

EVACUATION AND FDS SIMULATION

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as
Fire Terminators

15TH MARCH 2014, LULEÅ

SMARTMOVE SIMULATION REPORT

INPUT DATA

NUMBER OF STAIRWAYS: 1

STAIRS' WIDTH: 3m

NUMBER OF PEOPLE/FLOOR: 200

NUMBER OF EXITS: 1

POSITION OF EXIT: SOUTH SIDE

VELOCITY THROUGH

COMPARTMENT AND CORRIDORS: 1.3 m/s

VELOCITY THROUGH STAIRS: 0.9 m/s

5th floor:

$$180 + 20 + 36,5/1,3 = \underline{227,5 \text{ s}}$$

4th floor:

$$227,5 + 6,9/0,9 + 24,5/1,3 = \underline{254 \text{ s}}$$

3rd floor:

$$254 + 6,9/0,9 + 24,5/1,3 = \underline{281 \text{ s}}$$

2nd floor:

$$281 + 6,9/0,9 + 24,5/1,3 = \underline{308 \text{ s}}$$

1st floor:

$$308 + 6,9/0,9 + 24,5/1,3 = \underline{335 \text{ s}}$$

Ground floor:

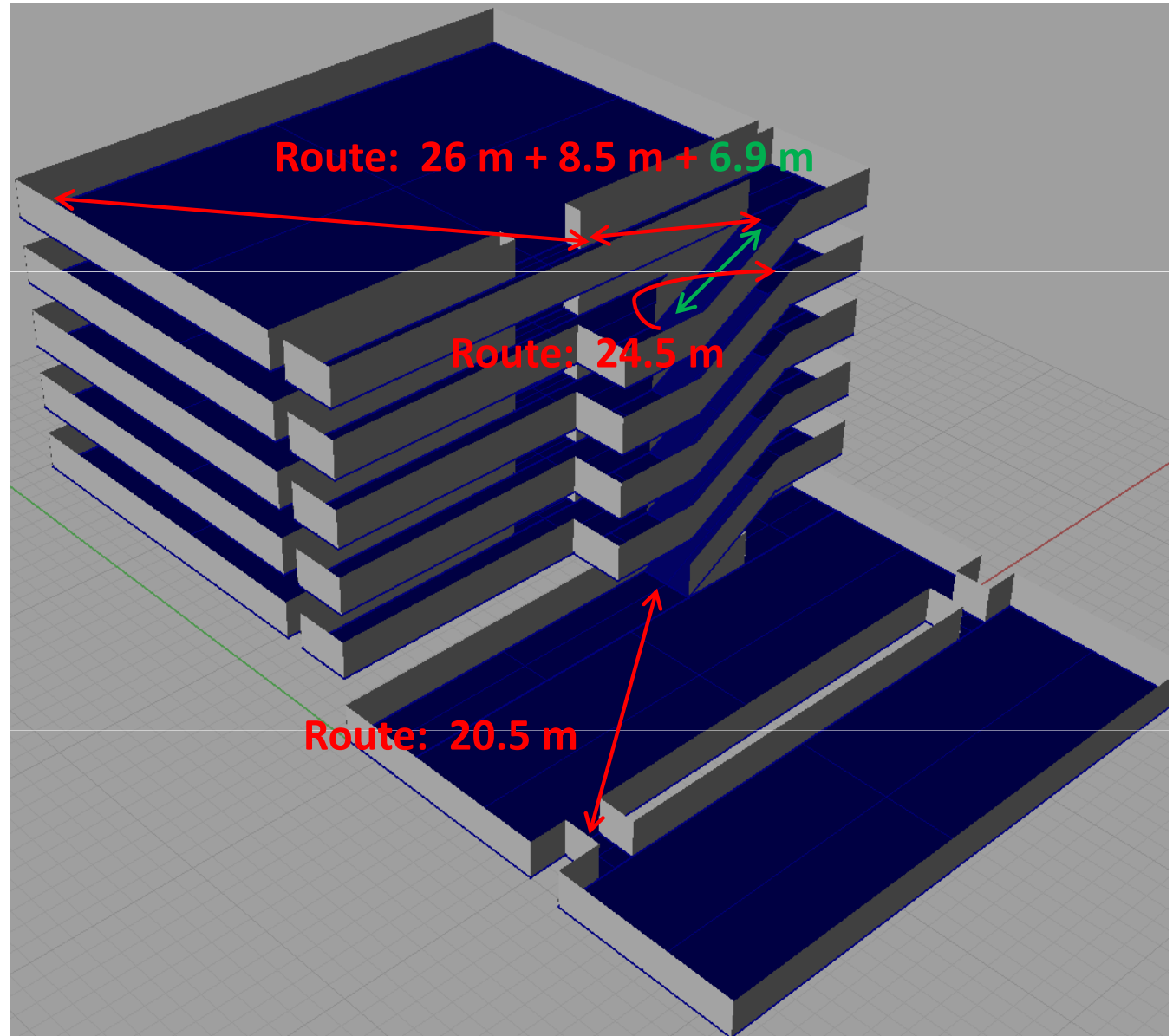
$$335 + 6,9/0,9 = \underline{343 \text{ s}}$$

Exit:

