



TRO / **life**
magazine no.10

Shopping air

Shop 'til you drop in fresh room air.

contents



science & technology

EffShop. Sustainable energy schemes for shopping centres of the future.

Page 4



project report

Shopping climate: Feel the breeze.

Page 10



highlights

The history of the consumer society.

Page 24



forum & economy

Consumer climate. Trade in transition.

Page 28



lifestyle

Consumer trends.

Page 30



feature

Sales psychology. The tricks of the secretive seducers.

Page 36



interview

Unibail-Rodamco Germany. Shopping centre specialist.

Page 42



trox internal

Obituary for Heinz Trox.

Page 46



trox news

The 10th TROX life.

Page 48



humour

Shopping: the weird and the wonderful.

Page 54

viewpoint

Consumer

Good room air quality has a definite impact on how successful a shopping centre is: in addition to making consumers stay longer and improving well-being, it also increases work satisfaction and has important health benefits for the sales staff.

Shopping centres are highly complex structures that accommodate thousands of visitors every day who flock to the arcades to browse shops' wares. This is why room air conditioning must do more than just provide a comfortable climate whilst people are there. In fact, when designing a shopping centre, the safety of the many people visiting and working in the environment is not only in the interest of the operators and those renting the spaces, it is also a key consideration when it comes to planning the room air conditioning concept. All over the world, in addition to supplying fresh room air in hundreds of shopping centres, thanks to intelligently connected fire protection systems, TROX Technik also provides reliable solutions for partitioning off fire compartments and for safely removing smoke fumes in a targeted manner using mechanical smoke extract systems in the event of a fire.

In this issue, we introduce two ambitious projects to you: the recently completed Gerber shopping centre in Stuttgart, Germany, and the Mall of Africa in Johannesburg, South Africa, a 120,000 m² shopping centre that will open its doors in 2016.

Heinz Trox, our majority shareholder, sadly passed away on 1 October. We pay tribute to his 56-year work in the company and the industry in an obituary in the TROX internal section.

Existing shopping malls offer enormous opportunities for the technical building services sector. They are being renovated at a rate that is almost four times higher than that of residential buildings. With 28%, wholesale and retail buildings make up the largest proportion of existing non-residential buildings – even more than office buildings, that make up 23%. A good reason then to turn our attention to the world of consumer experience and its facilities and technical specifications in this issue of TROX Life.

I hope that that we have put together an interesting mix for you once again.

Yours



Udo Jung
Chief Sales and Technical Officer
TROX GmbH

EffShop.

Sustainable energy schemes for shopping centres of the future.

Shopping centres are buildings with a very high specific energy consumption. As more and more shopping centres are being built, it is absolutely necessary to develop sustainable energy schemes for the heating, ventilation and air conditioning of this type of building. This is the subject of a future oriented research project of the E.ON Energy Research Center of RWTH Aachen University and the IEK of Leibniz University in Hannover, Germany, a project subsidised by the German Federal Ministry for Economic Affairs and Energy.

EFFICIENCY





The energy required for a shopping centre results from electricity, heating and cooling, and is responsible for a considerable part of the operating costs. A rather large portion of electricity is required for lavish lighting schemes that are intended to present the merchandise in the most favourable light. Lighting, just like occupancy, is a crucial factor when the cooling load has to be calculated. It is not unusual to have maximum cooling capacities in excess of 200 W/m² that need to be dissipated by the ventilation and air conditioning system.

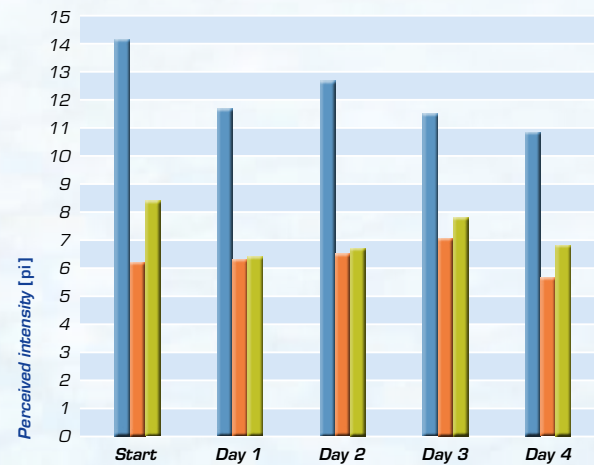
The research project examines two approaches to increasing the energy efficiency. One approach is to use a renewable energy source for cooling. The researchers look at several case studies for geothermal cooling, which provides only a fairly high temperature of 14 to 18 °C for lowering the room temperature. Such high temperature levels are best utilised by induction

