Using ANSYS fluid dynamics software to determine smoke accumulation and clearing during a fire in a car park — as well as to calculate the temperature surrounding the fire — allows building managers to perform virtual safety studies to obtain government approval for the structure. Leveraging simulation is one way MAICO maintains a leading position as a supplier of jet fans for smoke management and ventilation.

**Arun Thakur**  
Design Manager  
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Smoke management is essential to safety in commercial parking garages, also called car parks. Architects, building managers and owners need to be confident that the system to clear smoke will perform as required and meet local regulations even before the system is installed. If these stakeholders need to alter the design, they require accurate information to assist in making the right decisions.

Challenges
Civil Defence in the United Arab Emirates approves buildings for fire safety and permits the use of CFD to design jet fan ventilation in basement car parks. A smoke management system is required to remove smoke as quickly as possible and within safety limits. These limits include specific requirements, such as fire-rated fans and visibility of more than 12 meters after 20 minutes of air exchange. As a supplier of jet fans, MAICO Gulf must prove that its equipment meets Civil Defence requirements, ensuring that the building management company can obtain approval.

Technology Used
ANSYS® Fluent®

Engineering Solution
- Create a 3-D model of the parking garage in ANSYS DesignModeler™ that enables the engineering team to study how effective various configurations of equipment are in attaining mandated visibility after a fire starts.
- Use ANSYS Fluent to determine visibility in the car park at specific intervals after the fire starts, and to ascertain heat generated by a fire load. (A heat load of 2.5 MW for each of two fire locations was implemented.) This information can then be used to determine evacuation safety.

Benefits
- The results of simulation helped the building manager determine viable exit routes for emergency conditions, evaluate areas where the smoke would not clear according to requirements, ascertain heat effects, and take corrective action before ventilation installation.
- The proposed system met safety standards and was approved without having to build a scale model.

Company Description
MAICO Gulf is a large multinational supplier of innovative technology and high-quality products for the HVAC industry. In the United Arab Emirates, MAICO performs distribution and technical support for a wide range of ventilation products with the DYNAIR brand name. Services include roof, car park and smoke ventilation fans as well as air handling units, ecology units, etc.