



OVERVIEW



MIX-IND[®]
TECHNOLOGY
&
SPIROJET



PRESENTATION

❖ OUR PROFILE

SINTRA (Innovated systems of treatment of the ambient air) is the leading producer in Europe of micro perforated metallic ducts for the "IMPULSE of ambient air " and input air DIFFUSION, for all types of applications.

❖ OUR MISSION

SINTRA was incorporated in 1995, after 15 years of research, in order to develop in the market MIX-IND® technology of "IMPULSE of ambient air", invented in 1981 by Mr. Marco Zambolin, current CEO of SINTRA.

Our mission is to develop innovative systems for the treatment of ambient air, based on MIX-IND® technology, whose main objective is the constant research for maximum energy efficiency.

Our commitment is to provide to the applicant high-performance, clear and simple technical solutions to minimize energy consumption, and at the same time offering a new concept of comfort and an innovative approach to the HVAC design, based on the experience transfer.

❖ OUR PARTICULAR JOURNEY

Through this long journey of research, we can say that the MIX-IND® technology is "ONE OF A KIND", because it has constantly evolved using research criteria and calculation methods very different from those traditionally used.

The experience acquired during 30 years of continuous research for the highest performance and testing innovative technical solutions, allowed to file many patents. Those patents does not relate only to products, but firstly to technical solutions that will be used during the conception phase of the plants.

It is thanks to this atypical journey if we can now offer the new patented MIX-IND® systems, which allow us to design NEW GENERATION plants, ensuring an unequalled level of energy efficiency and comfort.

❖ TRAINING AND TECHNICAL UPDATES

MIX-IND® technologies of Impulse of ambient air are applied with design criteria which are very different from traditional air diffusion.

By offering such particular technical solutions, we must first of all acquire the technical confidence of our customers. This is why we believe that it is essential to inform them about our technologies.

For that purpose, we regularly organize TRAINING and TECHNICAL UPDATE days, on three levels, fully dedicated to the HVAC industry experts, divided into three levels:

- Level 1: The MIX-IND® base technology, comparisons with the traditional input air DIFFUSION technology.
- Level 2: NEW GENERATION plants, and new QPE® regulation systems (Quality Performance Efficiency).
- Level 3: Specific applications, such as: great volume buildings, specific pollution environments, (oily fogs, welding fumes, foundries, etc.), process plants, environments with high endogenous heat, environments with high thermo hygrometric demands, airports, hangars, shopping malls, swimming pools, cinemas, show halls, etc.

To learn the basic principles of patented MIX-IND® technologies, a short SELF-TRAINING sequence is available on our website:

www.mix-ind.com

❖ OUR ACTIVITY

Our main activity is the support to the design of innovative plants, using MIX-IND® perforated ducts, textile or metallic, for the realization of NEW GENERATION plants.

To complete our product range, today we also offer SPIROJET perforated metal ducts, which are manufactured in exactly the same way as the MIX-IND® ducts, but are conceived according to traditional criteria of air diffusion.

Other products are added to the range of MIX-IND® patented systems, such as:

- Customized plenums for the regulation of the "Impulse Beams" with TWIN-VARIBOOST® technology
- Humidification and adiabatic cooling high efficiency systems, HYGRO-COOLING® type
- Custom VARIWIND air curtain systems for industrial doors, operating with ambient air or external cold air
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low power consumption MODULAIR ventilation systems for large-volume buildings, at low cost and low energy consumption

PATENTS Italy-Europe:

MI2009A000275 - 10154832.9 - MI2009A000604 - MI2009A001174 - 10743224.7 - MI2011A001380 - MI2011A001382 - MI2011A001384 - MI2010A001539 - MI2011U00319 - MI2011U000357

PATENT PENDING Italy-Europe:

10159863.9 - IT 0001394571 - PCT/IB2010/001658 - MI2010A001538 - 12179782.3 - 12188085 - MI2014A001535 - MI2014A001352 - MI2015A000181

Trademarks :

SINTRA - PULSORE - PULSEUR - MIX-IND - VARITRAP - DLP - SPIROPACK - VARIAMIX - HYGRO-COOLING - VARIBOOST - VARIPULSE - VARISTEP - VARITOTEM - VARIPLenum



SINTRA PROPOSES TWO TYPES OF PERFORATED METAL DUCTS:

THE PERFORATED DUCTS

SPIROJET

PRODUCT IN FREE COMPETITION
Comparable to the best products on the market

SPIROJET is a modern product, easy to use, made in modules of 1 metre with patented **GREEN** technology SPIROPACK™, ensuring exclusive use of high-quality metal and high level workmanship.

