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& TECHNOLOGY ALLIANCE

Ion Martinez de Apellaniz

Bus. Dev. Manager – Advanced Manufacturing

imartinezag@ceit.es

Índice:

- Introducción Ceit
- Capacidades Cervera:
    1. Fabricación aditiva
    2. Tecnologías de Superficies
    3. Robótica en Fabricación Inteligente
    4. Movilidad Aérea Autónoma

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Ceit en cifras

+280
PERSONAS EN PLANTILLA

+350 PhDs
+400 Investigadores
TRANSFERIDOS A LA INDUSTRIA

+100 Proyectos europeos

Actividad científica:

+1300 publicaciones científicas indexadas
+2000 publicaciones a Congresos Internacionales

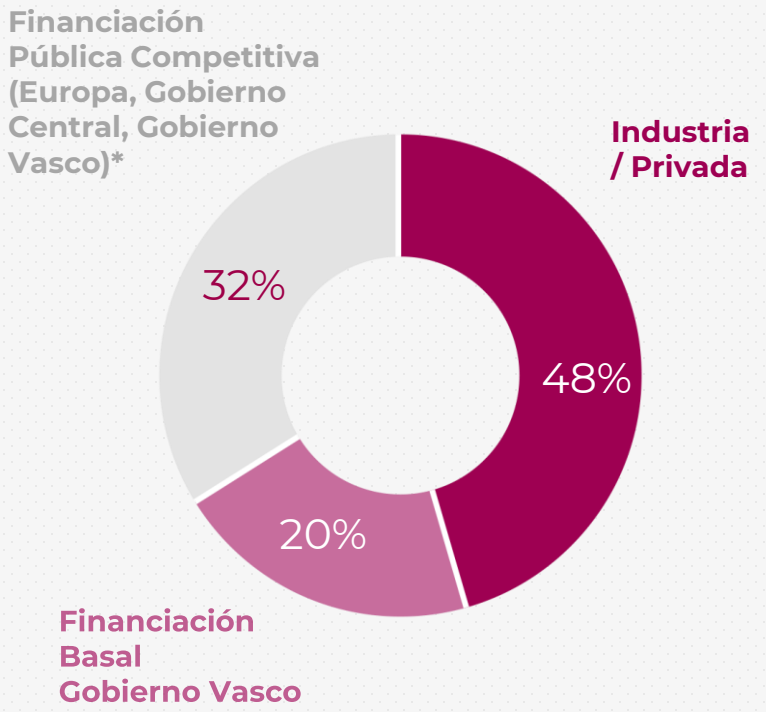
Spin-offs

+300 Puestos de trabajo creados
+200 Millones de euros de ingresos

PRESUPUESTO 2024

€ 25,5 Millones

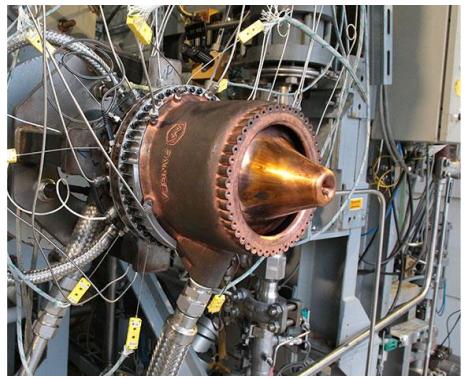
Fuentes de financiación y tipo de investigación



1- Additive Manufacturing

MADISON
Materiales. Digitalización. Sostenibilidad

Aerospace projects

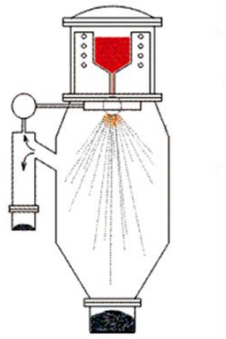


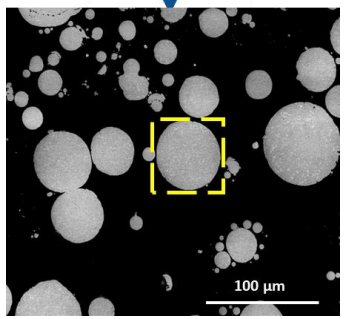
GRCop-42 MethaLox aerospike, PBF-LB (Pangea)

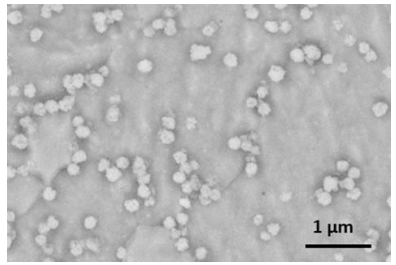
Cu-4Cr-2Nb (at.%) gas atomized powder.

