

## **ENERGETICS**

## DIATI - Planning and simulation of railway and metro operations using accurate localisation of rolling stock by optimizing train paths and energy consumption

Funded By	Dipartimento DIATI
Supervisor	DALLA CHIARA BRUNO - bruno.dallachiara@polito.it
Contact	
Context of the research activity	The research activity involves the study of new-generation rolling stock, both for passenger transport, mainly for use in metros, and freight, for use on high- speed/high-capacity railway lines. This is to be followed by the planning and simulation of railway and metro operations using accurate localisation of rolling stock through optimisation of train paths and their energy consumption. To this end, rail and metro operation simulation tools, including mathematical modelling approaches, suitable for the purpose can be used.
Objectives	In the international context, the use of goods trains for high-speed lines is being evaluated in several European countries. This implies a study of network capacity and analysis of both de and consumptive paths associated with new-generation freight trains. This can be applied to the future operation of the Turin-Lyon HSL/HCL. The activity could be carried out in collaboration with TELT for the planning and optimisation of the operation in terms of energy consumption of the line between the two cities. At the same time, on a local scale, in the automatic metros above all the migration from the fixed-block signalling system to the CBTC (Communications - Based Train Control) system is underway, for example in the automatic metro of Turin (L1), with the consequent evaluation of the planning of line 2 in Turin. The implementation of CBTC allows a more flexible management of rail traffic, with the advantage of a reduction in the minimum spacing between trains, subject to compliance with safety standards, and optimisation of the use of the existing infrastructure. Unlike the fixed-block system, which binds rail traffic to predefined sections, CBTC uses radio communication between vehicles and the control centre to determine the exact position of trainsets in real time, thereby improving service fluidity. This is particularly relevant in light of the expected increase in transport demand, which will require advanced technological solutions to meet the new demands of urban mobility. In order to assess the impact of the new system also in terms of energy consumption, simulations of railway operations can be conducted using specially

developed software. These tools allow the dynamic behaviour of trains to be modelled in realistic scenarios, making it possible to compare the performance of the CBTC system with that of fixed block systems currently in
use.

Skills and	
competencies	Master Degree/M Sc. in Mechanical, Nuclear/Energy or Civil Engineering;
for the	having passed at least one exam concerning rail transport and train
development of	operation.
the activity	