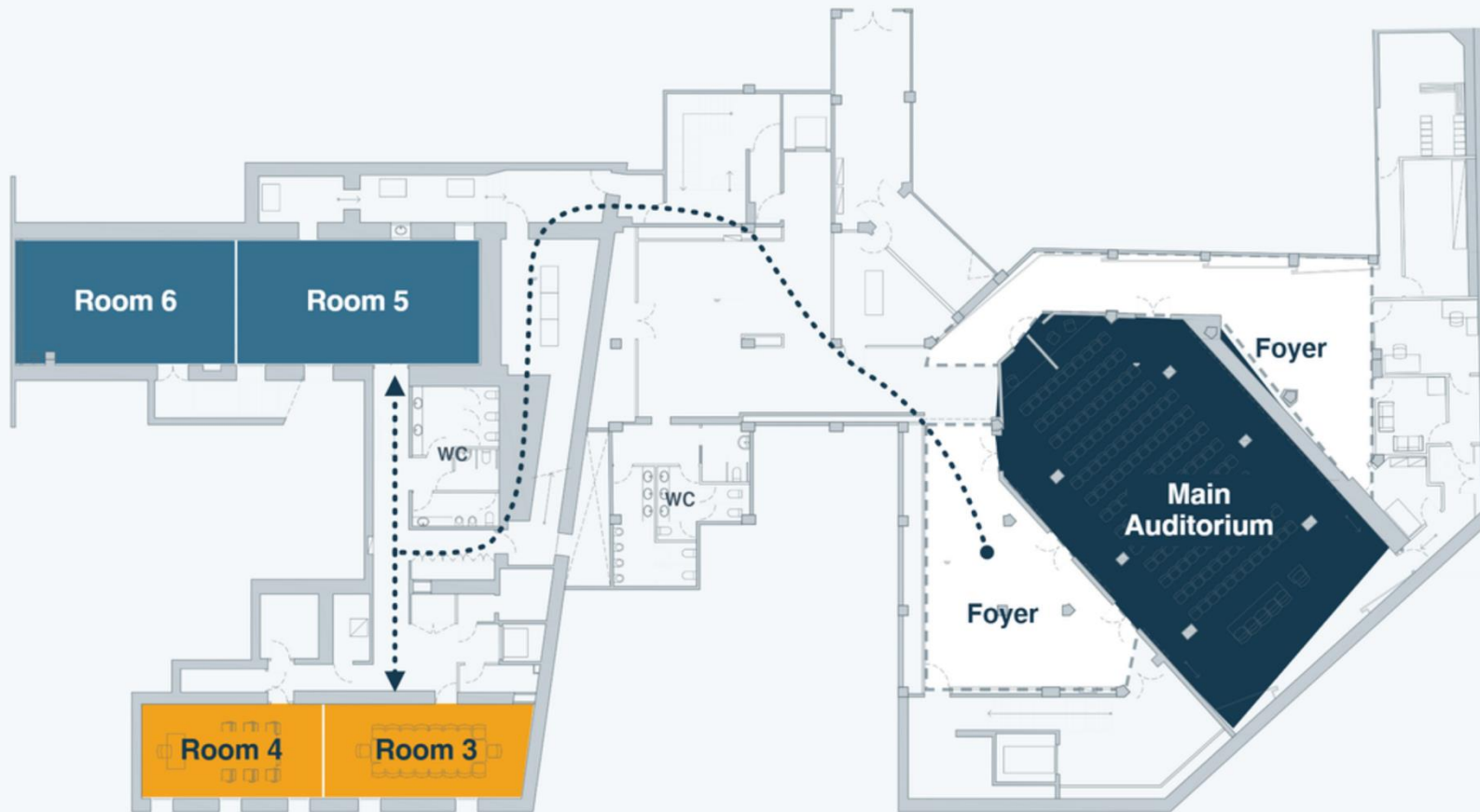
15:30–17:30 ELN Workshop (ELN members)

Coffee breaks and lunch are served in the foyer next to the Main Auditorium.

Venue · Palau Macaya

Passeig de Sant Joan, 108, 08037 Barcelona

ELN CONFERENCE
SPAIN
2026



WHERE TO GO

Main Auditorium

ELN Conference sessions

Rooms 3 & 4

MAV Lightweight Expo

Rooms 5 & 6

Brokerage Event · workshops in Room 5

Foyer

Next to the Main Auditorium · coffee breaks and lunch

PRACTICAL INFORMATION

Accreditation: Palau Macaya entrance hall

Wi-Fi: WIFI_PALAU_MACAYA

DAY 1 · WEDNESDAY 7 OCTOBER

Welcome & Opening

09:00 – 09:20 · Main Auditorium



EVENT MODERATOR

Ona Bombí

Clúster MAV (ES)

SPEAKERS

Joan Romero ACCIÓ (ES)

Boel Wadman & Nikolaj Zangenberg RISE (SE) · DTI (DK)

Welcome & Opening

7 October · 09:00 – 09:20 · Main Auditorium

ELN CONFERENCE
SPAIN
2026

PRESENTATION 1 OF 2



Joan Romero

Executive Director, ACCIÓ (ES)

Welcome



PRESENTATION 2 OF 2

Boel Wadman & Nikolaj Zangenberg

RISE (SE) · DTI (DK)

Opening

Welcome to the 6th ELN conference!

Promoting the potential of lightweighting to contribute to international sustainability goals, the European Green Deal



Short term



Medium term



Long term

Welcome to the 6th ELN conference!

Promoting the potential of lightweighting to contribute to international sustainability goals, the European Green Deal

Earlier ELN conferences:

ELN1 in Germany

ELN2 in Austria

ELN3 in Sweden

ELN4 in Belgium

ELN5 in Poland

ELN6 in Spain 2026

ELN7 in Denmark 2027



Short term



Medium term



Long term

ELN Vision, strategic goals & activities



Developing a European Lightweighting Strategy

- Builds on national processes and results
- Network countries are frontrunners in developing the strategical approach: concept paper
- Close cooperation with lightweighting R&D networks



ACTIVITIES

- Promoting the Advanced Materials Initiative IAM4EU
- Developing and aligning national Lightweighting goals

Co-creating a joint Research Agenda

“Lightweight for a Sustainable Future, a common vision for European and national activities”

ACTIVITIES

- Establishing joint calls to fund bi- or multilateral projects in lightweight technologies via dedicated EUREKA lightweighting call and ERA.NET call topic with lightweighting focus



Short term



Medium term



Long term

Lightweighting Satellite Accounting standard

What is the economic impact of lightweighting on employment, innovation, and gross national product?

ACTIVITIES

- The creation of a “Lightweighting Satellite Accounting Standard” to make the impact tangible
- Examples Austria, Germany and Sweden



Short term



Medium term



Long term

Arranging delegation visits

Fostering and enabling networking, cooperation and knowledge-sharing between companies and R&D institutes

ACTIVITIES

- Arranging delegation visits connecting research institutions, industrial partners and public authorities between the partner countries such as AT, BE, DE, CH, DK, ES, LUX, PL, SE, SI



Short term



Medium term



Long term

Promoting competences and knowledge transfer

Bringing partners together to enhance knowledge
and technology transfer - cross-sector, cross-
borders and cross-material

ACTIVITIES

- Improving knowledge transfer research to industry such as the Lightweighting-Atlas
- Submission of a COST Actions
(<https://www.cost.eu/>)



Short term



Medium term



Long term

**A European Lightweighting Strategy
provides a long-term vision for
lightweighting and serves as input to
policy decisions on a strategic level.**

Thank you

DAY 1 · WEDNESDAY 7 OCTOBER

Policy Session

09:20 – 10:00 · Main Auditorium



MODERATOR

Riánsares López

ACCIÓ (ES)

SPEAKERS

Julien Lecompanion BAM (DE)

Alexander Pogány Federal Ministry BMIMI (AT)

Johanna Scheper BNN-ATIMA (AT)

PRESENTATION 1 OF 3



Julien Lecompañon

Researcher, BAM (DE)

SELENE: A COST Action Proposal on Methodology Coordination Across the Lightweighting Lifecycle

07.10.2026

2026 COST ACTION: SELENE

SAFE AND SUSTAINABLE EUROPEAN LIGHTWEIGHTING
THROUGH EXCELLENCE, NETWORKING AND EXCHANGE

Dr. Julien Lecompanon

COST Action

What is it and what does it fund?



Focus of a COST Action project:

- Supports international research networking, not direct research funding
- Brings together researchers and innovators from different countries
- Focus on knowledge sharing, collaboration, and idea development
- Funds activities like workshops, meetings, training schools, and short-term exchanges
- 4 years standard duration

Structure of a COST Action project:

- Management Committee (2 members per country) as main governing body; appoints Chair, Vice-Chair and Working Group leaders
 - Independently operating Working Groups carry out the work
-

COST-Action 2026

Building on the 2025 groundwork

ELN5 workshop, June 2025

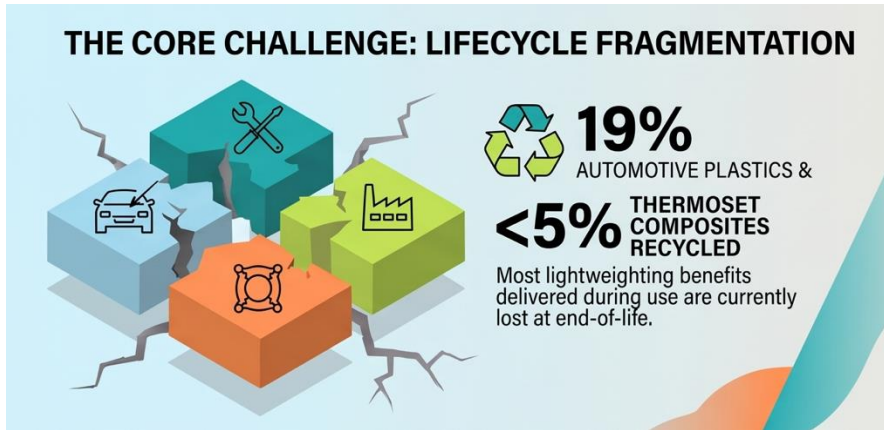
- First feedback from participants
- Working Group topics and networking discussed

Since then: project reorganized

- Restructured for the 2026 COST call
- Core team formed to build the proposal outline together
- COST Action anchored in ELN activities
- Feedback built into the new proposal



ELN Conference 2025 Krakow



A COST Action linking those who design, assess, make, inspect and recycle lightweight structures.

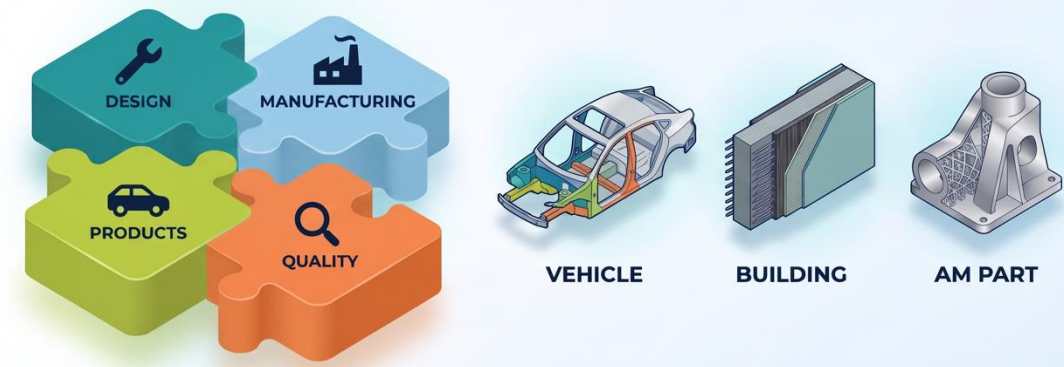
Problem: each lifecycle stage has its own terms, methods and data

Approach: 5 Working Groups compare methods on 3 shared use cases

Outputs: common terminology, LCA comparison rules, Digital Product Passport content etc.

Impact: input to CEN/ISO standards; training for young researchers

THE SELENE APPROACH



SELENE

Current network of proposers

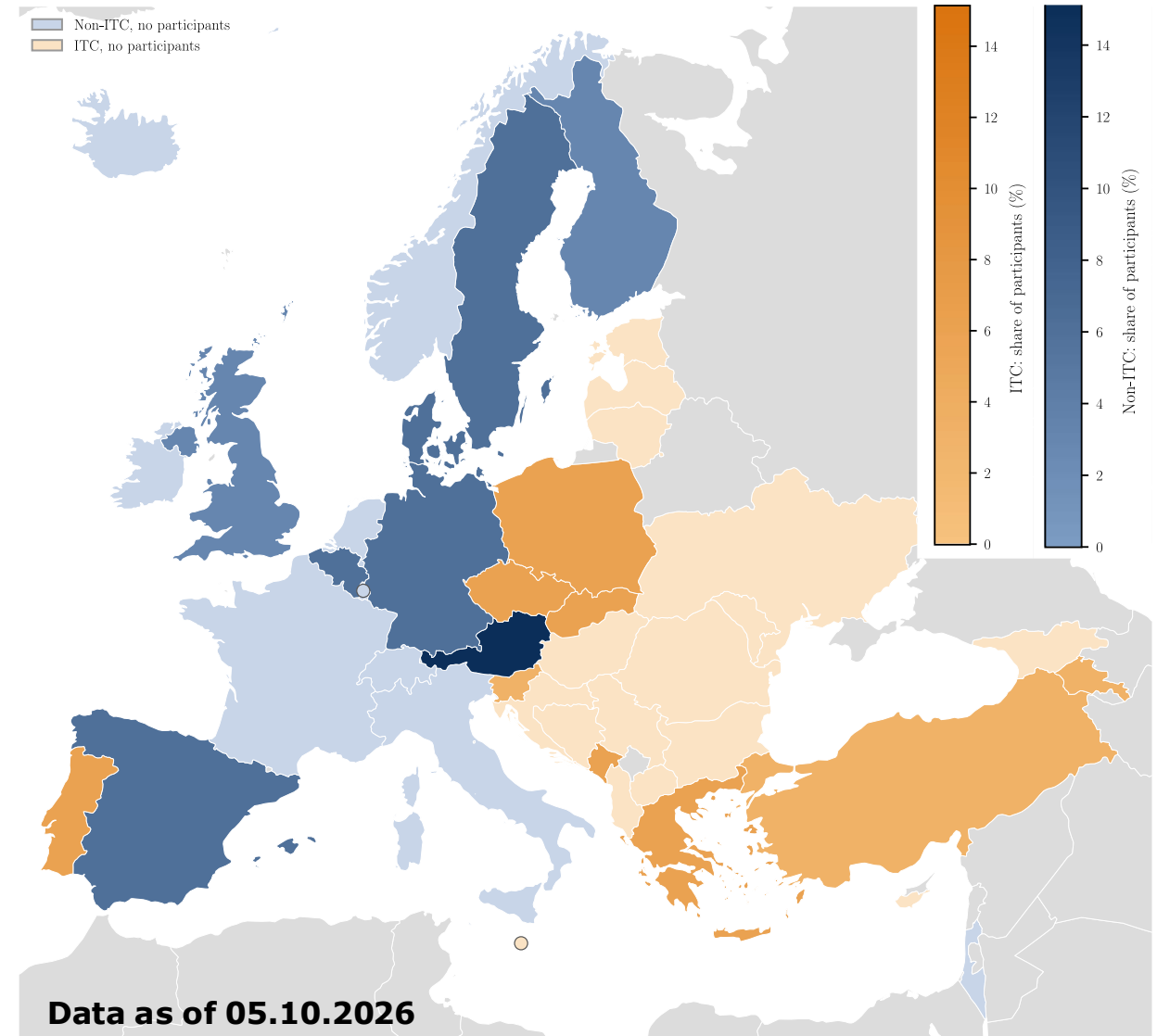
The network consists of

- **33 proposers**
- from **17 different countries**

and consists of

- **42.42% Young Researchers and Innovators.**

9 Inclusiveness Target Countries are part of the network (orange)



Sparked your interest?
Get in touch!

Dr. Julien Lecompagnon
julien.lecompagnon@bam.de



Get & Stay in Touch

Become part of the network



PRESENTATION 2 OF 3



Alexander Pogány

Federal Ministry for Innovation, Mobility and Infrastructure (AT)

Research Policy in Lightweight: Insights from Austria's Innovation Ministry

Research Policy in Lightweight: Insights from Austria's Innovation Ministry

ELN 2026 Barcelona, 7th October 2026

Alexander Pogány

Federal Ministry of Innovation, Mobility and Infrastructure

Department III/5: Digital and key technologies for industrial innovation

Austrian Industrial Strategy

- six goals and 117 measures aimed at bringing Austria into the top 10 of OECD countries in industrial production (Industrial Production Index) by 2035
- Fields of action:
 - Research, technology & innovation
 - Energy
 - Education, skilled workers & labour market
 - Circular economy, bioeconomy & transformation
 - Infrastructure, mobility & economic resilience
 - Europe & geopolitical challenges
 - Cutting red tape & ensuring finance



Key enabling technologies and „fields of strenght“



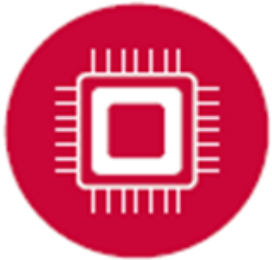
AI, Data



Quantum
technologies and
photonics



**Mobility
technologies**



Chips,
electronic
components
and systems



**Advanced
Materials**



Energy and
environmental
technologies



Advanced
Manufacturing
and robotics



Life science and
biotechnology

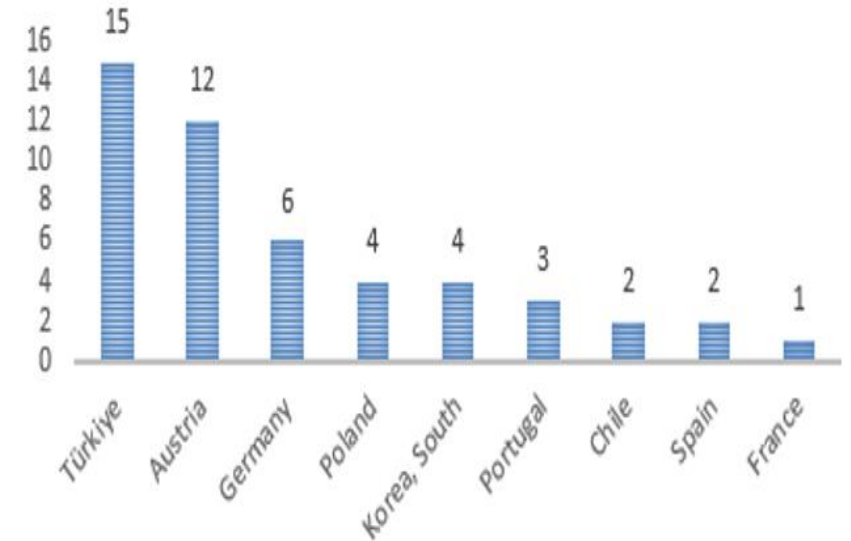


Space and
aviation
technologies

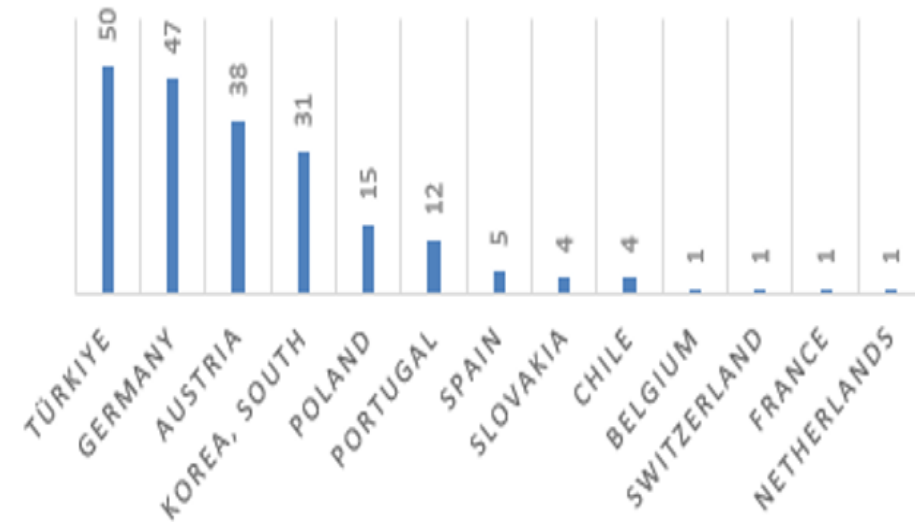
Eureka Lightweighting Calls

- 4. Eureka Lightweighting Call 2026 in preparation
- Increasing number of participating countries
- 5 applications (2023) – 30 application (2024) - 49 applications (2025)
- topics:
 - Circular Lightweight Design & Safe-and-Sustainable-by-Design
 - Next-Generation Lightweight Materials
 - AI-Driven Digital Lightweighting
 - Circular Manufacturing and Disassembly Technologies

APPLICATIONS PER LEAD COUNTRY



N° OF PARTNERS PER COUNTRY



Roadmap in
preparation

Austrian Advanced Materials Ecosystem: ATIMA

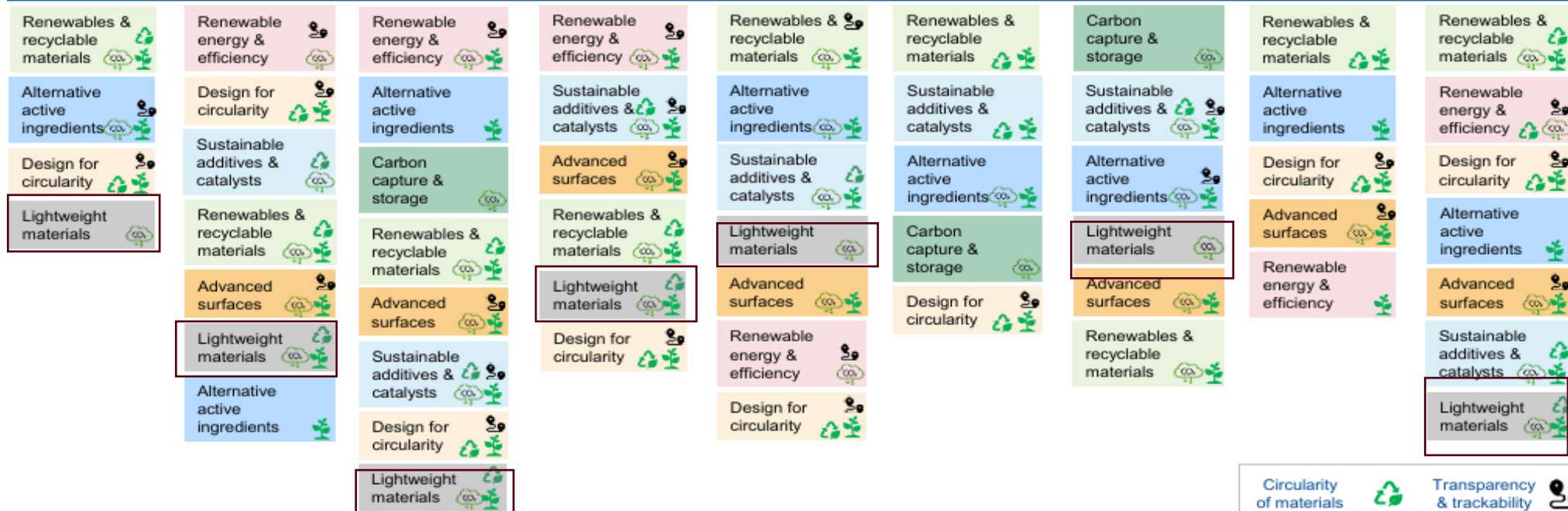


Materials 2030 Manifesto



New Technology & Innovation: resources and processes optimization (energy, production, performance increase), materials data, digital twins & passports, big database, AI, blockchain, mass customization, sensing, new biotechnology methods

New Policies: Harmonized norms & standards, certification schemes, Eco-label compliance on all products levels, insure sovereignty & EU autonomy, lifecycle assessment



Circularity of materials  Transparency & trackability 
Zero pollution & nonharmful  Climate contribution 

The future of European competitiveness

Part B | In-depth analysis and recommendations

„DRAGHI Report“

- **Increase funding and build new partnership for advanced materials.** Build on the initiative to boost EU industrial leadership in advanced materials^{xxiv} and ensure that EU funds effectively reinforce and steer investment in technology development and deployment through direct support, by mobilising private capital and by building on the new partnership with industry under Horizon Europe.

xxiv European Commission, Communication on Advanced Materials for Industrial Leadership, 2024.

KEY PRIORITIES FOR 2024

A European Green Deal

- European Wind Power Package
- 2040 climate target
- Initiative for water resilience

A Europe fit for the digital age

- EU Space Law
- Strategy on Space Data Economy
- Initiative to open up European supercomputer capacity to ethical and responsible AI start-ups

An Economy that Works for People

- EU Biotech and Biomanufacturing Initiative
- Follow up to the Val Duchaesne Summit
- Advanced Materials for industrial leadership
- Initiative on rules on the European Works Council

A Stronger Europe in the world

- Strengthen partnership with Africa
- European Defence industrial strategy

MISSION LETTER

Ursula von der Leyen
President of the European Commission

Commissioner-designate for Startups, Research and Innovation

Ekaterina Zaharieva

- Reflecting the growing importance and demand for advanced materials to support the competitiveness of European industries and the twin green and digital transition, you will work on an **Advanced Materials Act** to support the research and innovation process through to manufacturing and deployment.

Horizon Cluster 4/AT-funding about
€ 336 Mio. 2022-2025

Europäische Entwicklungen: Communication on Advanced materials for Industrial Leadership



The European Commission is preparing an Advanced Materials Act, a key legislative initiative scheduled for 2026. A key deliverable of the Competitiveness Compass, the future Advanced Materials Act will aim at establishing a strategic framework for advanced materials that is crucial for industrial leadership, strategic autonomy and competitiveness in the EU.

M-ERA.NET and IAM4EU Partnership

- 49 funding agencies and 25 european partners
- Budget volume 2026: € 40 Mio.
- Topics:
 - Materials for energy storage and distribution systems
 - Materials for energy conversion
 - Innovative surfaces, coatings and interfaces
 - Innovative functional materials with defined architectures
 - Materials addressing environmental challenges
 - Next generation materials for electronics
- IAM-I: SRIA - P#7 -IAMs for lightweight, durable and sustainable structural systems
<https://www.iam-i.eu/wp-content/uploads/2025/02/SRIA-Innovative-Advanced-Materials-for-Europe.pdf>



FP10: merge
M.ERANet with
IAM4EU??

Thank you?

Questions?

My contact dates:

alexander.pogany@bmimi.gv.at

mobile: +436648453355

PRESENTATION 3 OF 3



Johanna Scheper

Innovation Manager, BNN-ATIMA / InnoMatSyn (AT)

InnoMatSyn: Innovative Materials Ecosystem for synergies of regional, national and EU initiatives

Innovative Materials Ecosystem for synergies of regional, national and EU initiatives

Johanna K. Scheper, PhD, MBI

Science and Innovation

BioNanoNet Forschungsgesellschaft mbH

johanna.scheper@bnn.at



**Funded by
the European Union**

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement 101204218. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.



InnoMatSyn

Innovative Materials Ecosystem for Synergies of regional, national and EU Initiatives



**Our project
at a glance**

36

Months
duration

14

International
partners

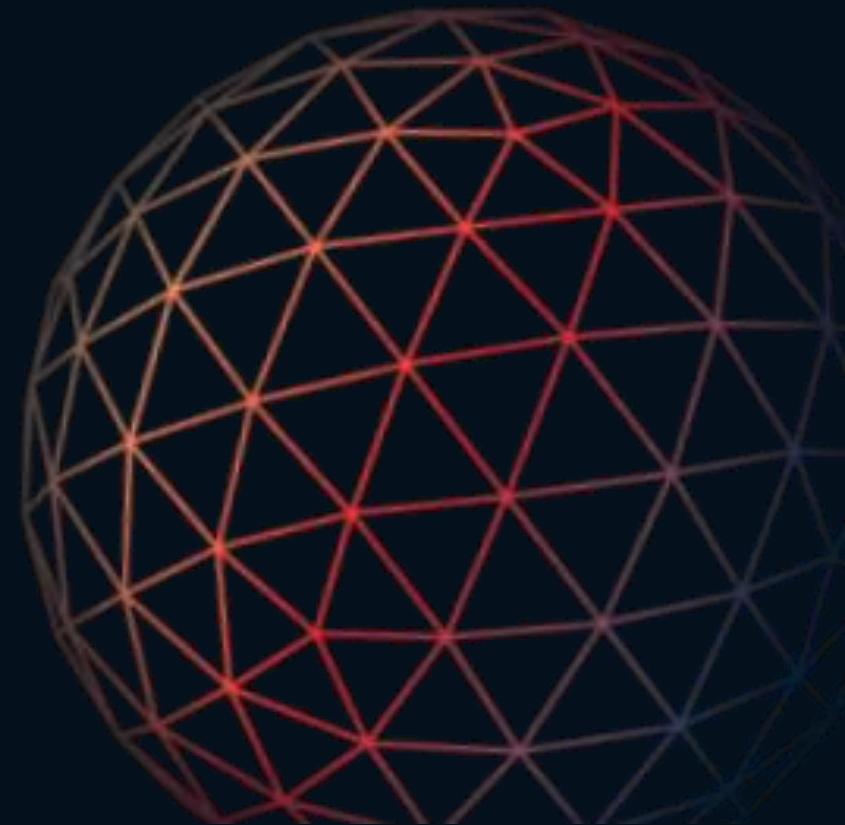
4

Mio. €
budget

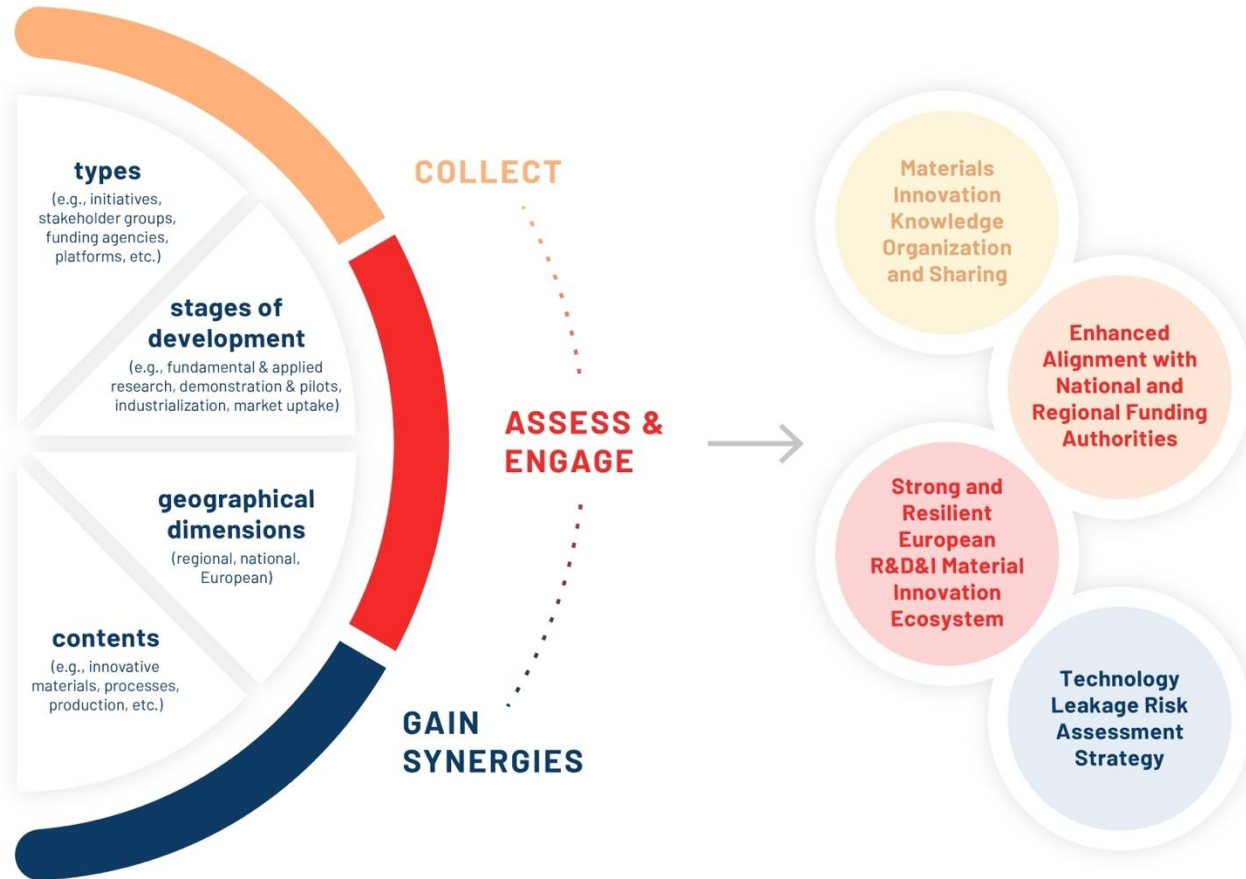
InnoMatSyn's Outcomes



- **A materials knowledge repository AI tool** to connect existing databases and identify needs & gaps.
- **Support to national and regional funding bodies** to co-develop joint calls (from 2027 onwards).
- **A resilient European R&D&I AdMa ecosystem** to facilitate cooperation among materials communities and actors.
- **Technology leakage risk assessment strategies** and operational guidelines to enhance EU sovereignty



InnoMatSyn's Impact



- **Sustainable innovation:** contribute to a resource-efficient R&D&I environment
- **Economic growth:** accelerate development of advanced materials, increase competitiveness, foster value chains.
- **Global leadership:** strengthen Europe's position in R&D&I for AdMa
- **Scientific impact:** develop low-carbon solutions, accelerate innovation

InnoMatSyn's Stakeholders



- It is based on a **collaborative movement**
- Stakeholders are **critical and key** for the success
- Based on a **transformative** stakeholder engagement strategy
- Turn a fragmented landscape into **a resilient innovation engine**



Connect Ecosystems

Bringing together stakeholders, networks, and initiatives to create a more coordinated and connected innovation landscape.