- Composition within specifications
- Fine and homogenous distribución of alloying elements

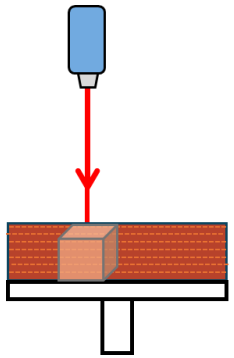
Gas atomization

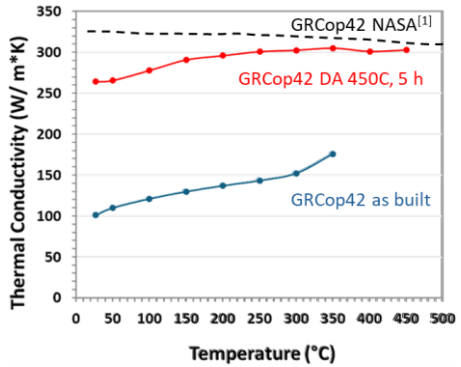






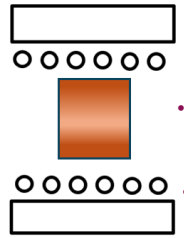
Additive manufacturing (PBF-LB)



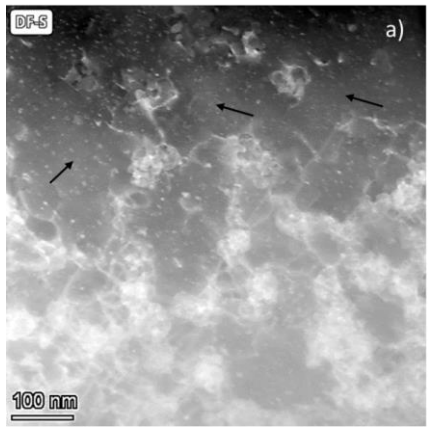


- Combination of excellent conductivity and Hardness through addequate selection of post-build heat treatments
- Ultrathin nanometric Cr_2Nb precipitates

Post-build HTs



- Porosity below 0,3% in the as-built condition.
- Further reduction by HIP



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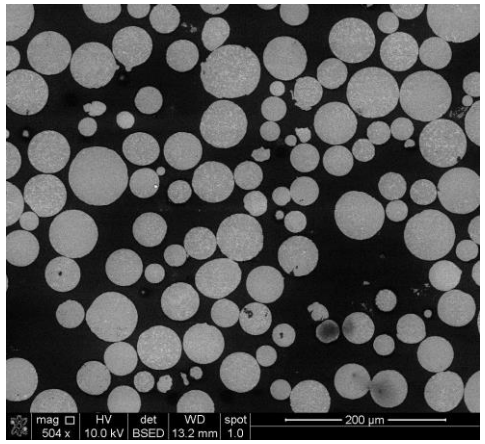
1- Additive Manufacturing

CEFAM
ADDITIVE MANUFACTURING EXCELLENCE

Aerospace projects

- RIME bracket (Spacecraft component)



Scalmalloy®

Scancromal®

CiTD

CATEC CENTRO AVANZADO de TECNOLOGÍAS AEROESPACIALES

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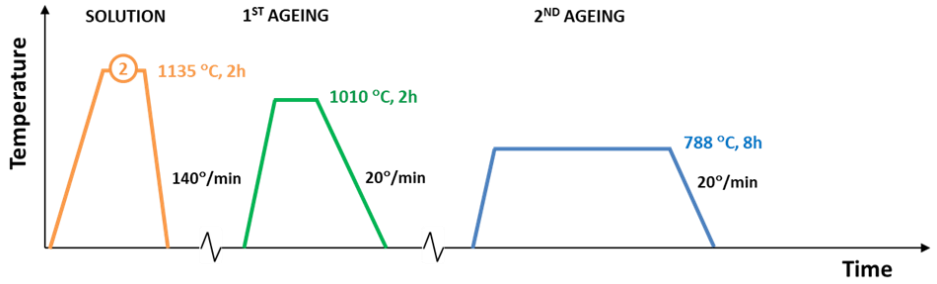
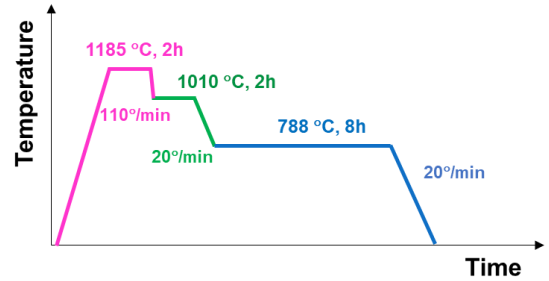
1- Additive Manufacturing

Integration of HIP and post-build heat treatments of AM components for highly demanding applications

Standard: Solution annealing & ageing

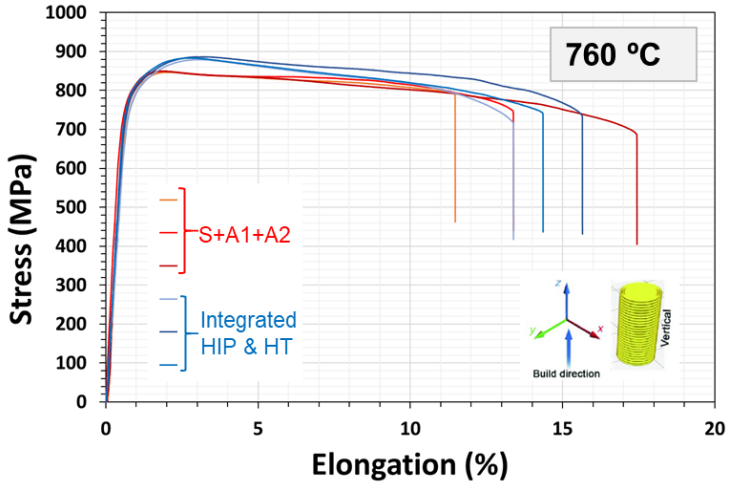


Integrated into a unique HIP cycle



AENIUM Additive Systems

Hiperbaric HIP



- Integrated HIP improves mechanical strength and reliability of PBF-LB Haynes® 282

