

Overview of C2D

C2D Solutions Pte Ltd is a holistic knowledge-based engineering solutions provider with a wealth of experience. We are committed to deliver the most optimal solution based on sound engineering principles.

Problem Statement

To ensure safety of motorists, concentration of indoor air pollutants must be maintained at a safe level. The objective of this study is to predict the flow field, CO concentration and temperature distribution of the 3 level car park. Basement 2 car park is used to illustrate the study.

Challenge

Supply fans and exhaust fans in one zone are considered to be in failure and not operating. In addition, 674 cars (50% of the car park capacity) are considered to be in simultaneous operation. The reason for imposing such conservative limits is because B2 has a lower headroom and a larger car park capacity than the other levels. Hence, if the ventilation system is able to meet the demands for this extreme scenario, the safety and comfort of occupants of B2 will definitely be ensured in reality.

Solution

The flow field, CO concentration and temperature will be analyzed at average human head level when standing (1.7m) and when seated in a car (0.5m) using Computational Fluid Dynamics (CFD) simulations. This is to establish how effectively the ventilation system can manage the pollution in the car park and maintain a reasonable air quality.

Results

The CFD study predicts that there are no significant stagnation zones within the car park. The Carbon Monoxide (CO) concentration within the majority of the car park is less than 24ppm (Threshold Limit Value of CO = 25ppm) and the temperature is less than 35°C. This illustrates that the proposed ventilation system can manage the pollution in the car park and maintain a reasonable air quality.

