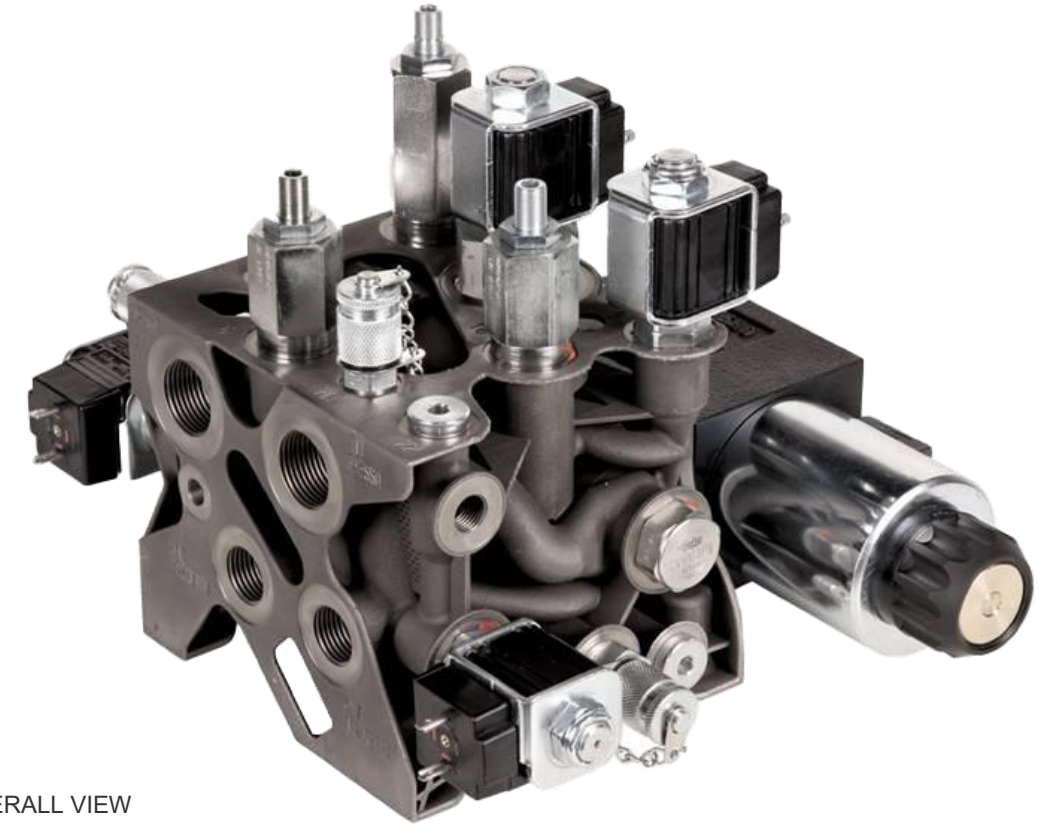


AMD ENGINEERING

Portfolio

Some content may be partially omitted or modified in compliance with non-disclosure agreements (NDA).

OIL & GAS



01 OVERALL VIEW



02 DETAIL



03 DETAIL

PROJECT NAME

Manifold

2021 | In collaboration with Parker Hannifin

From client documentation

PROJECT DESCRIPTION

Medium-complexity hydraulic manifold, designed and manufactured in collaboration with Parker Hannifin. The manifold integrates 8 valves and 15 threaded ports, ensuring high functional density within a compact envelope.
The system is capable of handling the delivery of two pumps for a combined flow rate of 113 l/min at a nominal pressure of 160 bar.

Manifold

2021



04 TEST MACHINE

TECHNICAL SPECIFICATIONS

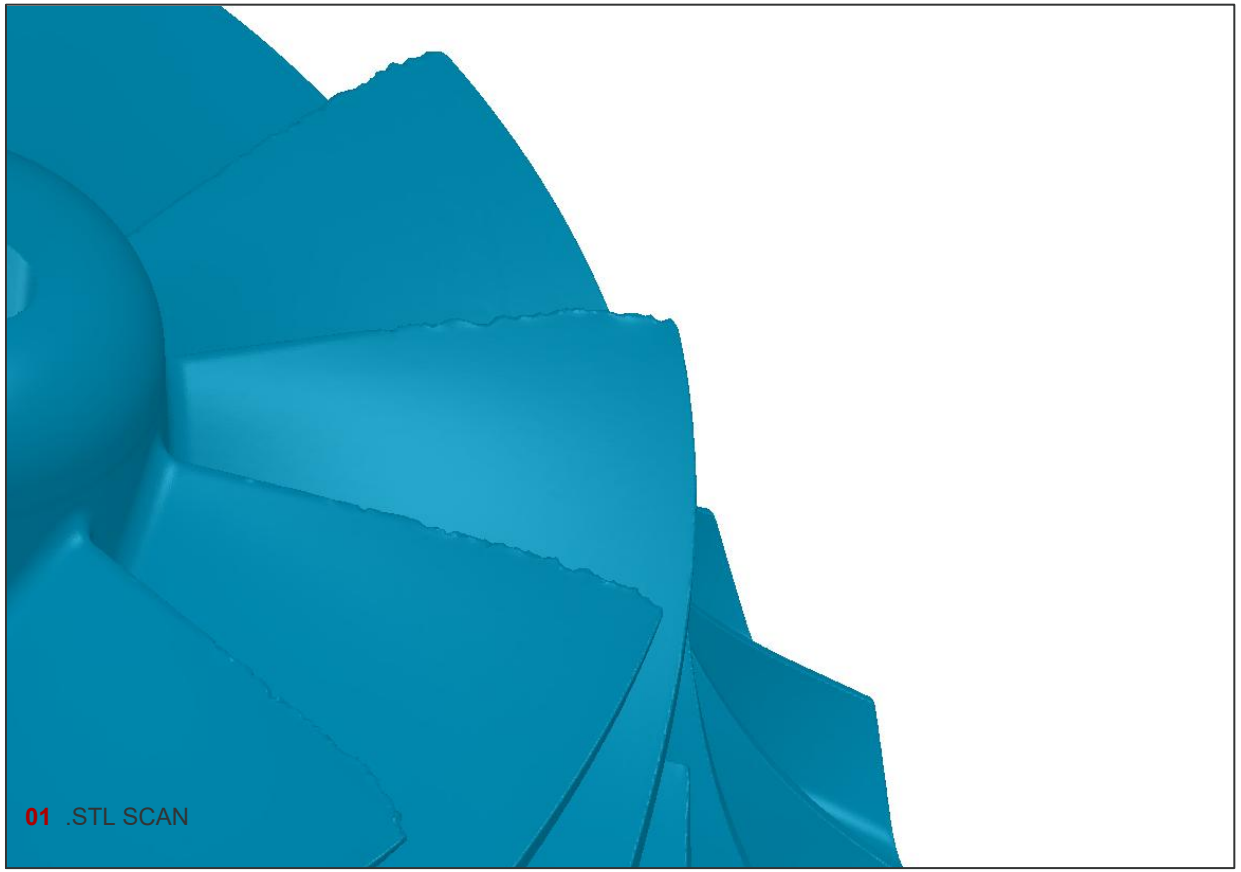
PARAMETER	VALUE
Material	Maraging Steel 1.2709 (AM)
Dimensions (L x W x H)	250 x 250 x 250 mm
Weight	15 kg
Surface Finish	Phosphating
Heat Treatment	Ageing
Polymer Impregnation	Yes

TECHNICAL NOTES

Additive manufacturing with mechanical finishing and AFM treatment of internal channels. Topological redesign reduced mass by 41.9% (from 25.95 to 15.08 kg), optimising the fluidic path and minimising pressure losses.



DET. 3D PRINT DETAIL



01 .STL SCAN



02 WEAR DETAIL



03 WEAR DETAIL

PROJECT NAME

Impeller

2023

Reverse Engineering

PROJECT DESCRIPTION

Rotating component with blade profile compromised by progressive wear. The original geometry was acquired by means of three-dimensional scanning (STL output) and subjected to a Reverse Engineering process for the reconstruction of the reference CAD model. Dimensional and functional restoration of the blades was performed using Direct Energy Deposition (DED) – laser cladding technology, enabling localised deposition of metallic material and component recovery without replacement.

Impeller

2023



DET. WEAR

TECHNICAL SPECIFICATIONS

PARAMETER	VALUE
Material	*non-disclosable (confidential)*
Dimensions (L x W x H)	Ø 440 mm
Weight	26,9 kg
Repair Process	DED

(data subject to NDA)

TECHNICAL NOTES

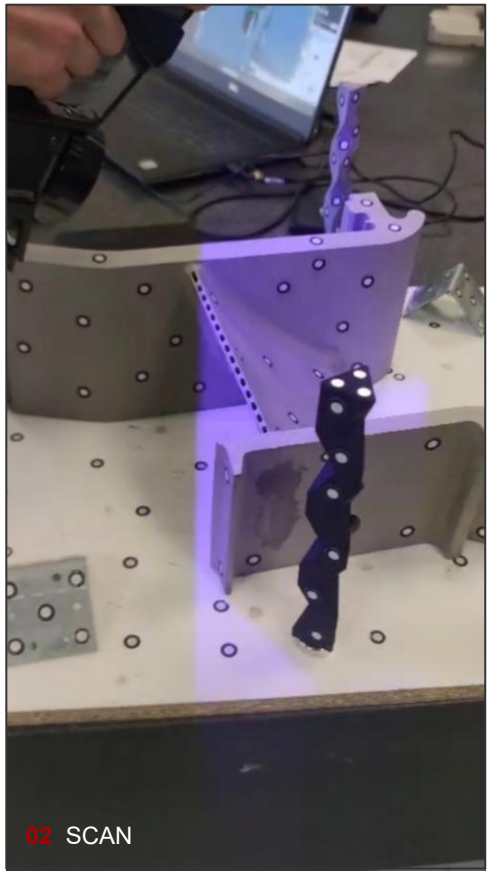
LASER CLADDING (Direct Energy Deposition): advanced metallic additive manufacturing process that uses a focused energy source (laser) to melt and deposit material (in powder form) layer by layer, enabling the production and restoration of complex three-dimensional geometries with high precision and metallurgical integrity.