The modules are assembled with special patent collars and semi-rigid joints specially studied.

The competitive unit cost, the very high induction rate and the high quality of the components make the SPIROJET perforated ducts one of the best air diffusion products present on the

THE PATENTED SYSTEMS



**Technical solutions which
ARE NOT IN FREE COMPETITION**

THE MIX-IND® PATENTED SYSTEMS are constituted by perforated ducts made exactly like the SPIROJET ducts, but designed with patented technologies, capable of energy performances and comfort levels well above those attained by the traditional systems of air diffusion.

Despite its higher cost per linear metre, compared to traditional perforated ducts as SPIROJET or similar, the MIX-IND® technology allows to not only obtain the highest performances, but also to often reduce the total cost of the plant.

SINTRA proposes a new approach, simple and efficient, for the design of this new kind of plants using the free service of:

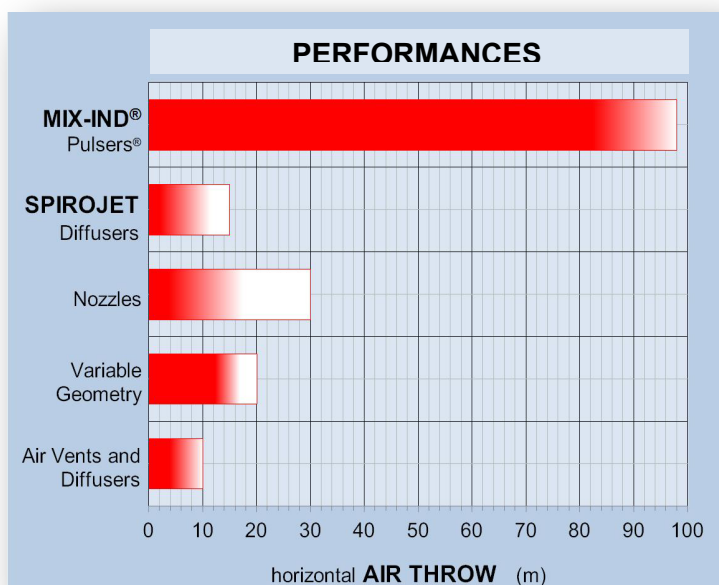
AIDED DESIGN

This service includes:

- ❖ Ambient diagnosis
- ❖ Technical orientation
- ❖ Risk analysis
- ❖ Performance index

IMPORTANT NOTE :

These kind of plants **are not in free competition** because they systematically involve adopting patented technical solutions which, if implemented or used by third parties, would constitute a serious violation of the industrial property rights, attributed to all



THE PERFORATED DUCT

SPIROJET

The SPIROJET perforated ducts are constituted of a set of modules of one meter of length, each comparable to a high induction diffuser.

The diffusion element is represented by the perforation, which can be applied to any module regardless of the diameter.

The air coming out from the holes recalls by induction a quantity of ambient air which is generally 30 times higher than the quantity of air coming out from the holes itself.

By increasing the air exit speed from the holes, it is possible to easily increase the induction, even over 50 vol/h, but this would reduce the performance of the diffuser duct.

The diameter and the quantity of holes that are applied to each SPIROJET module define both its ability to throw the air at a specified distance and its functioning features.

The conception of an installation using SPIROJET perforated ducts is carried out in a traditional way by homogeneously allocating the perforated ducts in the room, according to the air flow and air throw of each module, exactly as any other diffuser.

Under normal use, the ambient air induced by the holes causes a continuous ventilation of the outer surface of the duct, preventing the formation of condensation.