a) $343 + 20,5/1,3 = 359 \text{ s}$

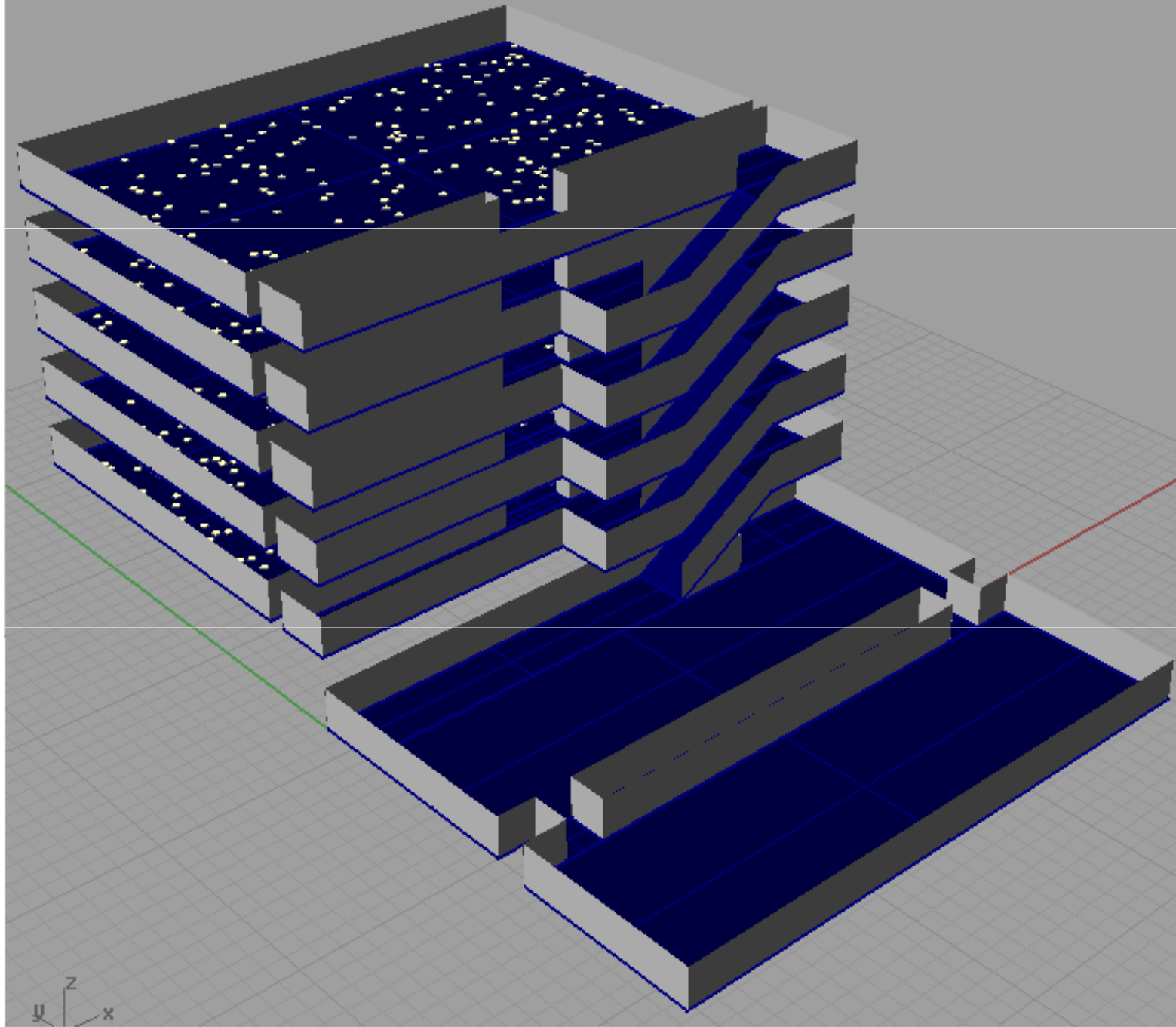
or

b) $359 + 1000/3$



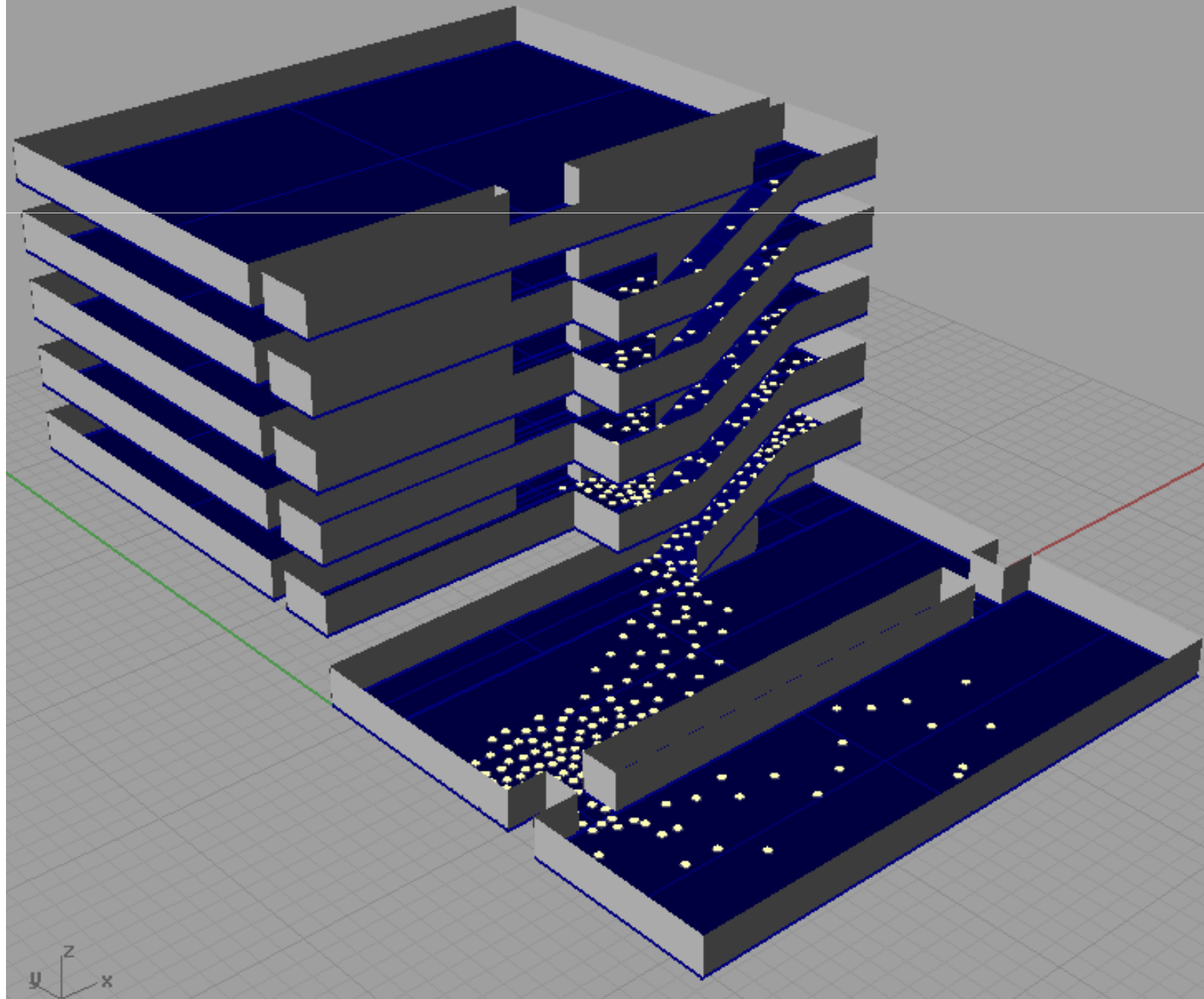
SMARTMOVE SIMULATION REPORT

Time: 00:00:00



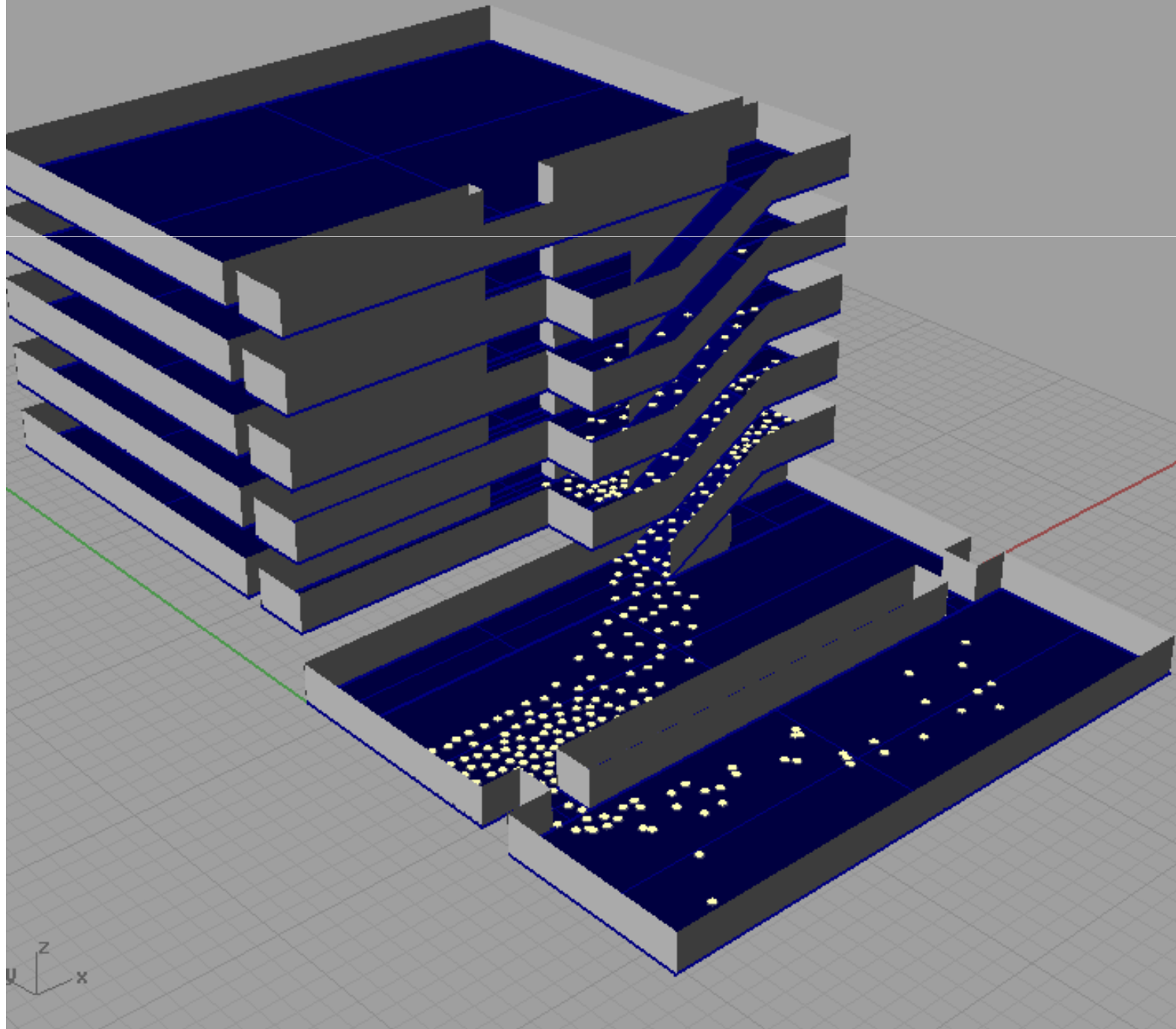
SMARTMOVE SIMULATION REPORT

Time: 00:03:41

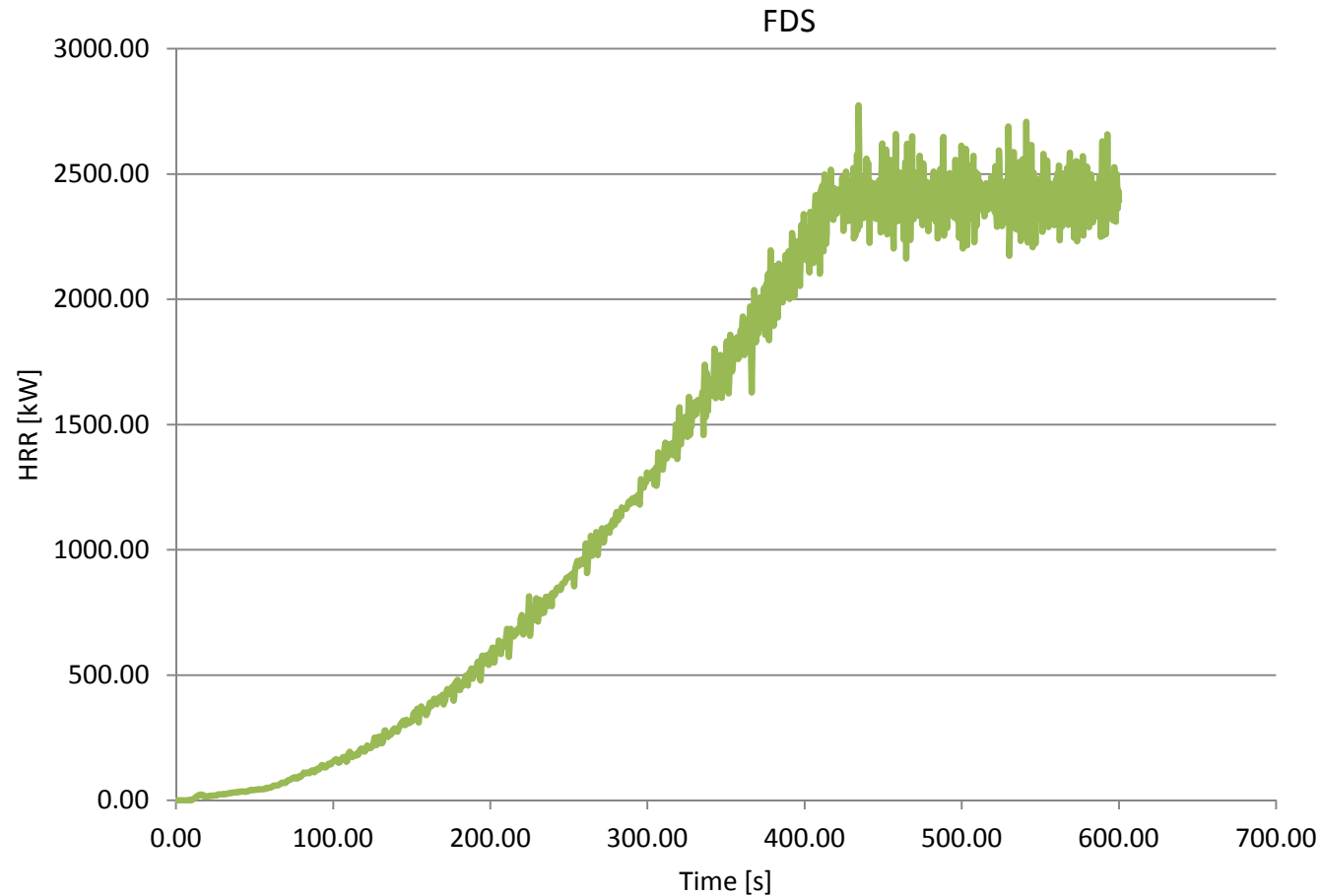


SMARTMOVE SIMULATION REPORT

Time: 00:04:09