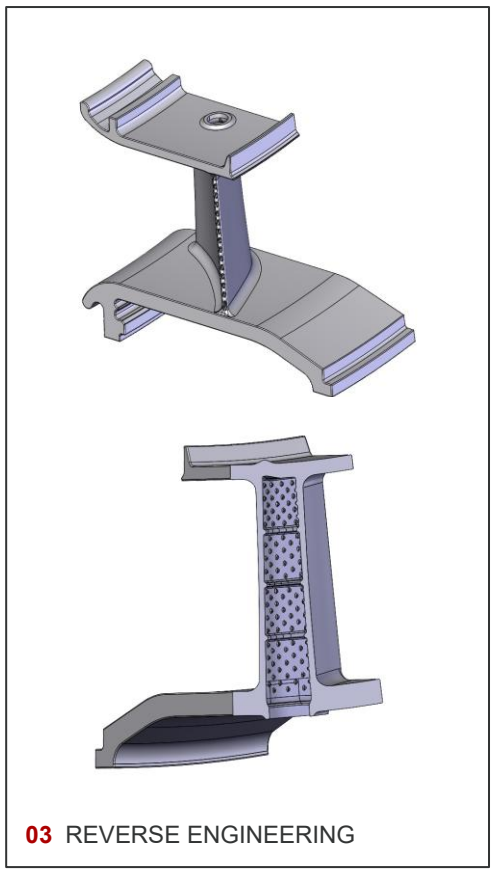
04 LASER CLADDING REPAIR



01 SCAN MESH



02 SCAN



03 REVERSE ENGINEERING

PROJECT NAME

Blade

2026

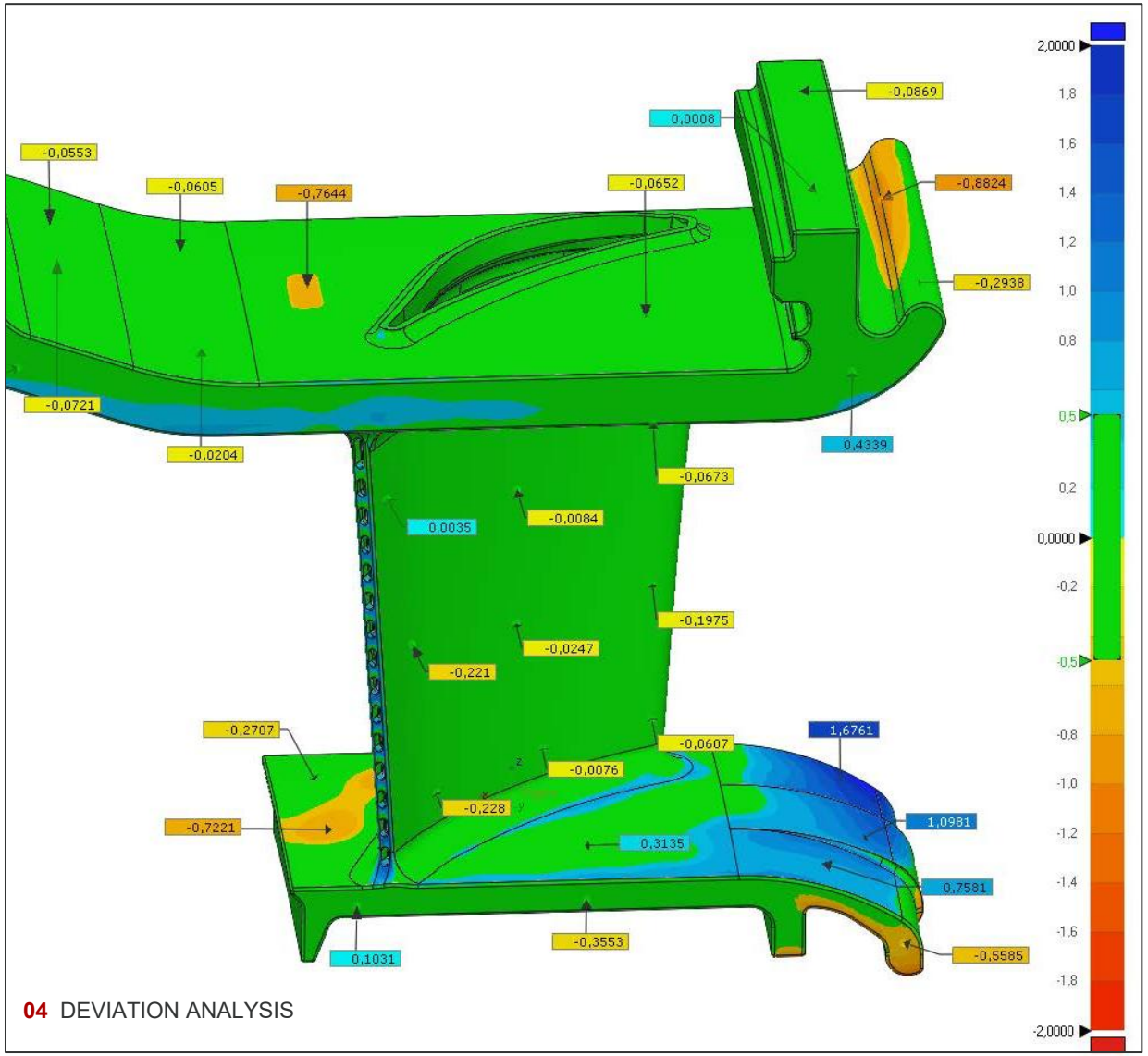
Reverse Engineering

PROJECT DESCRIPTION

The project involved reverse engineering of the blade, with the objective of reconstructing its digital geometry from the existing physical component. The process was structured in the following operational phases: geometry acquisition via 3D scanning of the master part; processing and optimisation of the resulting mesh file; positioning and orientation of the 3D model in the reference frame; analysis of geometric deviations between the CAD file and the mesh acquired from the 3D scan, with subsequent correction of the CAD file; production of the 2D technical drawing.

Blade

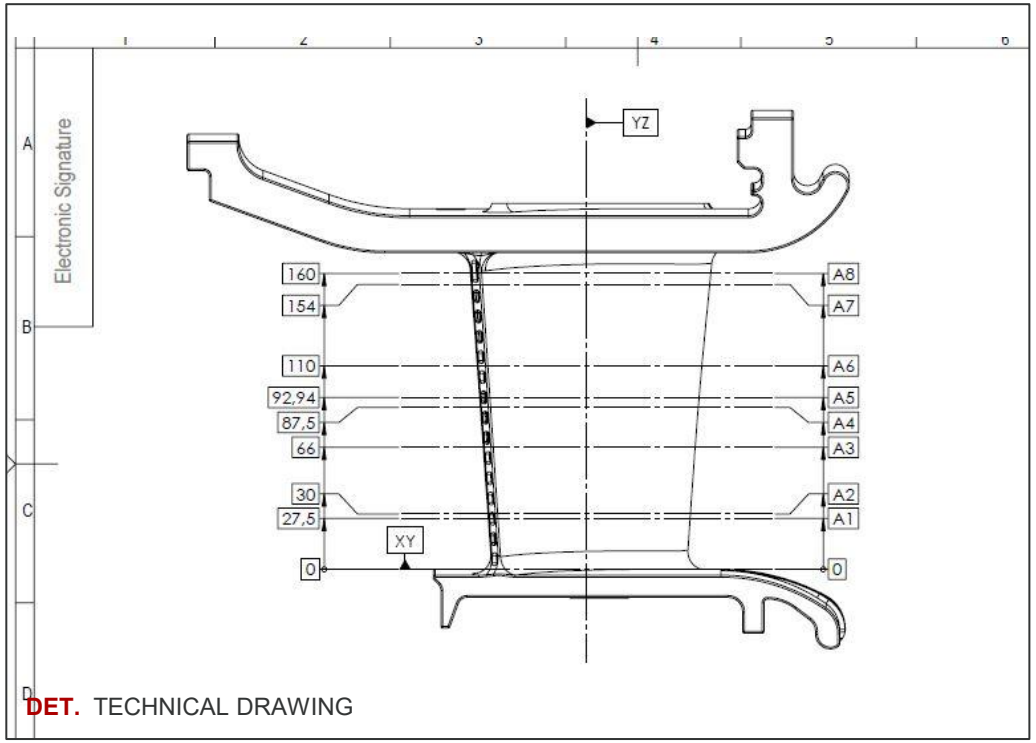
2026



04 DEVIATION ANALYSIS

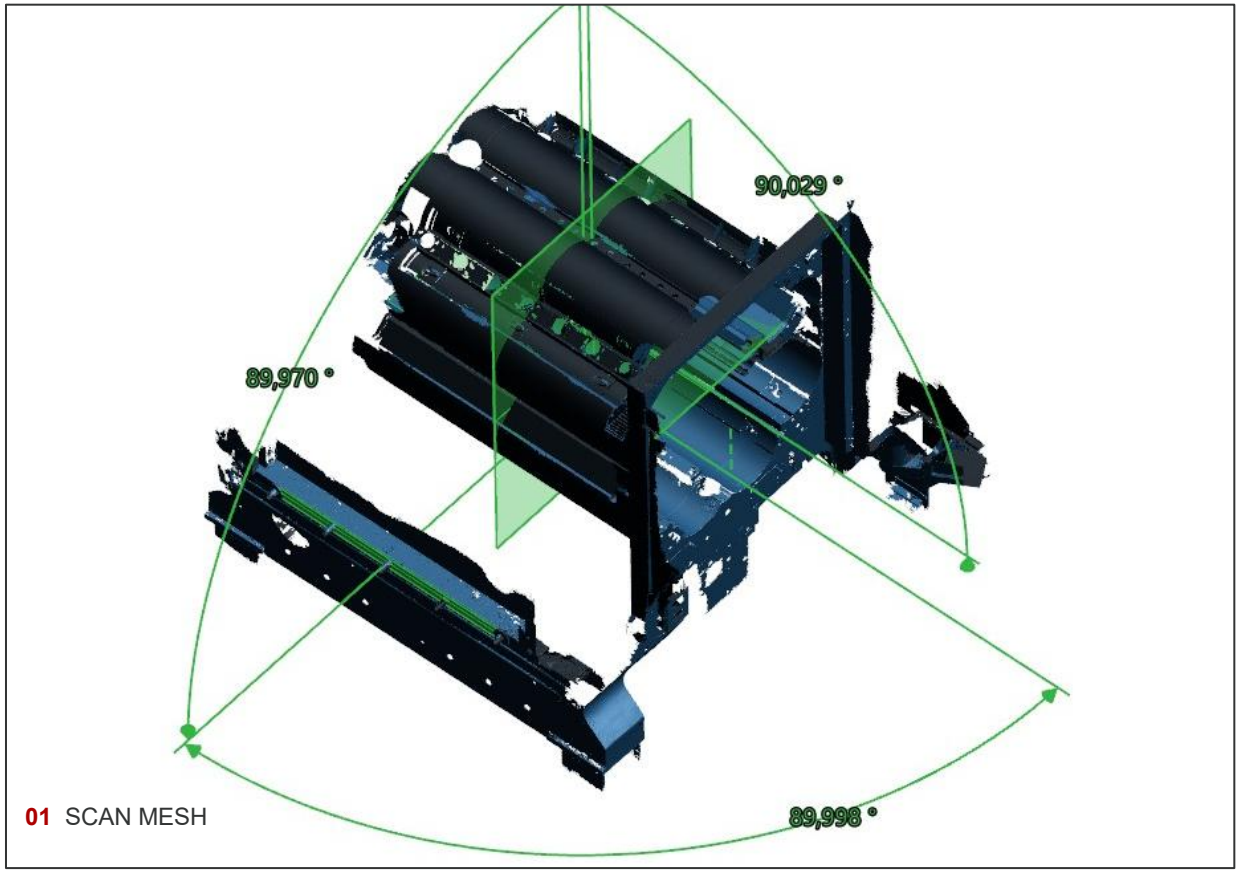
TECHNICAL NOTES

Dimensional deviation analysis was performed by applying a customised colour and value scale, defined to client specification, in order to accurately assess the degree of wear and geometric deformations detected on the scanned blades.
The CAD model was subsequently updated in accordance with the results obtained, and detailed technical drawings including multiple reference cross-sections were produced.



DET. TECHNICAL DRAWING

INDUSTRY



01 SCAN MESH


02 SCAN


03 DETAIL

PROJECT NAME

Rolling Mill Stand

2025

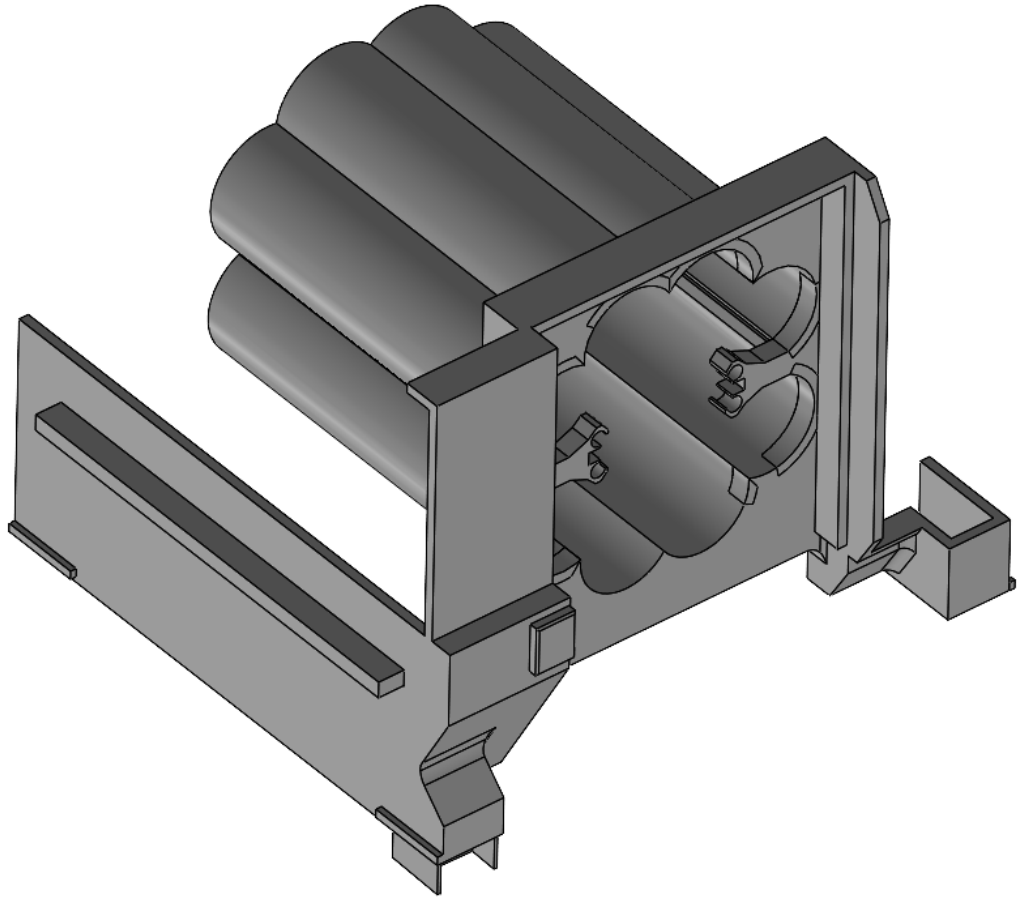
Reverse Engineering

PROJECT DESCRIPTION

OBJECTIVE: Reverse engineering of the internal geometry of a rolling mill stand for the restitution of functional dimensions required by the client.
The data acquisition campaign was conducted using a MetraSCAN Black Elite structured-light scanner, with particular attention to the acquisition of the component's internal surfaces. The resulting mesh was processed and optimised in order to extract the critical dimensions required by the project.
From the processed mesh, CAD reconstruction of the internal surfaces was performed. The digital model was finally supplemented with a dimensioned technical drawing conforming to the required representation standards.