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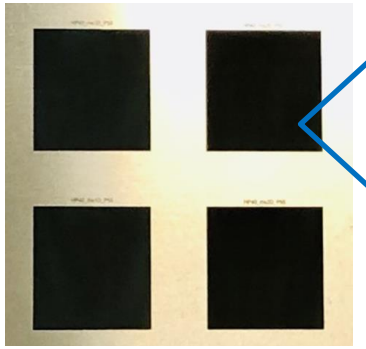
2- Surface Technologies

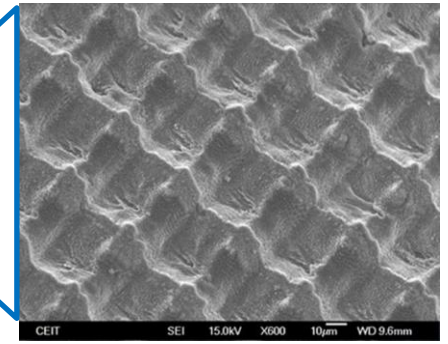
Laser Precision Manufacturing

Broadband omnidirectional antireflective surfaces

- Combination of micro-nanostructures in Al and Steel surfaces with:
  - Low IR-visible reflectivity(< 12%), High emissivity (> 89%), High absorptivity (> 92%) in Al
  - Industrial applications: Aerospace/aeronautic, IR Detectors, Solar panels



Texturized Al surfaces with low reflectivity



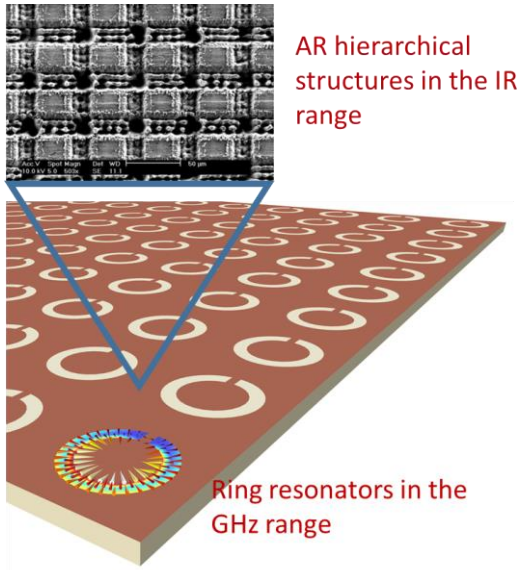
Pyramidal microstructure

Femtosecond laser stealth structures based on metamaterials

1.- Antireflective hierarchical micro/nanostructures in the IR range
- Combining laser microstructures and LIPSS nanostructures

2.- Ring resonators in the GHz/THz range
- Split/Closed ring resonators with tailored dimensions
- Ultrabroadband absorbers using multiple ring resonators and/or lumped resistors

3.- Compatible stealth in radar and infrared bands
- Combining ring resonators and hierarchical micro/nano structures
- Design and simulation using standard FDTD method



AR hierarchical structures in the IR range

Ring resonators in the GHz range

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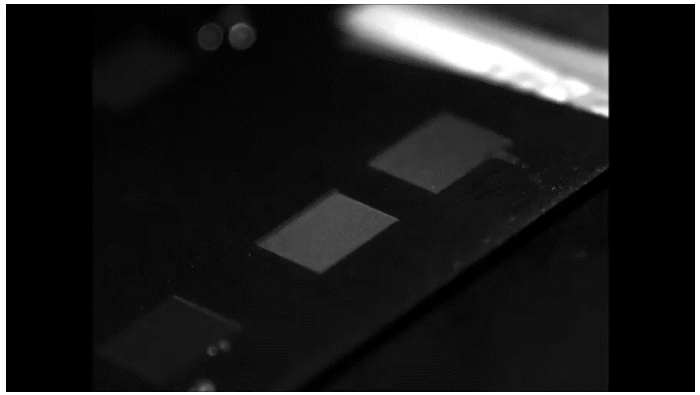
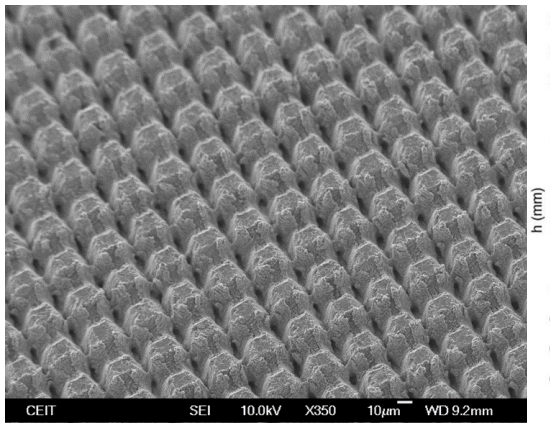
2- Surface Technologies