HEAT RELEASE RATE IN FDS

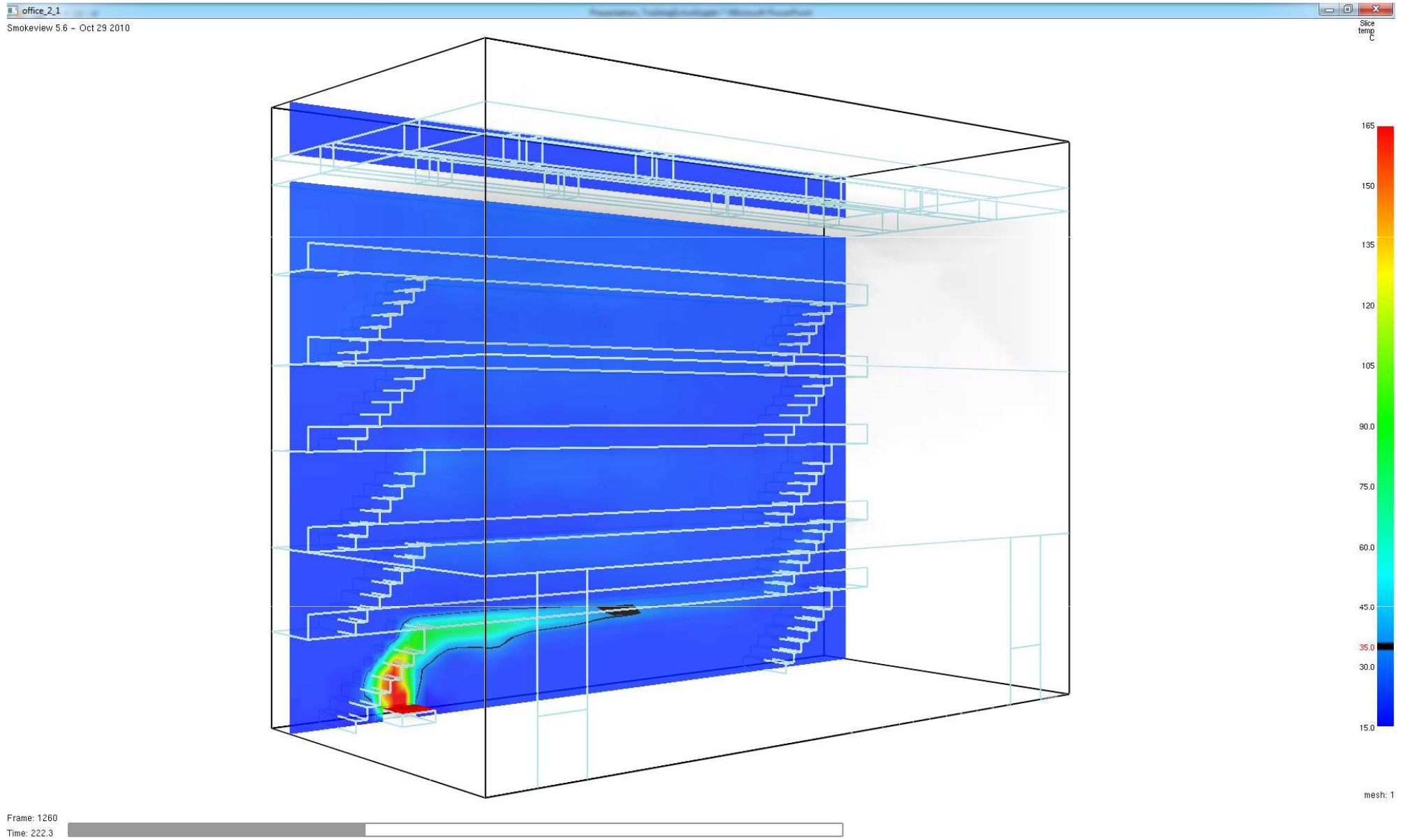


Scenario B – a sofa was set on fire, nearby stairs, and under balconies.

Medium fire growth, maximal Heat Release Rate (HRR) = 2400 kW.

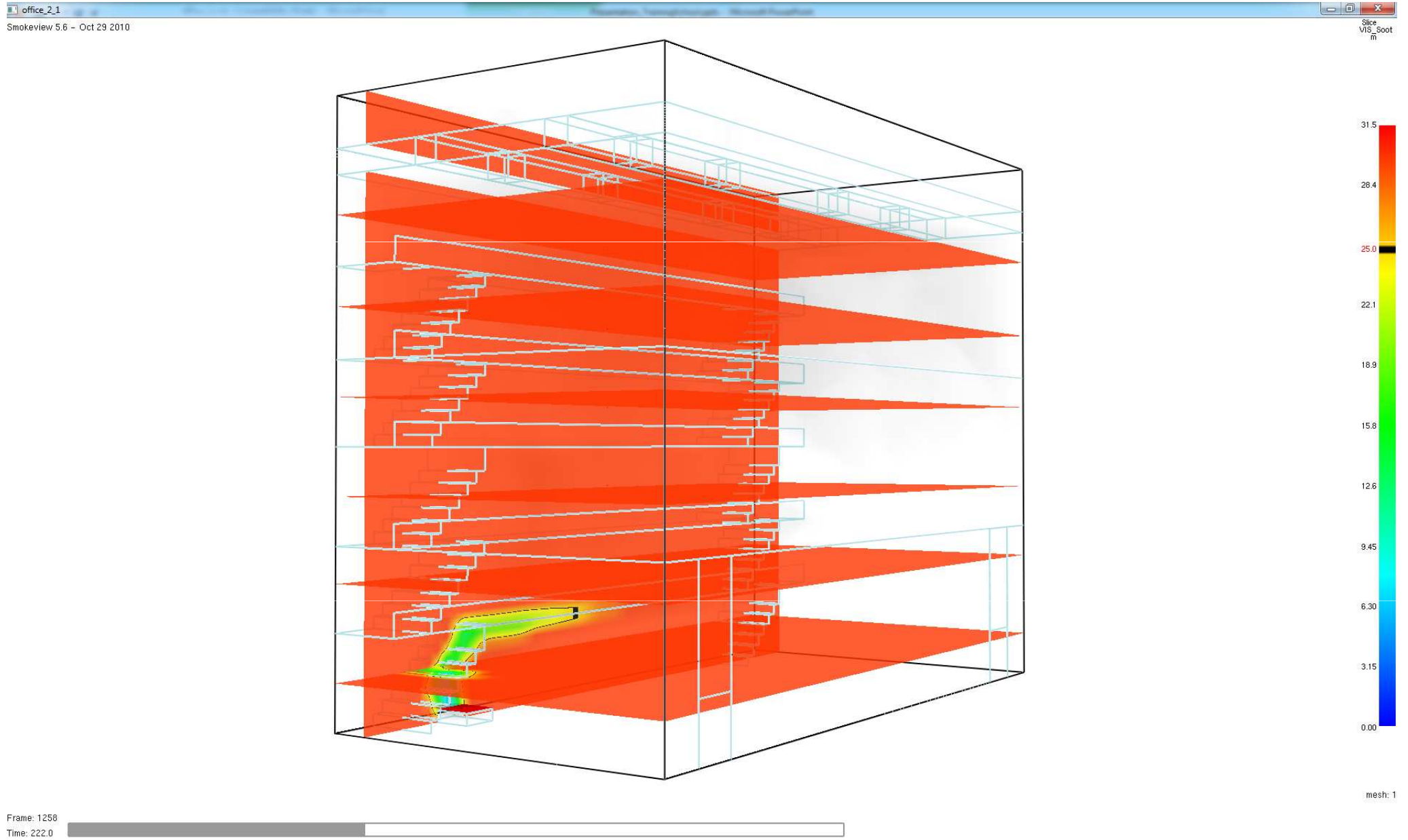
Natural smoke extract: $8 \times 1 = 8 \text{ m}^2$ skylights, $2 \times (2,00 \text{ m} \times 2,50 \text{ m}) = 10 \text{ m}^2$ doors