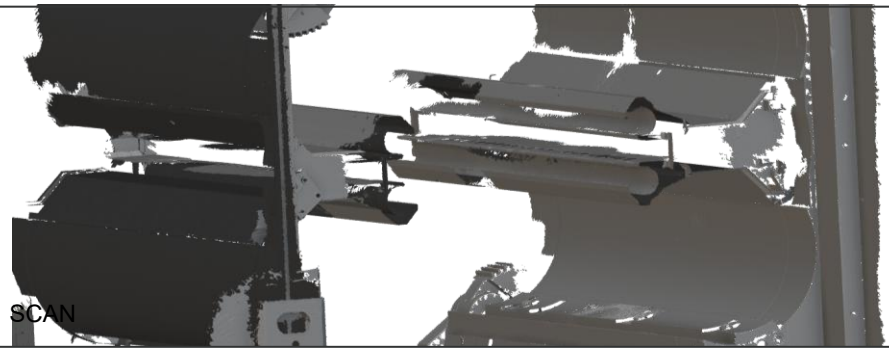
Rolling Mill Stand

2025



04 REVERSE ENGINEERING

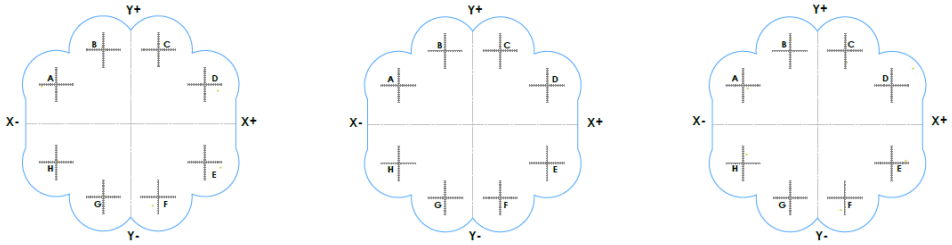
TECHNICAL SPECIFICATIONS



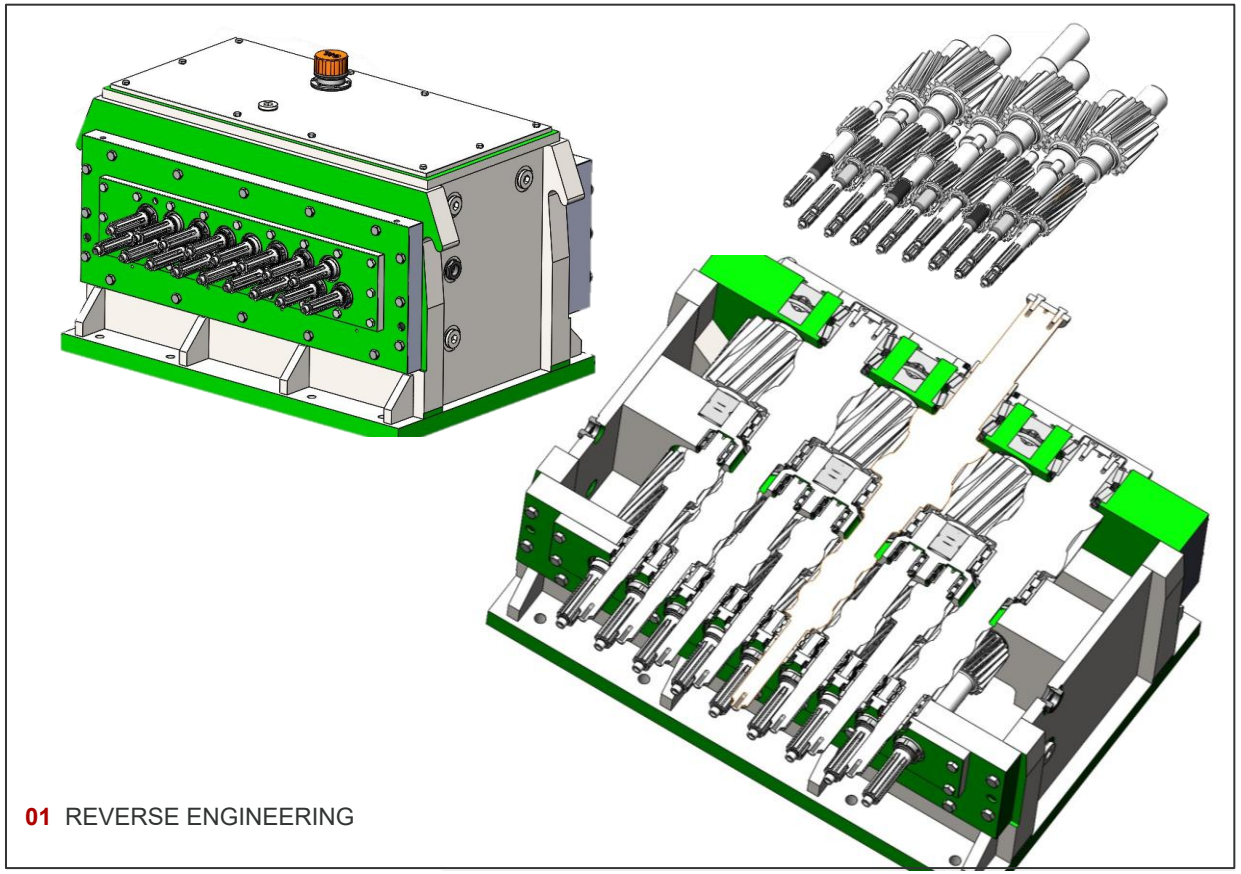
DET. SCAN

TECHNICAL NOTES

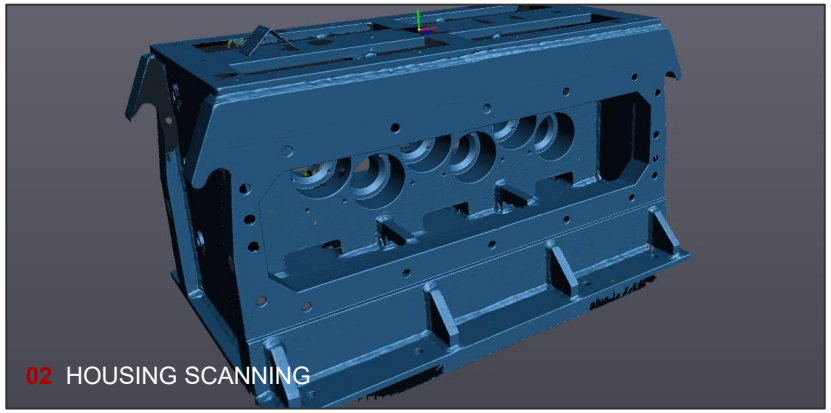
In order to ensure correct superimposition and alignment between the reverse engineering CAD model and the acquired scan mesh, the planar reference surfaces required for the geometric registration phase were extracted and modelled.



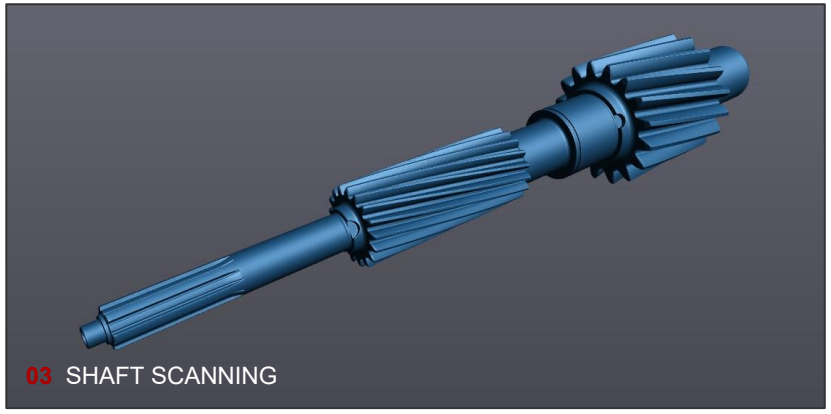
DET. TECHNICAL DRAWING



01 REVERSE ENGINEERING



02 HOUSING SCANNING



03 SHAFT SCANNING

PROJECT NAME

Torque Splitter

2026

Reverse Engineering

PROJECT DESCRIPTION

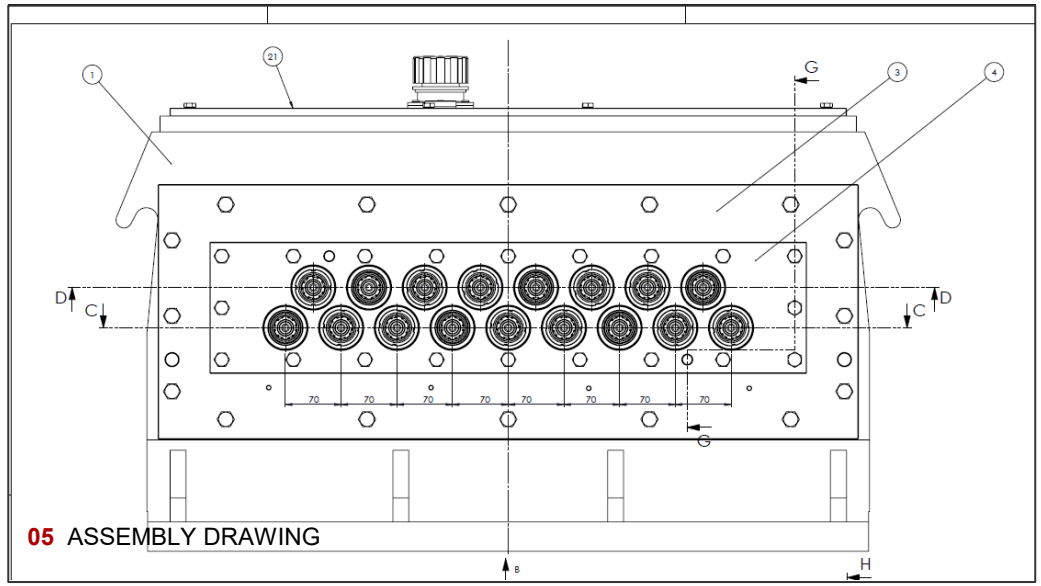
The project encompassed 3D scanning of each component in the assembly (shafts, gears, plates and housing), followed by reverse engineering with complete 3D CAD remodelling of all components and the final assembly, including commercial elements (bearings and standard parts). For the entire bill of materials, 2D construction drawings with comprehensive parts lists were produced.

Torque Splitter

2026

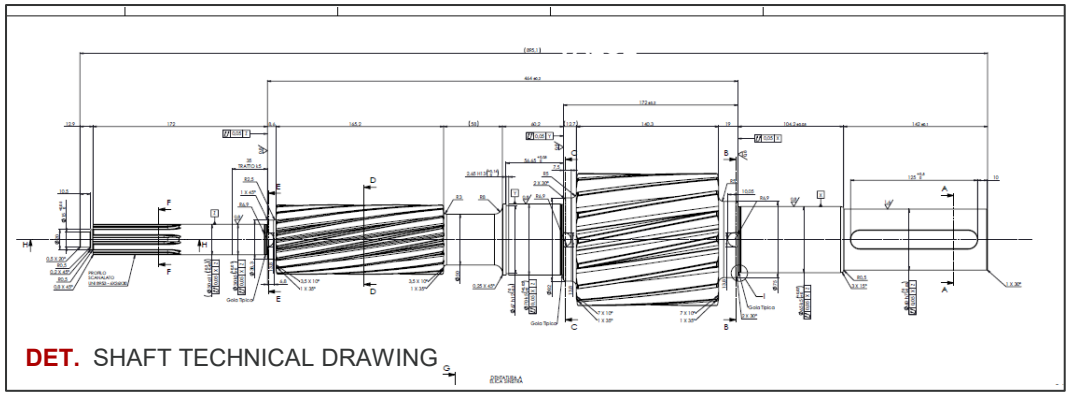


04 WEAR



05 ASSEMBLY DRAWING

TECHNICAL SPECIFICATIONS



DET. SHAFT TECHNICAL DRAWING

TECHNICAL NOTES

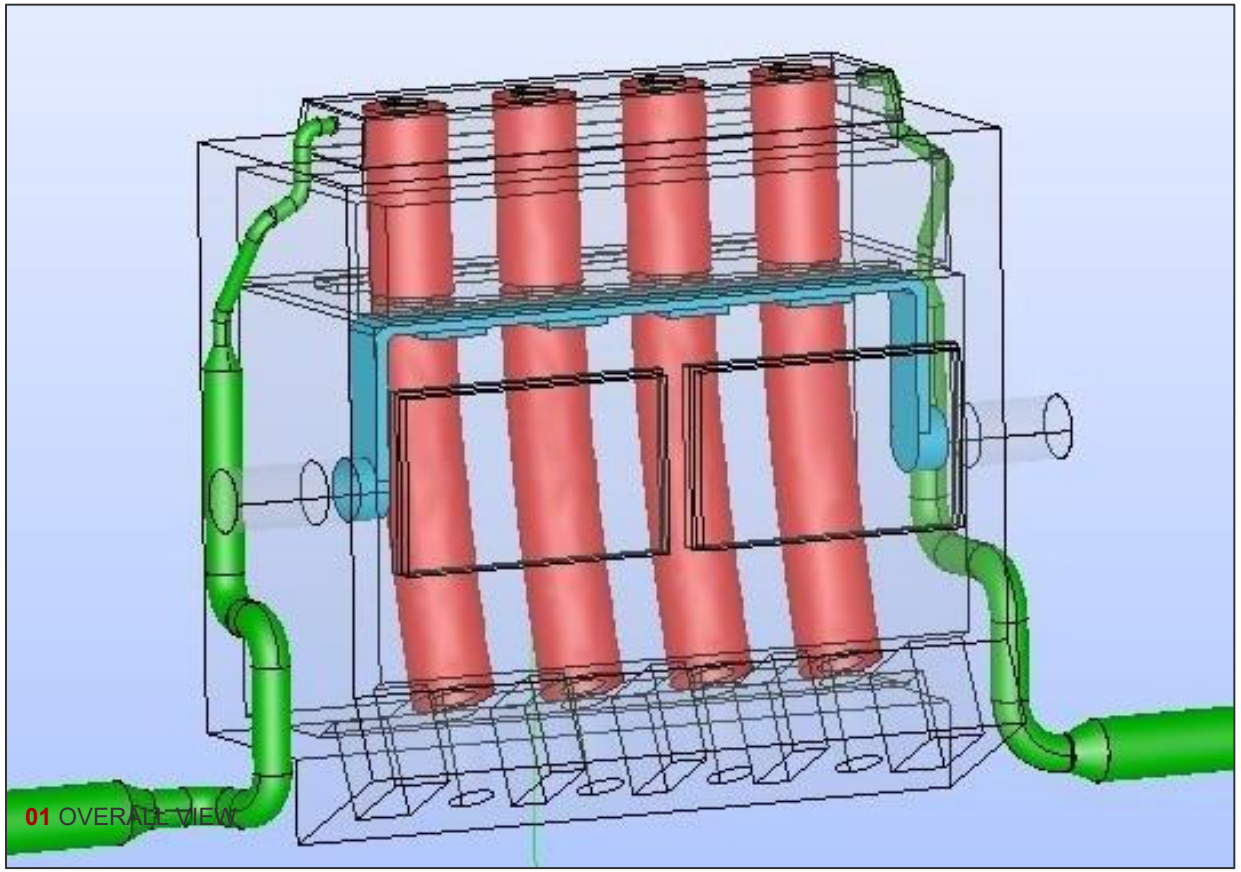
The technical challenge involved measuring the centre-to-centre distances between gear wheels to the hundredth of a millimetre and determining the helical gear data – module and helix angle – in order to ensure perfect power transmission.

