

MOTORS®

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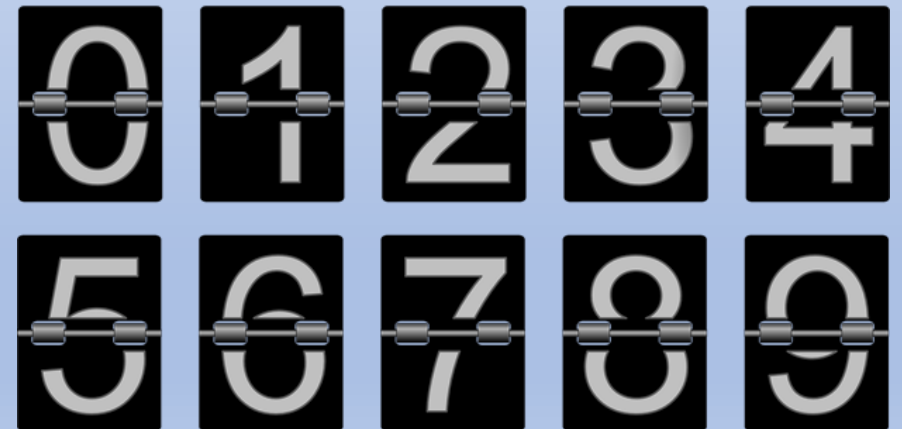
MOTORS supports electric power consumption evaluation and power system design for every electrified transport system.

MOTORS is an integrated electromechanical simulator for railway, metro rail, light rail and trolleybus systems.

The tool can be used also as **Virtual Counter** for the locomotive consumption of the power supply

MOTORS consists of:

- a mechanical module for traffic modelling,
- two electrical modules (AC and DC) for electrical modelling.