FDS



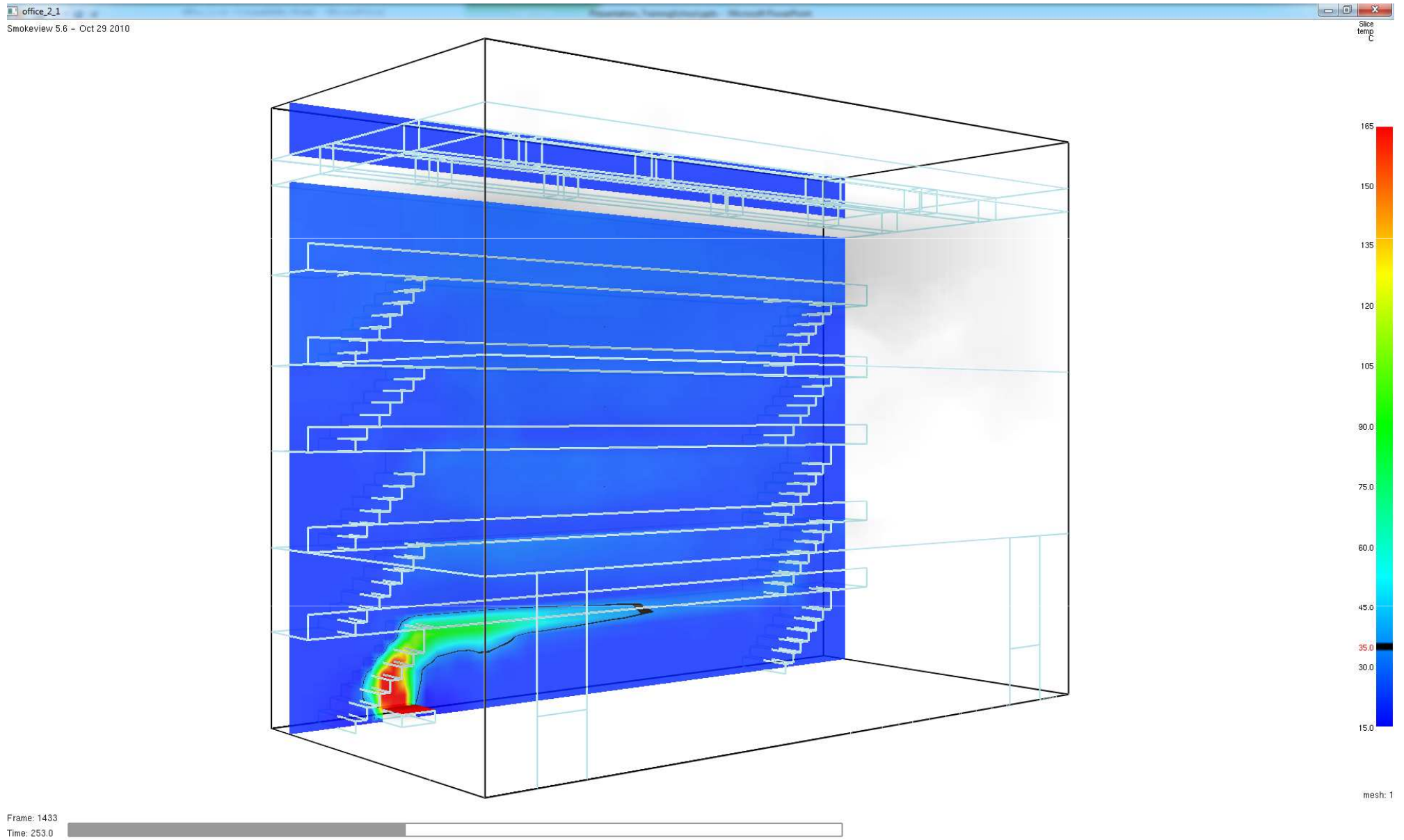
Evacuation of 5th floor: 222 s, temperature – safe

FDS



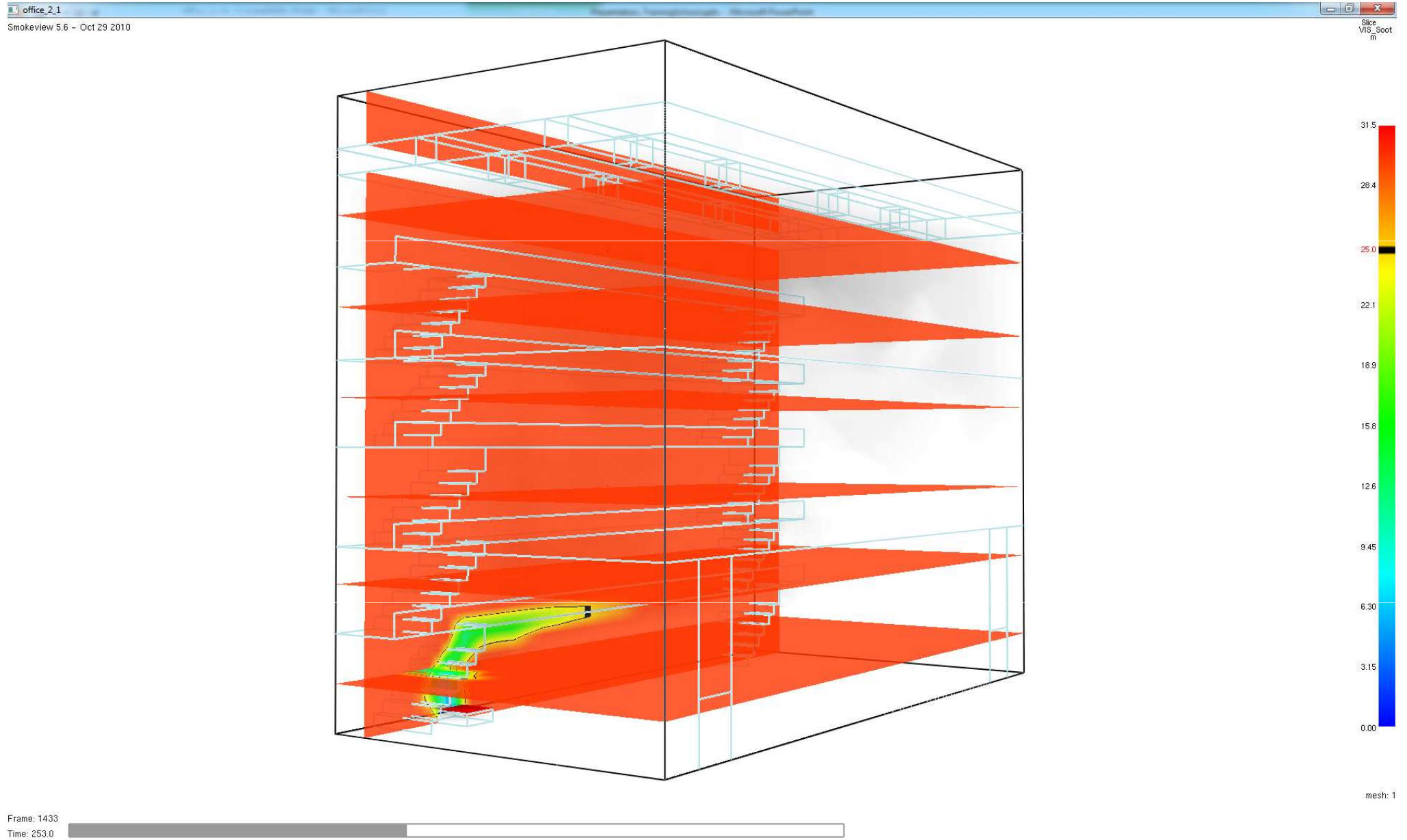
Evacuation of 5th floor: 222 s, visibility – safe