units, which are optimised for particularly high secondary air volume flow rates as part of the research project.

The next step is a comparison between these new air-water systems and those which are currently being used. The comparison refers not only to cooling capacities, but also to the comfort level in shops, which is determined with CFD simulations (Computational Fluid Dynamics) based on comfort-relevant criteria.

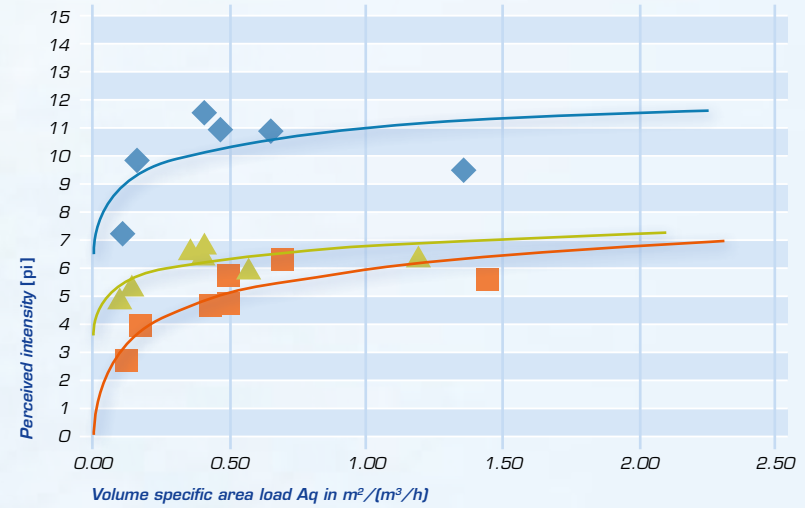
The other possibility to increase energy efficiency is adapting the fresh air flow rate to the actual demand. Nowadays shops are usually supplied with a constant fresh air flow rate. The research project determines the minimum fresh air flow rate based on the air quality as perceived by a test group of people. One of the goals of the research project is to find out how large the fresh air flow rate should be for customers to feel comfortable in a shop with a particular type of merchandise.

Average perceived odour intensity of various product groups over time



Source: EBC Institute for Energy Efficient Buildings and Indoor Climate

Odour intensity of various product groups based on load factor



> A lower air change rate does not lead to a significantly higher odour intensity.
 Source: EBC Institute for Energy Efficient Buildings and Indoor Climate



In the research project of EBC (Institute for Energy Efficient Buildings and Indoor Climate), an E.ON ERC institute, TROX AIR-WATER SYSTEMS were being used.

For this purpose, the air quality in shops with specific goods was tested, namely goods that emit a certain odour, such as shoes, books or clothing; the air quality tests were based on how test persons rated it on a reference scale (acetone percentage in the air). The effects of reduced air change rates on the perceived air quality in a shopping centre can be evaluated by certain 'dilution' characteristics.

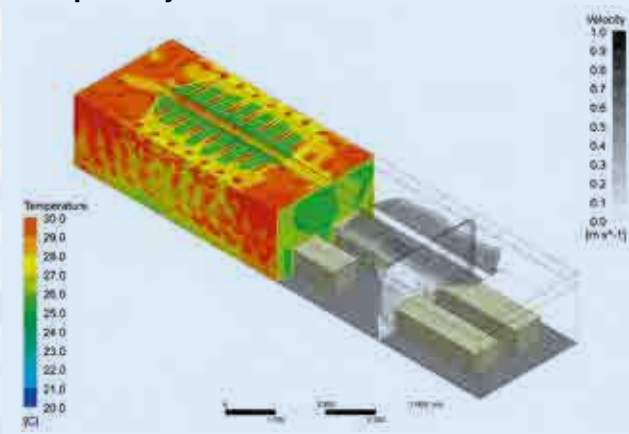
First results have already shown that a constant 3 1/2 air changes per hour in a test lab and over a test period of four days result in a slight decrease of the odour intensity for shoes. For clothing and books, the odour intensity remains almost the same. In order to reduce the perceived odour intensity by 50 %, the air change rate has to be raised by factor 7; this, however,