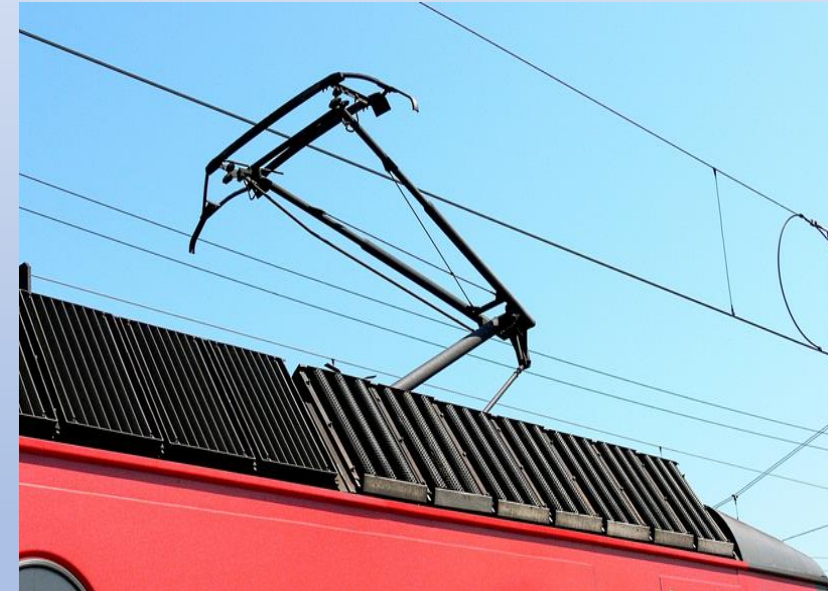


The Model

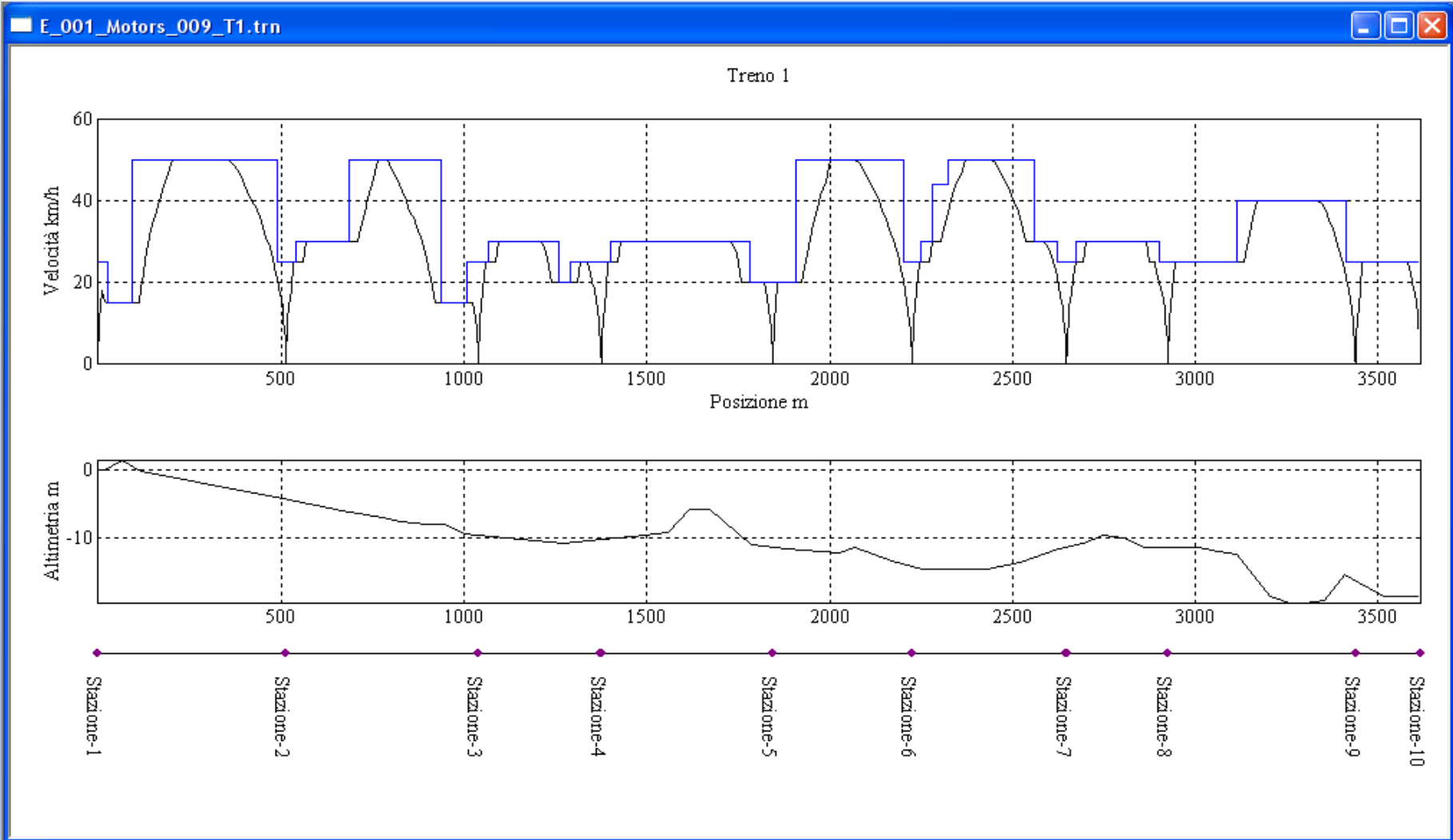
MOTORS allows the electrified transport system analysis under real conditions.

The model takes into account of:

- Real traction curve of the locomotives,
- Real profile of slopes and curves of the tracks,
- Electrical model of Electrical Substations (ESSs) and catenary system,
- Electric Power interaction among trains and ESSs



