

TRRO

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Noise and smoke.

Controlling the spread
of noise and smoke.

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Controlling the spread of noise and smoke.

Noise and smoke aren't something you can feel or hold onto – they're just something fleeting. Not for us, though. In the field of ventilation and air conditioning, noise and smoke are by-products so-to-speak, and they are highly undesirable. To be able to control them, we first have to measure them in our laboratories, almost like physical objects.

So the TROX research and development engineers conduct extensive tests before components are shipped and installed. The tests aim at preventing excessive sound pressure levels, ensuring that in the event of a fire the toxic smoke is safely removed, and making sure that fire dampers and smoke control dampers work reliably.

In this issue of TROX life we're focusing on fire protection and smoke extract systems, taking inspiration from famous German author Goethe and his epic poem 'Faust', where it says: 'The name's mere noise and smoke.'

We report on two extraordinary construction projects in which the designers had to contend with difficult conditions and consider particular acoustic or structural aspects in the process of designing a smoke extract system. We also present the new pressurisation system in our head office in Neukirchen-Vluyn – plus fascinating insights and a collection of quirky and amusing articles inspired by the theme of noise and smoke.

I'm sure that you'll find something in this issue to pique your interest and hope you enjoy reading.




Yours
 Udo Jung
 TROX Board of Management

Grand Hall. Zollverein Coal Mine.

The coking plant at the Zollverein Coal Mine World Heritage Site in Essen, Germany, is 650 metres long. When the mine was still in operation, a total of 304 coke ovens converted more than 10,000 tonnes of coal per day into 8,000 tonnes of coke, and they produced 3,000,000 m³ of gas.



Previously used machines give visitors a feel of authenticity and add to the special charm of the heritage hall.

Coming to life again.

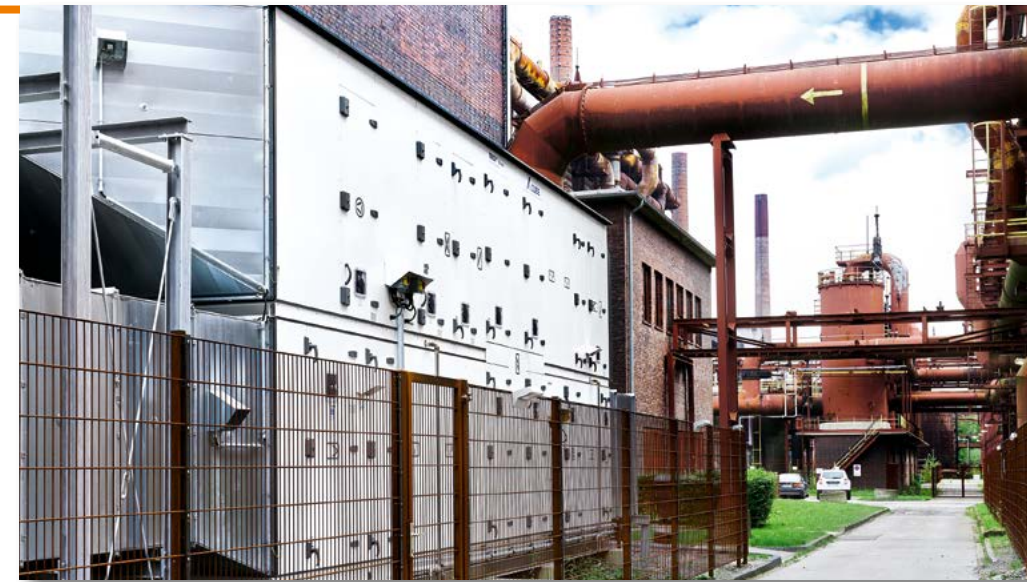
While the coking plant produced coke, gas exhausters and compressors were used to clean every day up to 4,000,000 m³ of coke oven gas from tar, ammonia, hydrogen sulphide and benzene. Slightly less than half of the gas was then used for under-firing the coke ovens, while the balance was compressed to 8 bar and fed into the regional mains gas network.

Thanks to private investors, the huge gas exhauster and compressor hall has come to life again as the 'Grand Hall at Zollverein', an extra class event venue. The hall can seat 2,400 people and provides full service for all types of events; there are also a foyer, a stage, and a bar and lounge area. Thanks to the large auditorium and the site's versatility with regard to usage, the Grand Hall has actually filled a void in the range of event locations in the densely populated Ruhr region.

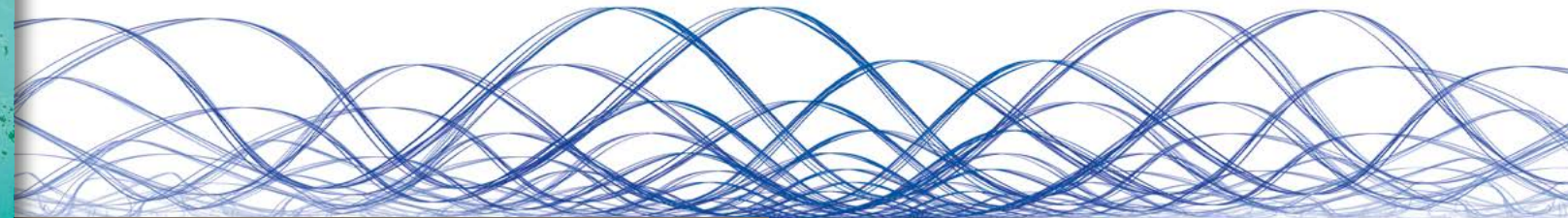
A listed monument as a monumental challenge.

Gutting and restoration of the buildings required utmost care as the industrial monument was meant to retain its authentic character. Gas exhausters, compressors and other machinery were not removed, but put behind glass windows, where they continue to bear witness to the former use and history of the building. Concrete, glass, iron, steel and bricks – these are the materials that are so typical of such buildings and that were also used in this impressive hall.

The former gas exhauster and compressor hall is a listed building, just as the other buildings at the Zollverein heritage site. As a consequence, the building envelope had to be left unchanged. That was a huge challenge for building services consultants. Since the building is listed, it was not possible to install smoke exhaust fans on the roof and hence fully visible.



A dedicated weatherproof X-CUBE air handling unit provides the hall and the ground floor with up to 56,000 m³/h of treated fresh air.



Neither was it possible to create additional openings in the roof or in the façade. After extensive discussions the heritage preservation authority at least agreed to the installation of an air handling unit at the back of the building, where it is not easily visible.

Perfect smoke and noise control.

Smoke and noise control in the given difficult circumstances required a lot of creativity and skills from the building services consultants.

