

Access to technical & business support to implement nanotechnologies





Ramona Landgraf
BLUMORPHO
Venture Project Manager



Speakers



Sonia Florez Fernandez
TECNALIA
Project Coordinator OASIS



Roman Pasek
AMIRES
Programme Manager
for Advanced Manufacturing



Matthias Warkentin
FORD
Research Engineer
Ford R&A Europe



OASIS

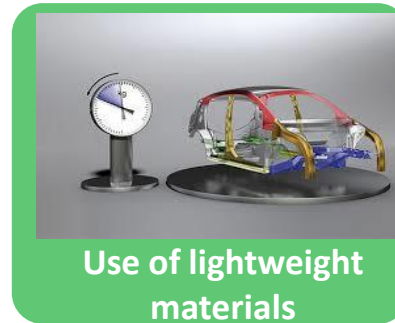
Open Access Single entry point
for scale-up of Innovative Smart lightweight
composite materials and components



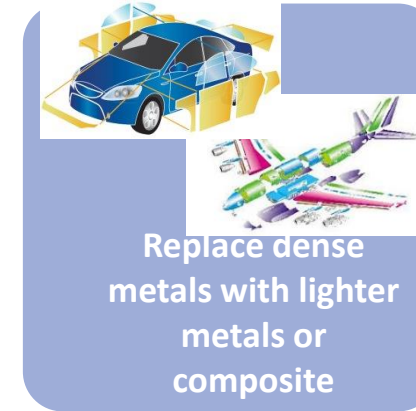
PROBLEM



CE directives
regulations



Use of lightweight
materials



Replace dense
metals with lighter
metals or
composite

PROBLEM:

1. **Composites and lighter metals individually: Insufficient properties:** do not meet all requirements for mechanical, electrical or thermal abilities
2. **Nanotechnology** cannot easily be introduced into composites and metallic supply
3. **Lack of industrial scale** manufacturing of nano-enabled products
4. **Not sufficient quantities** are currently produced for the high demanding industries
5. **High Cost** of intermediate nano-enabled products, especially for SMEs
6. **Tailored solution for each application:** different chemical content, production process, etc
7. **Limited accessibility** to SME producers

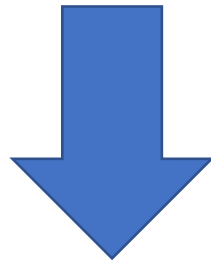




PROBLEM



NANOTECHNOLOGY + ADVANCED MATERIALS
ADVANCED MANUFACTURING



LIGHTER MULTIFUNCTIONAL ESTRUCTURES





PROBLEM



Companies and new technologies- Introduction of nanotechnologies in metallic and polymer composites in **today's industrialized systems** as part of advanced materials and advanced manufacturing processes



Bottlenecks

- Need for specialized expertise
- Investments cost too high
- Novel techniques not a priority
- RTO not offer facilities and services covering the full value chain
- Development of new products may require Access to finance and optimised business plan

