

## Cloud-based-HPC simulation of railway infrastructure for high-speed trains

### Fortissimo Experiment Facts:

- Industry Sector: **Mechanical Engineering**
- Country: **Italy**
- Software Used: **Siemens NX**

### THE COMPANIES

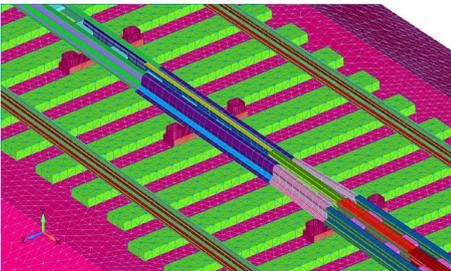
Alstom Ferroviaria S.p.A. is the Italian branch of Alstom Transport, a multinational leader in the railway transportation sector. Alstom Transport has a presence in over 60 countries and employs over 28,000 people. A promoter of sustainable mobility, Alstom Transport develops and markets the most complete range of equipment and services in the railway sector.



### THE CHALLENGE

Alstom is investing huge effort in creating new services for the railway industry and other transportation fields. One of the main areas of investment currently is the development of a diagnostic service to automatically schedule maintenance intervals.

A diagnostic service would need to: understand how parts degrade and determine which would need to be serviced at each interval; automatically plan availability of spare parts or consumables; and quickly report to engineers what needs to be done in order to service the train and the network, as efficiently as possible.



### THE SOLUTION

This experiment focused on predicting the effects of failures in different components of the turnout (or set of points), one of the basic part of railways infrastructure, with high accuracy. HPC was necessary as the turnout is a complex and large-sized system, which became even clearer during the course of the experiment. The dynamic interactions between the basic components of the system were studied by taking into account the dynamic load due to the transit of high-speed trains and the failure modes of the turnout. Hypertec Solutions, an Italian SME, was responsible for the development of the model, adapted by CINECA into the Fortissimo cloud environment.



### BUSINESS IMPACT

The major benefits reported by the partners are: For Alstom, replacing the system based on field measurements with an effective diagnostic monitoring based on simulation has resulted in up to a 50% decrease in time-to-results (from between 16 & 22 months to 8 months), with a corresponding cost saving of between €50k and €70k per application. In the best case scenario, this will result in a saving of €280k per year. For Hypertec, the experiment allowed it to increase its engineers' skills, enabling new services for Hypertec's industrial customers in many areas of CAE Simulation. It is estimated that, as a consequence, HPC-related revenue will increase 87% in 2017 to €45k. By 2020, this is expected to reach €100k per year.

### Fortissimo Experiment Partners:

- Alstom (End User)
- Hypertec (Application Expert)
- CINECA (HPC Provider and Expert)

### More Information:

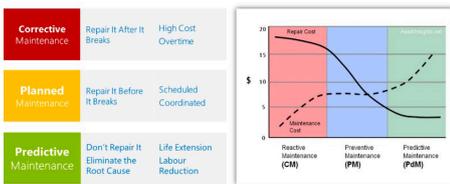
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## BENEFITS

- 50% decrease in time required to create a new diagnostic system for a railway component.
- Savings up to €280k per year for Alstom, based on optimising four applications per year.
- A predictive service developed which will more accurately monitor the railway network and schedule service interventions when necessary.

## THE FORTISSIMO PROJECT

Fortissimo is a collaborative project that enables European SMEs to be more competitive globally through the use of simulation services running on a High Performance Computing cloud infrastructure. The project is coordinated by the University of Edinburgh and involves more than 100 partners including Manufacturing Companies, Application Developers, Domain Experts, IT Solution Providers and HPC Cloud Service Providers from 14 countries. These partners are engaged in over 90 experiments (case studies) where business relevant simulations of industrial processes are implemented and evaluated. The project is funded by the European Commission within the 7th Framework Programme and Horizon 2020 and is part of the I4MS Initiative.



**I4MS** Fortissimo is part of I4MS ICT Innovation for Manufacturing SMEs: [www.i4ms.eu](http://www.i4ms.eu)



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