Press release

Nantes, 11 February 2021

Centrale Nantes and SNCF produce a train part by additive manufacturing. A real breakthrough.

Within the scope of its national Additive Manufacturing project, the SCNF (Rolling Stock Engineering division) called upon Centrale Nantes's expertise to study the feasibility of producing certain components. The production of a pivot, an interconnecting part, by additive manufacturing is an achievement that opens up new avenues for the design of metallic components.

Additive manufacturing technologies are of interest in maintenance management in the quest to overcome supply issues, to better manage parts obsolescence, product end-of-life or the slow turnover of components produced traditionally via casting.

Following SNCF's study of SLM* technology (Selective Laser Melting) for metallic materials, their project moved on to assess other manufacturing methods by adding material such as WAAM (Wire Arc Additive Manufacturing) in order to broaden the panel of suitable parts towards larger components and repair.

In 2020, Centrale Nantes and Naval Group used this technology to print the first hollow propeller blade demonstrator. This prompted Laëtitia Kirschner, Additive Manufacturing Project Manager at SNCF Voyageurs, to get in touch with Professor Jean-Yves Hascoët, Head of the Rapid Manufacturing Platform at Centrale Nantes.

After analysing the geometries and constraints of a catalogue of possible components, Centrale Nantes and SNCF opted to use additive manufacturing to produce a pivot, a part that connects the bogie to the carriage.

Centrale Nantes worked on this part, also producing a number of specimens for analysis at SNCF, in order to monitor material integrity, which involved the participation of mechanics specialists and metallurgists in the study. The promising results obtained (metallurgy, mechanical characteristics, etc) on these specimens and tomography on the part itself were sufficiently convincing to proceed to dynamic testing. Given the green light, the part was then submitted to the test bench at the Agence d'Essai Ferroviaire, where it performed successfully under fatigue.

Based on this first study, other projects are in the pipeline for 2021.

Jean-Yves Hascoët: "*The collaboration between the laboratory and the SNCF is very encouraging, especially with regard to the input of Additive Manufacturing for maintenance applications. This first step, in this field, raises many opportunities for both establishments*.

Laëtitia Kirschner: "*WAAM technology is a new milestone for us on the road towards the repair and maintainability of large parts via additive manufacturing. Our fruitful collaboration with Centrale Nantes has made this achievement possible."*

* Additive manufacturing technique specially developed for 3D printing in metal alloys. It creates parts using a high power-density laser to melt and fuse metallic powders together.

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 for academic excellence (Le Figaro), 4th engineering school in France in 2021 (L'Etudiant), and top 200 worldwide for engineering (Times Higher Education). 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.

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About SNCF – SA Voyageurs

SNCF Voyageurs is the SNCF group subsidiary that handles all SNCF passenger rail transport. It provides shared mobility and door-to-door solutions to meet passengers' needs for high-quality, eco-friendly services at the right price. Its services cover both everyday mobility and long-distance travel, in France and Europe, with: Transilien in the Paris area; TER for regional services; and long-distance trains (TGV INOUI, OUIGO, Intercités, Eurostar, Thalys, TGV Lyria, etc.). Its online ticketing agency OUI.sncf, operated by its digital subsidiary e.Voyageurs, is today one of France's leading e-commerce sites. Its industrial department is responsible for the maintenance of all rolling stock, as well as on-board safety, comfort and innovation. The 70,000 employees of SNCF Voyageurs transport around 5 million passengers every day. Founded on 1 January 2020, SNCF Voyageurs is a public limited company, wholly owned by the SNCF Group.