CLEAN AIR MAGAZINE

zehnder
always the best climate

THE WAREHOUSE OF THE FUTURE

Hamilton Medical: another way of **CLEANROOM ACHIEVEMENT**

The **IOT IMPACT** – it's not science fiction

Beverage **LOGISTICS CHALLENGES** at Göttsche eliminated

A message from Peter

Dear reader,

Welcome to the 2016 issue of the Clean Air Magazine.
You know it best: Business is on an energetic pace and there are futuristic trends that become reality quite fast. One of those trends is our focus topic: Automation.
Automation of certain processes is a technological advancement that is just around the corner, and has the potential to increase productivity and efficiency in factories and distribution centres. Some months ago, I discovered it myself visiting a US Managing Director responsible for a 250,000 sq ft [76,200 m^2] automated warehouse.
To see all those automated processes was very impressive! But still – automation needs the right environment. During my visit I learned a lot about the challenges coming with technical development: Due to dust accumulating on the line tape, communicational services between the equipment didn't run properly. This caused – besides trouble and unproductive downtimes – extra costs. Every time employees had to be sent into the warehouse's backbone system to rectify the cause of the problem.
I won't lie – I knew a solution to get rid of airborne particles. After installing Clean Air Solutions they now treat the source not the symptoms of dust in their sophisticated facility.
Besides cost benefits, they increased efficiency, boost image and partnership and last but not least Clean Air Solutions created a healthier, much safer environment for all associates.
Another trend we are engaged with is The Internet of Things (IoT).
At Zehnder we are currently working on bringing our units together with the IoT. In doing so, we aim to deliver even more service benefits to our customers.
Expanding our services and the best experiences for our customers is our all day business. It is in our best interests to look out for their interests and find ways to benefit their challenges: So we started business in Italy and Austria.
We have internalised that good relationships take years to build and we pride ourselves on delivering an outstanding service in every region we operate in. So please take a look at some of the success stories we want to share with you. The latest case studies represent two quite new and interesting sectors: industrial laundry and medical production.

Enjoy!

Peter Krantz, Managing Director Zehnder Clean Air Solutions

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HAMILTON MEDICAL: ANOTHER WAY OF CLEANROOM ACHIEVEMENT

For the past year, Hamilton Medical AG, one of the most internationally renowned manufacturers of medical ventilators and consumables for intensive care units, A&E departments and patient transport, has been relying on state-of-the-art air cleaning technology for its sensitive production process.

With its top hygiene standards – clean room quality for manufacturing and packaging – the company underpins its strong position in the international competitive environment. Hamilton Medical is currently the fastest growing company in the global “medical ventilators” business area and is presently ranked third in the world market. Hamilton Medical has around 350 employees at its headquarters in Bonaduz (Switzerland) and at its distribution site in Reno, Nevada (USA), and sells its products to hospitals across the globe.

Patient hygiene is the top priority

Hamilton Medical products such as medical ventilation hoses and flow sensors must be produced and packaged in a consistently hygienic process according to the 93/42/EEC European Directive and GMP (Good Manufacturing Practice), so that the material-related risk of infection for the patient is virtually non-existent. Furthermore, the medical technology company always ensures that its products are manufactured in accordance with ISO clean room class 9 as a minimum. According to the Hamilton Medical Head of Respiratory Care Supplies, Dr Hans von Pfuhlstein, the Swiss production location was therefore searching for effective solutions to improve the infrastructure for a hygienically optimised production process. The previous ventilation system was now far from sufficient for the hygiene requirements. The system had to have a flexible design in order to meet the hygiene standards, in particular with regard to the separated production areas. At the same time, the solution had to reduce the amount of cleaning required and the associated costs as much as possible. Hamilton Medical’s main goal was to enhance the clean room conditions throughout the production area in an affordable and flexible way and consequently reduce the amount of particles, germs, bacteria and viruses in the air to a minimum. However, none of the previously evaluated clean room suppliers in the healthcare industry met the specific requirements of the medical technology company. Then in 2015, at the Empack trade fair in Switzerland, Hamilton Medical heard about the leading indoor climate specialist Zehnder and its air cleaning systems, Zehnder Clean Air Solutions.

Hamilton was not only excited about the technology, but also about the enormous potential for cost savings.

In the run-up to the decision, Hamilton Medical defined a specification listing its main requirements for modern and efficient air cleaning. Zehnder Clean Air Solutions not only fulfilled all of the specifications but actually exceeded them, against all expectations. The project was managed and implemented by Stefanie Schmidt, who was an undergraduate student at the time.

The specification:

- Ensure a consistent, very high hygiene standard in accordance with ISO clean room class 9 throughout the production area.
- The equipment should be highly flexible and easy to remove and reposition.
- The equipment should be specifically aligned with particular dust sources.

The packaging area in particular is subject to large volumes of dust due to carton abrasion. The equipment must “capture” this dust immediately before it can spread through the rest of the hall area.

- High pressure needs to be generated, especially in the particularly sensitive production areas for medical ventilation hoses and sensors.
- Low energy and operating costs.
- Ensure a complete service package for upcoming filter replacement and maintenance, without affecting the production flow.
- No investment costs or long-term contract commitment. Hamilton Medical adopts the air cleaning systems as a service model and thus conserves its liquid funds.

Before the Hamilton Medical premises were equipped with Zehnder Clean Air Solutions, numerous measurements were performed to determine the concentration of germs and particles in the room air.
During installation, the air cleaning units were ultimately placed next to the sensitive application areas in production and final inspection. The units run in automated permanent operation with two adjustable performance levels, which can be programmed using a timer. Hamilton Medical is therefore able to regulate the operating time in a customised and flexible manner, without causing pressure losses or drops in performance.
A further advantage of the air cleaning systems is their compact design, which enables fast mounting using steel chains directly on the ceiling. “This easy mounting process is a key part of their particular appeal, as it makes the air cleaning systems very flexible and enables them to be removed and suspended elsewhere as needed. Furthermore, the suspension height can easily be adjusted using the steel chain system in order to achieve the optimum airflow,” explains Dr von Pfuhlstein.
With its usual focus on service, Zehnder installed the units outside of regular hours of operation in order to avoid disrupting Hamilton Medical’s production flow.
As well as installing Zehnder Clean Air Solutions, Hamilton Medical also carried out additional accompanying measures in order to support the hygiene requirements even further. These comprised, for example, extensive hygiene training, an intensification of hygiene controls and even a tightening of clothes safety regulations (long-sleeved protective gown, face mask, hair net).

The hygiene requirements are greatly exceeded
In order to assess the efficiency in terms of the actual air quality, measurements for airborne germs and particles were carried out in twelve measurement locations following a year of operation with just one filter replacement and improved hygiene measures on the part of Hamilton Medical. The results speak for themselves:

- Rather than ISO clean room class 9, the air conditions now correspond to clean room classes 6 - 7/GMP classes B - C in some cases. The general germ count was reduced by an average of 73%, while the particle count in the air decreased by 59%.
- As a positive side effect, the absentee rate for employees in production dropped by a whole 27 % and is now significantly below the Swiss average.