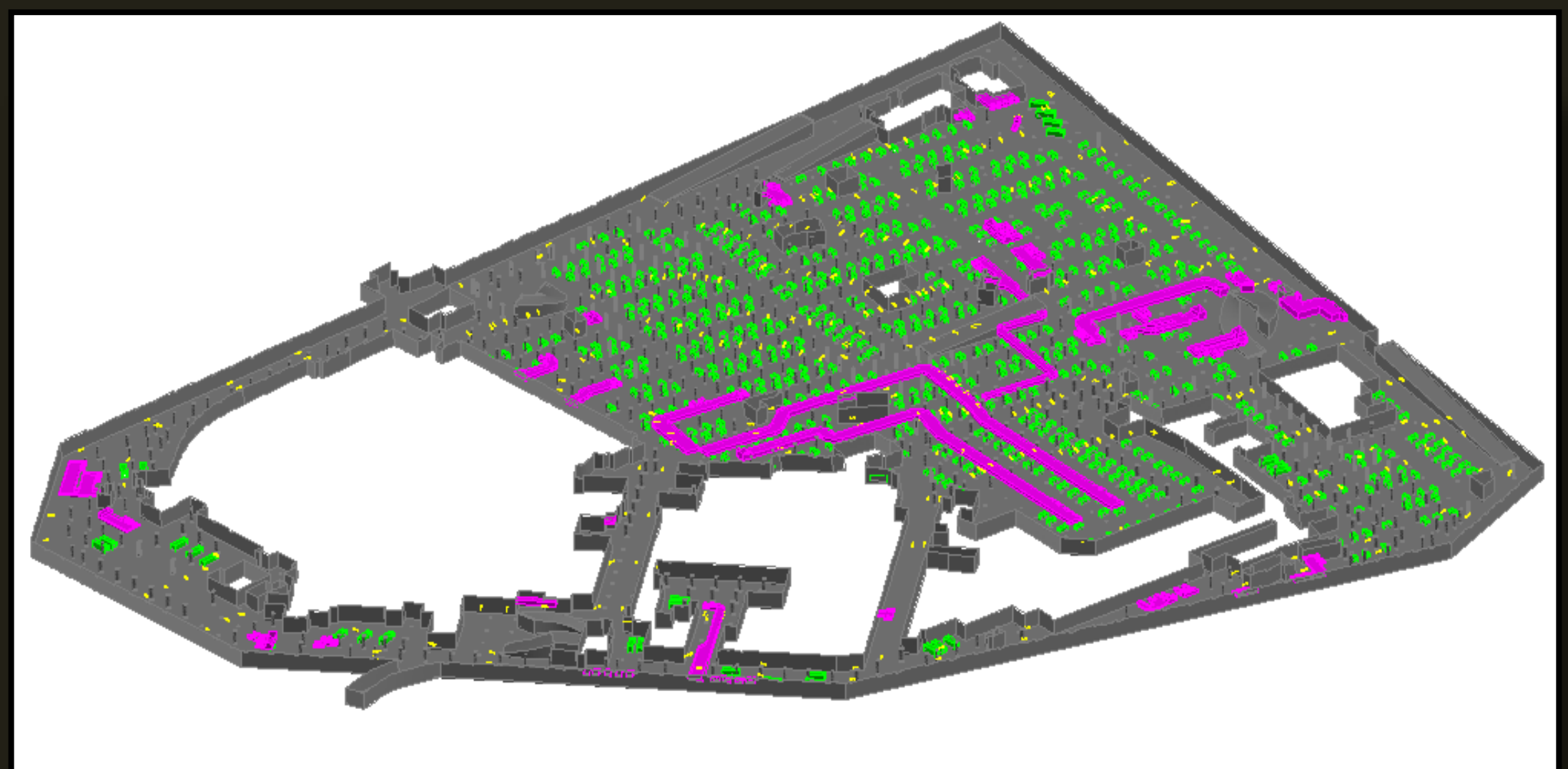


Fig 1: Computational Grid of Basement 2 Carpark

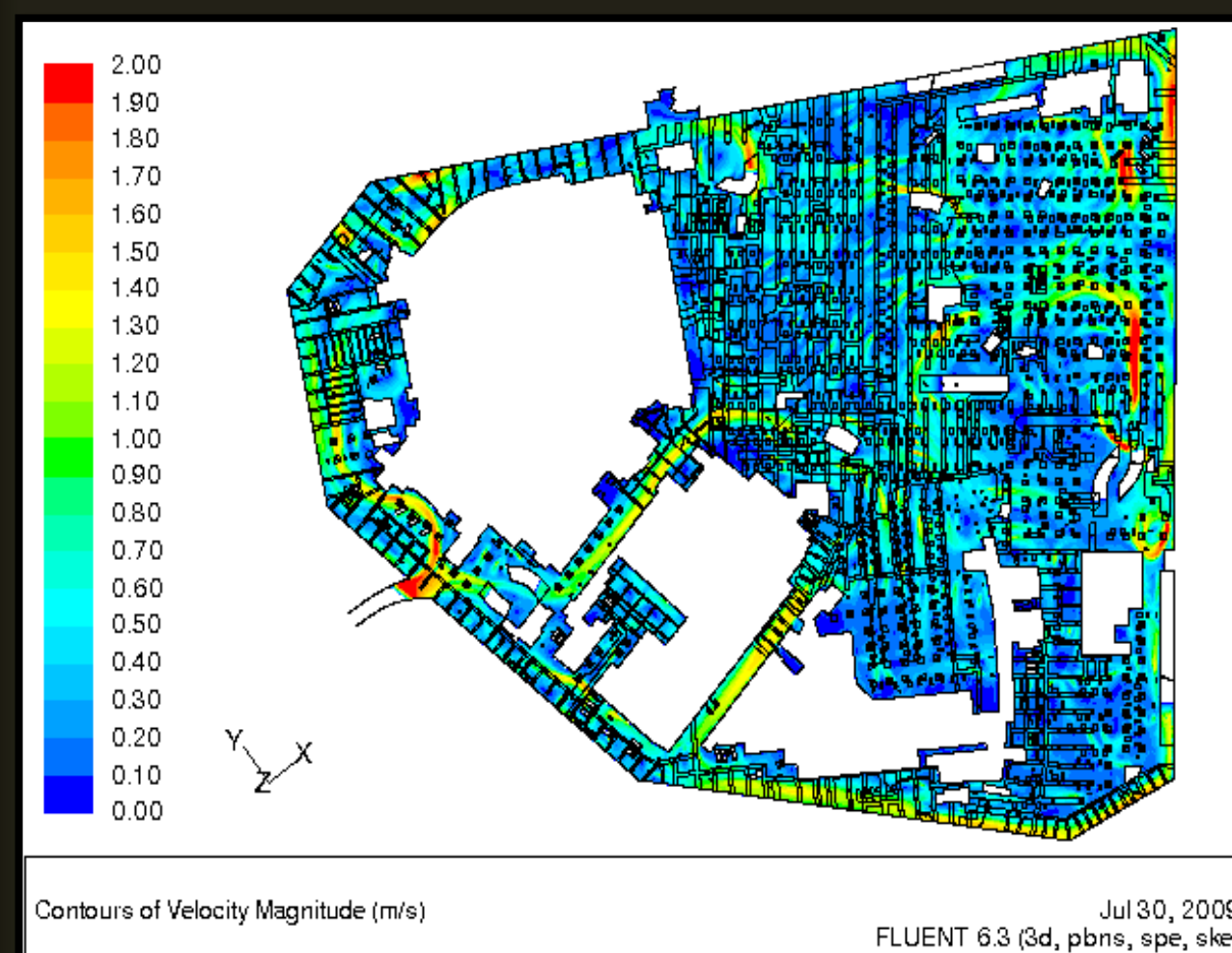