Accelerate Innovation

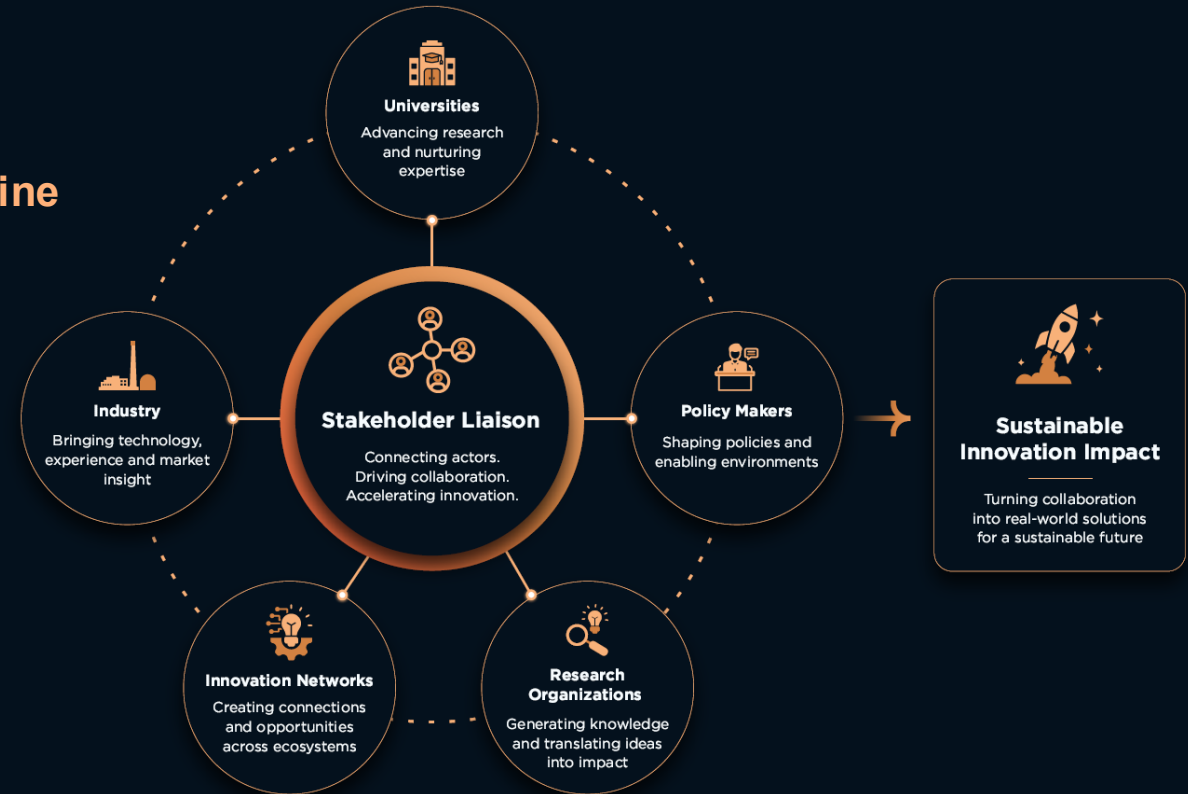
Supporting knowledge exchange and collaboration that helps innovative advanced materials move faster from research to real-world impact.



Strengthen Collaboration

Collaboration

Encouraging long-term partnerships between academia, industry, policy actors, and ecosystem communities.



Register as an InnoMatSyn stakeholder!

Are you involved in the advanced materials (AdMa) ecosystem, as a researcher, in production, working for a funding body or policy maker?

Contribute to open activities of the project – and get exclusive access to project results and activities that can benefit your organization – by registering!



InnoMatSyn's upcoming **FAME-Ecosys Events**



BNN Annual Forum | FAME-Ecosys-Austria & ATIMA-Event

FUTURE OF THE ADVANCED MATERIALS *IN EUROPE*

Austria boosting the translation and uptake of AdMa

17
November
2026 // Graz
Austria // Kunsthaus Graz
Space 04



FAME-Ecosys-Germany

9-10 of February 2027, Berlin

Will be announced soon!

ATIMA - Austrian interface of the European AdMa ecosystem



ATIMA

Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

FFG
Promoting Innovation
Funded by the FFG
(n° FO999919580).

**Mobilisation and
connection of national
stakeholders on the
topic of 'Advanced
& Innovative
Materials' in
Austria**



ATIMA Partners



ATIMA - Austrian interface of the European AdMa ecosystem



ATIMA Involved Platforms



- Generates a **strong multiplier effect** through established platforms **in strategically relevant sectors** and promising technology areas.
- Develops a **joint roadmap for Austria's future in innovative Advanced Manufacturing**, aligned with EU priorities.
- Addresses cross-sector **needs, challenges, and solutions**.
- Serves as an **incubator for industrial transformation**.
- **Strengthens Austria's visibility** within the European and global AdMa ecosystem.

Advanced materials as a key strategic technology field

9 Key Technologies and Areas of Strength:

1. AI & Data Innovation
2. Chips & Electronics Production
3. Technologies & Robotics
4. Quantum Technology & Photonics
5. Advanced Materials
6. Life Sciences & Biotech
7. Energy & Environmental Technologies
8. Mobility Technologies
9. Aerospace Technologies





Get in touch!

Johanna K. Scheper, PhD, MBI

BioNanoNet Forschungsgesellschaft mbH



www.innomatsyn.eu



InnoMatSyn



**Thank you for
your attention!**

PANEL DISCUSSION

Policy Session

7 October · 09:20 – 10:00 · Main Auditorium



MODERATOR

Riánsares López

ACCIÓ (ES)



Julien Lecompagnon

BAM (DE)



Alexander Pogány

Federal Ministry for Innovation, Mobility &
Infrastructure (AT)



Johanna Scheper

BNN-ATIMA (AT)

DAY 1 · WEDNESDAY 7 OCTOBER

Coffee break

10:00 – 10:30 · Foyer next to the Main Auditorium

We resume at 10:30 with Automotive I

Visit the MAV Lightweight Expo in Rooms 3 & 4

DAY 1 · WEDNESDAY 7 OCTOBER

Automotive I

10:30 – 12:00 · Main Auditorium



MODERATOR

Katharina Schöps

RKW Sachsen (DE)

SPEAKERS

Oriol Grau BCIRCULAR (ES)

Fabian Hofstätter SAG Group (AT)

Amaya Igartua TEKNIKER (ES)

Alberto Gómez Ficoso (ES)

PRESENTATION 2 OF 4



Fabian Hofstätter

Team Leader Product & Process Development, SAG Group (AT)

Rheocasting – A lightweight solution at hand

RHEOCASTING

Rheocasting – A lightweight solution at hand

6th European Lightweighting Network Conference
Barcelona | Spain
2026

Fabian Hofstätter | SAG New Technologies | Austria

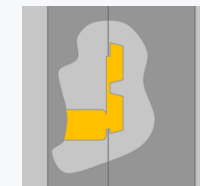
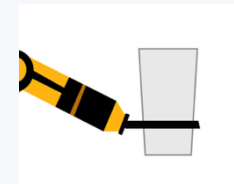
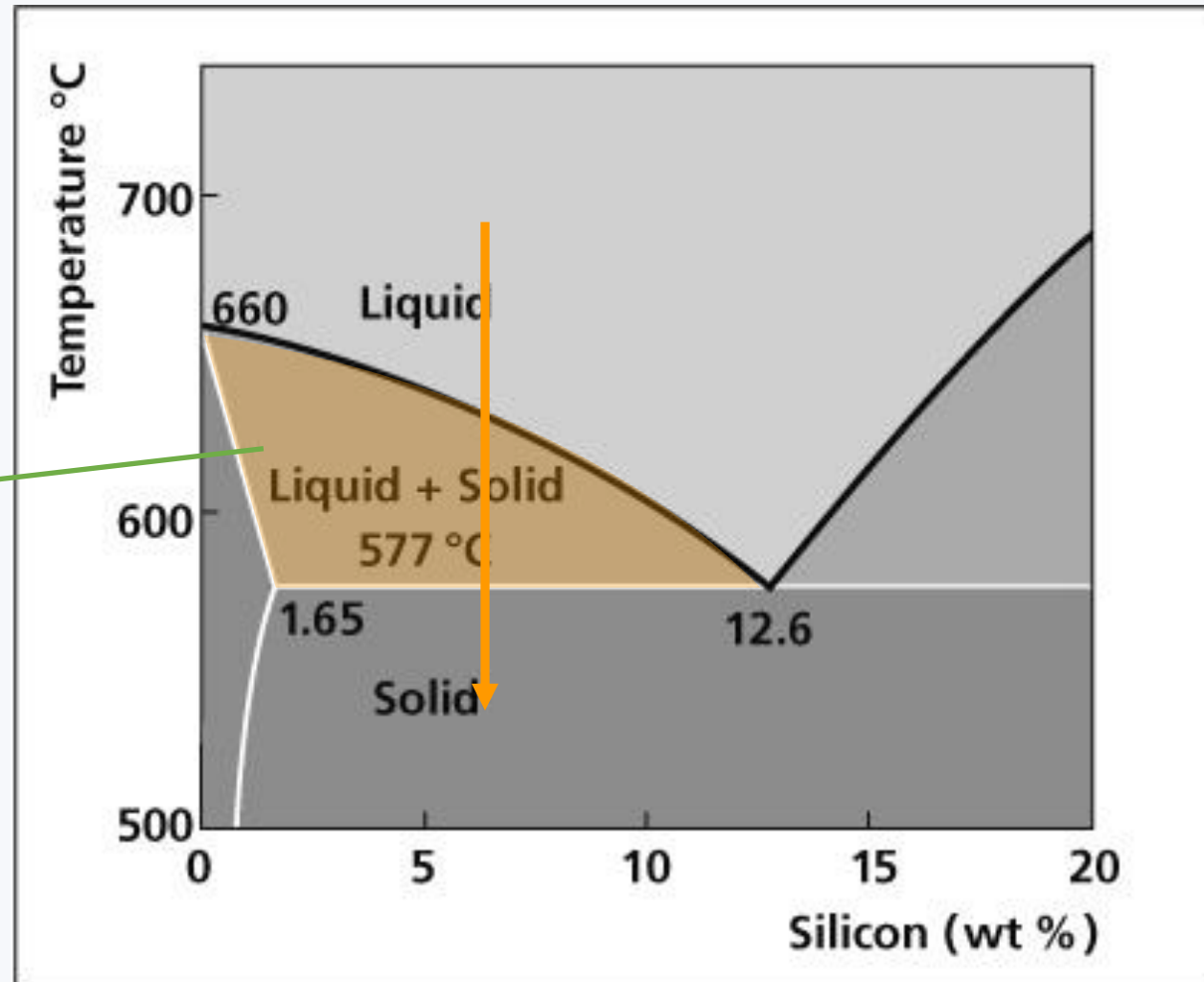
SAG Rheocasting | Component Lightweighting



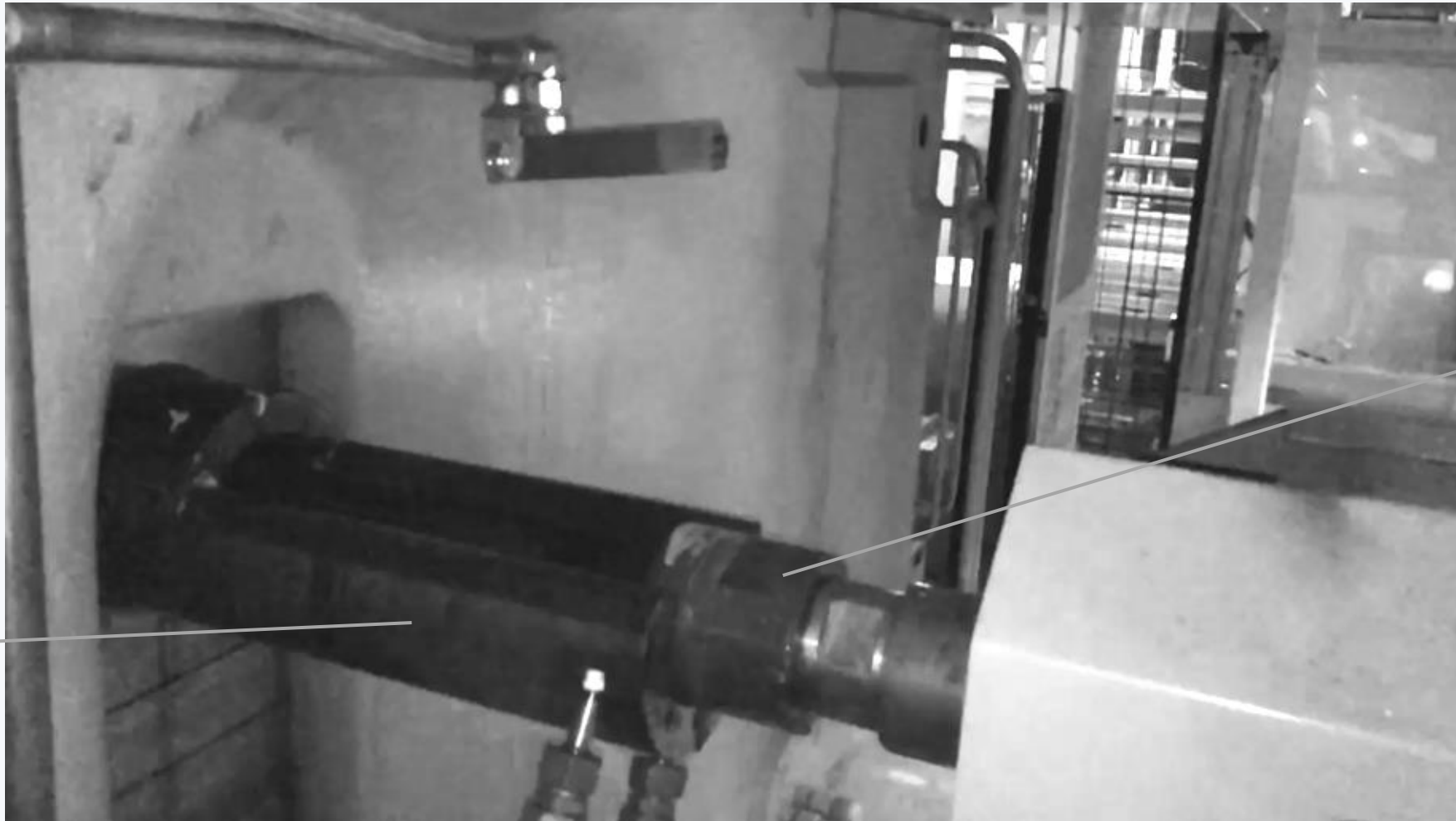
DRIVING
A LIGHTER TOMORROW.

Rheocasting

Rheocasting
process window



Rheocasting

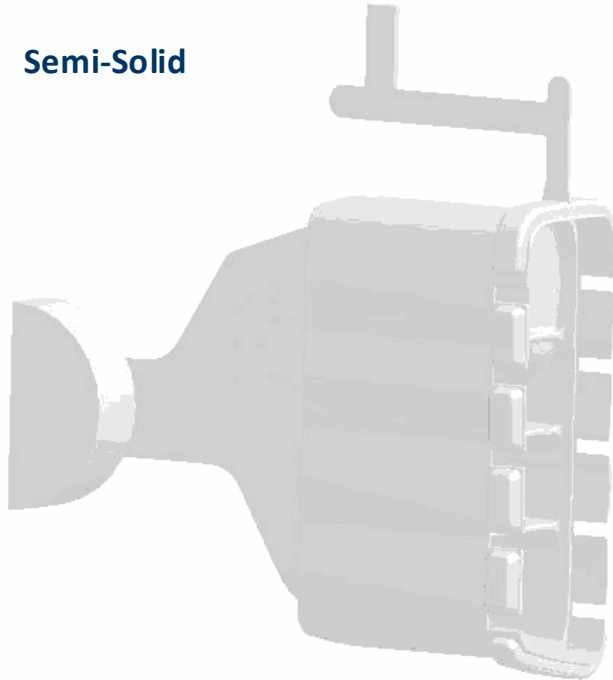


Shot
chamber

Casting
piston

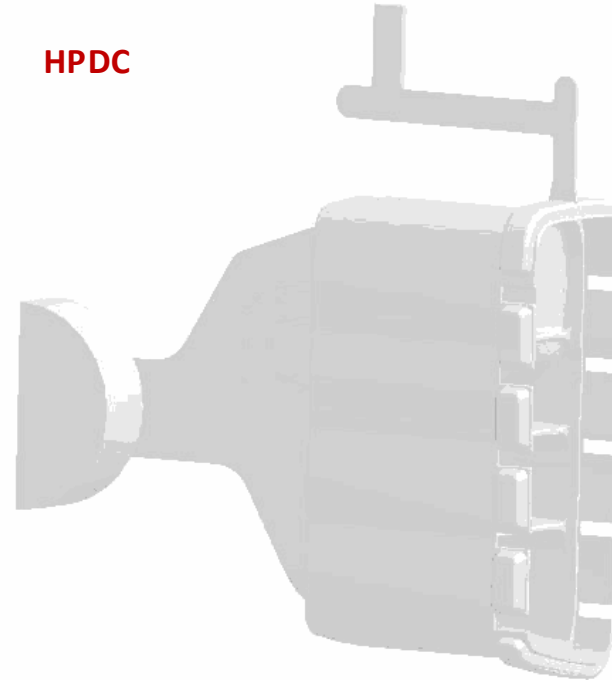
Rheocasting

Semi-Solid



Low temperature, low speed, high viscosity

HPDC



High temperature, high speed, low viscosity

RHEOCASTING

Lightweight construction potential at component level

5 COMPONENTS

10–61 %

Lightweight construction potential in series production



Casting node

Safety-relevant structural node with high design freedom



Series component

≈ -30 %

Weight saving

-1.1 kg

3.8 kg → 2.7 kg

PROS

● Weldable & resilient

Low porosity supports weldability and mechanical performance.

● Net Shape Design

Rheocasting 2.7 kg

HPDC 2.9 kg

Gravity casting 3.8 kg

● Lighter than alternatives

Rheocasting 2,7 kg

HPDC 2.9 kg

Gravity Casting 3,8 kg

B-Bracket / Engine Mount

Replacing the forging part with near-net-shape rheocasting



-20%

Weight saving

≈ -0.22 kg

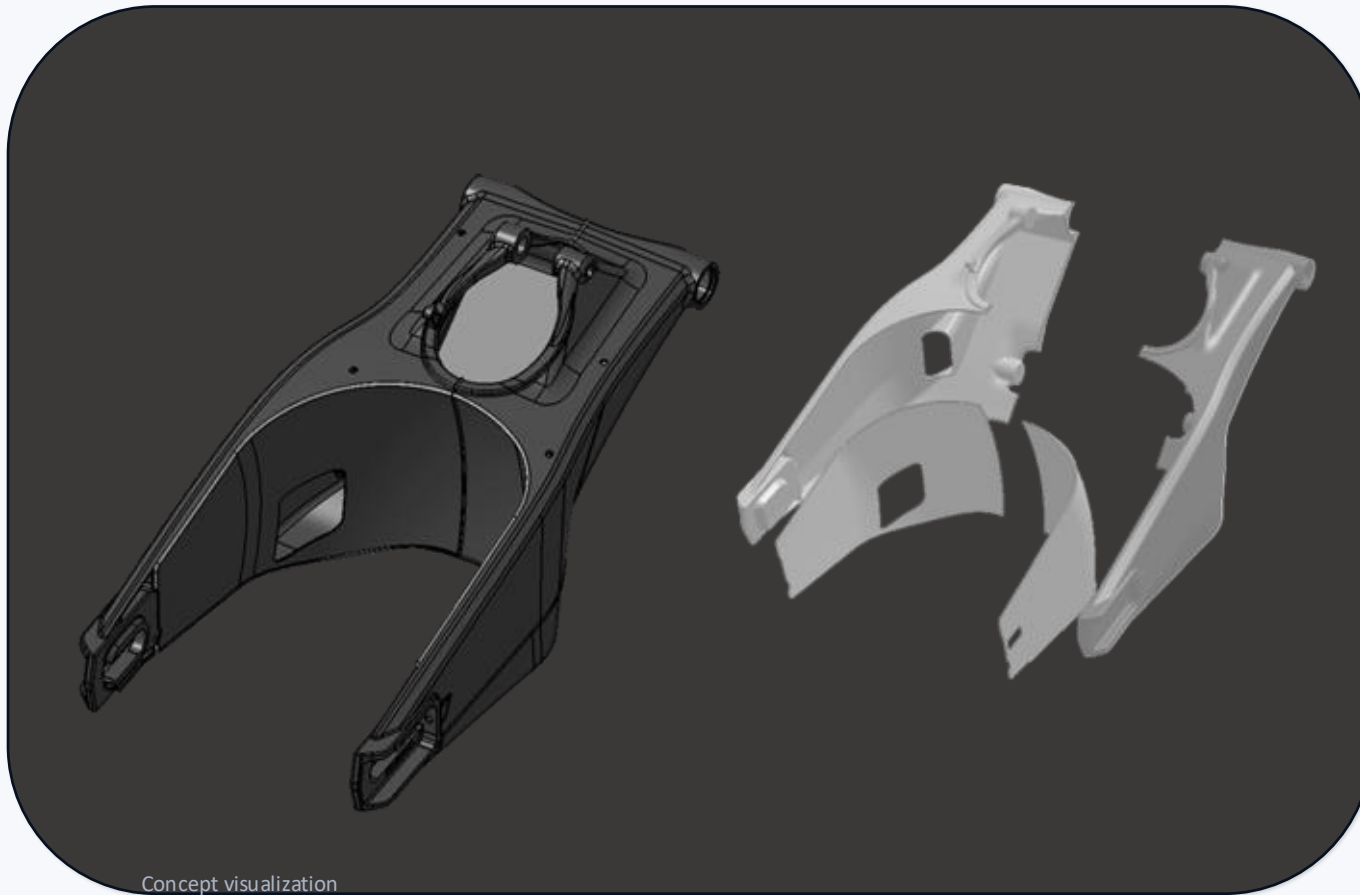
Rheocasting: 0.894 kg

PROS

- T6 capable**
High strength and elongation for use as an engine mount. Mechanical properties of an aluminum forging.
- Near-Net-Shape**
Functional surfaces can be produced without additional processing.
- Cost & Weight**
Semi-solid 0.88 kg compared with a 1.1 kg forging. No machining required. Four-cavity casting tool.

Swing Arm

Reduction of unsprung mass in safety-critical applications



-16.1%

Weight saving

-1 kg

6.2 kg → 5.2 kg

PROS

- **Dynamic advantage**
Less unsprung mass supports driving dynamics and comfort.
- **High component requirements**
Safety-critical, low porosity supports weldability and mechanical performance.
- **Integral Geometry**
Ribbs and bearing areas support stiffness where it is needed.

Rear Cabin Bracket

Replacing cast iron with aluminum rheocasting



–60.5%

Weight saving

–6.05 kg

10.00 kg → 3.95 kg

PROS

● Less machining

Rheocasting solution with proven higher fatigue strength than steel.

● Less editing

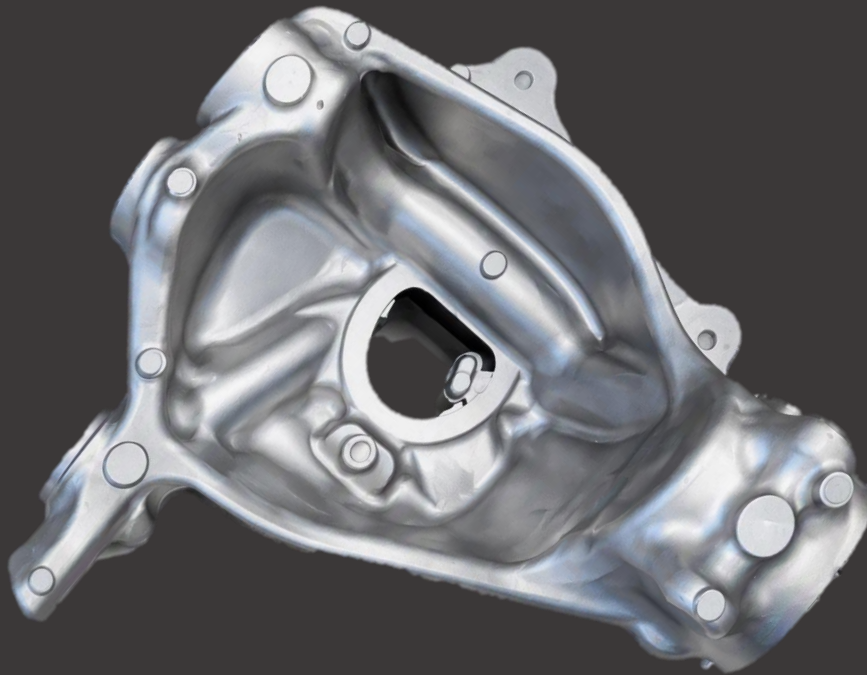
Reduced machining effort compared to LPDC components.

● Economical replacement

Structural component replaces a much heavier cast steel solution. Weight reduction 12 kg per vehicle.

Steering knuckle

Integrating a multi-part forging and milling solution into a functional component



–10%

Weight saving

–0.45 kg

4.5 kg → 4.05 kg

PROS

● Dynamic advantage

Less unsprung mass supports driving dynamics and comfort.

● High requirements

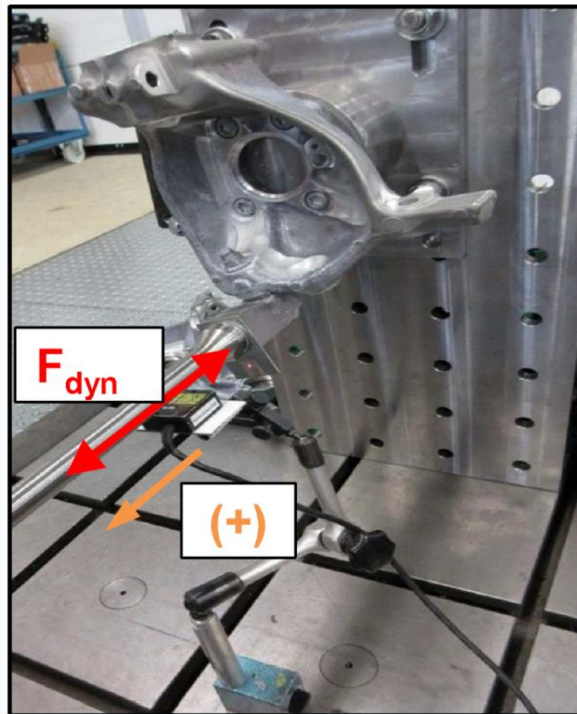
Safety-critical, low porosity supports mechanical performance.

● T6 capable

High strength and elongation for use as a swivel bearing.

Steering knuckle

Integrating a multi-part forging and milling solution into a functional component



Slewing crane:	Test force [kN]	Factor	Calculated load changes ¹⁾		Variance
			N _{min} (100,000)	N _{90%} (170,000)	
Steering knuckle in Y-direction (SK - Standard)	-5,0 ± 19,0	1,0	338.733	466.190	2,00
Steering knuckle in Y-direction (SK - HighEnd)	-5,0 ± 19,0	1,0	459.817	618.070	1,65
Steering knuckle in Y-direction (SK - Rheocasting)	-5,0 ± 19,0	1,0	2.242.480	2.672.999	1,53
Trailing leg in Y-direction (SK - Standard)	-2,0 ± 7,0	1,0	364.186	417.464	1,31

- Fatigue limit reaches up to **5 times** that of low-pressure die-cast parts
- Mechanical requirements are exceeded by up to **11 times**

400 kg

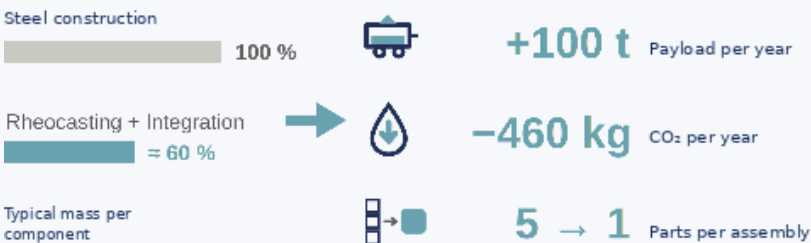
COMPLETE VEHICLE

Around 400 kg less.
Without a single extra kilometre.

WEIGHT REDUCTION PER VEHICLE ZONE

01 Cab structure	-45kg
02 Chassis & frame	-75kg
03 Air & Brake	-30kg
04 Thermal Management	-25kg
05 Energy storage	-105kg
06 Bodies	-40kg
07 Trailer	-80kg

TOTAL **~-400 kg**



**ONE VEHICLE.
MULTIPLE OPPORTUNITIES.**

WEIGHT POTENTIAL

-400 kg

≈40%

Typical reduction: 230–585 kg

vs. steel equivalent

CALCULATION EXAMPLE (40 t semitrailer, 250 loads/year, 8 years)

Weight reduction	More charge p.a.	More charge 8 years	Fleet 100 vehicles.
-400 kg	+100 t	+800 t	+80,000 t

WHAT THIS MEANS FOR YOU

- 230–585 kg per combination
- +100 t freight per year
- +800 t over 8 years
- ~160–190 l diesel/year
- ~420–505 kg CO₂/year
- 100 vehicles: +80,000 t

YOUR BENEFITS

- ▲ Higher payload
- Casting + Assembly
- ▣ Fewer part numbers
- ◆ Prototype to large-scale production

VALUE

Let's transform
the industry
by increasing
value together!



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Rheocasting Team Lead
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SAG | RHEOCASTING



DRIVING
A LIGHTER TOMORROW.

PRESENTATION 3 OF 4



Amaya Igartua

Coordinator of Materials Initiatives, TEKNIKER (ES)

High performance light alloys for automotive applications

“High performance lightweight materials for automotive applications”

2026| Fundación **Tekniker** | EIBAR |

Amaya Igartua; Raquel Bayon, Patricia Fernandez, Sophia Alves, Esther López
amaya.igartua@tekniker.es





Content

- 1. TEKNIKER
- 2. Automotive lightweighting challenges
- 2. Lightweight Materials Landscape
- 3. Aluminium alloys for automotive applications
- 4. Plasma Electrolytic Oxidation (PEO)
- 5. Conclusions

WHO ARE WE

Technological centre

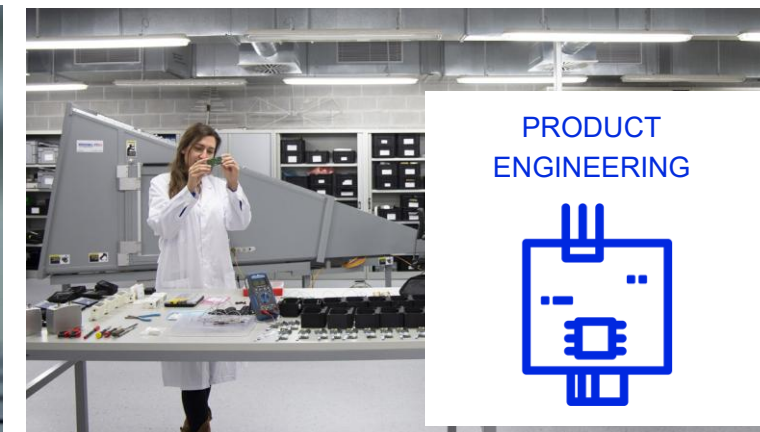
Non-for-profit Private foundation

Since 1981– Applied Research.
45 years

Mission: to deliver growth and wellbeing to society at large via R&D&I and to further the competitiveness of the Business fabric in a sustainable manner.