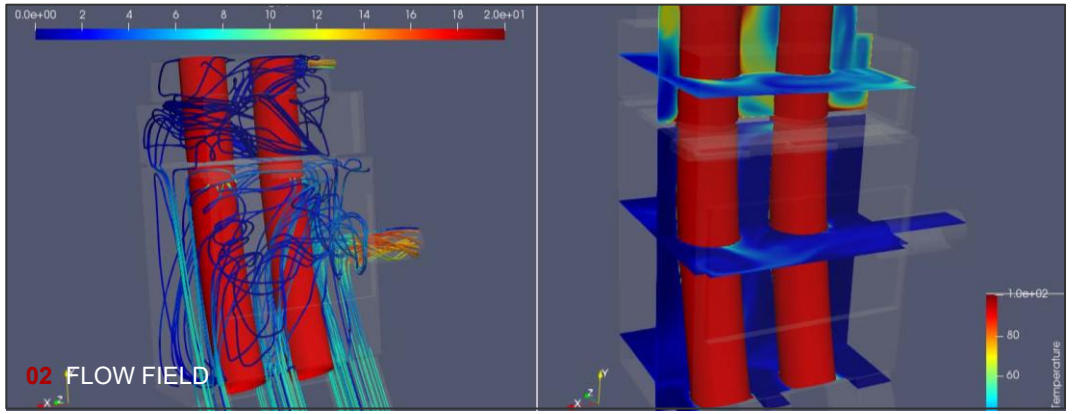
Shaft detail

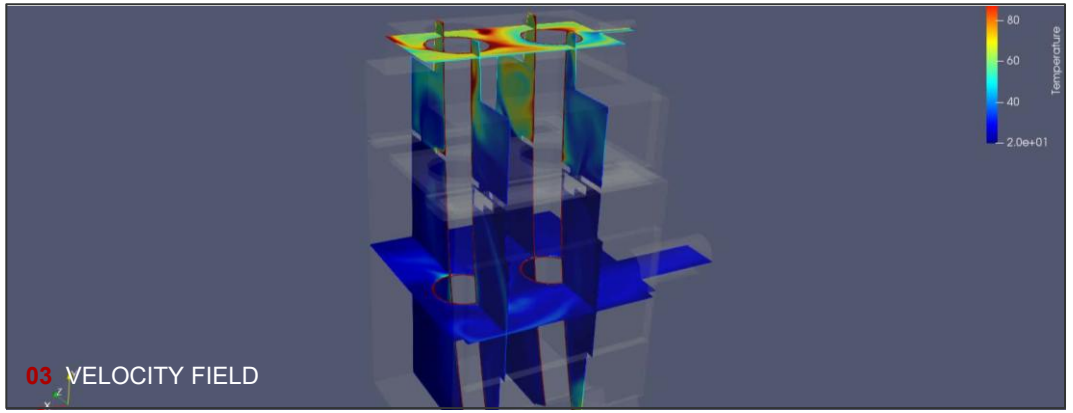


DET. SHAFT DETAIL

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PROJECT NAME

Casting Chamber

2022

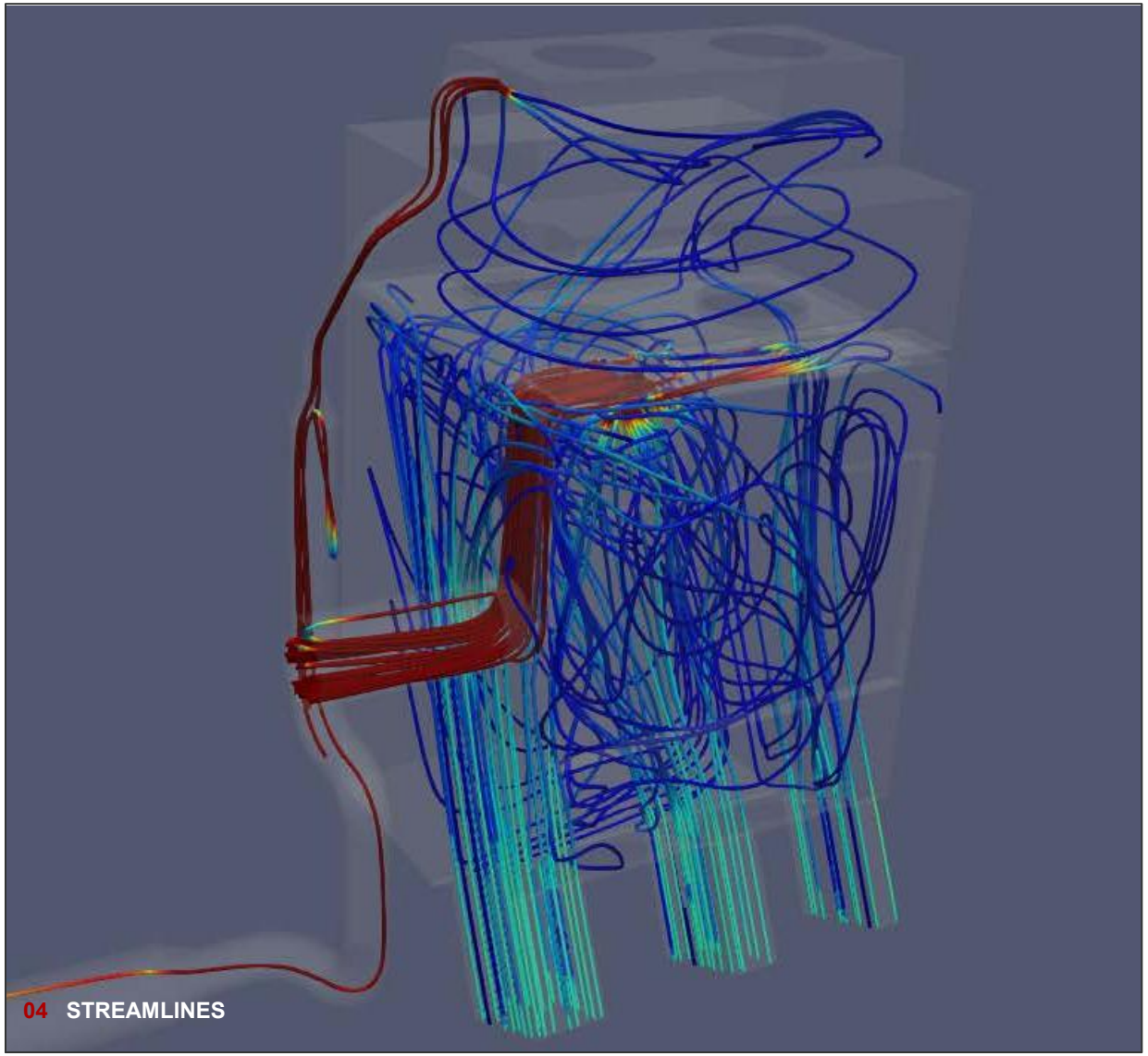
CFD Analysis

PROJECT DESCRIPTION

This study analyses a continuous casting chamber in which vapour deposition phenomena are observed in the upper zone of the confined volume, with consequent condensation formation and the onset of issues related to surface corrosion and vapour flow management.
The installed ventilation system consists of four mechanical extractors, fed by six suction inlets, dimensioned to ensure an adequate air exchange rate within the chamber.
The objective of the study is the fluid-dynamic evaluation of the extraction system and the identification of zones with the highest suction velocity and greatest propensity for condensate deposition, in order to support improvement interventions on the plant.

Casting Chamber

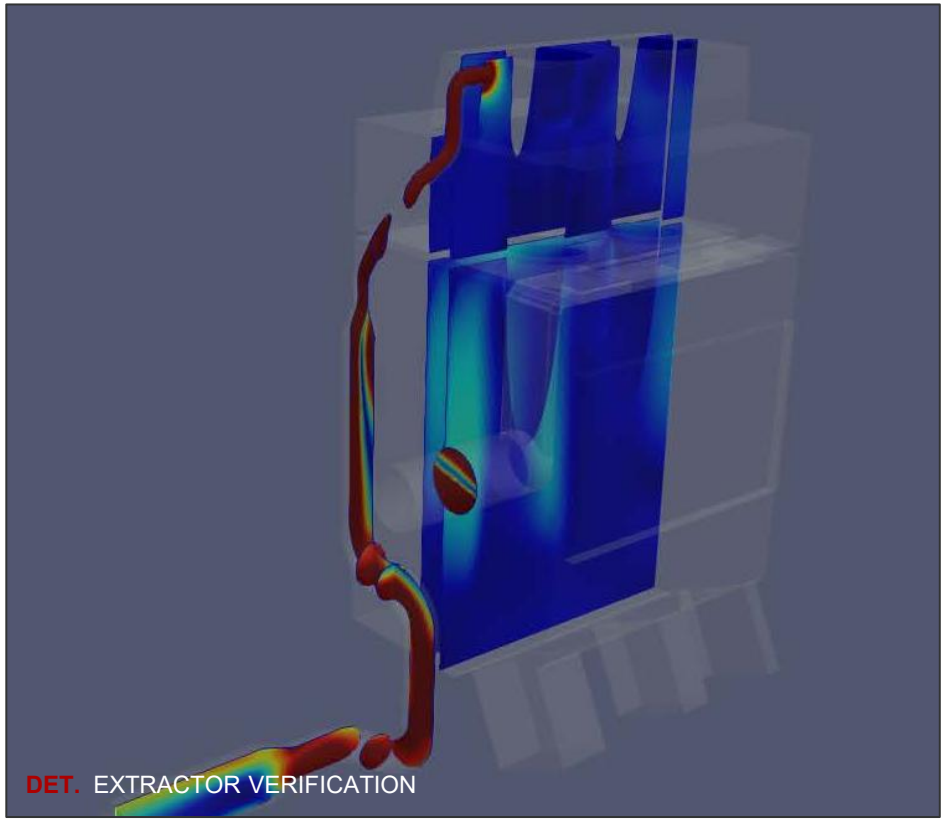
2022



04 STREAMLINES

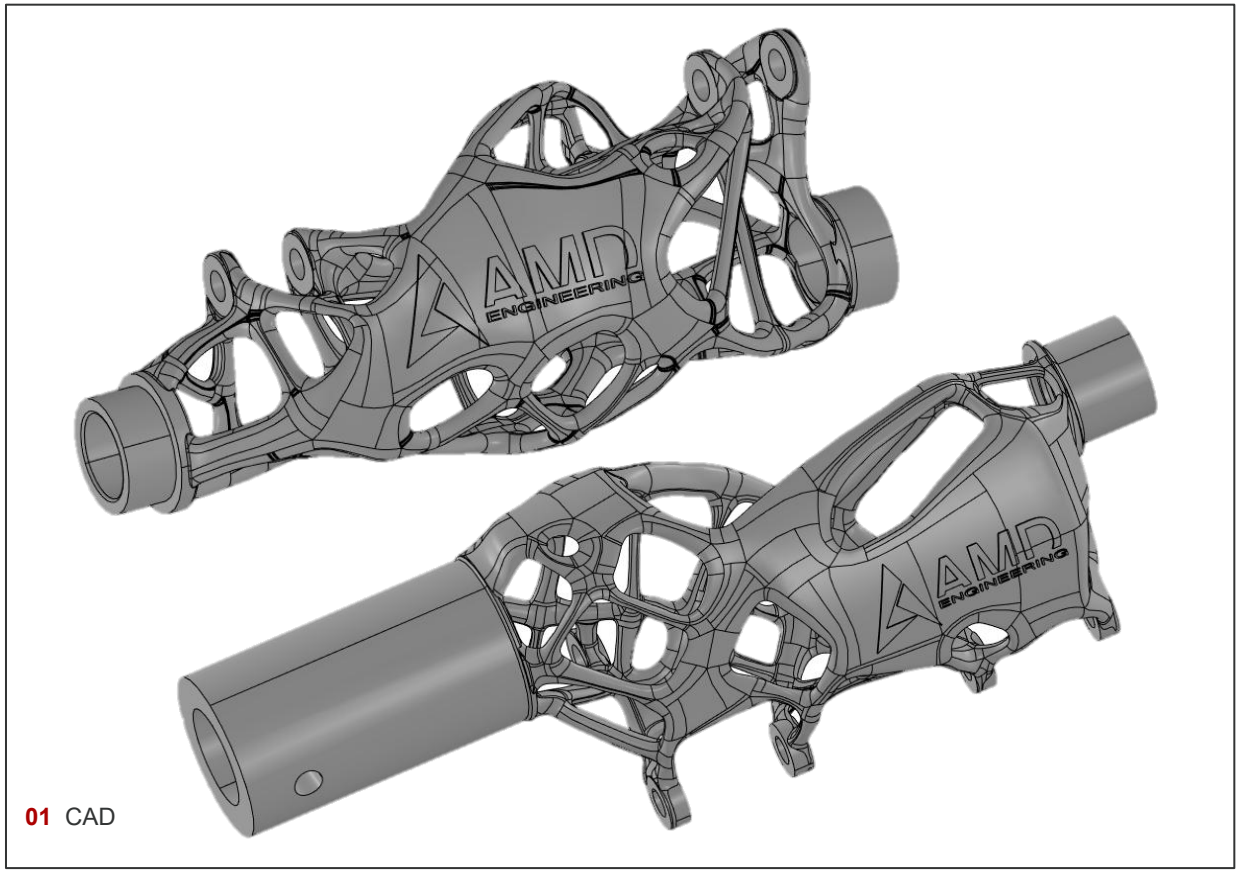
TECHNICAL NOTES

Optimised configuration: redistribution of the suction circuit with re-routing of the lower fans towards the upper zone. The solution reduces peak temperatures from >100°C to approximately 20°C and mitigates vapour stagnation. Calculated pressure drop on the extraction duct: ~5,500 Pa.