FDS



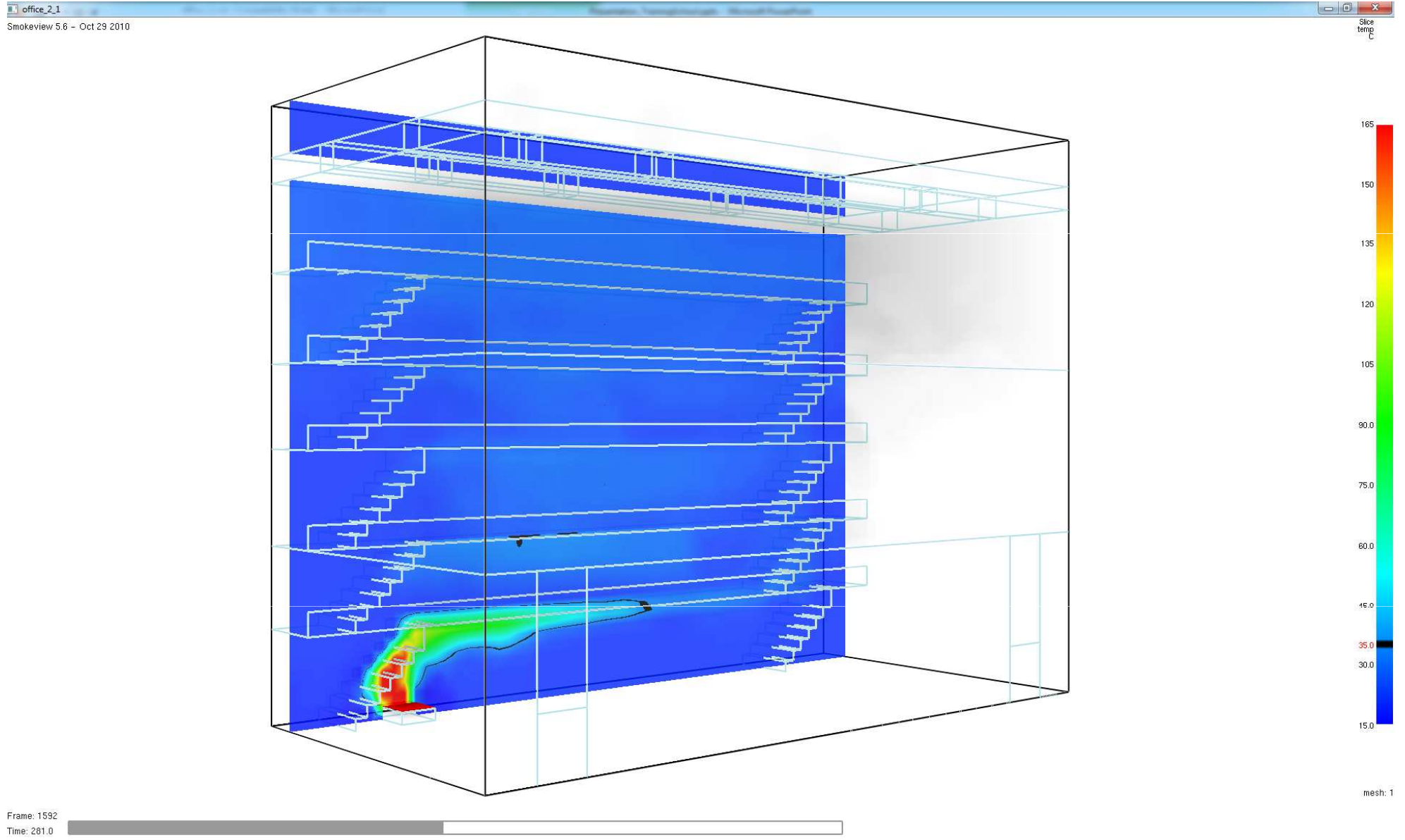
Evacuation of 4th floor: 253 s, temperature – safe

FDS



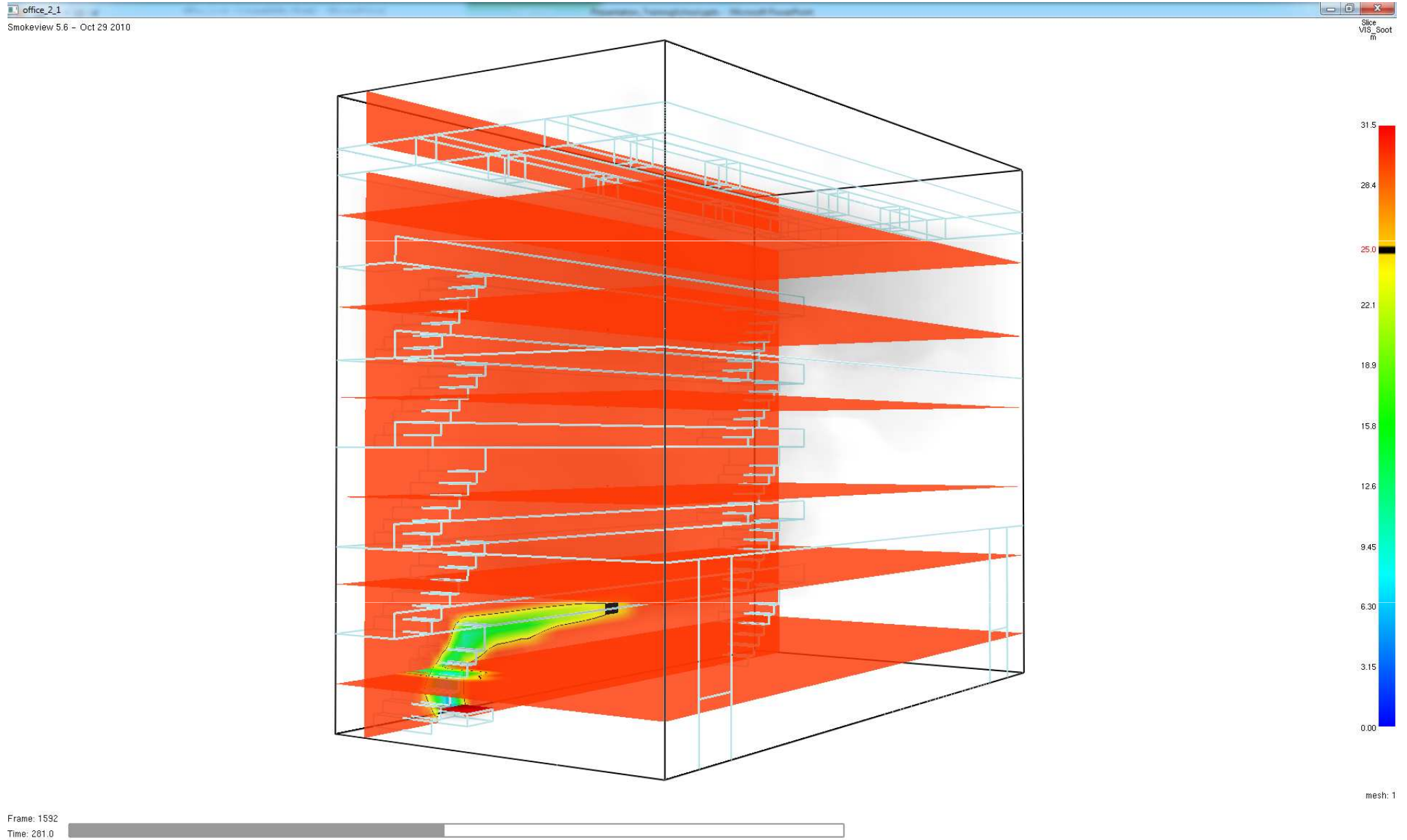
Evacuation of 4th floor: 253 s, visibility – safe

FDS



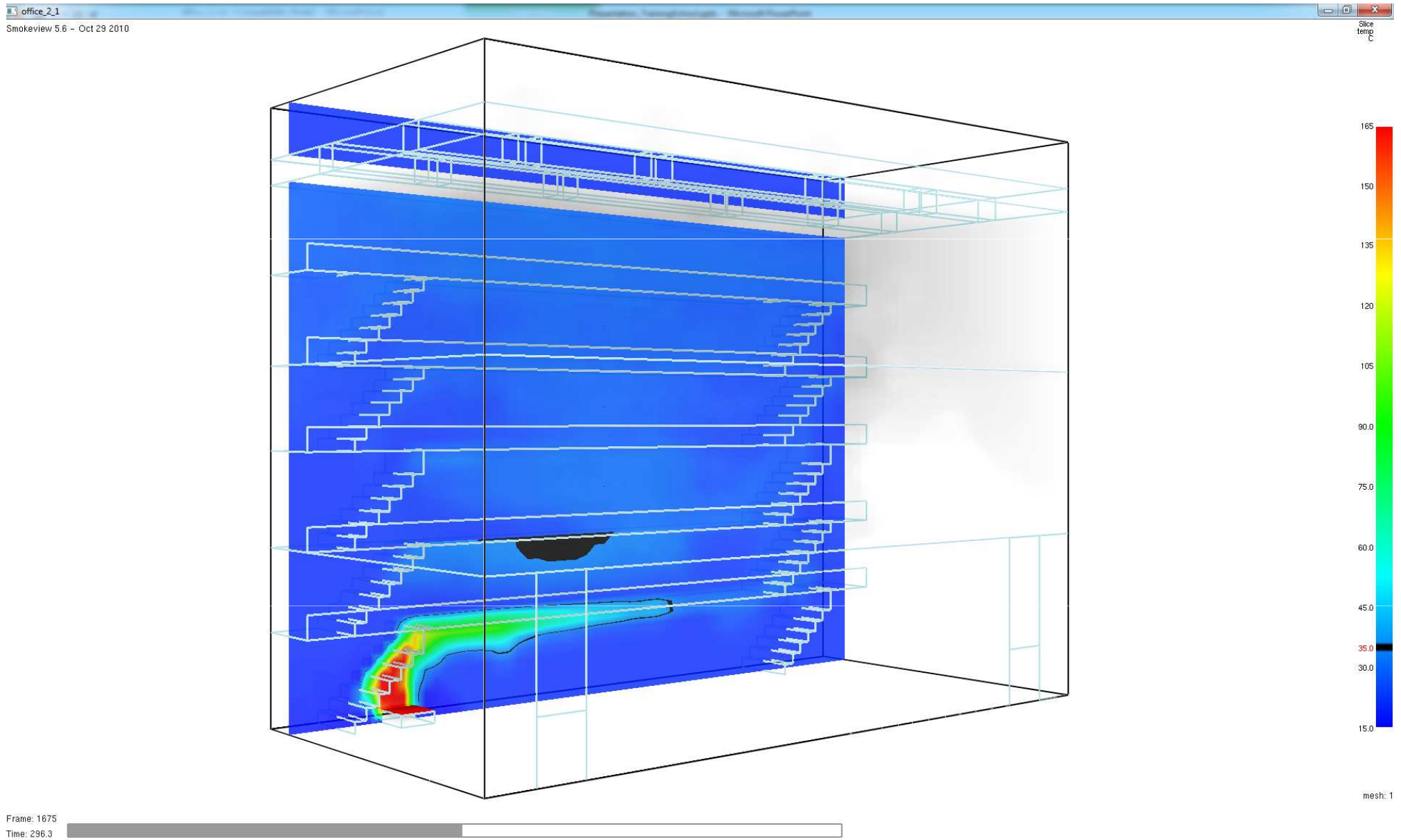
Evacuation of 3rd floor: 281 s, temperature – safe

