Summary

- Equipex FIGURES: remodeling faces
- MSC Scanning: the 3D scanner unit used by Figures
- PIVERT : an Investment for the Future ahead of its time
The IRT-Railenium received its Government recognition (label) in 2011 after approval by an international jury. The IRT Railenium is the first cluster with a world-class calling, via the pole called i-Trans. The concept underpinning “Investments for the Future” is to accelerate innovation in France, by creating structures that are capable of ensuring the connection between the academic laboratories and the industrialists. This is the mission assigned to the IRTs (including Railenium) thanks to development of strategic public-private partnerships in research, training and innovation” says Jean-Marc Delion, Railenium’s Delegate General. After a period of testing and trials – bearing in mind that IRTs represent new entities that rarely fit into administrative charts – Railenium, as of 2013, is now in battle order.
Dividing the time-to-market by two

In terms of research work, the IRT has defined 8 working thematics: processes and materials, civil engineering and soil mechanics, energy management, intelligent intra-vehicular “smart” interactions, metrology and testing, data processing and man-machine systems, digital modelling and virtual prototypes and, final area, the economy and sustainable land planning. “The IRT came to be via an ambition that focused on railroad infrastructures and systems and we extended our field of investigation to rolling stock and operators”, explains Jean-Marc Delion. “We are having discussions with Alstom, and we identified 34 technological blocking points to design tomorrow’s high speed trains (ex. French future TGVs) and proposed our scientific aid to remove these blocks”.

How do you get in phase with innovations in telecommunications? How do you channel high speed internet connections to very fast trains? How do you increase the number of trains running at the same time? Today France’s TGV tracks are “saturated” when more than 13 trains/hour are running and it would cost far too much to double up the tracks. But the inter-train distance (currently 20km) could be reduced inasmuch as the emergency braking distance is 3.5 km. We still have to see how we can reduce this inter-train distance.

“We could also have between 18 to 30 suburban trains on the SNCF networks! More and more conurbations round the world need solutions such as we are proposing” adds Jean-Marc Delion. The mission of Railenium is to reduce the time-to-market, that is the time between having the idea and the introduction of a solution in the market-place, currently estimated at 14 years! “If we could divide this time by a factor 2, we would have a key to successful railroad innovation” stresses Jean-Marc Delion. “Railenium can contribute to accelerating the upstream and downstream research work, offering services to both the industrial and academic partners: the offer covers better contact protocols, project specification, negotiations on intellectual property rights, location of resources, validation of results though physical and digital testing … today tests are carried out for many forms of equipment on
operational networks and this alone created organizational stress and incurs extra costs!"

A computational platform at UTC

This is a point where UTC is especially involved, i.e., in virtual computerized prototyping and digital modelling via the project CERVIFER, initiated by Prof. Mohamed Ali Hamdi, UTC-Roberval Laboratory and a member of the Railenium Board as UTC’s representative. The objective of the project is to enhance the level of competitiveness of France’s railroad industry thanks to intense use of virtual computerized prototype software packages. “The railroad industries still use physical tests which are often very costly in order to qualify and certify rolling stock and railroad infrastructures. If we refer to virtual certification as practiced in the aeronautical and automobile sectors, the railroad sector has high potential margins to use computer aided virtual prototyping”, stresses Prof. Mohamed Ali Hamdi.

The CERVIFER project started October 17, 2013 with an initial budget allocation of 11.8 Meuros over 4 years (of which 4.85 Meuros in State subsidies in the framework of the Government Programme Investments for the Future; in particular the Vehicle for the Future Programme, via ADEME (State environment agency) and 1.76 Meuros from the Regional Authorities (Nord-Pas-de-Calais and Picardie).