MOTORS® output window

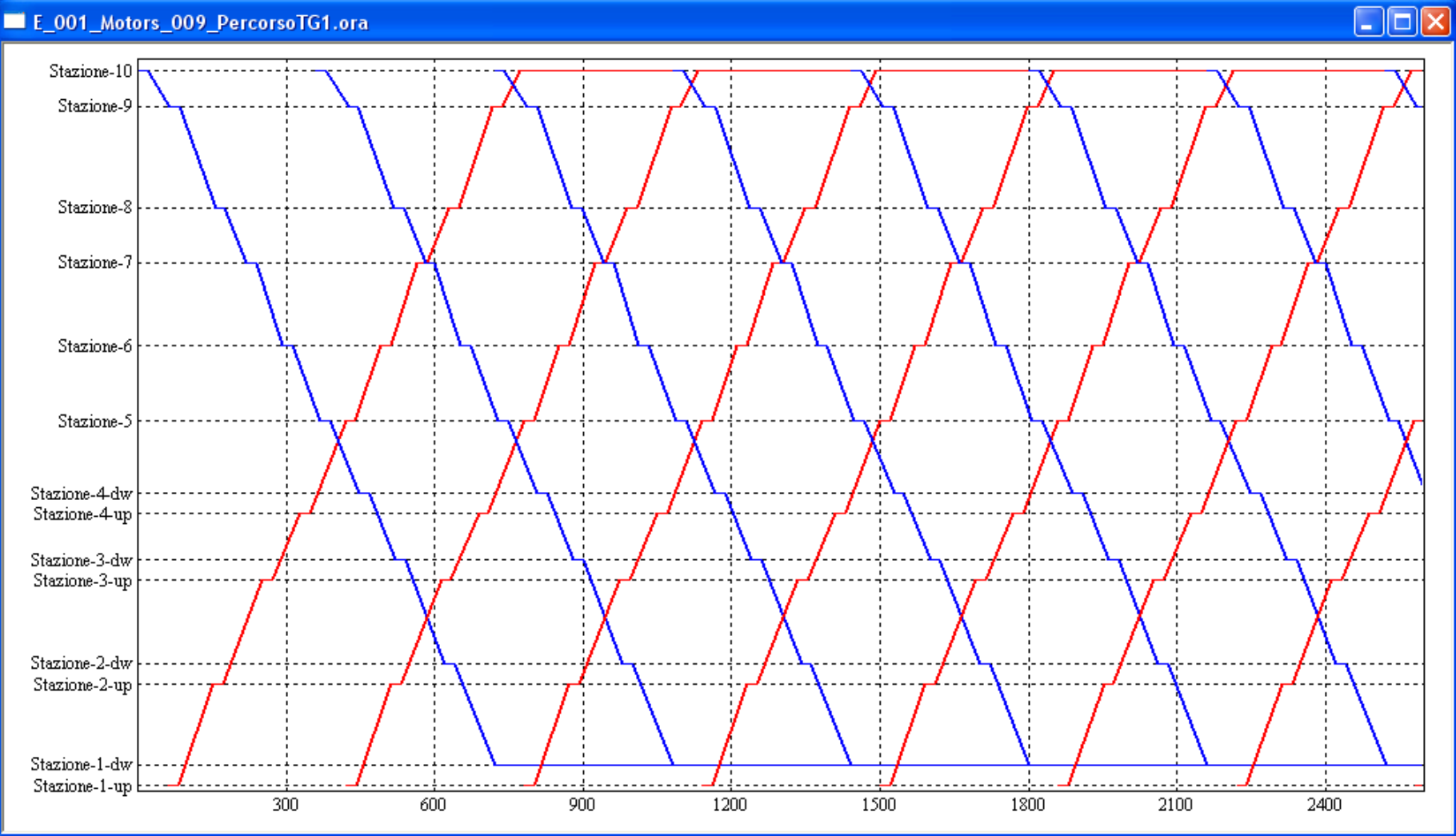


Output Results

MOTORS provides the following results:

- Mechanical variables of Trains - speed, acceleration, traction effort, trains running times, timetable and commercial speed;
- Electrical variables of Trains - pantograph current and voltage versus position or time; single train energy consumption in kWh/km and kWh/km/t;
- Electrical substations - power, voltage and current versus time;
- Joule power losses;
- Average, RMS and maximum value of current, voltage and power in electric network nodes and branches;
- Pantograph voltage drop versus train position or time;
- Track potential versus time;
- System receptivity and renderability in case of trains regenerative braking;
- Etc...

MOTORS® train graph window



References /1

The tool has been used to support the design of the following traction power and supply systems as well as in order to evaluate the fleet and the operation; main customers are RFI (Italian State Railways), Ansaldo STS, Porto Metro, etc.:

- Railway lines AV 2x25 kV 50 Hz:
 - Turin – Milan,
 - Milan – Bologna,
 - Milan – Verona,
 - Bologna – Florence,
 - Rome – Naples,
 - Line Thalys (Paris – Lille – Bruxelles).
- Railway lines 3 kV CC:
 - Padova – Mestre,
 - Koper – Divacia,
 - Line High-Capacity Genoa Milan.

References /2

- Urban Railway in Mexico City – Vera Cruz (1x25 kV 60 Hz),
- Tehran Suburban Railway (1x25 kV 50 Hz),
- Copenhagen Minimetro (750 V CC),
- Porto LRT, Lines C, S, P e T (750 V CC),
- Metro Hanam (750 V CC),
- JFK Airport Minimetro (750 V CC),
- Midland Metro (750 V CC),
- Manchester Metrolink (750 V CC),
- Madrid Metro, Line 10 e Metrosur (600 e 1500 V CC),
- Dublin LRT (750 V CC),
- Linea Filobus Express 90 – ATAC Roma (750 V CC),
- Linea 1 ATM Milano (750 V CC),
- Linea Tranviaria Bergamo – Albino delle Tranvie Elettriche Bergamasche (750 V CC),

References /3

- Madrid Metro Linea 3, Linea 6 e Linea 7 (600 e 1500 V CC),
- Line Tranviaria Firenze – Scandicci (750 V CC),
- Line 4 Metro of Tehran (750 V CC).
- Integrated study to analyse the possible modification of the electric traction system of the Porto underground following the introduction of a new vehicle
- Integrated study for the analysis and eventual adjustment of Milan Metro Line 1 electrical traction system due to the introduction of a new type of vehicle,
- Verification Activities on the electrical dimensioning of the Energy Supply System on High-Capacity Line Milan-Bologna
- Verification Activities on the electrical dimensioning of the Energy Supply System on Line Turin-Lyon
- Preliminary design of traction power supply systems (tenders phase) of BBA railway line Thenia (Algeria)