



## CITY M AIR PURIFIER

### OPTIMUM OPERATING CONDITIONS IN A CLASSROOM

#### Purpose:

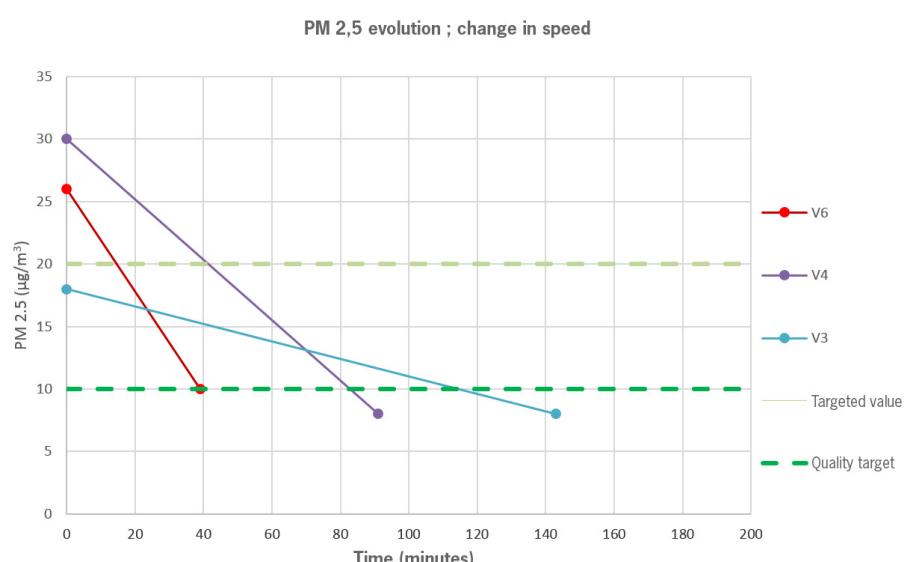
Camfil has partnered up with a French engineering school, the EPF in Sceaux to test and verify the optimum operating conditions of the air purifier City M in a classroom. This partnership was the subject of a study undertaken by students in 3<sup>rd</sup> year.

#### Site :

EPF, 3 classrooms: 120 m<sup>3</sup> (40 m<sup>2</sup>), 210 m<sup>3</sup> (70 m<sup>2</sup>) and 280 m<sup>3</sup> (120 m<sup>2</sup>)

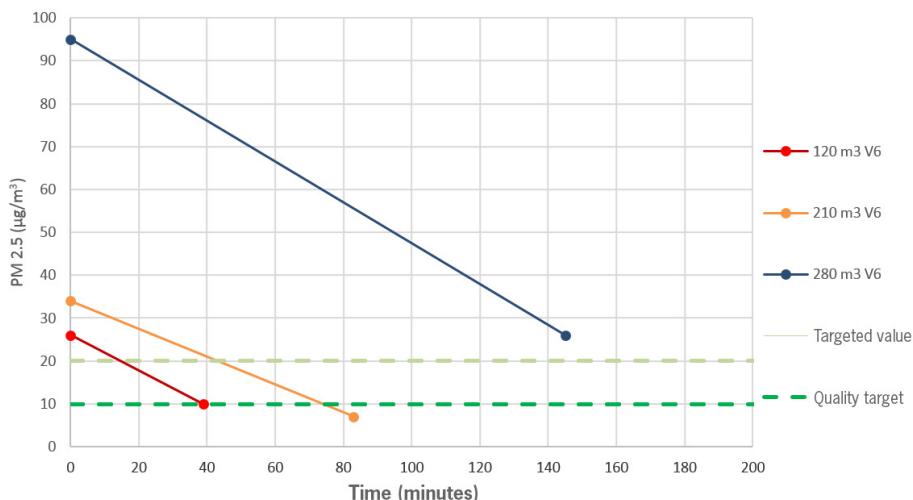
#### Study:

The study was based on the speed of the room's purification and the final concentration of particles PM 2.5 µg/m<sup>3</sup>. The impact of the size of the room on the speed and the quality of the purification was also studied.



City M considerably reduced the concentration of particles PM 2.5 which goes from 26 µg/m<sup>3</sup> or 30 µg/m<sup>3</sup> (highly-polluted air) to levels much lower than the target levels recommended by the WHO in 2015. It even enabled the target of "quality air" to be reached. So the speed V6 (433 m<sup>3</sup>/h) improved the air quality in less than 40 min from 26 µg/m<sup>3</sup> (very polluted air) to 10 µg/m<sup>3</sup> (quality air, threshold to be reached in 2025). An excellent IAQ (8 µg/m<sup>3</sup>) was obtained in 1½ hours from a very mediocre IAQ (30 µg/m<sup>3</sup>) at speed 4 (127 m<sup>3</sup>/h).