The calculation of SPIROJET perforations is made to measure for each installation using a mathematical model CFD (Computational Fluid Dynamic, among the most advanced on the market, further enriched by the multiple

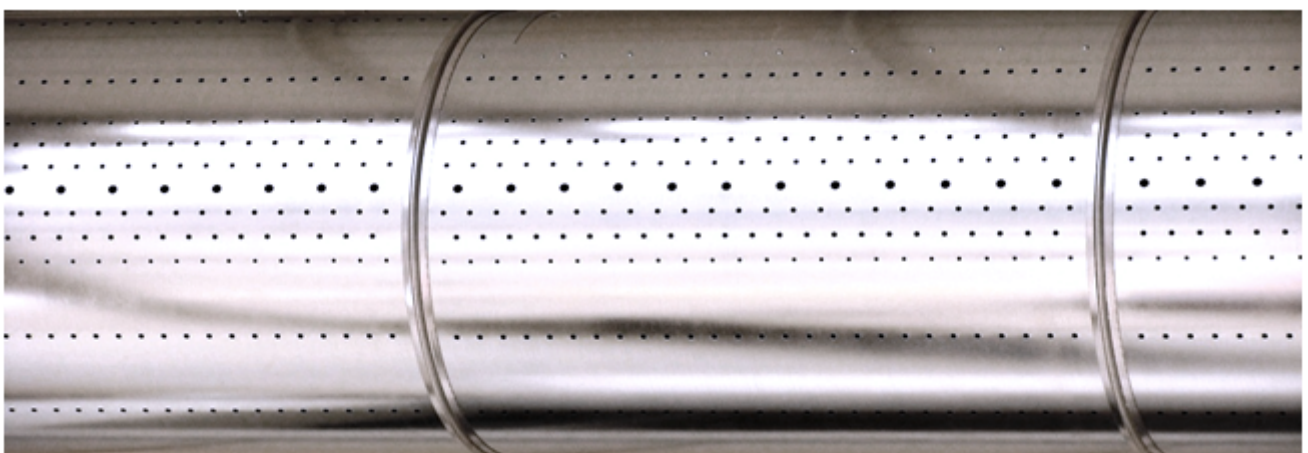
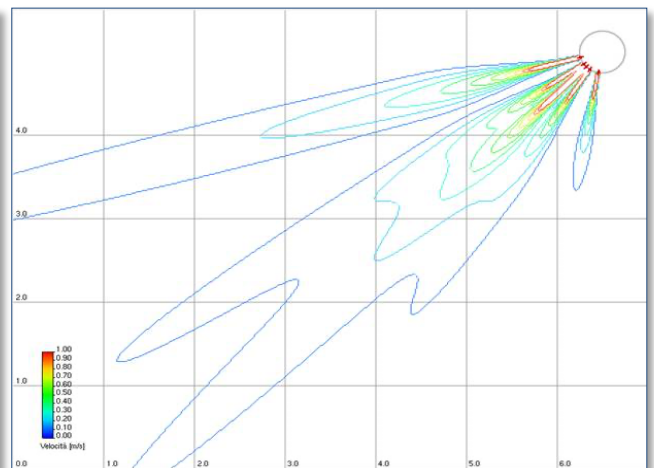
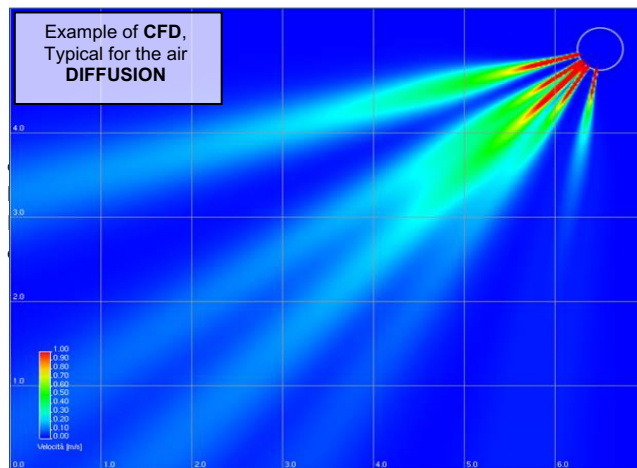
The SPIROJET perforated ducts provide maximum performances in the following situations:

- Maximum recommended installation height during heating 5 m
- Maximum recommended air throw 7 m
- Optimal air speed inside the duct 5 m/sec
- Maximum ΔT during heating 10 °C
- Minimum air input temperature 12 °C

The main advantages of perforated SPIROJET ducts, compared to traditional diffusion systems such as insulated ducts fitted with vents or diffuser, are:

- Very competitive cost
- Very neat appearance
- No need for thermal insulation
- High air diffusion quality, thanks to its high induction capacity
- Large selection of materials: galvanized steel, stainless steel, pre-painted metal, magnesium treated steel, copper, etc.
- Circular, semi-circular, or customized shape
- And thanks to its **GREEN** Technology SPIROPACK™:

- Easy assembly on site
- Reduced installation costs
- Reduced transportation costs
- Very high manufacturing quality



THE PATENTED SYSTEMS

MIX-IND[®]

TECHNOLOGY

Perforated ducts with MIX-IND[®] technology, also called PULSERS[®], do not "throw" the input air into the area to be treated as all diffusers, but create a "pressure area" on their axis, able to set in controlled motion the totality of the ambient air mass.

