



Public health and air quality

A HISTORY OF PROTECTION

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THE CHALLENGE

Although invisible to the naked eye, fine particles are a significant source of air pollution.

Loaded with carbon and metals, **they are emitted by the braking system of vehicles**, whether individual or collective, light or heavy. Railway trains also produce particles, causing pollution of concern in the confined environment of urban underground stations.

These fine dusts remain suspended in the air and are inhaled. They then reach the lungs and bloodstream, increasing the risk of respiratory, cardiovascular and neurodegenerative diseases. **Each year, they are responsible for more than 300,000 premature deaths* in the European Union.**

Reducing this source of pollution is therefore a major public health issue.

* Death before the person's life expectancy is reached.

TAMIC®

is the name of the product designed by Tallano Technologies to filter out more than 90% of the fine particles emitted by the braking system of vehicles.

40%

is the share of particulate matter, Europe's most serious pollutant for human health, that is emitted by transport.

THE RESULTS AND REFERENCES OBTAINED

Today, thanks to our TAMIC® product, we have achieved a reduction of more than 90% in fine and ultrafine particle emissions.

We already have several cooperation projects underway with world-class car manufacturers. We also work with railway companies in Europe, with the French railway company (SNCF) on line C of the regional express railway in Paris, as well as in Asia.

THE SOLUTION

We have decided to act to limit the impact of fine particles on health.

In 2012, we invested in research and development to develop the TAMIC® product, whose technological performance has continued to improve since then, following the research programmes, tests and experiments in real conditions that we have carried out.

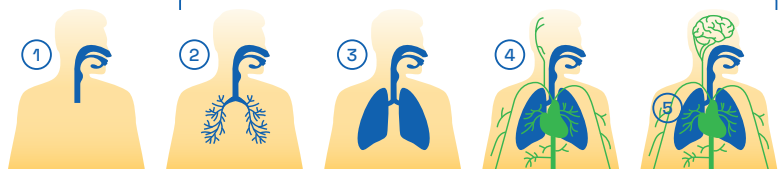
TAMIC® directly sucks the fine particles emitted in the brake linings. By capturing them at the source, it prevents them from becoming airborne.

It is the only product available on the market capable of retaining more than 90% of fine particle emissions.

Our technology, which can be easily fitted to original equipment vehicles as well as retrofitted to trucks and rail vehicles, makes a significant contribution to reducing pollution.

It enhances the environmental performance of the vehicle and helps accelerate the transformation of the automotive and rail industries.

Brake emissions



1 LARGE PARTICLES
upper respiratory tract
Size = $<10 \mu\text{m}$ $\text{PM}_{10} = 0.01 \text{ mm}$
pollen and dust

2 FINE PARTICLES
lower respiratory tract
Size = $<2,5 \mu\text{m}$ $\text{PM}_{2.5} = 0.0025 \text{ mm}$
bacteria / fungi and moulds / pollen and dust

3 INHALABLE PARTICLES
Alveoli
Size = $<1 \mu\text{m}$ $\text{PM}_1 = 0.001 \text{ mm}$
virus / exhaust gas

4 ULTRAFINE PARTICLES
Blood/whole body
Size = $<0,1 \mu\text{m}$ $\text{PM}_{0,1} = 0.0001 \text{ mm}$
Nano particles

5 ULTRAFINE PARTICLES
Blood/whole body/brain
Size = $<0,01 \mu\text{m}$ $\text{PM}_{0,01} = 0.00001 \text{ mm}$
Nano particles