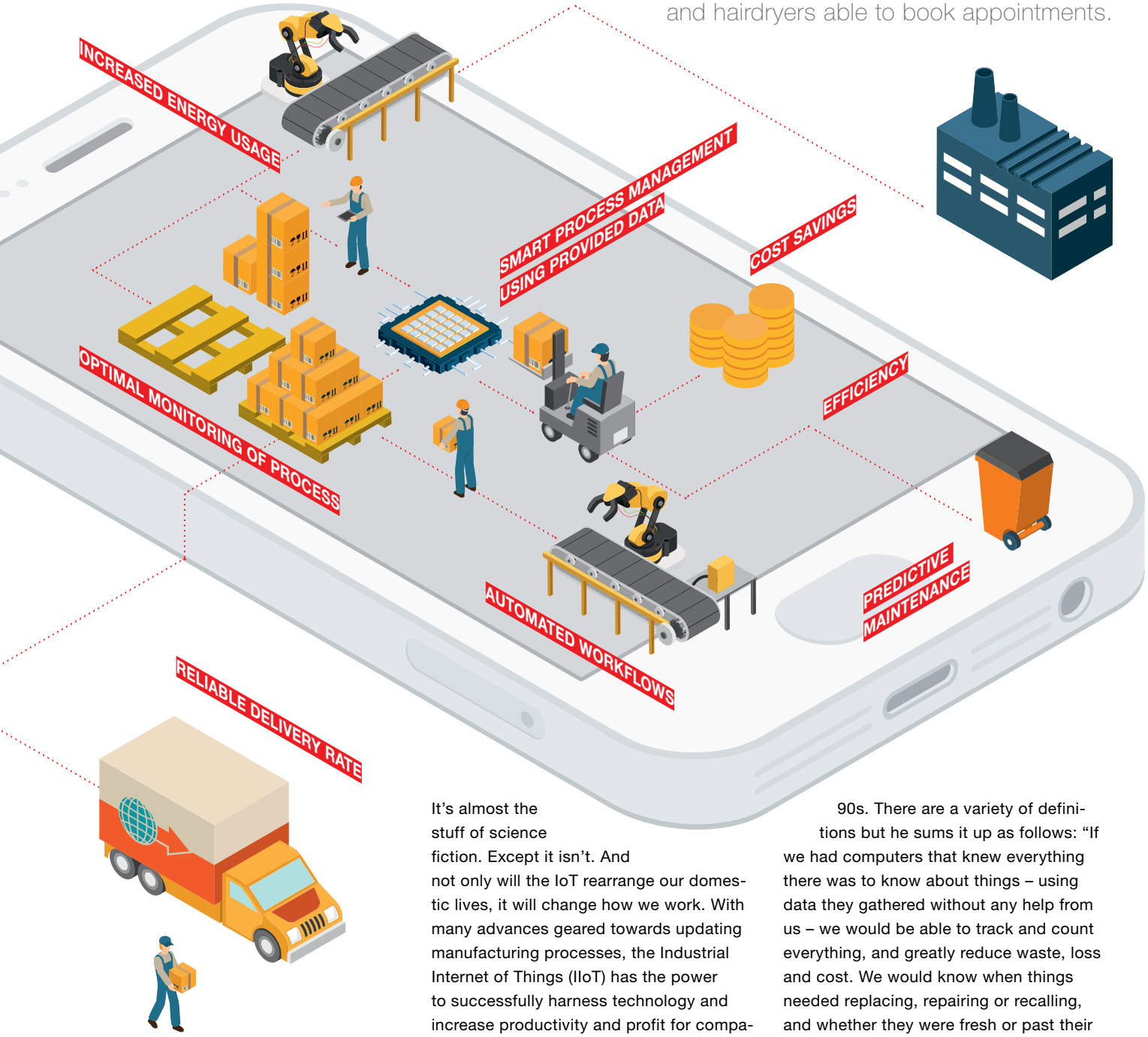
These results impressively prove the high level of efficiency of Zehnder air cleaning technology, which was enhanced by the accompanying hygiene measures carried out by Hamilton Medical. The project has also been a complete success in terms of costs: by installing the air cleaning systems, the company was able to avoid the expense of investing in a clean room infrastructure which, by way of comparison, would have only paid itself off after more than 37 years. This highlights once again the superiority of Zehnder Clean Air Solutions for outstanding hygienic conditions.
For Dr Hans von Pfuhlstein, “the Zehnder air cleaning equipment has now become an integral part of the production infrastructure and is therefore vital for compliance with the high hygiene standards which Hamilton Medical has set for itself.”
The medical technology company also sees great potential for the future integration of the Zehnder air cleaning systems into the continuously growing infrastructure, rather than building costly clean rooms.

MEDICAL TECHNOLOGY HAMILTON MEDICAL AG

COMPANY	Hamilton Medical AG
INTERVIEW PARTNER	Dr Hans von Pfuhlstein
INDUSTRY	Medical technology
LOCATION	Bonaduz, Switzerland
DUST SOURCE	Carton abrasion in the packaging area
DUST REDUCTION AFTER INSTALLATION	59%
ALWAYS THE BEST CLIMATE FOR	Clean room conditions according to ISO class 6 - 7, additional germ count reduction by 73%, below-average absentee rate, enormous cost saving

THE IOT IMPACT – IT'S NOT SCIENCE FICTION

There is a lot of talk about how the Internet of Things (IoT) will transform the world of tomorrow, impacting daily lives with technological innovations such as fridges that can order groceries and hairdryers able to book appointments.



It's almost the stuff of science fiction. Except it isn't. And not only will the IoT rearrange our domestic lives, it will change how we work. With many advances geared towards updating manufacturing processes, the Industrial Internet of Things (IIoT) has the power to successfully harness technology and increase productivity and profit for companies of all sizes.

What is the IoT?

The innovator and consumer sensor expert Kevin Ashton, coined the term in the late 90s. There are a variety of definitions but he sums it up as follows: "If we had computers that knew everything there was to know about things – using data they gathered without any help from us – we would be able to track and count everything, and greatly reduce waste, loss and cost. We would know when things needed replacing, repairing or recalling, and whether they were fresh or past their best".

We're not just talking about computers anymore. IoT now describes a world where any digital device, be it a phone or forklift, computer or conveyor belt, can connect

and communicate with another. Using shared data such devices act together to perform better, and ultimately, more intelligently.

IoT in action

The IIoT, also known as Industry 4.0, is built on the premise that smart machines are better than humans at accurately and consistently capturing and communicating data and translating it into smart manufacturing processes.

In a warehouse or factory this could play out in a number of ways, for example, virtual tracking of all your capital assets, operations, products and resources, will give you full visibility across all areas of your business, streamlining processes and optimising supply and demand.

All this available information from the plant floor and along the supply chain is gathered in real-time, made visible and turned into actionable insights that result in greater business efficiency.

Zehnder 4.0

While the full transformative power of the IIoT remains to be seen, the potential of machine-to-machine learning and big data technology is irrefutable. At Zehnder we decided to enter this brave new world with a starter project to test the possibilities of data shared between devices.

In partnership with our customer Martin & Servera, we placed information screens in their visitor reception and employee entrance areas and dust meters in their buildings where our clean air solutions are installed. Then we connected the devices to communicate with each other.

The dust meters pick up information regarding the quality of the clean air in the building and send it to the information screens for visitors and employees to see. The data is shown in an easy to read diagram and updated in real-time as new information is gathered.

Info screen providing company infos in the visitor reception area

Do good and make it known

With the numbers to prove it, the screens also feature the benefits of a clean air working environment, highlighting how Martin & Servera's employees enjoy better health and their machines experience less downtime due to repairs and maintenance, thanks to less dust circulating on site.

We added even more value to their employees, customers and visitors by displaying Martin & Servera company info, relevant transport schedules, the weather forecast and a live news ticker. This means that everyone who passes one of these screens is a little bit more informed than they would otherwise have been.

This project confirmed one very important point for us. The IoT is not science fiction. Its benefits are real and the technology is ready.

Factories of the future

As information becomes more readily available, the manufacturing industry will stand to gain from harnessing sensor technology, machine-to-machine (M2M) communication and learning automation technologies such as robotics. The IIoT has great potential to improve processes such as quality control, sustainable practices, supply chain tracking and overall supply chain efficiency.

The data IIoT devices gather will lead to improvements in the maintenance of machines and enable factories to pick up on any inefficiencies and problems sooner, saving time and money.

Whether in the home or in the workplace, the world not too far ahead will be connected by intelligent machines able to transform information into action.

