QUESTIONABLE FIRE SAFETY ASSESSMENT OF THE BAKERY PLANT BUILDING

Krzysztof Lacki
The Main School of Fire Service in Warsaw, Poland

Paweł A. Krol
Warsaw University of Technology, Poland

About...

It is a free-standing bakery plant building, consisting of a single-storey production hall with two mezzanines located in two separate zones of production part, and the internal patio as well as a two-storey part containing the staff rooms for employees and office rooms.

Specific data:
- usable area: 6,280 m²
- total height: ~10.5 m
- rectangle-like shape with dim. 127 m x 67 m,
- employed: 189 total, at the same time about 65 people may stay in the building.

Regulatory requirements

The object has been designed based on the assumptions, that:
- fire load density does not exceed 3,000 MJ/m²
- does not contain any spaces and hazardous areas, and ...
- in terms of height - classified as the “low” building which raises some specific consequences

Fire load density distribution

- The estimated average fire load density reached 974 MJ/m², so ... it’s less than 1,000 MJ/m²
- In approx. 47% of the area of the building the fire load density does NOT exceed 100 MJ/m².
- In the lowest range of the fire load density which one can find in the technical regulations (i.e. of less than 500 MJ/m²) fails to approx. 74% of the floor area of the analysed object.
- Surfaces for which the fire load density exceeds 4,000 MJ/m² (in extreme cases, it’s 5,644 MJ/m²) represent only about 11% of the total area – but their presence is evident.

In these areas construction of a building designed and executed based on the initial assumptions is not adequately prepared for the likely fire conditions that may occur there.

More on regulatory requirements

- The fire zones, for which the fire load density exceeds 4,000 MJ/m², (but calculated as an average value for the entire fire zone) due to national regulations and codes of design must meet the criterion R240 of structural fire resistance, so ...
- ... it would be reasonable to separate the office part of the building from the technological part (as different fire zones) and to create completely new fire zone consisting of some storage areas with a high fire load density but it entails costs (but ONLY if one wants to have a safer but MORE COSTLY building, requiring application of additional technical solutions)

Conclusions

- A building design based on the formal requirements conditioned by the fire-load density parameter may lead to unsafe and unsatisfactory solutions,
- An average value of fire-load density (calculated for an entire fire zone) especially in fire zones and/or premises of large areas and varied functions - can lead to significant underestimations of building fire safety and result in incorrect assessment of the construction located in areas of high fire-load density levels.

This problem is not generally discussed in the legal regulations,
THANK YOU FOR YOUR KIND ATTENTION