Computer aided virtual prototyping in the automobile and aeronautics sectors has enabled physical testing to be cut by a factor 2 and, consequently, to reduce by the same factor the time to design a new car/aircraft – which is in line with the CERVIFER project. The consortium has 14 partners, co-ordinated by ESI Group, the main European virtual prototyping software editor. There are 5 railroad industrialists (Alstom, RATP, RFF, SNCF and Vossloch-Cogifer) and the same number of research and training institutions (CETIM, IFSTTAR, Lille 1, UTC and UVHC). Hutchinson-Paulstra (a company specialist in anti-vibration material) and Vibratec (acoustics and vibration services), alongside Railenium are also among the partners. The objective is to deliver
an experimental prototype of a software platform integrating specific modules to meet the needs of railroad industrialists to pre-certify rolling stock and infrastructure components. This collaborative platform allows for service and expertise offers to be made and certain modules could go on the market-place. details Prof Ali Hamdi. “The platform will be located in UTC’s Computer Centre and accessible to all CERVIFER partners”,

An idea nursery open to European programmes

The other programme that mobilises UTC is the creation of a railroad test facility at Compiegne. “We are currently working on the test bench project to validate our calculations – for example for wear and fatigue of wheel-rail contact situations”, underlines Professor Mohamed Ali Hamdi, who is participating in the specification of the test-bench with IFSTARR and the industrialists who would like to run tests on this future facility.

“The objective, after a long bench-making phase, is to finalise the detailed specification for the test-bench project before end-2014”. Railenium will ensure the project management and monitoring. Today, one half of the 15 IRT projects subsidised by ANR have started. “We have 34 new ideas in the incubator stages”, adds Jean-Marc Delion. “The aim is to encourage the seeding of new ideas”.

Other UTC laboratories are beginning to show interest in Railenium, notably UTC-LEC and on April 16, 2013, Jean-Marc Delion and three collaborators presented the IRT projects to the UTC research scientists. “If Railenium effectively started in the Nord-Pas-de-Calais and in Picardie Regions, we would like to build partnerships outside the circle of the founders, in France and also in Europe”, stresses Railenium’s Delegate General. Railenium is looking to Europe, via the ShiftRail2 Programme, Europe having decided to devote one billion euros to research and innovation in the railroad sectors. “The ambition of Railenium is to be the go-between for the EU and the French actors in the Shift2Rail programme between 2014 and 2020. Railenium is therefore a very strategic IRT for UTC’s international visibility and there is an advantage for the
university to be more and more involved in railroad research and development”, concludes Mohamed Ali Hamdi.

www.railenium.eu www.shift2rail.org

The 15 Railenium projects

15 projects were selected in the launch phase of Railenium. They covers all “rail” and infrastructure components, interfaces with rolling stock and associate activities:

- Types of track and track components;
- Control and modelling of rail-wheel contact;
- Designing smarts sensors to monitors tracks and critical infrastructure points;
- Using materials with renewable origins;
- ‘Levers’ to increase track capacity (trains/hour);
- Optimised maintenance and in situ work zones;
- Track and platform sustainability;
- Development of very high data rate connections using laser technologies;
- Railroad signaling and inter-operability of comm. systems.

What is an IRT?

Among the priorities set by the Government’s Investments for the Future programmes, there are the IRTs (acronym in French for Institutes of Technological Research. Each IRT serves to reinforce ecosystems formed by the clusters and presupposes that the units together have a critical mass of means and skills assembled on a single site (preferably). The IRT must cover all the stages of an innovative process, up to demonstration and industrial prototyping. It pilots research programmes carried out in connection with technological platforms and can carry out experimental R&D compliant with the highest international standards and lastly monitors the added value of its work.

The 8 IRTs selected in 2011, with an overall budget of 2 billion euros should allow France to reach levels of “excellence” in
tomorrow’s key sectors. The other 7 IRTs are: NanoElec in Grenobles, AESE in Toulouse, LyonBiotech in Lyons, with a branch unit Paris, M2P in Metz, Belfort-Montbeliard and Troyes, Jules-Verne in Nantes, SystemX, Saclay and B-Com à Rennes.