DET. EXTRACTOR VERIFICATION

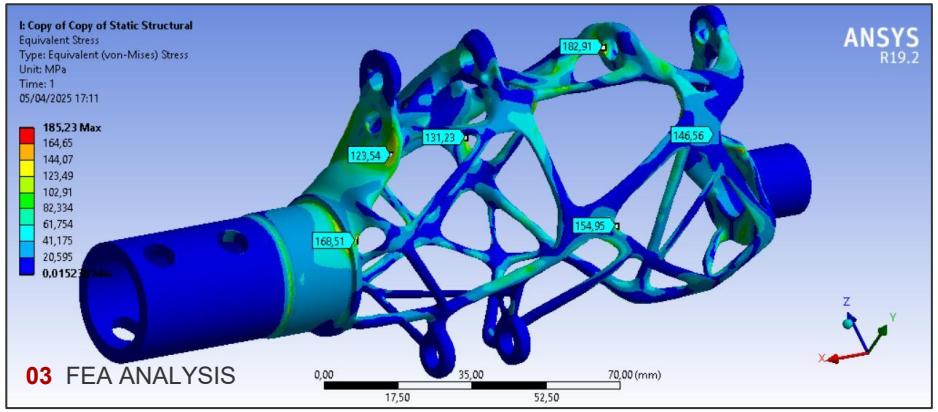
MOTORSPORT



01 CAD



02 DETAIL



03 FEA ANALYSIS

PROJECT NAME

Rocker

2025 | RACE-UP in collaboration with UNIPD

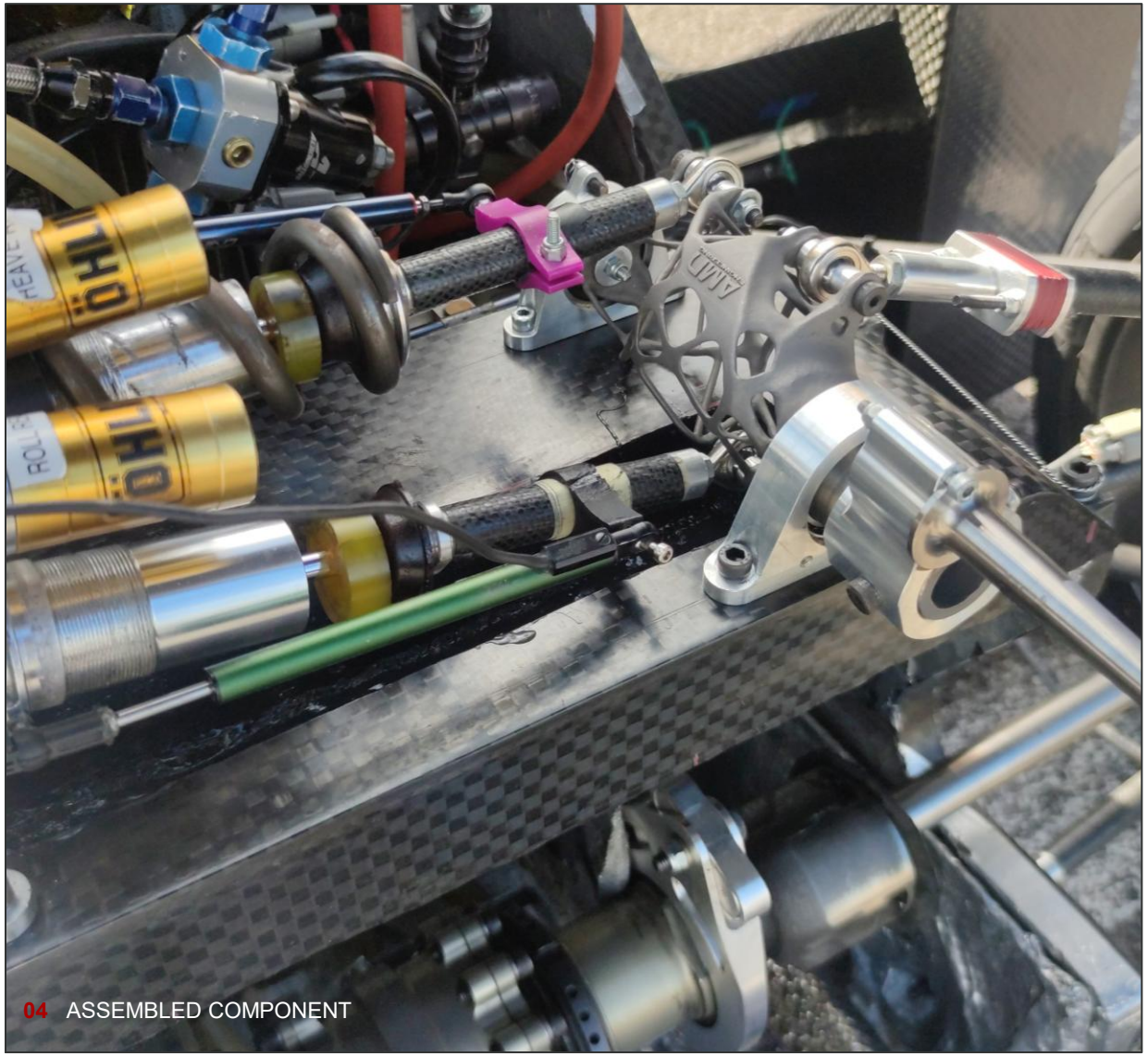
PROJECT DESCRIPTION

Decoupling suspension system rocker designed for Formula Student vehicles, manufactured in Ti6Al4V titanium alloy via LPBF technology.
The use of additive manufacturing technologies derives from the objective of achieving the best possible weight-to-stiffness ratio, unattainable using conventional machining methods.
The geometry was developed through topological optimisation analysis, utilising the full available space taking into account the entire range of motion and assembly methodology.
During the 2025/2026 season, the component was subjected to over one thousand kilometres of cumulative on-track operation, exceptionally high distances for Formula Student competition vehicles.

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Rocker

2025



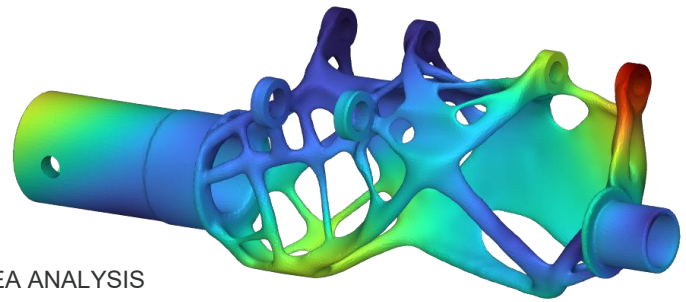
04 ASSEMBLED COMPONENT

TECHNICAL SPECIFICATIONS

PARAMETER	VALUE
Material	Ti6Al4
Dimension (L x P x H)	65,1 x 56,6 x 33,9 mm
Weight	172,96 g
Surface Finish	Satin / Polished
Normative	EN 10088-2

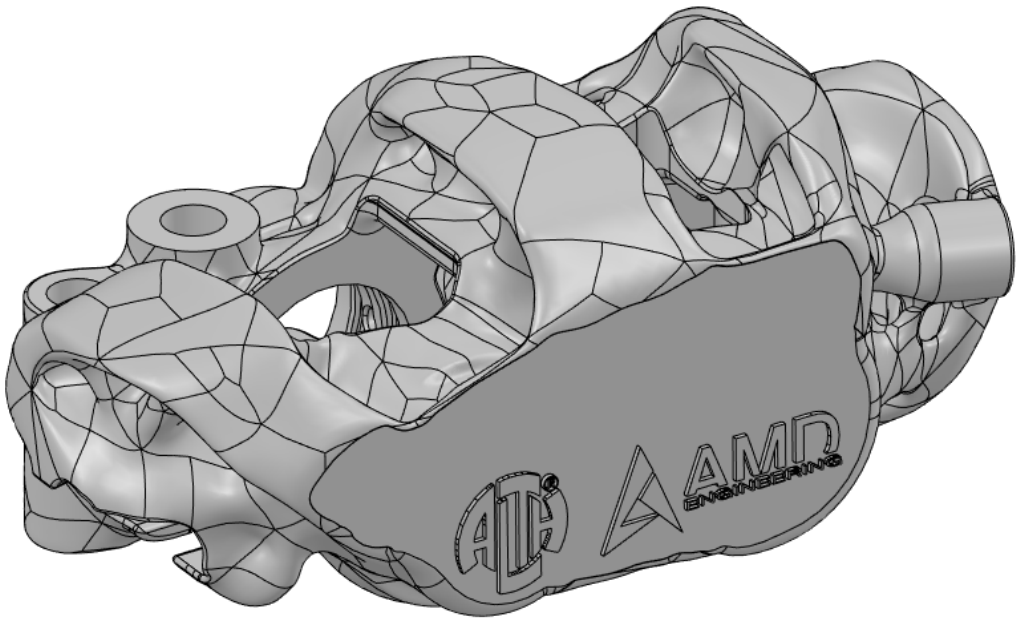
TECHNICAL NOTES

• Decoupling system: independent springs for pitch and roll, with wide setting margin compared to conventional systems.
• AM Rocker: topological optimisation with maximum stress and deformation constraints, maximising stiffness and reducing weight compared to conventional machining.
• On-track validation: over 1,000 km of cumulative operation during the 2025/2026 season including testing and timed Formula Student events.

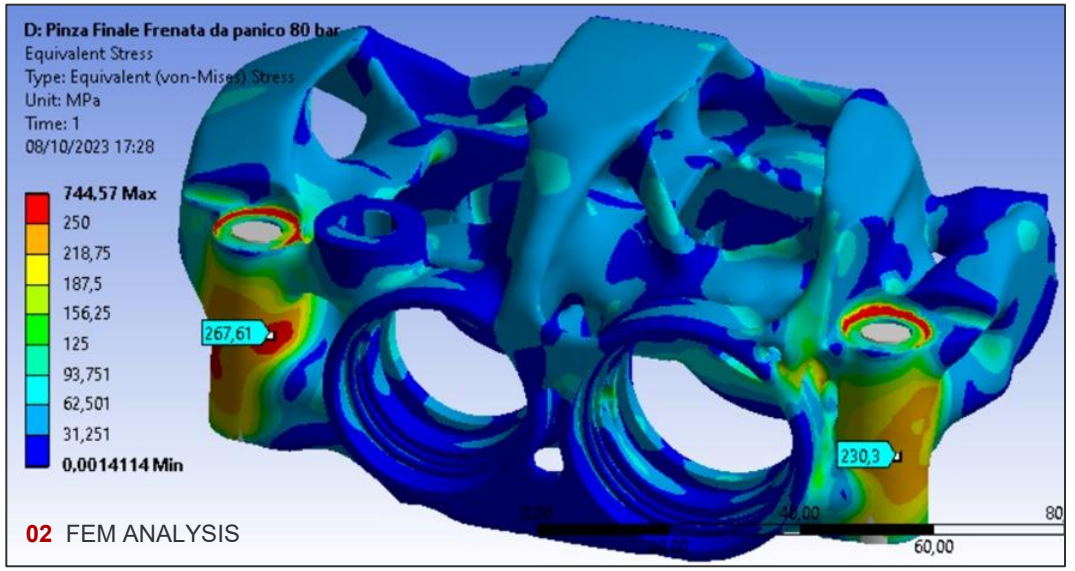


DET. FEA ANALYSIS

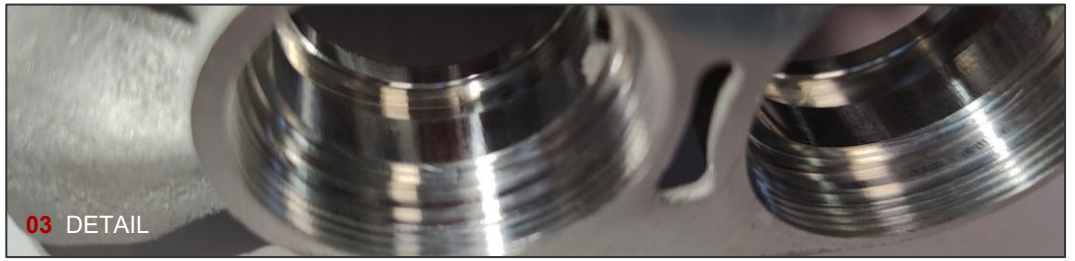
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01 CAD