The Grand Hall is also used for rock concerts. As it is right next to a residential area, not only the façade had to meet special requirements and be preserved; noise control was another challenge as sounds should not leave the enclosed room. Insulated extract air ducts and calcium silicate smoke control dampers of Type EK-EU, which due to their special construction also have good acoustic properties, make sure that any noise remains inside the building.



Ducts and swirl diffusers are installed exposed to add to the industrial style of the ground floor lounge and bar area.

Ventilation and smoke extract – a science in itself.

German law requires that internal spaces with an area exceeding 1,000 m² have a smoke extract system that ensures a 2.50 m thick layer of fairly clean air near the ground. This applies to the hall on the first floor. According to a fire protection expert, a volume flow rate of 80,000 m³/h is required for smoke extract in the event of a fire, and ensuring that this quantity is then available has not been easy. Why? Because of the architecture of the building and because it is a listed building.

Since the building is listed, it was not possible to install smoke exhaust fans on the roof. The solution was to place ten X-FANS BVAXN fans in the roof lanterns. These were originally used to provide the hall with light, and also for ventilation, or heat dissipation. There was not much space, so it was quite difficult to install the extract air ducts with the smoke control dampers.



Ten BVAXN smoke exhaust fans remove the smoke in the event of a fire.



In the event of a fire, air is supplied by means of noise-insulated multileaf dampers, special supply air inlets and the main stairwell. An air handling unit also supplies a considerable portion of the additional supply air.

Extracting smoke means that the same quantity of fresh air has to be let in, through dedicated additional supply air inlets, the main stairwell, and large multileaf dampers that open if smoke is detected: 30,000 m³/h in total. Another 50,000 m³/h of additional supply air are made available by the specially designed air handling unit. In the event of a fire and as soon as the smoke control dampers open, the air handling unit automatically goes into smoke extract mode and provides the required additional supply air. For smoke extract, the air change rate has to be considerably higher than for 'normal' ventilation. This is why the damper blades of the VAV terminal units are fully opened in the event of a fire.

Smoke extract strategy based on various scenarios.

The controls specialists used various scenarios with different occupancy numbers to determine the required parameters. These parameters were then used to plan an individual ventilation and air conditioning control strategy for the event of a fire. The ventilation and air conditioning system can now respond adequately to different situations.

Happy building owners, happy specialist consultants.

Wilfried Meyer, former director and now management consultant with building services company Planungsgruppe M+P, and Thomas Köppen, also of Planungsgruppe M+P: 'It was the many configuration options and the high degree of flexibility of the X-CUBE air handling unit that have given us the opportunity to apply our creative design ideas and to find and implement an unusual ventilation and air conditioning solution. The resulting intelligent control strategy allows for demand-based ventilation and air conditioning and ensures reliable smoke extract.'



A small X-CUBE air handling unit in the basement removes the extract air from the catering area if required.



Adjustable jet nozzles are ideal for supplying air to this very large hall.

Building owner: Convention Hall Zollverein GbR
 Architects: HWR Architekten, Dortmund, Germany
 Building services: Planungsgruppe M+P, Dortmund, Germany
 Fire protection expert: FRANKE – Beratende Ingenieure für Brandschutz PartG mbB
 HVAC contractor: AIRTEC, Gronau, Germany

Exhibition and event area: 40 – 4,000 m²
 Capacity: 25 – 2,500 people
 Two zones: Club for 900 people, event hall for 2,400 people



Gotthard. The world's longest tunnel.

With a length of 57 km, the Gotthard Base Tunnel (GBT) under the Gotthard mountain range in Switzerland is the world's longest tunnel. It is over 6 km longer than the Eurotunnel under the English Channel and extends from the municipality of Erstfeld, in the Canton of Uri, all the way south to Bodio, in the Canton of Ticino. The total length of the two bores and cross passages is 153.5 km. It took 17 years to complete the tunnel. 28.2 million cubic metres of rock were moved, a quantity that would fill a 7,100 km long freight train – reaching from Zurich in Switzerland to Chicago in the US. The tunnel was opened in December 2016. It is expected that by 2020 a total of 260 freight trains and 65 passenger trains will pass the tunnel every single day. The Gotthard Base Tunnel brings the north and the south of Europe closer together, at least as far as transport and travel are concerned.





Safety above all else.

If a fire breaks out in a tunnel, the temperature rises quickly to 1200 °C and more. This is why special safety strategies have to be in place and ensure that all safeguards function reliably and that people can get to safety as quickly as possible. In the case of the Gotthard Base Tunnel, even a mock fire was ignited for the safety checks. It was a huge drill scenario in which a train with 800 people could be evacuated quickly and according to plan.

The Gotthard Base Tunnel includes two multifunctional and emergency stop zones – Sedrun at km 16, and Faido at km 30; they allow for trains to change tracks. Trains can move from one tube to the other tube there, not only in case of an emergency, but also if a tube is under maintenance. Then the huge gates between the tubes are opened.

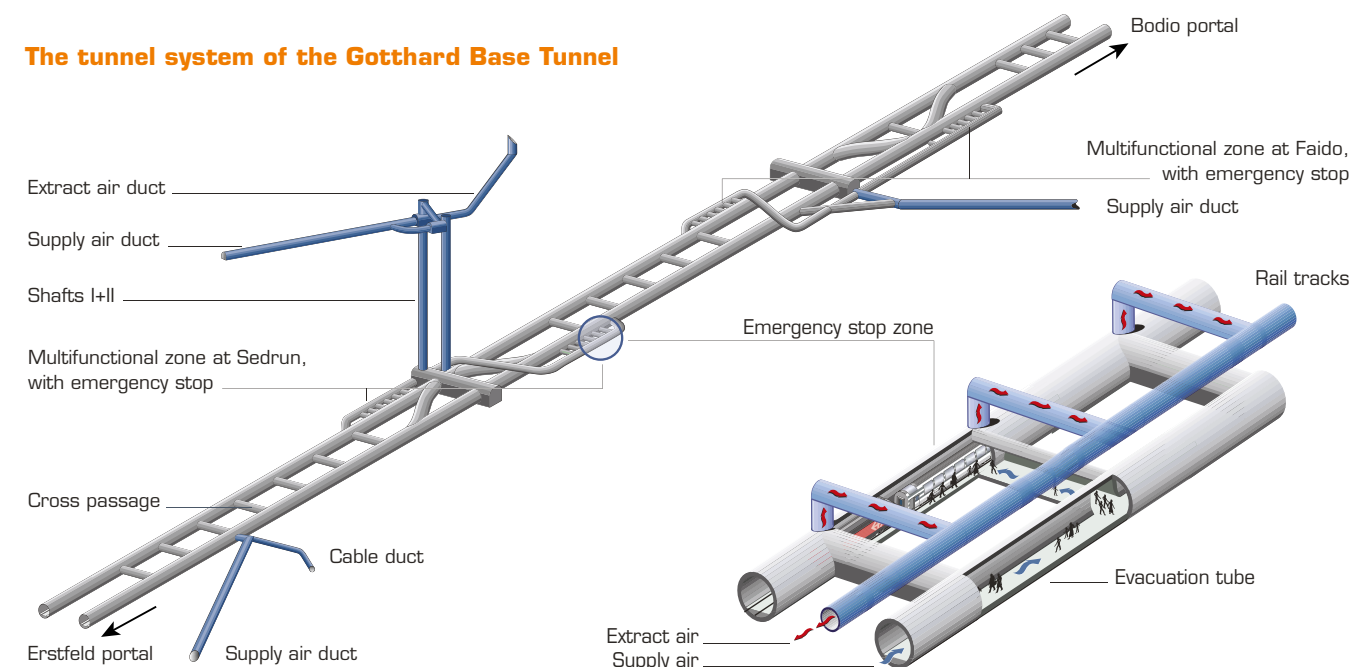
The main purpose of the gates is, however, to keep ventilation and air conditioning separate for the two tubes. In the event of a fire, the gates prevent smoke from spreading to the other tube and they allow for pressure ventilation in the non-incident tube. At and near the two emergency zones sufficient fresh air is led in, while the smoke is driven out by smoke