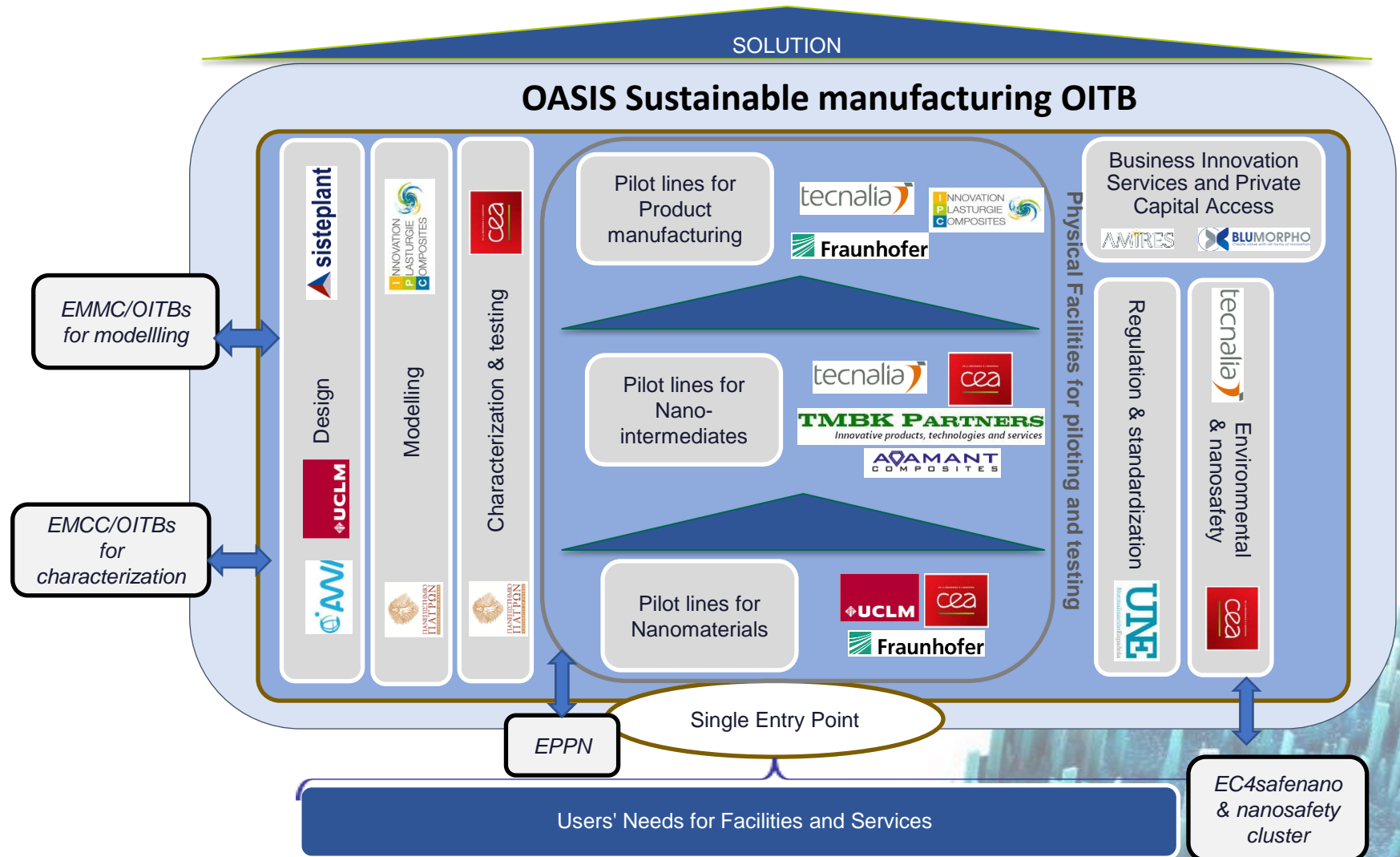


SOLUTION



Develop and organize a **sustainable Open Innovation Test Bed** for innovative scale-up of smart lightweight aluminium and polymer-based composite compounds and products to which

Companies - and more precisely SMEs - can gain access through a **SEP** to **develop, test and adopt, new lightweight**, high performance, **multifunctional**, safe and environmentally friendly high value **materials, components and structures** in a cost-effective and sustainable way



OASIS- ADVANCED MANUFACTURING FACILITIES ECOSYSTEM



Pilot lines for nanoscale structures in unprocessed form with intrinsic functionalities

- SiO₂ nanoreinforced aerogels
- Nanoparticles and nanomaterials synthesis by wet chemical route
- Magnetic and flame retardant nanoparticles and nanocomposites



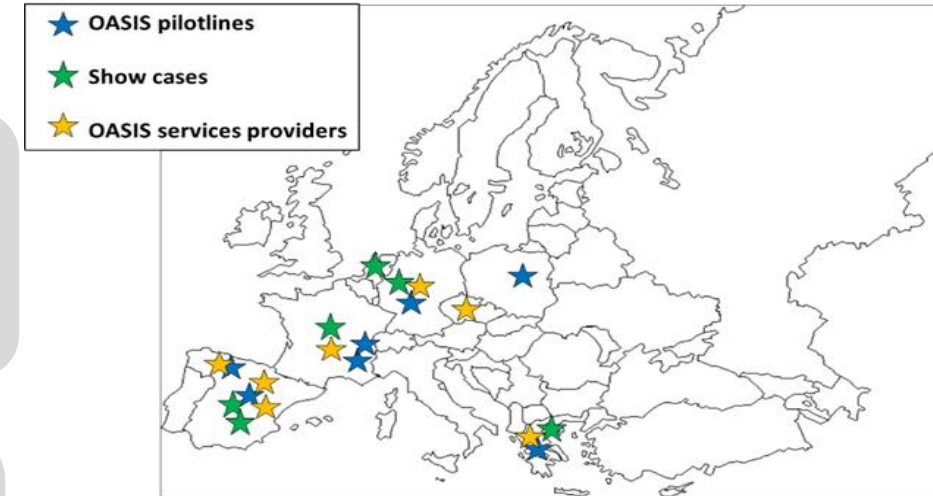
Pilot lines for intermediate product with nanoscale features

- Buckypapers
- CNT treated thermoplastic veils
- CNT treated preregs
- Sheet to sheet smart printed sensors and actuators
- Nanoreinforced metallic alloy ingots



Pilot lines for Nanoenabled-products

- Nano-enabled injected cast parts
- RTM polymer based composites
- Nano-enabled Al/composites hybrid products
- Nano-enabled pultrudates



OASIS Sustainable manufacturing OITB



12 PILOT LINES

Competitive, quality, safe, environmental friendly production of nano-enabled products

Development and commercialization support of lightweight multifunctional products based on aluminium and polymer composites

TECHNICAL SERVICES

From primary concept to final qualification of the product

- ✓ Material selection
- ✓ Manufacturing processes
- ✓ Product and process Design
- ✓ Modelling & simulation
- ✓ Characterisation & testing
- ✓ Sustainable-manufacturing diagnosis
- ✓ Environmental and nanosafety
- ✓ Safe-by-design approaches
- ✓ LCA (recycling concerns)



business support SERVICES

Accelerate market commercialization

- ✓ Diagnosis methodology
- ✓ Training
- ✓ Business support
- ✓ IP
- ✓ Coaching to SMEs
- ✓ Access to finance/investors



SOLUTION



SEP



Pilot line facilities are efficient catalysts for innovation, helping overcoming upscaling barriers and the “crossing of the valley of death” between invention and market.



Validation of upscale/upgrade of pilots and services



OASIS Sustainable manufacturing OITB

PILOT PLANTS



...

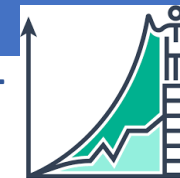
TECHNICAL SERVICES

- ✓ X
- ✓ Y
- ✓ Z
- ✓ ...



BUSINESS-SUPPORT SERVICES

- ✓ A
- ✓ B
- ✓ C
- ✓ ...