02 FEM ANALYSIS



03 DETAIL

PROJECT NAME

Brake Caliper

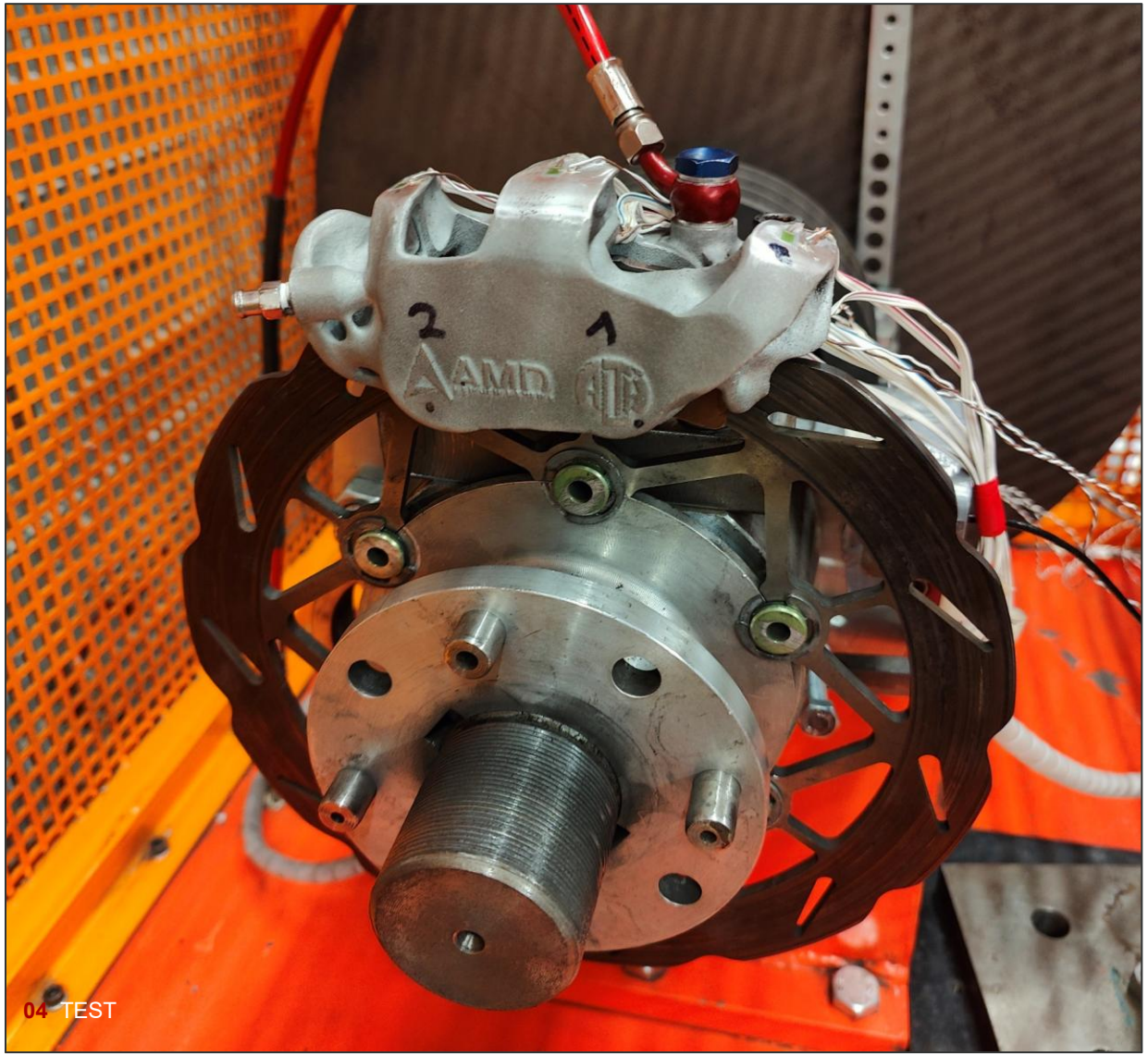
2024 | RACE-UP in collaboration with UNIPD

PROJECT DESCRIPTION

Monolithic hydraulic brake caliper designed for Formula SAE vehicles and manufactured in Scalmalloy®, an innovative high-strength lightweight aluminium-magnesium-scandium alloy. The component was developed with the objective of reducing mass while maintaining high braking performance and structural rigidity. The geometry was optimised by means of topological optimisation techniques, eliminating unnecessary material and improving the weight-to-performance ratio. Manufacturing was carried out using LPBF (Laser Powder Bed Fusion) technology, a metallic 3D printing process enabling the realisation of complex lightweight geometries. Experimental tests confirmed component reliability, with deformations and displacements consistent with FEM numerical simulations.

Brake Caliper

2024



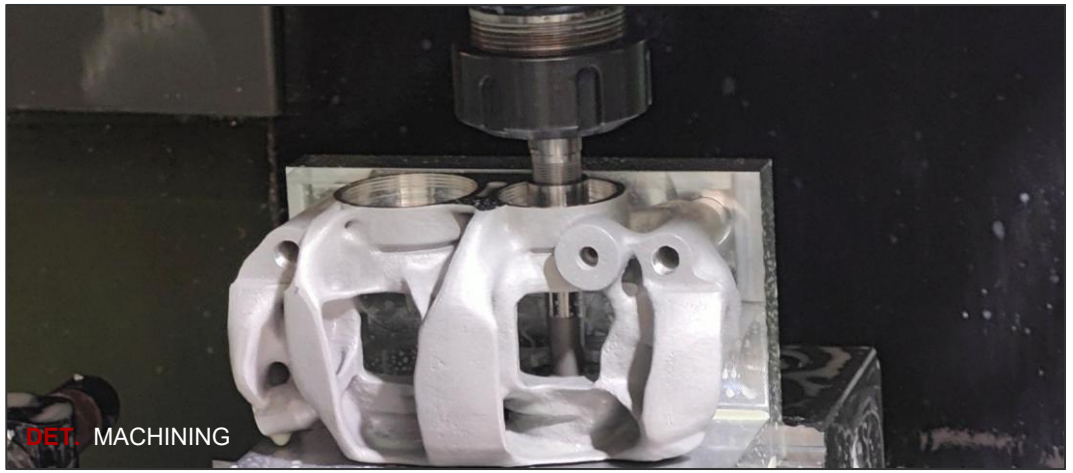
04 TEST

TECHNICAL SPECIFICATIONS

PARAMETER	VALUE
Material	Scalmalloy
Dimension (L x P x H)	130 x 68 x 48 mm
Weight	308 g
Surface finish	Satin / Polished

TECHNICAL NOTES

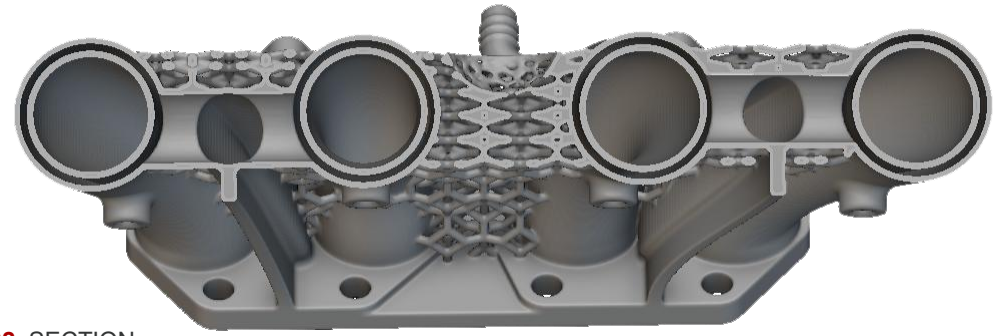
Material: Scalmalloy® (high specific strength Al-Mg-Sc alloy). **Optimisation:** topological (mass reduction, structural stiffness maximisation). **Validation:** experimental tests with deformations consistent with FEM simulations.



DET. MACHINING



01 RENDER



02 SECTION



03 ORIGINAL VERSION

PROJECT NAME

Intake Manifold

2022

PROJECT DESCRIPTION

Custom intake manifold developed for the Lancia Fulvia 1.3S, optimised for integration with enlarged Weber carburettors. Manufactured via MJF additive manufacturing in PA12, with internal channels designed to exploit the existing cooling circuit. The lattice structure, generated with nTop, is engineered to maximise the stiffness-to-weight ratio and ensure effective vibration damping.

Intake Manifold

2022



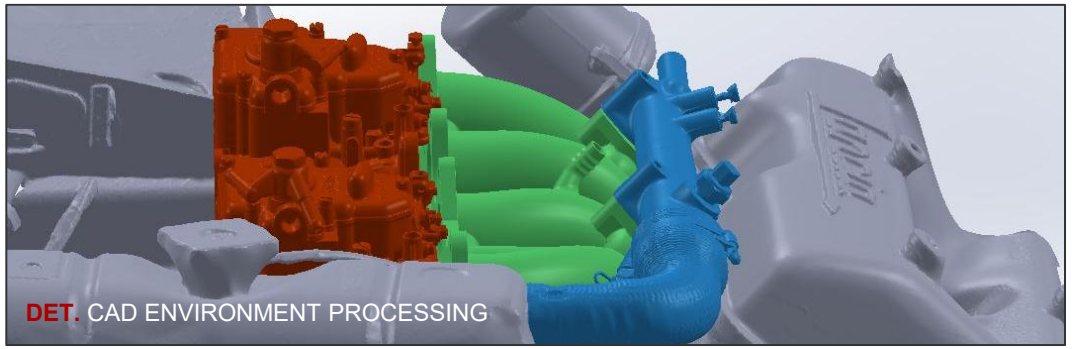
04 ASSEMBLY TEST

TECHNICAL SPECIFICATIONS

PARAMETER	VALUE
Material	PA12
Dimension (L x P x H)	334 x 148 x 125 mm
Weight	665,5 g
Surface finish	Sandblasting

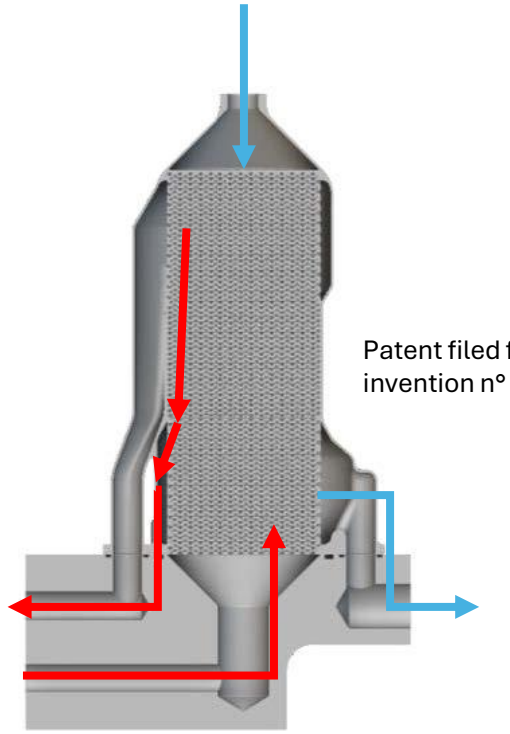
TECHNICAL NOTES

For volumetric analysis and reverse engineering of the mounting interfaces, the components of interest were acquired via 3D scanning using a Creaform Black Elite scanner. The resulting mesh was subsequently imported into the CAD environment for further design elaboration.



DET. CAD ENVIRONMENT PROCESSING

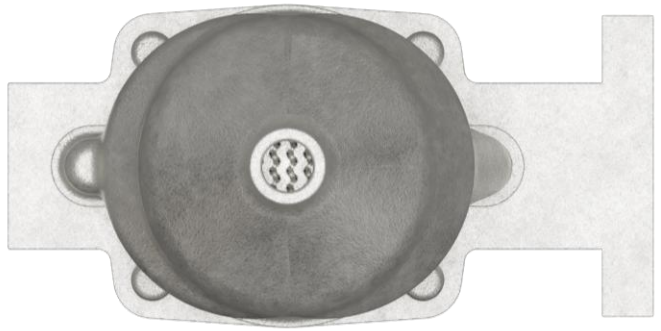
SPACE & DEFENCE



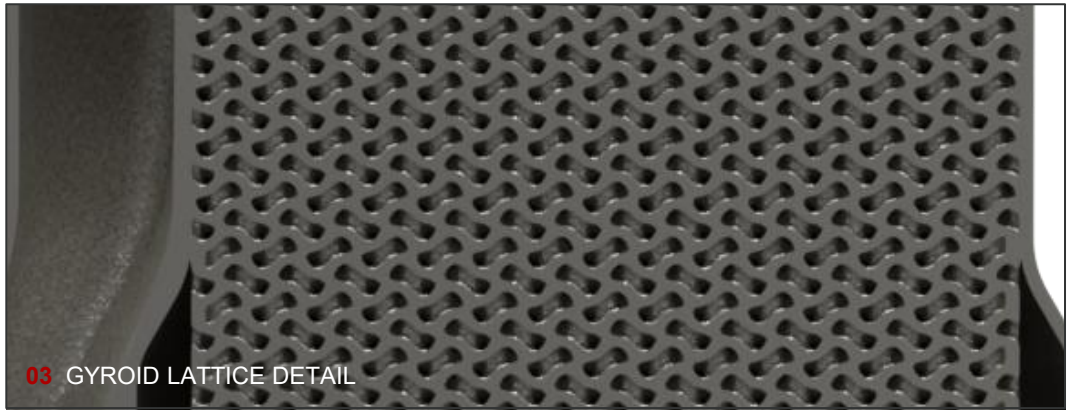
Patent filed for industrial invention n° 102022000004907



01 SECTION WITH FLOWS AND OVERALL VISION



02 TOP VIEW



03 GYROID LATTICE DETAIL

PROJECT NAME

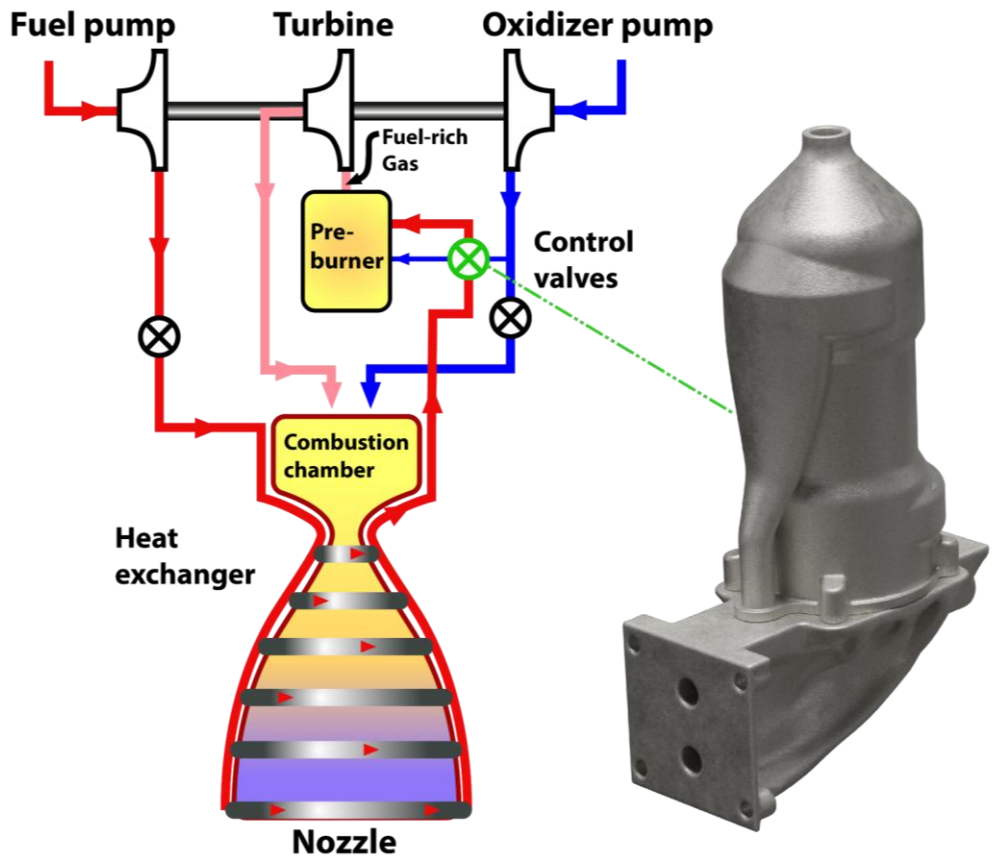
Pressure Control Unit with Integrated Heat Exchanger

Produced via additive manufacturing

PROJECT DESCRIPTION

The developed system consists of a pressure control unit with integrated heat exchanger for heating and/or cooling of the working fluid circulating within it.
In conventional hydraulic systems, the valve block and heat exchanger are separate and distinct components, interconnected by means of tubing and plates. In the proposed system, thanks to heat exchanger integration, additional tubing and fittings are eliminated, ensuring superior performance and reduced footprint, as well as lower manufacturing, assembly and installation costs. Individual modules can furthermore be connected in series or in parallel.