FDS



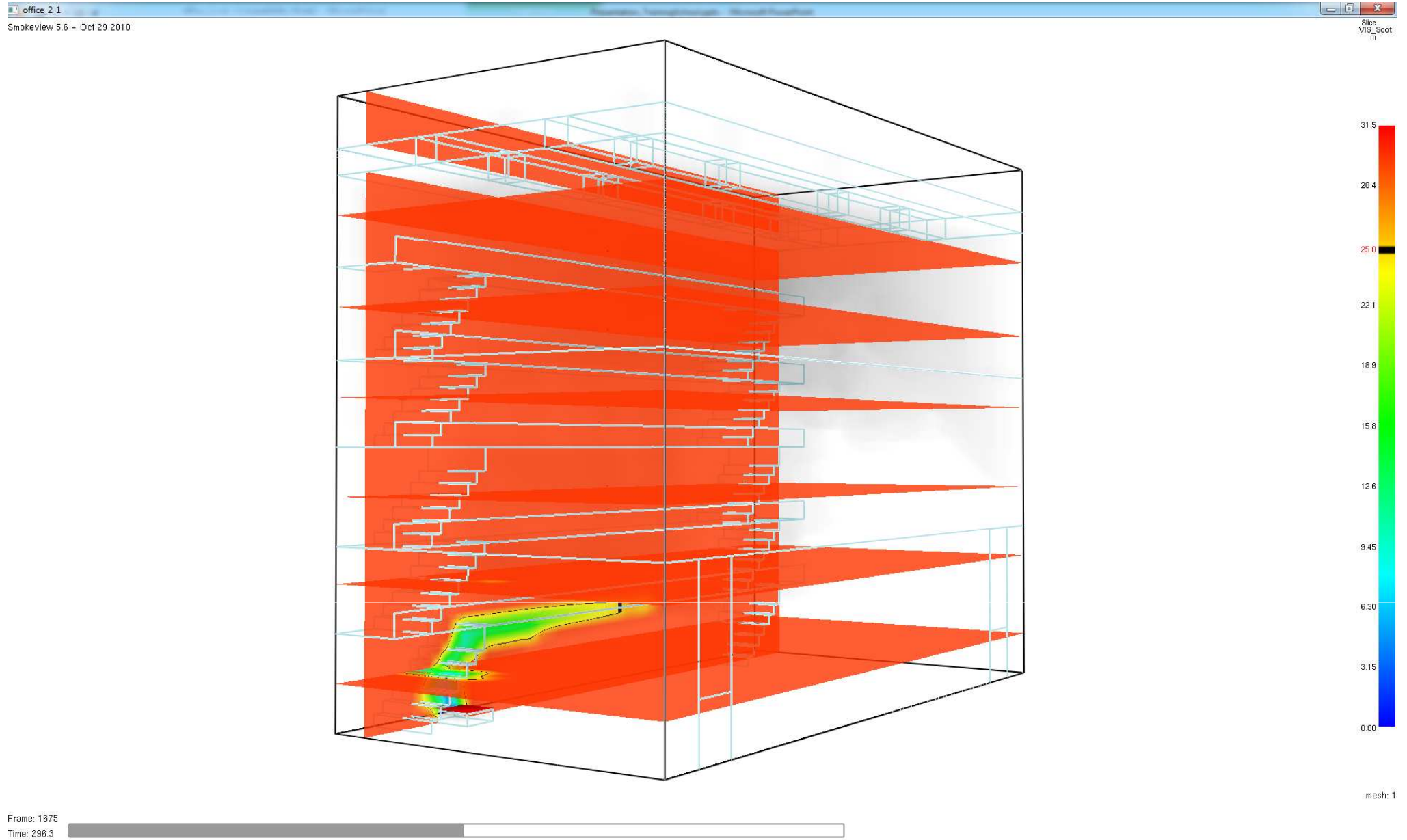
Evacuation of 3rd floor: 281 s, visibility – safe

FDS



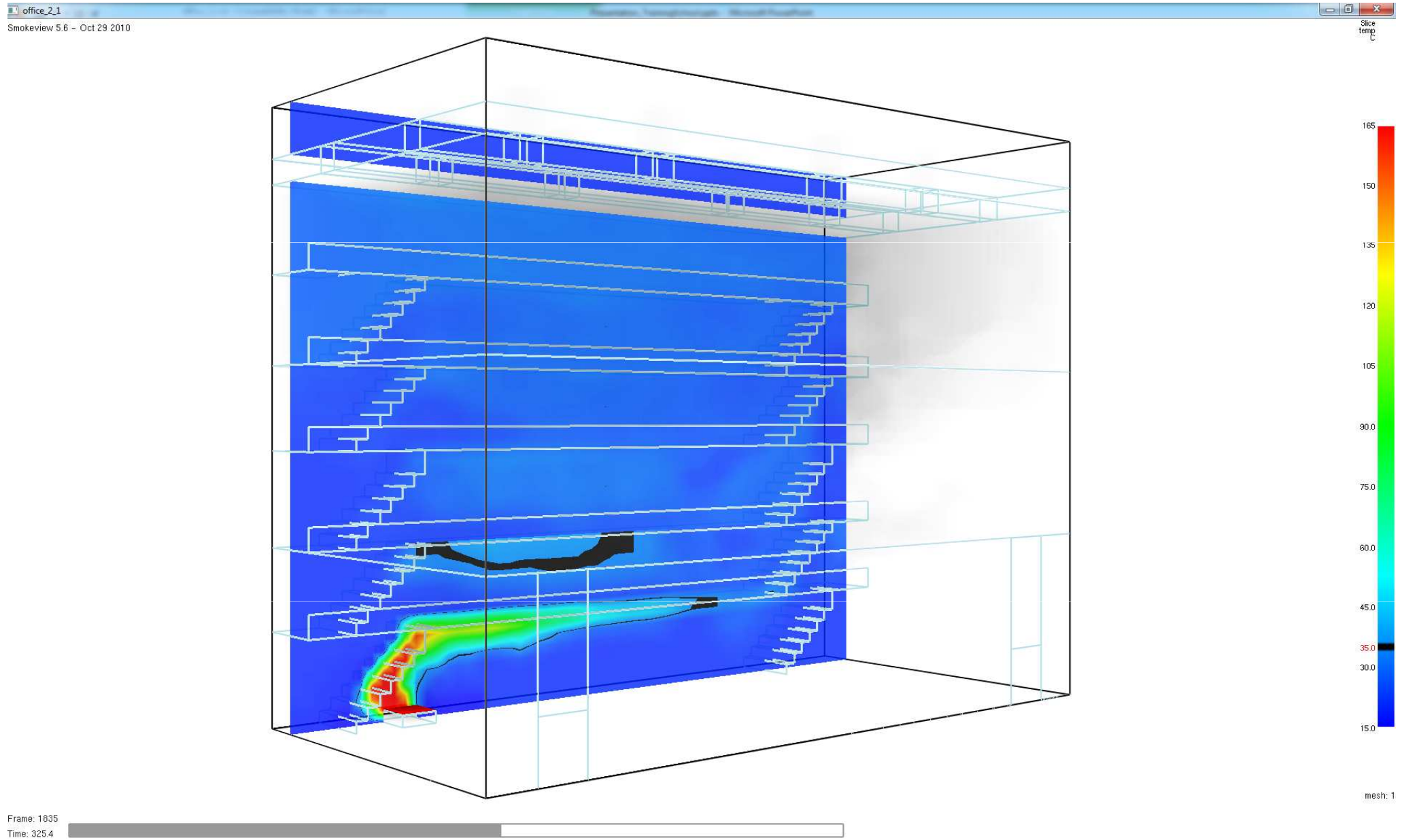
Evacuation of 2nd floor: 296 s, temperature – safe

