CARPARK VENTILATION

NFJAF - F300 Axial Jet Fan

Figure 2 illustrates 4,500-cfm (2 m3/s) flow through a jet fan. The red jet is the air leaving the jet fan. The black arrows illustrate what is called the "multiplier effect," whereby the jet entrains air in its wake, resulting in up to 20,000 cfm (9 m3/s) of flow moving downstream of the jet fan. It is this multiplier effect that makes jet fans so effective at moving air around a parking garage. Only about one-quarter of the air that needs to be moved actually needs to pass through the jet fan itself. The remainder is motivated to move by the jet-fan jet.
Figure 2 is from a computational-fluid-dynamics (CFD) simulation. CFD is the process of modeling a physical phenomenon involving fluid flow mathematically and solving it numerically. In practice, CFD may be thought of as building and testing jet fans in a virtual parking garage, as opposed to a real one.

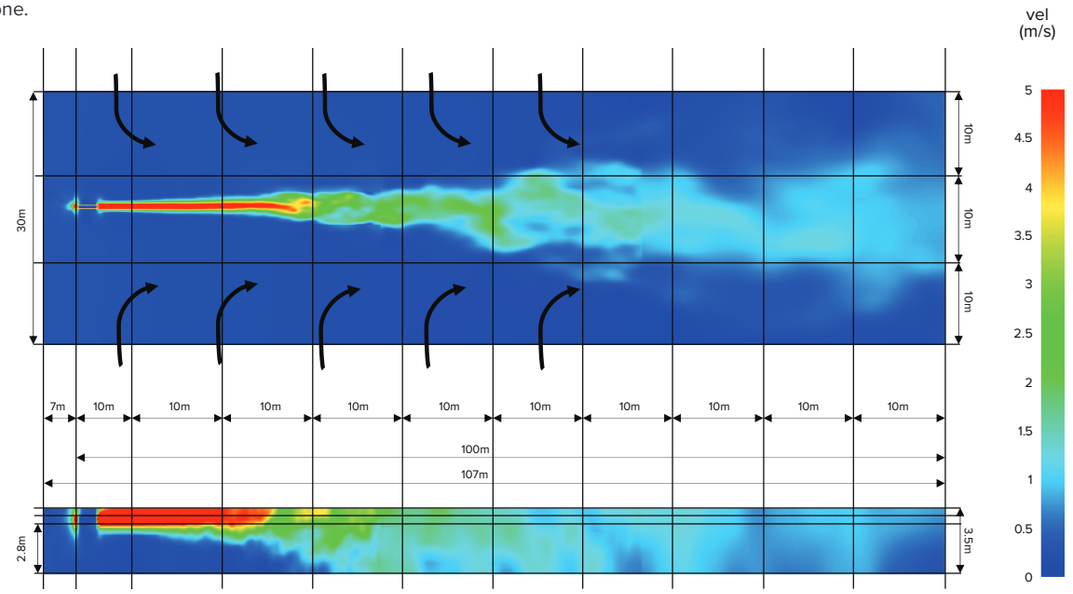


Figure 2: Airflow through a jet fan

Figure 3: CFD simulation of the flow induced by 43 separate jet fans in a parking garage. The jet out of each fan is colored red, with slower-moving air colored blue. This was the final simulation in a series of simulations intended to refine the design until it met code requirements for both normal and emergency operating modes.

