



NOISE AND VIBRATION IMPACT



WHO IS MM?



MM Spa

is the leading engineering company in Italy in the design and construction of public transport infrastructure and urban requalification works aimed at the sustainable development of the area in which it operates.

Set up in Milan in 1955, MM constructed the city's entire underground railway network – 108 stations along its route of over 100 km – and major road and hydraulic engineering works.

The experience gained in this field has enabled the company to transfer its know-how all over Italy, taking part, for example, in the construction of the underground systems of Naples, Rome, Brescia and Turin, the rapid surface transit systems of Padua and Venice and the BreBeMi A35 motorway; and overseas in the underground systems of Copenhagen and Thessaloniki.

The services offered by MM Spa range from the planning of operations to technical and economic assessments, from preliminary investigations to works management, from design validation to tests, final inspections and quality control.

Today, MM is a business partner working alongside the institutions in the execution of major public works, which, due to the complexity of their design and the size of their financial commitment, require consolidated management capabilities and support in the technical and administrative fields.

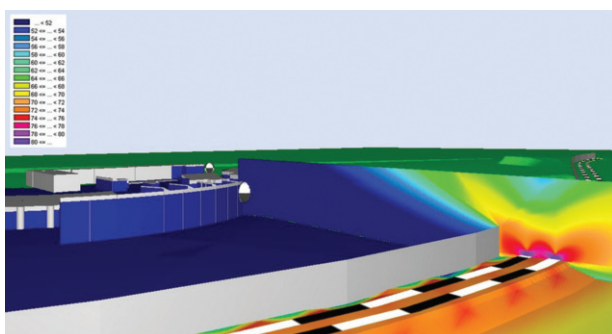
Since 2003 MM has also managed the Water Service of Milan, handling groundwater withdrawal, purification, distribution, wastewater collection and treatment and, in general, the maintenance and investment plan of the water supply and wastewater networks.

On 1st December 2014, MM Spa took over the management of the real estate of the City of Milan, which consists of over 38,000 items of property including council houses, garages and other buildings. To this aim, MM set up the new organisational unit called "MM Casa", which will work alongside the other company facilities already operating in the management of the city's services.

NOISE AND VIBRATION IMPACT



Noise and vibration impact is one of the principal causes of the deterioration in quality of life, above all in urban areas where, every day, people have to live with the disturbance generated by road, rail and air traffic, or the presence of work sites for the construction of new infrastructure, nearby industrial plants, bars, shops and restaurants, which are naturally noisy, and the noise-emitting sources existing in the living units themselves.



Noise measurement and mitigation studies must take account of the type, intensity and various sources of noise emission, with a view to preventing the deterioration of areas with no noise impact and requalify as far as possible those already impacted.

Legislation on noise and vibration impact is evolving continuously so it is becoming increasingly important to be familiar not only with the measurement and control methods but also with the update on transducers and equipment and the efficacy of the mitigating or compensatory measures.

The noise and vibration impact of a at-grade transit or underground railway line can be determined adequately in the preliminary phase using particular simulation instruments. The same applies to any infrastructure to be constructed.

WHAT MM OFFERS



MM Spa provides public authorities and companies with a specialist consultant service for the management of environmental problems caused by noise and vibrations, in particular when the disturbance has origin in urban work sites, industrial activities or transportation infrastructures (underground lines, tram lines, railway lines, roads, etc.).

MM'S SPECIFIC EXPERTISE

MM's specialist skills are constantly developed through its direct experience in the field and kept up to date through its active participation in international research projects and regulatory working groups. Evidence of these skills is provided by the publication of scientific articles and the presentation of papers at congresses and conferences.

MM puts its **noise** technicians, with their significant experience in the study of noise and vibration mitigation plans with particular regard to rail transportation, at the disposal of its customers.

MM supplies various types of **services**, according to the customer's needs: measurement campaigns, preliminary studies, noise measurement and mitigation plans, preparation of the measurement result documentation and validation of some existing documentation (submitted by private individuals to the public authority, in accordance with the law).

MEASUREMENTS AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLANS

MM carries out noise and vibration **measurements** for use in the line impact studies (prior to construction) and subsequently in checking the impact (after commissioning).

MM also operates within the scope of **construction environmental management** plans. This service maps the area of interest and checks whether the limits assigned in the local noise classification plans and any exceptions granted are exceeded, providing the necessary support in case of complaints carrying out measurements together with the operator for plants in operation or with the builder for work sites.

In addition, and prior to that, MM draws up the **environmental management plan** to reduce the sound level if the noise exceeds the legal limits. The implementation of the plan may be assigned to third parties.

> INSTRUMENT KIT

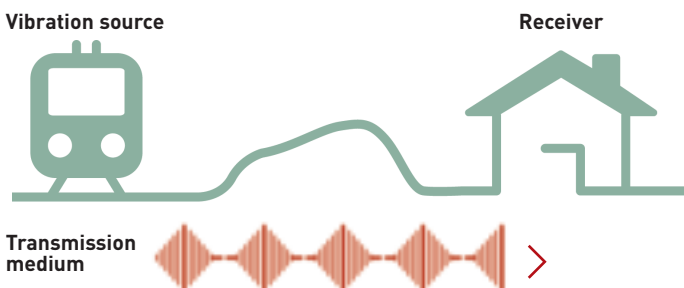
- IEC60651/IEC60804/IEC61672 class 1 precision **sound level meter**, equipped with 1/3 octave band frequency analysis
- self-powered live **monitoring station** with control unit and IEC60804 class 1 sound level meter for outdoor measurements
- triaxial **accelerometer**, piezoelectric with frequency analyser
- long-term continuous detection **tamperproof system**



ENVIRONMENTAL IMPACT PLAN AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN CONTROL SERVICE

MM provides a **documentation control** service in support of the checking activities carried out directly or indirectly by the public authorities to certify the correctness of the environmental impact studies in the construction and operation phases, and the construction environmental management plans drawn up by third parties.

MM not only expresses its opinion on the need for supplementary measurements, but it also draws up a report indicating any non-conformities and possible corrective action. If there are no serious non-conformities, MM may recommend stricter limits be set with a view to obtaining a continuous improvement.



GUIDELINES IN COLLABORATION WITH TECHNICAL DEPARTMENTS OF PUBLIC BODIES

Within the scope of the management of problems related to noise and vibrations, MM offers a **special service to the public authorities** responsible for checking the documentation submitted by third parties. MM conducts a **preliminary analysis necessary to develop the action plan** considered the most suitable on the basis of the legislation in force, the specific needs and any critical problems found, and then to define the guidelines, which will be used by the public authorities to validate:

- **line service impact studies** (during operation or just before being commissioned), which, through an analysis of measurements and mathematical models, give qualitative and quantitative indications;
- **construction environmental management plans (CEMPs)**, which, in addition to the procedural controls and instrumental noise measurements, indicate the tests to be carried out on the work site, the roles and responsibilities, the frequency of the audits and the emergency procedures;
- **manuals for the operational management of the disturbance caused by vibrations**, which provide an overview of the state of the art, the methods of assessment and the possible mitigation measures.



A work site may cause particularly loud and annoying noise. The disturbance is mitigated through an effective preventive approach to the processes that emit the most noise and through an adequate monitoring and information campaign.

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