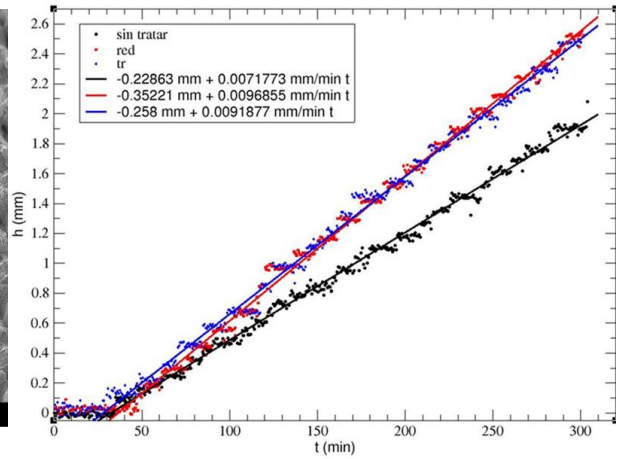
Superhydrophobic metallic surfaces with hierarchical structure

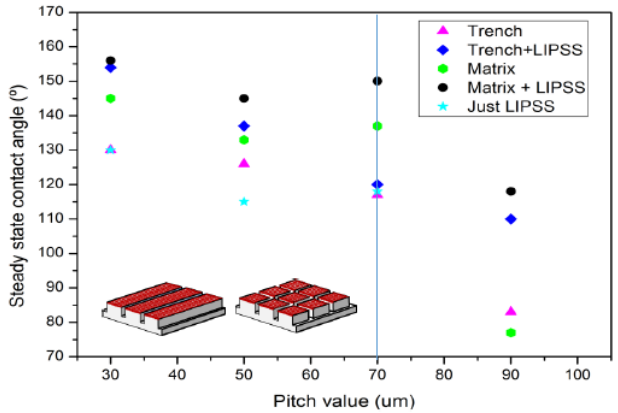
Combined micro/nanostructures to produce extreme water-repellent metallic surfaces:

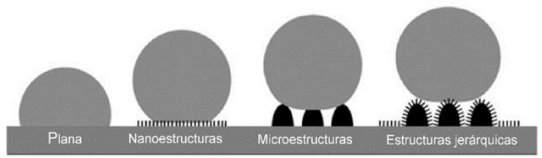
- Contact angle up to 160° (stainless steel)
- Increase of 40% in water condensation
- Industrial applications:
  - Heat exchangers
  - Anti-fouling surfaces
  - Self cleaning surfaces
  - Anti-icing surfaces