Pressure Control Unit with Integrated Heat Exchanger



TAV. 01 VALVE POSITIONING IN THE STAGED ENGINE

TECHNICAL SPECIFICATIONS

PARAMETER	VALUE
Material	AlSi10Mg
Dimension (L x P x H)	150 x 75,5 x 246,8 mm
Weight	1,24 Kg
Surface finish	Satin

TECHNICAL NOTES

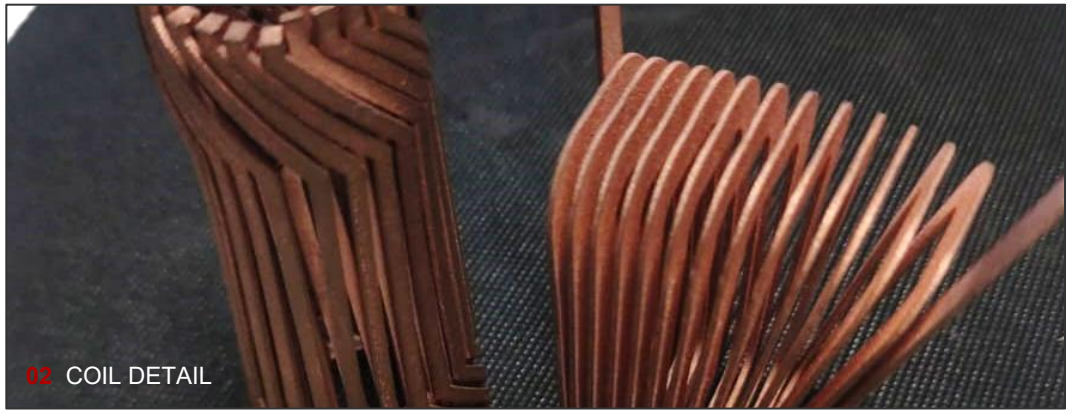
Manufactured via 3D printing with topology optimisation for mass reduction; the internal structure adopts a TPMS lattice to maximise heat transfer.



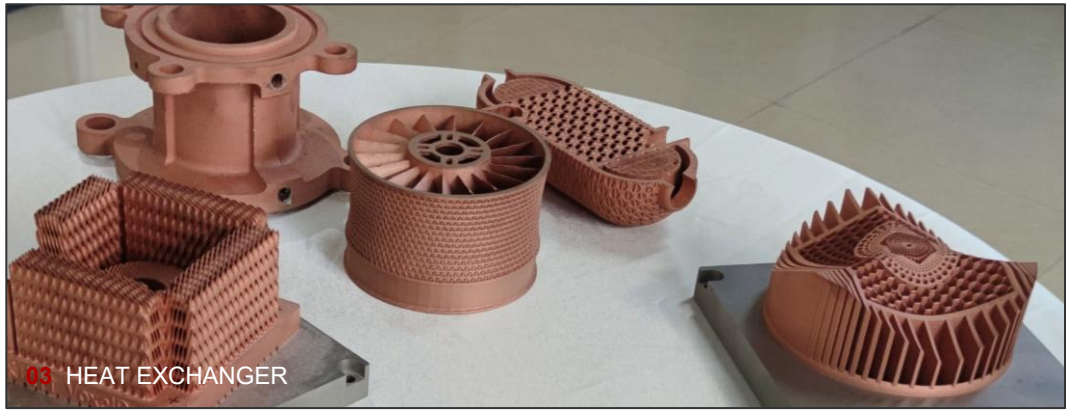
DET. INTERIOR



01 COMPONENTS



02 COIL DETAIL



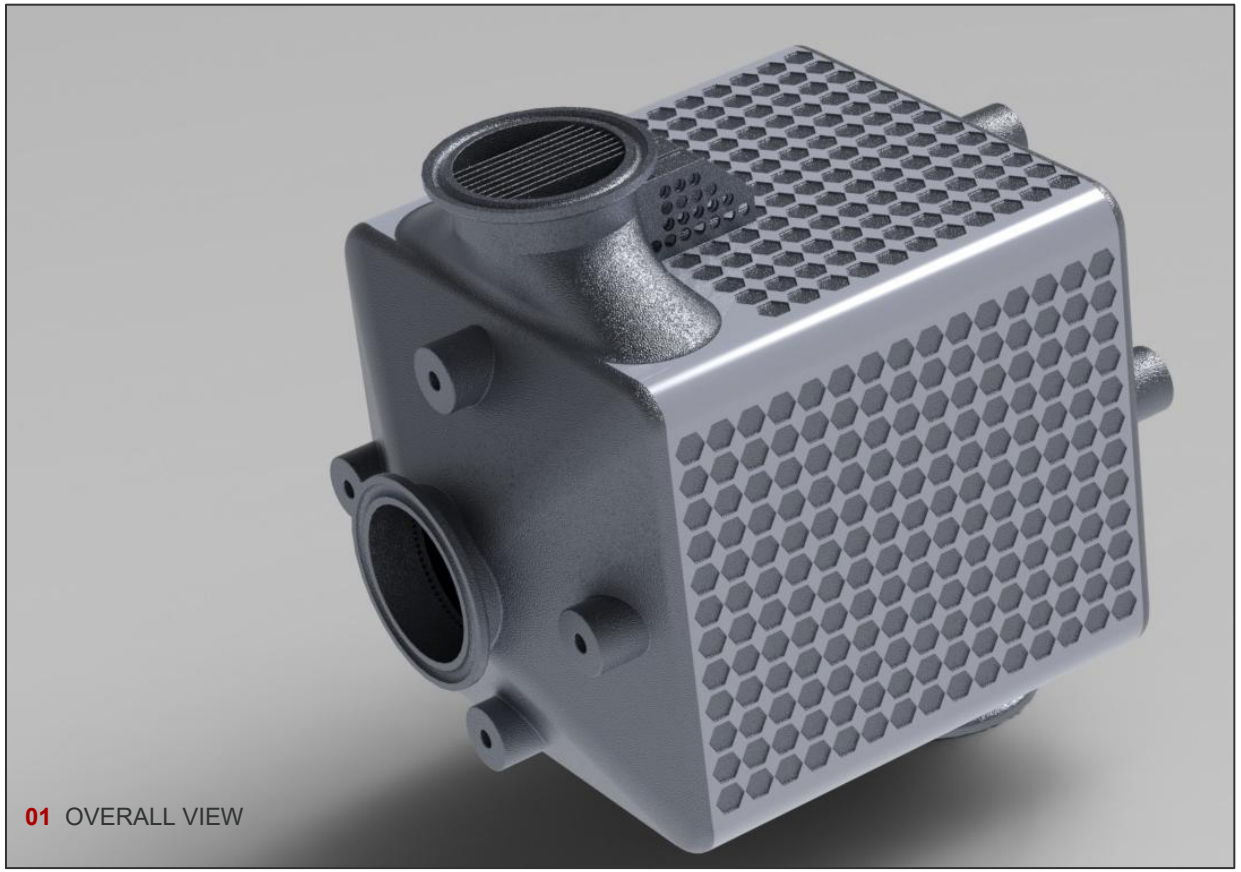
03 HEAT EXCHANGER

PROJECT NAME

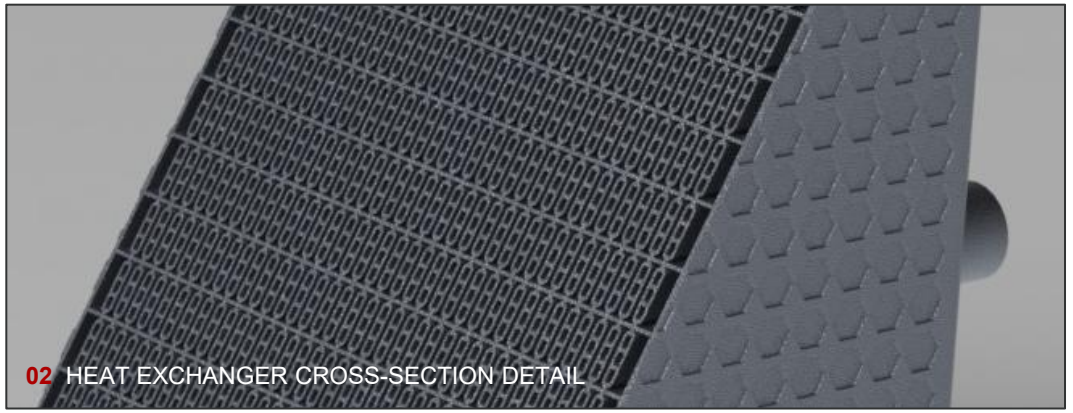
Heat Exchangers

PROJECT DESCRIPTION

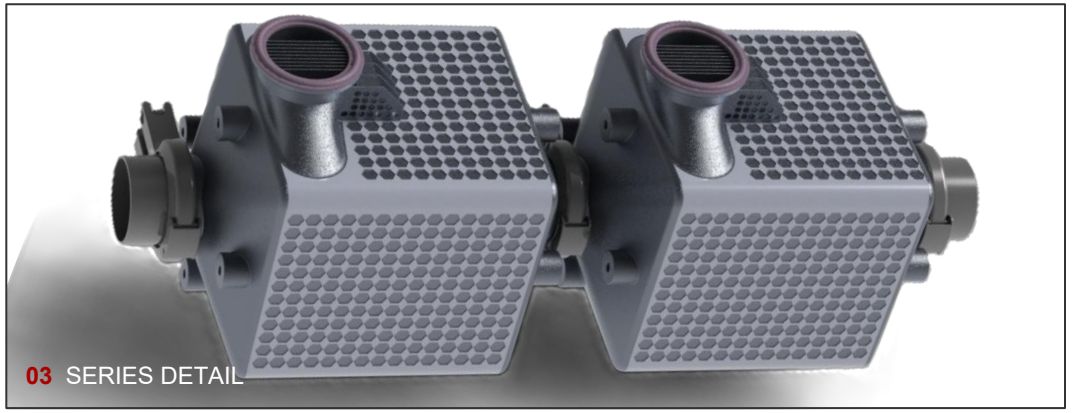
Custom design and manufacturing of high-performance heat exchangers, thermal and magnetic induction coils, and advanced nozzles using copper and aluminium additive manufacturing technology (SLM).
Integrated engineering of rocket engine components with optimised geometries, manufactured entirely via 3D printing.