Tallano Technologies

A HISTORY OF MOBILISATION

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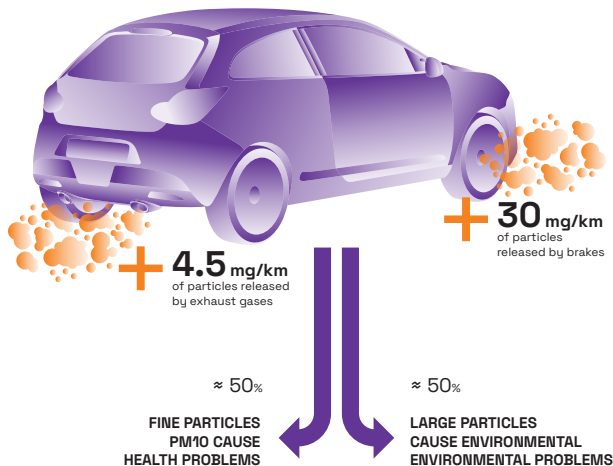
THE CHALLENGE

Since our inception, we have focused on the problem of air pollution caused by fine particles from the braking systems of cars and railcars.

These dusts, which are six times more polluting than those from catalytic converters (30 mg/km compared to 4.5 mg/km), represent a real public health issue.

We therefore set out to design **a system capable of capturing fine particle emissions at the source to prevent them from being released into the air.**

The challenge we are addressing is both health and environmental. The aim is to improve outdoor air quality and clean the air in underground railway stations with an effective and innovative product **in order to protect the health of users and the planet.**



THE SOLUTION

More than 10 years after the creation of Tallano Technologies, **we are today the pioneer of clean braking and a global player in the fight against air pollution.**

Our ongoing investment in research and development has enabled us to develop the TAMIC® product. **This patented technology captures at the source, by means of a suction principle, the fine particles emitted during braking, which are then retained at more than 90% in a filter.**

With this unique technological know-how, we aim to revolutionise the way the automotive and rail industries deal with fine particle emissions.

Convinced that our solution is right and appropriate, we work with transport operators, manufacturers and equipment suppliers.

“We are reducing fine particle emissions at source from the road and rail sectors by more than 90% with a unique capture product”

THE RESULTS AND REFERENCES OBTAINED

Thanks to the support of prestigious investors convinced by our project, **we were able to test our TAMIC® product for several years in the laboratory and in real conditions.**

Our innovation is protected by numerous patents which we systematically file in a large number of countries around the world.

The next European standard on vehicle emissions will soon tighten the current thresholds and regulate the issue of fine particles during braking.

Our work and innovative spirit have been rewarded with numerous awards including first prize in the Seoul Global Challenge 2021 and, most recently, we were the Laureate of the French Tech Green 20*.

* The French Tech Green 20 programme aims to bring out the new technological champions of the energy transition.



TAMIC®

A HISTORY OF INNOVATION

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THE CHALLENGE

The air we breathe in city centres and urban areas is polluted by fine particle emissions, 40% of which come from road traffic and 20% from brake abrasion

We have developed a clean braking technology that offers a solution to three major problems.

It can:

- capture at source the fine particles produced during the braking of a vehicle or a railway train,
- avoid their dispersion in the atmosphere,
- and prevent their inhalation, which is particularly dangerous for health.

We are targeting this solution to the automotive and rail industries, two particularly demanding markets.

THE SOLUTION

We have spent several years of research and development to develop TAMIC®, a **universal product designed for all vehicles using friction brakes.**

Built around an electronic card, a filter and a turbine as well as a triple control, suction and filtration system, **this breakthrough innovation captures the fine particles produced during braking at the source**, thus preventing them from being dispersed in the air and thus inhaled. It is the effective solution needed by the automotive and rail industries.