SEP

ONE STOP
FULL
PACKAGE
OFFER

Nano-enabled pultrusion for lightweight construction

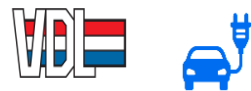
Structural nanoreinforced Al castings by HPDC process

Multifunctional heatable pannels

Energy Storage in prefabricated walls

Multifunctional nanobased layer for aeronautical structure

Battery module nanocomposite packaging



OASIS Sustainable manufacturing **OITB**

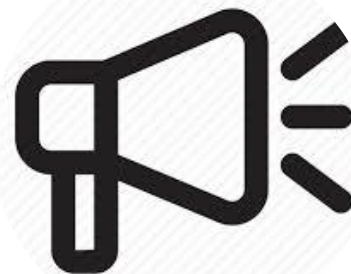
PILOT PLANTS



TECHNICAL SERVICES



business support
SERVICES



OPEN CALL (OC)

- New SMEs
- Industries
- Individuals
- Acaemia
- RTOs

Will be attracted

DEMOCASES (6 months)
Development of specific demonstrators
Access to specific services

MULTIFUNCTIONAL NANO-ENABLED PRODUCTS

Open Call for Democases



What?

- **Project acronym:** OASIS
- **Project full name:** Open Access Single entry point for scale-up of Innovative Smart Lightweight composite materials and components
- **Project grant agreement number:** 814581
- OASIS, an Open Innovation Test Bed ecosystem of 12 nanotechnology manufacturing pilot lines, is organizing an Open Call for Democases with the objective of providing support to organizations in order for them to **develop and test novel nano-enabled products** taking advantage of top-notch European infrastructure.
- Specifically, the aim of each supported Democase will be to transform a product idea into a **functional product/part demonstrator** and develop its associated **exploitation plan** targeting early market adoption.

When?

- The Call will be open from **29th June 2020 to 31st July 2021** and applicants will be able to apply anytime.
- Submitted proposals will be evaluated following one of the two cut-off dates
 1. **31st January 2021**
 2. **31st July 2021**
- Applicants can work on their proposals in the system up until the cut-off date (deadlines at 5 p.m. CET for both). However, after they „**submit**“ their proposals, **they won't be able to change them anymore.**

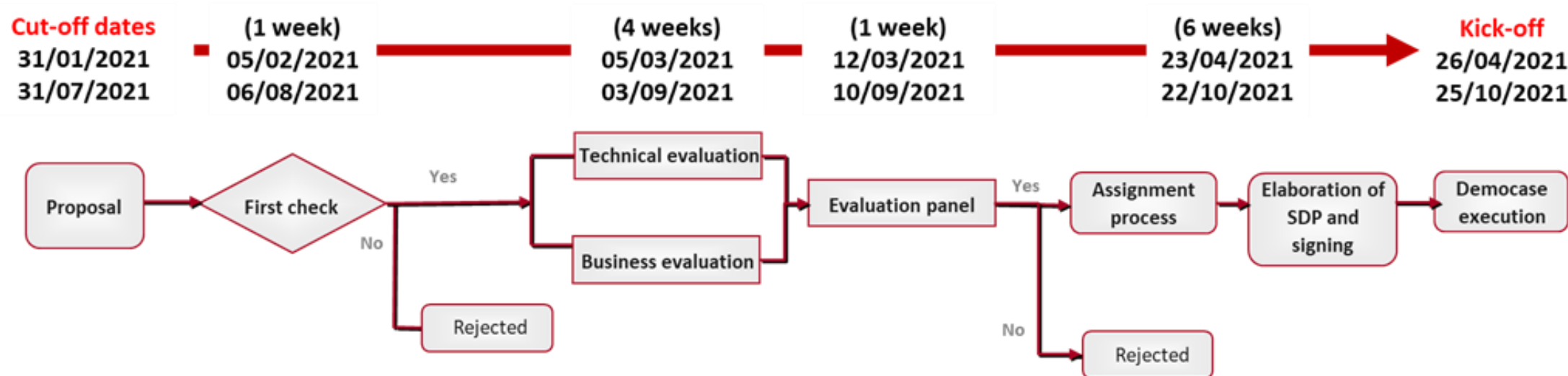
Who?

- The call is open to all organizations regardless of their type, size or field of activity. The following categories are being used in the Call:
 - PRC (Private for profit, excluding education)
 - **SME (Small and medium-sized enterprises)**
 - REC (Research organisations)
 - HES (Higher or secondary education)
 - PUB (Public body, excluding research and education)
 - OTH (Other)
- Important:
- Given the project's aim of fostering the competitiveness of European businesses, the primary target of the OASIS Open Call are **Small and Medium-sized Enterprises (SMEs)**. A minimum of **50%** of the supported Democases will be dedicated to SMEs, provided they score above the required threshold. **Which means they may take priority over higher ranked proposals submitted by other types of organizations.**

Why?

- All successful applicants to the OASIS Open Call will get **free access** to an ecosystem of 12 nanotechnology manufacturing pilot lines, providing nanomaterials, nano-intermediates, nano-enabled products and associated services for the development and commercialization of **lightweight multifunctional products based on aluminium and polymer composites**.
- The selected applicants will be provided with **customized support** through a complete set of services integrating **technical and business expertise** which will enable them to build up sustainable business cases.
- The free of charge contribution by the OASIS consortium is composed of:
 - Qualified human resources dedicated to the execution of the Democase.
 - Consumables and materials required for the product demonstrator.
 - Access to top-notch equipment and infrastructure of the pilot lines.

Process?



- Submitted proposals will be evaluated by 4 evaluators (2 for technical and 2 for business aspects). The maximum overall score is 15. The standard **threshold for individual criteria is 3**, and the **standard overall threshold is 10**.
- However, apart from the proposal-level evaluation there will also be a **portfolio-level assessment** done by the Evaluation Panel which will take into consideration also other factors like balanced use of the services and the available capacities to execute the Democases. **These factors might change the final ranking of the proposals.**

How?

