



ADDITIVE4RAIL: A NEW PARTNERSHIP TO PRODUCE TRAIN MAINTENANCE PARTS ON DEMAND

SNCF, Centrale Nantes, VLM Robotics and 4DPioneers are today launching the Additive4Rail consortium with state support. The aim is to speed up the industrialisation of additive manufacturing technologies in order to streamline train maintenance and reduce costs by producing components piecemeal or in small batch runs. The four partners have set up a production line in Saintes to manufacture and repair metal parts, with a view to transforming railway maintenance.

ADDITIVE MANUFACTURING, A PROMISING TECHNOLOGY FOR THE RAILWAY INDUSTRY

Additive manufacturing - the industrial equivalent of 3D printing - combines digital design and rapid manufacture of mechanical parts by adding layer upon layer of material.

This process has many advantages. Prototyping, tooling and supply lead times are considerably shorter, thus paving the way for more operational availability of trains. Less spare parts will be held in stock, thereby generating cost savings (train maintenance has 150,000 part numbers, including many small batch runs).

Certain parts that are no longer manufactured can be produced via additive manufacturing throughout a train's entire working life, which can be up to forty years.

Finally, beyond simple reproduction, additive manufacturing opens up new opportunities to improve and customise parts and make them more reliable, lighter or quieter than the original.

CONSORTIUM MEMBERS

Additive4Rail is a four-year collaborative project, combining industrial research and experimental development. It brings together four partners with complementary roles and expertise:

SNCF, a world leader in railway operation and maintenance, is leading the consortium through its use cases which cover the use, production, maintenance, repair and recycling of train parts.

Centrale Nantes, a world-class higher education and research institution, is contributing its scientific expertise in the field of materials and processes, and in particular: numerical simulation, design of large parts for additive manufacturing, and production trajectory generation and optimisation.

VLM Robotics, an SME based in the Nouvelle Aquitaine region, specialising in "manufacturing 4.0" and manufacturer of machines and agile robotic cells.

4DPioneers, Deeptech based in the Hauts de France region, specialising in materials and industrial processes for additive manufacturing.

A STATE-FUNDED PROJECT

Additive4Rail is one of the first 7 projects selected in the Call for Expressions of Interest launched in 2021 by CORIFER (Comité d'Orientation de la Recherche et de l'Innovation FERroviaires), which aims to improve train and rail network performance, operation and maintenance, with support from the Investments for the Future Programme (PIA4) and France 2030, overseen by the Secrétariat Général pour l'Investissement and operated by Bpifrance and ADEME. All of the projects will play a part in boosting both quality of service and competitiveness in the railway sector.

Additive4Rail represents an investment of 10.7 million euros over 4 years, which is allocated as follows to the consortium members:

- SNCF: 4.8 M euros
- Centrale Nantes: 2.7 M euros
- VLM Robotics: 2.4 M euros
- 4DPioneers: 890 K euros

THE CONSORTIUM'S GOALS

Additive4Rail is an R&D project that aims to speed up the industrial implementation of additive manufacturing processes for train maintenance. This research will focus on both metallic and polymer materials.

This involves overcoming certain technological obstacles, such as: the still limited size of part that can be manufactured with current processes, the lack of fireproof polymer materials certified for railway use, the production cost of finished parts that is still too high for the railway market, as well as the availability of 3D files detailing the parts.

The consortium will also work on developing the expertise and workflows needed to implement these new processes, on the certification issues involved in their industrialisation and, of course, on a business model to bring down costs.

To meet these goals, the SNCF and its partners have invested in the creation of a 150 m² industrial facility in Saintes (Charente-Maritime), on one of the SNCF's Industrial Technicentre sites in Charente-Périgord. From April 2022, a special team of three will run extensive tests on the materials and machines developed by 4DPioneers, VLM Robotics and Centrale Nantes. Wire Arc Additive Manufacturing and Fused Deposition Modelling processes will be closely studied for the manufacture and certification of mechanical parts that will be mounted on trains in operation.

The consortium will also develop "railway demonstrators" that will be world firsts, such as a train bogie that could be in production as early as 2026.

A PROMISING OUTLOOK

Additive4Rail will thus play a role in driving adoption of this new technology in France, in particular for the railway industry. PhD theses will be undertaken, new skills will emerge and jobs will be created. The consortium's work may also find market opportunities outside France, given the European harmonisation of railway safety standards.