Main focus: **Materials and Manufacturing**

Research Areas



1. Automotive lightweighting challenges

Key industry drivers

- ◆ Vehicle electrification
- ◆ CO₂ emissions reduction
- ◆ Extended driving range
- ◆ Energy efficiency improvement
- ◆ Sustainability and circular economy



Weight reduction remains one of the most effective approaches to improve vehicle efficiency and **reduce lifecycle emissions.**



2. Lightweight Materials Landscape



- Comparison of major material families

Material	Density (g/cm ³)	Specific Strength	Cost	Automotive Maturity
AHSS Steels	~7.8	Medium	Low	Very High
Aluminium Alloys	~2.7	High	Medium	Very High
Magnesium Alloys	~1.8	High	Medium-High	Medium
Titanium Alloys	~4.5	Very High	Very High	Low
CFRP Composites	~1.5	Extremely High	Very High	Medium

Aluminium offers a very Good compromise between performance, cost and industrial scalability.



3. Aluminium alloys for automotive applications

Why Aluminium for Automotive Applications?

Main advantages

- Up to **60% weight reduction** compared with conventional steels
- Excellent **strength-to-weight ratio**
- Acceptable **corrosion resistance**
- **Fully recyclable material**
- Mature **manufacturing technologies**
- Suitable for large-scale production

Typical applications

- Body-in-white structures
- Battery enclosures
- Suspension systems
- Crash management systems
- Thermal management components

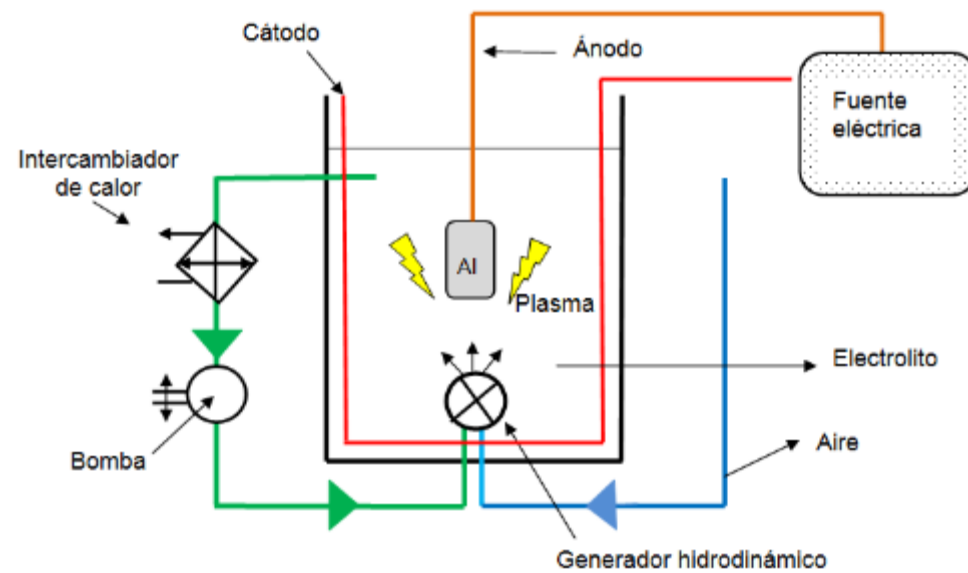


Despite its advantages, aluminium components often require *surface engineering solutions* to overcome wear, corrosion and functional limitations.



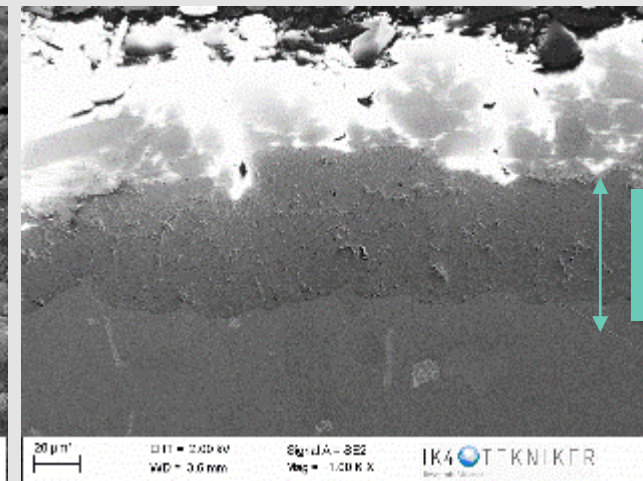
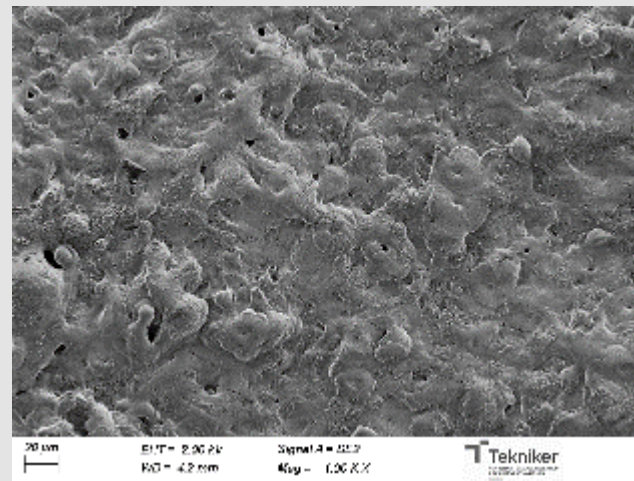
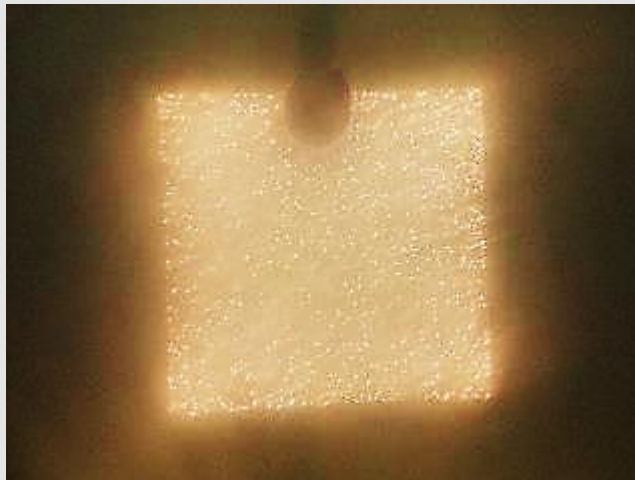
PLASMA ELECTRO
OXIDATION (PEO)
COATINGS

4. Plasma Electrolytic Oxidation (PEO)



Plasma electrolytic oxidation (PEO)

- High-voltage electrochemical process
- Ceramic oxide coatings developed on metallic surfaces
- Great versatility
- Aqueous-based alkaline electrolytes
- Eco-friendly



PEO coating

Facilities and equipment



- Pulsed DC power supply.
- Commercial equipment from Keronite
- Maximum power of 20 kW
- Maximum tank capacity 50 L
- **Able to treat Al, Ti, Mg at laboratory scale**

Facilities and equipment



Semi-Industrial installation with new power supplies

Chiller for electrolyte cooling



Three tanks with capacities of 5, 50 and 150 litres.



bipolar pulsed power supplies.



Comparison between PEO and anodizing

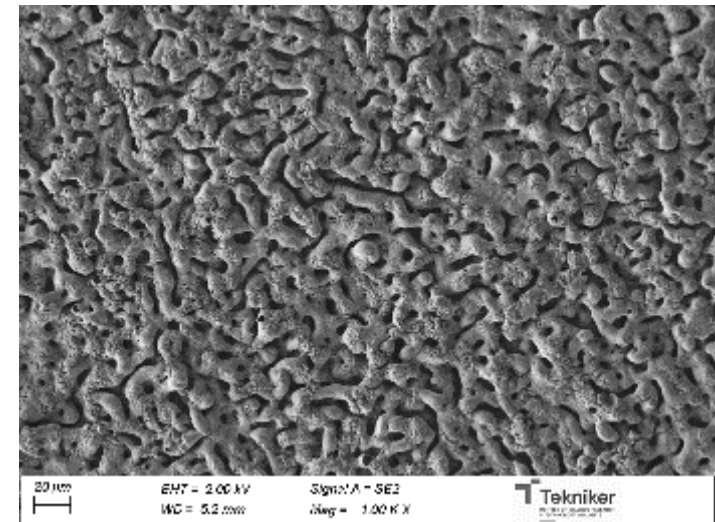
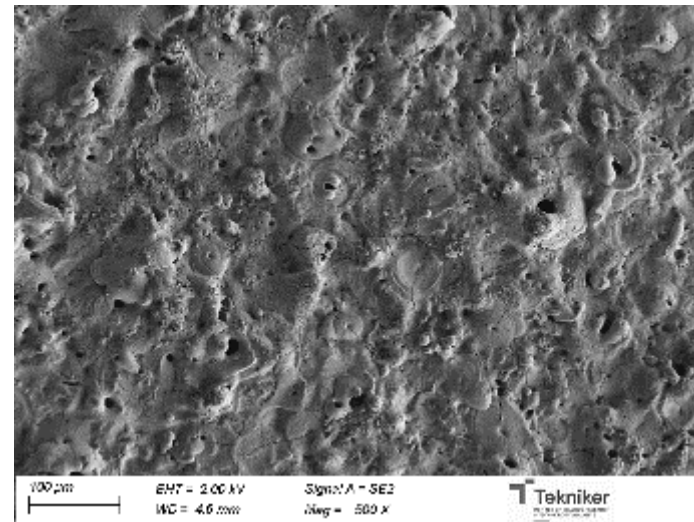


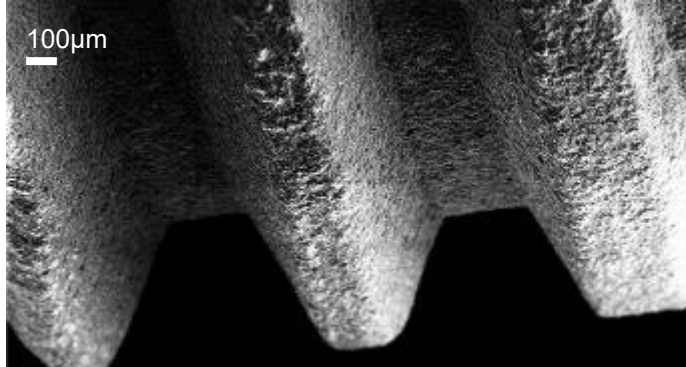
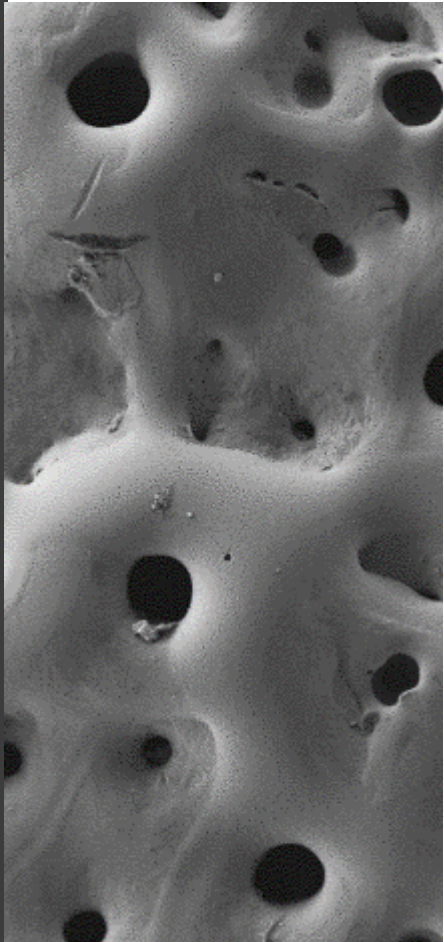
VARIABLE	ANODIZING	HARD ANODIZING	PEO
Pre-treatment	Critical		Not necessary
Electrolyte	Acids (sulphuric, chromic, nitric...)		Alkaline
Potential	10 - 50 V	20 - 120 V	Higher than breakdown voltage
Current density	Low: $<10 \text{ A} \cdot \text{dm}^{-2}$		Medium-High: $5\text{-}25 \text{ A} \cdot \text{dm}^{-2}$
Metallic substrate	Critical	Medium	Great versatility
Adhesion	Good	Moderate	Very good
Time	Moderate: 10-60 min	High: 30-120 min	Low $< 10 \text{ min}^*$
Coating growth rate	Low: $< 1 \mu \cdot \text{min}^{-1}$	Medium: $1\text{-}3 \mu \cdot \text{min}^{-1}$	High: $1\text{-}5 \mu \cdot \text{min}^{-1}$
Microstructure	Amorphous		Amorphous and crystalline
Energy consume	Low	Medium	Medium
<i>Eco-friendly</i>	No	No	Yes



Properties of PEO coatings

- Tribological
 - High hardness
 - High wear resistance
- Anti-corrosion resistance
- Tribocorrosion resistance
- Chemical stability
- Thermal and electric isolation
- High dielectric resistance





Industrial sectors for PEO



Engine components: pistons, liners....
Cases
Brake systems: discs, calipers...



Optical devices
Valves, actuators...
Cases



Implants
Prosthesis
Stents



Irons, friers...
Ceramic brushes, straighteners and curling irons...
Bikes
Phone cases



Lightweighting
Remediation of polluted water

Offshore, Textil, Defense, Oil & Gas

Multifunctional PEO coating on cast Al-Si



Cast aluminium-silicon (Al-Si) alloys

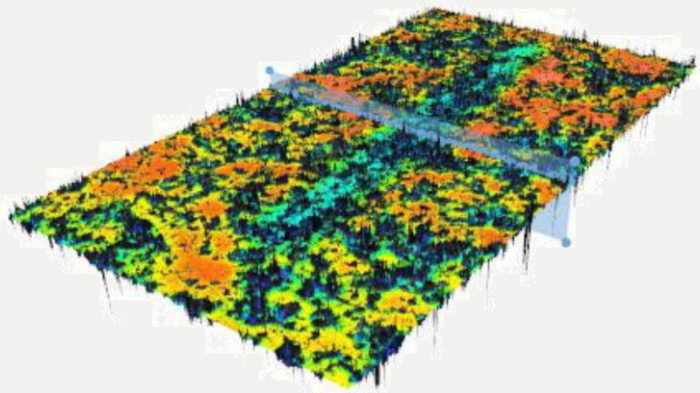
Non-ferrous alloys most widely used in automotive applications

Advantages

- High strength-to-weight ratio
- High electrical conductivity
- Low expansion coefficient
- Proper mechanical properties
- Low cost
- Lighter vehicles → Reduction of CO₂ emissions

Disadvantages

- Low wear resistance
- Limited corrosion resistance
- NON-treatable through anodizing (due to ↑Si%)



Improvement of cast Al-Si alloys throughout PEO technology

Objective

Multifunctional PEO coatings developed on cast Al-Si alloys, including secondary alloys and high Si contents

Capabilities - Tekniker

- Formulation of novel electrolytes
- Multivariable optimisation of the process parameters
- Basic and advanced characterization:
 - Tribological tests
 - Corrosion tests
 - Tribocorrosion tests

Patented results

(Spanish Pat. Trademark Off.: P202130312, P202230276)

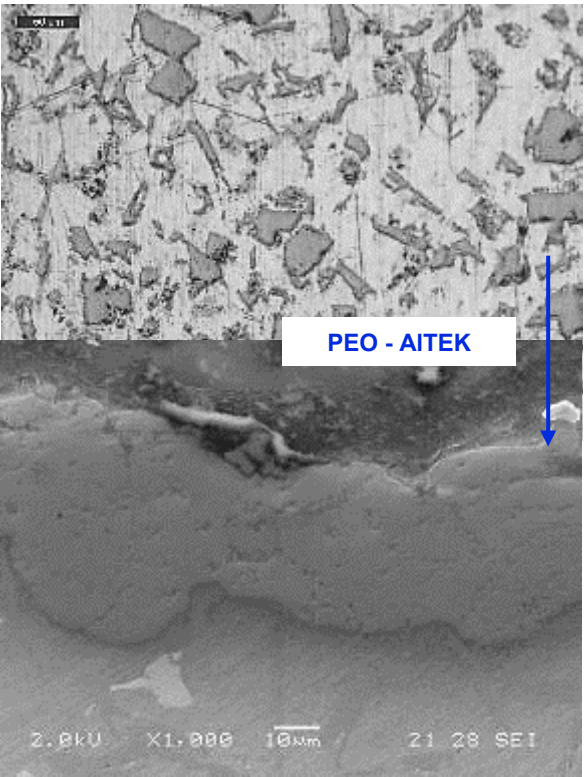


Development 2
PEO coatings on
engine cylinder liners

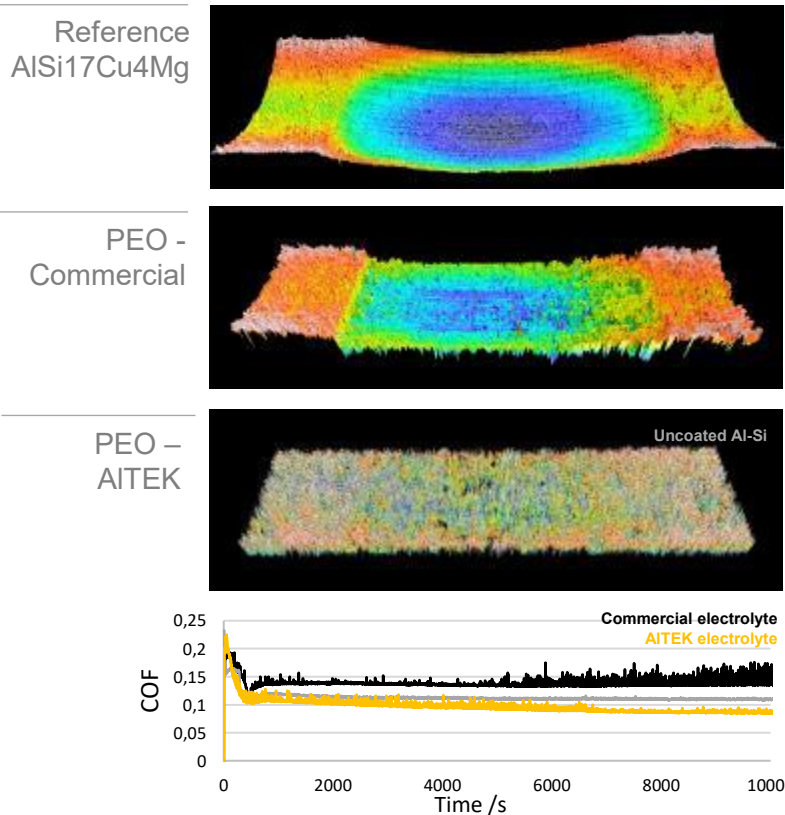
- Alloys with high silicon content
- **Development of novel electrolytes**
- **Competitive against cast iron liners**



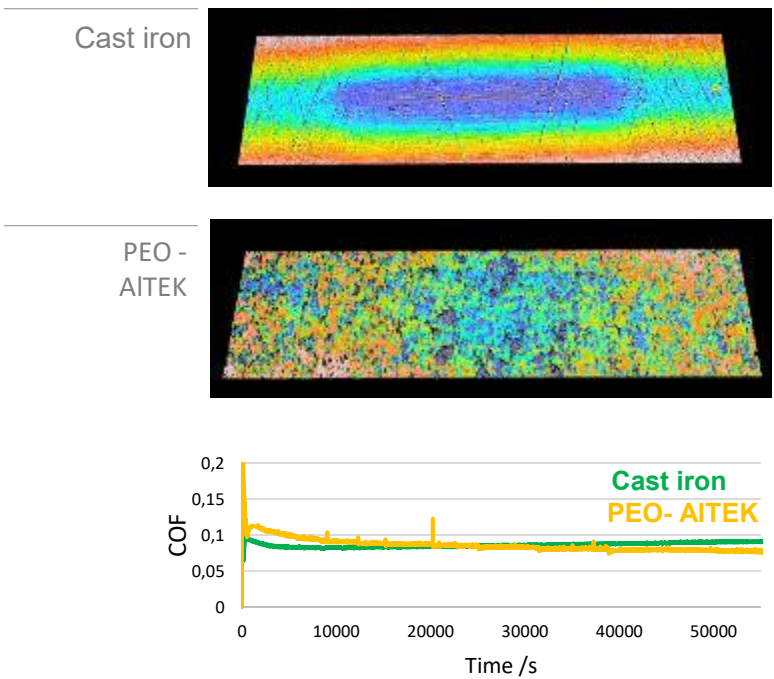
Cast Al-Si (AlSi17Cu4Mg)



Electrolytes: Commercial Vs. AITEK



Cast iron Vs PEO-AITEK

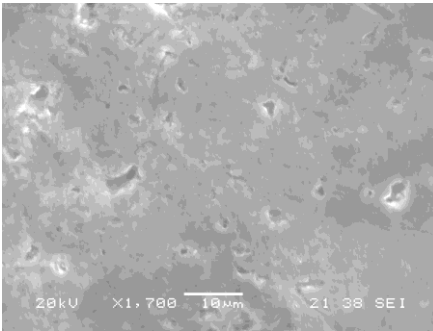




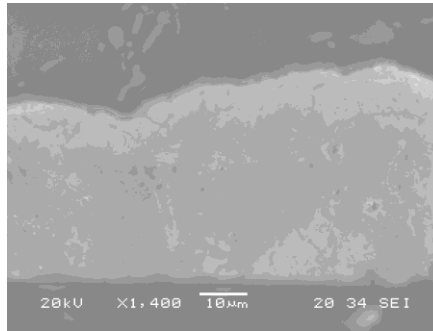
Development 2 PEO coatings on engine cylinder liners

- Al-7Si alloys
- Conventional electrolyte
- Competitive **against HVOF coatings**

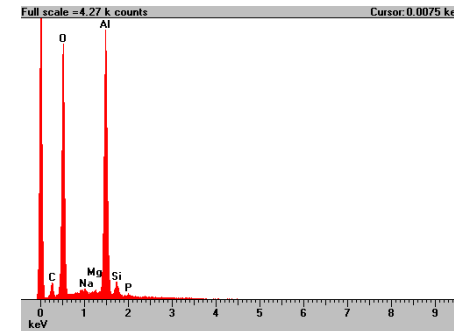
- **PEO coatings for corrosion tests:** A thick plasma electro oxidation coating was applied on polished Al-7Si alloy.



Outer porous layer



Thick and dense inner layer



Film mainly composed by
aluminium oxide

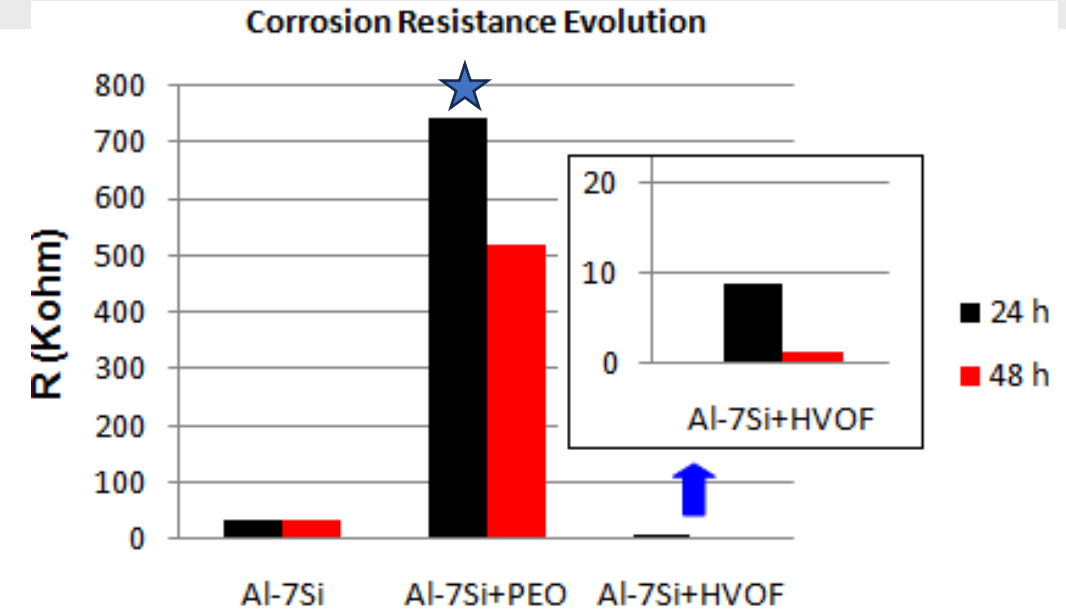
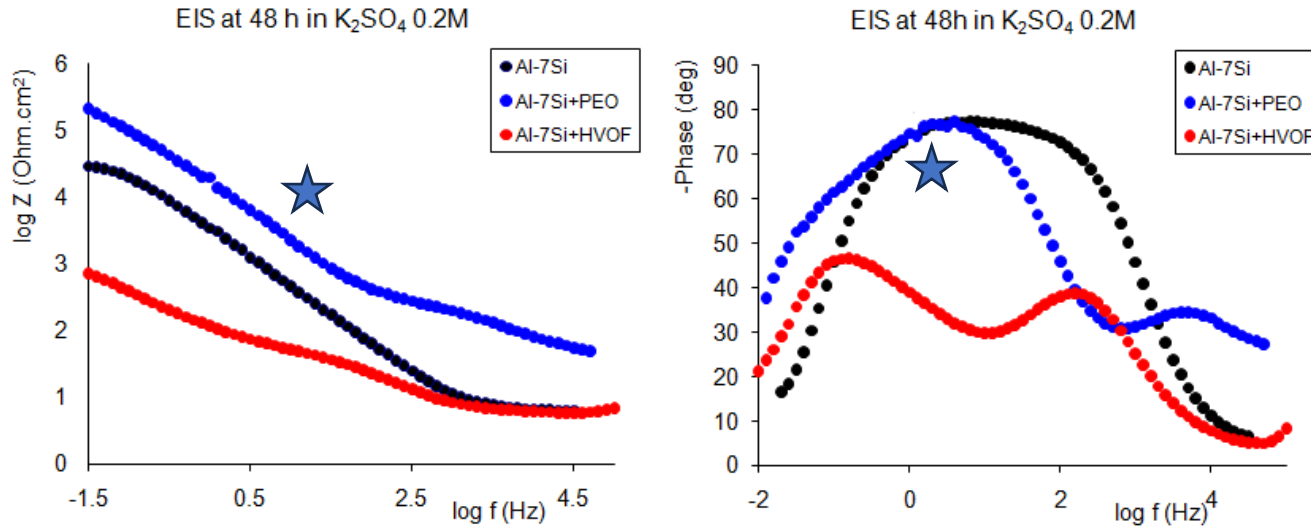
- **Corrosion behavior** of PEO coatings was compared with alternative coatings deposited by thermal sprayed HVOF (High Velocity Oxy-Fuel) Technique:

	Thickness before polishing (mm)	Thickness after polishing (mm)	Roughness before polishing (mm)	Roughness after polishing (mm)	Hardness (Hv0.1)
Al-7Si+PEO	210	116	10.0	0.5	362
Al-7Si+HVOF	128	60	5.6	1.0	340



Development 2 PEO coatings on engine cylinder liners

- Corrosion resistance
- Al-7Si alloys vs Conventional electrolyte
- Competitive against HVOF coatings



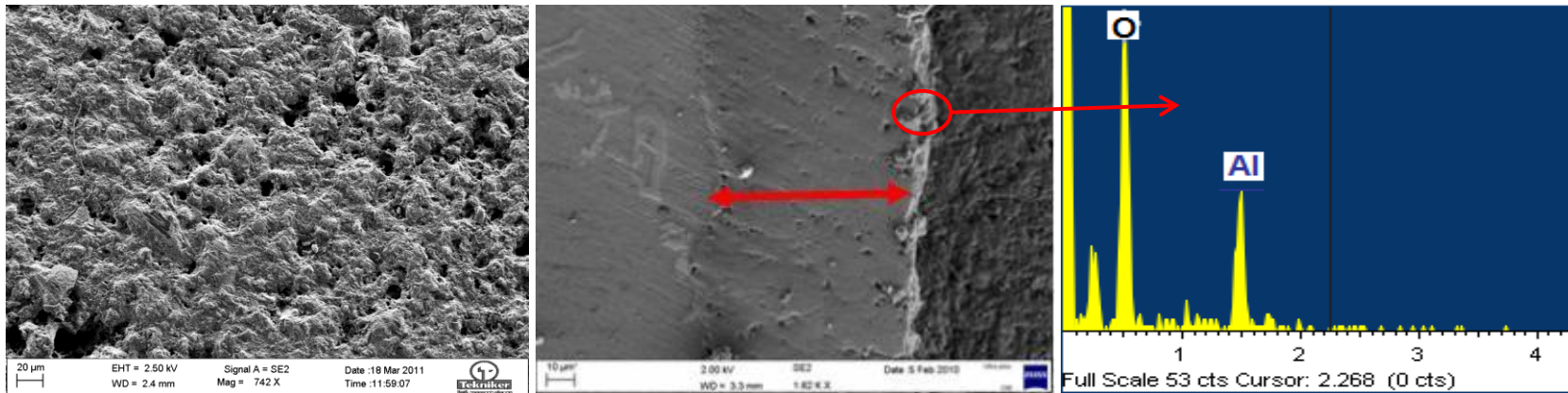
- The corrosion resistance of the Al-7Si with PEO is much higher than Al-7Si and HVOF coated.



Development 2 PEO coatings on engine cylinder liners

- Al-7Si alloys
- Conventional electrolyte
- **Treated and Untreated coating**

- **PEO coatings for tribocorrosion tests:** Thick PEO coating was developed on Al-7Si discs.
- Some samples were treated according with T6 procedure. The final thickness was in between 149-177 mm (treated/untreated).