With TAMIC®, we were the 2022 Laureate of the French Tech Green20* cohort, **and we intend to lead the entire transport sector in the ecological transition, in the face of increasingly strict regulatory constraints.**

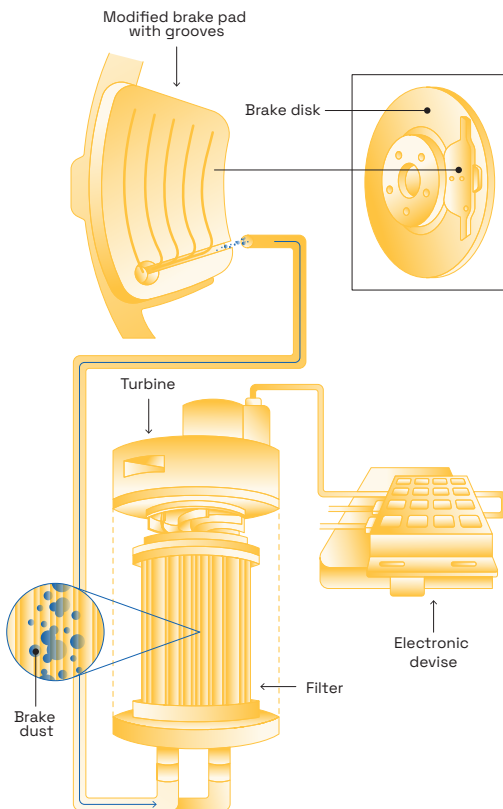
* The French Tech Green20 programme has rewarded 20 start-ups proposing a breakthrough innovation in the field of ecological transition. It aims to bring out the new technological champions of tomorrow who will contribute to a greener and healthier world.

THE RESULTS AND REFERENCES OBTAINED

As a pioneer in clean braking, we are helping to transform the automotive and rail industries.

Our TAMIC® product is indeed a pioneer and remains unrivalled on the market.

At Tallano Technologies, we are the only ones to date to have designed a source capture system, whose technology we have patented, capable of capturing more than 90% of the fine particles. **Our system is universal and easy to implement.** Our product can be installed as original equipment in the automotive industry and offers a retrofit solution for heavy-goods and rail vehicles.



x6

The emission of fine particles from vehicle braking is six times higher than the exhaust from catalytic converters (30 mg/km versus 4.5 mg/km).



Automotive industry

FINDING A SOLUTION

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THE CHALLENGE

We created Tallano Technologies with the objective of contributing to the solution of five major challenges.

A health challenge:

how to significantly improve air quality and reduce the number of premature deaths due to air pollution?

A technological challenge: how to reduce the emission of fine particles from brake abrasion, which pose serious health and environmental problems, particularly in city centres?

A sustainable mobility challenge:

how to make the air in cities more breathable?

A regulatory challenge:

how to provide car manufacturers with solutions to meet the anti-pollution standards that will become even stricter with the entry into force of the post Euro 6/VI standard in the European Union and its equivalent in Asia and North America?

Finally, an environmental challenge:

how can we prevent large particles made of microplastic, which come from braking and are smaller than 10 µm, from polluting runoff water?

THE SOLUTION

To meet these five challenges simultaneously, we have designed TAMIC®, a breakthrough innovation consisting of adapted brake linings and an electronic control, suction and filtration system that retains fine particles at the source, thus preventing them from being dispersed into the air.

Our product is distinguished by its universal character and ease of use.

It can be fitted to all vehicles, both internal combustion and electric, and requires no maintenance, except for filter replacement every two years or 30,000 km.

We have been working on this product for several years. **We tested it both in the laboratory and in real-life conditions, confronting it with all the conditions that a vehicle may encounter** (temperature, humidity, atmospheric pressure, etc.).

Since 2020, we have been forging partnerships with equipment and systems manufacturers with a view to industrialising and marketing TAMIC®.



Upcoming Euro standard

This European standard tightens the anti-pollution standards and now takes into account the fine particles emitted by brakes.

THE RESULTS AND REFERENCES OBTAINED

As actors in the ecological transition of industrialists, we are responding to a major need.

Our TAMIC® product allows more than 90% of the fine particles emitted to be sucked up at source, which is beneficial for all those involved in transport (equipment manufacturers, manufacturers, cities and citizens).

All car manufacturers and suppliers can use our innovation as our business model is based on licensing.