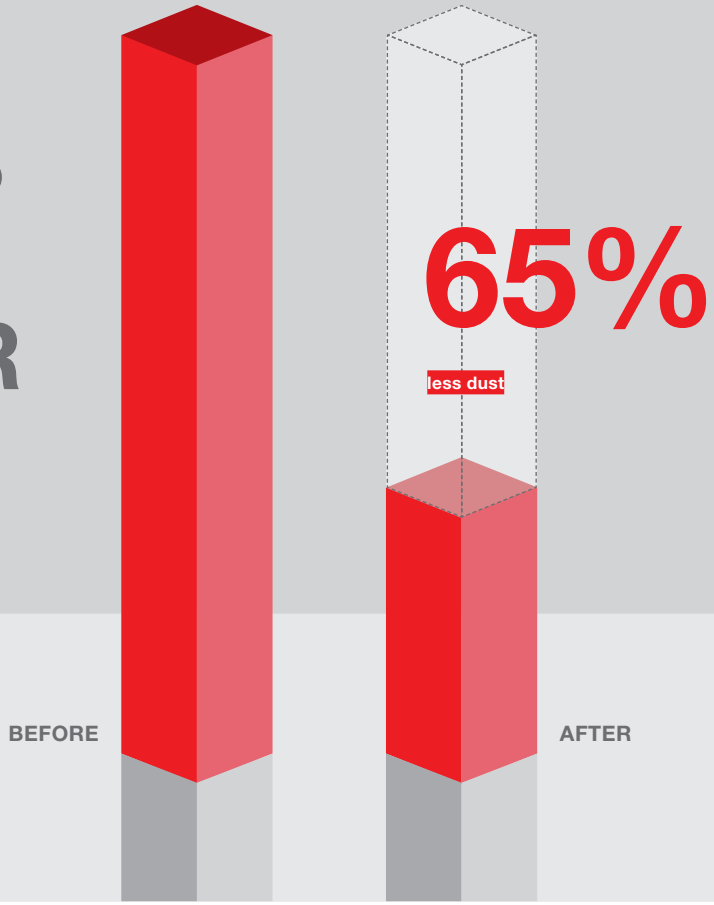
IOT CHALLENGES AND OPPORTUNITIES

- The Industrial Internet transforms the entire company and must be part of the CEO agenda.
- By 2020, European industrial companies will invest €140 billion annually in Industrial Internet applications.
- In five years, more than 80% of companies will have digitised their value chain.
- The Industrial Internet creates better productivity and resource efficiency – an 18% increase in efficiency within five years.
- The integrated analysis and use of data are the key capabilities for the Industrial Internet.
- The Industrial Internet holds various challenges – policy-makers and industrial associations can help.
- Horizontal co-operation allows for improved satisfaction of customer requirements.
- The Industrial Internet paves the way for new, often disruptive digital business models.
- Digitised products and services generate approximately €110 billion of additional revenues per year for the European industry.
- Digitisation of the product and service portfolio is the key to sustainable corporate success.

Source: PWC Industry 4.0 Study

THE PITFALLS OF FRESH OUTDOOR AIR

Since it was founded in 1982, Airxchange has manufactured energy recovery ventilation products and components that feature outstanding performance, reliability and maintainability.



The company, headquartered in Rockland, MA, has played a pioneering role in the development of standards and third-party performance certification programmes for energy recovery wheels, which are a major component in energy recovery ventilator systems (ERVs) and provide all the health and productivity benefits of outdoor air ventilation while also reducing energy consumption and indoor humidity concerns.

Airxchange's energy efficient ventilation technology is widely available in many configurations, and is incorporated by the majority of the HVAC OEM market into their products, resulting in more than 250,000 installations.

"For public health reasons, building codes define a required minimum amount of outdoor air that commercial buildings must bring in," says David Kirk, Vice President and Chief Operating Officer at Airxchange. "We believe more outdoor air is better for occupant health and productivity, and numerous studies have shown this to be true. In our own facility, we exceed the minimum requirement of outdoor air by 30%, and are always looking for ways to create a better work environment for our employees."

The Challenge: reduce dust levels to improve the work environment

In Airxchange's manufacturing facility where the energy recovery wheels are constructed, "natural" dust – which comes in through open doors, on boxes and parts delivered to the facility and is generated by general manufacturing and equipment operations – presented an opportunity for further improvement to indoor air quality.

"Our ventilation and equipment pickup systems kept the environment acceptable," says Kirk. "But frequent filter changes in the HVAC rooftop units told us there was room for improvement."

In addition, airborne particles not picked up through the systems in the manufacturing area raised several concerns for Airxchange, including:

- the potential for an increase in preventive maintenance on precision equipment
- the need for frequent filter changes in the HVAC and dust collection systems
- additional time required for cleanup thus reducing production time.

Airxchange, in its desire to further improve the indoor environment in its manufacturing area, sought an efficient, cost effective way to do so.

The Solution: Zehnder Clean Air Solutions

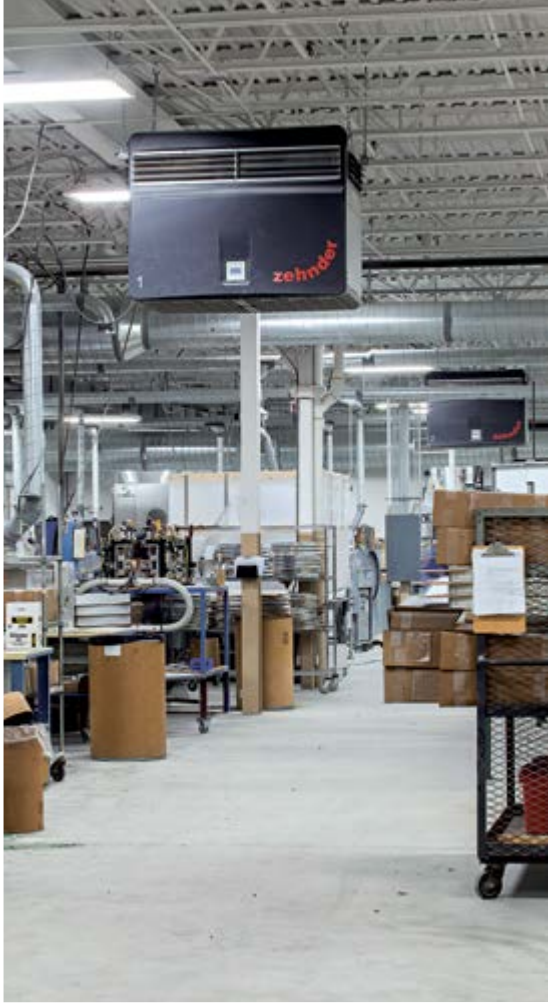
Airxchange personnel were already familiar with Europe-based Zehnder and so contacted Bob Matthews, Vice President of Sales and Operations for Zehnder Clean Air Solutions in the U.S. He quickly determined Zehnder Clean Air Solutions could easily and efficiently improve Airxchange's indoor air quality.

"We monitored the dust conditions in Airxchange's manufacturing area for 12 days," says Matthews. "We found higher than desired levels, and knew our system could improve the air quality tremendously."

The Zehnder CleanAir 6 units were installed to cover approximately 400,000 cubic feet (11,327 m^3) of air in the manufacturing area. The self-contained system installs easily, requires no wall or ceiling penetration or additional ductwork. The installation at Airxchange took less than one day, with no interruption on the production floor.

The Result: cleaner air and a savings in time and operating expenses

"We had been looking for something to further improve the working environment, and we found it with the Zehnder Clean Air Solutions system," says Kirk. "The improvement was significant. Our dust



trackers showed an immediate 55% improvement on average and a 65% improvement at peak times."
In addition to reduced residual dust and a cleaner work environment, Airxchange has enjoyed other benefits with the installation of the Zehnder units, including:

- a 90% reduction in time needed for cleanup
- fewer hours spent on preventive maintenance
- a significant reduction in filter changes in the HVAC and dust collection equipment, resulting in approximately $5,000 in annual savings
- the operators experienced noticeable air quality improvements

"Our employees definitely noticed the improvement, and comment favourably on the improved conditions all the time," says Steve Kennedy, Manager of Manufacturing at Airxchange.

INDUSTRY AIRXCHANGE

COMPANY	Airxchange
PERSON INTERVIEWED	David Kirk, Vice President and COO
SECTOR	Industry
LOCATION	Rockland (Massachusetts), USA
DUST SOURCE	Natural dust generated by general manufacturing and equipment operations coming through open doors
DUST REDUCTION AFTER INSTALLATION	55% on average, 65% at peak times
ALWAYS THE BEST CLIMATE FOR	Cleaner work environment, fewer hours for preventive maintenance, cost savings, improved air quality for employees

MISSION ACCOMPLISHED: CLEAN AIR SOLUTIONS IN LOGISTICS

Göttsche Getränke GmbH & Co. KG, the largest beverage wholesaler in Hamburg and the surrounding area with an annual turnover of EUR 51 million, was looking for an efficient solution to purify the air in its logistic halls covering a total surface area of 4,500 m².

