Airport Terminal Fire, Düsseldorf, Germany. April 11, 1996

On Thursday, April 11, 1996, a fire in an unoccupied passenger terminal at the Düsseldorf Airport in Germany, killed 17 people and injured 62.

This five-level building was the sole terminal for the Düsseldorf Airport and handled all passenger traffic. Passengers claimed their luggage on the ground level, where the baggage conveyor systems and car rental facilities were located. The height from the floor on this level to the underside of the concrete deck above was approximately 15 feet (4.6 m). Adhered to the underside of this deck were blocks of polystyrene insulation 3 inches (8 cm) thick. Reportedly, this void was not used as an air handling plenum.

The second level of the terminal contained airline ticket desks, shops, restaurants, and seating areas. Like the ground floor, the second level was approximately 30 feet (9.1 m) from floor to ceiling. Overlooking the second level was the third, or mezzanine, level containing the VIP lounges, conference rooms, and various administrative offices. The fourth level contained a restaurant and the observation deck, and the fifth level contained another restaurant. A train station was located below the terminal, and a vehicle service tunnel ran the length of the building. A five was adjacent to the terminal area on the south side, and two vehicle bridges connected the terminal area to the south side.
There are many structural and human errors in this:

* There was no fire watch during welding (normally obliged).
* There were no fire walls or traps in the suspending ceiling.
* The presence of combustible insulation in the ceiling of the terminal.
* There were no smoke detectors nor a sprinkler installation.

http://www.iklimnet.com/hotelfires/dussairportfire.html
* After alarm, somebody started the wrong warning message right into the burning area.

Lifts were not stopped (nor going to a safe area), so people started going down to the parking lot on the roof top directly into the deadly smoke. Dense smoke hindered the light beam so that the lift doors could not be closed again.

* Escape ways were not readily available at the right places. Eight victims were trapped at the Air France desk, by not having a nearby way out.

* Unprotected vertical openings carried fire to upstairs floors.

* Ventilation was not (automatically) stopped.

* Sprinkler system applied partially & again fire started.

* The municipal fire brigade was called 27 minutes after the fire alarm.

**NFPA Fire Report of Düsseldorf Airport Fire**
Fire Protection Features

The west end of the structure was partially equipped with sprinklers, but the fire occurred on the east end of the structure, which was built in 1972 and was not equipped with sprinklers. The dry standpipes on the curb side of the building in the stairwells were not connected to a municipal water supply and had to be pumped by fire department apparatus. Smoke detectors were observed in the office areas of the second floor but not at the ceiling level in the main concourse area.

The terminal was equipped with a fire alarm system that transmitted alarms to a command center in a remote building on the airport grounds and to the Airport Fire Brigade. It did not transmit signals to the Dusseldorf Fire Brigade. This alarm system used an emergency voice/alarm communication system using pre-recorded messages.

The terminal's ground floor could be divided into two separate fire areas by a rolldown...
fire door, which could be activated either by smoke detectors in the ceiling on either side of the door or by manual pull stations next to the door.

The exit doors on the south side of the terminal were pre-actuated swinging doors and power-actuated glass sliding doors. The ground level, through which arriving passengers passed, had 12 sets of doors, while the floor above had 10 sets of doors. According to the site investigations and during subsequent conversations, the doors could not be opened outward by applying pressure.

Several enclosed stairwells on the curb side of the building provided egress from the mezzanine, second, and ground floors directly to the exterior of the building. Investigators, who saw no such stairwells on the air side, could not document the means of egress on the air side of the terminal.

The Dusseldorf Airport Fire Brigade is a full-time fire brigade with 24 fire fighters and officers who staff five pieces of aircraft rescue and fire fighting (ARFF) apparatus. The station is located approximately 1,700 feet (518 m) from the terminal.

The Dusseldorf City Fire Brigade is composed of a combination of paid and volunteer fire fighters who staff seven full-time stations and ten volunteer stations, as well as a fireboat that provides protection on the Rhine River. Each shift is staffed by 120 permanent fire fighters and 250 volunteers.

After fire airport applied extra safety systems

The 1996 fire showed that poisonous smoke gases spread uncontrollably across ventilation systems and pose an even greater danger to people than high temperatures. Thus along with chilled ceilings in each room, controlled ventilation, the new Terminal B also has 1,900 fire damper modules from LonMark member, 1,000 of which are equipped with smoke detectors. These are built into the air ducts and have been integrated into an open LonWorks network using Echelon's LNSTM network operating system architecture. In the case of fire, the fire dampers close automatically, preventing the spread of poisonous gases to neighbouring areas. Smoke detectors and fire dampers are connected via LonMark modules to the building automation system. The fundamental building functions, such as HVAC, are controlled by a plant controller and are connected to the LonWorks network. Should a fire damper close, a message is sent as a LonTalk telegram to the building automation system and this, in turn, switches off the other fundamental building functions. 20% of the damper messages have an effect on the basic building functions.
In the case of the smoke detectors, airflow and sensor pollution, as well as possible electronic faults, are monitored. At the same time, the point at which the fire damper reaches its stop position is registered. An alarm is set off only after a delay or not at all. In this way, faulty dampers can be identified quickly and routine maintenance checks can thus be reduced.

In total, 15,000 hardware data points and 1,600 LonMark nodes have been integrated into the building automation system as part of the 339 million Euro project, "airport 2000 plus".

New Dusseldorf airport fire safety concept

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