The conception of a MIX-IND[®] plants cannot use CFDs, unlike all traditional air diffusion plants.

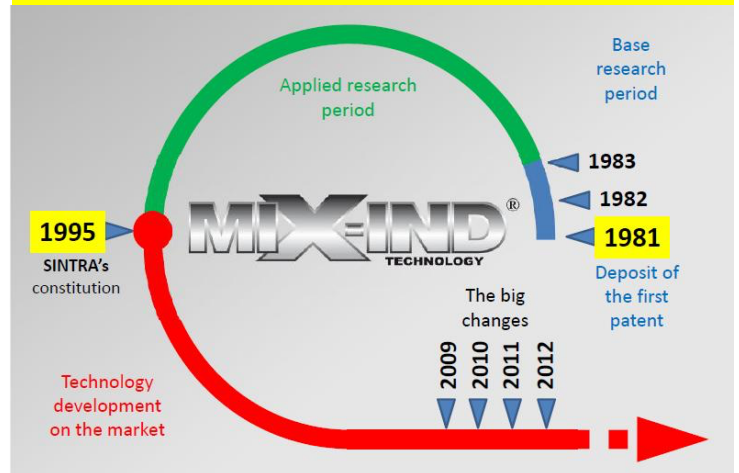
For an ambient air "IMPULSE" plant, the number and the position of each PULSER[®], based on unit air flow, are extremely important for the performances.

For this reason, the design of a MIX-IND[®] plant requires the technical support of SINTRA, offered to the applicant with the free service of AIDED DESIGN.

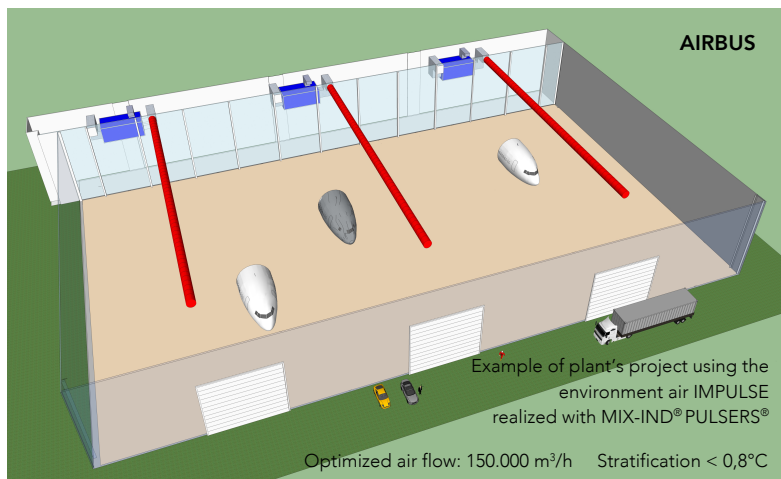
The MIX-IND[®] technology of IMPULSE of ambient air is ONE OF A KIND, thanks to its unique experience acquired during 30 years of a very special journey, including 15 years mostly dedicated to research and experimentation.

Today, more than 10,000 MIX-IND[®] plants have been designed and realized successfully in almost all sectors of industry and services.

OUR PARTICULAR JOURNEY



EXAMPLE OF AIDED DESIGN



Compared to traditional air distribution systems using perforated ducts such as SPIROJET or similar, the MIX-IND[®] technology systems offer the following significant advantages:

- **Homogeneity of both vertical and horizontal temperatures** with $\pm 1^\circ\text{C}$, regardless of the building height.
- **Maximum Comfort** with optimal control of residual speeds in the occupied zone.
- **Total destratification**, especially for high buildings, even higher than 40m.
- **No return air ducts**, therefore less pressure loss for the fans, less maintenance costs, less encumbrances and reduced cost of the ducts.
- Total recovery of all **endogenous heat** produced in the local (engines, lighting, etc.).
- Applicable both to **high-rise** and **low-rise buildings**, without any loss of performance.
- Easy to bypass any potential **major obstacles** on the site.
- Possibility to introduce **air at low temperature** directly into the room without discomfort or condensation problems.
- Ability to perform **long air throws**, so less ducts to install, less weight on the structures, less encumbrances in the room and a lower total cost of ducts.
- Possibility to significantly reduce the **overall cost of the plant**, using the free service of AIDED DESIGN which can eventually allow an optimization of the plant's air flow, especially for medium and large volume buildings.