exhaust fans. The emergency exits are opened automatically, via remote control, and hot fire smoke is extracted and led outside. The other tube functions as an emergency assembly zone, where passengers can wait for a rescue train. 'Normal' breathing air prevails in the assembly zone, and a positive pressure of 20 kPa is maintained and keeps the smoke out. The function is similar to that of a pressurisation system, only the other way round (see article on TROX ACADEMY trainings).

Tunnel fans put to the test.

The Gotthard Base Tunnel has been equipped with 356 stainless steel axial fans and 68 tunnel dampers from TROX; they 'control' the air change between the two tunnel tubes. In addition to fans and tunnel dampers, TROX has supplied volume flow controllers, external weather louvres, smoke control dampers and fire dampers, all of which help to protect the rail passengers in the Swiss tunnel. The special Type JFM tunnel dampers can not only withstand high pressures for a long time, they are also fire-resistant.

The tunnel system of the Gotthard Base Tunnel



Main breakthrough of the Gotthard Base Tunnel (top left)

Schematic illustration of the Gotthard Base Tunnel

The mountain range above the tunnel and the heat generated by the trains let the temperature in the tunnel often rise to 50 °C. The equipment in the cross passages is cooled from the other, cooler side of the tunnel.

When a train speeds through the tunnel at 250 km/h, the air ahead of the train is compressed, i.e. a massive pressure buildup occurs, as with a piston in a cylinder, while a huge suction pressure is generated behind the train's tail. Such enormous forces could easily damage the ventilation and air conditioning components, which is why safety has priority.

The cross passages are ventilated with small, robust fans, which can withstand the permanent extreme pressure fluctuations without becoming damaged

mechanically. Such systems are designed to last for 25 years in spite of the high frequency of trains in the tunnel, i.e. they have to withstand millions of pressure strokes during their service life – pressure strokes of 0 to ±10 kPa.

To make sure that the fans in the cross passages would safely resist the enormous forces, a 20 x 10 m pressure chamber was built to simulate the conditions in the world's longest tunnel. The test procedure was such that the continuous noise in the tube-like chamber was every six seconds interrupted by a bang. Each bang simulated a passing train. So the TROX fans were subjected to this type of test no fewer than 250,000 times. This was to make sure that the TROX components would withstand the extreme ambient conditions and work smoothly and reliably.

Life-saving technology.

December 2015. Elbtunnel in Hamburg, Germany. An articulated lorry with ground soy beans is passing through the tunnel under the Elbe river. All of a sudden, a tyre bursts and catches fire. 150 metres short of the exit, the lorry driver has to stop at the kerb. He runs to the exit. Thanks to the safety equipment installed two years earlier, the smoke is quickly extracted. This allows other vehicles and the people in them to also reach the exit and get to safety, while the fire brigade is able to move in to the fire site. 'We could reach the fire without any problems, there was hardly any smoke', said a spokesperson for the fire services afterwards.



Owner: AlpTransit Gotthard AG
 Design, ventilation and air conditioning: Deutsche Montan Technologie
 Construction time: 17 years
 Cost: More than 12 billion euros
 Components from five TROX factories: Neukirchen-Vluyn, Anholt, Bad Hersfeld (all in Germany); Seremban (Malaysia); Rüti (Switzerland)



Mere noise and smoke.



Just like noise and smoke, urban legends have a habit of spreading. But after a while, they don't just disappear into thin air. They keep spreading and eventually burn themselves into our collective consciousness, insisting that they are true. When in fact they are nothing more substantial than noise and smoke.

Urban legends.

We're all familiar with ancient myths and modern-day tales. But how do they spread? The myths we know today usually begin with an allegedly true story: 'I know this story is hard to believe, but I know someone who knows someone who has a friend to whom that really happened...' Old wives' tales and horror stories are all they really are. Probably the best known is the story of the yucca plant that turns out to have a tarantula nesting in it (although sometimes it's a scorpion, or a poisonous snake). With their origins in Madagascar, yucca plants give this well-worn tale a hint of the exotic – making it all the more believable that a tarantula could have nested in it and bitten and killed the person who purchased the plant.



True or not true? The following story from the German BILD tabloid makes you wonder. Recently a woman from the state of Thuringia was said to have been bitten by a snake. In a supermarket. The 76-year-old was in the fruit section when she suddenly felt a stabbing pain on her stomach. Back at home, she then discovered two dark circular marks on her skin. When she had them examined by a doctor, she was told that the marks could only have come from a reptile bite. Is this a case of a journalist getting carried away? Or a 'true rumour'*

The offending creature was never found, so the fire brigade is thinking about fumigating the supermarket just in case.

* 'True rumour' is a 'Janus word' or 'auto-antonym', referring to a word that has at least two meanings, where one is the opposite of the other. Another example is 'quantum leap'.



World-famous legends.

The Bermuda triangle and the moon landing are some of the most famous examples of what are considered to be myths.

Numerous planes and ships are said to have mysteriously disappeared in the Bermuda triangle, with even Christopher Columbus allegedly reporting that his compasses went haywire and he saw a flame crash into the sea in its vicinity.