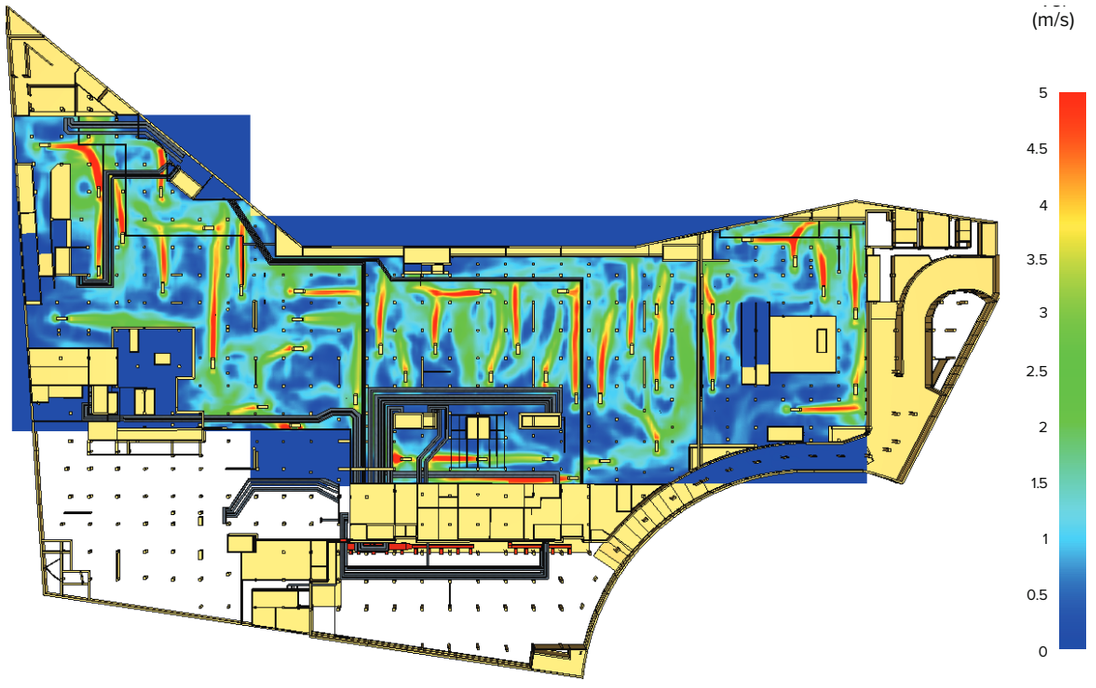


Figure 3

Figures 3 are from a CFD simulation used to assess the ability of strategically placed jet fans to move air from supply-air points through a parking garage to extractor fans, with the airflow splitting as it travels around the central space.
Measuring air velocity in a parking garage is impractical as airflow is driven by the heat released by fire. Thus, a parking garage literally would have to be set ablaze for air to move as it would in the event of a fire. Strengthening the case for CFD simulation is that, as parking garages get larger, with multi-layer interaction between levels, air movement becomes progressively harder to predict using any other method.

The use of computational methods for the design of unducted parking-garage ventilation systems that minimize both first and operating costs, dynamically manage the removal of pollutants, and, critically, are optimized for a range of fire scenarios.

Computational Fluid Dynamics

CFD Analysis

Computational Fluid Dynamics

Computational Fluid Dynamics (CFD) analysis is a valuable tool to efficiently design and plan a ventilation system for your car park. It precisely predicts airflows by dividing the car park space into thousands of different cells (mesh) using specific mathematical models generated with real field experience.

With a CFD analysis, you can visually ascertain airflows and smoke trails to predict their dispersal to various areas and fire ignition points, and investigate the influence jet fans may have if differently positioned.

In this way, the designer can optimize the layout and number of jet fans required, and avoid unproductive and expensive oversizing. Once the system is installed, it is a good practice to carry out a test to check the efficiency of the system to limit smoke in the fire ignition area and transfer it from the car park without obstructing emergency exits.

NAFFCO provides both the CFD modelling to demonstrate the ventilation system is adequate and effective, and a full technical report to obtain council or local authority approval prior to installation.

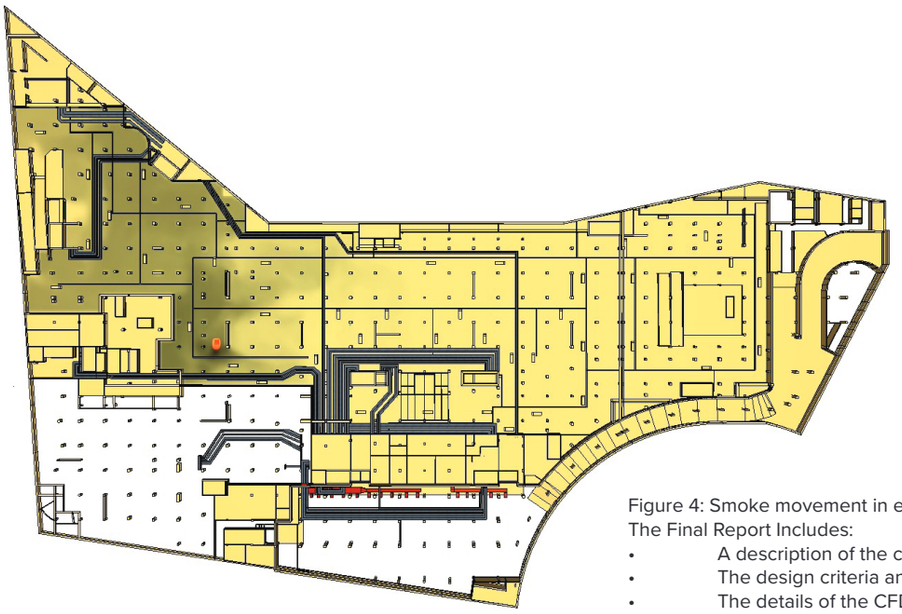


Figure 4: Smoke movement in enclosed car parking

The Final Report Includes:

- A description of the car park and the ventilation system;
- The design criteria and targets of the analysis;
- The details of the CFD model setting; and
- The final results of the analysis.

NFJAX - F300 Axial Jet & Tunnel Fan

The jet fan, a technology long accepted globally as a cost-effective alternative to traditional ducted parking-garage ventilation, is gaining traction.
With a jet-fan system, strategically placed arrays of jet fans direct supply air from air-supply points toward extraction points, ventilating all parts of the parking garage in the process. Supply air can be delivered in a number of ways: via vehicle entrance or exit ramps, fresh-air openings (grilles), or supply-air fans.
A key advantage of jet fans is that they can be positioned between building structural elements. By not requiring ductwork, they lower height requirements and allow for easier maintenance.