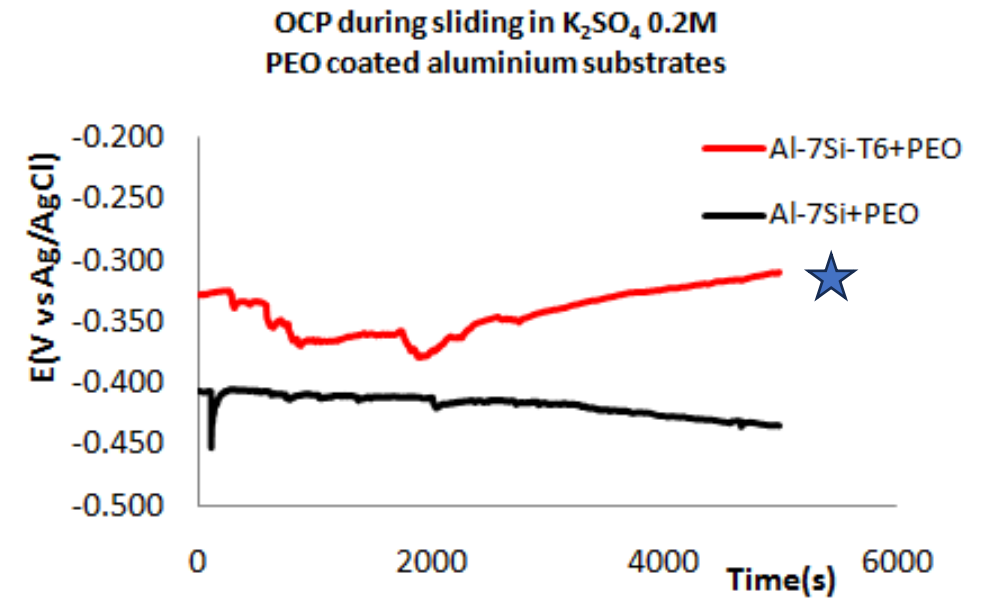
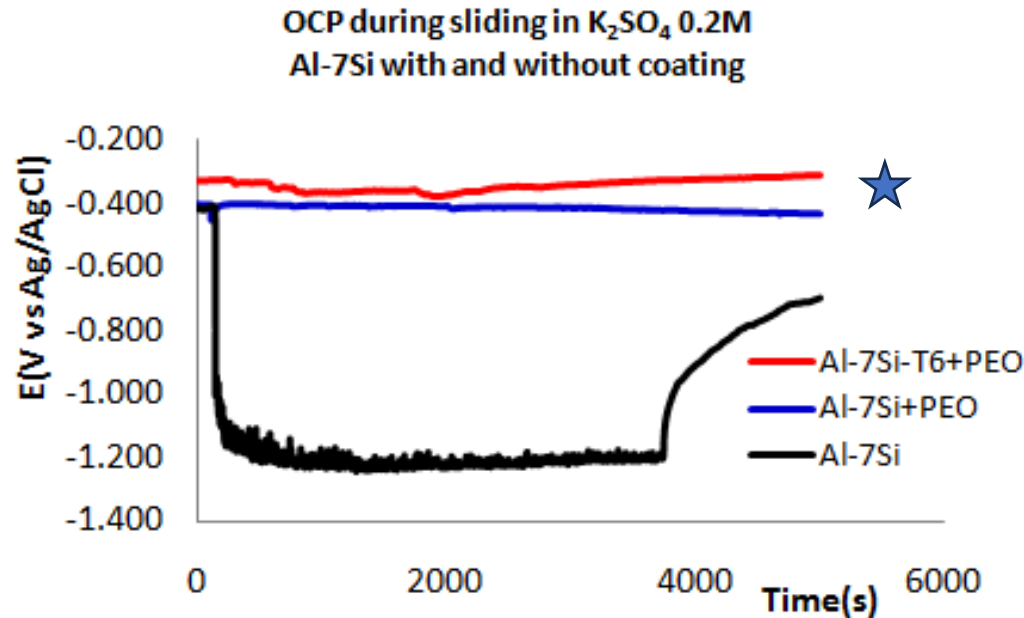


Alloy	Treatment	Thickness before polishing (μm)	Ra before polishing (μm)	Thickness after polishing (μm)	Ra after polishing (μm)	Hardness (Hv0.1)
Al-7%Si	T6	176.3 ± 7.9	8.03 ± 0.59	130.1 ± 5.5	1.65 ± 0.22	822
Al-7%Si	untreated	149.6 ± 8.5	9.09 ± 0.86	110.8 ± 2.1	1.66 ± 0.32	782



Development 2
**PEO coatings on
engine cylinder liners**

- Al-7Si alloys
- Commercial electrolyte
- Comparative **T6 treated substrate vs untreated**

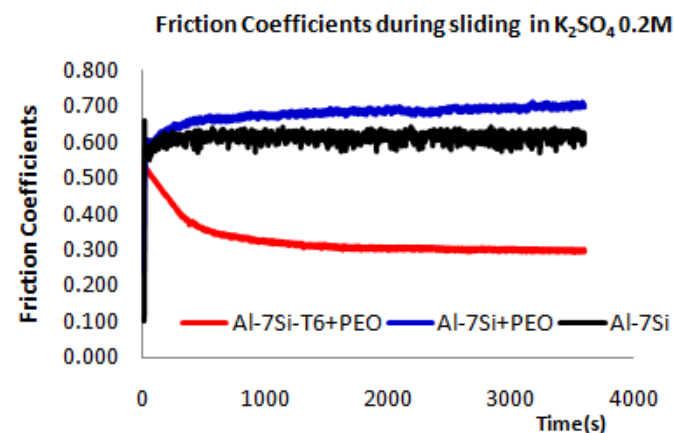


- In case of bare aluminium, a pronounced potential drop takes place when the alumina ball is loaded on the uncoated alloy, indicating the removal of its passive layer. When the rubbing ends, potential rises to a more noble values slowly (repassivation)
- Potential of PEO coated surfaces seems to not be affected by the mechanical effect. Coating thickness can be considered as a thick and hard passive layer and when the removes part of this layer the substrate still is covered by protective oxide film



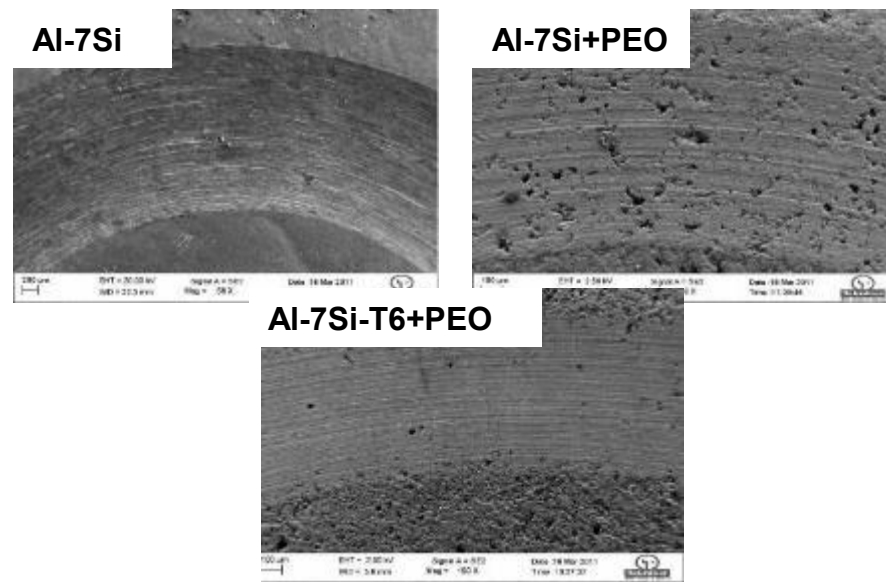
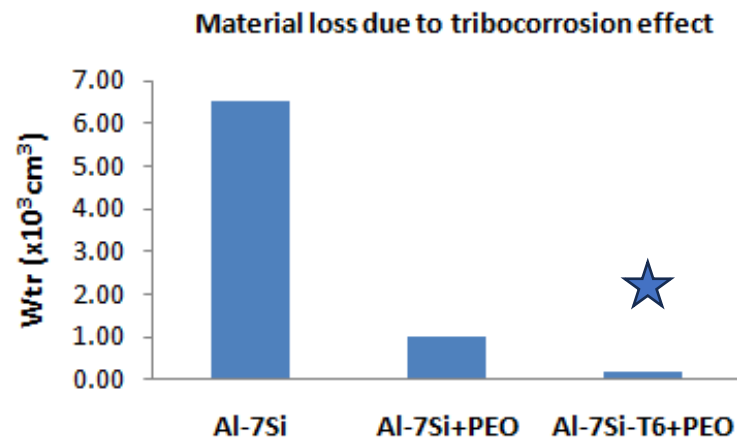
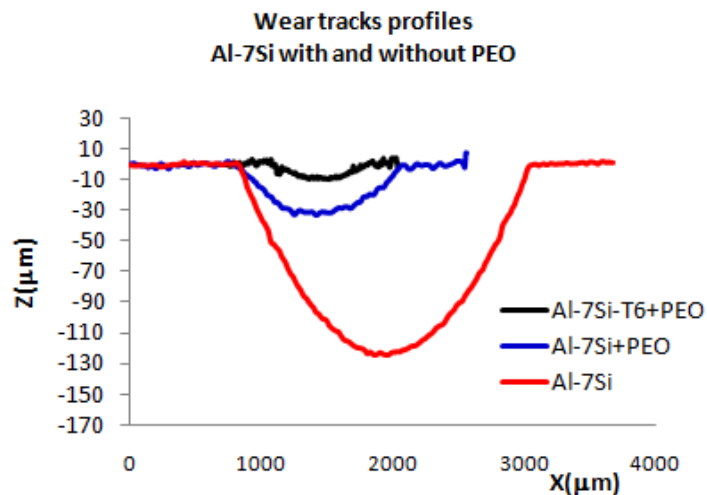
Development 2 PEO coatings on engine cylinder liners

- Tribocorrosion behaviour
- Al-7Si alloys vs Conventional electrolyte
- Substrate **Treated vs untreated**



	Mean μ
TRT742 Al7Si-T6+PEO	0.324
TRT742 Al7Si +PEO	0.679
TRT742 Al7Si	0.613

PEO coating applied on untreated aluminium substrate does not reduce substrate friction whereas PEO coating applied on thermal treated aluminium substrate strongly reduces the system friction response





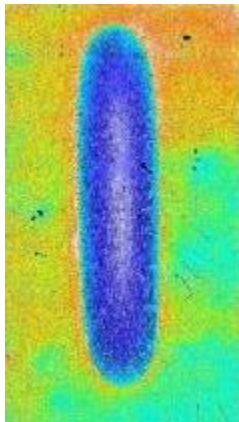
Development 1 PEO coatings with excellent tribological performance

- Coatings grown on Secondary cast Al-Si alloys with high silicon content
- Development of novel electrolytes
- Excellent wear resistance under severe requirements

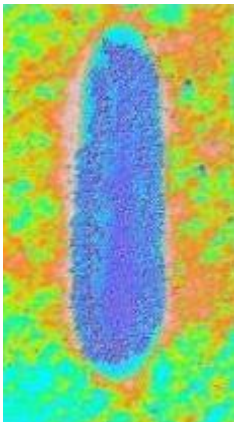


TRIBOLOGICAL TESTS

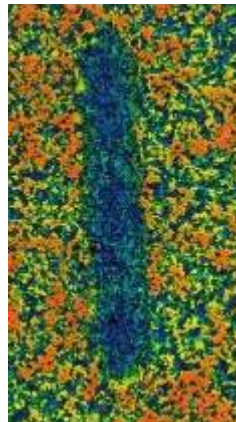
Al-Si
reference



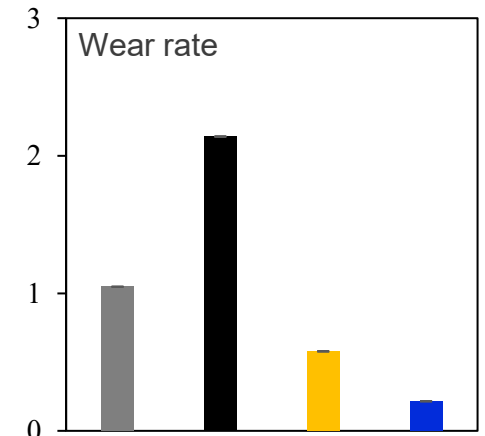
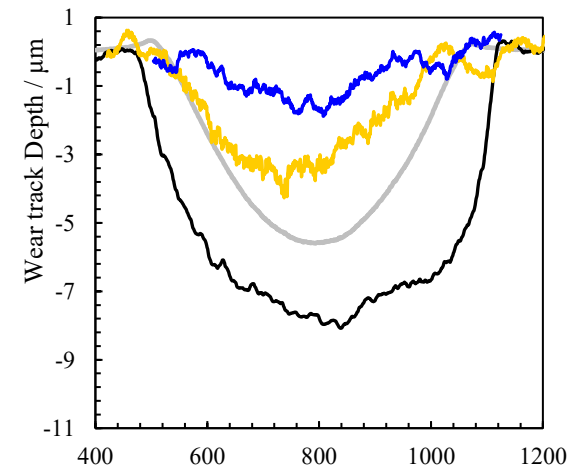
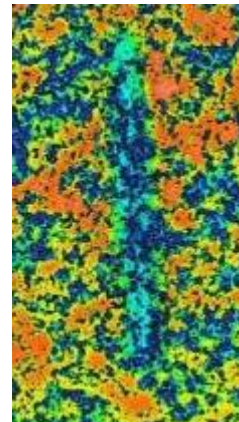
Commercial
electrolyte



AITEK
electrolyte



AITEK Plus
electrolyte



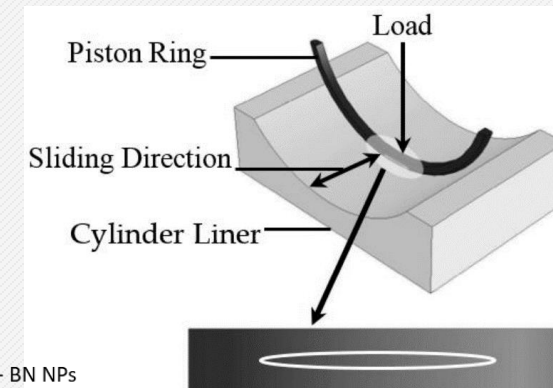
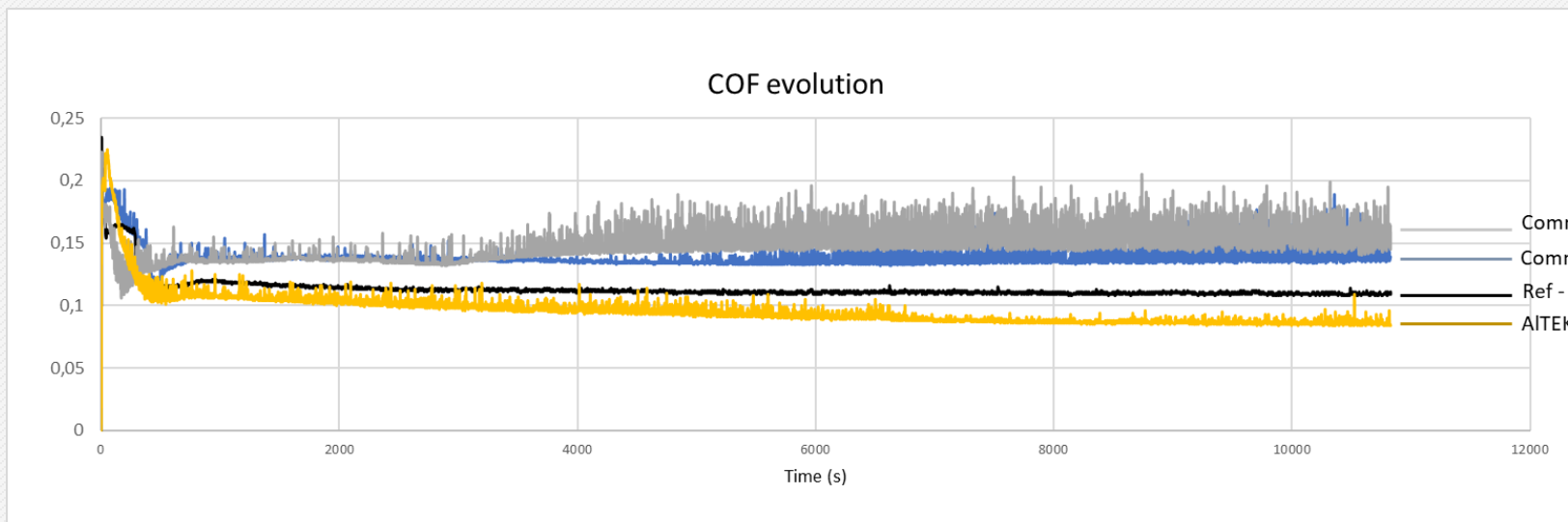
PEO coatings: Tekniker's background



PEO COATINGS WITH IMPROVED TRIBOLOGICAL RESISTANCE

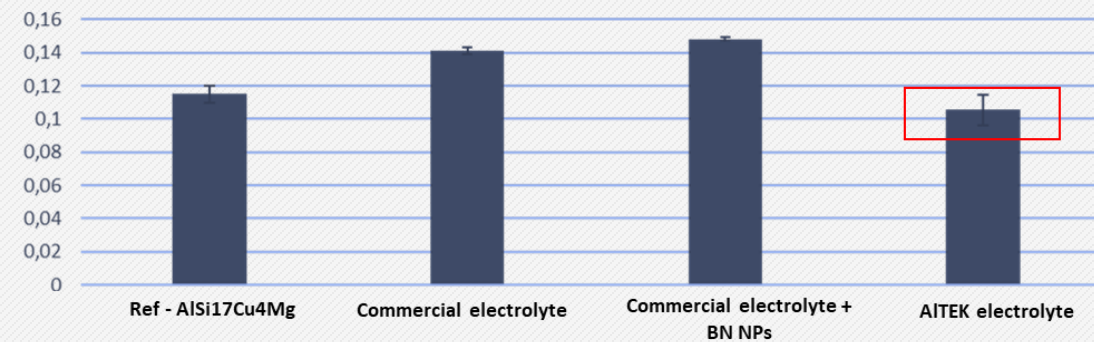
Tekniker's development 6: Development of new electrolytes for PEO coatings with improved properties for engine components

TRIBOLOGICAL TESTS: simulation of piston ring/cylinder liner real contact



Mean coefficient of friction (COF)

- **Lower COF** for PEO AITEK coatings vs. PEO commercial coatings and Ref
- **COF more stable** for PEO AITEK coatings vs. PEO commercial coatings



PEO coatings: Tekniker's background

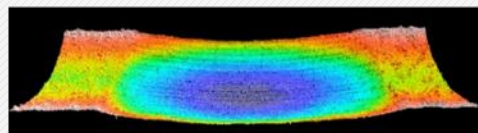
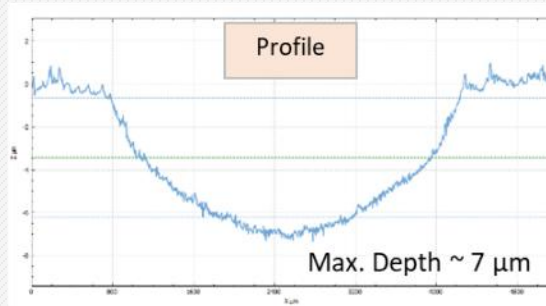


PEO COATINGS WITH IMPROVED TRIBOLOGICAL RESISTANCE

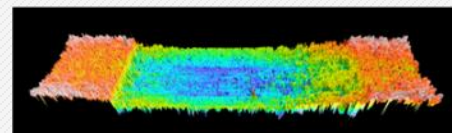
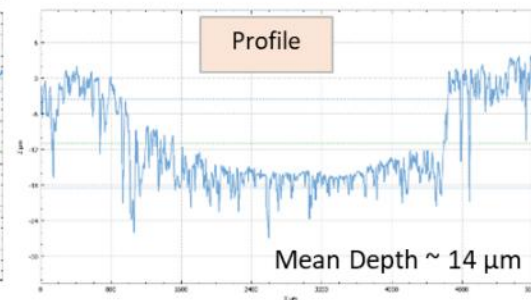
Tekniker's development 6: Development of new electrolytes for PEO coatings with improved properties for engine components

TRIBOLOGICAL TESTS: WEAR TRACK PROFILES AND CONFOCAL IMAGES

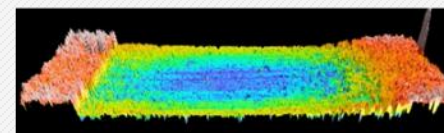
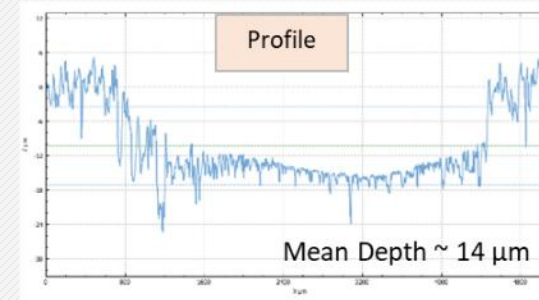
Cylinder liner - AlSi17Cu4Mg



Cylinder liner - AlSi17Cu4Mg
PEO commercial electrolyte

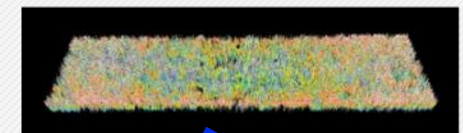


Cylinder liner - AlSi17Cu4Mg
PEO commercial electrolyte + BN NPs



Cylinder liner - AlSi17Cu4Mg
PEO AITEK

It was not possible to
acquire a profile of the
wear track!!!



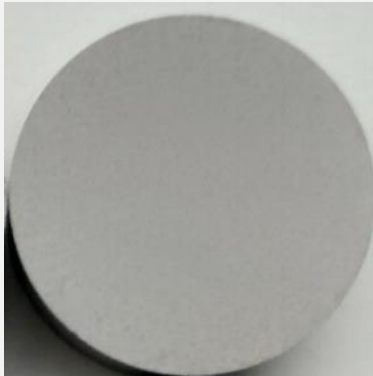
✓ **Significantly lower wear damage** for *AITEK* PEO coatings.
No wear damage is observed

PEO coatings: Tekniker's background



PEO COATINGS WITH AESTHETICAL PROPERTIES

Tekniker's development 7: Development of new electrolytes for the obtention of aesthetic PEO coatings



✓ Homogeneous PEO coating
Greyish color

By changing electrolyte's composition



✓ Homogeneous PEO coating
Black color

Other colors obtained by changing electrolytes composition:



Blue color



Light greyish color



Dark greyish color

PEO technology: examples of application in automotive sector



Engine block



PEO treatments

Al-Si alloys



- Weight reduction (untill 50%)
- Reduction of CO₂ emissions

Aluminium pistons

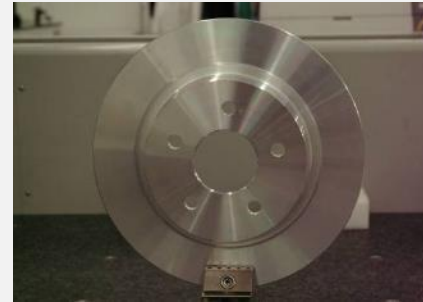


PEO treatments

Al-Si alloys



Brake discs



PEO treatments

Al-Si alloys



SUMMARY OF PEO TECHNOLOGY FOR ALUMINUM SUBSTRATES IN AUTOMOTIVE SECTOR

- Extensive experience in the **development of PEO coatings** for high-silicon AlSi alloys (up to 20% Si), mainly for automotive applications.
- Extensive experience in the development of **PEO coatings for secondary AlSi alloys containing impurities such as Zn, Fe, etc.**
- Proven expertise in the development of **tailor-made electrolytes (supported by 2 patents) for the treatment of high-silicon aluminium alloys.**
- In-house laboratories and testing facilities for the **characterization and evaluation of developed coatings**, including metallurgy and metallography laboratories, tribology laboratories, corrosion and ageing testing facilities, etc.





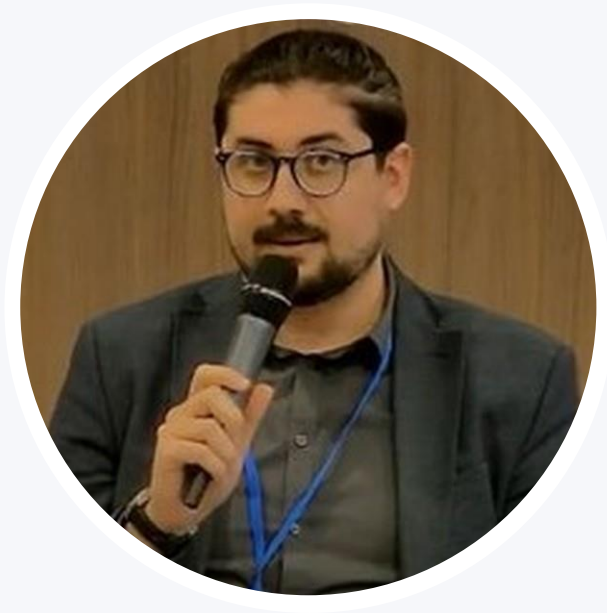
Contact: Amaya Igartua, Raquel Bayon,
Sofia Alves, Esther López, Patricia Fernández

Fundación TEKNIKER

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PRESENTATION 4 OF 4



Alberto Gómez

Advanced Engineering Manager, Ficosa (ES)

Lightweighting Electric Vehicle Batteries: From Copper to Aluminium Busbars



Manufacturing and assembly of modular and reusable EV battery for environment-friendly and lightweight mobility

Alberto Gómez, PhD – FICOSA
a.gomez@ficsa.com

7th October 2026

FICOSA GROUP HIGHLIGHTS



Spain



Established in **1949**
in **Barcelona**

Presence in **14**
countries

>7,000
employees

Automotive **Tier 1** supplying
all major OEMs

50% Sales
Technological Products

8%
sales invested in R&D

1,5 bn €
sales



Poland



Morocco



Turkey



China



USA



Mexico



FICOSA BUSINESS UNITS

MECHATRONICS

eMobility

Battery Management System, Junction Boxes, Multi-Sensors, Cell Contacting Systems, EV Charge Communications



Command & Control

Gearbox actuators, Shifter-by-wire, MTX / ATX Gearshift and Styling parts, Electric Lumbar Systems and light cables.



Rearview Systems

Exterior Mirrors, Interior Mirrors and IRMS (Intelligent Rearview Monitoring System), Sensor Cleaning System



ADAS

Parking Cameras, Camera Monitoring Systems (eMirror), Surround View Systems, Autopark and Object sensing Camera, In-Cabin detection



VISION



H2020 – MARBEL PROJECT OVERVIEW



Manufacturing and Assembly of modular and Reusable EV Battery for Environment-friendly and Lightweight mobility

- > 20% weight reduction
- > 25% charging time reduction
- > 40% LCA improvement by using modularity
- Useful Battery life up to 300,000 km
- Easy & Safe (dis-)assembly automatization
- Reparability and 2nd life transition
- Adaptable to all cells & vehicles

eurecat

Technische Hochschule
Ingolstadt

CARISSMA
Institute of Electric
Connected and Secure Mobility

IREC^R
Shaping Energy for a Sustainable Future



Applus⁺
IDIADA

FICOSA

PowerTech
systems

OTCEngineering
Technologic Development
Connected Mobility Technologies & Solutions

SINTEF



ASAŞ

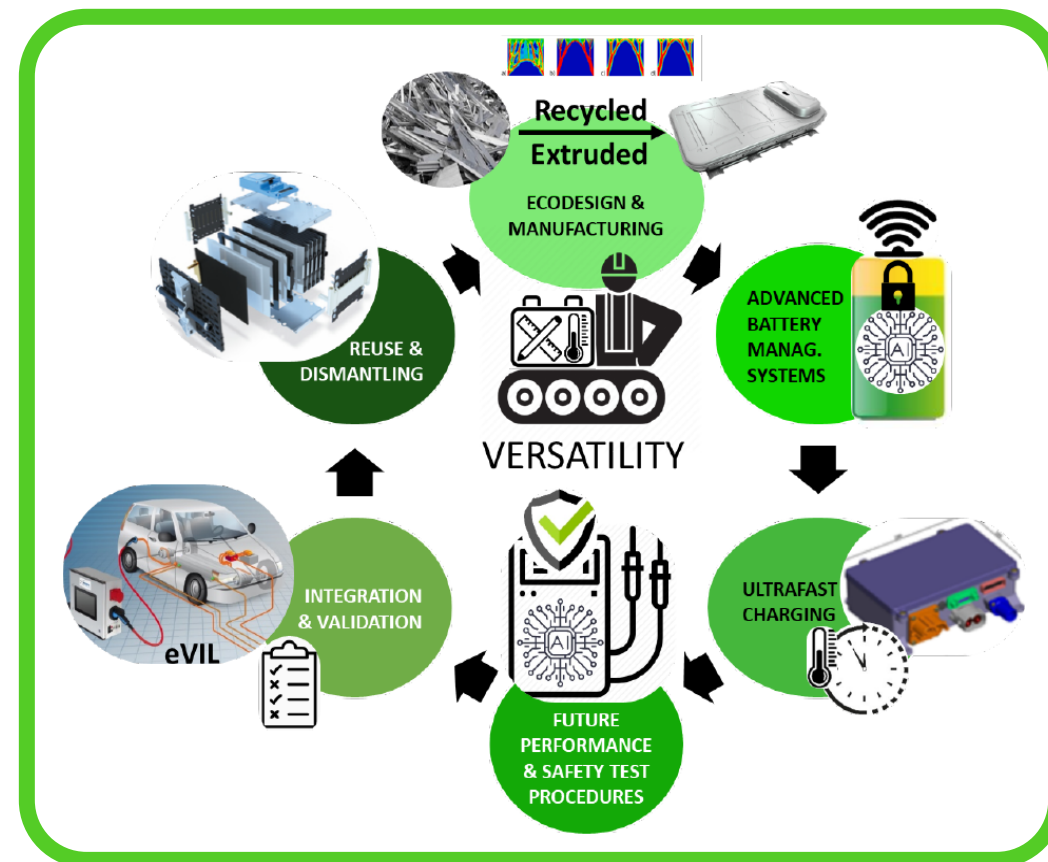
AGRATI
World Fastener Solutions

Fraunhofer
IWU

TES

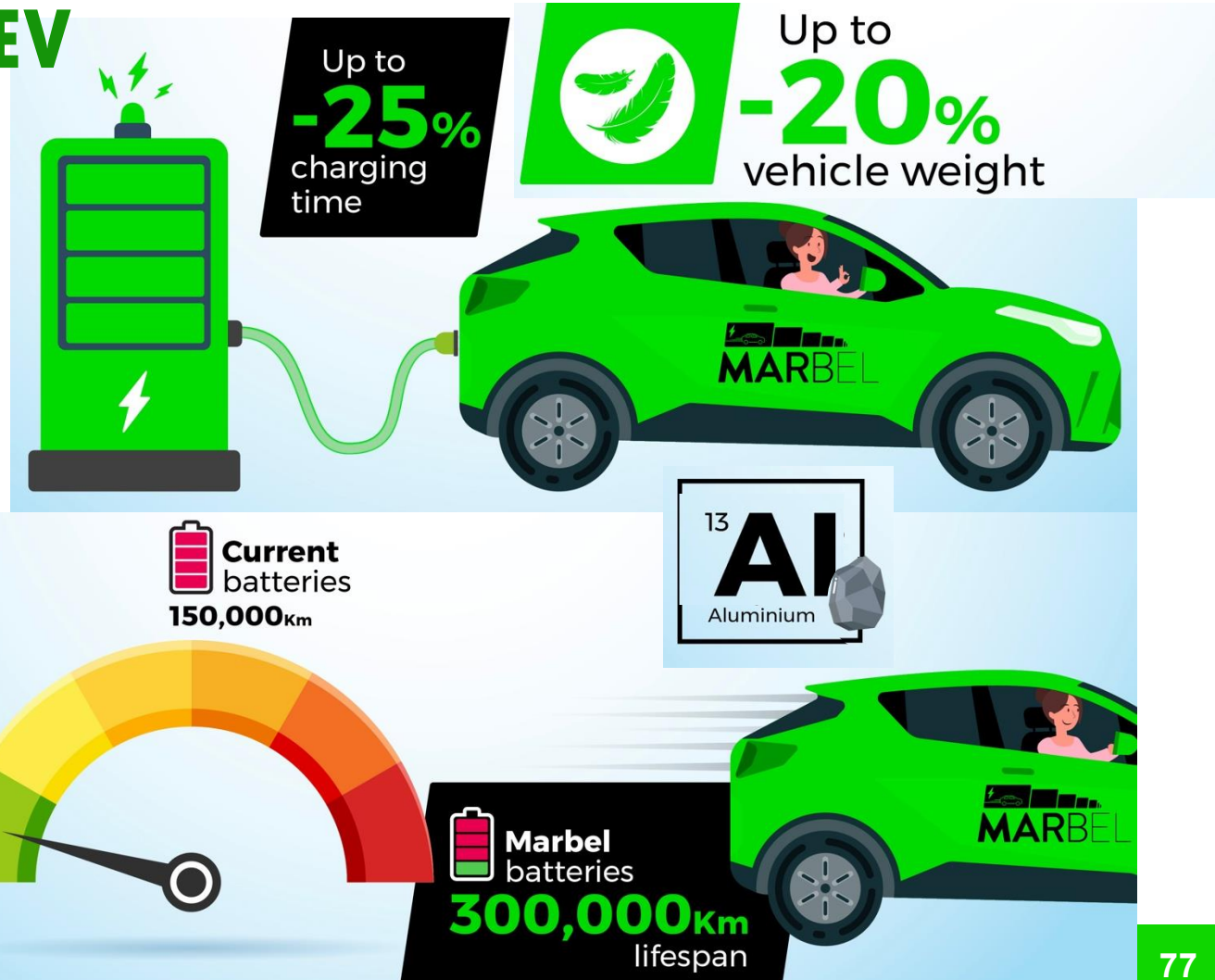
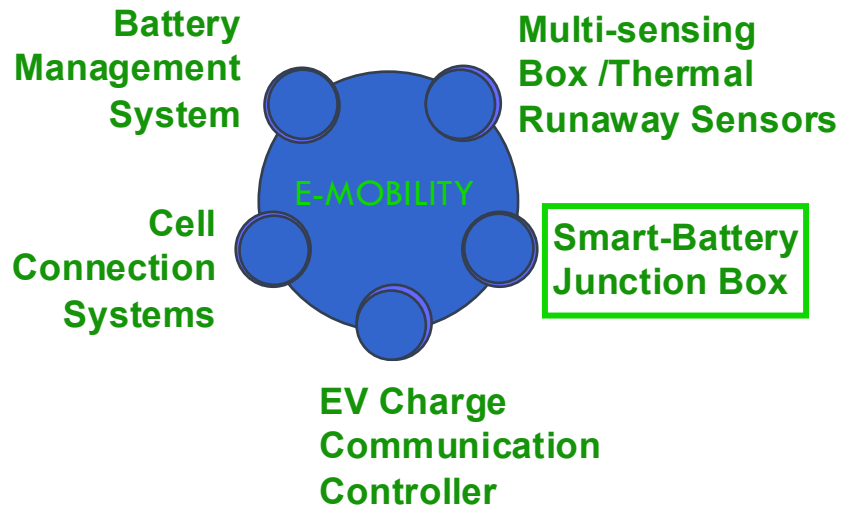
AVL

MARBEL



The project was coordinated by EURECAT

SAFELY CONTROL OF ENERGY MANAGEMENT AND CHARGING IN BEV, PHEV & FCEV



What were We thinking about in 2020? 400 V vs 800 V technologies



400V Architecture	800V Architecture
Charge times are typically current-limited either due to the capacity of the cables or the heat generated by the higher currents.	Supports higher power charging due to lower current needed for similar power.
Higher power potential with similar current profiles and smaller motors.	Can provide more power to the motors for faster acceleration.
Many high-power chargers use 200A cables, limiting 400V vehicles to slower-than-expected charging speeds.	Higher voltage enables the use of lower current cables. This applies to both charging and the powertrain.
400V vehicles are already compatible with both 400V and 800V chargers.	Requires a DC/DC converter to be able to charge on existing 400V charging infrastructure.
Heavier components and less energy recovery potential compared to 800V. Higher currents produce more heat.	Able to capture more power from regenerative braking. Less energy lost to heat. Overall lighter build leads to better efficiency/range.
Current limitations lead to heavier cables, power equipment, and motors being used due to lower voltage.	Lighter cables, power equipment, and motors can be used due to high voltage supporting lower current.
No new architecture required and existing high-volume components can be used.	Requires a rework of vehicle architecture and investment into new electronic components.