The Bermuda triangle myth originated in the First and Second World Wars after several large military transport vessels and jets vanished without a trace in the area. In most of those cases, however, severe weather conditions or human error turned out to be the real culprit. Every now and then, the Gulf Stream is responsible for significant shifts in the weather that often lead to accidents. With no wreckage remains found in several of the cases, however, the legend persists to this day – despite scientists' repeated observations that, statistically, the area is no more prone to incident than any other.

Celebrity myths.

Celebrities are also the subject of many myths. The more famous people are, the more absurd the stories become, especially if someone died at a young age or in mysterious circumstances.

Paul McCartney is said to have died and been replaced by a double. As one fan reported to a Detroit radio station in 1969, numerous Beatles songs contain hidden messages communicating this. In fact, the rumours were so persistent that Paul ended up spending all his time fending them off. In an exclusive interview with Life magazine he responded with a quote that paraphrased Mark Twain: 'Rumours of my death have been greatly exaggerated. However, if I was dead, I'm sure I'd be the last to know.'

Other celebrities, meanwhile, are said to have been resurrected from the dead – Elvis Presley and The Doors' Jim Morrison among them. Others still, it has been speculated, were victims of murder. Pope John Paul I is said to be an unquiet ghost haunting the Church after being killed just 31 days into his office, while the CIA is supposed to have murdered Marilyn Monroe because of her affair with John F. Kennedy.

A rather hilarious rumour began to spread when the Berlin Wall came down. Baywatch star and singer David Hasselhoff, so the grapevine said, stood at the wall and sang to it so vehemently that it finally collapsed. Fun fact: His song 'Looking for Freedom' happened to be no. 1 in the charts when the wall came down. The singer himself has repeatedly said that it is nothing more than coincidence, but the rumour has stuck in people's minds for almost 30 years now.



For many people, the moon landing was so unimaginable that it became an ideal breeding ground for legends, asserting that the event had been staged and filmed in a desert. This story even inspired a science fiction film. 'Capricorn One', dating from 1978 and directed by Peter Hyams, tells the story of a Mars landing hoax. Instead of journeying to space, the astronauts are taken to the desert while the spacecraft is left empty. When it burns up upon its return to earth, the astronauts are said to have died in it, which means they can never officially return home. They manage to escape, and this kicks off a thrilling chase to find them.

Onomastics. What's in a name? It's not mere noise and smoke.



Goethe (1749 – 1832) is arguably Germany's most famous writer, and Faust his most famous character. In the epic poem of the same name, Faust claims that names are nothing more than 'mere noise and smoke'. Evading a question about which god he believes in, he utters an insincere, rhetorical phrase: 'I have no name for it. The feeling's all there is: The name's mere noise and smoke – what does it do but cloud the heavenly radiance?'

Faust could not have been more wrong. In fact, onomastics – the science of names – is an instantly fascinating field that draws on etymology, history, the development of human settlements over time, the psychology of language, and genealogy.

Surnames.

The Chinese introduced surnames as far back as 2850 BC. Each family chose one from the 438 words in the classic text 'Hundred Family Surnames'. Over in Europe, it was the Romans who first adopted surnames. In most cases, their names were made up of three parts: a given name, followed by a traditional family or tribal name, and finally a surname. After the fall of the Roman Empire, only the given name remained in common use.

Until the 12th century it was normal for people to have just a given name. Following that time, however, fast population growth resulted in many Josephs and Marys springing up in the same place. So a given name was no longer enough to address or identify a particular person. As a result, descriptive words such as occupations, origins, appearance descriptions or characteristics were appended as an epithet: Joseph the Smith, for example. Later, these individual descriptors gave rise to official family names that were passed on to descendants. In Celtic countries, names of clans were used more commonly than occupations: Murphy, Kelly and Stewart are some examples. The Scandinavian nations didn't begin to use surnames until the start of the 19th century, and in Turkey, surnames came along as late as 1933.

After Europeans had settled in America and Australia, unsurprisingly large numbers of Smiths, Herreros, Muellers, Millers, Garcías and Murphys began popping up. As an aside on that note, only one person in every one hundred in Germany has the surname Müller, while every 17th person in Spain is a García.



Iceland, meanwhile, has its own unique approach to surnames. If a man called Jón Einarsson has a son called Ólafur, for example, then Ólafur's surname will be Jónsson – son of Jón – rather than Einarsson. The same rules apply to naming daughters. So Jón Einarsson's daughter Sigríður would take the surname Jónsdóttir – daughter of Jón. If two people within a group of acquaintances happen to have the same first name and surname, then the names are combined with the name of the paternal grandfather: for example, Gunnar Kristjánsson Bjarnasonar (Gunnar, son of Kristján, son of Bjarni).



This unique practice gave rise to some unusual coinages that were the subject of much amusement for German speakers during the last Euro football tournament. The Icelandic national team included a goalkeeper called Thór Halldórsson ('Tor' being the German for 'goal') and a centre forward called Kolbeinn Sigthórsson (combining 'Tor' with 'Sieg' = 'winning').

Then there was the almost comedy-like event on an English football field, where the referee gave a player a warning and asked for his name. 'Watt', came the prompt reply. Thinking the player had said 'what?', the referee asked again: 'What's your name?' The same reply came: 'Watt'. At that point the referee became very annoyed because he thought the player was making fun of him, and showed the player both a red and a yellow card.

The world's most common surnames

1. Lee	More than 100 million	Expressed as a Chinese character. Interestingly, there are only 450 surnames in China.
2. Zhang	Around 100 million	
3. Van	More than 93 million	Denotes a ruler
4. Nguyen	More than 36 million	Over 40% of Vietnamese people have this name
5. García	More than 10 million	Of Basque origin, meaning 'courageous in battle'
6. Gonzalez	More than 10 million	Derived from the first name Gonzalo, a medieval name ('Gundisalvus') with its origins in Old High German
7. Hernández	More than 8 million	
8. Smith	More than 4 million	
9. Smirnow	More than 2.5 million	Meaning tolerance or peace
10. Muller	More than 1 million	

Most surnames are derived from

- Occupations and official titles
- The father's or mother's first name
- Characteristics of the person
- Geographical origin
- Particular features of a dwelling place



First names.

First names are so called simply because they come first, before the surname. However, the term is something of a misnomer in Africa and East Asia, as first names invariably come after the surname there. East Asian first names are used to identify people much more commonly than their European counterparts – an essential practice since the countries in that region only have small pools of surnames to choose from. In China, for example, there are only around 450 surnames. First names may be one morpheme or any combination of two morphemes* – the Chinese characters that we are all familiar with. This results in an almost unlimited choice of given names. Some unusual names have begun emerging too, such as Jackie Chan, all the more so as Westernised names have become increasingly fashionable. Meanwhile, many Western countries place legal restrictions on how many first names a person can have, or what kind of names.

