


Case study

 The Prince Royal's College, Thailand

CLASSROOM VENTILATION

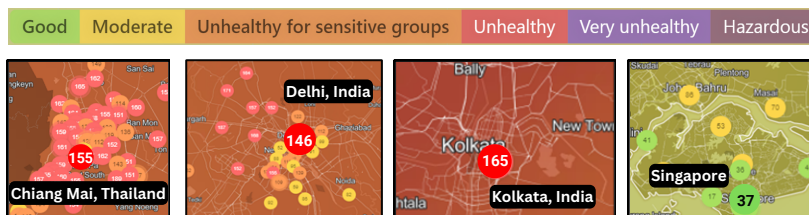
Background

Chiang Mai, Thailand, is grappling with a serious air pollution problem. Soaring Air Quality Index (AQI) levels, fueled by PM 2.5 particulates, paint a concerning picture not just for outdoor environments, but also highlight the critical need for effective Indoor Air Quality management.



What is AQI?

The Air Quality Index (AQI) is a numerical scale ranging from 0 (Good) to 500 (Hazardous) used to communicate how polluted the air is.



Resource: IQAir. (2024). Retrieved from <https://www.iqair.com/th-en/world-air-quality>

Live city ranking

Cities with high air pollution (AQI)

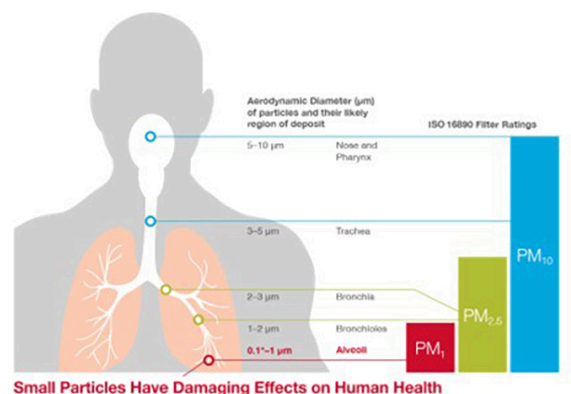
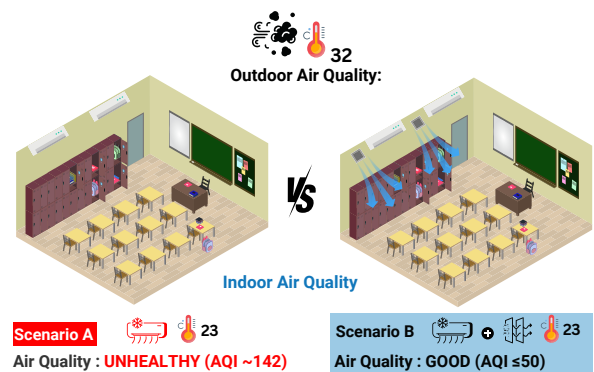
#	MAJOR CITY	US AQI
1	Cairo City, Egypt	169
2	Kolkata, India	165
3	Hanoi, Vietnam	157
4	Jakarta, Indonesia	157
5	Tehran, Iran	155
6	Chiang Mai, Thailand	155
7	Wuhan, China	152
8	Kathmandu, Nepal	151
9	Delhi, India	146
10	Dhaka, Bangladesh	133

Why is it important?


Comfortable Room \neq Clean Air Room

- Reduces the concentration of airborne contaminants that cause respiratory illnesses.
- Ensures a safer environment by preventing the spread of infectious diseases, such as COVID-19.
- Creates a more comfortable learning environment.
- Significantly enhances students' cognitive performance.
- Controls unpleasant odors from various sources.
- Meets the proper ventilation standards and building codes.

Recognizing the direct impact of poor IAQ on respiratory health and overall well-being, The Prince Royal's College in Chiang Mai has prioritized mitigating indoor air quality risks within its 175 classrooms, catering to a large student and staff population. Kruger Ventilation, a leader in providing effective ventilation solutions, has been entrusted with addressing these IAQ challenges. Collaborating with Chiangmai Air Tech Engineering Co., Ltd., Kruger Ventilation will implement customized strategies to significantly enhance indoor air quality. This ensures a healthier learning environment for all occupants within The Prince Royal's College premises, safeguarding their respiratory health.



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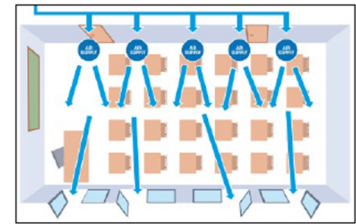


Existing Conditions

The existing ventilation systems are inadequate, failing to provide the necessary air exchange and filtration to combat the rising levels of air pollution. Conventional air conditioning units, while offering temperature control, are simply not equipped to effectively remove PM2.5 and other harmful particulate matter, leaving the indoor air quality far below a desirable AQI level. This poses a significant health risk to occupants and necessitates the implementation of more robust air filtration solutions.