Source: SBD Automotive



120 kW 400-volt charger with 300A



180 kW 800-volt charger with 300A

EVESCO
ELECTRIC VEHICLE ENERGY STORAGE COMPANY



400-volt electric vehicle



800-volt electric vehicle



US – Penetration of 800V Chargers

3.50%

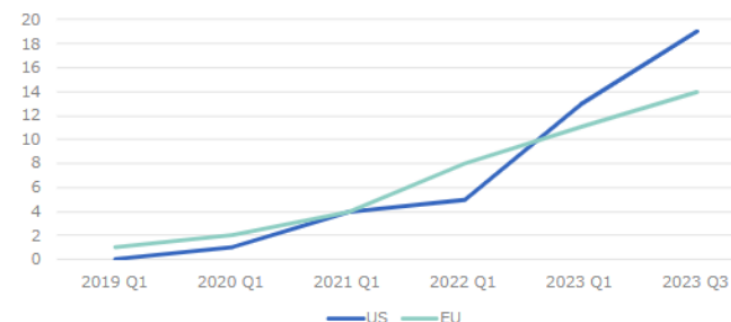


EU – Penetration of 800V Chargers

3.50%



Number of 800V In-Production Vehicle Models



OEMs with 800V models

Audi Genesis GMC Hyundai Kia Porsche
Audi Hyundai Kia Porsche

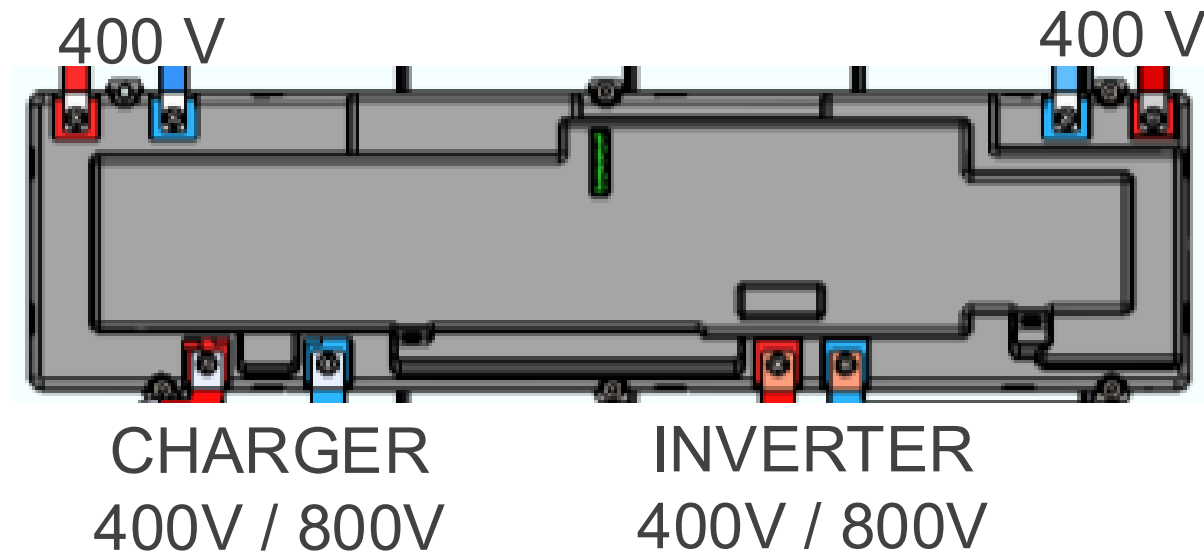
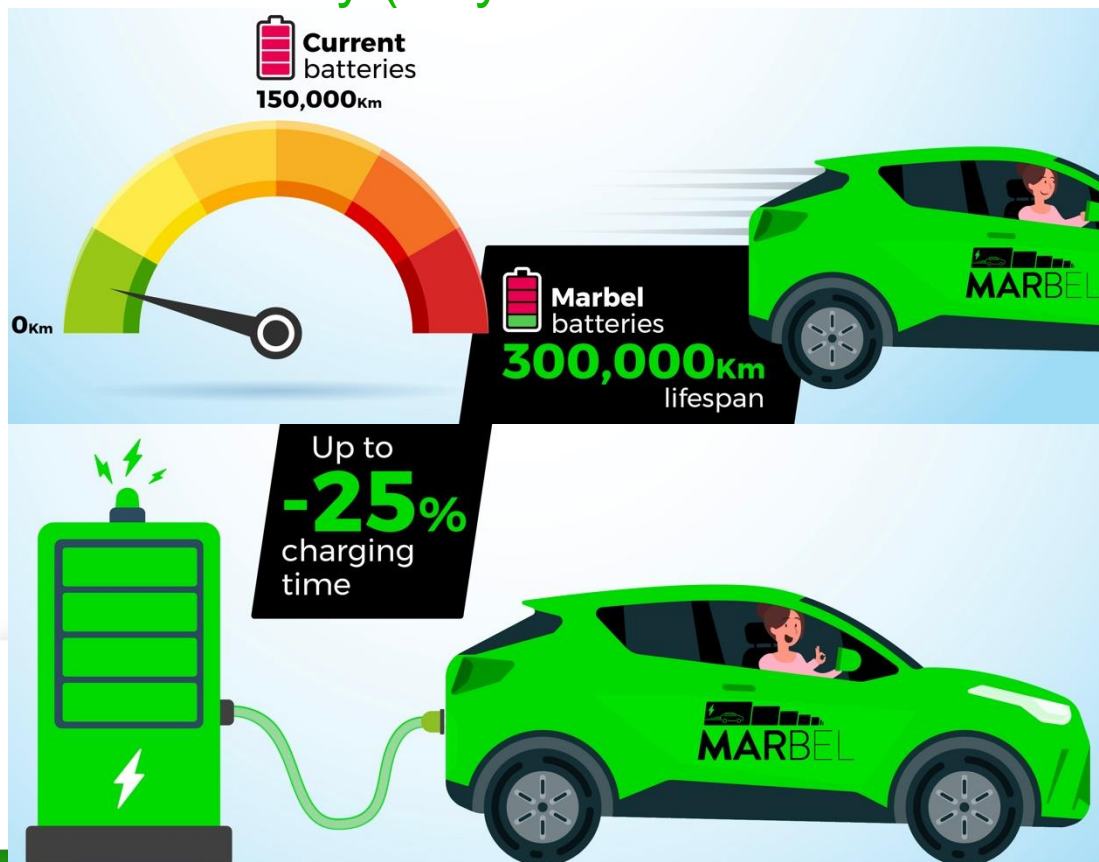
Future is (>) 800 V, but when will it be a reality?

MARBEL SWITCHABLE JUNCTION BOX



Switchable architecture 400V / 800V

- Pro → Versatility for (dis-)charging
 - ↓ Cell-stress when charging > 150kW
 - ↑ Battery Lifetime & Safety
 - Safety (only one 400V when necessary)

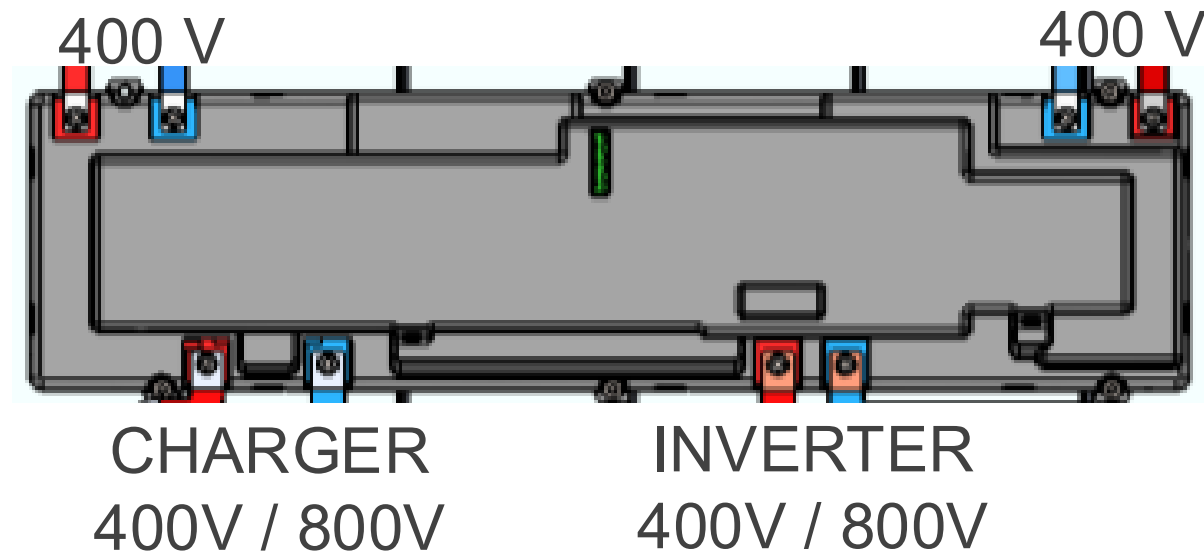


MARBEL SWITCHABLE JUNCTION BOX



Switchable architecture 400V / 800V

- Pro → Versatility for (dis-)charging
 - ↓ Cell-stress when charging > 150kW
 - ↑ Battery Lifetime & Safety
 - Safety (only one 400V when necessary)
- Con → Future is (>)800V in EV & EVSE
 - ↑ Components = ↑ Weight & Cost
 - Contactor's ageing when cycled



MARBEL SWITCHABLE JUNCTION BOX

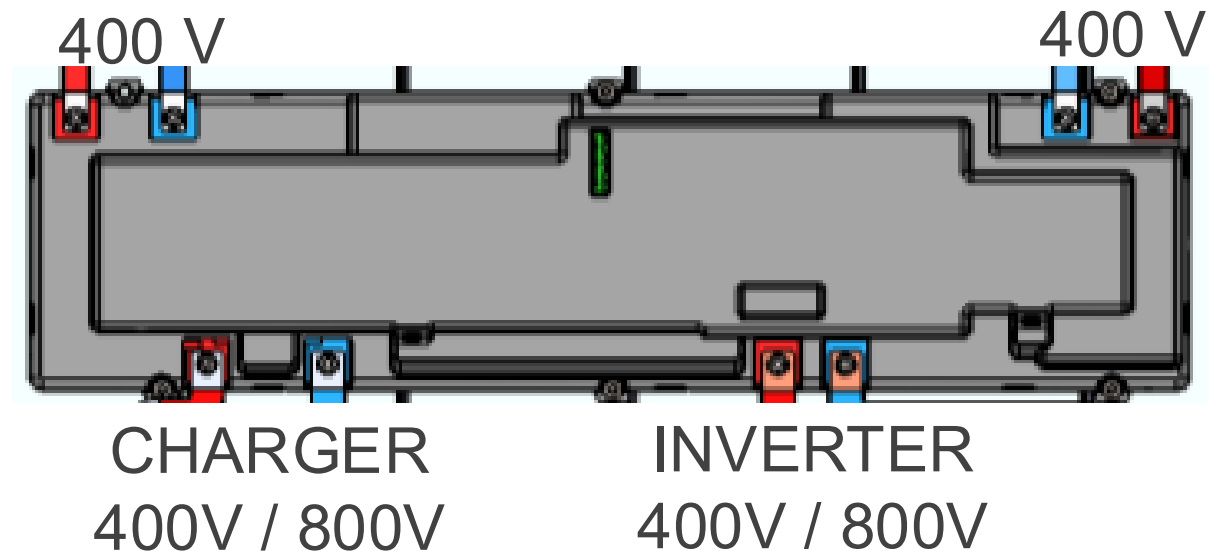
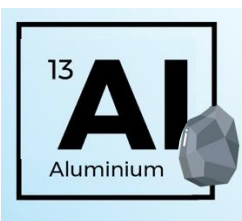


Aluminium busbars (instead of Copper)

- Pro → ↑Sustainability vs Copper
↓Weight & Cost vs Copper



Up to
-20%
vehicle weight

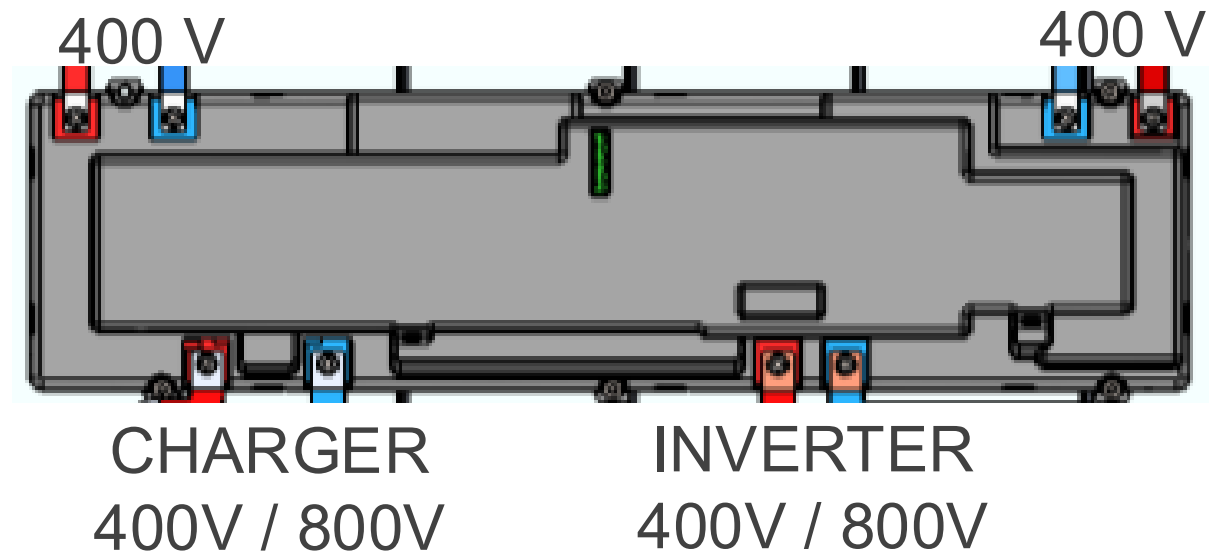


MARBEL SWITCHABLE JUNCTION BOX



Aluminium busbars (instead of Copper)

- Pro → ↑Sustainability vs Copper
↓Weight & Cost vs Copper
- Con → Ni-coating (↓Sustainability)
Non recycled Al (↓Sustainability)

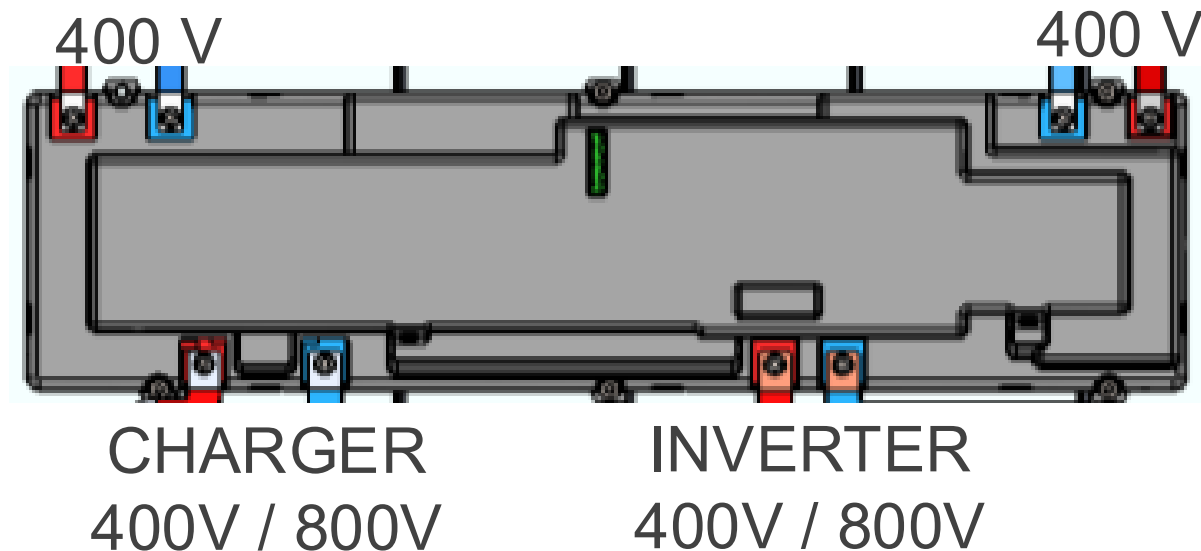
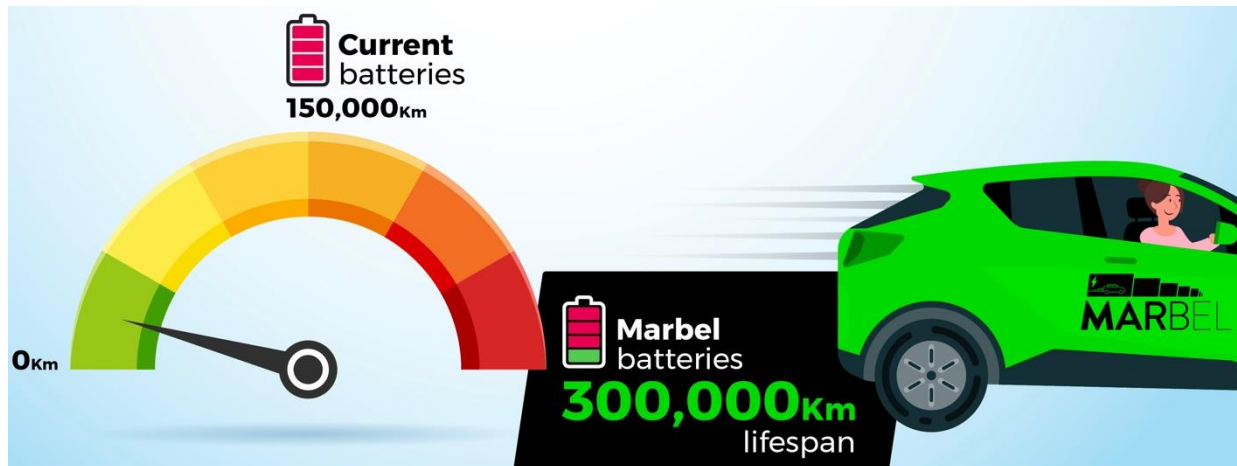


MARBEL SWITCHABLE JUNCTION BOX



Optimized Housing (Brackett/Cover)

- Pro → ↑Sustainability + ↓Weight & Cost.



MARBEL SWITCHABLE JUNCTION BOX

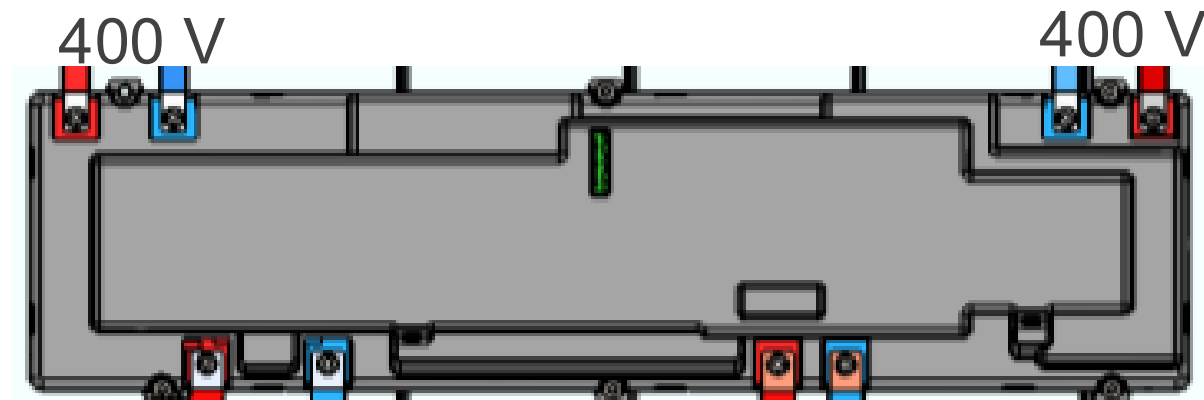
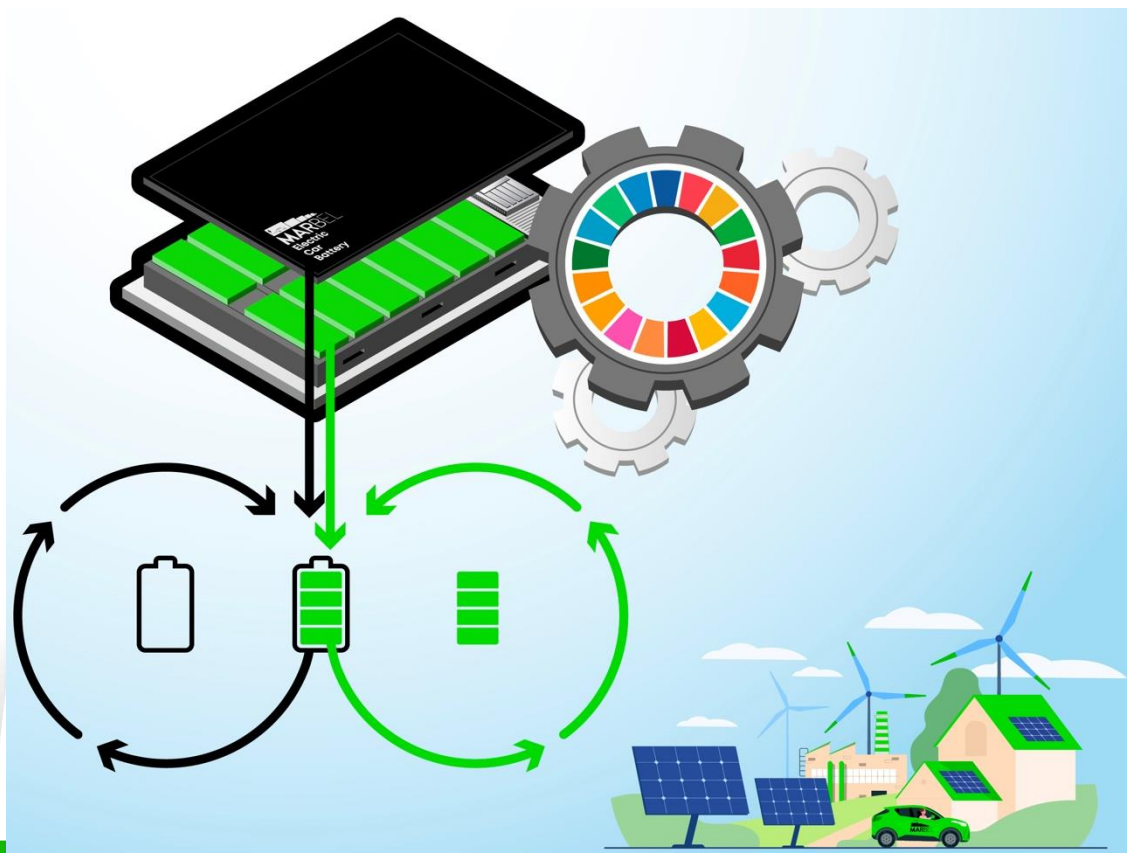


Optimized Housing (Brackett/Cover)

- Pro → ↑Sustainability + ↓Weight & Cost.

- Con → Non recycled Plastic* (↓Sustainability)

**Polypropylene (PP) & Polyamide (PA)*



CHARGER
400V / 800V

INVERTER
400V / 800V





**Manufacturing and assembly of
modular and reusable EV
battery for environment-friendly
and lightweight mobility**

THANK YOU!

Alberto Gómez – FICOSA
a.gomez@ficsa.com

7th October 2026



A project coordinated by:

eurecat

PANEL DISCUSSION

Automotive I

7 October · 10:30 – 12:00 · Main Auditorium



MODERATOR

Katharina Schöps

RKW Sachsen (DE)



Oriol Grau

BCIRCULAR (ES)



Fabian Hofstätter

SAG Group (AT)



Amaya Igartua

TEKNIKER (ES)



Alberto Gómez

Ficosa (ES)

DAY 1 · WEDNESDAY 7 OCTOBER

Aerospace

12:00 – 13:30 · Main Auditorium



MODERATOR

Josep Costa

University of Girona (ES)

SPEAKERS

Peter Glaser FACC AG (AT)

Christopher Wiednig voestalpine AG (AT)

Daniel Claret Composites ATE (ES)

Mate Gaal BAM (DE)

PRESENTATION 1 OF 4



Peter Glaser

Engineering & R&T, FACC AG (AT)

“Pull your weight” – Every gram of material on the product needs to have its purpose



„PULL YOUR WEIGHT“
– EVERY GRAM OF MATERIAL ON THE PRODUCT
NEEDS TO HAVE ITS PURPOSE

P. Glaser - FACC
VP Engineering, Research & Technology

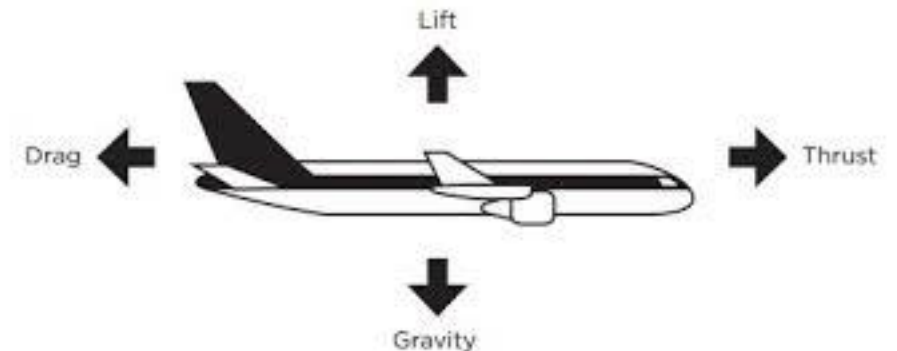
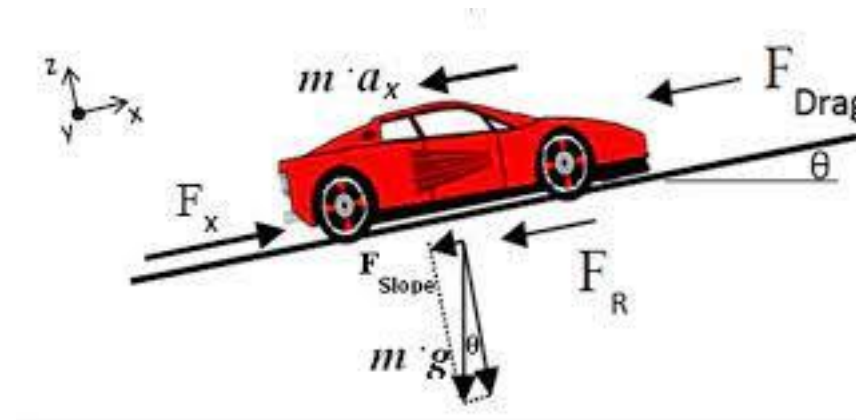
10/2026

MASS IN MOTION CONSUMES ENERGY

Energy to overcome inertia:
Mass related



Energy to outrun „the pull of earth“:
Mass related



LIGHT WEIGHT AS MISSION ENABLEMENT



LIGHT WEIGHT – THE COST FACTOR



„Affordable Light Weight“

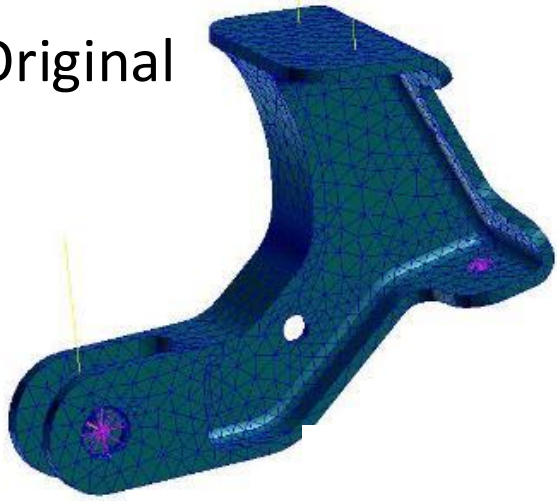


“MOLECULES, PULL YOUR WEIGHT!”

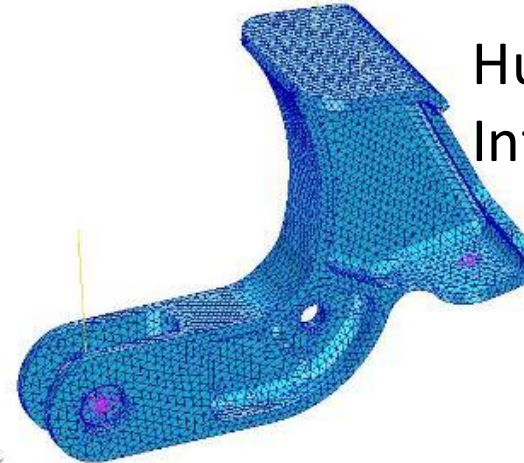
- „If you are not adding to the mission (by carrying load), get out!“
- Focusing on function (load carrying, beauty, watertightness, etc.)
- Finding solutions where multiple functions are integrated (beauty and strength in one)
- Choosing most favourable architecture
- Identifying areas of surplus material

BEST SOLUTION THROUGH ARCHITECTURAL CHANGE

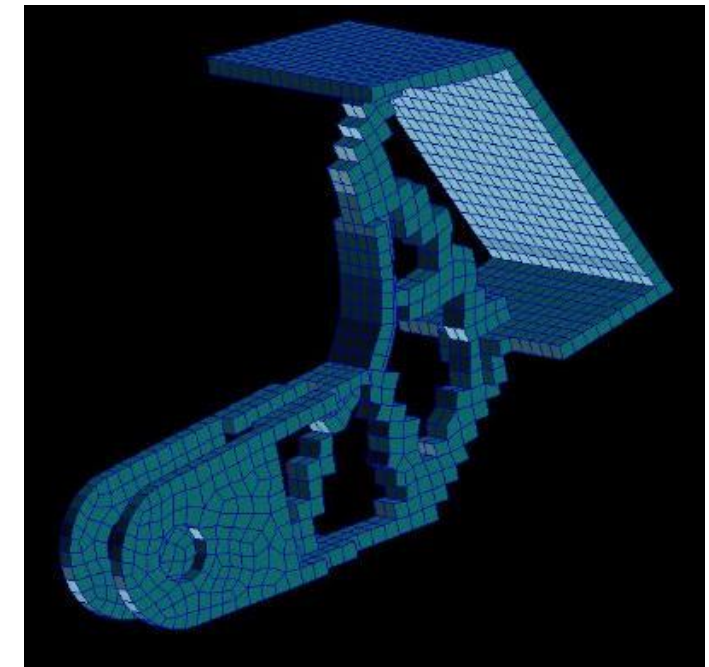
Original



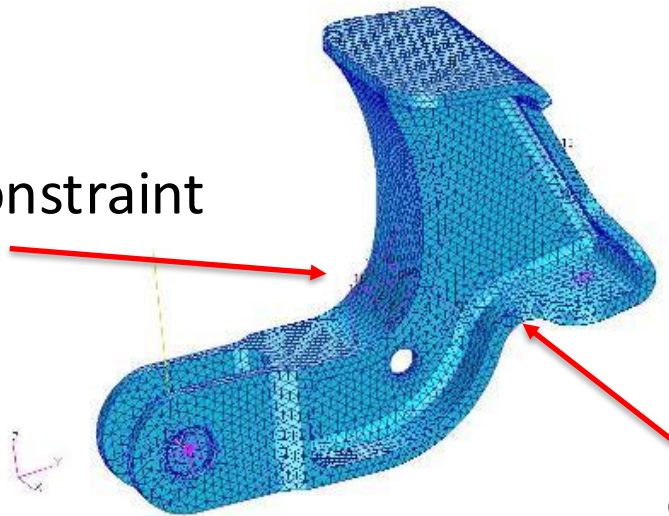
Human Intelligence



Optimization Routine



New space constraint



constriction

Same architecture,
more material

“MOLECULES, PULL YOUR WEIGHT!”