* Morphemes are generally defined as the smallest unit of language that carries meaning.

王 陳 李

Wáng Chén Lǐ

- Traditional origins of first names:
- Religions and their texts
 - Roman, Greek, Nordic and Celtic mythology
 - Combinations of meanings; for example, the Germanic name Gerhart is made up of 'Ger' (meaning 'spear') and 'hart' (meaning 'hard')
 - Botany
 - More recently, other languages

Residents of the Emerald Isle with a sense of tradition make the naming process easy for themselves. If they opt to follow the conventional rules, deciding on names for their children is easy:

- The first son takes the name of his father's father
- The second son takes the name of his mother's father
- The third son takes his father's name
- The fourth son takes the name of his father's oldest brother (his uncle, in other words)
- The first daughter takes the name of her mother's mother
- The second daughter takes the name of her father's mother
- The third daughter takes the name of her mother
- The fourth daughter takes the name of her mother's oldest sister (her aunt, in other words)



By the way, Patrick – Ireland's patron saint and perhaps the most Irish of all names – no longer ranks in the top 100 names. Interestingly, Patrick actually derives from Latin and means 'of noble origin'.

**What's in a first name?
More than meets the ear.**

The scientific discipline of onomastics also focuses on associations with names rather than just their origins. This is because names carry certain expectations. Without knowing a person called Peggy personally, for example, you might imagine someone who is funny and cheeky. A classical name such as Constantine or Cornelius, meanwhile, might convey an image of dependability and intelligence. Researchers into names say that people with short, snappy names such as Tim, Nick or Jack tend to be viewed as sporty types.

In the 1980s, Germany suddenly experienced a spate of Kevins; and the name has remained popular to this day. This is all thanks to the wildly popular English footballer Kevin Keegan, who was playing for Hamburg at the time. Intriguingly, names such as Kevin, Dustin, Chantal and Jacqueline have gained popularity in more working-class sections of Germany, while traditional, classic names have found favour in better-educated social strata. Research has shown that the Kevins and Dustins therefore carry a heavy burden through their names. Their teachers and, later in life, even their bosses tend to see them as less high-achieving than others.

Celebrities have adopted a special fondness for unusual first names – resulting in what is essentially a competition to see who can produce the most fanciful moniker. Do you know which famous chef has called his children Poppy Honey Rosie, Daisy Boo Pamela, Petal Blossom Rainbow, Buddy Bear Maurice, and River Rocket Blue Dallas? Or whose daughter is called Rosalind Arusha Arkadina Altalune Florence?*

* Jamie Oliver and Uma Thurman respectively.



Poppy Honey Rosie

Daisy Boo Pamela

Buddy Bear Maurice

River Rocket Blue Dallas

Petal Blossom Rainbow

Rosalind Arusha Arkadina
Altalune Florence

Heat and smoke exhaust systems.



The International Association of Fire and Rescue Services (CTIF) develops comprehensive world fire statistics and publishes annual reports. In 2015 the association developed statistics for 31 countries, or 14% of the world's population. More than 3.5 million fires were reported from those countries. Two people in each 100,000 died in a fire. Most casualties of fires are actually due to accidents in people's homes, at night. When people are asleep, they cannot smell the smoke and eventually suffocate.

We have talked to a fire protection and smoke control expert, engineer Professor Reinhard Ries, and asked him for a statement.



Source: Logistik heute magazine, November 2009

Investments into safety measures pay off.

Fire and smoke protection measures are moving more and more into the focus of experts and also of insurance companies*. The average fire damage claim is now almost six times as high as it was ten years ago. One reason is that companies use more and more expensive machinery and systems; another reason is the lack of investment into effective heat and smoke exhaust systems. The consequence: Many companies that are hit by a fire are not able to resume operations.

*VdS, an independent German institution which is active in the fields of fire protection and security and develops advanced safety strategies, have updated their guidelines for the design and installation of heat and smoke exhaust systems accordingly (VdS 2098).

Average no. of fire victims per 100 fires

Russia	10.4%
South Africa	4.1%
Finland	0.7%
Turkey	0.4%
Sweden	0.3%
Germany	0.2%
France	0.1%
Italy	0%

CTIF statistics show that the number of victims is lower in countries with stricter fire and smoke protection laws and regulation. Fire and smoke protection measures do obviously have a positive effect.

Smoke exhaust equipment for buildings: Useful or a waste of money?

by Professor Reinhard Ries, Dipl.-Ing. **

To this day there are no overall fire statistics from German fire services. While they do record, at least approximately, the number of incidents in each state and then add the numbers of fire victims, no detailed figures are available. The number of fire victims in Germany is fairly low, at about 300 to 500, which seems to indicate that fire protection measures are effective and the fire services are doing a good job.

Distorted media reports.

However, this low number is currently misused in order to question the allegedly high cost of fire protection measures in general. Leading daily newspapers carry feature articles claiming that fire protection in the building sector drives the costs up beyond belief. Public authorities and fire services are accused of causing exorbitant price increases with more and more new requirements.

Fire victims are actually smoke victims.

Such reports basically deny that over 90% of the 'fire victims' have actually died from smoke. People who die some time after a fire due to their injuries are not counted at all, and neither is the increasing number of people who suffer injuries caused by smoke. I would assume that every year several thousand people are severely injured by being exposed to smoke. The number of people who suffer minor poisoning from fire smoke is probably higher than 10,000. Long-term effects of injuries are not even documented.

So the number of fire victims says nothing about the total number of people who have been injured by smoke, which is why it is completely misleading. The figure should in no way be used as a basis for discussions about building standards, and least of all to compare the increasing number of fire alarm systems to the stagnating number of fire victims, as the reputable Frankfurter Allgemeine Zeitung newspaper has done. They even went as far as calling the expenses for fire protection totally absurd.

What we have learnt from firefighting operations.

The experience of fire and rescue services has shown that the number of people injured due to smoke is much higher than the number of actual fire victims. And it is particularly high when the incident happens in a kindergarten, school, hospital or nursing home. Large-scale evacuation operations in nursing homes or other care facilities for the old and sick are on the rise due to the development and spreading of smoke, even from small fires. For the fire and rescue services such operations require more and more resources since very often the entire building has been filled with smoke, is hence contaminated, and can no longer be used. Occupants have to be moved to other facilities, which is an additional challenge, especially at night or on weekends.

A fire in a kindergarten or in a school often requires the building to be closed for several weeks; the health authorities have no choice, given the contamination due to smoke. For the affected municipalities this is a huge problem, especially if there are hardly any other suitable facilities; or if these are old.

Fire protection in hospitals.