PM 2,5 evolution ; change in volume, in the classroom



In a very polluted classroom (concentration of PM 2.5 of 25  $\mu\text{g}/\text{m}^3$  and 35  $\mu\text{g}/\text{m}^3$ ), the City M purified rooms with areas of 40 m<sup>2</sup> (120 m<sup>3</sup>) in 40 min and 70 m<sup>2</sup> (210 m<sup>3</sup>) in 85 min. It achieves the target value recommended by the WHO and even the "quality target". In the particular case of a large classroom, these thresholds were not completely met but this concerned days with pollution peak. Nonetheless, the City M enabled the IAQ to improve by 74%.

**The study undertaken by these students definitively concluded that the City M met the expectations of public health.**

#### Benefits of a better IAQ:

A study<sup>(1)</sup> has shown that a better IAQ improves the performance of pupils by 13% in reading tests. Furthermore, another study has concluded that a better IAQ improves productivity in offices by 10% due to a higher rate of air circulation and correct maintenance of ventilation systems<sup>(2)</sup>.

#### Benefits confirmed by the students of the EPF



<sup>(1)</sup> Shaughnessy, R.J., et al., A Preliminary Study on the Association Between Ventilation Rates in Classrooms and Student Performance – Indoor Air, 2006. 16(5): p. 465-468.

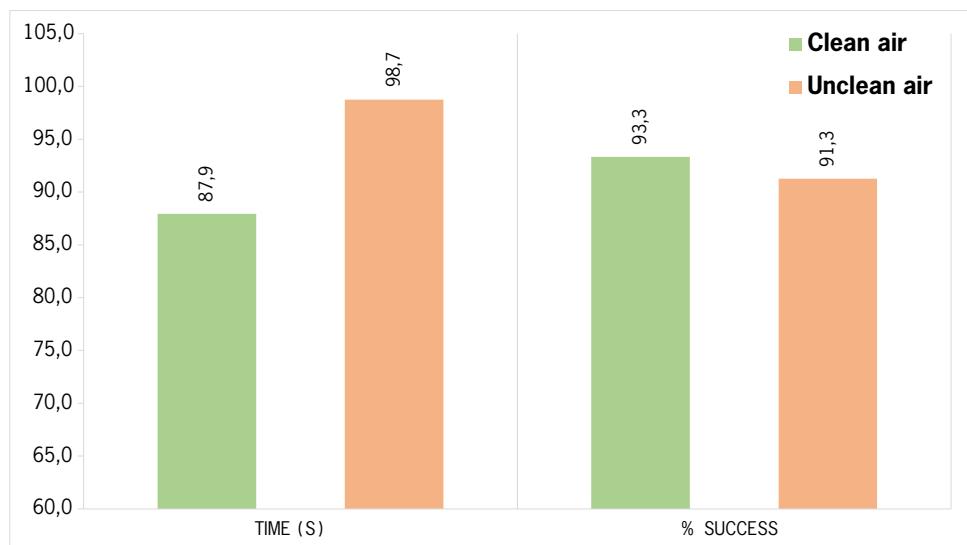
<sup>(2)</sup> Wargocki, Improving Indoor Air Quality Improves the Performance of Office Work and Schoolwork , INIVE International Network for Information on Ventilation and Energy [www.inive.org](http://www.inive.org)

## Testimonies of Vladimir Dugourd and Quentin Bérard, students at the EPF

Vladimir Dugourd: "After demonstrating that the purifier enabled the recommended IAQ levels to be reached, we were curious to see the actual impact on this IAQ on students. A class of engineers take some tests: typing and arithmetic in unpurified air and air purified by City M. These tests demonstrated that those students type and calculate faster (about 5 to 10% faster on average), with slightly fewer faults."

	Average number of particles (0.3 to 0.5 µg)
Unpurified air	28,4 millions
Purified air (City M)	0,6 millions

Comparison of Arithmetic Test in Purified and Unpurified Air



Comparison of Typing Tests in Purified and Unpurified Air



Quentin Berard: "Furthermore, students told us they felt less tired after the lessons. These tests have really made us aware of the importance of air quality, and we hope schools to get aware of that to. For the large majority of our tests, the IAQ levels in the classrooms were above the WHO guidelines. We need to work in an optimum environment which does not reduce our effectiveness."