THE NEW GENERATION PLANTS

The NEW GENERATION plants are MULTI FUNCTION MIX-IND® plants which use patented QPE® technologies (Quality Performance Efficiency), with very high performances both from the energy and the comfort point of view.

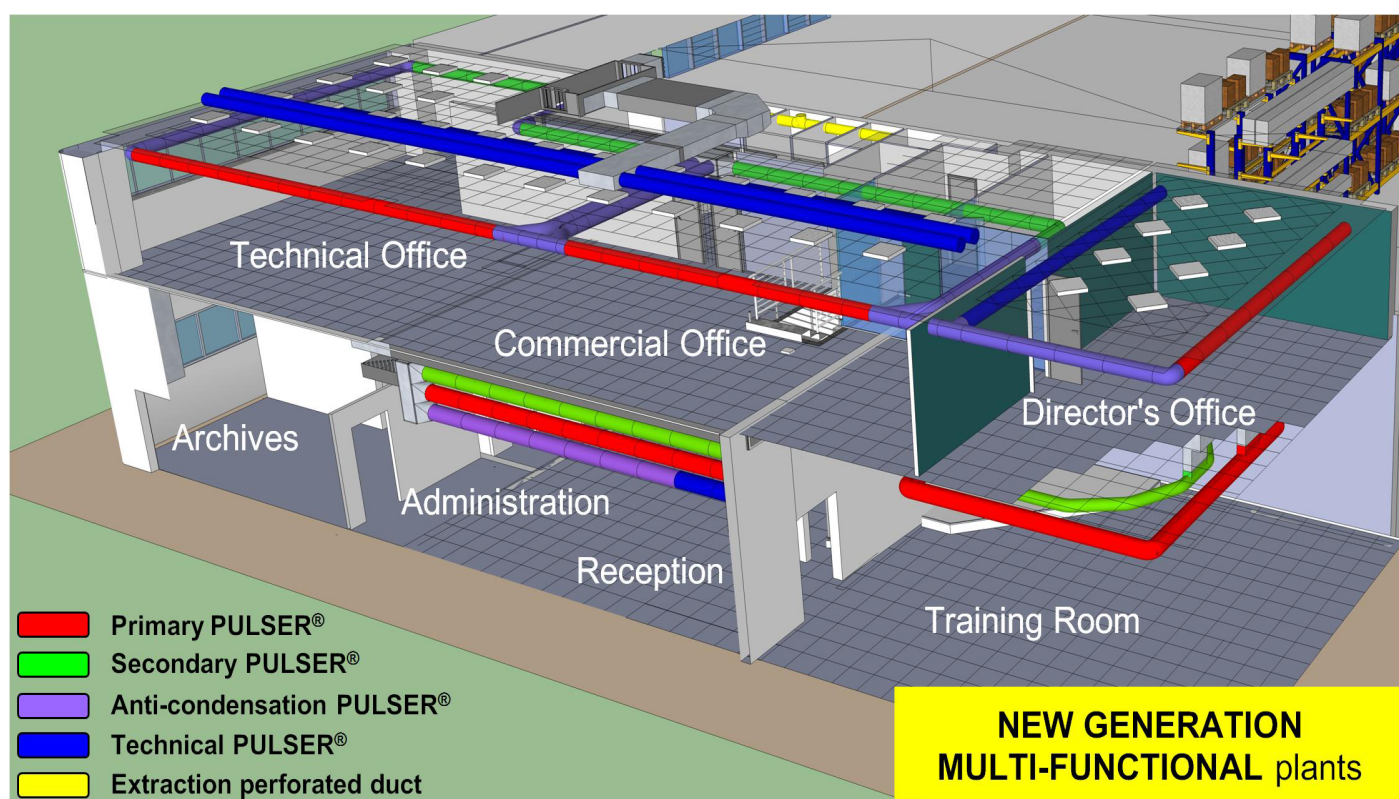
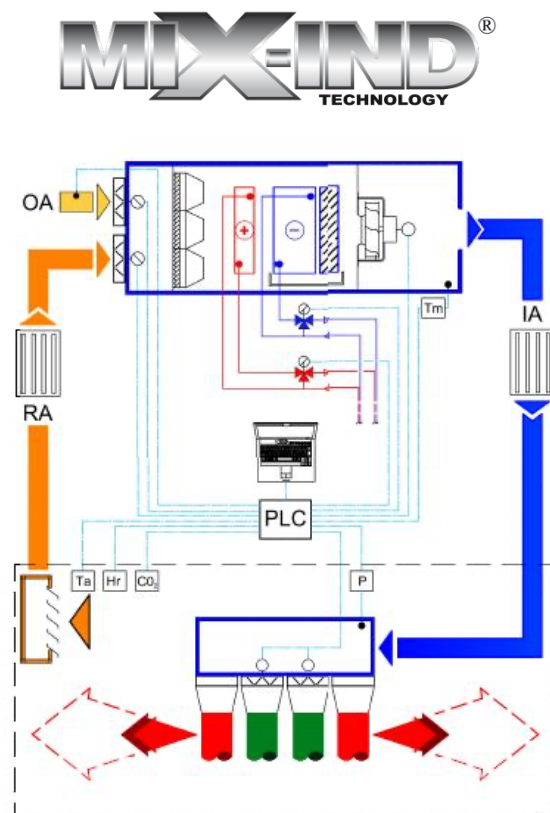
For each project, each PULSER® has different functions depending on the type of application and/or the activity carried out on the premises, while taking into consideration the plant's potential specific needs.

