50: Aeronautics :strong links with industry

When the UTC-Roberval Lab was created, back in 2000, by the merger of the LG2mS (Mechanical engineering and for Materials and Structures) and some other research units, it was placed under a joint hierarchy: UTC and the CNRS. So, what are key features of the Roberval research Lab? Firstly, we can cite the noteworthy, excellent reputation of the research scientists' teams and the strong links they have built with a variety of industrial sectors.

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Summary

Following another, recent merger, with UTC-LEC, the 5 research teams specialized to cover the domains: computational mechanical engineering, acoustics and vibrations, materials and surfaces, mechatronics, energy sources and uses, electricity, system integration and, last but not least, industrial systems: products/processes. Let us look at the team for Computational Mechanics, to illustrate their scope and scale of their activities.

Prof Jérôme Favergeon - who has directed the UTC-Roberval Laboratory since 2015 - explains, "What we do is to develop robust test phase computational techniques we use to elaborate methodology with some original, specific digital models for the purpose of optimizing complex multi-physics problems. Our Acoustics and Vibrations team is investigating all sorts of unwanted noise and/or vibrations found building structures and in vehicles that first need to be identified, then characterized and finally treated using digital models and experimental setups to optimize vibro-acoustic behaviours". In regard to the Materials and Surfaces team, " they essentially examine three families of materials: composites which prove to be of great interest to the aeronautical sector, metallic alloys and nano-charged polymers which in short is equivalent to integrating nano-materials into polymers. The aim here - whatever the materials involved - is to better understand their structures at various scales and to determine how they will behave through time. In fine, we predict expected operation life span for them", he details. Next we have the Mechatronics team, in full Mechatronics, energy, electricity and integration with two main lines of activity: "on one hand, miniaturized, small mechatronics systems with low power ratings, and on the other machines that require powerful electric supply - such as we

find in all-electric vehicle power propulsion motors and the Industrial Systems team who do research into product/process thematics as found in manufacturing lines and associated design work and develop "tools and methodologies used for integrated robust design work on products and processes to ensure manufacturing line-design-industrialization assembly digital continuity, as well as multidisciplinary collaboration all of which research works is in line with the concept of Industrie 4.0", adds Prof Favergeon.

As far as the links between UTC-Roberval and industry are concerned, they go back a long way in time, plus being numerous and varied. To begin we can cite the CIFRE industrial theses defended at UTC-Roberval, i.e., which are financed by an industrial host partner. These PhDs are supervised by several of the Robert research scientists and can be found in a number of fields, first among which is transpiration, with a number of sub-themes - automobiles, aeronautics, railroad, naval... followed by energy topics (which of course is a contributor to transportation) for example for propulsion units in all-electric vehicles and finally we have health-care sector technologies, in a collaboration with another UTC Lab - BMBI (Bio-mechanics and Bio-engineering).

Some of our industrial partnerships are more formal, notably in the framework of the 15, or so, Government vetted Institutes of Technological Research (IRTs) that exist today in France. As Prof Favergeon underscore, "UTC is a partner to Railenium, a rail-road IRT (notably working for the French SNCF national railway company). Other partnerships are signed outside pre-established structures. For example, there is a project underway with the Paris region "metro" consortium, RATP, to investigate rail wear phenomena and other projects are being discussed with SAFRAN for the inclusion of composites in aeronautics. And a final from of partnership - and maybe we can see this as reflecting the high-profile image UITC enjoys from the industrialists' point of view - the setting up of joint laboratory structures with objectives to carry out "academic research whilst serving the needs for innovation of the industrialists", he explains. "A case in point here is the creation of a joint lab set up with Deltacad, in a close liaison with the Roberval Industrial Systems research scientists. This lab is devoted to "the whole area of digital mock-ups and general digitization of industrial enterprises. There will be a similar case for a joint lab we plan to launch with ArcelorMittal in Autumn 2019", concludes Prof Jérome Favergeon.

PROF. JEROME FAVERGEON WAS APPOINTED DIRECTOR OF UTC-ROBERVAL LAB. IN 2015. He successfully completed the merger with UTC-LEC in 2018. UTC-Roberval now has a staff of 170, i.e., making it the largest research unit, out of eight, at UTC. The new structure has 5 research teams.