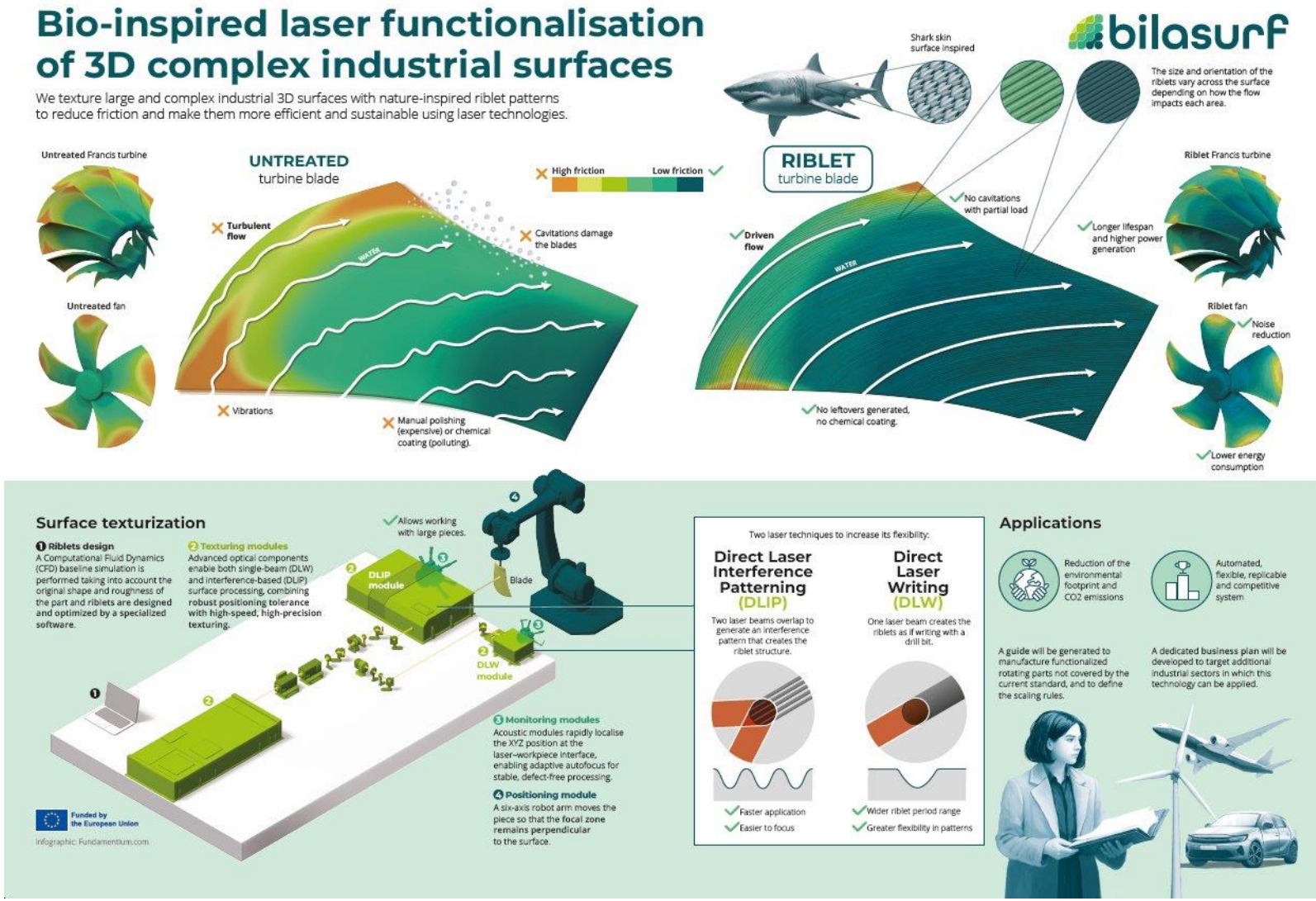




Dependence of the contact angle with the hierarchical structure

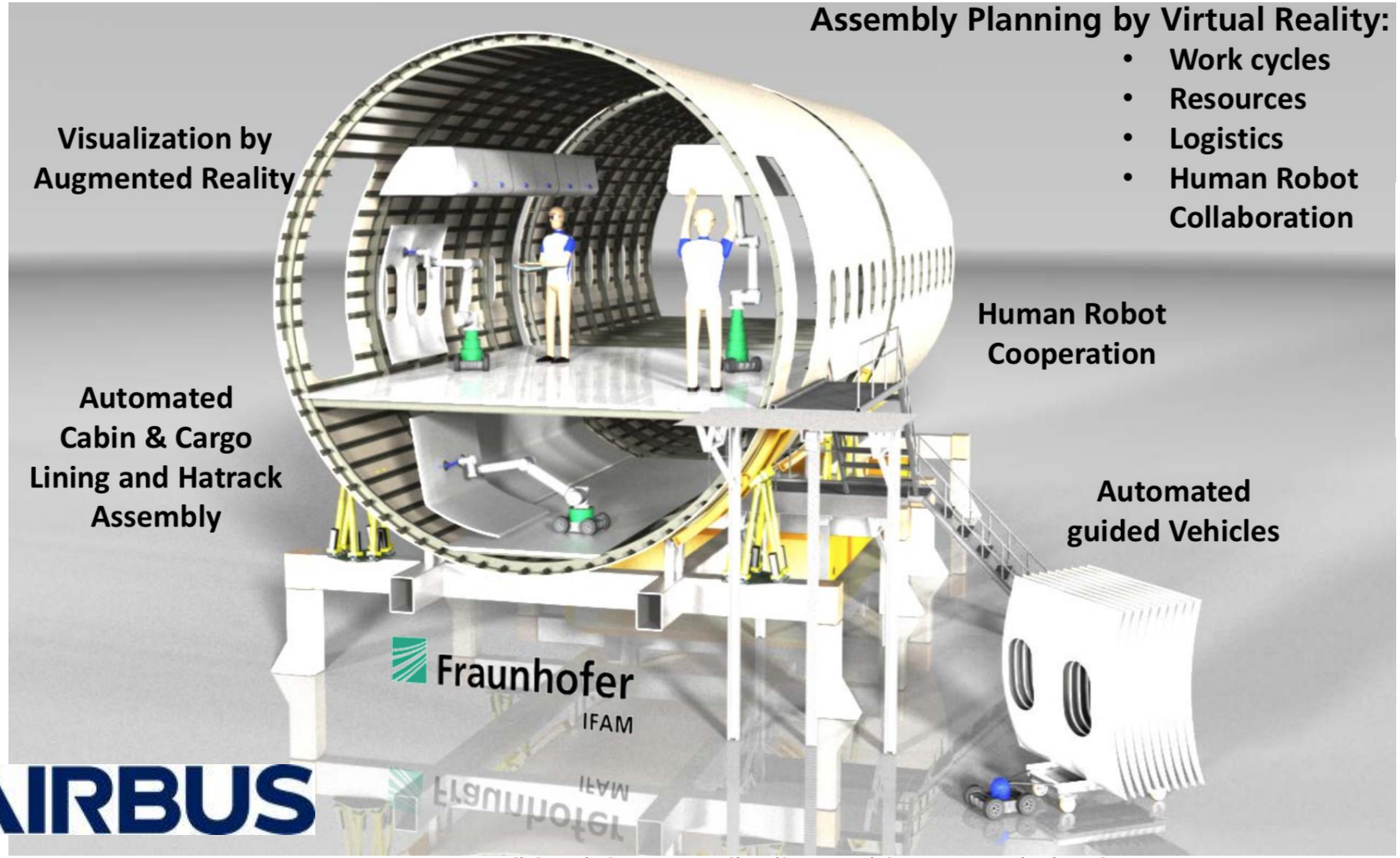
2- Surface Technologies

Laser Precision Manufacturing

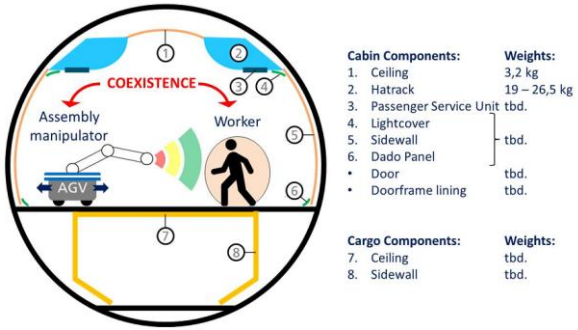


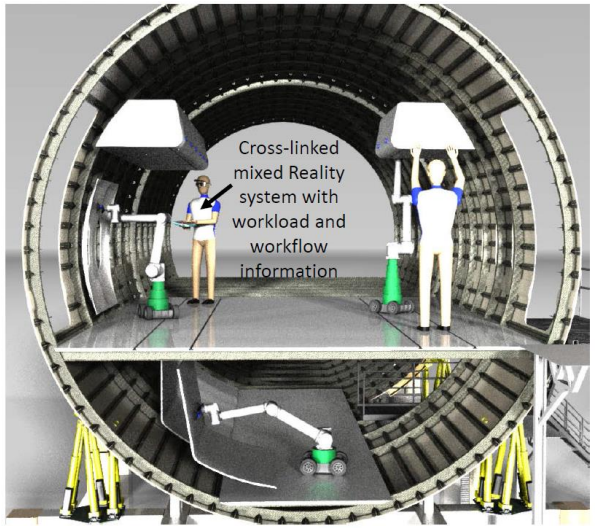
3- SIMFAL: Assembly Planning & Simulation of an Aircraft Final Assembly Line

Providing a simulation environment based on virtual reality and augmented Reality for the automatized assembly of linings and hatracks



Clean Sky 2



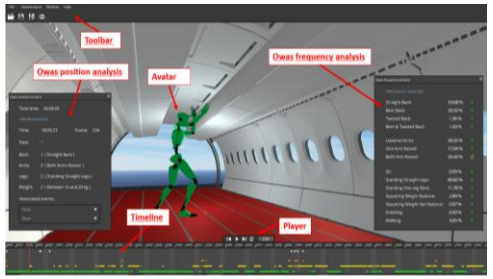


AIRBUS

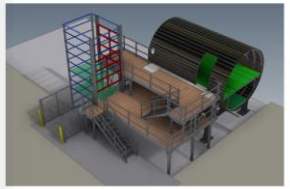
3- SIMFAL: Assembly Planning & Simulation of an Aircraft Final Assembly Line

Flexible and Interactive Virtual Simulator

- A very flexible VR environment to simulate different scenarios (even processes)