1. Check out www.project-oasis.eu.
2. Browse through the Catalogue of Services to see how they match your needs.
3. Download & read the Application Guidelines.
4. Register through the submission software at <https://apply.project-oasis.eu/>.
5. Fill in the application data including your preliminary choice of services (a minimum of 2 technical and 1 business supporting service).
6. Download the Application Form from the software.
7. Complete the Application Form, save it as a PDF file (MAX 5 pages), upload it and submit it through the submission software.

Contact

- If you need assistance with applying to the Call, or explanations about technology offerings and your possibilities with OASIS, please send us your enquiries by phone to: +420 226 217 422 or by email to helpdesk@project-oasis.eu.
- Helpdesk will be active Monday - Friday from 9 a.m. to 5 p.m. We will be happy to help you.
- **We encourage all applicants to check the technical and business feasibility of their ideas well in advance of submission.**

Showcase:

Structural Nanoreinforced Al Castings

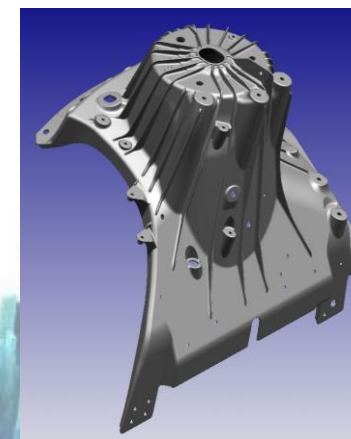
Ford-Werke



The next-generation 2020 Ford Explorer



Aluminum in the hood and front shock towers



Ford Goes Electric in Europe

FORD HYBRID



MILD HYBRID
(mHEV)



FIESTA

FOCUS



KUGA

PUMA



TRANSIT

TRANSIT CUSTOM



TOURNEO CUSTOM



HYBRID
(HEV)



MONDEO

MONDEO WAGON



KUGA



PLUG-IN HYBRID
(PHEV)



EXPLORER

KUGA



TRANSIT CUSTOM

TOURNEO CUSTOM



BATTERY
ELECTRIC VEHICLE



MUSTANG-INSPIRED
PERFORMANCE SUV



TRANSIT

Great potential for Al castings:
 housings, battery trays



Challenge: High cost pressure on e-mobility , Aluminum does not run by itself !!

Strong focus on cost efficient Aluminium castings for high volume production.

Potential for cost reduction due to:

- **High strength alloys not require heat treatment**
- **Longer life time of tools**
- **Efficient design**



tecnalia Inspiring Business

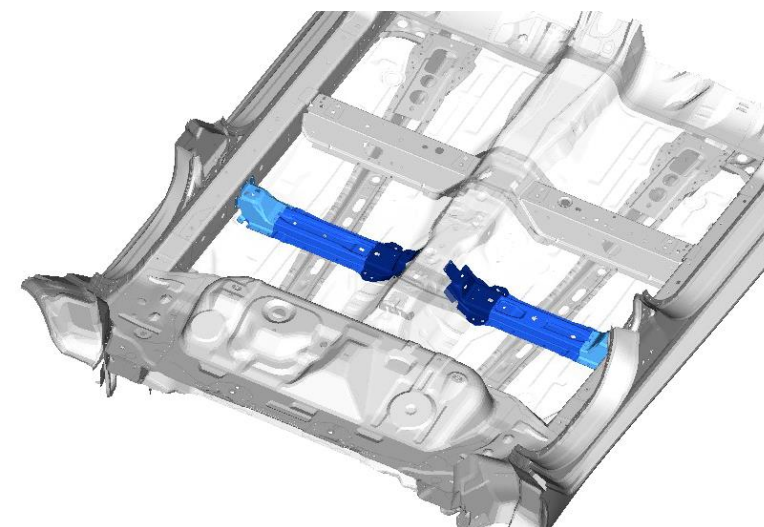
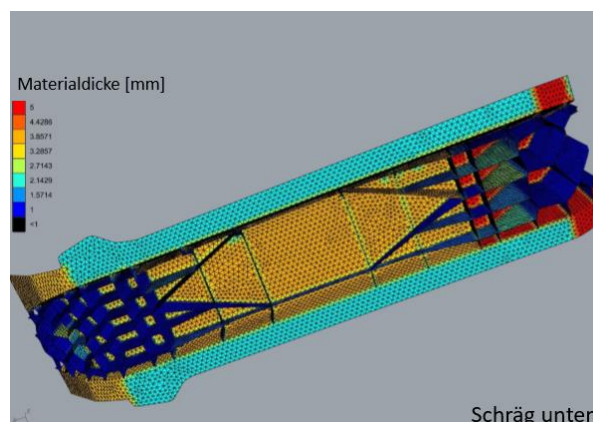
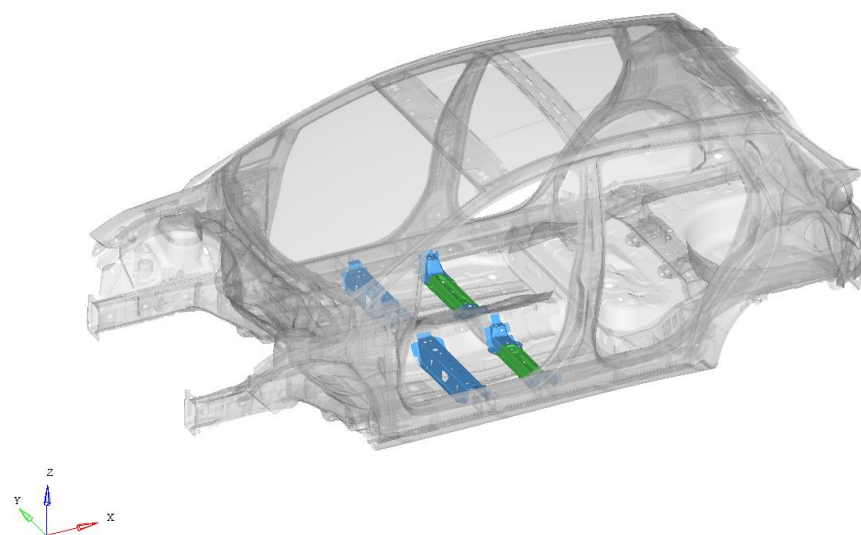