The functioning of the system is therefore personalized thanks to an "ambient diagnosis" that identifies the customer's needs.

In addition to the already remarkable performances of the plants with simple MIX-IND® technology, the NEW GENERATION plants are the only ones on the market that can guarantee the following additional performances:

- **Variable air flow** 20-100 %, without the usual loss of performance, allowing therefore:
 - Savings up to 80% of the fans electrical consumption.
 - Savings up to 80% of the filter replacement costs.
 - Reduction of the mechanical wear, allowing in this way to increase the longevity of the plants.
- **Variable comfort:** a new concept of "comfort" that allows the user to choose and change, easily and at any time, the residual air speed in the occupied zone, depending on the circumstances.
- **Quick start up of the plant,** with a consequent significant energy saving in addition to the possibility to reduce or completely eliminate the night attenuation of heating.
- Possibility of **TOTAL energy requalification** for any kind of existing obsolete plant, without having to replace them.
- **Extreme winter free-cooling,** which allows to introduce directly into the room cold unheated outdoor air (up to -15 °C) without risks of condensation or loss of comfort, applicable in particular to any installation characterized by significant thermal loads.
- **Maximum operating safety** in case of failure of one of the AHUs.
- **Personalization and flexibility of use,** which allow to easily adapt to any evolution of the needs within the treated area.

QPE® REGULATION SCHEME FOR NEW GENERATION PLANTS



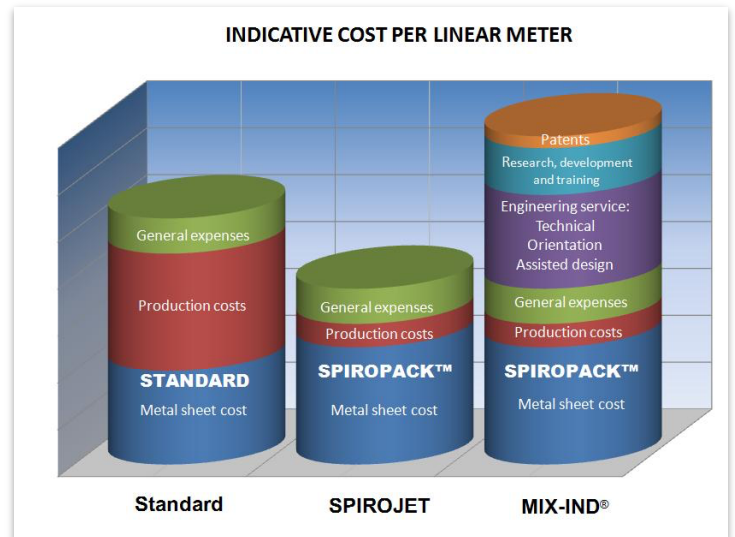
IMPORTANT INFORMATION

PRICE DIFFERENCE BETWEEN SPIROJET AND MIX-IND®

The price per linear metre of MIX-IND® PULSERS® is significantly higher compared to the price of traditional perforated ducts, such as SPIROJET or similar.