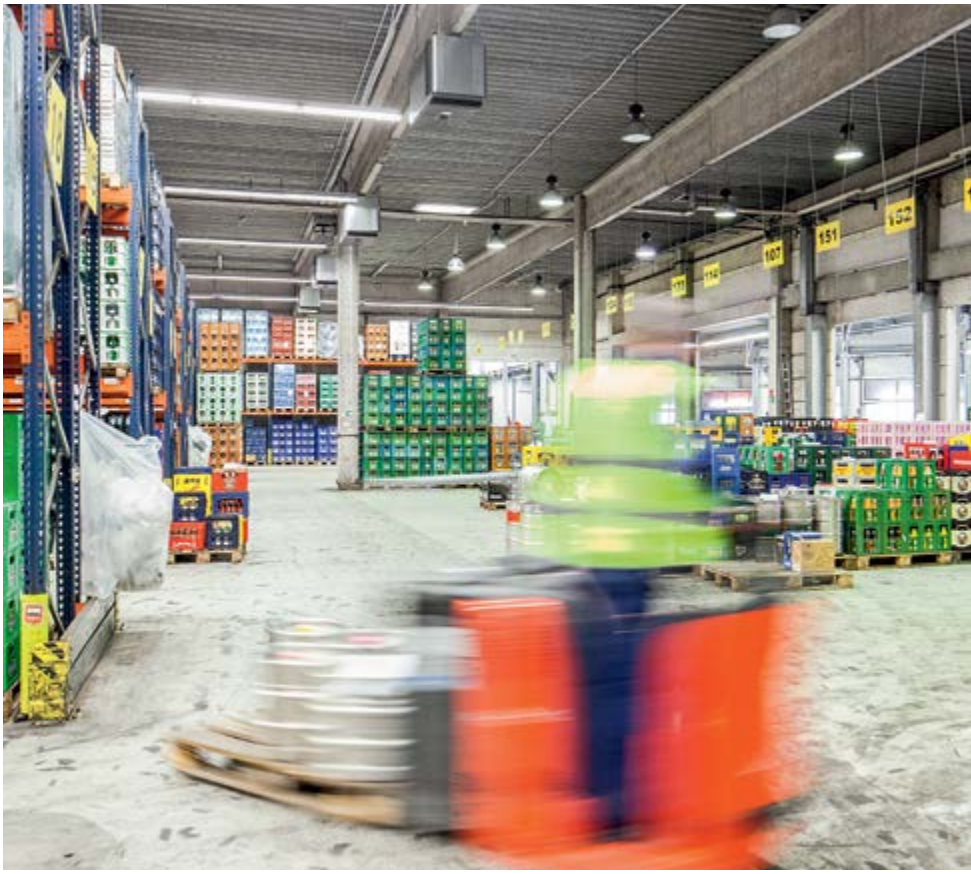
The high levels of industrial truck traffic, floor abrasion during transport and the introduction of external dust meant that a lot of manual cleaning was required and that the appearance of products suffered as a result. The decision by the company to implement a modern air cleaning system reduced dust levels by up to 75% and offered significant benefits: the number of customer complaints was reduced by around 70%, while also reducing the amount of cleaning and improving the well-being of employees.

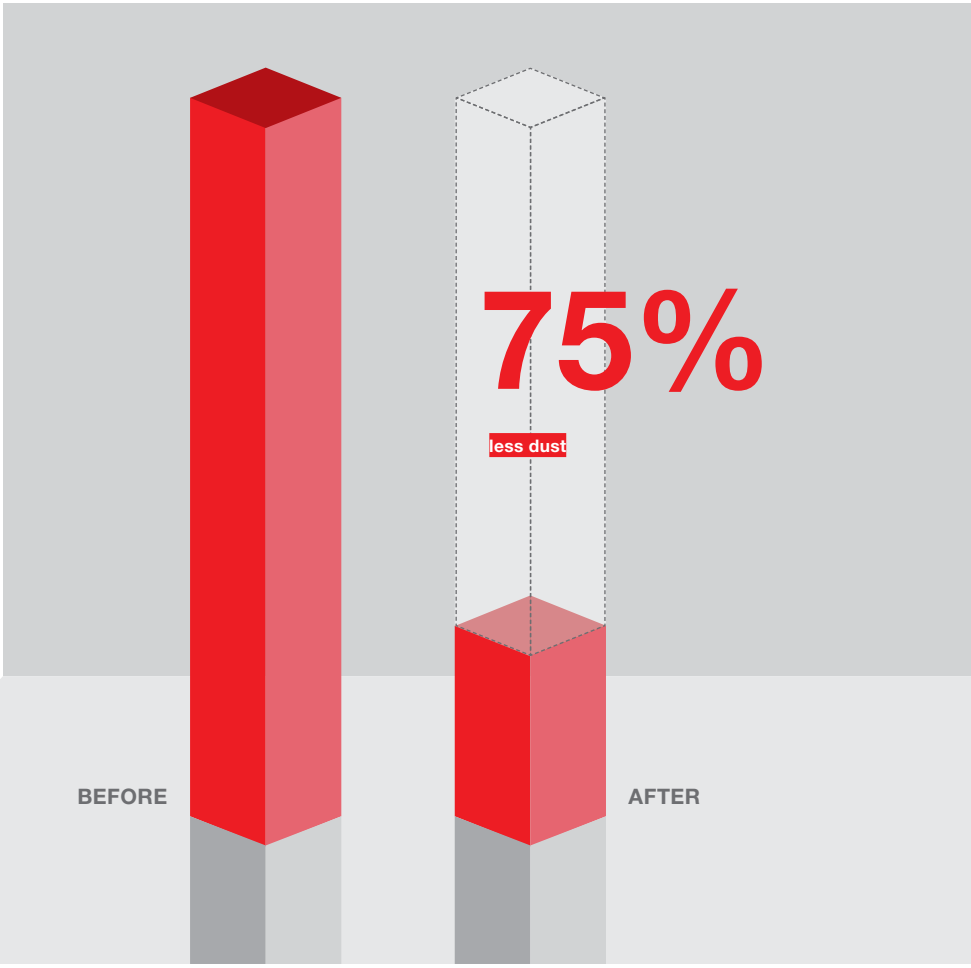
A lot of manual cleaning required to appease unsatisfied customers

Areas used for storage and transport often have high dust levels, which, depending on the extent, can impair the well-being of employees as well as the appearance of goods and product quality, consequently resulting in customer complaints. To reduce the problems caused by dust, companies often resolve to increase cleaning regimes, which does not prevent the distribution of fine particulate matter and merely proves to be a costly way to combat the consequences. This is why the Hamburg-based beverage wholesaler, Göttsche, was seeking a more efficient solution to minimise dust levels in its logistic halls. At Göttsche, the main dust problem was caused by abrasion of the hall floor due to high levels of industrial truck traffic and the introduction of particles through open hall doors. This caused dust to quickly collect on bottles in crates and on the surfaces of boxes on the shelves, which resulted in customer complaints and a lot of work to manually clean the products and premises. “Therefore, our primary objective was to significantly reduce dust levels for our goods and employees to achieve a higher level of customer satisfaction,” explains Andrea Wipprecht, Head of Warehouse Logistics & Logistics Projects. “Additionally, we also wanted to optimise the general cleaning process. The concept of a professional air cleaning system convinced us immediately.” This is because these air cleaning systems filter dust particles out of the air before they can settle and generate cleaning costs or problems relating to the goods or employee health.

Professional air purification at a great price/performance ratio

"At the start, we completed some market research to determine which professional air cleaning system was suitable for us. The primary reason why we opted for Zehnder was the considerable contractual flexibility thanks to the service packages, an excellent price/performance ratio as well as the technical advantages the system had to offer. We were also particularly convinced by the level of competence and support services provided by the company's own sales and service employees, who completed a detailed preliminary analysis of the dust levels and extensive requirement calculations," explains Wipprecht. As a first step, the amount of dust generated was recorded over several days using the latest measuring technology. One of the measuring points was located in the hall, which is used as an allocation area for the routes, and recorded an average dust level of 212 µg/m^3. Another measuring point was placed at the junction between two halls and recorded an average of 167 µg/m^3. In a second stage, Zehnder developed a solution to ensure the optimum purification of the room air in accordance with specific customer requirements. Zehnder CleanAir 3 models have now been implemented as the air cleaning system since August 2015. The air cleaning systems were installed directly in the activity areas, mostly above the main traffic routes in the halls, so that they can absorb the dust particles as close to the location where they are generated as possible. All systems are ceiling mounted on to the hall girders at a height of eight to eleven metres. "The installation of the systems by Zehnder was simple and fast without restricting our general operations," explains Wipprecht. No structural changes had to be implemented either, thanks to the simple and intelligent chain suspension of the systems. In addition to the professional installation, the cooperation with Zehnder also includes any filter replacements,





maintenance and any necessary repairs, thus guaranteeing the functionality of the system at all times thanks to the overall service package.
A dust level reading was completed three months after the installation and recorded a significant reduction of the dust particles in the air. The general dust volume during working hours and rest periods was able to be reduced by up to 75.4%. The average value at the first measuring point was previously 212 µg/m³ and was reduced to 54 µg/m³, while the load at the second measuring point could be reduced from 167 µg/m³ to 41 µg/m³.

