



**Interview** with Herr Dipl.-Ing. Karl Edelmann from TÜV Süd in Munich, technical assessor specialising in: the independent and neutral assessment of power supply systems in industrial facilities and industrial systems with the objective of the reliable, safe and cost-effective design of these systems.



## IT system ensures electrical safety at the Munich Airport

**Herr Edelmann you travel all over the world for TÜV, including Mexico, Chile, China, Singapore, the Bosphorus in Turkey and India. But you also have an interesting project in your home city.**

Yes, I also work in Munich, including at Munich Airport. I have supported this project, which is my baby so to speak, since 1987. At that time aircraft still took off and landed from the old airport in Riem with the resulting noise and other problems for the people who lived there.

However, before the new airport outside Munich could go into operation, it first had to be planned, approved and built. In particular during the approval

and construction phase I worked as an assessor in the broadest sense for the approval authorities. Since then I have been more or less married to Munich Airport.

During the latest construction project there that is currently in progress, the modification of a luggage sorting hall into the satellite terminal, the following question arose some years ago: how can we meet the new requirements in relation to protection against electric shock in the low voltage power system while at the same time meeting the requirements on the reliable supply of power also in relation to high availability?

**The issue in the new satellite terminal is therefore the reliable supply of electrical power and high availability. How were we able to solve this issue?!**

Well, this question is easy and difficult to answer at the same time. The starting point for the entire discussion was the entry into force in Germany of a standard that describes the protection against electric shock in low voltage systems. I am talking about DIN VDE 0100-410 (VDE 0100-410):2007-06.

Among other aspects in this standard a requirement on the additional protection of certain electrical circuits, including those for wall outlets up to 20 A, is formulated that prescribes the mandatory usage of residual current devices.

Exceptions to this requirement are possible that, however, are not formulated very precisely and are therefore the source of discussion. The majority of operating organisations, like Munich Airport,

therefore install residual current devices with a rated residual current of 30 mA.

For the "Satellite terminal" project the operating organisation and the planner expressed concerns that there is a certain risk due to the high sensitivity of the residual current devices. It must not be forgotten that a large number of electronic devices are operated in the electrical circuits these days; these devices contain a large number of capacitive loads that can cause the residual current circuit breakers to trip. If this were to happen in the satellite terminal and as a result the power supply to the check-in desks were to be interrupted, it would result in a state of chaos.

After an extended discussion with the operating organisation, it was decided: why not make use of the exception formulated in the standard for compliance with the protective measures not just by means of direct shutdown using a residual current device, but also by means of an unearthed power supply (IT system) with insulation monitoring and signalling.

Here it is to be ensured that the permissible continuous touch voltage of 50 V is not exceeded due to the leakage currents that occur on an initial short-circuit to an exposed-conductive part. However, as a rule this aspect is always to be met in a building installation.



Once these concerns had been dispelled, a few calculations were made. What is the way forward then? A transformer with a power of 20-25 kVA would perhaps be very practical, especially as it would have the advantage that if such a system transformer were to have a malfunction the whole building would not be affected, but only a specific well-defined area. The behaviour of an IT system in earth fault conditions was also defined and taken into account during these studies. In the event of an earth fault in an IT system the fault-free conductors can be at the line-to-line voltage in relation to earth. This situation would in turn also have disastrous consequences for the supply to the check-in desks. As due to the first earth fault a complete three-phase system, that is the equipment connected to it, would be destroyed by overvoltage. 400 V to earth could occur in the extreme case. The EMC interference suppressors are generally not designed for this high voltage. This problem was solved by the specification of a line-to-line voltage of 230 V. In the event of an earth fault a maximum of 230 V then occurs and all AC equipment must be insulated for 250 V to earth.





▶▶▶ This is then the technical solution and I was pleased when this proposal was also accepted and implemented by the planner and client.

If you make a pure cost comparison, the IT system is more expensive than the solution with residual current circuit breakers. However, in my opinion this aspect should not be viewed so simply, instead it is necessary to consider in addition to the installation costs, also the overall operating costs and, ultimately, also the costs in the event of the failure of the supply of power.

A further argument is that the function of residual current devices must be regularly checked! This check requires a large amount of effort in relation to schedule co-ordination and can only be undertaken at night in such an installation in the airport.

On an IT system with insulation monitoring this requirement does not exist. The installations constantly monitor themselves and signal a fault as a minimum on a reduction in the minimum insulation resistance. As such it is in my opinion a very good system for increasing availability while complying with the safety requirements stipulated in the standards, and would also be recommendable for many other applications.

In practice I often discuss this topic with customers and very often find that customers are very surprised that this solution (IT system with insulation monitoring), as is used at Munich Airport, is employed at all outside hospitals, or that this application is allowed. Yes, it is allowed practically everywhere protective measures against electric shock are required.

**Can I then take it from what you have said that this pilot project will be imitated in other projects?**

Yes, definitely. Personally, I would like to see more of this type of installations built. As the faults occurring in a small, manageable system always remain restricted to a relatively small area. So I only really see clear advantages. There is a little more effort during installation, but this then clearly pays for itself during subsequent operation. So, if I am asked, I recommend everyone to at least give this solution detailed consideration.

**Herr Edelmann, I would like to thank you for the interesting chat. – Where are you going on your next trip?**

To Istanbul for the final functional measurement on the power supply for the Marmaray project\* . ■

*Reinhard Piehl, Bender  
Technical Office Munich*

\* Note: The Marmaray project links Europe and Asia: in 2013 Turkey opened the first transcontinental tunnel 56 metres under the sea.