- Task manager and agents system to monitor, interpretate and evaluate tasks
- Simulation of “full-automated” and “human-robot collaborative” scenarios
- Motion capture system to acquire and evaluation of ergonomics
- Robust platform for “try-evaluate-decide” in terms of process decisions
- SIMFAL use case: assembly of interior components in cabin and cargo



IFAM demonstrator fuselage

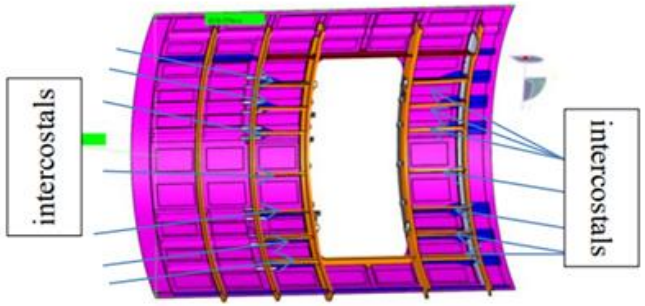


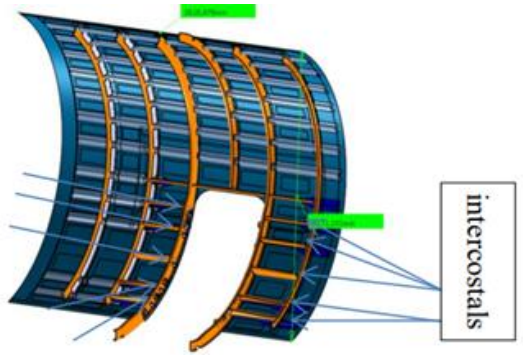
CALITO parts

EURECA Mechatronic systems

3- Robotics in Intelligent Manufacturing

ASSASSINN: Intercostal Past Assembly Assistance System





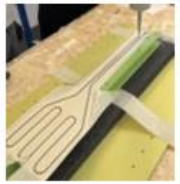
Automatic sealant aplication:

1) Intercostal part recognition.

Area scanner: Using Phoxi 3D to scan the piece.

2) Automatic Sealant Deposition.