tecnalia Inspiring Business

tecnalia Inspiring Business



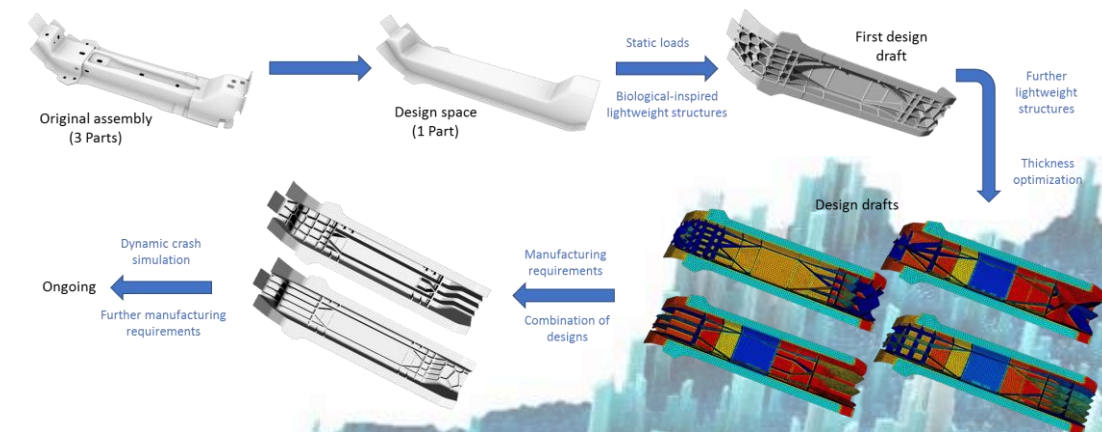
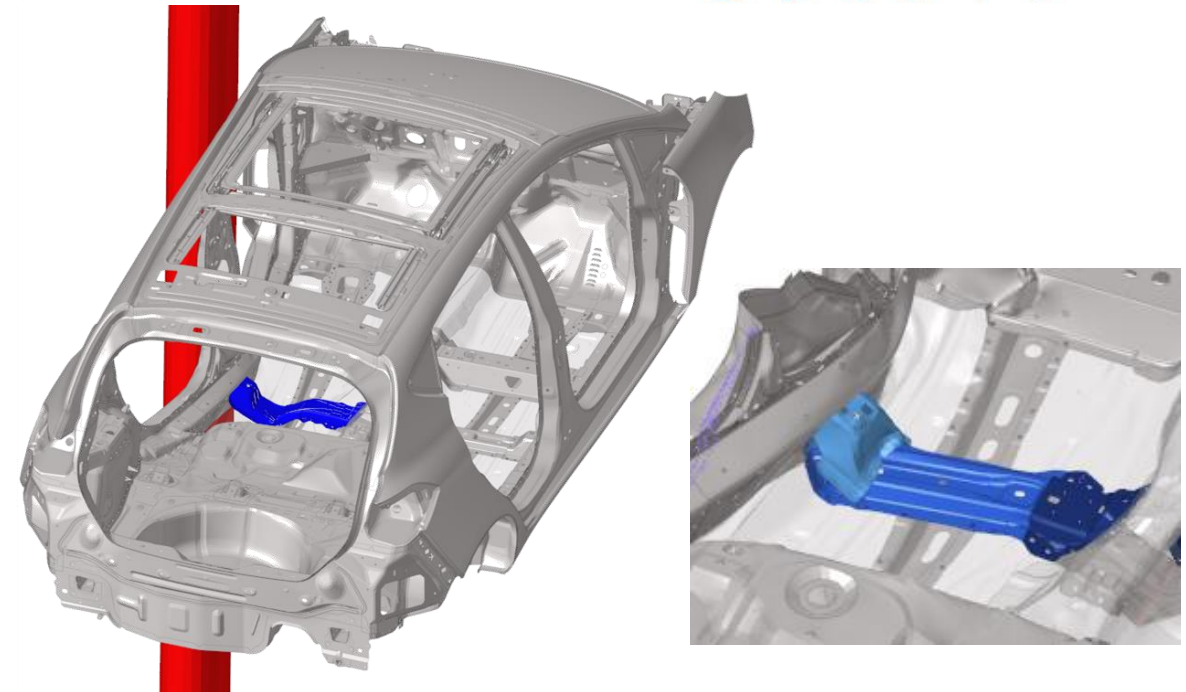
Ford showcase: Structural Nano-reinforced Aluminum Casting



Showcase #2: Cross beam member

3 APPROACH VALIDATION IN HPDC PILOT PLANT

- **Nano-reinforced alloys:** Manufacturing of nano-reinforced aluminium alloy components by HPDC process
- **High resistance die materials:** High resistance cermet coatings deposition on die insert for HPDC process with high corrosive aluminium alloys.
- **Bionic inspired design:** New complex structural designs modelling solution based on a bionic data base.



Show case leader:



Showcase #2: Cross beam member

3 APPROACH VALIDATION IN HPDC PILOT PLANT

- **Nano-reinforced alloys:** Manufacturing of nano-reinforced aluminium alloy components by HPDC process
- **High resistance die materials:** High resistance cermet coatings deposition on die insert for HPDC process with high corrosive aluminium alloys.
- **Bionic inspired design:** New complex structural designs modelling solution based on a bionic data base.