Additive4Rail should contribute to the creation of a genuine national additive manufacturing sector, particularly for moulds, tools and spare parts. The outlook across Europe is very promising, as shown by the interest expressed by manufacturers (energy, naval, defence, space, etc.) at "Formnext", the European additive manufacturing exhibition held in Frankfurt in November 2021.

ABOUT SNCF

SNCF is one of the world's leading passenger transport and freight logistics groups, with the management of the French rail network at its heart, generating 34.8 billion euros in turnover in 2021, a third of which is generated internationally. With a presence in 120 countries, the Group employs 270,000 people, 208,000 of whom are in France, more than half of whom work in its core railway business. The new public Group, which came into being on 1 January 2020, is managed by the parent company SNCF, which owns five companies: SNCF RESEAU (management, operation and maintenance of the French rail network, rail engineering) and its subsidiary SNCF GARES & CONNEXIONS (station design, operation and sales), SNCF Voyageurs (Transilien, TER and Intercités, TGV InOUI, OUIGO, Eurostar, Thalys, Alleeo, Lyria and distribution with SNCF Connect), KEOLIS (urban, suburban and regional public transport operator in France and worldwide), Rail Logistics Europe (rail freight transport) and GEODIS (logistics solutions and freight transport). Alongside its customers (passengers, local authorities, shippers and railway companies with regard to SNCF Réseau) and with a strong regional presence, the Group relies on its expertise across all aspects of the railway, and more globally in all transport services, to meet all their mobility needs in a simple, fluid and sustainable way.

Learn more: <https://www.sncf.com/en#menu+sncf-group>

ABOUT CENTRALE NANTES

Founded in 1919, Centrale Nantes is a French engineering school and member of the Ecoles Centrale Group. The school boasts excellent rankings: top ten engineering school in France (L'Etudiant 2022), and top 250 worldwide for engineering (Times Higher Education 2022). Its undergraduate, Master and PhD programmes are based on the latest scientific and technological developments and the best management practices. With strong international outreach, 43% of its student body are international students, representing more than 87 nationalities. Partnership agreements are in place with 178 universities in 48 countries and two-thirds of students follow a double degree programme abroad. At Centrale Nantes, research and training are organised into three key areas for growth and innovation: manufacturing, energy transition and healthcare. With research platforms ranging from digital simulation to prototyping with full-scale models, and a joint incubator - with Audencia and ensa Nantes - which has 20 years of experience in supporting start-up projects, the school has two major tools for innovation and creation, working hand-in-hand with industry. Through a proactive approach of collaborative research between laboratories and industry, Centrale Nantes is developing initiatives for the creation of international chairs, of which there are 15 to date.

Learn more: www.ec-nantes.fr. Media Library: <https://phototheque.ec-nantes.fr/> /
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About VLM-Robotics

Manufacturer of agile robotic cells for manufacturing 4.0: Non-Destructive Testing, Machining, Bonding, Additive Manufacturing... VLM-Robotics' cells are generally multifunctional: Machining or Additive Manufacturing with Control in Process and/or Post-processing... and can be multi-robot. These cells work in a closed loop in real time. Based on this very unique know-how in Europe, VLM-Robotics is the innovation partner of Siemens in France (Siemens Solution Partner). Its 4.0 offer is present within Symop, France Additive and the new French SIF sector. VLM-Robotics receives support from the BPI as part of the BPI Accelerator Solution Industrie du Futur programme.

Learn more: [website](#) / [LinkedIn](#).

About 4D PIONNERS

A startup located in the Hauts de France region supporting manufacturers in their efforts to achieve a responsible and sustainable economy through the additive manufacturing of functional parts in high-performance and innovative materials. The company is developing breakthrough technologies (functional materials and hybrid printers) that will facilitate the development of Industry 4.0 by rethinking the production of spare parts locally and on demand. The expertise of 4D Pioneers (a spin-off of Lamcube hosted at Centrale Lille Institute) is based on a scientific board of 10 experts with recognised skills in the durability and behaviour of materials, manufacturing processes and their links to behaviour, and a technological hub of 45 multi-material and multi-process machines for mass-produced 3D manufacturing.

Learn more: 4dpioneers.com

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