There is unfortunately no special building directive for hospitals that is valid in all German states. As a consequence, fire protection strategies vary, and uniform quality standards are an impossible thing. The spreading of smoke is something that is quite often not taken seriously; smoke exhaust systems are expensive, and people do rather without.

Whenever a decision has to be made about specific critical measures, someone is likely to say that the lack of such a smoke exhaust system, e.g. in corridors, can't be such a problem since authorities in the neighbouring state accept the lack of such a system without batting an eyelid. As if it was not widely known that any contamination is, for economical reasons alone, the absolutely worst case for a hospital. Effective smoke exhaust ensures safety, and not only that of patients. For firefighters, too, is it easier to do their job if patients can remain on the wards.

Preventing smoke from spreading.

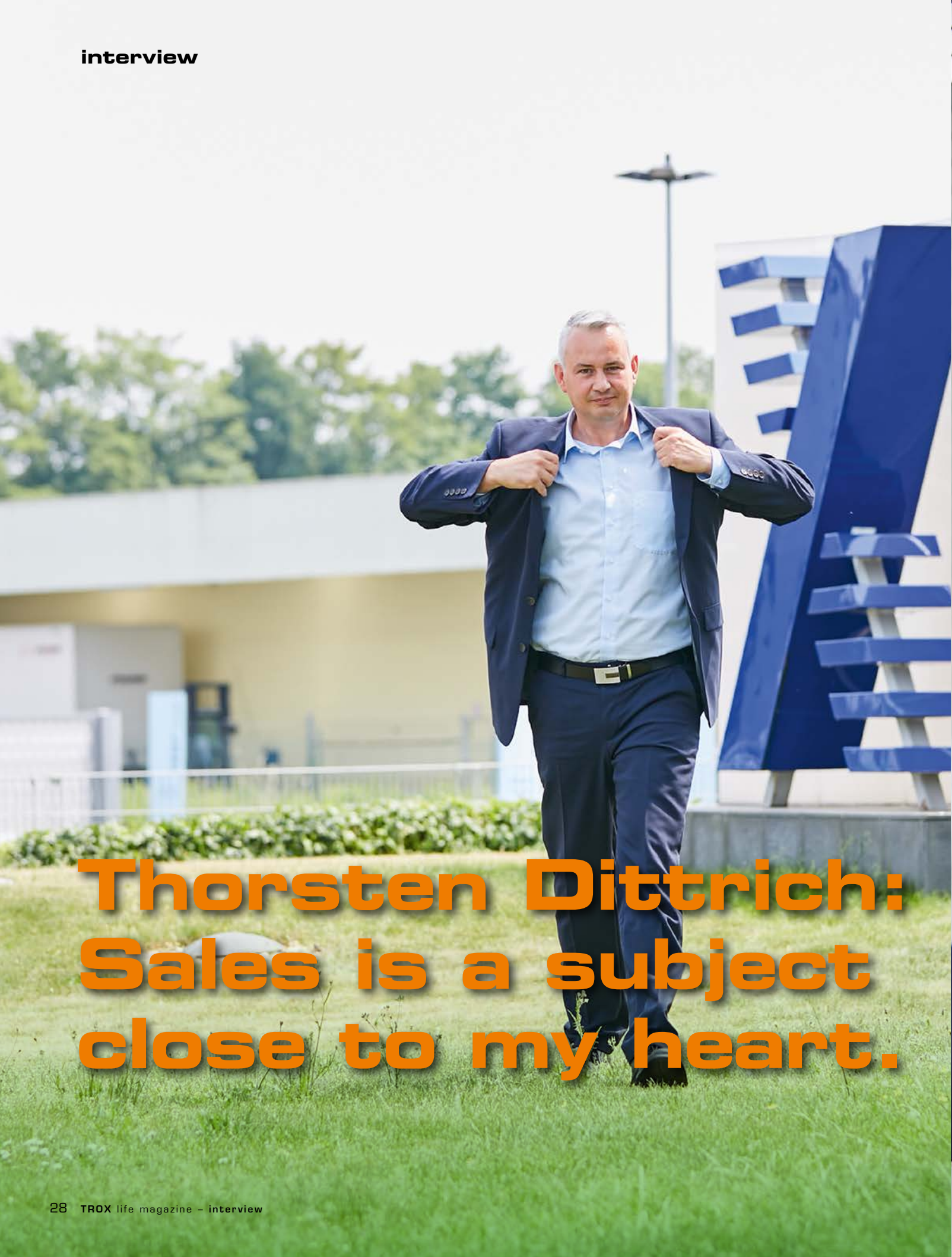
Airports, assembly halls, railway stations and underground transport systems are required to have a fire protection strategy in place. Such places are part of the critical infrastructure in cities where the large number of inhabitants makes protection against the spread of smoke a necessity.

Effective smoke exhaust equipment allows people to get to safety and the fire brigade to get into the incident building and look for and save people who are injured. As the smoke from a fire is prevented from spreading, the interruption of operations is considerably reduced, which is an important factor for critical infrastructure.

Conclusion.

Smoke control in buildings will become more and more important, not only to protect and save lives, but also to protect property and ensure operational reliability. The general awareness of health and safety in the workplace has considerably increased in recent years and presents ever greater challenges to building owners. Buildings that remain fairly clean even after a fire incident will attract more and more attention.

**Professor Reinhard Ries was director of the fire brigades in Frankfurt, Germany, until March 2018, and head of fire protection, civil protection, rescue services, emergency ambulance, and air ambulance, with 1000 permanent staff and 1500 volunteers. He has been a chairman and member of various national and international committees, e.g. the international commission examining the 1996 fire at Düsseldorf Airport, Germany. Several international assignments as an expert, on behalf of the Federal Republic of Germany. Lecturer at Frankfurt University of Applied Sciences, Darmstadt University of Applied Sciences, and Darmstadt Technical University.



**Thorsten Dittrich:
Sales is a subject
close to my heart.**



On 1 September 2017, Thorsten Dittrich took up the role of Head of Sales Germany at TROX. At the same time, he was appointed to the company's extended Board of Management. Thorsten Dittrich is a man at the top of his game, and he has made his way there from the ground up.



Thorsten Dittrich, have all your career dreams now come true?

The field I work in is a fascinating one, and I hold a leading position in one of the most innovative companies in the ventilation and air conditioning industry. I also meet extremely interesting people on a daily basis. What more could you ask for?

Where does your interest in this industry come from?

You know, I've been in the HVAC sector all my working life, and I've never once been bored. Heating, ventilation and air conditioning are such a dynamic environment that there's always something fascinating and new to learn.

You first did an apprenticeship as a gas installer and plumber. What made you choose that path?