The robotic arm deposits the sealant on the part, efficiently covering the surface



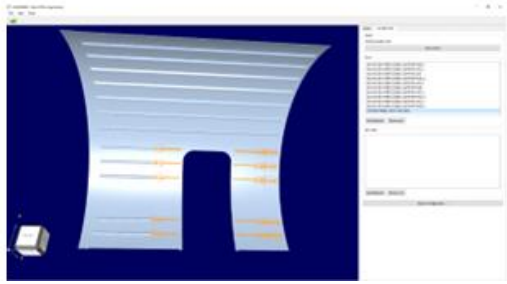
3) Automatic quality inspection

Linear scanner + Robot quality inspection.

This work needs to be redone.

Mixed Reality Assembly Assistance Application:

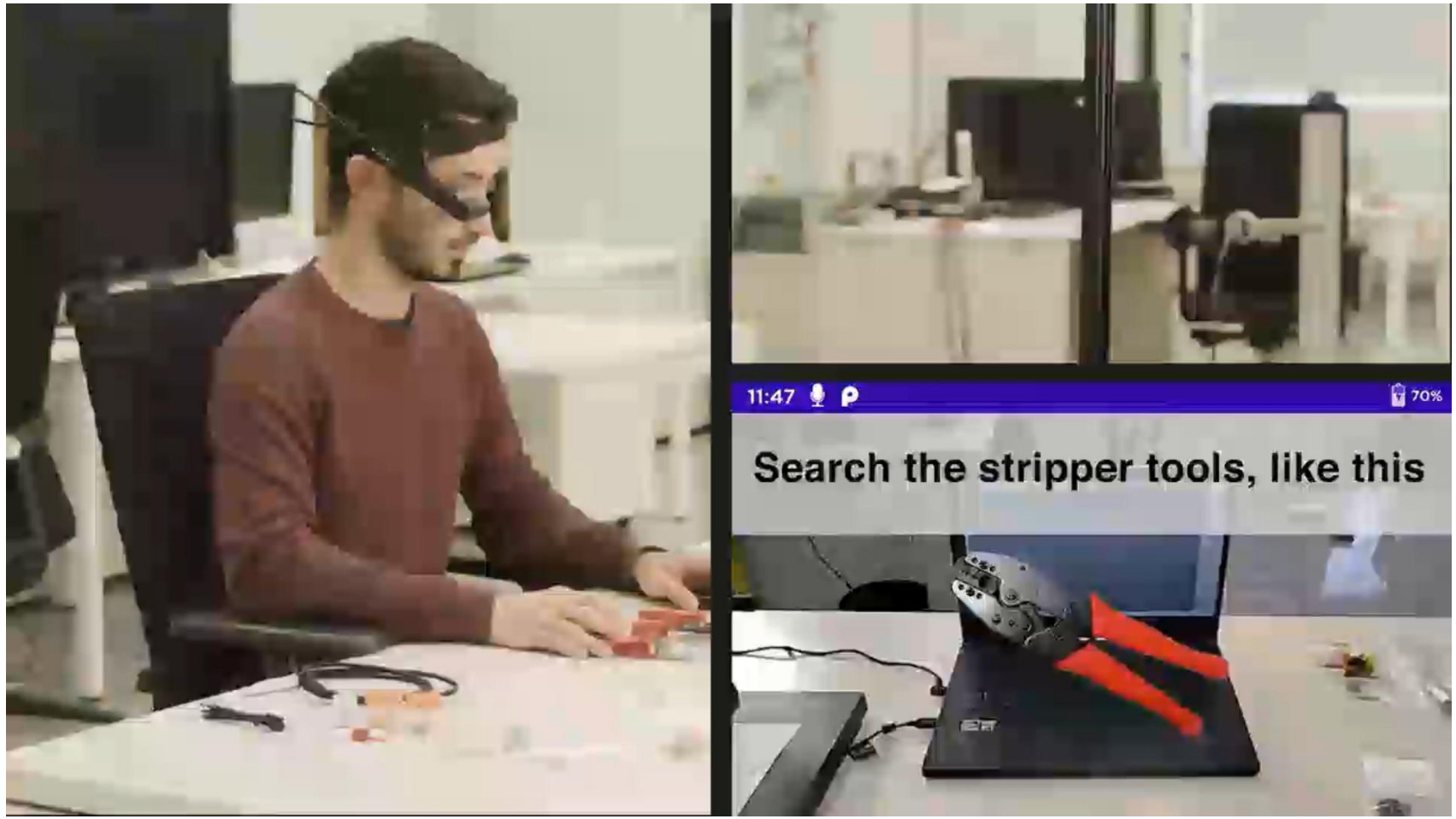
The operator dresses the mixed reality glass and he runs the "mixed reality installation app". The application shows to the operator, the holograms of the parts to install and related work assembly instructions.