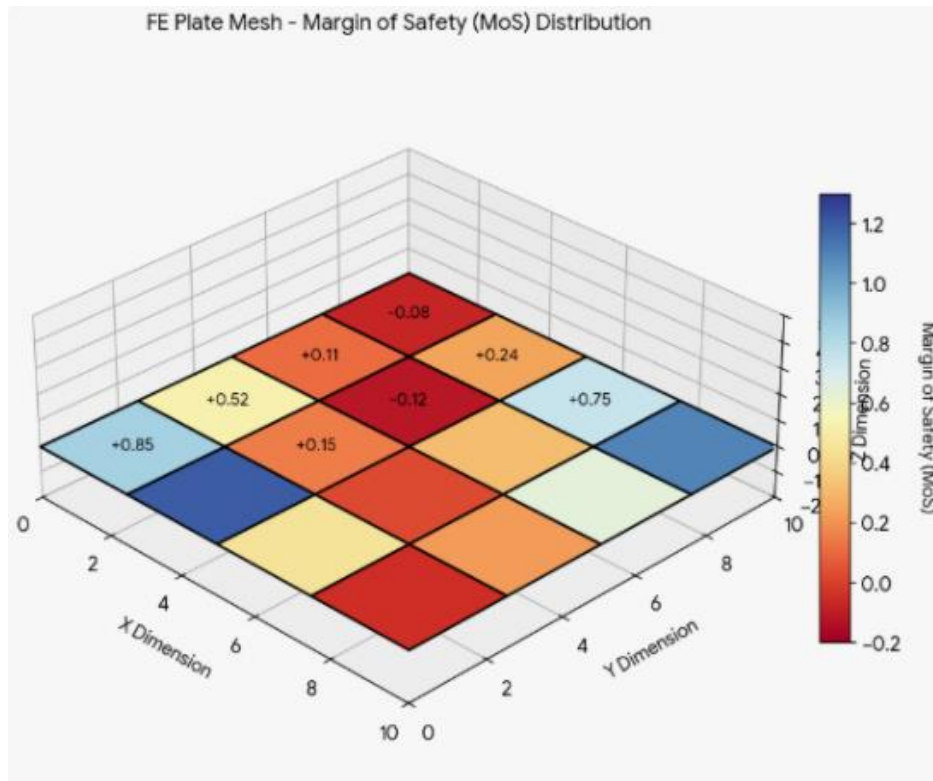
Aggregations:

- Material that is still there, could be avoided, (but is too costly to reduce)
- Material that must stay for another function than load carrying („Design Constraints“)

2 sets of Optimization indices:

- „Zero Margin – optimization Index“
- „Deadweight Index“

“MOLECULES, PULL YOUR WEIGHT!”



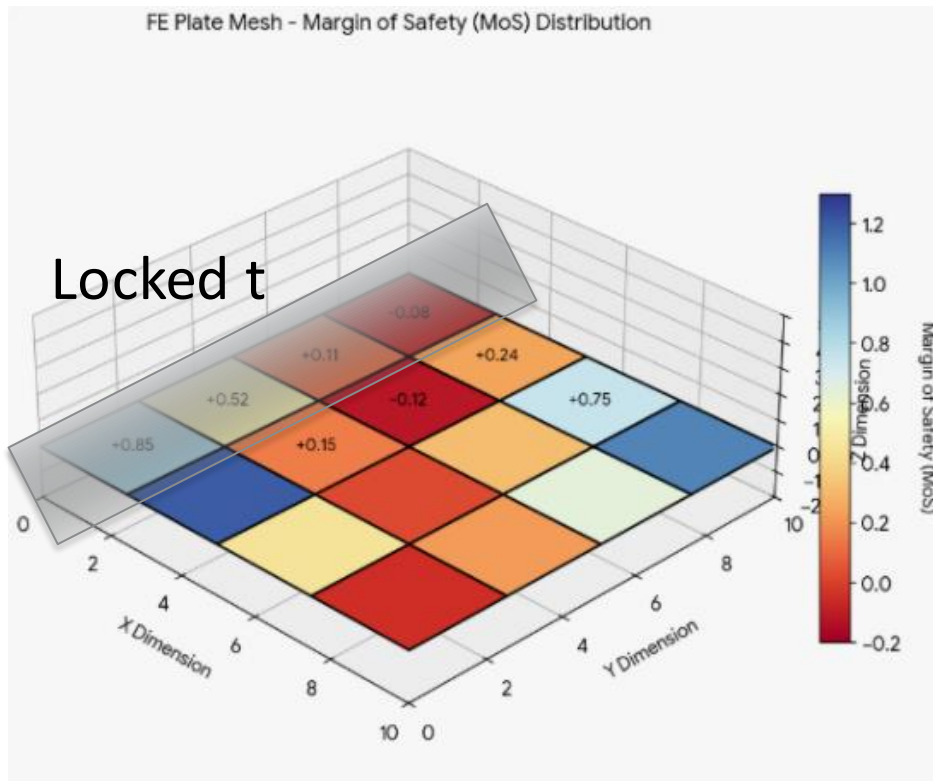
- „Zero Margin – optimization Index“

“Sum of all elements’ mass individually scaled to the target MoS (e.g. 0.0)” , divided by “Sum of all elements mass”

(Scaling to be linearly or quadratically dependent whether predominant loading is in plane or bending)

Elm MoS,
Elm area,
Elm thickness

“MOLECULES, PULL YOUR WEIGHT!”

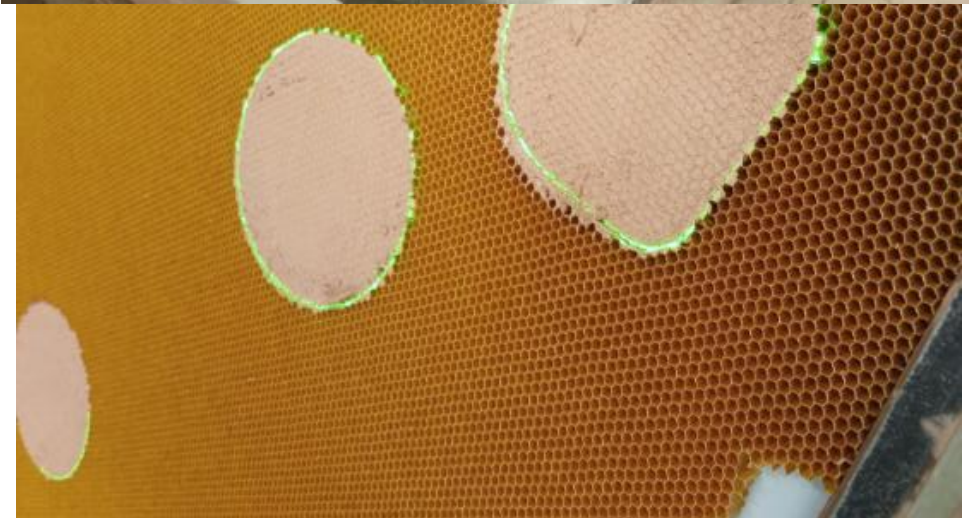


- „Deadweight Index“

It is calculated as the factor between the optimum theoretical mass (as before) and the theoretical mass as calculated **locking** some of the elements' mass to not be scaled down.

Elm MoS,
Elm area,
Elm thickness
Locked Areas

“MANUFACTURING DEADWEIGHT”

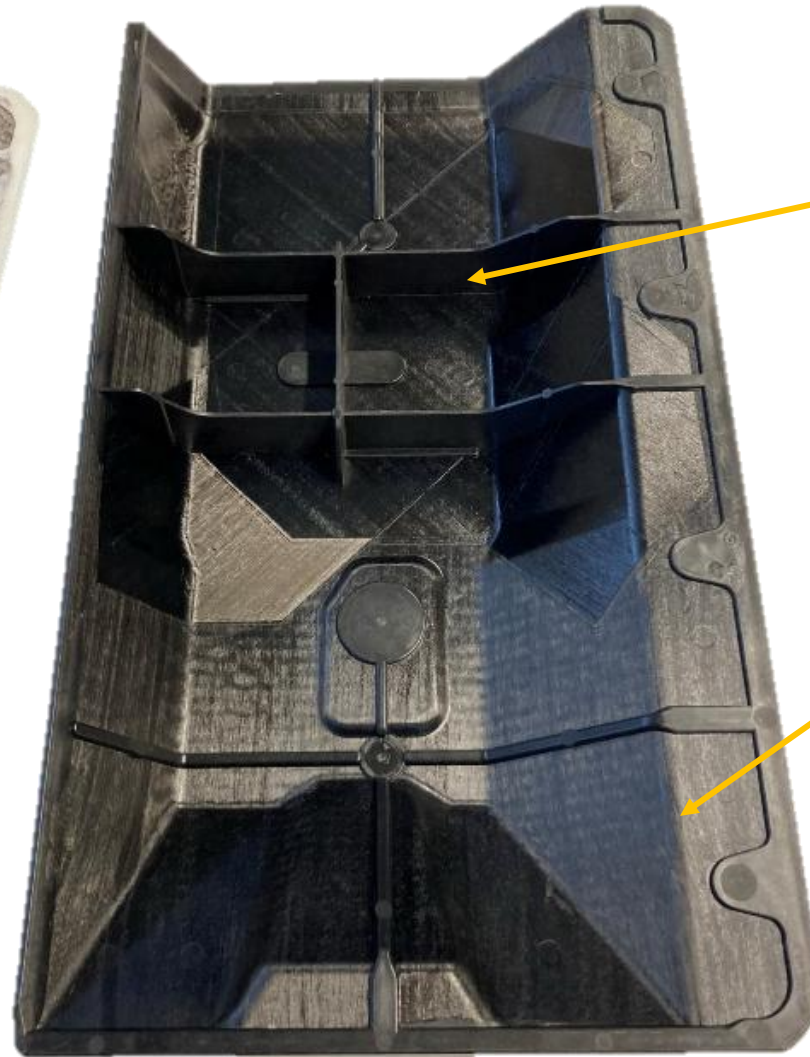


PoC in
NFPP and PLA



© ENGEL

PoC in
Polycarbonate



© JKU

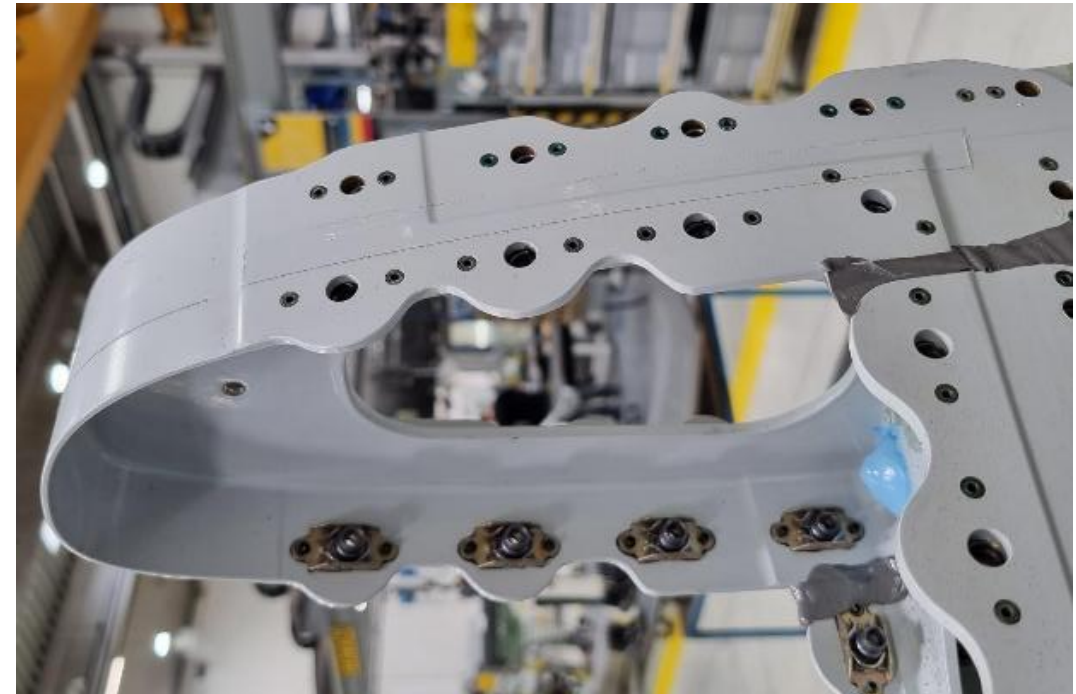
Injection
molded ribs

UD-Tape
reinforcement

SUCCESSFUL LIGHTWEIGHT ENGINEERING

Machined AL components

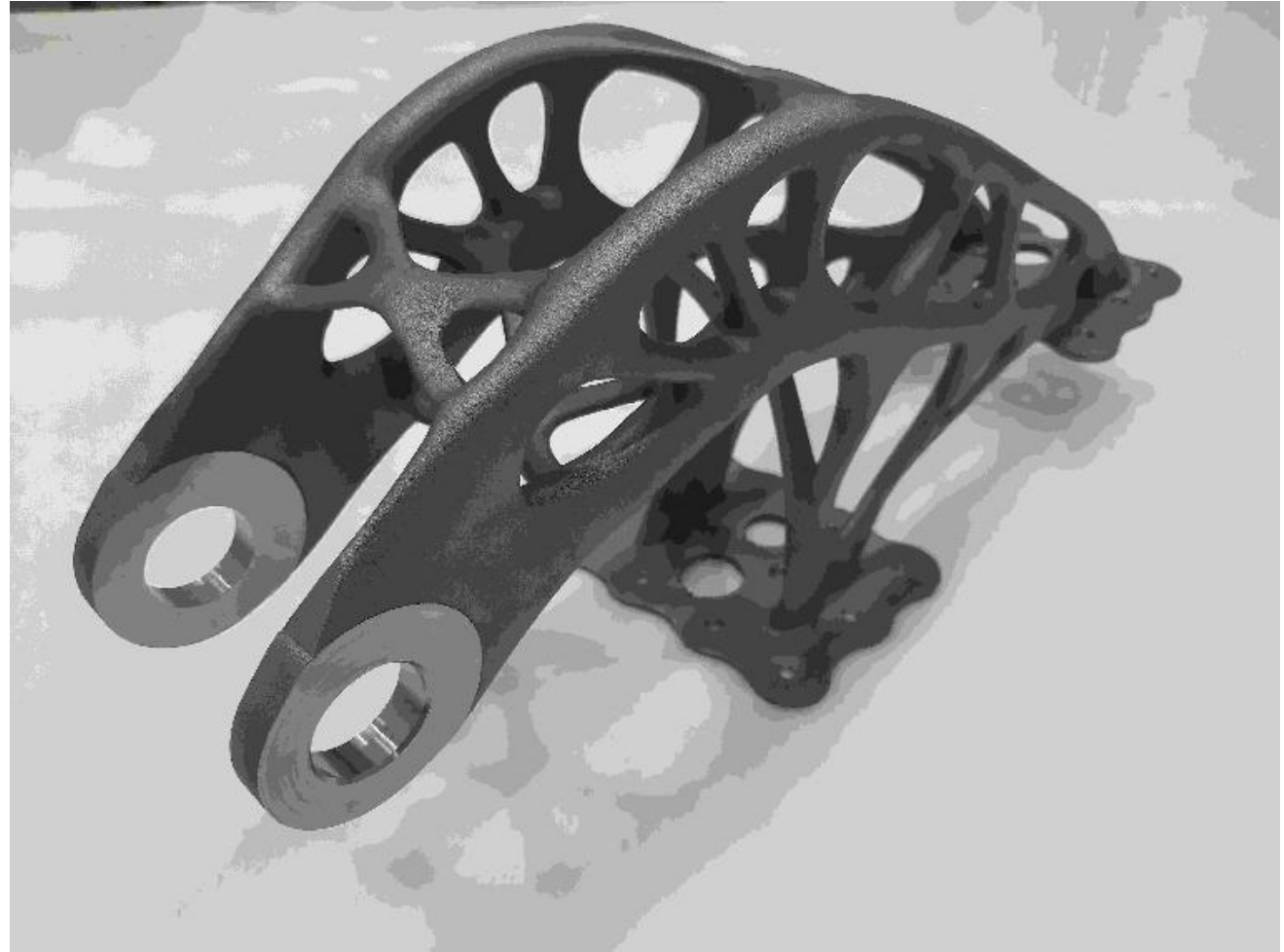
„Scallopping“ to remove excess weight
at the cost of increased machining
time



If there is no load – there is no stress
If there is no stress – there is no problem
-> „Molecules, get out!“

SUCCESSFUL LIGHTWEIGHT ENGINEERING

3D Print example

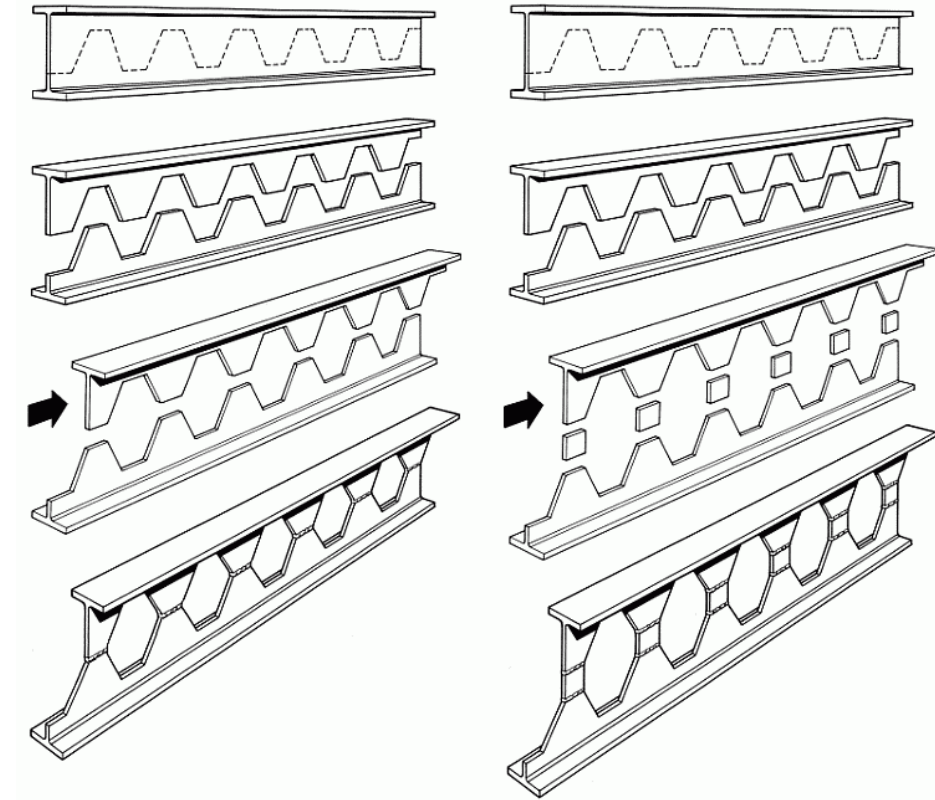


SUCCESSFUL LIGHTWEIGHT ENGINEERING

Castellated Beams;

Material Efficient Optimization,
based on the knowledge of how a
structure functions

(That's what we go to school for!)



CONCLUSION

“MOLECULES, PULL YOUR WEIGHT!”

- „If you are not adding to the mission (by carrying load), get out!“
- Focusing on function (load carrying, beauty, watertightness, etc.)
- Finding solutions where multiple functions are integrated (beauty and strength in one)
- Choosing most favourable architecture
- **Identifying areas of surplus material**

Thank you for your attention!

Thank you



REFERENCES

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- > <https://www.grunbauer.nl/eng/wat.htm>

PRESENTATION 2 OF 4



Christopher Wiednig

SVP R&D Metal Forming Division, voestalpine (AT)

From Microstructure to Component: Enabling Cost-Effective Deep Drawing of Titanium Sheet

FROM MICROSTRUCTURE TO COMPONENT: ENABLING COST-EFFECTIVE DEEP DRAWING OF TITANIUM SHEETS

ELN Conference 2026

DI Dr. Christopher Wiednig, voestalpine Metal Forming GmbH
DI Dr. Carina Schlögl MBA, Austrian Institute of Technology

voestalpine Metal Forming GmbH
www.voestalpine.com/metalforming



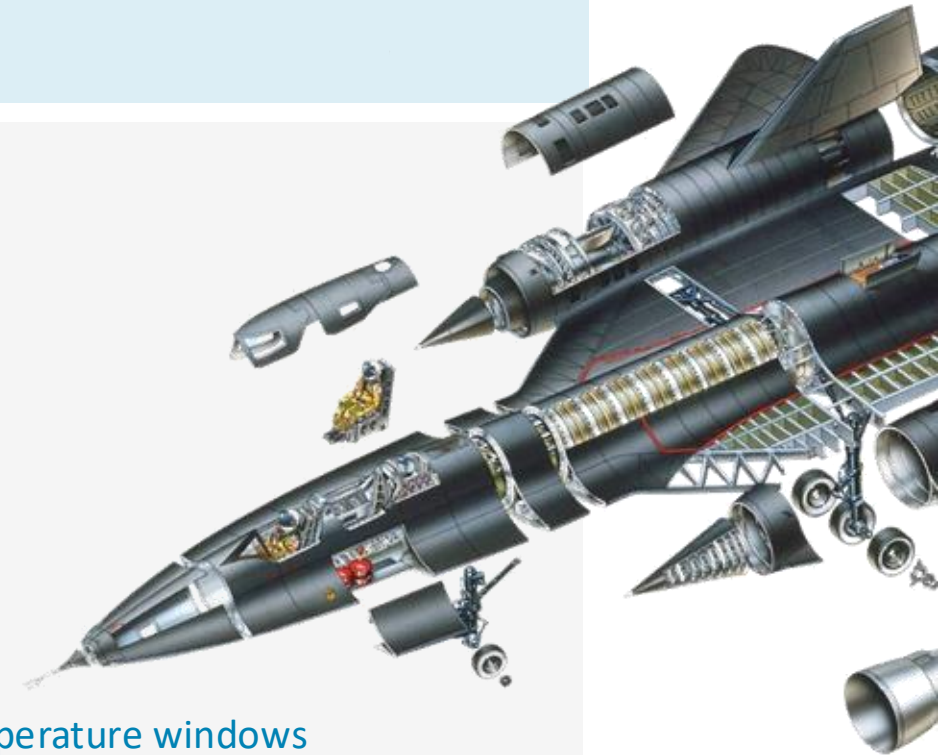
voestalpine
ONE STEP AHEAD.

TITANIUM IN AEROSPACE

ADVANTAGES & DISADVANTAGES

Titanium is used due to its excellent performance per kilogram, durability and temperature capability

- » Low density ... 4.4–4.8 g/cm³, roughly 50% of steel
- » Thermal performance ... remains its strength up to 600°C
- » Low thermal conductivity ... 6.7 to 7.0 W/(m·K)
- » High corrosion resistance ... self-healing layer of titanium dioxide (TiO₂)
- » High price & restricted availability
- » Allotropic transformation ... $\alpha \rightarrow \beta$ transformation
- » Complex processing routes ... adhesion, oxidation, springback, narrow temperature windows



INDUSTRIAL TI FORMING PROCESSES FOR SHEET METALS

Superplastic forming (SPF)

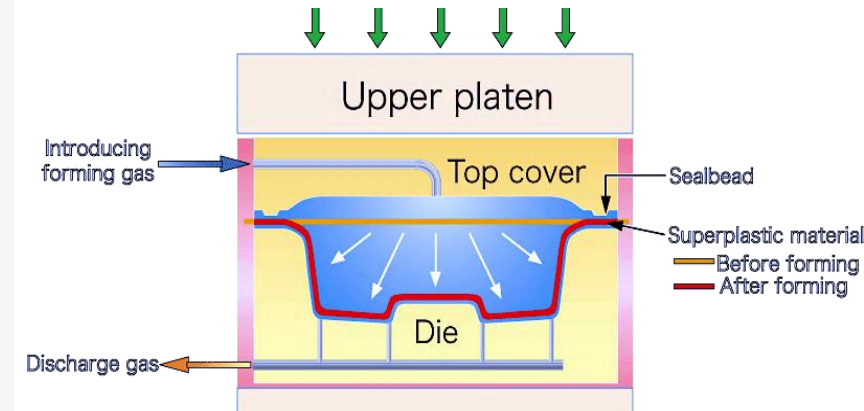
Gas-pressure forming in heated die

- » Elongation >1000 %
- » High-complexity parts possible
- » Forming temp ~900 °C,
- » Heat-resistant tools necessary
- » Very slow strain rates, cycle times typically 2-4hours
- » Argon atmosphere required
- » Thin α -case often

Hot Forming

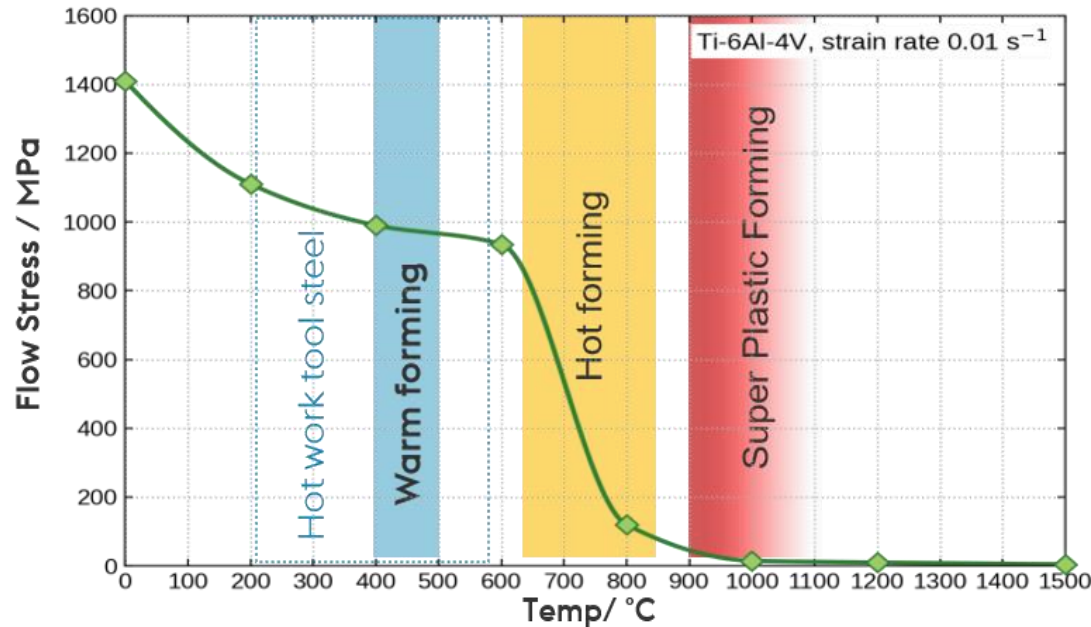
Stamping process with heated die

- » faster than SPF, cycle time 5-30minutes
- » Forming temp. ~650–850 °C
- » Heat-resistant tools necessary
- » Limited geometrical complexity
- » alpha-case oxidation layer forms above 480°C



GOAL & APPROACH

DEEP DRAWING PROCESS

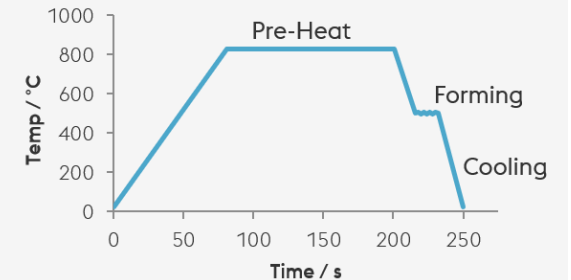


Goal: lowering forming temperature to make tool steel usable ... 500 °C or lower

Hypotheses: Formability of BCC β is by far higher than of HCP α

Approach:

- 1) Preheat to the α - β regime
- 2) ... to increase β amount
- 3) Transfer to 500 °C die
- 4) Form part with high strain rate

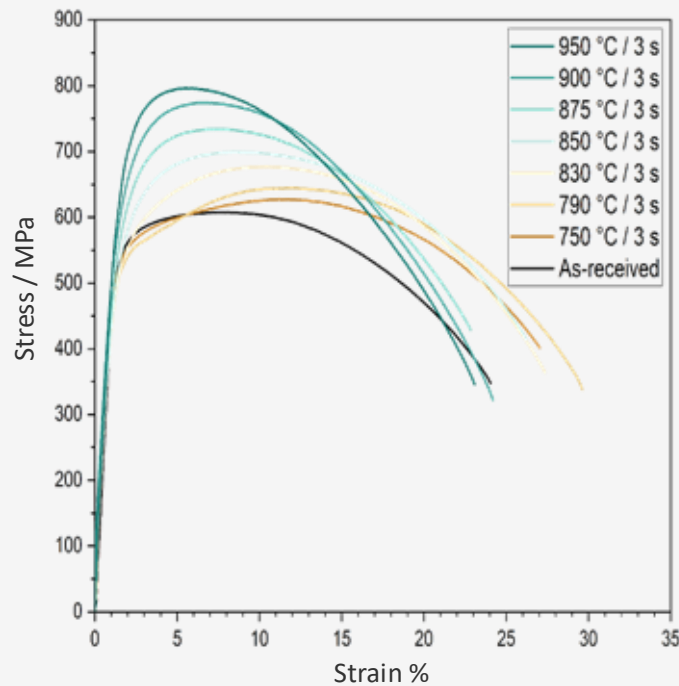


SAMPLE TESTING

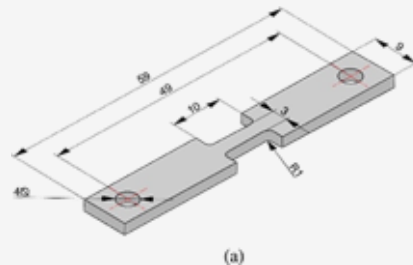
HOT TENSILE TESTS

Pre-heating temperature has the most influence on the deep drawing process

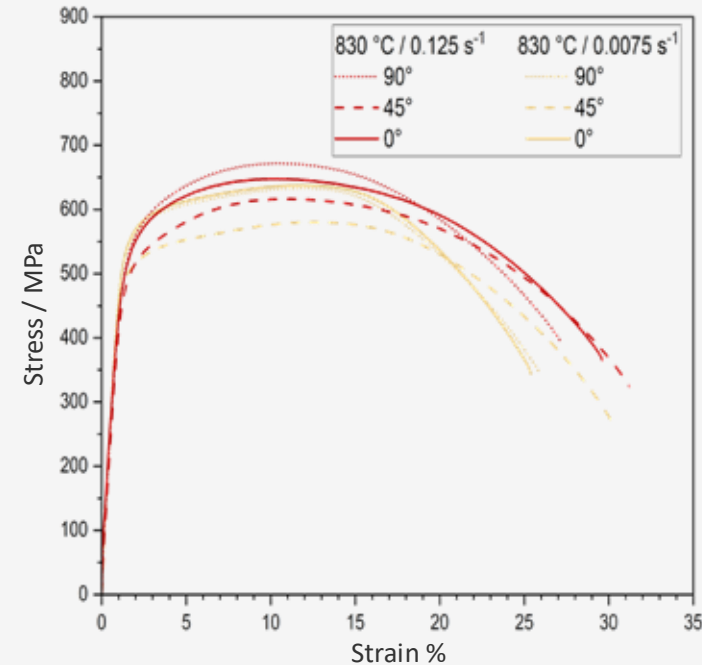
Influence of different preheating temperatures



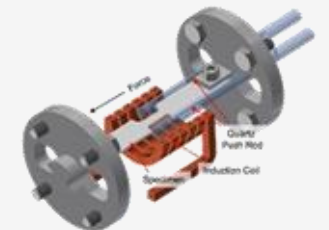
A lower pre heating temperature causes less stress in the deep-drawing process



Influence of different rolling direction

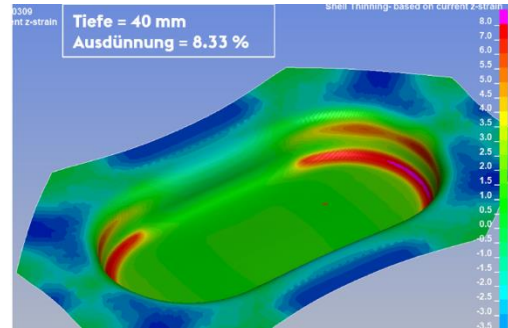
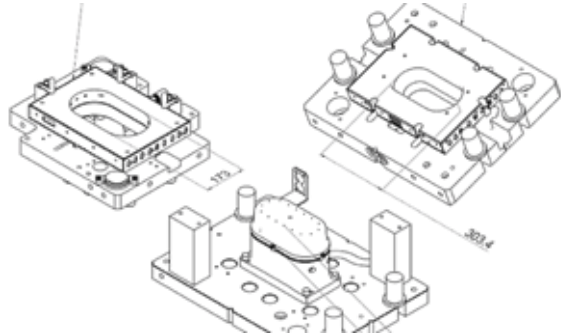


The orientation of the sample in relation to rolling direction has minor influence on stress and strain.