Showcase #2: Cross beam member

PL#8 SIMPnano Metallic (Al) alloys with dispersed nanoreinforcements

PL#9 METcast Nano-enabled lightweight injected cast parts

Bionic CAE method 

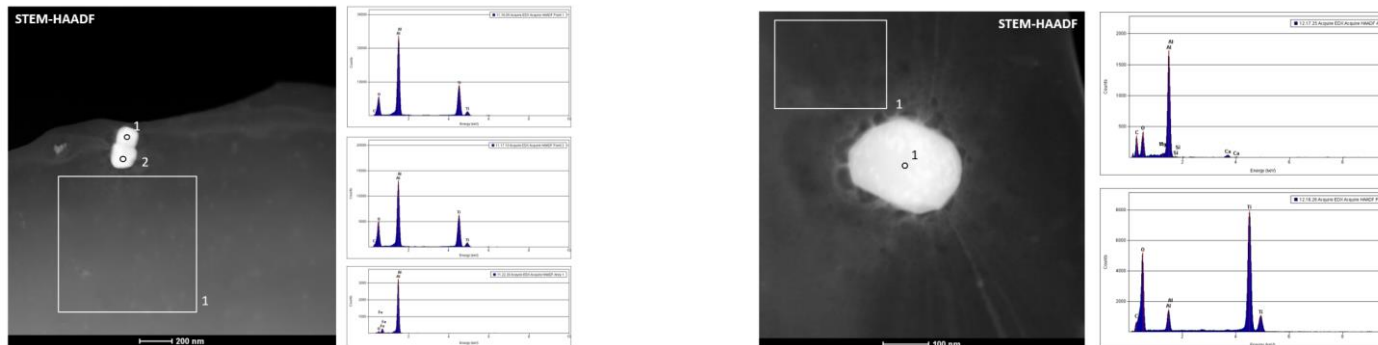
Entire process chain is covered by OASIS partners



High mechanical requirements are necessary to manufacture light structural parts

- HPDC aluminium parts are heat treated to obtain high mechanical requirements.
- Heat treatment adds higher cost to the part manufacturing process.

SOLUTION: Nano-reinforced alloys can increase mechanical properties of HPDC parts

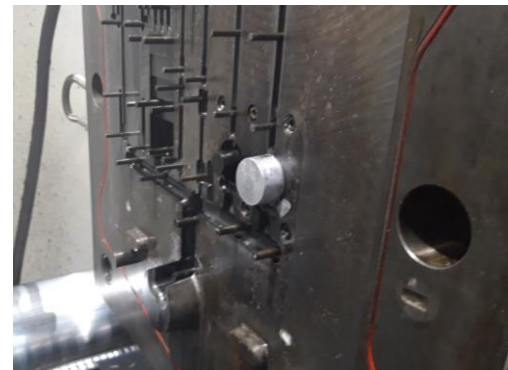


STEM-HAADF images and corresponding EDS analysis performed at two points, matrix and TiC nanoparticulates (Courtesy of IMIM)

High mechanical requirements are necessary to manufacture light structural parts

- Silicon free Aluminium-magnesium alloys can achieve mechanical requirements without heat treatment.
 - Die wearing increases shortening die's life, increasing the overall cost of the process and decreasing productivity due to the higher maintenance stops.