Reducing the amount of dust decreased the number of customer complaints by around 70%

The empirical values at Göttsche with the new air cleaning systems are very positive: “Thanks to the professional air purification, we have been able to record a significant reduction in the number of customer complaints by an estimated 70%. The surfaces of bottles and boxes are considerably cleaner, which has also reduced the amount of cleaning work required,” explains Wipprecht. “Our employees also made positive comments just two to three days after the air cleaning systems were installed, stating that the air was noticeably cleaner and that their well-being had improved. The system is operating perfectly, we are very satisfied.”
The use of professional air cleaning has ensured that the working environment at the beverage wholesaler, Göttsche, has been optimised easily and quickly, while reducing the amount of cleaning work and effectively resolving the main problem of products being impaired by fine dust.

BEVERAGE WHOLESALER GÖTTSCHE

COMPANY	Göttsche Getränke GmbH & Co. KG
INTERVIEW PARTNER	Andrea Wipprecht, Head of Warehouse Logistics & Logistics Projects
INDUSTRY	Beverage wholesaler
LOCATION	Hamburg, Germany
DUST SOURCE	Abrasion of the hall floor caused by industrial truck traffic and introduction of particles through open hall doors
DUST REDUCTION AFTER INSTALLATION	More than 75% at both measuring points after three months
ALWAYS THE BEST CLIMATE FOR	Satisfied customers, significantly reduced amount of cleaning work

EXTEND THE LIFETIME OF YOUR FORKLIFTS

Given how hard forklifts are worked, it's hardly surprising how much dust and dirt they absorb from floors and surrounding areas. Keeping warehouses clean is everybody's goal, but small dust particles can escape notice and seriously affect the service life of your working equipment.

Dust in the air

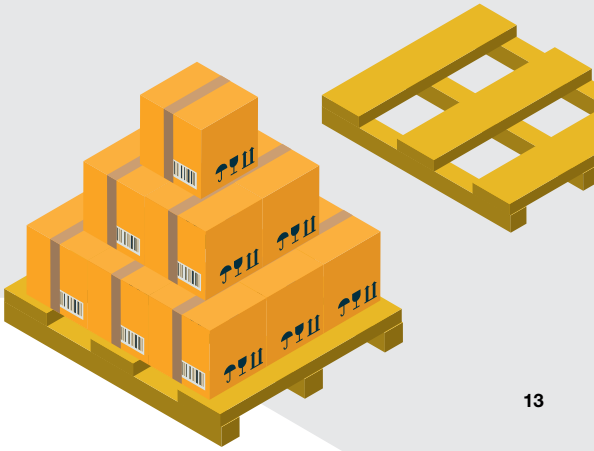
Engine wear, oil contamination or problems of electronical gear are some of the mechanical issues that can considerably reduce the performance of forklifts. Another important factor to consider is how, when in motion, the forklifts' fast moving engine parts spread dust, creating a cyclone effect that scatters the particles into the air. These dust particles are easily absorbed by another piece of equipment and ultimately increase the need for machine maintenance, which in turn decreases production efficiency and reduces your profit margins.
Conventional countermeasures such as air intake systems, cyclone air filters and engine protecting plates are a good start, however they will not fight the dust at source.

Improve your equipment's lifespan

A big cost of dust is that it blocks engines, wearing them down fast and frequently, requiring regular replacement or repair work. This often results in downtime which can disrupt production and affect your customer relationships. This is expensive to manage and can be avoided.
Installing industrial air purification systems will reduce dust particles in a workplace by up to 90%. A clean site does not only mean that your forklifts will work better for longer; it will also considerably cut your cleaning costs and contribute to achieving higher profit margins.

The benefits of industrial air cleaning

Zehnder Clean Air Solutions will help your equipment run smoothly and reliably, reducing your maintenance requirements by up to 30%. Minimising your operating costs, you may concentrate on processes and productivity. The result? Valuable competitive advantages and highly satisfied customers.
And remember, the impact of dust on oil quality affects your forklifts' engines and can cause dangerous emissions. In addition to causing production downtime, these emissions can put the health of your employees at serious risk, and damage the reputation of your company.
Maintaining a clean working environment will reduce the absenteeism of your workforce by up to 40%. A healthy workplace will help keep your staff healthy and motivated.



THE WAREHOUSE OF THE FUTURE

In the next five years, your average warehouse employee could be working side by side with robots. It sounds absurd if you say it out loud, but a combination of technological development and a rapidly changing global economy has made it a very real possibility.

To understand the near future, however, it's first necessary to understand the present. The world's total human population has grown continuously for centuries. Across Europe, however, the birth rate appears to be in decline. This will very likely impact the size of our workforce in the future, which in turn will affect organisational processes as there will be less labour available to hire. While the size of our future workforce may diminish, the global economy continues to grow, with new competitors vying for a piece of the pie daily. The cost of doing business is increasing and thus raising expectations in quality, efficiency and speed of delivery across markets. These challenges are particularly important to consider when managing logistics and production on sites, such as warehouses and factories. Here's why:

The changing face of logistics

The average weight of each shipment is on the rise: more goods – and heavier goods – must be handled and processed. In dealing with this, companies are faced

with a choice. One option is to raise costs and reduce service, but this will be unpopular because customers typically aren't too happy to pay more for less.
The other option is to invest in technology. Using robots and automation, is fast becoming a way to boost productivity while keeping costs down.

Collaborative automated solutions
The "Digital Industry" provides the advantage of digital processes: machines monitored via computer receive their instructions automatically, increasing productivity, accuracy, consistency and predictability of quality. Amongst other benefits, automated machines can now replace humans in tasks that involve hard, physical or monotonous work, or work that occurs in dangerous environments. Thanks to automated machinery, warehouses now have access to conveying systems, mini-load cranes, commissioners and shuttle systems.
With innovations developing at a rapid pace the future should see increasingly sophisticated telescopic conveyor belts, navigation systems, cameras and far more. The advantages of these technological solutions are many and varied. Automation technologies could enable zero-defect logistics processes and substantially boost output, performance and sensing capabilities.
Manual handling will be a thing of the past, and the role of your warehouse operatives will change to accommodate it. They may take on positions where they coordinate and take greater responsibility within the warehouse: in many respects, machines

and robots will be part of everyday work. Robots for example will take on increasingly human qualities in order to react to their environment: they may, for all intents and purposes, have “eyes”, “hands”, and “feet” – even if they look more like monitors and pincers. Using highly sensitive sensors, these machines will be able to load and unload trailers and containers. Stationary and mobile robots may even be able to take over picking and packing duties, selecting and depositing items and assembling and customising each package for delivery.
Robots are an important feature of automation but there is so much more potential to automated machinery, as seen by the fast-paced developments of the last thirty years with modern systems doing far more than simply storing and retrieving unit loads.

Bumps in the road

It’s an exciting time to be in logistics. Robots and automated machines will be able to operate more efficiently, more effectively, and for longer: they don’t get tired, they don’t get sick, they don’t get hungry, they don’t draw a salary, they don’t require breaks, and they have no other commitments.

But highly developed equipment, robots and machines need maintenance. They need to be kept clean to protect, for example, their sensors. When sensors malfunction, it is often an immediate indication of dirt which has a direct impact on their ability to perform tasks quickly and efficiently.
Robots and other automated developments will not develop respiratory difficulties, but an abundance of dust will lead to substandard performance, which will affect productivity and damage margins. They may not require rest, but an unclean environment will cause occasional malfunctions: they may bump into your human workers causing accidents and possible injuries or pick or pack the wrong stock thereby causing delivery delays. All of these things can lead to dissatisfied customers and a reduction in profits.
To combat this, it’s necessary to make sure that your warehouse environment is calibrated to ensure your human workers are healthy, and your machine workers are operating at maximum efficiency.
The benefits of investing in an automated workflow are many, however it’s important to consider how its efficacy and productivity could be affected by possible interruptions caused by a lack of clean air in your warehouse. Any malfunction can result in reduced profits and customer satisfaction – expenses you can’t afford in the short or long-term.
The future is always just over the horizon, and when it comes to robots and automation, those in the logistics industry – and, in fact, anyone running a warehouse – should be happy. Where they are concerned, the future is a rather bright one. But while potential gains in efficacy and profitability are right around the corner, you still need to make the appropriate preparations.
Zehnder Clean Air Solutions is an excellent way of doing exactly that.