EXPERIMENTAL SETUP

DEEP DRAWING PROCESS



Setup

Deep-drawing test of scaled Titanium
“Service-pod” cups with 1.6 mm sheet thickness

- » Tool set containing punch, blank holder & die;
- » made of hot work tool steel
- » Tribological measurement system
- » Thermocouples
- » 250 t servo hydraulic press
- » Forming for drawing simulation

RESULTS

KEY PERFORMANCE VALUES

Deep-drawn test of Ti service pot cups with 1.6mm thickness with conventional hot-work tool steel

450 °C

Forming temperature

1,090 MPa

Ultimate Tensile strength

68.5 mm

Crack-free depth

< 1 s

Effective forming time

10.9 %

Elongation at break

No α -case

detected in trials

15–70 mm/s

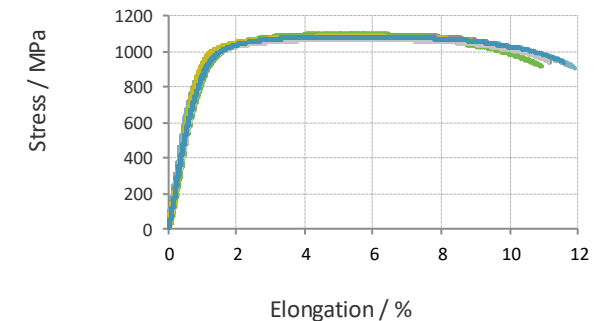
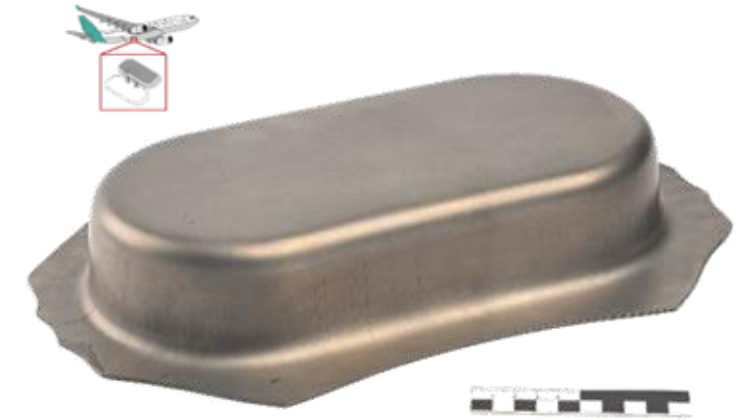
Forming speed

Ra 1.8 μ m

Surface roughness

1.5 MJ/kg

Process Energy



SUMMARY & CONCLUSIO

PROCESS COMPARISON – SPF vs WARM FORMING

Use **SPF** for complex geometries. Use **deep drawing** when rate, energy, tooling and cost dominate.



~97 %

lower energy use

1.5MJ/kg vs. ~80MJ/kg



~95 %

Shorter cycle time

minutes vs. hours



↓ €

lower tooling costs

hot work tool steel vs NiBas



Setup

simple drawing

No gas or vacuum needed



No α -case

reduced oxidation

no chemical post processing



✓ UTS

high performance

for medium complex parts

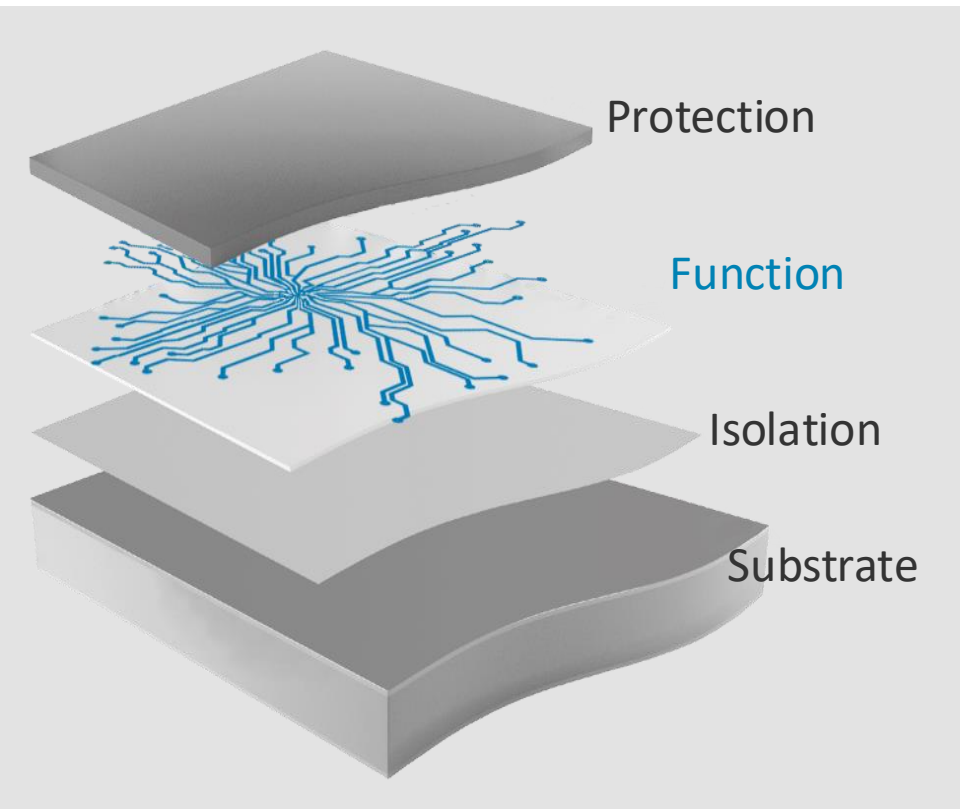


OUTLOOK

TAILORMADE FUNCTIONAL STEEL

INTEGRATED FUNCTIONALITY FOR LIGHTWEIGHT PRODUCTS

Embedded conductor tracks on steel combine capacitive and resistive principles for detection and heating applications



AEROSPACE & AUTOM. APPLICATIONS

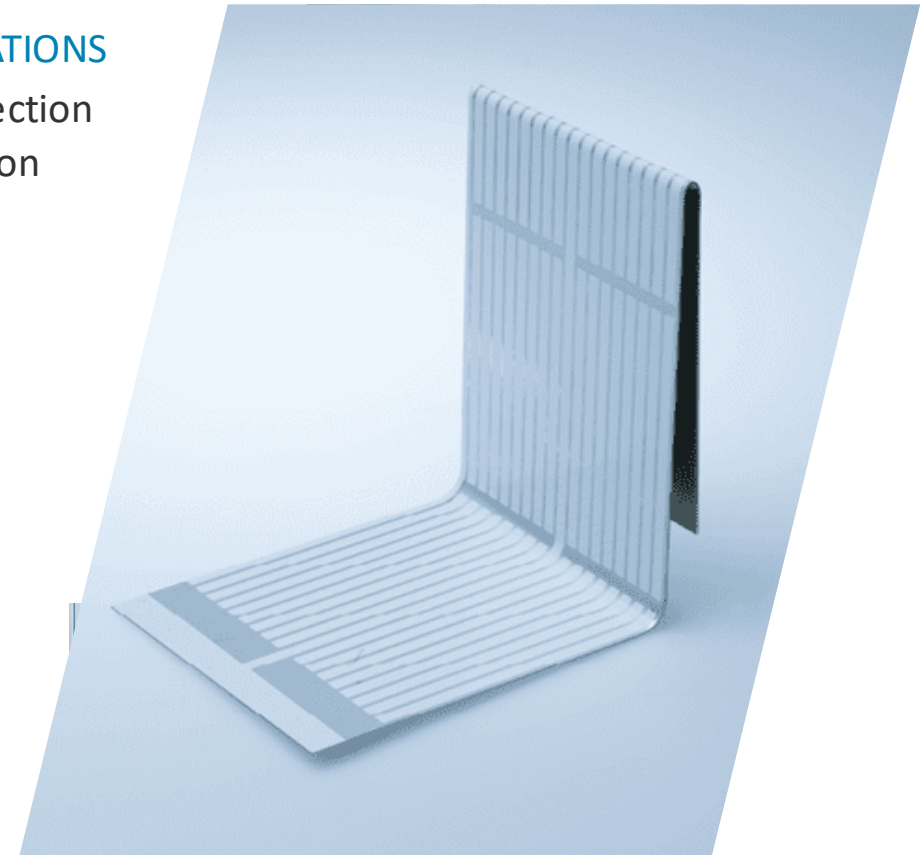
- » Damage- & deformation detection
- » Liquid- & condensate detection
- » Load detection

HEATING

- » De-icing function
- » Thermal management
- » Condensate avoidance

LOAD RECOGNITION

- » „Out of shelf“ function
- » Weight measurement
- » Fill level recognition



FROM MICROSTRUCTURE TO COMPONENT: ENABLING COST-EFFECTIVE DEEP DRAWING OF TITANIUM SHEETS

ELN Conference 2026

DI Dr. Christopher Wiednig, voestalpine Metal Forming GmbH
DI Dr. Carina Schlögl MBA, Austrian Institute of Technology



PRESENTATION 3 OF 4



Daniel Claret

CEO, Composites ATE – Barcelona (ES)

NERTHUS: Fast-Cure Bio-Composites for Aerospace



SHAPING EUROPE'S LIGHTWEIGHT FUTURE FOR SUSTAINABLE MOBILITY

Automotive · Aerospace · Railway · Dual-Use Technologies and Defense

ELN CONFERENCE
SPAIN
2026



7-8 OCTOBER 2026

PALAU MACAYA, BARCELONA

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ABOUT US

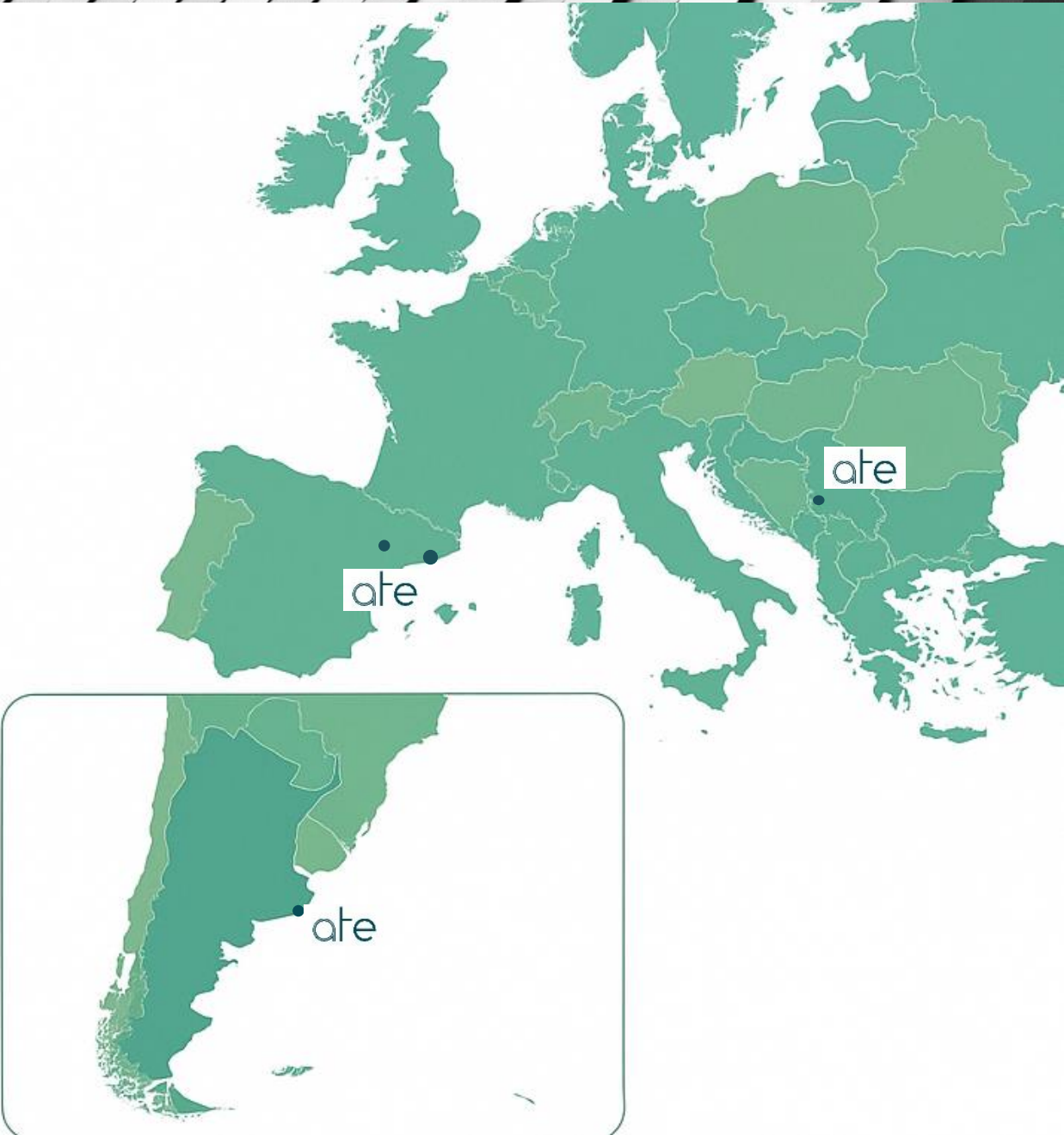
Founded in 1997, Composites ATE develops and industrializes high-performance composite parts for demanding OEMs, from concept to series production.











WHY ATE?

Engineering-led composite manufacturing, from prototype to series

- **Engineering-driven manufacturing:** Solving structural, aesthetic, and functional challenges that go beyond standard material and process limits.
- **Industrial focus from day one:** Every prototype is developed with repeatable and stable series production in mind, ensuring a seamless transition to industrial scale.
- **Direct access to experts:** We eliminate bureaucracy. Your engineering team has direct access to our process specialists for faster iteration.
- **Value Engineering:** We re-engineer parts to optimize material usage, reduce cycle times, and lower total cost of ownership.

Awards:

- Catalan Government 2022: *30 most disruptive companies of the year in Catalonia*
- Advanced Manufacturing Madrid 2022 Fair: *Best Technology in Composites Manufacturing*
- IN-MOVE (Spanish Rail cluster) 2023: *Award to Advanced Materials*



SECTORS

Automotive

- **Prepreg Compression Moulding**
- Tailored finishing
- **Serial Production** (100.000 sets/year)
- **Prototyping**
- **Repair** of Carbon Fibre parts



Aerospace

- **Design and development of parts, and industrial means**
- Prepreg Compression Moulding, autoclave, infusion...
- **Satellite Parts**
- **Aircraft Parts**



Sports

- **Premium sport accessories**
- Prepreg Compression Moulding
- Integrated **impact absorption** material



Railway

- Approved bonding and painting facilities for railway applications
- In-house manufacturing, finishing and assembly
- **European Adhesive Bonder (EAB)** certified personnel
- **Fire proof** (EN45545) manufacturing



NERTHUS

- Eureka-Eurostars EU-Founded project
- New Materials for the New Mobility.
- 5 partners (ATE leader), 3 years project. 2,7M€ budget
- **Full-scale demonstrators** under development for reference mobility OEMs Aero, Auto, Rail, Space & Sports
- **Bio-based pre-impregnated materials featuring:**
 - Fast cure or Self-healing Resin
 - Enhanced Natural Fibers or Carbon Fibers.



COMPONENT TARGET

Airbus A350 XWB Section 19 Access Covers

- **Unpressurized tail cone.** Secondary fairings located ahead of the auxiliary power unit.
- **Non-structural integration.** Zero primary flight loads or hydraulic pressure exposure.
- **Class-A aerodynamic flushness.** Must eliminate parasitic drag along the outer mold line.
- **Direct geometric fit.** Perfect adaptation to the adjacent carbon fiber fuselage panels.



TOOLING ARCHITECTURE

Calibrated Shims

- Precision mechanical stops integrated in-situ.
- Direct control over final cavity depth.
- Regulates laminate compaction dynamically.

Independent Plugs

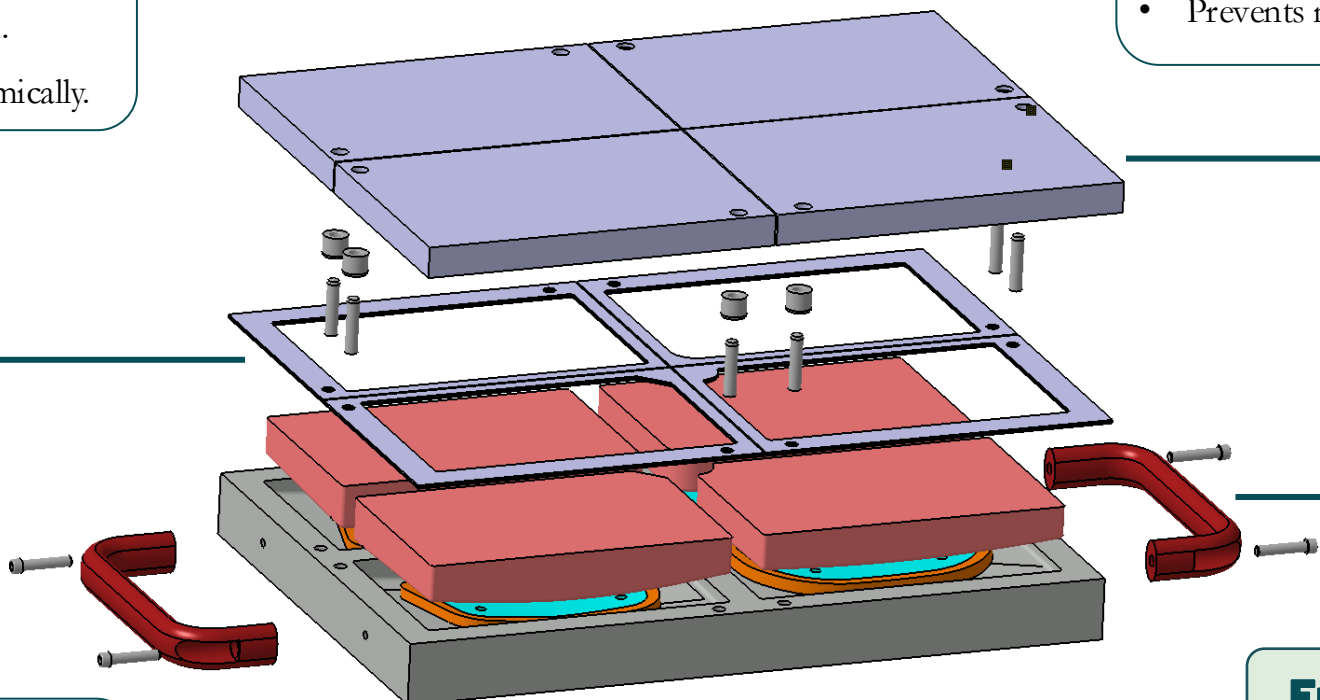
- Four completely autonomous upper covers.
- Aligned via precision guide dowel pins.
- Prevents mechanical tilting during prototypes.

4-Cavity Base

- Groups four symmetrical pieces together.
- Maximizes heated platen surface utilization.
- Optimizes thermal transfer efficiency.

Ergonomic Handles

- Heavy-duty bolted steel side mounts.
- Enables safe handling at high temperatures.
- **Eliminates overhead crane dependencies.**



INDUSTRIAL SEQUENCE

1

Tool Surface Preparation

Chemical cleaning and application of semi-permanent high-temperature release agents.



2

Automated Cutting & Layup

2D CNC plotter nesting guarantees exact geometry before manual cavity collation.



3

Thermocompression Curing

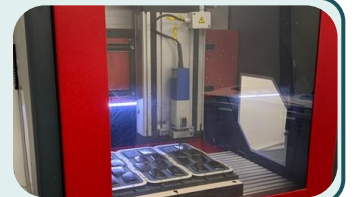
Heated platen consolidation under controlled tonnage until mechanical stops lock.



4

Demolding & CNC Trimming

Ergonomic extraction followed by precision perimeter edge routing on vacuum fixtures.



VALIDATION RESULTS

Quality Outcomes

- **Class-A Finish:** Aerospace-grade outer surface achieved directly from the mould.
- **Monolithic Structure:** 100% integrated architecture without secondary bonded stiffeners.
- **Flawless Consolidation:** Zero surface porosity, pinholes, or interior dry spots detected.
- **Airframe Tolerances:** Machined fastener geometry aligns perfectly with existing structures.





Composites ate, S.L.

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PRESENTATION 4 OF 4

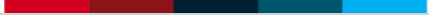


Mate Gaal

Researcher, BAM (DE)

Contact-free ultrasonic testing for aerospace

Sicherheit in Technik und Chemie



ELN6, Barcelona
7-8 Oct. 2026

CONTACT-FREE ULTRASONIC TESTING FOR AEROSPACE

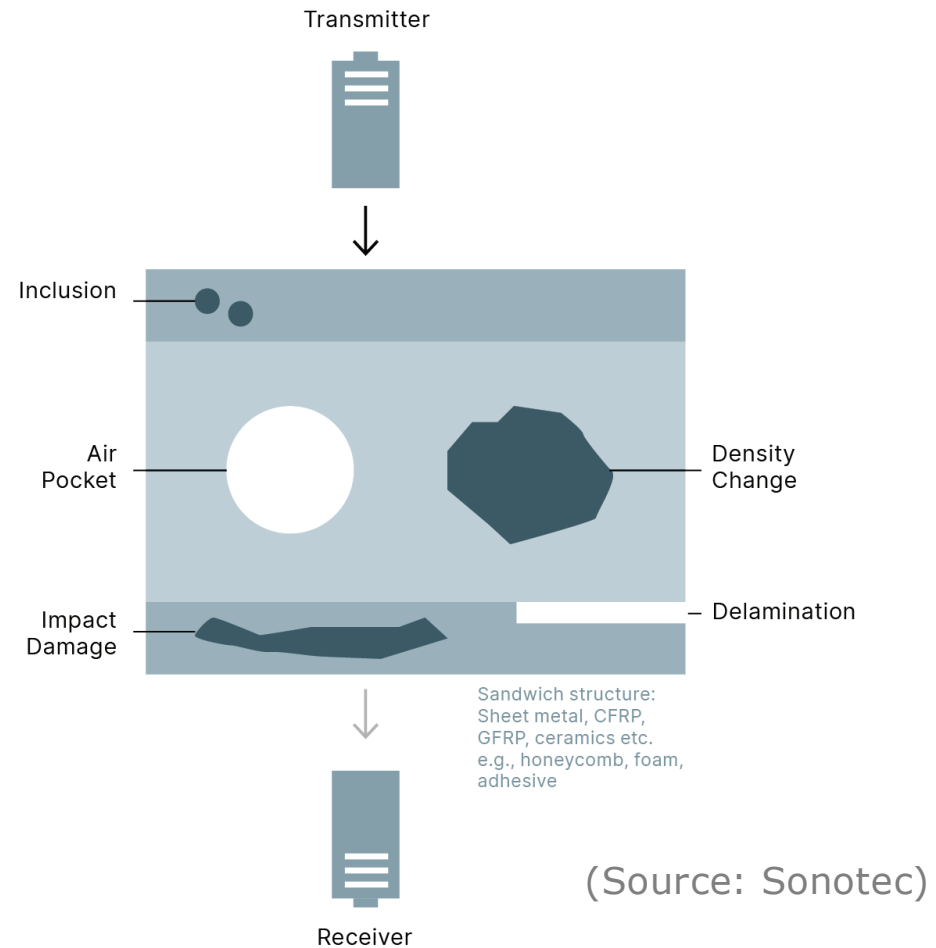
Mate Gaal

Bundesanstalt für Materialforschung und –prüfung BAM



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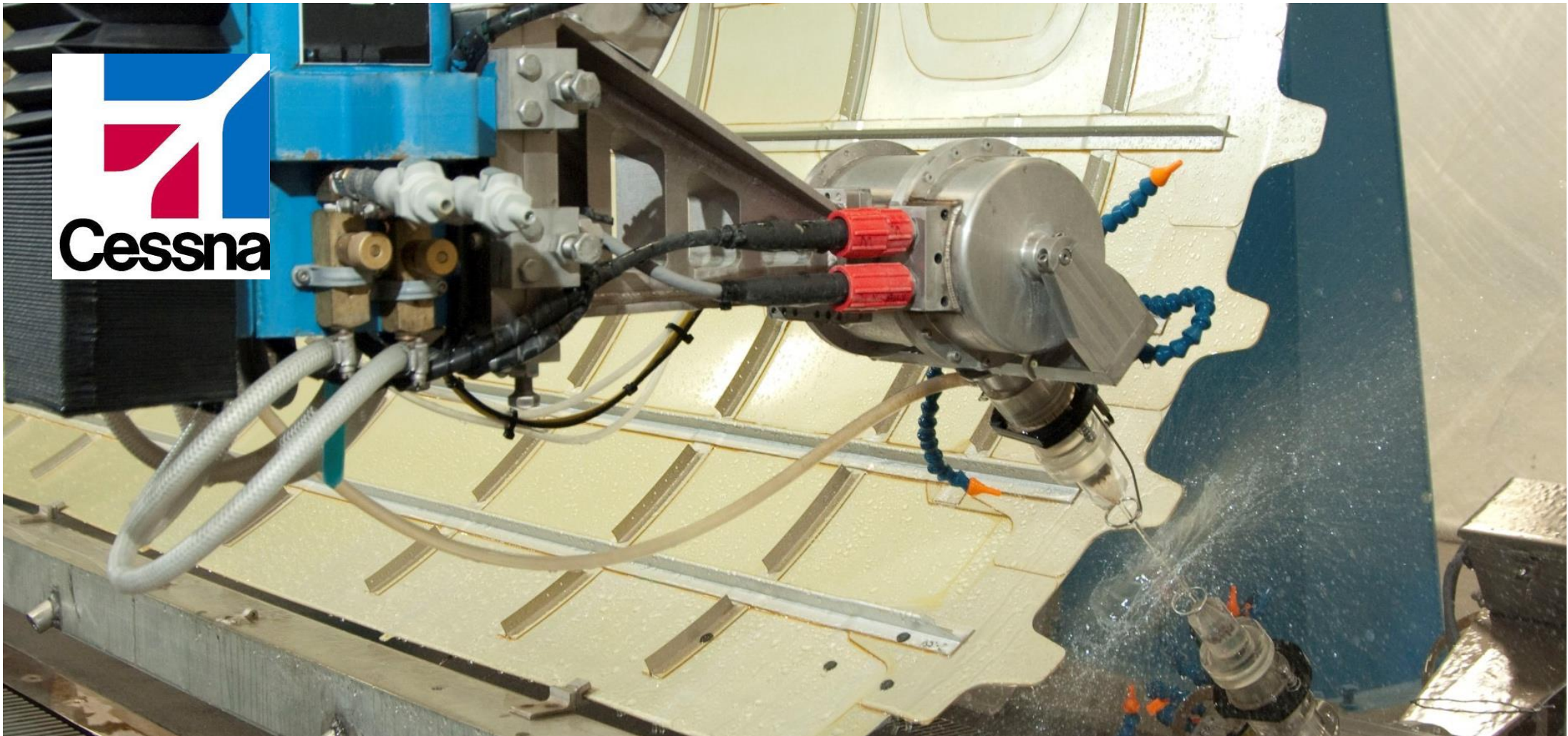
Air-coupled ultrasonic testing (ACUT) applications



Airbus A350

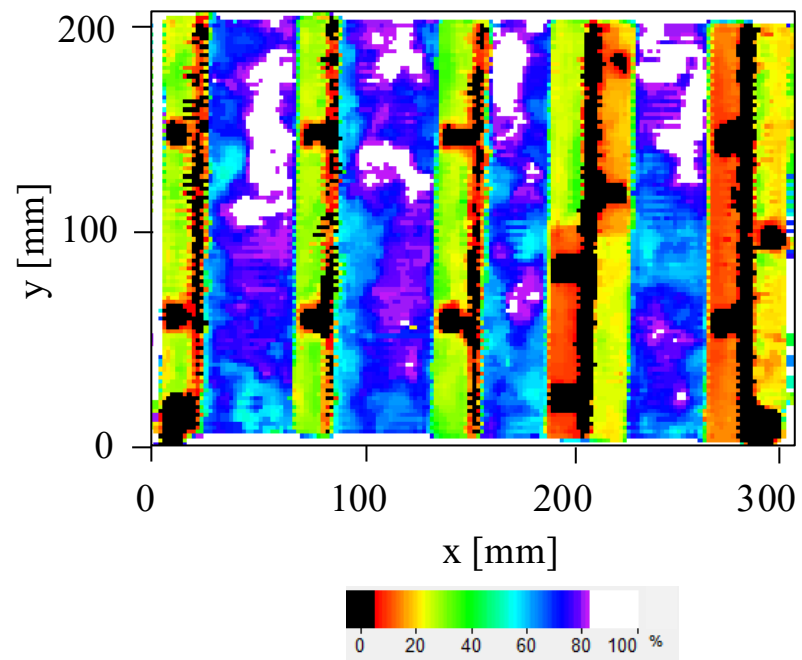
(Quelle: reinforcedplastics.com)

State-of-the-art as benchmark: squirter-jet technique

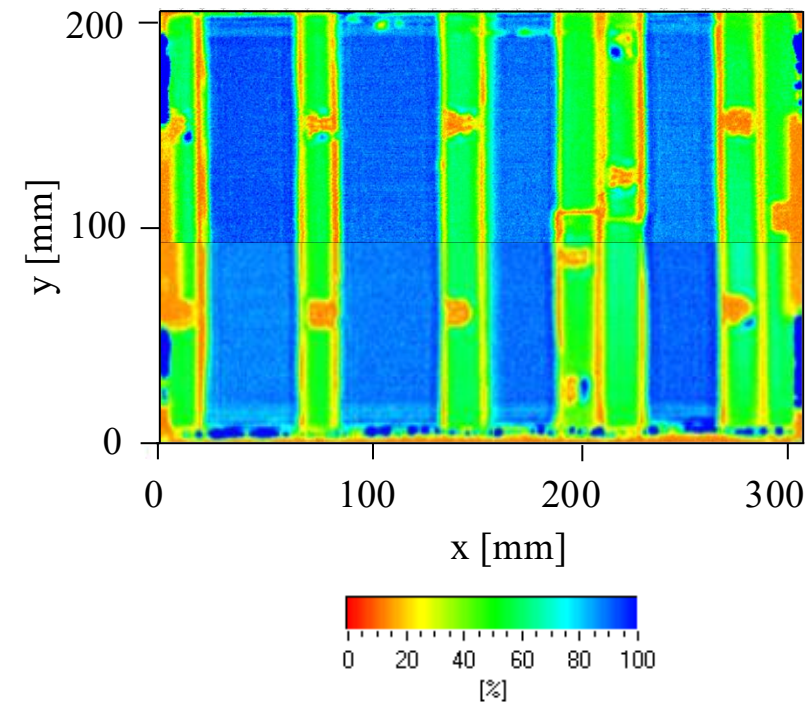


Comparison

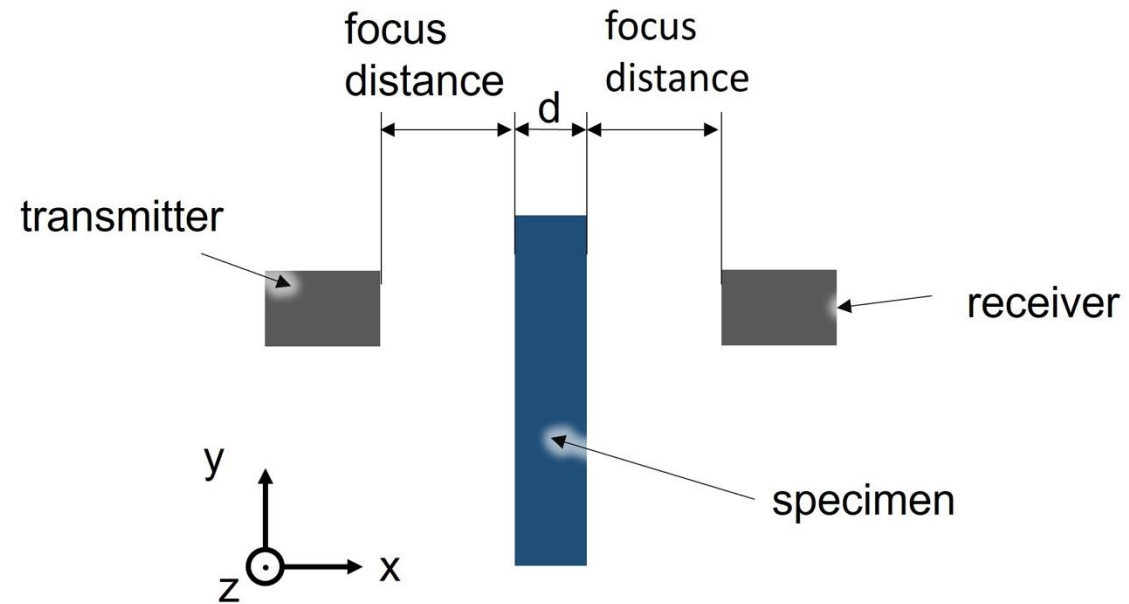
Squirter jet UT



Air-coupled UT



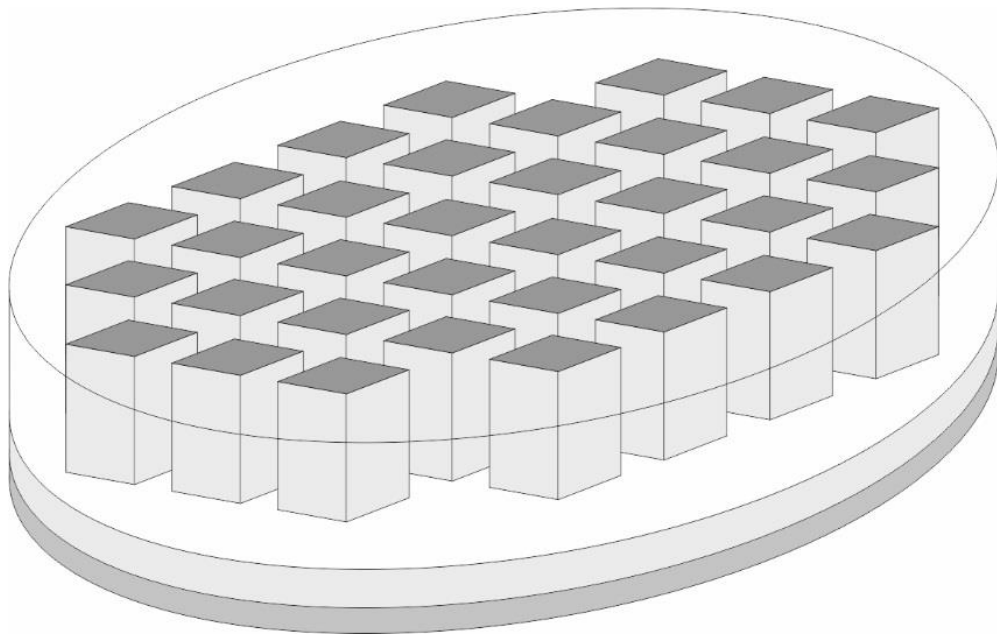
Typical ACUT setup



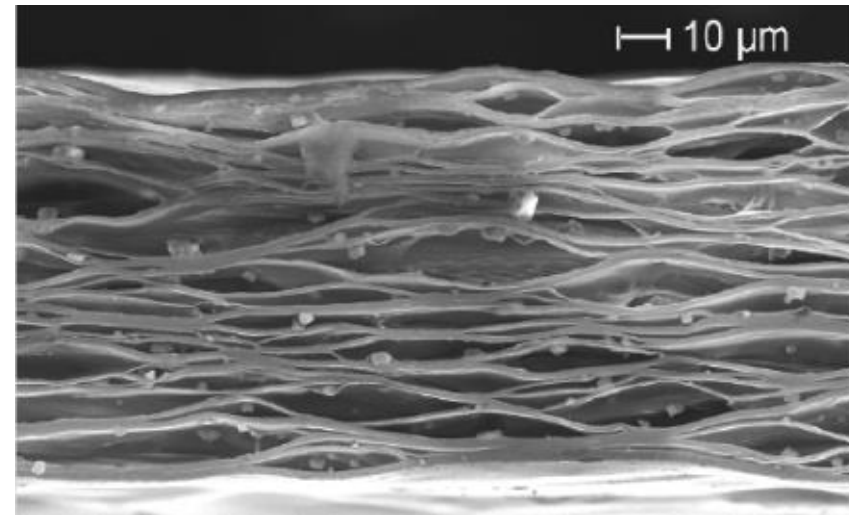
Challenge:
One-sided access!