The cost difference is justified by the fact that, for the SPIROJET ducts, only the production costs are charged, whereas for the MIX-IND® PULSERS® there are also patent, research, experimentation and Engineering Service costs that have to be added. All these additional costs have allowed this technology to evolve.

In most cases, the cost difference per linear meter is compensated by a smaller quantity of ducts and, quite often, also by a reduced cost of the entire plant, especially when it comes to applications in large volume buildings.



AIDED DESIGN

For the design of a plant that uses MIX-IND® patented systems, it is necessary to take advantage of SINTRA's technical support.

The AIDED DESIGN is a very fast and highly effective method that allows the applicant to choose with full knowledge which MIX-IND® solution best matches his technical and economic requirements.

The AIDED DESIGN REQUEST module is available on our website: www.mix-ind.com

The procedure is very simple: after collecting the main technical data, together with the plans of the building or of the traditional foreseen installation, SINTRA performs an AMBIENT DIAGNOSIS of the project, necessary to identify the patented MIX-IND® technologies which are more suitable to the case in question.

This is done so that SINTRA can elaborate some technical solutions before the "TECHNICAL ORIENTATION" appointment.

The TECHNICAL ORIENTATION is a special "conference call", organized by SINTRA with the applicant to submit to him all the MIX-IND® solutions which best correspond to his requirements in terms of performances and budget availability. At the end of this TECHNICAL ORIENTATION, the applicant will be able to choose one or more technical solutions which he deems suitable for his project.

It will be SINTRA's responsibility to verify that, for each technical solution, the applicant will be able to appreciate its true value and any possible compromise condition that might be imposed by architectural or economic necessities.

The technical solution(s) accepted by the applicant will be then treated more thoroughly by SINTRA, in order to evaluate analytically the "Kr risk coefficient" for each PULSER® ($K_r < 0,8$ = risk of stratification ; $K_r > 1,2$ = risk of air drafts), and the "Kp performance index", which will allow the applicant to better compare the proposed different technical solutions.

SINTRA can therefore perform its role of specialist in the design support, which remains limited to the development of technical solutions using MIX-IND® patented technologies, without interfering in the choice of the technical solution considered the most appropriate. In fact, this role remains the sole responsibility of the applicant.

EXCLUSIVITY AND RISK OF COUNTERFEIT

SINTRA systematically uses multiple patents which, if they were to be applied unfairly by others, would constitute a serious violation of the industrial property rights, involving the responsibility of all those who have participated or will benefit from it, from the supplier to the final customer. This would oblige SINTRA to defend itself in order not to lose its patent rights.

This rights are protected by international laws on the protection of industrial property and the fight against counterfeiting.

Too often we think that patents can be easily bypassed by making small changes to the basic concept: it is a common and inaccurate idea, often causing counterfeit offence, which consequences are underestimated.

For information about our patents, visit our website: www.mix-ind.com

SINTRA DOES NOT OBLIGE THE CUSTOMER TO USE THE TECHNICAL SOLUTIONS PROPOSED WITH AIDED DESIGN.

The only required condition is that in case of use, even if partial, of one of the technical solutions proposed or validated by SINTRA, the applicant agrees to do all the necessary to ensure the exclusive use of MIX-IND® ducts.

On the contrary, the applicant formally commits to not use and divulge to third parties the information received from SINTRA.

To guarantee this exclusivity, the applicant is asked to obtain all possible preventive approvals by his superiors or his client before any disclosure or use of the technical solutions proposed by SINTRA.

SINTRA reserves itself the intellectual property rights of the proposed technical solutions, in order to minimize the risk of possible counterfeits and the risk that the buyer could commit the easy mistake to compare them with other types of perforated ducts such as SPIROJET or equivalent, therefore more economical, similar to MIX-IND® PULSERS® only in appearance.

The technical solutions proposed by SINTRA are the result of 30 years of experience in the designing of MIX-IND® Impulse plants.