



# FIRE PREVENTION AND FLUID DYNAMICS SIMULATIONS



## 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.



## FIRE PREVENTION



### **Following the introduction of Italian Presidential Decree 151/2011 and in view of the imminent publication of the Fire Prevention Consolidated Act, the role of fire prevention is increasingly important in all design areas.**

Compared to the traditional prescriptive concept, evolution of the sector is increasingly leading to an approach based essentially on performance requirements.

In connection with these changes, the need to address issues sometimes regulated only by general principles of safety often emerges. A broad and in-depth expertise in the subject, to be integrated with innovative tools for the quantitative analysis of the consequences of fires and for studying evacuation situations, is therefore essential.

### **AMONG OUR REFERENCES**

MM Spa has gained vast and diverse experience in the field of fire prevention over the years. The management of this issue involves a multidisciplinary approach having close interaction with the civil engineering works, the functional design, fire extinguishing systems and mechanical systems in general.

MM has the skills to manage, on an integrated level, fire prevention analyses for various types of work: underground systems, railway and road tunnels, multi-storey car parks, office buildings, schools, public entertainment venues, exhibition facilities, etc.

Some of the most recent references in this field to be cited as examples are several buildings at the EXPO 2015 exhibition site, the renovation of the Lyric theatre in Milan, hydropower plants, schools, car parks and underground lines.

### **> ITALIAN PRESIDENTIAL DECREE 151/2011**

On 22 September, Italian Presidential Decree no. 151 of 1 August 2011 concerning the draft regulation for fire prevention procedures was officially published.

The new regulation identifies the activities subject to fire prevention (introducing new activities, such as underground lines and road and railway tunnels) and the obligations for the parties concerned.

The new regulation takes into account the impact of the advent of Certified business start-up notification (Italian Law 122/2010), as well as the provisions of the regulation for the simplification and reorganisation of the regulations for Productive Activities (S.U.A.P), pursuant to Presidential Decree no. 160 of 7 September 2010.

The new regulation implements the list of activities subject to fire prevention inspections and introduces three categories - A, B and C - to identify the seriousness of the risk rather than the size or, in any case, the degree of complexity that characterises the business activity carried out.

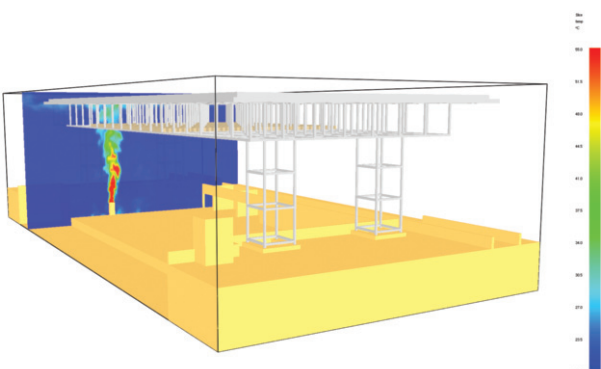


## MM EXPERTISE

A team that is continuously brought up to date on the latest technologies is capable of carrying out all the possible fire prevention activities, including the drafting of the accompanying paperwork required by current law: Preliminary Feasibility Authorisation, assessment of projects, requests for exemption, Certified business start-up notification.

In support of the fire prevention documentation, especially in cases where there is a need to apply for exemption, MM's specialised offices have the skills, the hardware resources and the software tools necessary to adopt the Fire Safety Engineering approach, by developing 3D thermo-fluid dynamics simulations of fire and modelling the evacuation in order to determine the time the people need to escape (according to the Society of Fire Protection Engineering method).

In this way, the safety conditions may be checked and the effectiveness of the proposed compensatory measures in support of the request for exemption can be assessed.



## > AREAS OF APPLICATION

- Fire prevention design for activities with B and C risk category, as defined in Annex I to Italian Presidential Decree 151/2011
- Assistance during the work, documentation analysis and completion of forms to request authorisation to start business after verification of compliance with fire safety (SCIA) for activities covered by Annex I to Italian Presidential Decree 151/2011
- Requests to assess designs with exemption from the fire prevention provisions
- Certified business start-up notification to the Fire brigade
- Executive design and construction management of fire extinguishing systems
- Fire Safety Engineering approach
- Evacuation modelling
- Fire safety management systems (SGSA)
- Advice on safety and fire prevention





## THERMO-FLUID DYNAMICS SIMULATIONS



The following needs arise during the design phase of a complex civil engineering work:

- Optimise the handling of fluids (air and water)
- Ensure the comfort of the people in terms of air temperature, velocity and quality
- Verify that, in the event of a fire emergency, the distribution of the combustion products in the air allows safe evacuation and - where possible - easy access for the rescuers.

In recent years thermo-fluid dynamics simulations (also called CFD, Computational Fluid Dynamics) have taken on an increasingly important role early in the design stage as they allow achievement of the objectives described above to be verified. At the same time, through the possibility to analyse different configurations (in terms of functional layout and systems), it is possible to optimise the systems together with their host structures, thus improving efficiency and consequently reducing the degradation arising from their use over time.

### > THE SIMULATION PROGRAMS MM HAS ARE

- one-dimensional non-stationary thermo-fluid dynamics models of networks of railway, underground and road tunnels:
  - SES (Subway Environmental Simulation)
  - EQUA IDA Tunnel.
- 3D non-stationary thermo-fluid dynamic models with complex designs
  - NIST FDS (Fire Dynamics Simulator)
  - Ansys Fluent

MM has equipped itself with a cluster with 64 processors to speed up the computing time.



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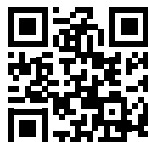
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