



Pre-insulated air ducts

Fiera Milano Hospital: from emergency management to design excellence

by Federico Rossi and Antonio Temporin

In times of a severe public health emergency such as that being experienced in recent months, the new Fiera Milano Hospital is not only a concrete aid in combatting the effects

of Coronavirus but is also the symbol of an Italy that is resilient, where the Public Administration, corporations and professionals are able to join forces on complex projects of great utility to the community.

The total value of about 21 million euro, gleaned exclusively from investments and private contributions, has made it possible to create a structure of the utmost level, which is anything but a "field hospital".

The hospital specialised in handling COVID-19 was devised with the prospect of going on to host an experimentation and analysis centre to map the developments of infectious diseases, once the current emergency

has passed. Net of the actual use of available beds, this operation represents a model to follow in terms of the design and implementation methods.

This important project saw great collaboration amongst the Milanese engineering community, directly involved by the client – Ente Fiera Milano – through the Chartered Engineers Association of Milan and which saw the establishment of a special Testing Commission that works free of charge and is composed of Engineers Bruno Finzi for the Edifices, Alberto Ariatta for the Electrical Systems, Armando Ardesi for the Electromedical

interview with
Engineer
Roberto Taddia,
a member of the
Fiera Milano
Hospital Testing
Commission



FIERA MILANO HOSPITAL

customer:

Fondazione Fiera Milan

testing commission of the Chartered Engineers Association of Milan:

Ing. Bruno Finzi per le strutture edili

Ing. Alberto Ariatta per gli impianti elettrici

Ing. Armando Ardesi per le attrezzature elettromedicali

Ing. Roberto Taddia per gli impianti meccanici e gas medicinali

ducts manufacturers:

Terma Energia Srl - Milan

Sebri Srl - Milan

products used:

P3ductal careplus

Equipment and Roberto Taddia for the Mechanical Systems and Medical Gases.

Mr Taddia, could you describe the fundamental features of this project?

The Fiera Milano Hospital project is based on the conversion of the ground and first floors of Hall 1 of the Fiera Milano City into a structure entirely dedicated to the COVID-19 emergency thanks to the installation of 24 fully-equipped modules, distributed across a total surface area of some 25,000 m² and able to accommodate over 200 ICU beds.

The exhibition space of the Portello area was chosen as the structure due to already being operational in hosting large exhibitions and being equipped with all auxiliary services such as electrical and water connections, whilst also offering expansive open spaces that simplified the development of the structural layout.

It was a real race against time, across some 20 days of non-stop work involving more than 500 people. The design, installation, project management and testing were practically handled

simultaneously, thanks to the great coordination effort afforded by all professionals involved. This was all to concretise to a greater objective, namely to effectively contribute to the management of the most serious health crisis in contemporary history.

Indeed, the beds are housed in prefabricated modules that, thanks to a specific steel structure and special infill panels, guarantee not only the seal but also a pressure differential between inside and outside so as to eliminate any risk of propagation of "soiled" air.

The thermohygrometric conditions are guaranteed by 26 UTA of 5,500 mc/H each with absolute filtration in the supply and recovery and which suction the air from inside the pavilion. This option allowed us to further limit the timeframes, since using the air already treated by the system normally in operation during the Fair has impeded the use of air being taken directly from the outside.

In such a particular installation context, the air ducting network also plays an important role. Can you tell us what were the criteria behind the choice?

The choice of air ducts was guided by two fundamental aspects: speed in terms of both supply and installation along with the guarantee of performance standards adapted to the type of use. Hence why we opted for the P3ductal careplus air ducts. As already indicated, the immediacy of supply was necessary to ensure the start-up of the hospital in the



shortest possible time. On this front, the operation of the company to have created the ducts and the support of P3 were decisive. In a very short time, the ducts were made available on site, ready for installation. In particular, the possibility of making changes on the spot, such as certain adaptations or the construction of the basic inspection portals, greatly simplified the performance of a project that, by its very nature, was constantly changing and did not permit any stoppages.

Another key feature was undoubtedly the lightness. The installation of the ducts had been planned externally to the ceilings of the modules but these had not been designed to carry such significant weights, in the interest of simplifying their construction. Hence, the choice of a light-weight duct was mandatory.

The fact of having ducts available for swift delivery that also had highly elevated technical characteristics – particularly in regards to air quality and hygiene, thanks to the use of self-cleaning and antimicrobial technology – was an additional winning factor of the P3 solution. This is also because we did not want speed to penalise the quality of the installation.

The installation is absolutely to standard and certified because, rightly so, the Building Site Supervisor did not allow any shortcuts on this level.

In your view, what system engineering needs are essential in hospital settings?

Hygiene and air quality would undoubtedly be two increasingly important factors in the management of systems for the most “delicate” hospital uses such as operating rooms, intensive care, high-intensity areas of care, or laboratories.

From this point of view, the possibility of using solutions specifically

designed for such zones would be a significant advantage.

For example, the P3 ducts of the P3ductal careplus line – produced with pre-insulated aluminium panels that have a nanostructured coating on the inner wall in contact



with the air, offering a self-cleaning and antimicrobial effect – are an optimal solution as they prevent dust and other pollutants depositing on the walls of the duct, thus impeding stratification that not only favours the proliferation of germs and bacteria but tends to cancel out the antimicrobial effect of the treatment itself.

The availability of this technology also for external applications facilitates the adoption of the same solution for the entire system.

Another key aspect is earthquake protection.

Today, earthquakes are increasingly frequent phenomena and the guarantee of safety in structures

that must ensure full operation even in such moments, must be at a maximum. Also in this case, the pre-insulated aluminium solution offers the utmost guarantee both in terms of the conformation of the materials and the offer by P3 of special anti-

seismic brackets. In addition, the extreme lightness and rigidity of the materials reduces the number of brackets needed, with obvious benefits in terms of minimising the dimensions, the accessories needed and the installation time.

In terms of the spread of the virus within the environment, do you think air ducts can actively contribute to the spread?

For this type of virus, characterised by a means of spreading via heavy wet particles and thus linked to close contact between people, the system certainly does not represent a factor able to accelerate its spread. This is demonstrated by the fact that the main concern of the medical staff

who would go on to work in the Fiera Milano Hospital had nothing to do with the air cleaning aspects, being guaranteed thanks to the depression of the environments, the absolute filtration and the use of ducts with a self-cleaning and antimicrobial effect, in terms of the maintenance of the internal thermohygrometric conditions.

In a 7-patient module, the estimated internal load is 8 kW. It is evident that the maintenance of the right climate (20° C and 40% humidity) is essential to ensure the comfort of both patients and the medical staff called to work in such difficult conditions due to all the Personal

Protective Equipment required.

Will this focus on air health and the spread of the virus affect how the systems are designed?

In principle, yes. Direct expansion systems are, in fact, air recirculation systems that not only present problems of “dirtying” the batteries but they do not actually contribute to the effect of air dilution that can rather guarantee the “all-air” solution that precisely draws clean air from the outside. Air exchange was specifically cited in the recent technical guidelines issued by the AiCARR (the Italian Association of Air Conditioning, Heating and Refrigeration) as a fundamental

aspect.

Real importance will thus have to be given to certain design details, such as the recovery unit that will be fitted on the ground in order to better capture the heavy particles with which the virus propagates. In addition, the possibility of choosing system engineering solutions specifically designed to guarantee the highest standards of air health will lead to the choices being oriented towards products that are perhaps a little more expensive but certainly more effective, even in such decisively delicate contexts.