(Laughing) It's all the fault of 'Werner', a cartoon character in a film that I saw when I was a teenager. The character was an apprentice plumber and got me really interested in the profession. So I applied for a position with a plumbing firm in my home town, Fulda in Germany.

So you've worked your way right from the ground up!

Exactly. It's given me a fundamental understanding of the field and a great deal of professional experience on building sites – something that I still put to good use today. For example, at one time I worked as an assistant foreman, helping to oversee bathroom installations for the Arabellapark Hotel in Munich.

How did you continue from there?

I wanted to go further up the ladder (grins), so I got another qualification at a college specialising in heating, ventilation and air conditioning technology in Gießen, Germany.

That meant I had a certificate to practise as a technician. I then went on the hunt for a new challenge and started working for Klimed Klimatechnik und Medizintechnik GmbH, where I was responsible for Eastern Europe, mainly Ukraine. Looking after building sites in that area really was an adventure. Our main tasks involved delivering and installing ventilation and air conditioning systems for hospitals, cooling systems for medical equipment, and precision air conditioning units for telecommunications and data centres.

What was next after your eastern European adventure?

It was TROX. I've worked here in various capacities since 2005 now, including positions in technical internal sales, as a sales engineer specialising in TROXNETCOM and LABCONTROL, as a key account manager for wholesale trade, and as a branch manager.

Let's talk about sales. Is it a multidisciplinary area?

Very much so, but the various types of training I have done have come in very handy.

Is it possible to boil sales down to a few key factors for success?

Our customer satisfaction survey has shown that product quality, reliability, image and expertise are what really matters to our partners. So I think we need to focus our efforts on the following areas:

- Outstanding products for a high level of customer satisfaction
- Products that are complementary to one another, combined to efficient systems
- Active support for our partners and communication of expertise
- A friendly relationship
- Starting early

What do you mean by that last point?

Well, the early bird catches the worm – so the earlier we can start helping our customers with their decisions, the better. As an example, let's take our air handling units, which are highly customisable and configurable, and the outstandingly high quality of our X-CUBE components. Thanks to both of these, it's possible for us to develop a winning solution in almost one hundred percent of cases by providing a product that exactly meets the requirements of the project. But that's only possible if we get in early with potential customers and show them what we have to offer. That's why we invite many of our partners to a preliminary discussion at our plant in Anholt, Germany, where we can get them on board there and then.

Thorsten Dittrich, thank you for your time.



Getting personal

Where would you most like to live?

In the mountains of South Tyrol.

What does real happiness mean to you?

Having time for my family.

What kind of mistakes are you most likely to forgive?

The ones that have some thought behind them :-)

Who's your favourite composer, musician or band?

Mark Foster.

What's your favourite pastime?

I enjoy barbecuing. I also love spending time with my family, quad biking and running.

What's your favourite food?

Whatever comes off the barbecue – from proper steaks (anything less than four centimetres thick is really just carpaccio) to low-and-slow-cooked dishes.

Which qualities do you most value in friends?

My friends are absolutely reliable.

What's your biggest weakness?

I'm sometimes a bit impatient.

What would be the worst thing that could happen to you?

Someone close to me becoming ill.

What's your favourite colour?

Blue, of course!

And your favourite flower?

The cornflower.

How about your favourite animal?

The bald eagle.

Your favourite book?

'Das Joshua-Profil' by Sebastian Fitzek.

What motto do you live by?

Don't look for the problems – look for the solutions.

Who would you like to have a drink with?

Anyone who'd like to have a drink with me.

Quiet, efficient, powerful. The new DID-E2.



Hospitals and hotels are places where good sleep is particularly important. Patients and hotel guests should not be disturbed by a ventilation and air conditioning system. Induction units are, hence, the preferred solution for hotel rooms and patient rooms since they do not need a fan. They are very quiet, very efficient, and do not require much maintenance. TROX originally developed the DID-E active chilled beam for just these areas of application. Its compact dimensions have made it an ideal solution for bulkheads above doors.

Air and water for a pleasant climate.

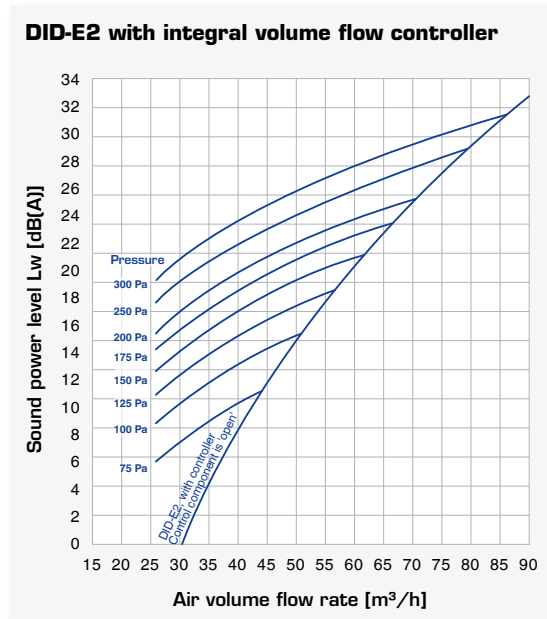
Now the DID-E active chilled beam has been improved, and the new Type DID-E2 offers quite a few technical highlights.

- In boost mode (values in brackets), the beam responds quickly to required temperature changes. Yet in boost mode, which is typically used before a room is occupied, the sound power level of up to 50 dB(A) is clearly audible.
- The output is higher, though, with a cooling capacity of up to 1.5 kW (2.5 kW) and a heating capacity of up to 1.2 kW (2 kW).
- The primary air flow rate is 25 to 150 m³/h (250 m³/h).
- The beam's special nozzles create the most effective airflow, for high comfort levels in the occupied zone.

An integral, low-noise volume flow controller for the DID-E2 is available as an option. The DID-E2 is ideally combined with X-AIRCONTROL, which turns individual ventilation components into a system that can independently control temperature and air quality in a room (e.g. a hotel room).



Thanks to its compact dimensions, e.g. 1000 mm x 704 mm x 212 mm (LxWxH), the DID-E2 is ideal for installation in bulkheads.



Sound power level with different volume flow rates and pressures when an integral volume flow controller is used.

Replication of a hotel room in a TROX R&D laboratory.



Extensive tests with attention to detail.

We wanted to improve an existing product. Our goal for the DID-E2 was to develop an active chilled beam with optimised thermal and acoustic properties that, thanks to its airflow characteristics, would ensure maximum comfort in ventilation.