FDS



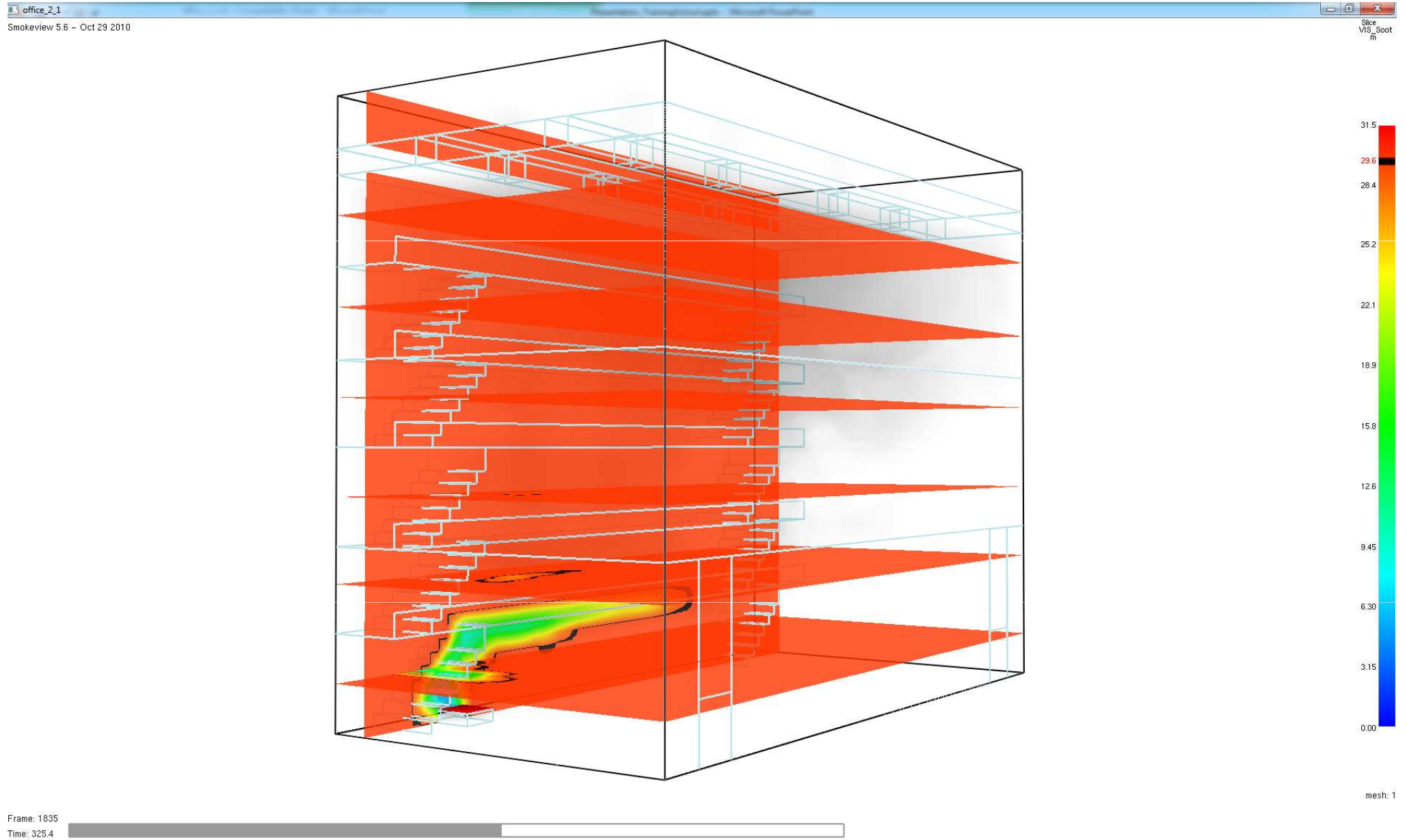
Evacuation of 2nd floor: 296 s visibility – safe

FDS



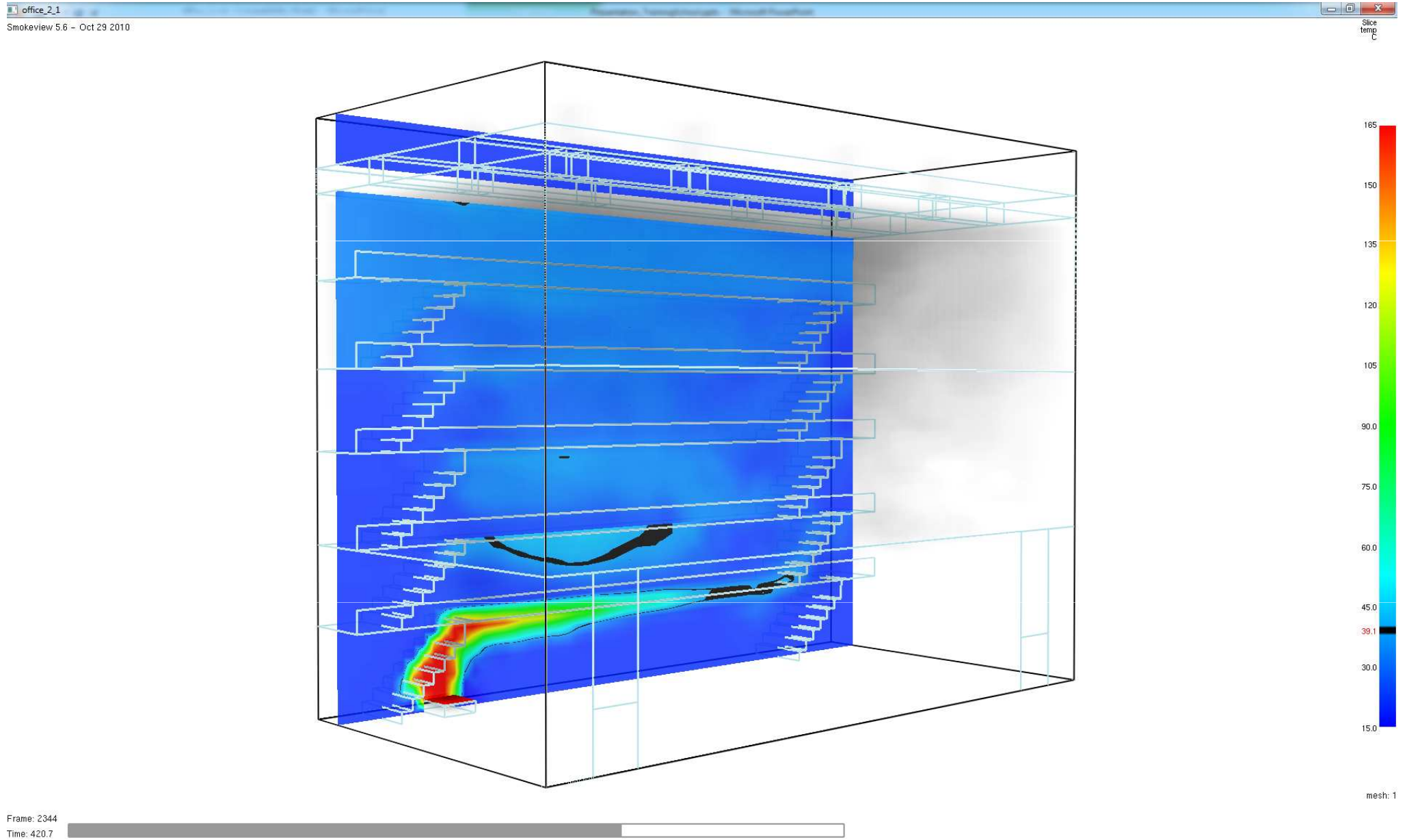
Evacuation of 1st floor: 325 s, temperature – safe

FDS



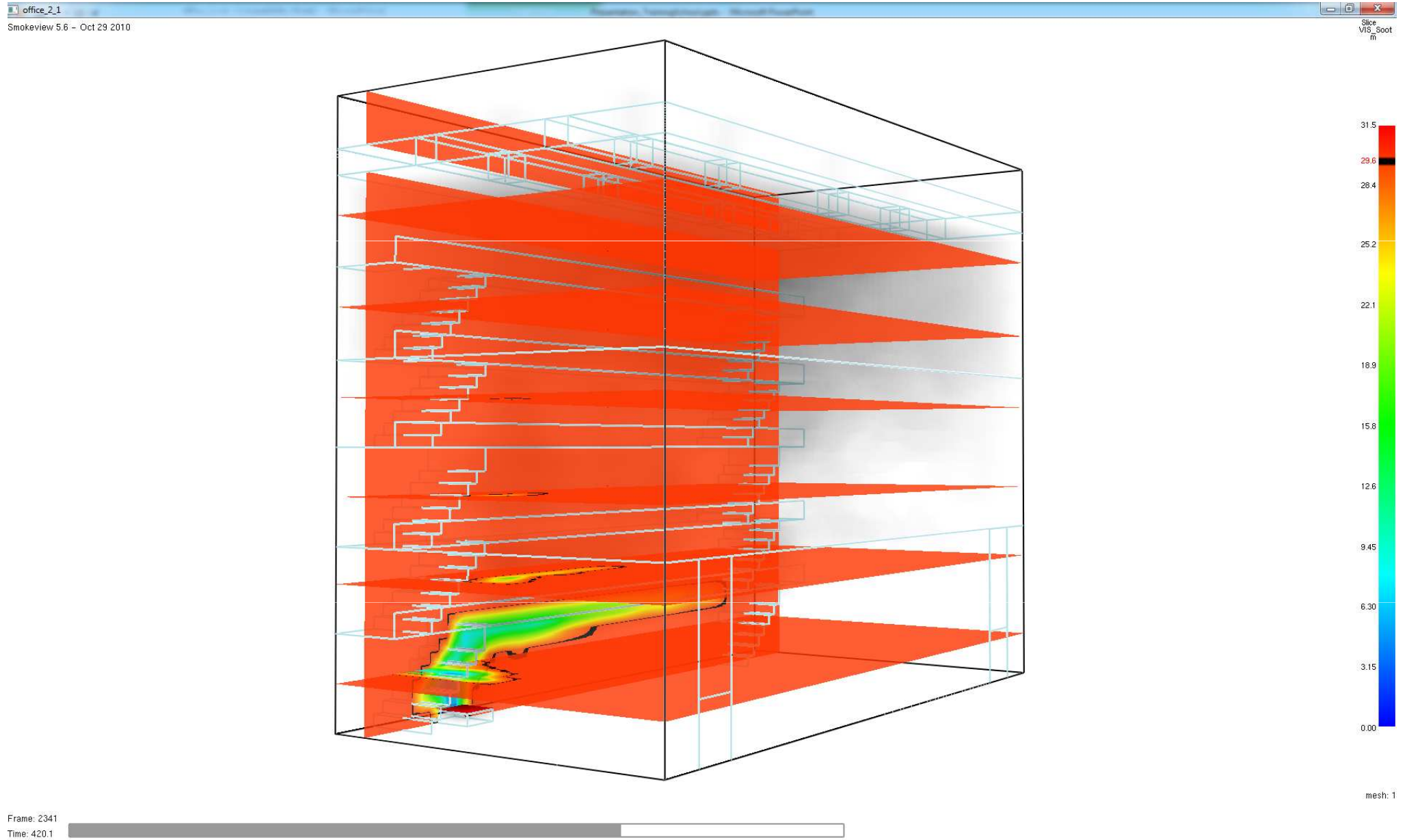
Evacuation of 1st floor: 325 s, visibility – safe