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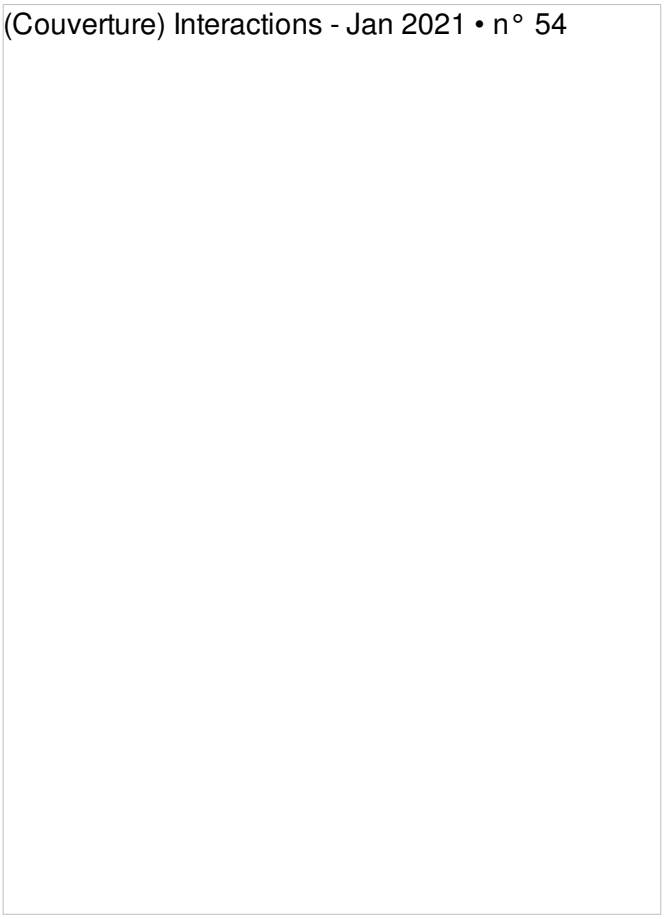

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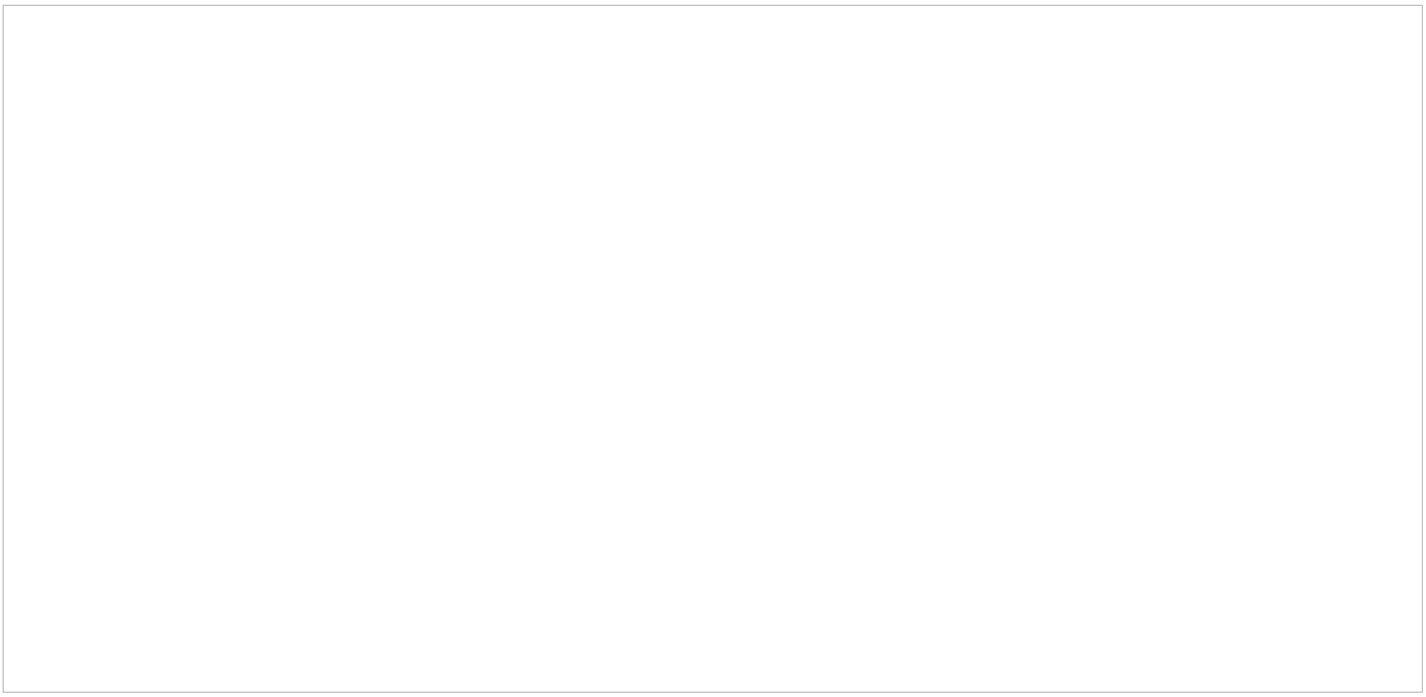

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