COST Action TU0604
Integrated Fire Engineering and Response

decivil universidade de aveiro departamento de engenharia civil

# EVALUATION OF THE FIRE RESISTANCE OF THE STEEL STRUCTURE OF AN EXHIBITION CENTRE USING STRUCTURAL FIRE SAFETY ENGINEERING

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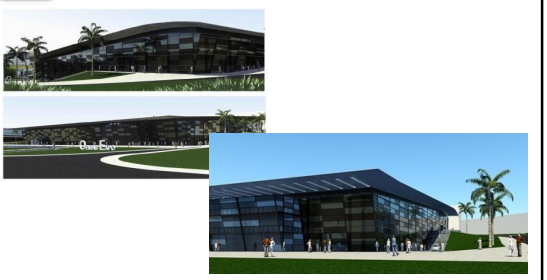
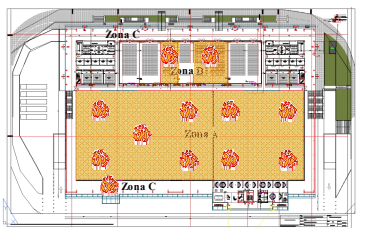
## EXHIBITION CENTRE



Required fire resistance 120 minutes (R120)

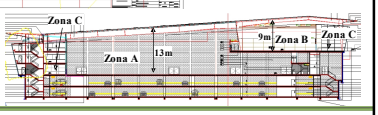
## Fire scenarios




6 fire scenarios

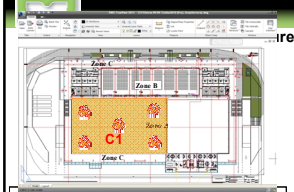
Fire load density reduced by 39% due to the sprinklers

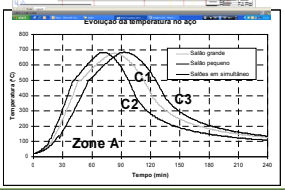
Fire resistance (R120)

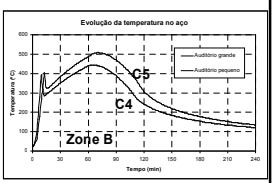



## Fire scenarios

ire evolution

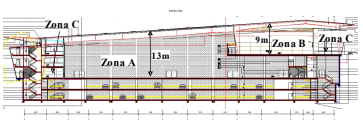



*C1-5 - Software OZone*
C6 is a localized fire in Zone C - Elefir-EN

## Main Structure

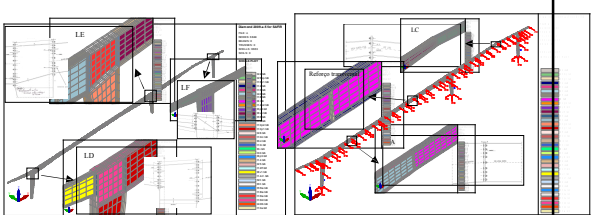



60.0 m 40.0 m

Main Portal Frame

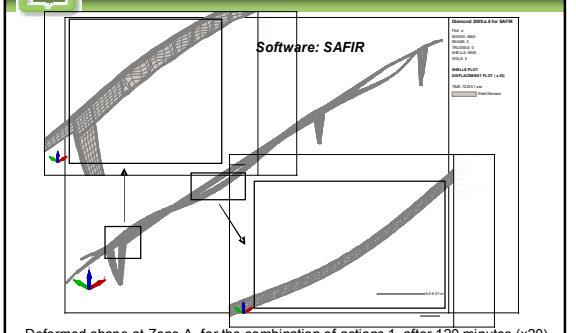
## Structural analysis

Main structure – portal frame with built-up non-uniform class 4 steel elements




*Software: GiD; SAFIR*

## Structural analysis




Deformed shape at Zone A, for the combination of actions 1, after 120 minutes (x20)

## Conclusions

- A performance-based analysis, demonstrated in this study that, protecting the structure for a standard fire resistance of 60 minutes (R60), considering a critical temperature of 500ºC, the load-bearing function is ensured during the complete duration of the fire, including the cooling phase.

- The steel structure of the Center for Exhibitions and Fairs in Oeiras consists of class 4 cross section profiles. In a prescriptive approach and without making any calculation, this structure should have been protected for a critical temperature of 350ºC and for R120.