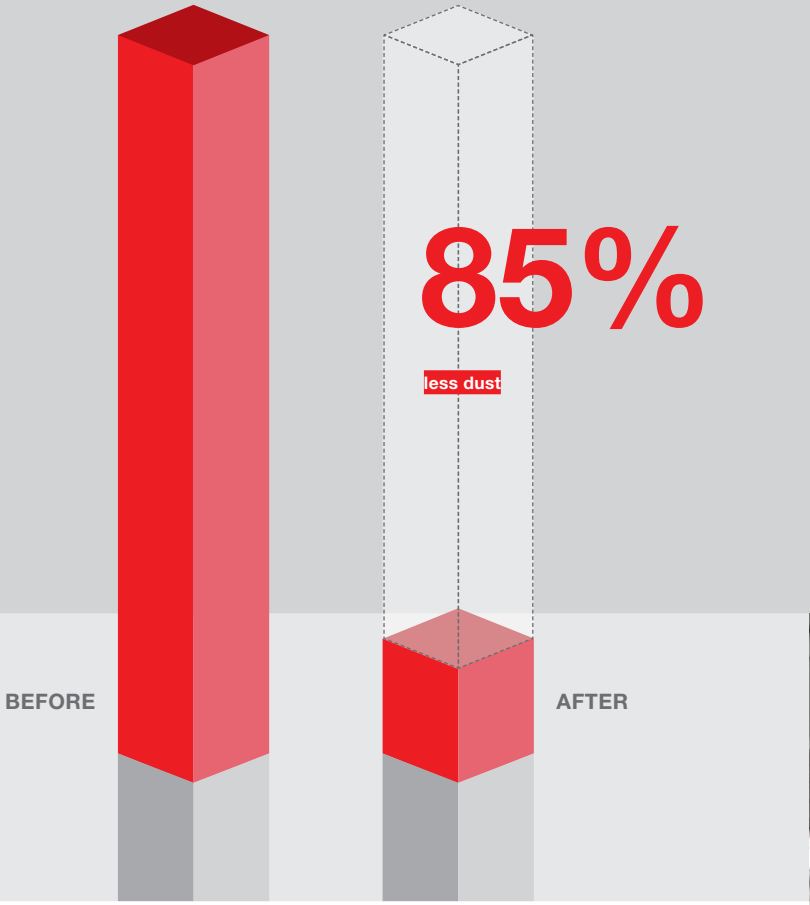
THE CHANGING FACE OF LOGISTICS

IMPORTANT BENEFITS OF AUTOMATION

- Increased productivity which raises the competitive advantage
- Increased predictability of quality with an improved consistency in production and output
- Increased pace and efficiency (i.e. reduced cycle time and higher production rates)
- Increased security
- Reduced production costs
- Reduced waste

UNBEATABLE EFFECTIVENESS IN THE LONG TERM

"Good things are here to stay for those who wait" could be the modern version of the well-known saying, particularly when referring to air cleaning technology from the Zehnder Group.



With its "Clean Air Solutions" division, Zehnder is one of Europe's leading innovators and has had many years of success in the field of industrial air cleaning. A recent dust concentration measurement taken in the production area at POLYTEC Car Styling GmbH in the Austrian town of Hörsching confirmed the effectiveness of Zehnder's air cleaning systems: years after installation, they still reliably extract the dust from the air and reduce the particulate-matter load. Dust is a touchy subject for POLYTEC Car Styling GmbH in Hörsching, which supplies renowned global brands in the automotive industry with genuine plastic accessories. As a specialist in all things plastic, the POLYTEC GROUP operates at 21 locations with 3,500 employees worldwide. Injection moulding, fibre-reinforced plastics and customised industrial solutions using polyurethane are among the core competencies of the company, which has been listed on the stock exchange since 2006. Among other things, the POLYTEC GROUP owes its success to its excellent performance in downstream production processes such as paintwork and polishing as well as the just-in-time and just-in-sequence delivery of its products. Zehnder air cleaning systems played a significant role in perfecting this performance – as a recent study of the paint shop and polishing room of the production facilities in Hörsching has demonstrated. It confirms that the average particulate-matter load has effectively and sustainably been reduced by approx. 85% since the installation of the Zehnder Clean Air Solutions air cleaning systems.

"This sustainability test was for us the proof that the air cleaning in our production spaces is still functioning perfectly," reports Horst Kolar, head of maintenance at POLYTEC. "Thanks to Zehnder Clean Air Solutions, we are still safe and sound when it comes to particulate-matter load, years after the installation of the air cleaning equipment. In particular, the efficient air cleaning in our painting and drying tunnel, which covers approx. 8,000 m^3, ensures that we satisfy our quality standard and perfects the level of performance we offer to our customers. This is because we reliably prevent dust from getting into our painted products. Time and cost-intensive rework such as repeated sanding and

painting therefore becomes unnecessary and the customer receives dust-free, perfectly painted products," explains Kolar, summarising the specific benefits of the Zehnder air cleaning systems in the work process. "At our premises, dust has no chance!" emphasises the engineer.
This is quite the opposite to the situation encountered prior to installing the Zehnder air cleaning systems. "At the time, the dust was even visible from a great distance," describes Kolar. From his office in the production hall, the head of production could see the dust on the products when the sunlight was shining on them in a certain way. This was reason enough for him to tackle the issue of "dust" and "particulate-matter load" and to search for an effective and practical air cleaning solution. When exploring the market for suitable providers, he finally became aware of renowned indoor climate specialist Zehnder and its air cleaning systems, Zehnder Clean Air Solutions.

Professional fine dust measurement reveals all

The experts at Zehnder first carried out extensive dust concentration measurements in the painting and drying tunnel as well as in the polishing room at POLYTEC. These highlighted just how high the PM10 particulate-matter load in the two production spaces actually was. A certified measuring instrument recorded the load of fine particulate matter as being between 0.1 and 10 µm (= micrometre = one-thousandth of a millimetre) over a period of six days and presented it as a mean value. According to international guidelines, mean values of a maximum of 50 µg/m³ of air are the upper load limit for fine particulate matter outdoors. In POLYTEC's drying area, a PM10 particulate-matter load with peak values of up to 700 µg/m³ was reached. The statistical mean value over the six-day measuring period amounted to 96 µg/m³ and therefore exceeded the guidelines for outdoor applications by almost 100%. These were grounds enough for POLYTEC to work together with Zehnder to create a handling concept for air cleaning: two Zehnder CleanAir 12 air cleaning systems, which have an air cleaning capacity of 12,000 m³/h, were installed in the 8,000 m³ painting and drying tunnel. One Zehnder CleanAir 12 proved sufficient for the 2,200 m³ polishing room. This is also where the freshly polished products are stored temporarily until the next work process or until they are ready for packaging and delivery. It is particularly when the polished products are left overnight that dust can settle on them – but this is now prevented very effectively by the Zehnder air cleaning equipment. What's more, POLYTEC saves itself an additional cleaning process in each application, as the air cleaning equipment runs from 3 p.m. when production ceases for the day until 6 a.m. the next morning when work starts again, ensuring clean and dust-free air.

Impressive results

The air cleaning systems were installed quickly and professionally on the ceilings of the painting and drying tunnel and in the polishing room. Each system was suspended from the ceilings within two hours with the aid of forklifts present on site and a special Zehnder chain attachment system. Six months after the air cleaning systems were installed and

after they had had their filters replaced for the first time, the PM10 particulate-matter load measurements reached a peak value of 100 µg/m³ and a statistical mean value of 14 µg/m³ over a measuring period of seven days. The PM10 particulate-matter load had seen its peak values reduced by approx. 86% and its mean values by approx. 85%. In the polishing room too, a reduction in the peak values of approx. 80% and in the statistical mean value of approx. 60% was confirmed.