FDS



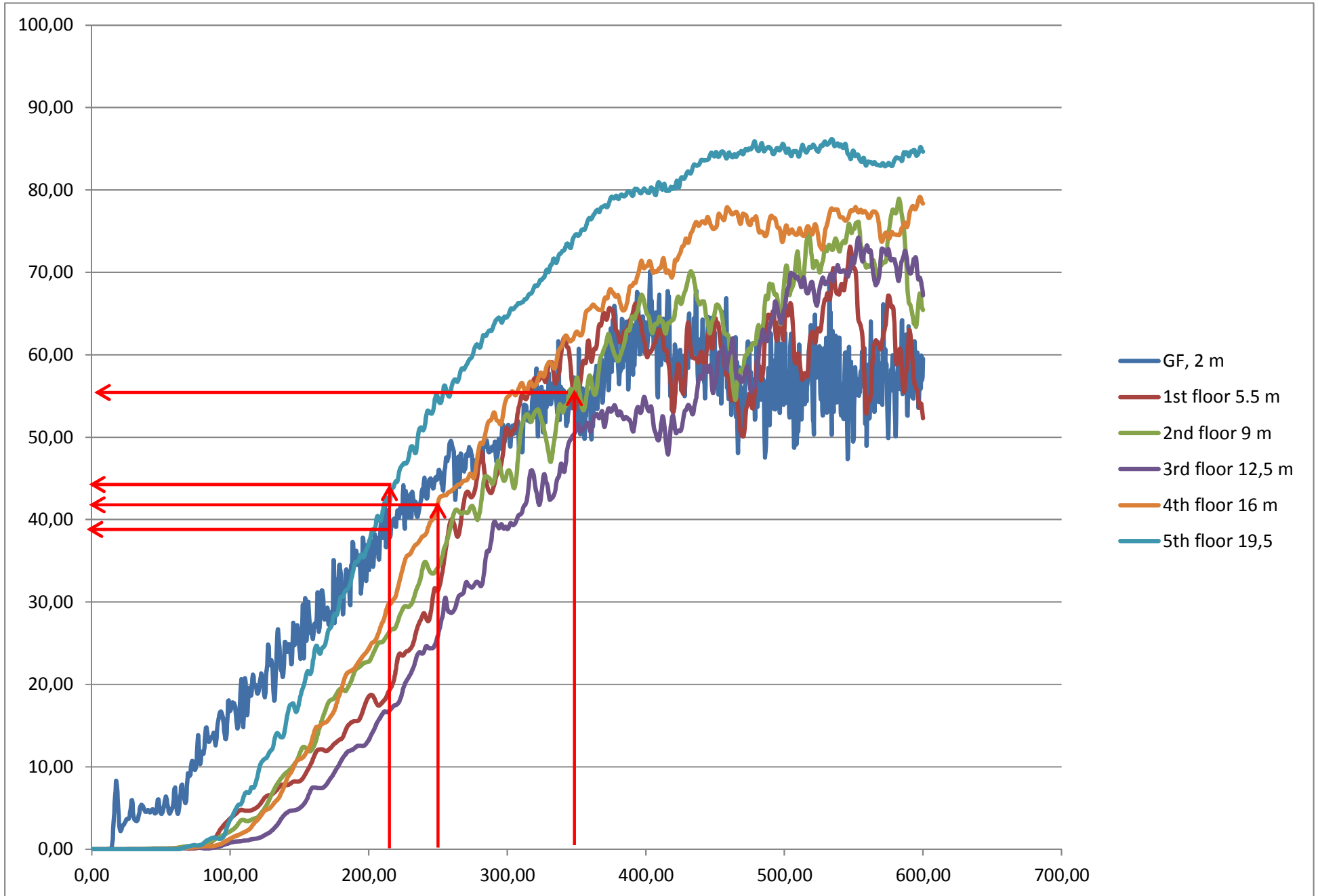
Evacuation of ground floor: 420 s, temperature – safe

FDS



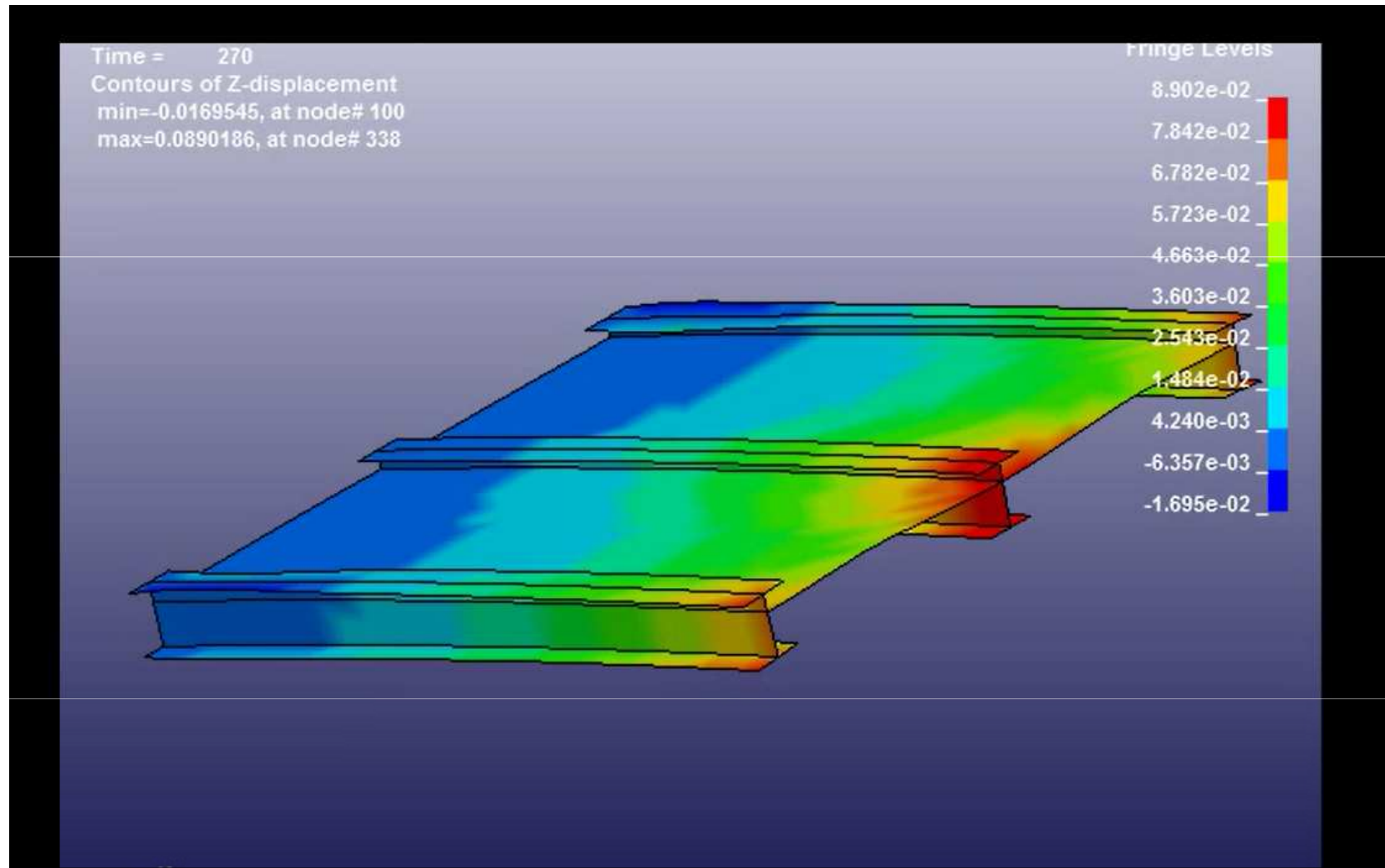
Evacuation of ground floor: 420 s, visibility – safe

FDS



Non-visibility values [%] on several storeys; 100% = zero visibility

LS-DYNA



Summary

Based on the results of the evacuation and of the FDS simulation, the building can safely be evacuated.

Temperatures were not higher than 40 °C.

Visibility never dropped below 29 m.

During FDS simulation we assumed both stairways were available.

Caution:

- no toxicity analysis has been made**
- analysis of loadbearing construction is yet to commence**

THANKS FOR YOUR ATTENTION!

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