Fig. 2: Velocity Contour at 1.7m Height

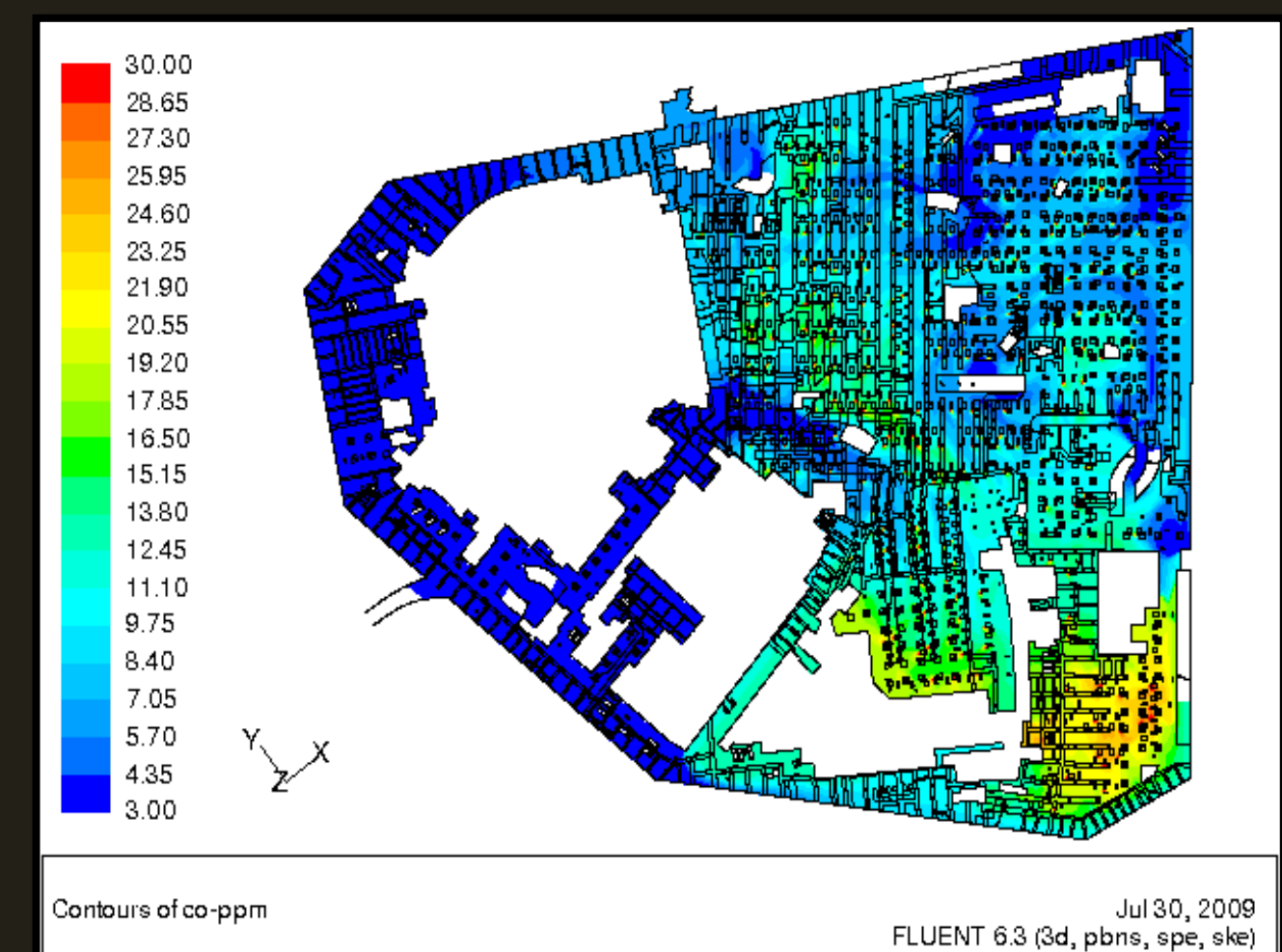