Long-term success

"For years, the Zehnder air cleaning equipment has been providing an extremely reliable service," states a delighted Horst Kolar. "We only replace the filters twice a year – a quick and practical process. Other than that, air cleaning virtually looks after itself thanks to Zehnder Clean Air Solutions," he concludes. Thanks to the high level of satisfaction that POLYTEC Car Styling GmbH has experienced with Zehnder technology, the company is planning to take the topic of "air cleaning" into account right from start for its upcoming project to construct additional factories.

AUTOMOTIVE SUPPLIER POLYTEC

COMPANY	POLYTEC Car Styling GmbH
INTERVIEW PARTNER	Horst Kolar, head of production
INDUSTRY	Supplier to the automotive industry
LOCATION	Hörsching, Austria
DUST REDUCTION AFTER INSTALLATION	Up to 85%
ALWAYS THE BEST CLIMATE FOR	More efficient work processes, assurance of quality standards, satisfied customers thanks to an improvement in product quality

HYPERMAT: SHOPPING OF A UNIQUE KIND

In 2014, Hypermat opened Scandinavia's largest food store in Charlottenberg in the Swedish county of Värmland. Located on the border between Sweden and Norway and boasting 10,000 square metres of floor space, it offered a high quality, cost-effective shopping experience in an ideal location – complete with a full-scale bakery and butcher's shop where both Swedes and Norwegians go to shop good food.

But conducting a modern retail operation at that scale often comes with complications. Hypermat sells soft drinks, bottled water, and other recyclable goods in high volume. Once consumed, containers will often make their way back to the supermarket to be processed for reuse. "We handle a lot of return bottles and cans", says store manager Kaj Hänninen.
Maintaining air purity in the space where these items are processed is vital, but it's not always simple. Odour, dust, and spilled liquids can pose real threats to any recycling operation – and at first, Hypermat's was no different.

The challenge: Reduce dust and odours to improve indoor air quality
Hypermat supplied a dedicated 25 square metres space for processing returns, complete with four recycling machines. The process of dismantling bottles and cans was automated by a conveyor belt system that fed directly into a shredder on another floor of the store. Once shredded, the materials were placed into outside containers, which were emptied weekly. This shredding process is indeed efficient but not one without downsides. "The shredding and the handling of the empty bottles and cans creates a lot of dust and odours", comments Kaj Hänninen. "As our store is so nice and clean everywhere else, we obviously wanted it to be the same in the area where bottles and cans are recycled."
The air quality in the recycling area is a problem that affects both customer and staff experience: the aroma from residual liquids can be overpowering and off-putting. It was a problem that needed to be resolved quickly, but having tried various methods, Hypermat were at a loss.
"We tried to reduce the air pressure in the space behind the area where bottles and cans are recycled in order to ventilate out the odours" says Kaj Hänninen. "Then we tried to change the cleaning routines and air the area more often. Nothing worked."

A professional air cleaning system was installed
Zehnder Clean Air Solutions had already been in use throughout the supermarket since it opened. The air cleaning systems remove airborne particles in the Hypermat store bakery, warehouse, loading area and in the entrance.

"We had very positive experience of the Zehnder air cleaning systems and when Zehnder offered us the chance to use a customised version of their usual system with special odour-eliminating filter, we jumped at the opportunity." says Kaj Hänninen who had previous experience with Zehnder systems from other stores, in which he had previously worked.

Hypermat – an outstanding shopping experience

Zehnder Clean Air Solutions had a dramatic effect on the recycling area's air quality: after three months only, the odours and dust were completely gone. "We have performed tests in the worst areas of the store, and we have noted that particulate values are extremely low", Kaj said.

Kaj Hänninen sees several advantages in using the Zehnder system. "We've seen major improvement to our working environment", he commented. "Our customers want to return bottles and cans without having to experience an unpleasant smell in an unhygienic area. Zehnder Clean Air Solutions has given us a clean recycling point with excellent air quality."

He adds: "Without having to worry about dust and dirt, our machinery will last longer, too. Cleaner air is good for equipment, has a positive impact on our staff's health and creates an incomparable shopping experience for our customers."

FAST MOVING CONSUMER GOODS HYPERMAT

COMPANY	Hypermat
PERSON INTERVIEWED	Kaj Hänninen, Manager
SECTOR	Fast-moving consumer goods, retail
LOCATION	Charlottenberg, Värmland County, Sweden
DUST SOURCE	Particles from bottles as they are ground off when the customers return them, and odours from beer and mineral water spillage from the bottles and cans
ALWAYS THE BEST CLIMATE FOR	Better user environment for Hypermat customers returning bottles and cans for recycling/ deposit return, also better working environment for personnel who work in the room where the equipment is placed. Furthermore, the life-cycle of the machinery is extended when they are not subject to wear caused by dust particles

RECYCLING: CLEANER ENVIRONMENT INCREASES PRODUCTIVITY

We think of recycling as a modern phenomenon, but our species has been doing it for centuries. In times where materials and money are scarce, the appeal of reusing goods and services is obvious. For this reason, recycling is widespread, with more than 60,000 companies worldwide doing it on a regular basis.

The share of problems

While recycling of course has its benefits, it has also caused its share of problems. In areas where scrap is handled and goods are processed for reuse, fine airborne particles form in the atmosphere. However, regulations are quite strict when it comes to waste handling and the recycling process at large.

As the recycling industry keeps expanding due to tighter and tighter legislation around waste management (because of the desire to send less waste to traditional 'landfill' sites), it is difficult for companies to keep pace when it comes to the health and safety of their staff. Those working in the recycling industry are regularly exposed to dust, fungi and bacteria, as well as endotoxins, all of which are harmful to our health.

In a report by Great Britain's Health and Safety Laboratory, employees should be exposed to a maximum of 10 µg/m^3 of dust over an 8-hour period. Yet, the same study found that employees on recycling sites are regularly exposed to general airborne dust way above this level.

Harry Harrison, head of division at Cannon Confidential, which provides confidential document handling, collection and destruction services, said: "Document destruction generates enormous volumes of dust. This is bad for the working environment, because the dust can have a negative impact on the health of our staff." Indeed, these particles are infamous for causing respiratory difficulties and other health complications. Due to excessive dust, employees are often compelled to wear masks or worse still, to not work at all. Harrison added: "The air quality was so bad that employees who wore contact lenses couldn't even go into the room." Given the sheer volume of waste processed every day, this is not altogether surprising. It is easy to imagine how hard this must have been on the employees – and what impact it had on morale at the company.

The benefits of an air cleaning system

Airborne particles are seen as an unavoidable part of recycling but an air purification system can mitigate much of the damage. Industrial purification systems make it up to 70% easier to maintain a hygienic and clean working environment.

It's a health issue at last

The benefits to staff health become immediately apparent and companies can pass those all-important health inspections with comparatively minimal effort.

For Cannon Confidential, the benefit of installing Zehnder Clean Air Solutions is there for all to see: "It's a win-win situation," explained Harrison. "If you improve the working environment, you inevitably boost employee motivation. When your employees can see that the management team is doing everything it can to improve conditions in the workplace, they'll show their appreciation by working more efficiently."

BEST PRACTICE OF CUSTOMER-CENTRED SERVICE

Comforta Oy, based in Oulu Finland, provides textile services to hotels, restaurants and hospitals. Founded in 2000, it takes enormous pride in the quality of its products and considers textile handling to be a real art.

The team enjoys the work and employees are rarely absent. However, machines were slow and inefficient, cleaning costs were high and staff were regularly suffering from flu like symptoms because of the excess dust in the factory.

Fine fibres circulating

Comforta Oy operates in a giant 1,700 m^2 industrial factory, handling 10,000 kg of textiles every day. Textile handling creates huge amounts of dust. While unpacking different kind of fabrics, fine fibres and fluffs circulate in the air. They are so fine that you can hardly see them.

Such was the dust that it started moving into the ventilation ducts and the machinery, which started to negatively impact operational efficiency because the machines had to be stopped regularly to be cleaned, which in itself was a significant additional cost to the company.

As well as economic and operational challenges, the dust also significantly impacted the working conditions, making work difficult for Comforta Oy's dedicated workforce. Both production manager Marja Rajala and the maintenance staff member Heikki Bolszak received feedback that the breathing air was poor, and the staff suffered from sneezing and coughing on a regular basis. There had to be a solution.

Radical improvement for working conditions

Zehnder Clean Air Solutions were installed in Comforta Oy's Koivuhaka site in 2013, and the results have been excellent.