Jet fans are small and can be attached directly to or suspended from a ceiling. A jet fan moves air at both ceiling level and at lower levels by means of entrainment.

MOTOR INSULATION CLASS	H CLASS
MOTOR PROTECTION CLASS	IP 54-IP 55
MOTOR EFFICIENCY CLASS	IE1-IE2-IE3
MOTOR ENCLOSURE TYPE	TEAO
BODY MATERIAL	GALVANIZED SHEET METAL
BODY COATING	Powder Coating
IMPELLER MATERIAL	ALUMINIUM
DUTY CYCLE	IEC Duty Cycle-S1
WORKING TEMPERATURE	-20 - +50 °C
STANDARDS	UL & ESL

MODEL	FLOW RATE (m^3/h)	AIR SPEED (m/s)	THRUST FORCE (N)	REVOLUTION (rpm)	MOTOR POWER (kW)	NOISE LEVEL (dB(A)-1m)
NFJAX 355	0.93 - 1.86	9.4 - 18.8	10 - 40	1450 - 2900	0.37 - 1.50	68
NFJAX 400	1.34 - 2.68	10.7 - 21.4	17 - 68	1450 - 2900	0.50 - 2.20	69
NFJAX 450	1.87 - 3.44	11.8 - 23.6	26 - 104	1450 - 2900	0.80 - 3.10	70
NFJAX 500	2.48 - 4.97	12.7 - 25.4	38 - 152	1450 - 2900	1.10 - 4.40	71
NFJAX 560	2.97 - 5.59	37.6 - 18.8	78 - 312	1450 - 2900	1.5 - 6	73
NFJAX 630	5.96 - 11.93	19.14 - 38.28	130 - 520	1450 - 2900	2.0 - 8	74
NFJAX 710	7.23 - 14.46	18.2 - 36.51	150 - 602	1450 - 2900	3.0 - 12	75
NFJAX 800	8.49 - 16.98	16.89 - 33.78	163 - 654	1450 - 2900	4.0 - 16	77
NFJAX 900	8.54 - 17.09	13.43 - 26.87	135 - 540	1450 - 2900	5.5 - 20	67
NFJAX 1000	11.67 - 23.34	14.85 - 29.71	203 - 815	1450 - 2900	6.3 - 25	61
NFJAX 1120	14.11 - 28.22	15.80 - 31.61	289 - 1158	1450 - 2900	8.5 - 33	71
NFJAX 1250	23.14 - 46.29	18.86 - 37.72	513 - 2052	1450 - 2900	9.0 - 37	78
NFJAX 1400	29.48 - 58.97	19.15 - 38.31	663 - 2655	1450 - 2900	12 - 46	80
NFJAX 1600	35.10 - 70.21	17.46 - 34.92	720 - 2882	1450 - 2900	15 - 55	81

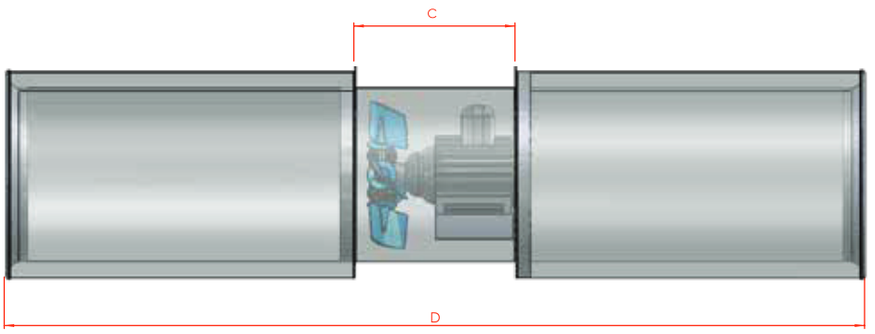
ACCESSORIES

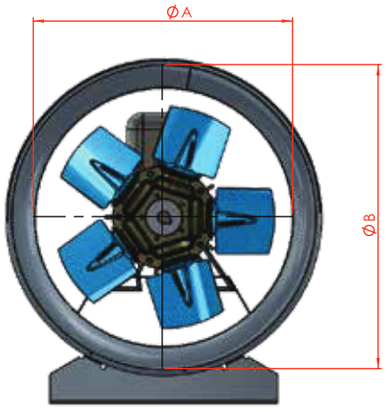
Difflector

Mounting Frame

Grill

DRAWING





MODEL	A (mm)	B (mm)	C (mm)	D (mm)
NFJAX - 355	355	425	380	2000
NFJAX - 400	400	480	380	2000
NFJAX - 450	450	550	380	2000
NFJAX - 500	500	580	450	1600
NFJAX - 560	560	640	500	1600
NFJAX - 630	630	710	500	2700
NFJAX - 710	710	900	590	2700
NFJAX - 800	800	1000	690	2700
NFJAX - 900	900	1100	680	2700
NFJAX - 1000	1000	1200	810	2700
NFJAX - 1120	1120	1320	810	3050
NFJAX - 1250	1250	1450	1150	3450
NFJAX - 1400	1400	1600	1150	3450
NFJAX - 1600	1600	1800	1150	3450