Common air-coupled transducers:
piezocomposites + matching layers

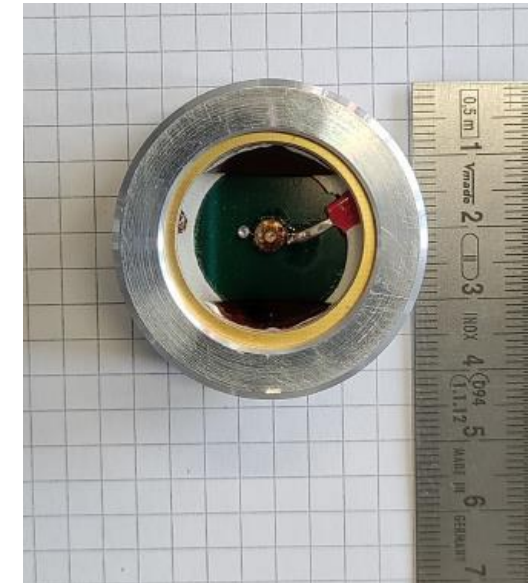
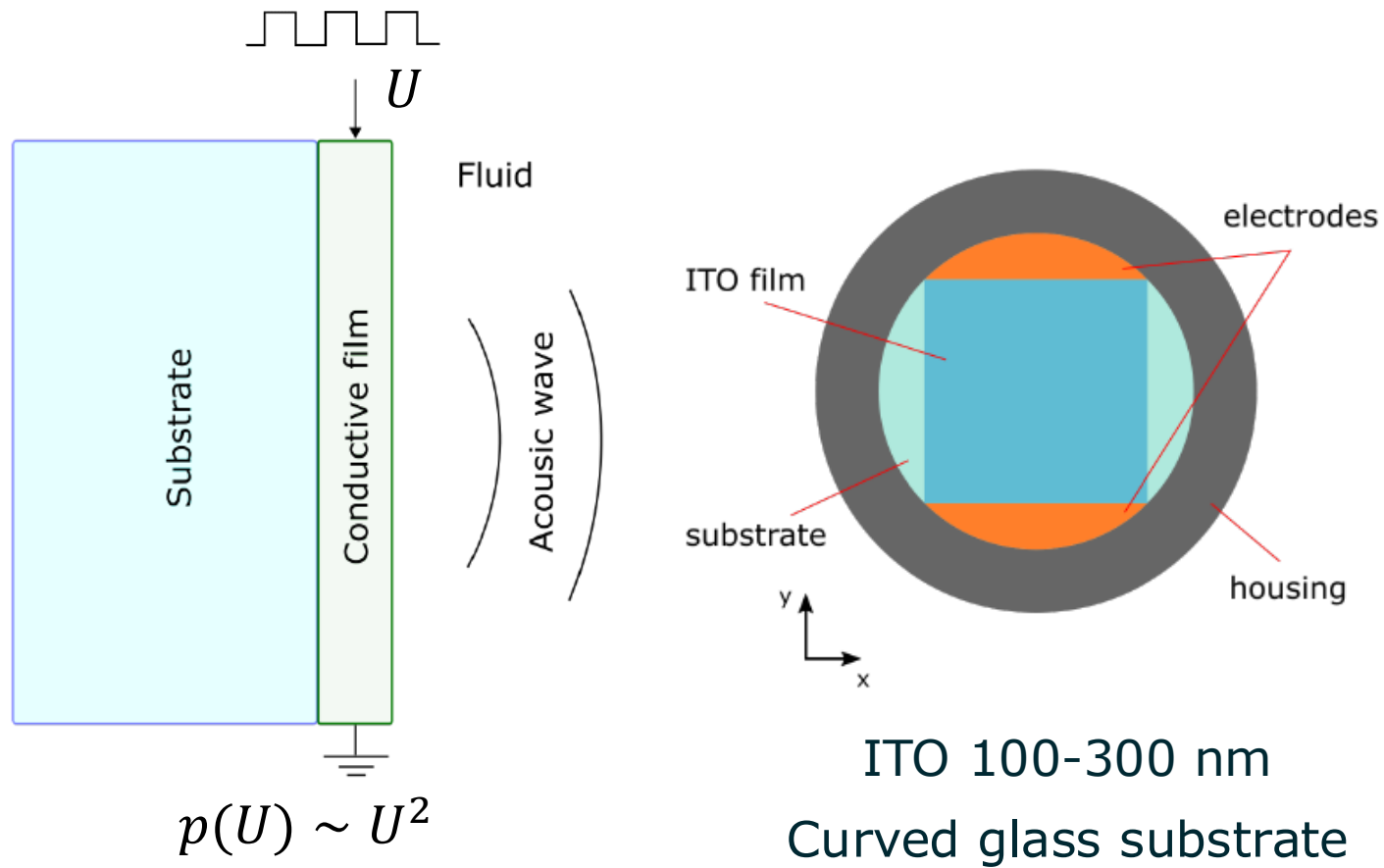


Ferroelectret air-coupled transducers:
charged cellular polymers



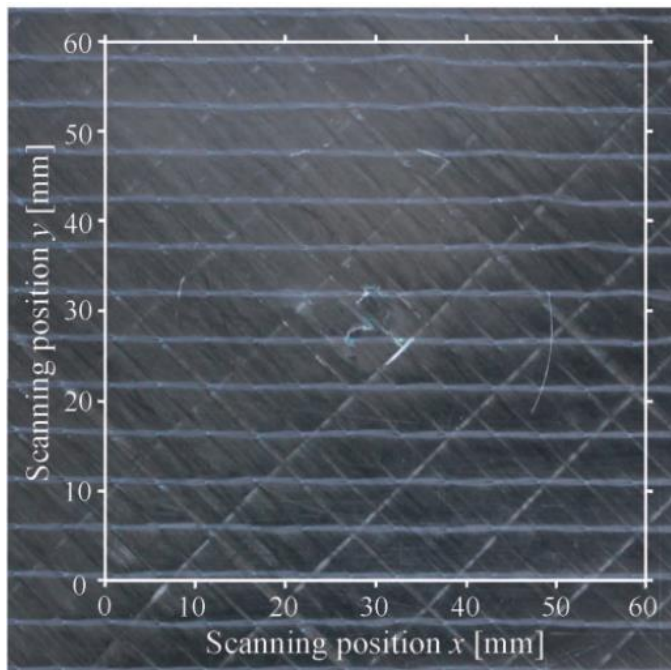
Source:
EMFIT Ltd.

Thermoacoustic transmitter

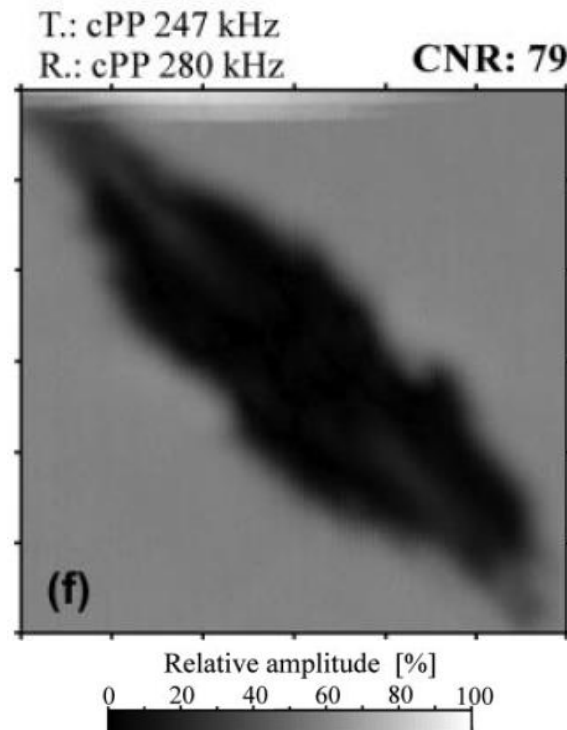


Comparison of typical test results

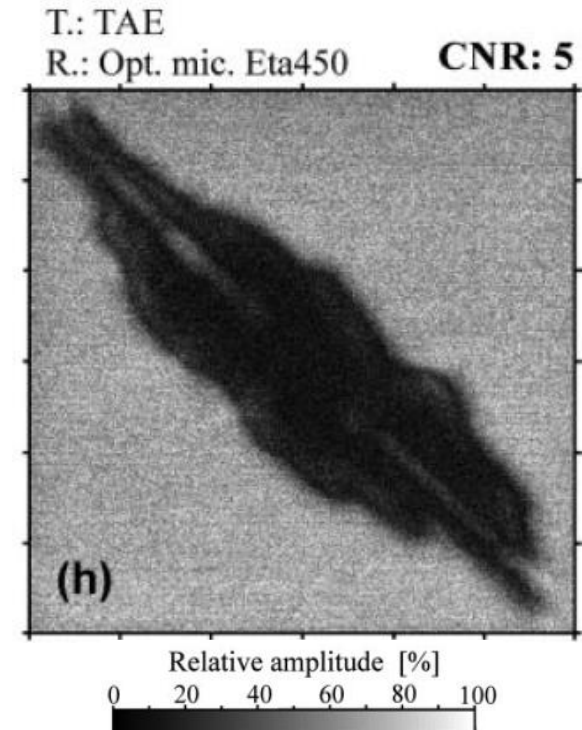
CFRP plate, 2,1 mm
Impact damage



Ferroelectret
transducers

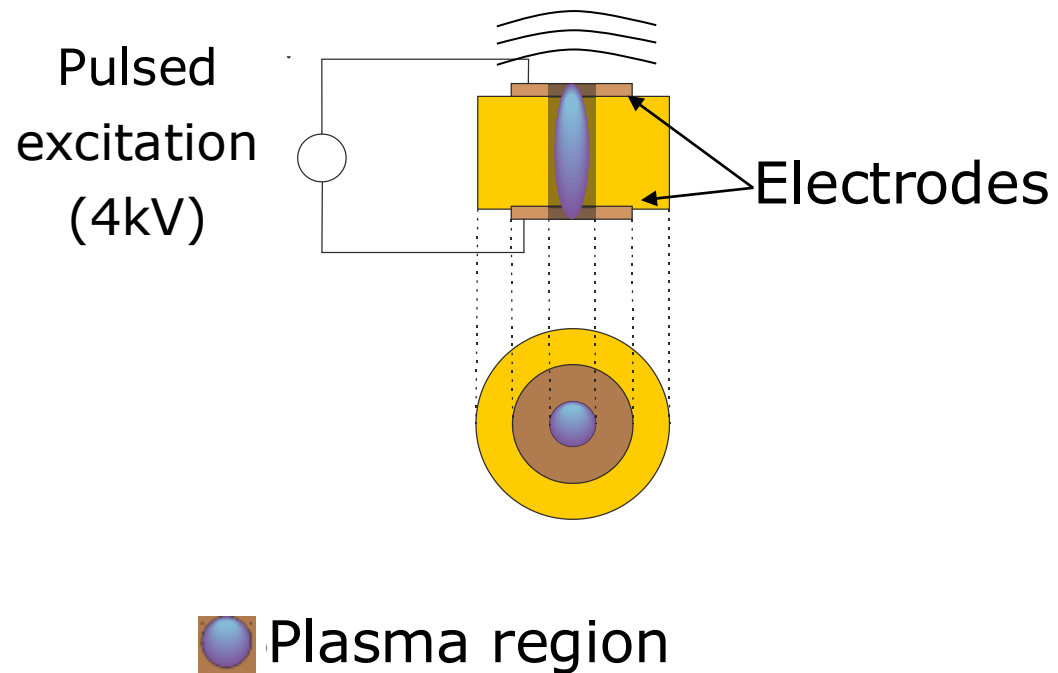


Thermoacoustic transmitter
and optical microphone

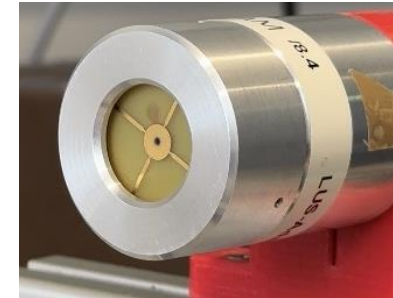
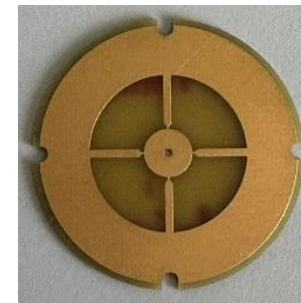


From J. Rus et al, Qualitative comparison of non-destructive methods for inspection of carbon fiber-reinforced polymer laminates, J. of Comp. Mat. 54 (27), 2020

Micro-hollow cathode (MHC) plasma



- Corona discharge as a source of ultrasound



- Transducer parameters:
Diameter 1 mm
Electrode distance 1.6 mm

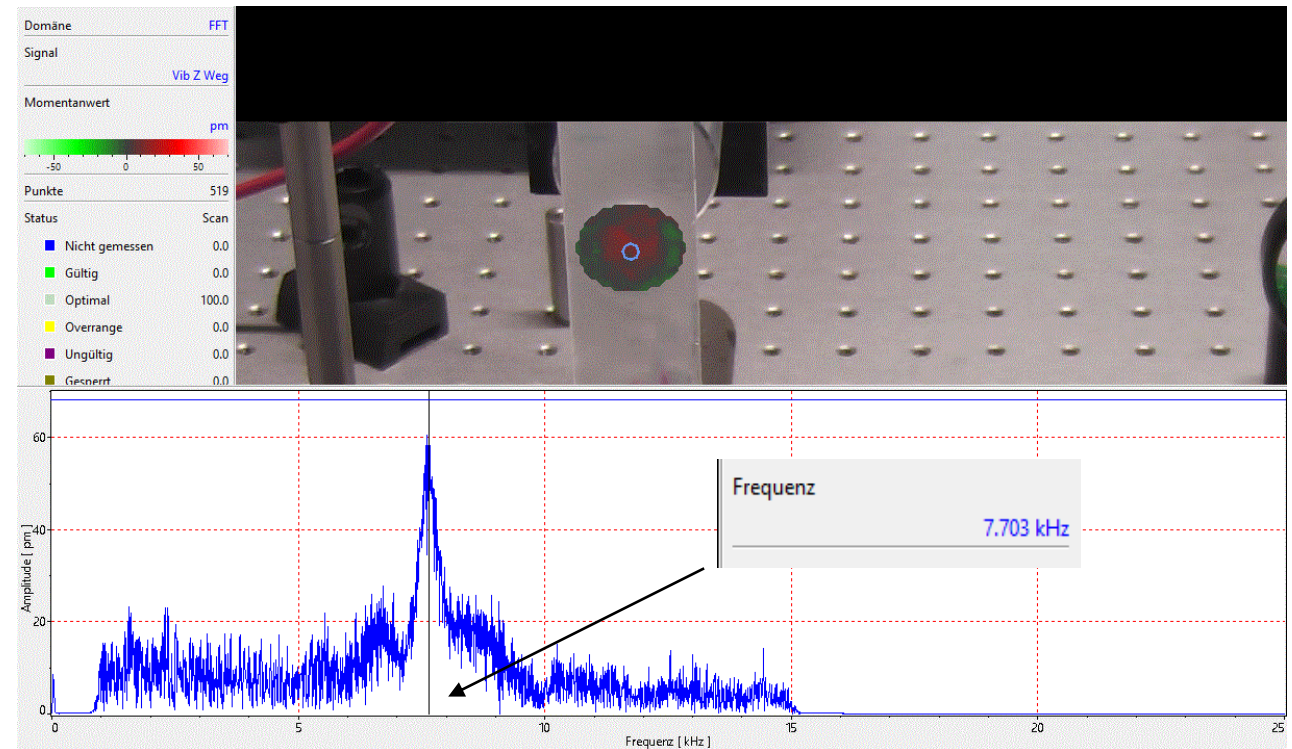
3D laser vibrometer measurements



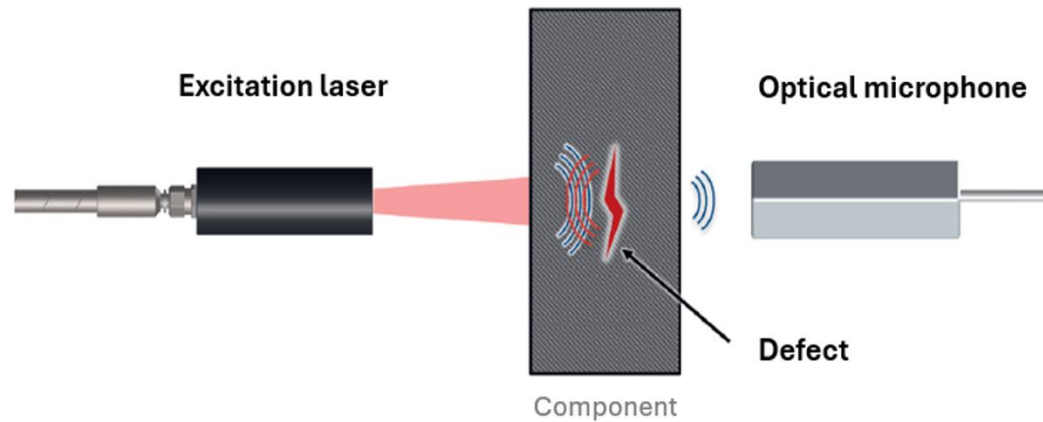
FBH 1: $f_{\text{LDR}} = 7,6 \text{ kHz}$

FBH 2: $f_{\text{LDR}} = 7,7 \text{ kHz}$

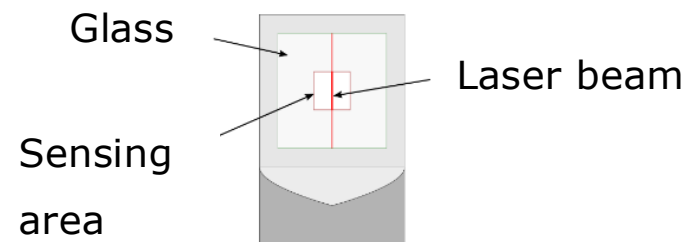
Theory: $f_{\text{LDR}} = 8,4 \text{ kHz}$



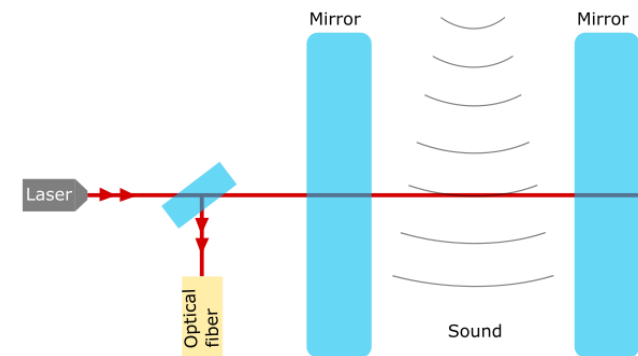
Laser-based technology



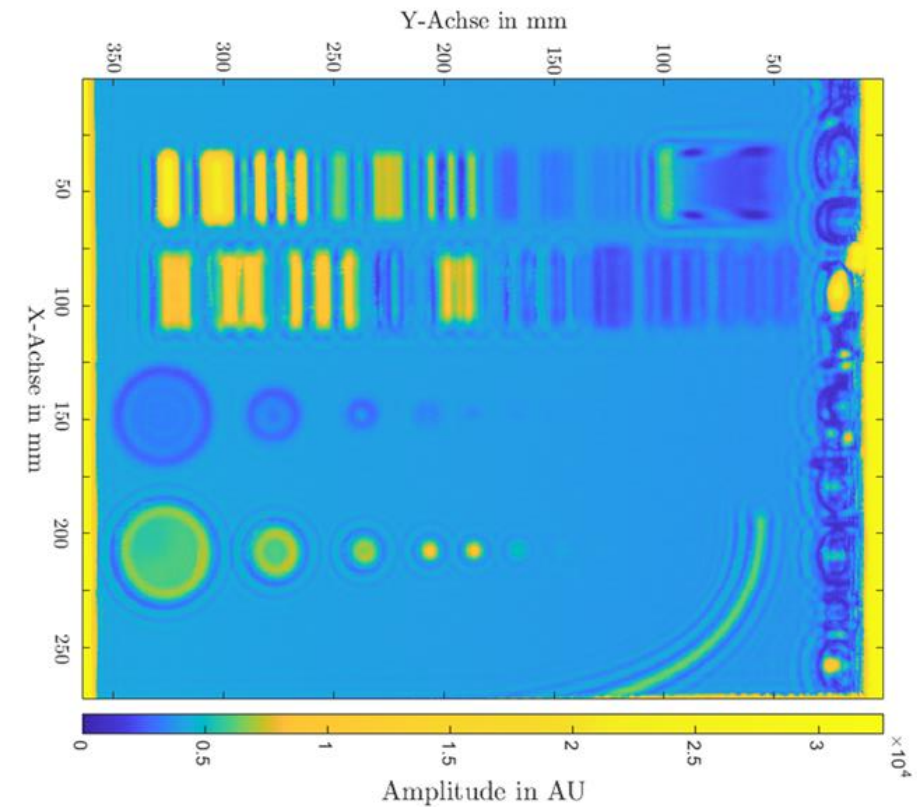
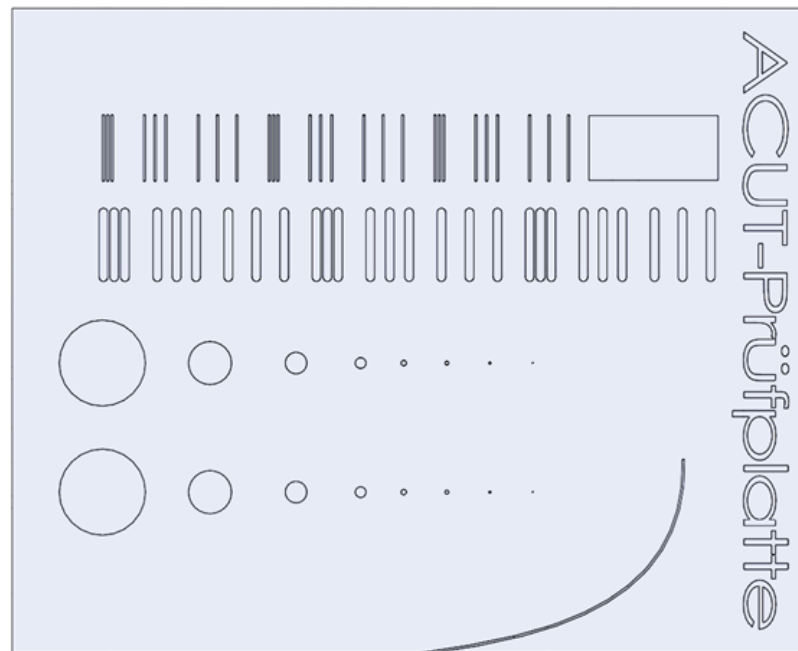
(Source: Xarion)



- Advantage:
- Large bandwidth
 - Higher resolution
- Disadvantage:
- Lower sensitivity



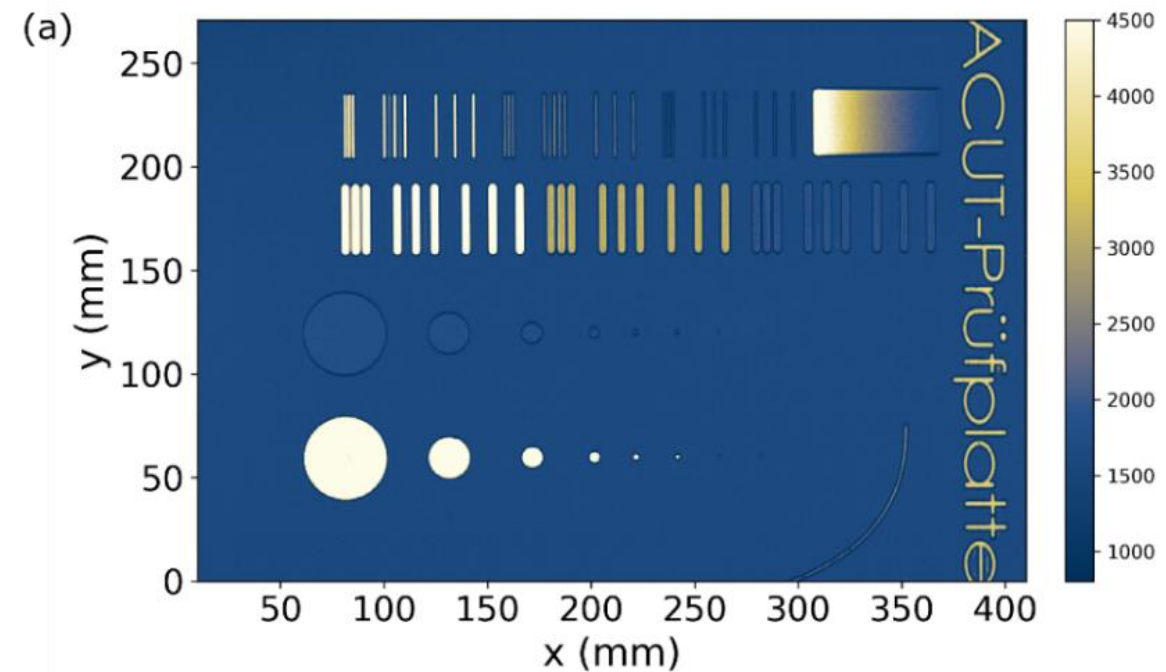
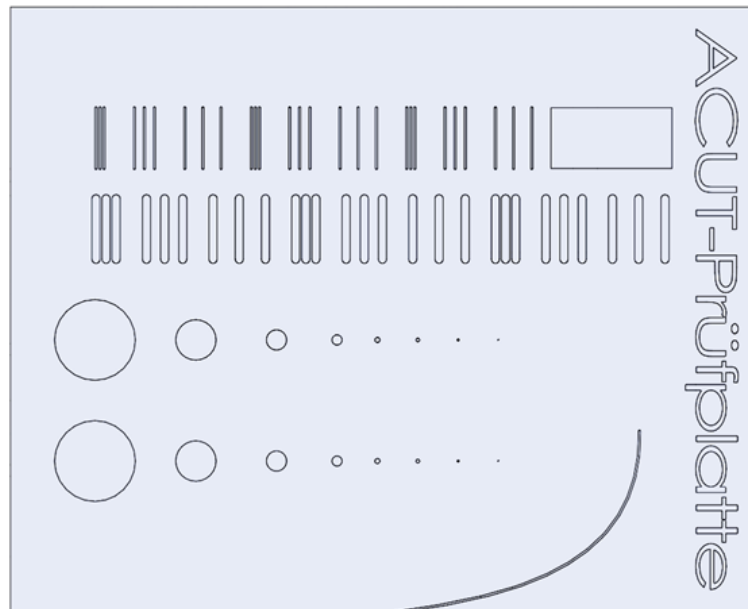
PMMA, thickness 5 mm Piezocomposite probes



(Source: IKT Stuttgart)

PMMA, thickness 5 mm

Laser excitation and optical microphone



(Source: Xarion)

Lightweight materials: CFRP, GFRP, sandwich structures, metal adhesive joints

Flaws: delaminations, impact damage, pores, ondulation, air pockets, missing adhesive

Conventional probes:

- Piezocomposites with matching layers

New technologies:

- Ferroelectrets
- Thermoacoustic transmitters
- Plasma transmitters
- Optical methods
- Innovations in signal processing

Thank you for your attention!

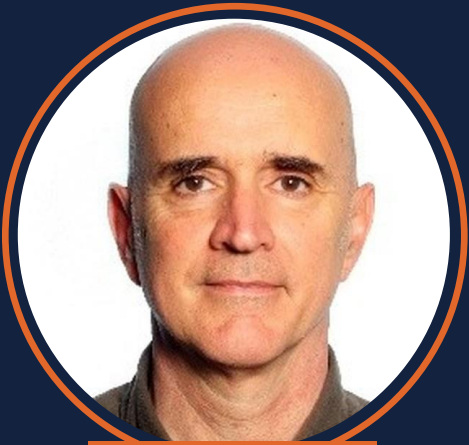


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PANEL DISCUSSION

Aerospace

7 October · 12:00 – 13:30 · Main Auditorium



MODERATOR

Josep Costa

University of Girona (ES)



Peter Glaser

FACC AG (AT)



Christopher Wiednig

voestalpine AG (AT)



Daniel Claret

Composites ATE (ES)



Mate Gaal

BAM (DE)

DAY 1 · WEDNESDAY 7 OCTOBER

Lunch

13:30 – 14:30 · Foyer next to the Main Auditorium

THIS AFTERNOON

All afternoon

MAV Lightweight Expo

Rooms 3 & 4

14:00 – 18:00

**Brokerage Event · B2B
meetings**

Room 6

14:00 – 15:30

**Lightweight EU Project
Workshop**

Room 5 · led by ACCIÓ

15:30 – 18:00

ELCA General Assembly

Room 5 · led by BAX

No auditorium sessions this afternoon. The conference resumes tomorrow at 09:00.