Since then, the clean air units have been installed across the Mäntsälä, Tampere and Jyväskylä sites.

When hearing about the success across Comforta's other sites, Comforta Oulu decided to install units of the CleanAir 6 and CleanAir 12 models in May 2015.

Initially maintenance staff member Heikki Bolszak was sceptical about the devices. He commented: "I saw the huge amounts of dust and I doubted that a few gadgets could really make any difference."

The air treatment system was installed into the production hall and the results were monitored over a three-month period and thereafter.

Dust decreases by 88 %

In just a year, the amount of dust in the Oulu factory decreased by 88 %, from 520 µg/m^3 to 66 µg/m^3. Heikki Bolszak's suspicions were unfounded.

"We have these tumble dryers that are five to six metres high. During the weekly and monthly cleaning I noticed that the amount of dust on top the ventilation ducts has massively reduced. When there is a

reduced amount of dust in the air, our lives are much easier!"
Production manager Marja Rajala values the staff well-being and work environment above anything else. The summer heat makes it really tiring to work, but last summer there was a big difference thanks to the air cleaning systems. She said: "Effectiveness didn't decrease and it was more comfortable to work as the air flow was better."
And this is not her only observation, as the staff have also said that the air quality has improved, making it easier to breathe in the workplace and massively reducing the number of staff suffering from coughs and colds.

Customer-centred: The Zehnder service
Marja Rajala and Heikki Bolszak are very happy with the partnership with Zehnder. "Zehnder is easy to co-operate with. The instructions are clear, and our opinions are taken into consideration. It's great." Rajala concluded.
Bolszak added: "Zehnder visits regularly which creates the impression that they truly care about the customer. I have a very positive image of their operation and would highly recommend it to any business suffering the same problems we were."

TEXTILE SERVICES COMFORTA OY

COMPANY	Comforta Oy
PERSONS INTERVIEWED	Marja Rajala, Production Manager Heikki Bolszak, Maintenance staff member
SECTOR	Textile services
LOCATION	Oulu, Finland
DUST SOURCE	Dust generated by handling of textiles
DUST REDUCTION AFTER INSTALLATION	88 %
ALWAYS THE BEST CLIMATE FOR	Efficient processes, healthy employees, cleaner working environment, less cleaning efforts

BEHIND THE SCENES

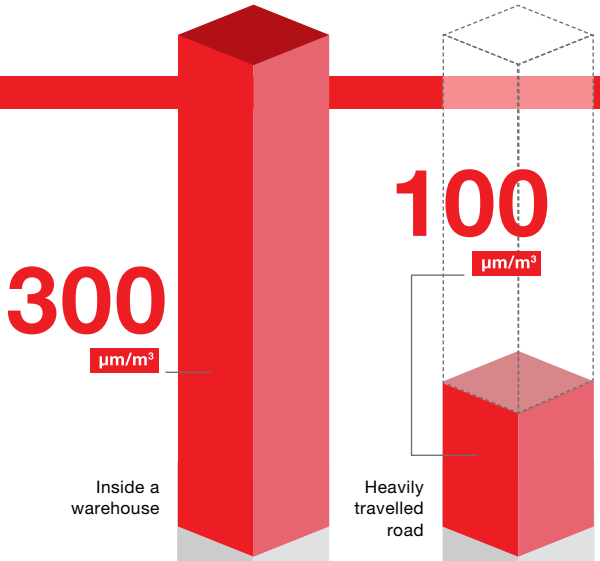
NEWS 01

Legislation lags behind reality: Beware of poor indoor air quality

Throughout the world, governments and regulators place great importance on reducing fine dust exposure in urban road traffic. Measures such as driving bans and legal restrictions are designed to reduce air pollution and to improve the health of people living and working in urban areas. However, what of the state of indoor air quality?

Definition: Fine dust consists of a complex mixture of solid and liquid particles. A distinction is made between the fractions PM10 with a max. diameter of 10 micrometres (µm), PM2.5 as well as ultra-fine particles with a diameter of less than 0.1 µm.

In a directive, the EU has set health-based limits for breathable particles in outdoor environments. Since 2005, these have determined as a 24 hour average value of 50 µg/m³ in the PM10 class – this must not be exceeded on more than 35 days a year. Unfortunately, the levels in many indoor working environments remain much higher than this. Measurements made by Zehnder have shown that for instance the fine dust exposure



in production halls and warehouses is up to 300 µg/m³ and more. Prolonged exposure to such levels can in some cases lead to considerable damage of the human respiratory system. This clearly indicates that the mills of legislation grind too slowly. For this reason, Zehnder Clean Air Solutions works to help employers achieve the same limits for indoor environments as governments and regulators currently require for outdoor air quality.

NEWS 02

Do good and make it known

We at Zehnder Clean Air Solutions strive to improve the quality of life by providing the finest indoor climate solutions. To illustrate how our solutions are of benefit to multiple industries, we just launched a database of case studies, outlining our customers' unique challenges and how our solutions helped them achieve their goals. This database is available online and is divided into the following sectors: Logistics, Industry, Recycling, Retail, Food productions and Public Institutions. To make referencing easier, we have sub-divided the categories even further, allowing customers to find the case study that best corresponds to their needs as quickly as possible.

Take a look: www.zehnder.co.uk/references-air-purification

NEWS 03

A breath of clean air for Italy and Austria

Zehnder Clean Air Solutions is proud to announce new ventures in the Italian and Austrian markets: two vital logistics hubs for trans-European commerce, both of which represent tremendous opportunities for the company.

It's a great time to be launching in both countries. The Italian economy is one of the largest in Europe, and the country's industrial production is undergoing something of a resurgence after five years of sustained crisis: National Gross Production has increased in the last six months.

Meanwhile, our efforts in Austria have already been well-received: we have several existing customers in the region – some of whom have been with us for many years – and more enquiries are constantly being processed. It's easy to see why: Austria is a nation with considerable industrial potential, and with that comes the need for robust hygiene and air quality.

We're present across all important national and transnational routes, including Vienna-Munich, the Brenner Pass, and the historically linked Austro-Italian Tyrol and South Tyrol regions. We're currently in the process of hiring a senior sales manager, a country manager, and other vital personnel, and we have good reason to anticipate further growth, progress, and collaboration between these countries.

The business is in better shape than ever – and we're just getting started!

INTERVIEW

Spotlight on – Magnus Bladh

NAME	Magnus Bladh
AGE	45
DEMOGRAPHICS	Swedish, lives in Stockholm, Schweden
EDUCATIONAL BACKGROUND	Electrical Enigneer and Health & Safety Engineer
PROFESSION AT ZEHNDER	Technical Support Manager
WORKING AT ZEHNDER SINCE	2000
TRUE EXPERT IN	Technical Sales Support

Describe yourself in 5 words: Ambitious, hardworking, good listener… and extremely bad at describing myself in 5 words

What motivates you? My family, my music, my work and a 6 month old Cocker Spaniel named Frans

What would you not leave home without? My Zehnder business cards and my dad's old Fender Jazz Bass

What is your favourite driving music? You can't go wrong with Bob Dylan

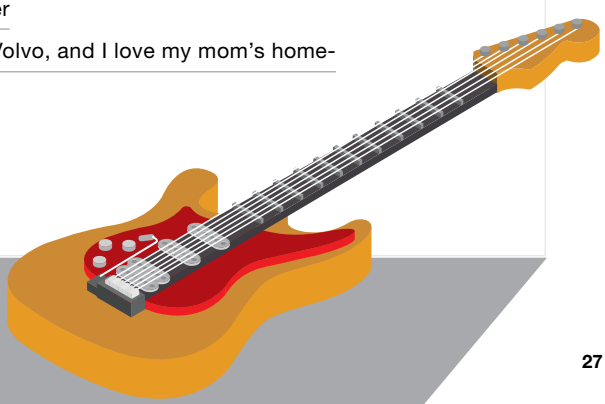
What are you best at cooking? I make a world class Chicken Korma

What's the best trip you have been on? I love New York City; I try to go there as often I can. I played in some jazz clubs in Manhattan a couple of years ago and that was a dream come true

What is the best book you have read? The poems of Tomas Tranströmer are something I always return to

What makes you sad? My heart bleeds when I see people or animals suffer

What Swedish stereotypes do you live up? I own IKEA furniture, drive a Volvo, and I love my mom's home-cooked Swedish meatballs



IMPRINT
We can achieve a lot more together

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