SOLUTION: High resistance nano ceramic coatings in critical parts of the die

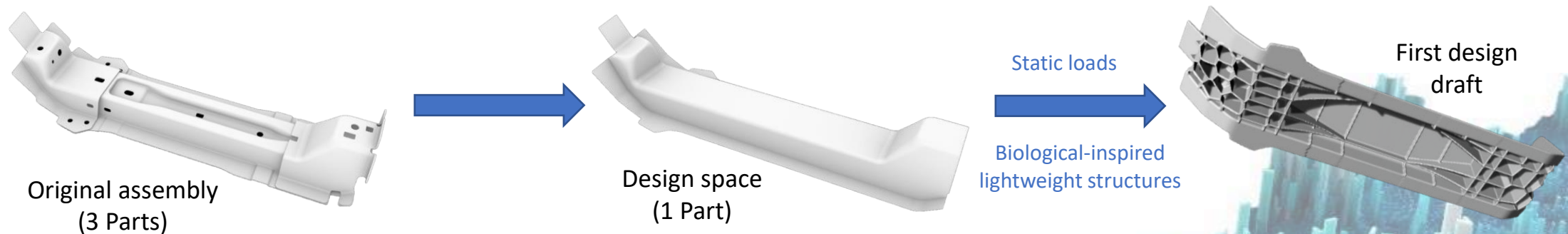


High mechanical requirements are necessary to manufacture light structural parts

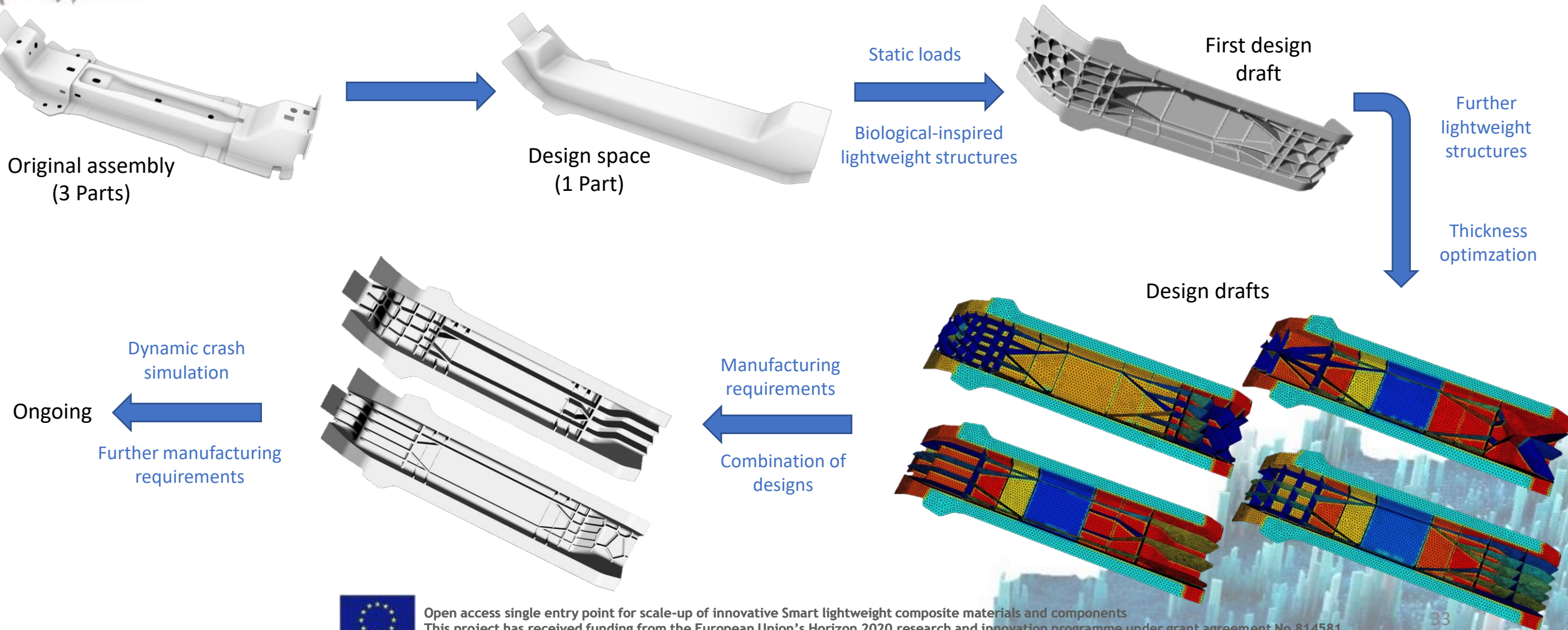
- **Optimized part designs:** Part light weight can be achieved with new designs that have to fulfil the castability conditions imposed by the HPDC process.
 - This designing process usually is very laborious, and the results often are not as good as expected.

SOLUTION: Bionic inspired design. New complex structural designing and modelling solution based on a bionic data base.

tecnalia[®] Inspiring Business

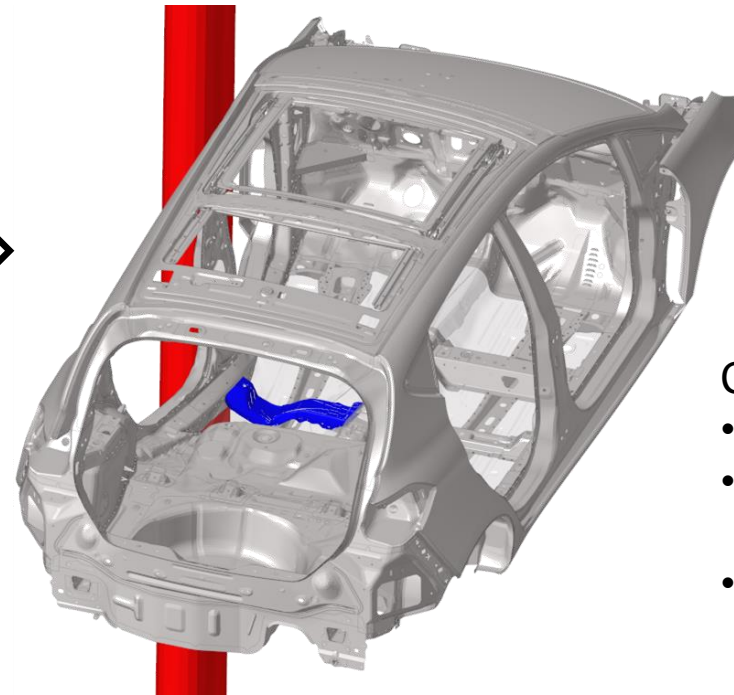
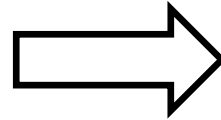


Development History – Generic Design

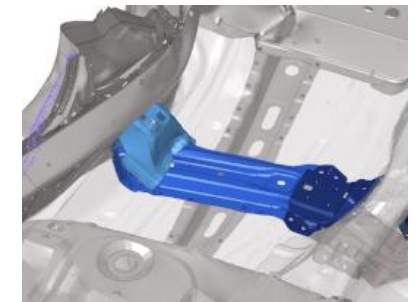


Development History – Generic Design Verification

- Side impact pole with $v_0 = 33$ kph



X-member to be optimized to meet crash criteria:

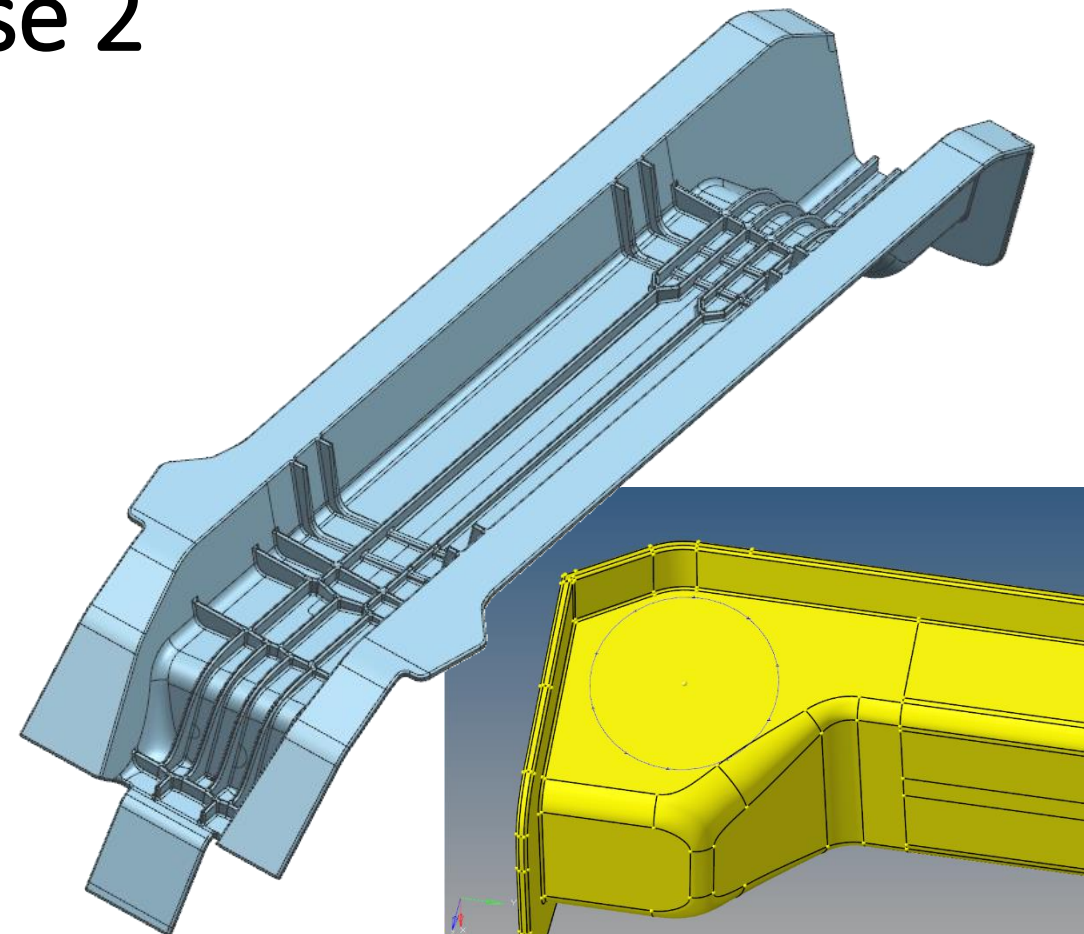
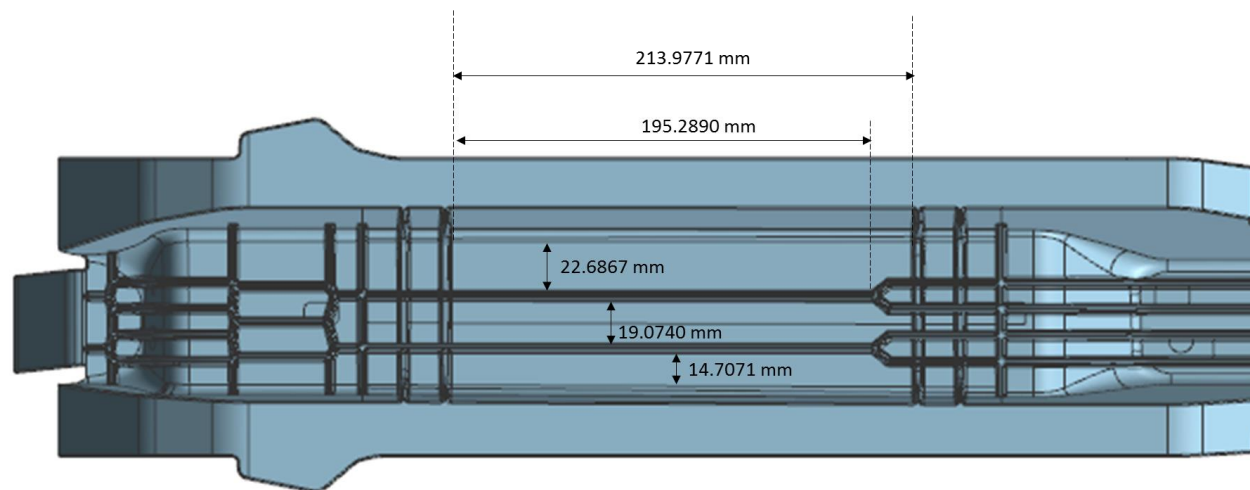


Consideration of:

- Cast ability
- Sample extraction for mech. evaluation
- Single component evaluation

Showcase 2

ModelOASIS_5th iteration > final ready to produce tool



Timeline

- Additional webmeetings to introduce the other **five Showcases** in **September and November 2020**



Nano-enabled pultrusion for lightweight constructions

responsible partner: ACCIONA



Structural Nanoreinforced aluminum castings

responsible partner: Ford-Werke



Multifunctional RTM composite panels

responsible partner: VDL Fibertech Industries



Smart battery casing in nanocomposites

responsible partner: Thales



Multifunctional nanobased layers

responsible partner: AIRBUS Operations



Energy storage in prefabricated walls

responsible partner: Pleione Energy



Timeline

- Additional webmeetings to introduce the other **five Showcases** in **September** and **November 2020**
- Application Deadline:
 - 1st batch: 31 January 2021 (5pm CET)
 - 2nd batch: 31 July 2021 (5pm CET)
- Start of Democase development:
 - 1st batch: May 2021
 - 2nd batch: November 2021



Thank you!