3- Robotics in Intelligent Manufacturing

ASSASSIN: Wire Assembly Assistance System

LEONARDO



4- Tecnologías de posicionamiento en interiores

Sistemas de localización en tiempo real

Sistema de posicionamiento para drones en tanques metálicos

ALERION

- **Nuevo sistema de posicionamiento basado en el sistema Ceit-LocEst**
  - Medidas en entorno muy metálico
  - Resultados preliminares
    - Configuración A (usual)
    - Configuración B (Ceit- primera propuesta)

Configuración	μ_p (m)	σ_p (m)	$RMSE_p$ (m)
Configuración A	1.76	1.54	2.33
Configuración B – Algoritmo 1	0.52	0.44	0.67
Configuración B – Algoritmo 2	0.30	0.12	0.32

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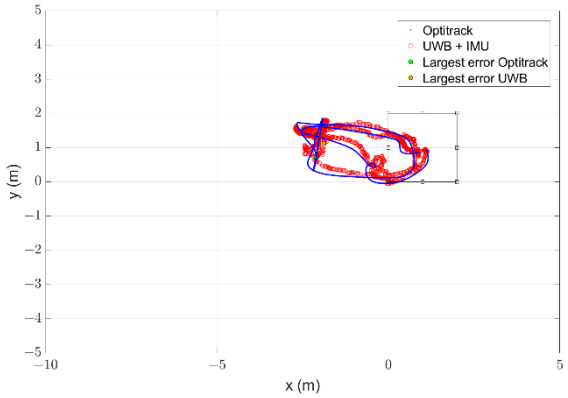
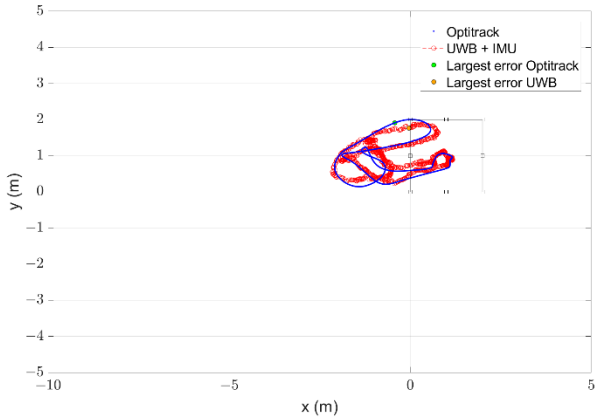
4- Tecnologías de posicionamiento en interiores

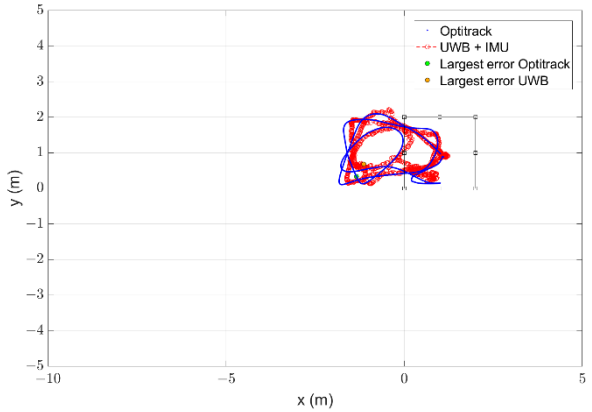
Sistemas de localización en tiempo real

Ayuda al aterrizaje de drones

- **Nuevo sistema de posicionamiento basado en el sistema Ceit-LocEst**
  - Resultados vuelos con dron:







ALERION

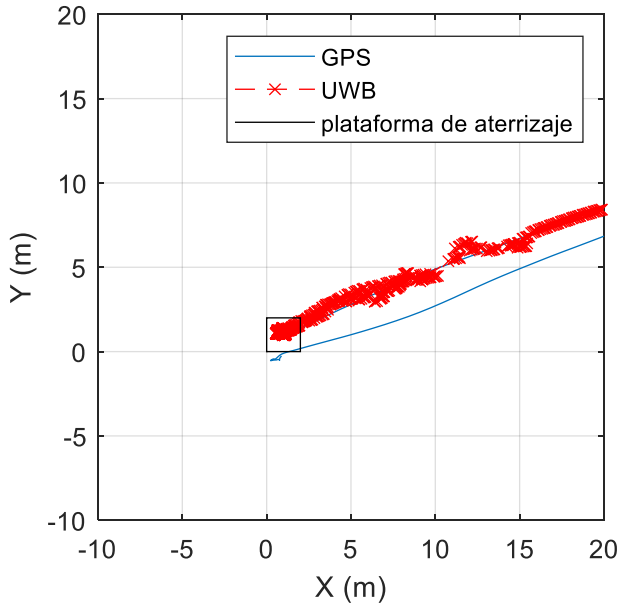
4- Tecnologías de posicionamiento en interiores/exteriores

Sistemas de localización en tiempo real

Sistema de posicionamiento para drones

- **Nuevo sistema de posicionamiento basado en el sistema Ceit-LocEst**
  - Resultados vuelos con dron en entorno relevante:

ALERION



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Thank you, muchas gracias, eskerrik asko

Sede Central
Paseo Manuel Lardizábal, 15
20018 Donostia, Gipuzkoa
+34 943 212 800

Sede Miramón
Mikeletegi Pasealekua, 48
20009 Donostia, Gipuzkoa
+34 943 212 800

Planta de atomización
Mikeletegi Pasealekua, 73a
20009 Donostia, Gipuzkoa
+34 943 212 800

Ion Martinez de Apellaniz (imartinezag@ceit.es)

www.ceit.es