To achieve this goal, we built a 1:1 replicated hotel room in one of our aerodynamic labs, and we held a workshop with hotel managers in order to discuss the general conditions and requirements. The results of those discussions were then used for the functional specification. Device and component variants were tested under 'real' conditions to arrive at the best possible product. Measurements included:

- Sound power levels and pressure loss for various nozzle sizes and beam lengths and constructions; tests took place in the TROX reverberation chamber
- Thermal output in heating and cooling modes
- Airflow velocity in the occupied zone

The samples were installed in the test room and put into operation. Temperatures as well as water and air volume flow rates were measured for a certain period of time, then saved and evaluated. Changes in the operating conditions allowed us to develop calculation procedures to determine the thermal values.

Determining the airflow velocity in the occupied zone was a similar process: measurements at different measurement locations (distance to DID-E2, installation height above the floor) led to calculation procedures.

The data from those tests has been made available to our customers in our catalogue and in the TROX Easy Product Finder design program.

Hotel owners and hospital owners can now select an advanced product that has been tested extensively and meets their specific requirements: whisper quiet, almost totally concealed installation, and with features that provide maximum comfort in the rooms.

TROX ACADEMY training. More than theory.

Some time ago a pressurisation system was installed in the stairwell of one of the TROX administration buildings. Its main purpose is to keep the stairwell free from smoke in the event of a fire. Yet the system not only provides more safety, it will also be used to demonstrate the function and components of a pressurisation system to participants in our technical seminars and trainings.



New pressurisation system in a TROX building.

The main purpose of the pressurisation system in the stairwell is twofold: One, to keep the stairwell free from smoke for a period of time that is long enough to allow people to use the staircase to get to safety; and two, to allow the firefighters to get in, save people who need help, and start firefighting.

Maintaining positive pressure in the stairwell also means that the air is pressed into any gaps, e.g. around door frames, and this prevents smoke from spreading beyond the storey with the fire and into the stairwell. At the same time a sufficiently large air volume has to be removed from the fire compartment. The system will function safely and reliably if the airflow velocity in the door cross section is 2 m/s.



Roof light dome with self-powered control damper blade.

The pressurisation system comprises four principal components.

Fresh air supply.

The required fresh air supply to the stairwell is provided by a supply air fan. The intake opening is on the external wall, below the ground floor, at a place where there is no risk of smoke being led into the building even in the event of a fire.

Pressure control.

Pressure relief in the stairwell is ensured with a natural smoke and heat exhaust system at the top of the stairwell. A self-powered multileaf damper allows for horizontal and vertical air passage and limits the pressure in the stairwell such that the required door opening force does not exceed 100 N. The self-powered damper responds immediately such that 90% of the volumetric requirements are met within 3 seconds, as stipulated in the standard.

Fire safety objectives for the four-storey building with stairwell:

- Target pressure should be achieved within 60 seconds after the system is activated
- Door opening force of 100 N max.



In the event of a fire, an X-FANS fan provides the required supply air in order to create a positive pressure in the stairwell.



Extract airflow.

In the event of a fire, two opposite windows are automatically opened on the affected storey such that air can escape. Since doors in offices would block the path of the airflow to a window, such doors also have to be opened automatically. The escape of air into the open ensures the required airflow velocity in the door opening (door cross section).

Control.

The pressurisation system has its own control system. The system is activated when a fire alarm is generated with the existing fire alarm system. All the components that are relevant to the function of the system are controlled automatically. As the system is an 'idle' system, it has to be monitored continuously. Uninterruptible power supply is a must which is why a UPS system has been installed.



Hi. LOL. 😊



Communication has evolved in a way that is as unique as humanity itself. Today, we communicate in around 6,500 languages worldwide, breaking down every single border. And conversations of one kind or another were taking place over long distances even before the invention of the phone.





Call it what you like!
 Call it joy, or your heart, or love, or God!
 I have no name
 for it. The feeling's all there is:
 The name's mere noise and smoke – what does it do
 But cloud the heavenly radiance?

Johann Wolfgang von Goethe

Noise and smoke.

People generally communicate using sound: The sounds we make when we speak are produced by pushing air through our vocal folds, which then start to vibrate. But we can also communicate silently, through writing or hand signals. Humans are thought to have been communicating through smoke instead of sound as long as 350,000 years ago: Peking Man is said to have used a sequence of smoke signals, with gaps in between, to convey messages over long distances.



Smoke signals.

Native Americans were the ones to perfect that technique. With its combination of short and long clouds of smoke, their signal-based language worked in a similar way to Morse code. To produce it, wet grass was placed on top of open flames. As thick smoke began to develop, the fire place was covered with a blanket and the smoke was released only at certain intervals. The fire would be made at the highest point in the area, and the smoke signals were visible as far away as 80 kilometres.



Much ado about nothing.

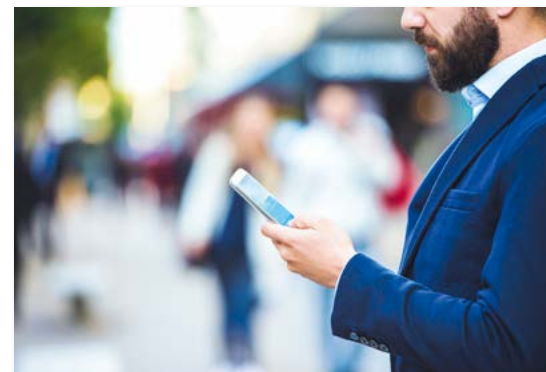
Modern methods of communication, on mobile phones and the Internet, ensure that we can be reached at any time, virtually regardless of where we are. This has resulted in much ado about nothing* or, as they say in German, 'a lot of noise over nothing'.

The second a plane lands on the tarmac nowadays, people are pulling out and switching on their mobiles. 'Hi, just landed' can be heard countless times on the shuttle bus to the terminal building. Social media have made communication more fast-paced and less trustworthy and brought about a constant stream of messages. Nothing remains a secret any more, unlike the times when smoke signals were used. The rapidly growing glut of messages out there has meant that communication is now approached more recklessly, even encouraging presidents to tweet missives cloaked in lies and hot air. As the German Minister for Foreign Affairs commented at the recent Munich Security Conference: 'Is it deeds, words or tweets that we have to measure America against?'

* The title of a Shakespeare comedy of errors.

An entirely new form of language has emerged alongside this – acronymia has taken hold. LOL, ROFL, ROFLMAO, THX, HDL, OMG, BTW and WTF are just some of the (painful) examples. They're as fleeting as puffs of smoke, and quite often impossible to decipher. And woe betide anyone who has autocorrect activated – in today's rapid-response culture of e-mails and text messages, correct spelling has fallen by the wayside.

But there are some gems growing in the fertile soil of digital communication formats such as Siri or app-based messages. As one comedian recently put it: 'I've got myself a postbox app so I can find out where the nearest postbox is. The only problem is that nobody writes letters anymore.'



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