Fig. 3: CO PPM Contour at 1.7m Height

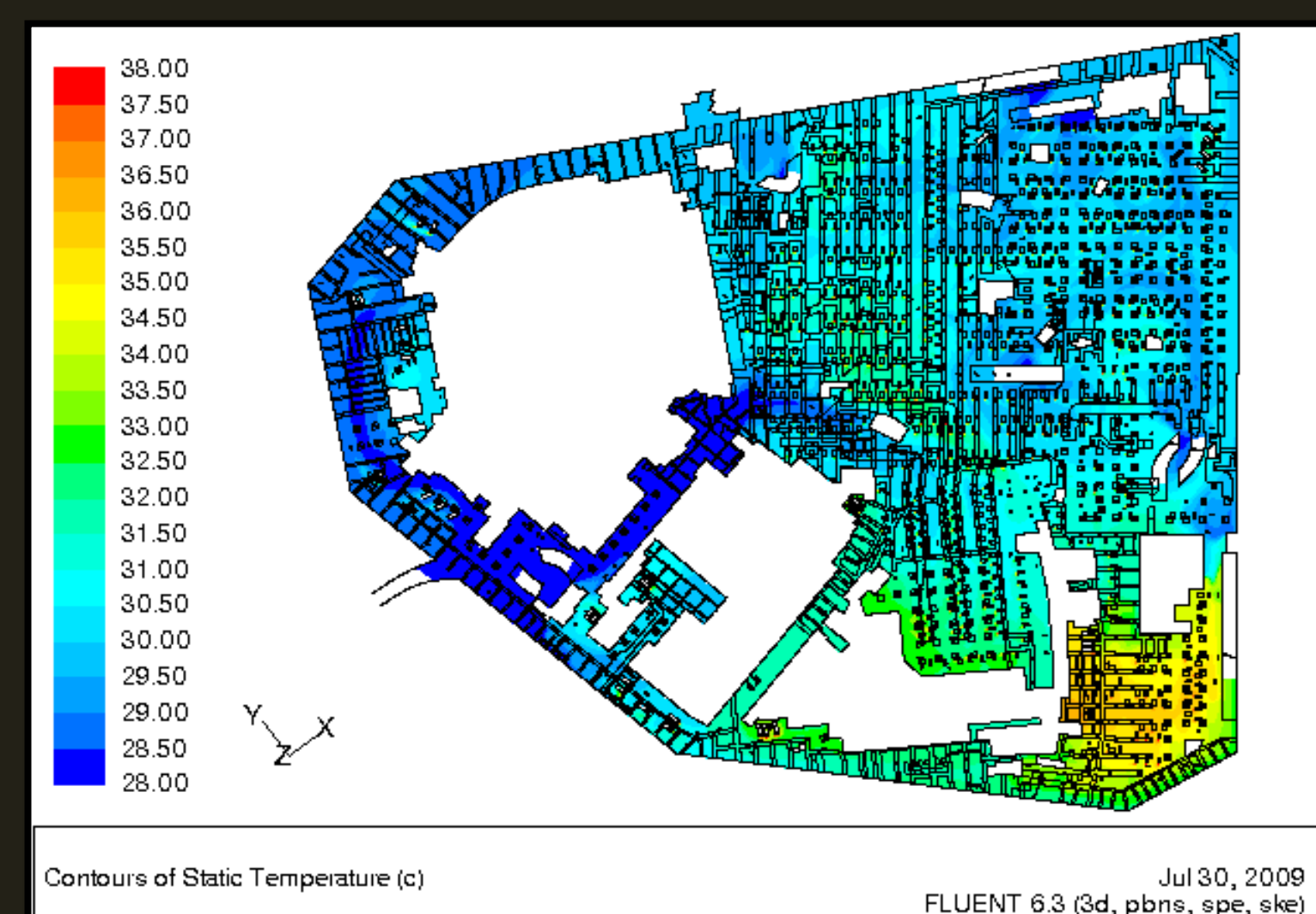


Fig. 2: Temperature Contour at 1.7m Height