01 OVERALL VIEW



02 HEAT EXCHANGER CROSS-SECTION DETAIL



03 SERIES DETAIL

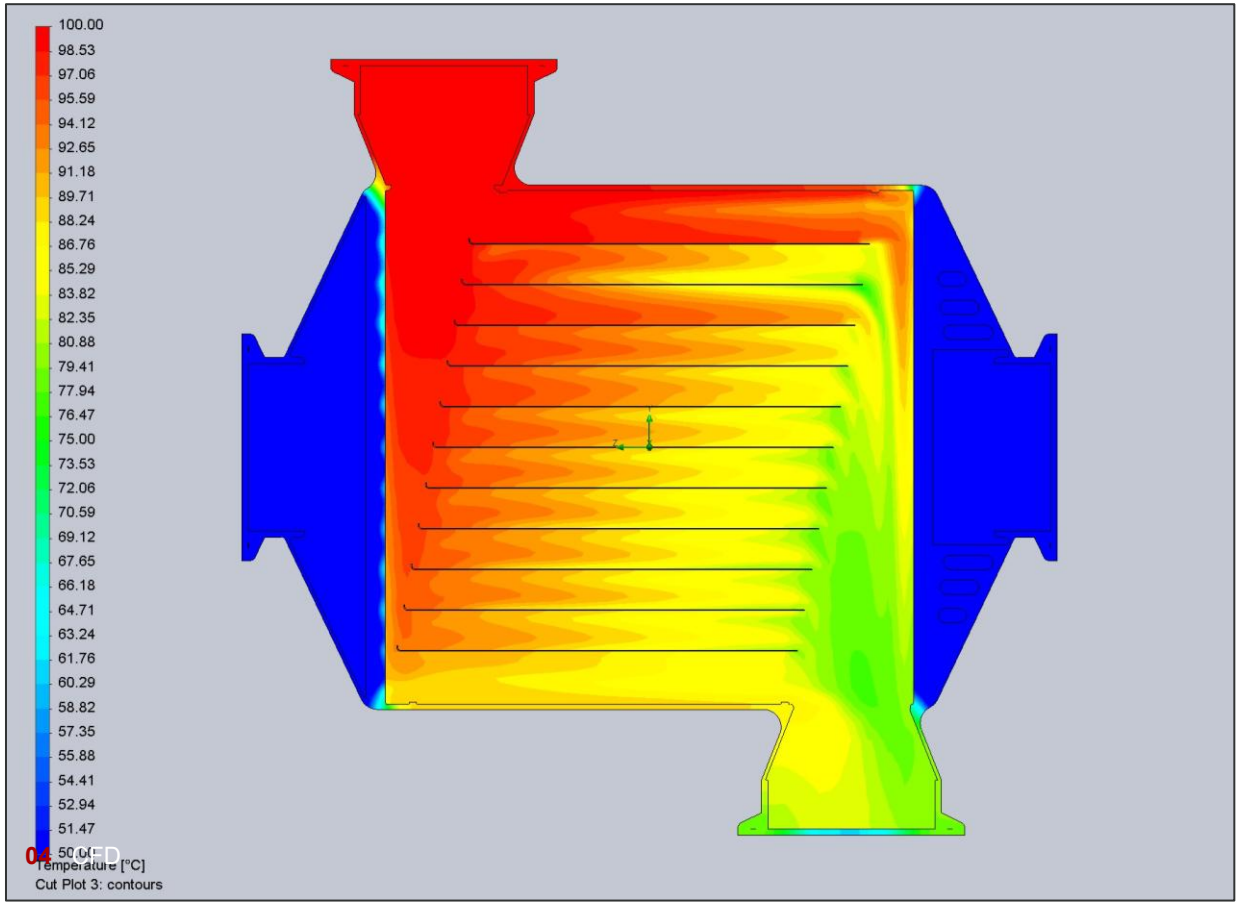
PROJECT NAME

Oil-Water Heat Exchanger

PROJECT DESCRIPTION

A 3D CAD modelling software was used for the construction of the model; in parallel, multiple CFD (Computational Fluid Dynamics) analyses were conducted to optimise the internal geometry with respect to fluid flows and heat exchange.
The external profile and positioning connection were optimised using a lattice structure; topological analysis was not applied, as the internal surfaces have a specific geometry determined by flow efficiency.

Oil-Water Heat Exchanger



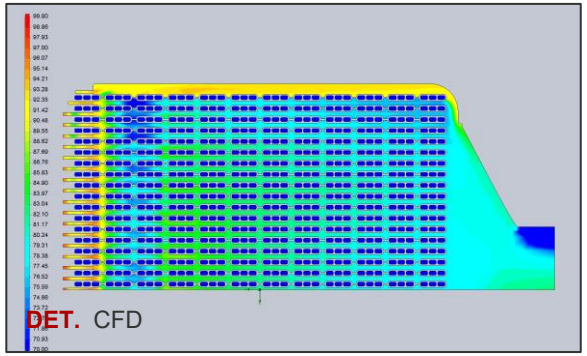
04 CFD

TECHNICAL SPECIFICATIONS

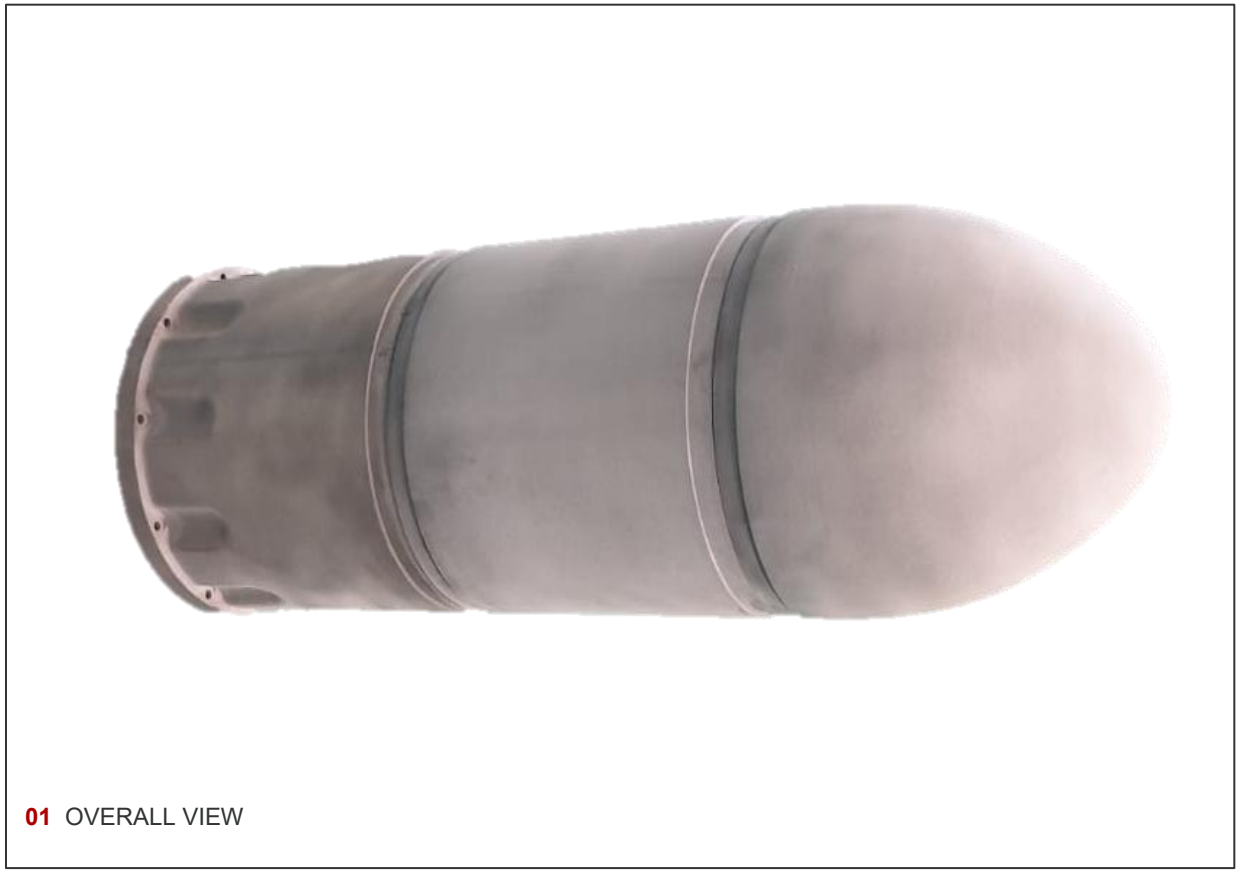
PARAMETER	VALUE
Material	Titanium
Dimension (L x P x H)	230 x 219,5 x 150 mm
Weight	10 kg
Heat exchange power	50 KW
Oil flow	50 L/min

TECHNICAL NOTES

By means of a simple and rapid flanged connection, using components readily available on standard markets, this element can be used in series to further increase efficiency.


DET. CFD

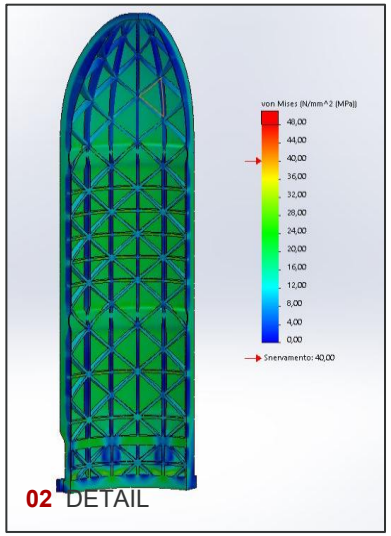

DET. HEAT EXCHANGER



01 OVERALL VIEW



03 INTERNAL DETAIL



02 DETAIL

PROJECT NAME

Defence Radome

2022

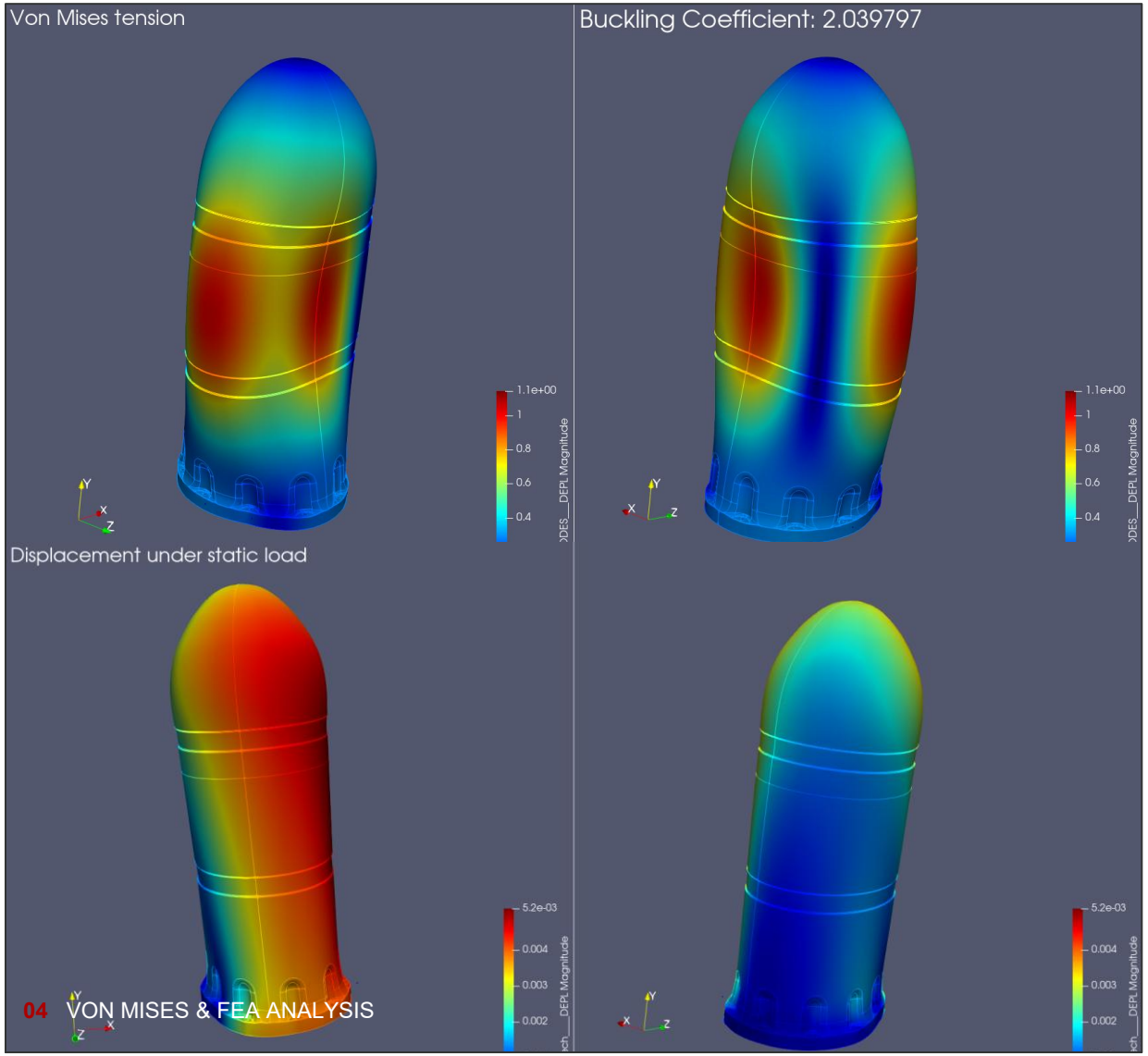
PROJECT DESCRIPTION

Executive design of structural components for passive sonar equipment installed aboard an underwater military vehicle.
Product manufactured using modular components in technical polymer materials via additive manufacturing technology.
Design optimised for the reduction of flow noise, vibrations, and front-to-back acoustic effect.
Coated with fibreglass and epoxy resin, with a dedicated paint finish.

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Defence Radome

2022

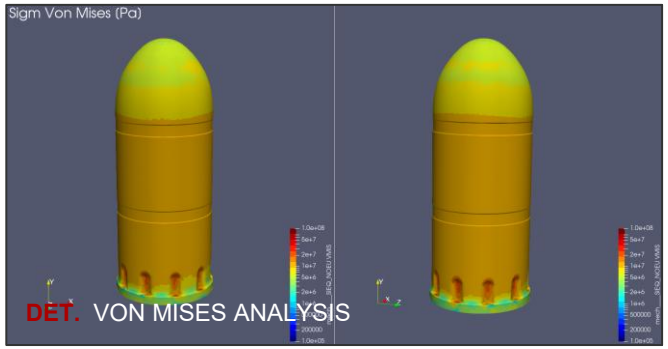


TECHNICAL SPECIFICATIONS

PARAMETER	VALUE
Material	PA12
Dimension (L x P x H)	303 x 306x 800 mm
Weight	6,9 kg
Surface finish	Resin coating and fibreglass

TECHNICAL NOTES

An external resin coating over the entire surface was applied, conferring greater rigidity and structural resistance while also improving UV resistance and providing a smoother surface for aerodynamic flow.



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For the **Defence and Space** sectors, we design and develop hydraulic, mechanical, and mechatronic components with high technological content, meeting the most stringent requirements in terms of reliability and performance.

Through the integration of **topology optimisation**, **lattice** structures, **generative design**, and **additive manufacturing**, we achieve significant structural weight reductions and verifiable performance gains.

We are actively involved in competitive calls under **EDF** (defence) and **HORIZON-CL4-2026** (space), positioning ourselves as strategic partners in European innovation.

The mechanical components and **spare parts** of the sectors in which we operate are at the centre of a digital transformation process: **AI-driven** platforms are enabling the development of increasingly high-performance, secure, and optimised solutions for advanced manufacturing.

AMDengineering is a centre of excellence for innovative frontier projects: emerging technologies are not a future scenario — they are our operational present.

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