

Engineering Solutions to Combat Dust Dispersion at Construction sites

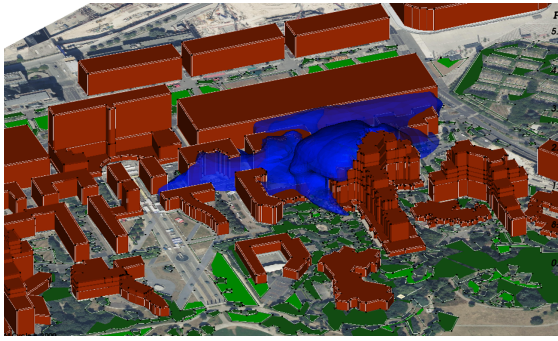
India's rapid infrastructure growth is driving major construction projects, including buildings, roads, bridges, and tunnels. These sites generate significant volumes of loose earth, which, during dry and windy conditions, become a health hazard and contribute to around 23% of urban dust pollution. This, combined with pollution from traffic and industries, forces authorities to halt construction, leading to financial losses for construction firms. It is essential to find practical, easily implementable solutions.

Dust generated during construction and dumpyard operations originates from activities such as excavation, demolition, material handling, vehicular movement, and waste dumping. Unpaved roads within construction sites and dumpyards are major sources of dust. Fine particulate matter (PM10 and PM2.5) along with other pollutants - CO, Nox, VOC including methane from organic waste in dumpyards, are particularly harmful. These pollutants can penetrate deep into the respiratory system, causing severe health issues. In cities like Delhi, construction and waste dumping activities contribute up to 30% of the total particulate pollution during peak seasons.

CFD based numerical Solutions for mitigating dust fly-off:

3D Computational Fluid Dynamics (CFD) environmental models can allow us to simulate and visualize accurately the air flow pattern and dust fly-off from construction sites based on site-specific factors such as wind speed, topography, and operational layout at microscale. A dedicated simulation software **PANMINE** of well proven **Fluidyn-Panache** family, is widely used for evaluating meter scale local air flow with dust erosion & deposition. It is in use, since last 25 years, in various countries- Europe, Japan, S. Africa, China, Canada, etc.. In India, Panache simulation software are in use by many major organisations, ex: NPCIL, CIMFR, ISM, ISRO, DRDO etc. besides leading consultants.

CFD models, direct and inverse both, integrated with real-time data from weather forecast and sensors network, can identify critical pollution sources whose emission must be controlled before-time to improve air quality at sensitive impact sites-hospitals, schools, stadiums etc. In urban areas, **Fluidyn-PANAIR** is used to simulate pollution dispersion. Jointly with **Fluidyn-REALTI**, it can locate emission sources in real time in an area of say 5x5km2. A micro-scale level, fine embedded mesh systems, having meter size precision, is used to evaluate impact of any strategy adapted. It can incorporate effect of all kinds of topographical features (buildings, forests, water bodies etc..) with their obstruction as well as heat contribution and thermal buoyancy (solar albedo, urban heat).



Dispersion of dust particles from Air Exhaust of Under-ground Metro



3D Modelling of Dust Dispersion from a quarry

Webinar on Combating Dust Dispersion at Construction sites & Dumpyards

3rd week of February 2025.

Fluidyn is hosting a focused webinar on **Dust Dispersion and pollutants modelling at Construction Sites and Dumpyards**, featuring authorities and experts to discuss potential solutions. The session will cover:

- Challenges in dust dispersion and the importance of accurate modeling
- Mitigation efficiency assessment through airflow and particulate simulations.
- Advancements in simulation for dust control – AI/ML, real-time monitoring, and high-performance computing
- Promoting sustainability through advanced simulation techniques.

To facilitate meaningful dialogue, we plan to limit the number of participants to ensure an adequate exchange of ideas. More details will follow. Register today for this exclusive session!

Register Now



UPCOMING EVENTS:

3-Day Workshop on Advanced Computational Fluid Dynamics

23 - 25 January 2025

Alliance University, Bangalore.

The **3-Day workshop** will cover CFD, FSI, and CHT using Fluidyn-MP, HVAC, internal comfort analysis, Fire and Explosion Modelling using Fluidyn VENTIL, and EIA, Dispersion modelling, accidental release modelling using Fluidyn PANACHE. 100+ students from institutions across India from AE, CE and ME branches have registered for this event. Please [click here to Register](#).

Hyvolution 2025

28 - 30 January 2025

Porte de Versailles, Paris.

Hyvolution - an International summit of political and economic leaders to address the challenges of Hydrogen.

India Energy Week

14 - 15 February 2025

IICC, Yashobhoomi, Dwarka, New Delhi.

Fluidyn is attending **India Energy week** where industry leaders and innovators drive solutions for a sustainable energy future.

ChemProTech India

29-30 April, 2025

Bombay Exhibition Center, Mumbai

Fluidyn to participate in **ChemProTech 2025**, with a confirmed 30-minute speaker slot on the topic - **Styrene Runaway Polymerization in Storage Tanks: Heating, Leak, and Dispersion Analysis using 3D CFD Methodology**

PAST EVENTS:

Fluidyn at TechConnect-2024, IIT Bombay

19 December 2024

IIT Bombay

Fluidyn participated in the faculty-industry interaction session organized by the Department of Mechanical and Aerospace Engineering, IIT Bombay, on 19th December 2024. The event, part of TechConnect-2024, aimed to foster collaborations between academia and industry to translate research into impactful products. Fluidyn is proud to contribute to advancing translational research initiatives.



Fluidyn at ICAQM Conference, IIT Madras

18-20 December 2024

IIT Madras

Fluidyn proudly participated in the prestigious ICAQM (International Conference on Air Quality Management) conference hosted by IIT Madras. Our invited talk on the topic - **Optimizing Sensor Locations, Source Detection, and Real-Time Air Quality Forecasting Using Advanced Simulation Tools** highlighted Fluidyn's cutting-edge CFD solutions for sensor optimization, emission source detection, and real-time air quality forecasting. We are honored to contribute to global discussions on sustainable solutions for air quality challenges.



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