We have also been selected in the VERA (Vehicles Emission Retrofit Activities) Consortium in which different retrofit solutions will be developed to reduce brake particulate emissions from road and rail vehicles.

Finally, we are working with Veolia to set up a downstream process to treat this fine dust.



Railway industry

FINDING A SOLUTION

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THE CHALLENGE

Rail activity is accompanied by air pollution with fine particles, more than 70% of which come from the braking system*.

These fine dusts are harmful, especially in the confined environment of underground stations.

In most underground rail networks, fine particles are 10 times higher than the outdoor air quality standards**.

We created Tallano Technologies to help the rail industry reduce this source of pollution, which poses serious health and environmental problems, and beyond that, to help meet three major challenges.

A technological challenge:

how to significantly improve the air quality in stations?

A health challenge:

how to contribute to reducing the number of premature deaths due to air pollution?

A sustainable mobility challenge:

how to make stations cleaner and the air in them more breathable?

* Study on the Swiss Federal Railways (SBB CFF).

** Study carried out by the Anses in May 2022.



THE SOLUTION

In response, we have designed TAMIC®, a breakthrough innovation consisting of specific brake linings and an electronic control, suction and filtration system that captures fine particles at source, thus preventing their dispersion in the air, particularly in railway stations.

Our product is distinguished by its universal character

It is available for urban and suburban trains, metros and trams, both as a retrofit and as original equipment.

The World Health Organisation has adopted new air quality guidelines for 2021. The recommended 24-hour thresholds are now set at 15 µg/m³ for fine particles (PM 2.5, less than or equal to 2.5 µm in size) compared with 25 µg/m³ previously.

THE RESULTS AND REFERENCES OBTAINED

Co-developed with the SNCF teams, our TAMIC® product has been tested on test benches in all the conditions of life of a vehicle.

It is currently being tested on the C regional express railway line in commercial service. Similarly, **tests are currently being carried out with various metro operators to improve ambient air quality. We are starting industrialisation testing.**

We were awarded a prize at the Seoul Global Challenge 2021, an international competition to promote innovative technologies to address urban challenges.

We were awarded the First Prize in the technology category for our solution to capture at source the fine particles generated by the braking of vehicles on the road.



Heavy vehicles

FINDING A SOLUTION

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THE CHALLENGE

After focusing on the automotive and railway industries, we decided to integrate heavy vehicles into our research and development process.

Whether buses, coaches, light commercial vehicles (LCVs) or heavy goods vehicles (HGVs), when braking, heavy vehicles generate fine particles that are harmful to health and the environment, particularly in city centres.

The greater the weight of the vehicle, the greater the volume of fine particles emitted.

We created Tallano Technologies with the aim of contributing to meeting three major challenges.

A technological challenge:

how to significantly improve air quality and reduce the emission of fine particles?

A health challenge:

how to contribute to reducing the number of premature deaths due to air pollution?

A sustainable mobility challenge:

how to make the transport of people and goods greener in modern town and city centres?

THE SOLUTION

In response, we have designed TAMIC®, a breakthrough innovation consisting of specific brake linings and a control, suction and filtration system **that captures fine particles at the source, thus preventing them from being dispersed into the air.**

Our product is universal. It is available for trucks, buses, waste collection and transport trucks and delivery trucks dedicated to last mile logistics.

More than **90%**

is the percentage of fine particle reduction achieved by the use of TAMIC®.



THE RESULTS AND REFERENCES OBTAINED

In November 2021, at the Solutrans trade fair dedicated to the players in the industrial and urban vehicle sector, we presented, alongside Lecapitaine, a subsidiary of the Petit Forestier group, the specialist in the rental of refrigerated vehicles, our first adaptation of the TAMIC® LCV (Light Commercial Vehicle).

We are also developing collaborations with equipment manufacturers.

In July 2022, the city of Paris asked us to equip a refuse truck with our product on a test basis.