Proposed Solution

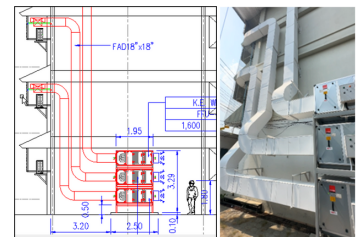
In order to ensure a safe and conducive learning environment within indoor spaces, our proposed solution entails the implementation of a **natural + mechanical ventilation with IAQ sensor and control systems approach**. This methodology combines effective ventilation systems to guarantee the circulation of clean, breathable air, thereby enhancing convenience and comfort for students and teachers.



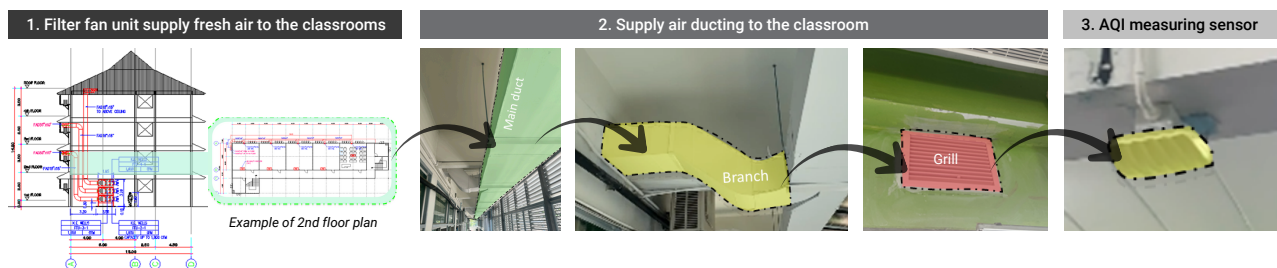
Implementation

Kruger implemented a comprehensive ventilation strategy across a school building, targeting 175 classrooms. The solution involved the installation of 35 Fan Filter Units (CFF Series) on the first floor, strategically positioned to ensure optimal airflow throughout all floors of the building.

The CFF Series is equipped with an aerodynamically designed plenum fan impeller, driven by an EC motor. This combination ensures efficient air circulation while minimizing energy consumption, thereby enhancing both the performance and sustainability of the ventilation system.

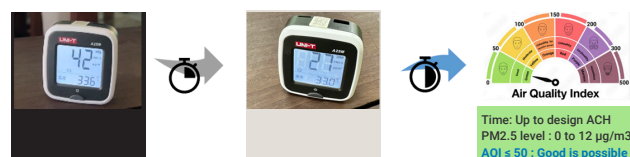


Fresh air is supplied to the classrooms through a ducting system and diffuser grills, with AQI sensors integrated to monitor and maintain the desired air quality index (AQI) level. Our design approach focused on optimizing ventilation efficiency through implementation process:



Results

Following the implementation of the proposed ventilation solution from Kruger, significant improvements in indoor air quality were observed across all classrooms at The Prince Royal's College. The integration of HEPA filters within the Fan Filter Unit Series effectively reduced the concentration of pollutants, including PM2.5, by 99.995%.



As the testing results show, over a 30-minute duration, there was a gradual decrease in PM2.5 levels, achieving the target range of 0 to 12 µg/m³ and AQI scores ≤ 50, validating the effectiveness of the ventilation system in improving indoor air quality.

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Conclusion

The successful implementation of the natural and mechanical ventilation improvement project at The Prince Royal's College, provided by Kruger Ventilation, has demonstrated significant findings and benefits. Key findings include:

- 1. Significant Air Quality Improvement:** The installation of HEPA filters in the Fan Filter Unit Series has drastically reduced the levels of harmful pollutants, particularly PM2.5 particles. This has led to a much healthier indoor environment, significantly improving air quality for students and staff.
- 2. Advanced Air Quality Management:** By integrating IAQ sensors and control systems, the school can now monitor air quality in real-time. This capability allows for immediate adjustments to maintain optimal air conditions, ensuring compliance with health and safety standards and creating a consistently healthy indoor environment.
- 3. Increased Comfort and Productivity:** The enhanced ventilation system not only filters out contaminants but also ensures a steady supply of fresh air. This creates a more comfortable and pleasant indoor climate, which can improve students' cognitive performance, reduce absenteeism due to illness, and overall contribute to better academic and work performance.

The implementation of these solutions underscores the importance of maintaining high indoor air quality in educational institutions, highlighting Kruger Ventilation's commitment to promoting healthier, safer, and more productive learning environments.

References

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