results in an increase of the energy consumption for ventilation and air conditioning and air transport. If the air change rate is reduced by 50 %, the perceived odour intensity increases by less than one odour unit, which is negligible.

The energy requirement can be drastically reduced.

A first analysis of the results shows that a combination of geothermal energy and an air-water system is likely to save a considerable amount of energy. Cooling capacities of up to 100 W/m² can be provided, even without additional recirculated air units.

Air temperature and velocity with a high cooling load, dissipated by active chilled beams



Source: EBC

The average air change rate can be set to a value between 1.6 and 2.4 per hour by adapting the fresh air flow rate and depending on the actual product group. As the project continues, a new system that can utilise both measures for increasing the energy efficiency shall be tested in practice. Energy savings can hence be achieved without compromising the comfort of users.

EU research group CommONEnergy.

The EU deals with the energy savings potential that is dormant in older shopping centres and can be opened up by energy-efficient refurbishment measures. With the current CommONEnergy research project, which is subsidised by the EU, the scientists want to show what an energy savings potential is actually hidden in shopping centres.

The rate of shopping centre refurbishment projects is above average. In most cases the structure of a building may not have to be refurbished yet, but the building is modernised anyway in shorter intervals than in the case of other types of buildings. This is done for the sake of customers who prefer to visit modern shopping malls and are looking for (the ultimate) shopping experience. If a shopping centre needs to be refurbished anyway, this is also a good opportunity to bring sustainability and energy efficiency up to the latest level.

Mega electricity consumers: shopping centres.

Retail property makes up 28 % of all non-residential buildings in Europe and is hence the biggest segment. Almost 7 % of all retail space is taken up by shopping centres.

A retail area of roughly 112 million square metres consumes 378 kWh of energy per square metre and year, or five times as much as a modern residential building.

According to the EU, an energy savings potential by factor 4 (75 % increase in resource efficiency) is feasible. The refurbishment rate is 4.4 %, i.e. fairly high.

By comparison:

For residential buildings it is only 1 to 1.5 %.

(Source: BPIE, 2011)

Shopping climate

Feel the breeze.

In this article we tell you about two very ambitious projects. In Stuttgart, in southern Germany, the GERBER shopping centre was totally revamped, yet part of the previous façade could be saved. Here we describe the way of the airflow through a shopping centre. In Johannesburg, South Africa, the Mall of Africa is going to be an exciting addition to the pedestrian precinct of Waterfall City. Both projects are excellent examples of an innovative and sustainable design using ventilation and air conditioning systems, units and components from TROX.

GERBER.

An airy shopping centre.

- **Architecture:** Arbeitsgemeinschaft EPA Planungsgruppe GmbH & Bernd Albers Ges. v. Architekten
- **Interior decoration:** Ippolito Fleitz Group
- **Lighting design:** Gerd Pfarrer
- **Building services engineering:** Kuehn Bauer Partner Beratende Ingenieure GmbH
- **HVAC contractors:** Karl Lausser GmbH

GERBER in Stuttgart city centre was opened just about a year ago, on 23 September 2014. With 86 shops and restaurants on three levels with a total area of 25,000 square metres, it is a spacious shopping mall with a window front of nearly one kilometre. 20,000 customers visit the complex on every single day.

With three main entrances from the surrounding streets and additional entrances via the shops and restaurants, GERBER is more firmly embedded in its neighbourhood than most shopping centres.



Quiet, whisper quiet, **SilentAIR** Air terminal devices of Type TDV SilentAIR have a very low sound power level.

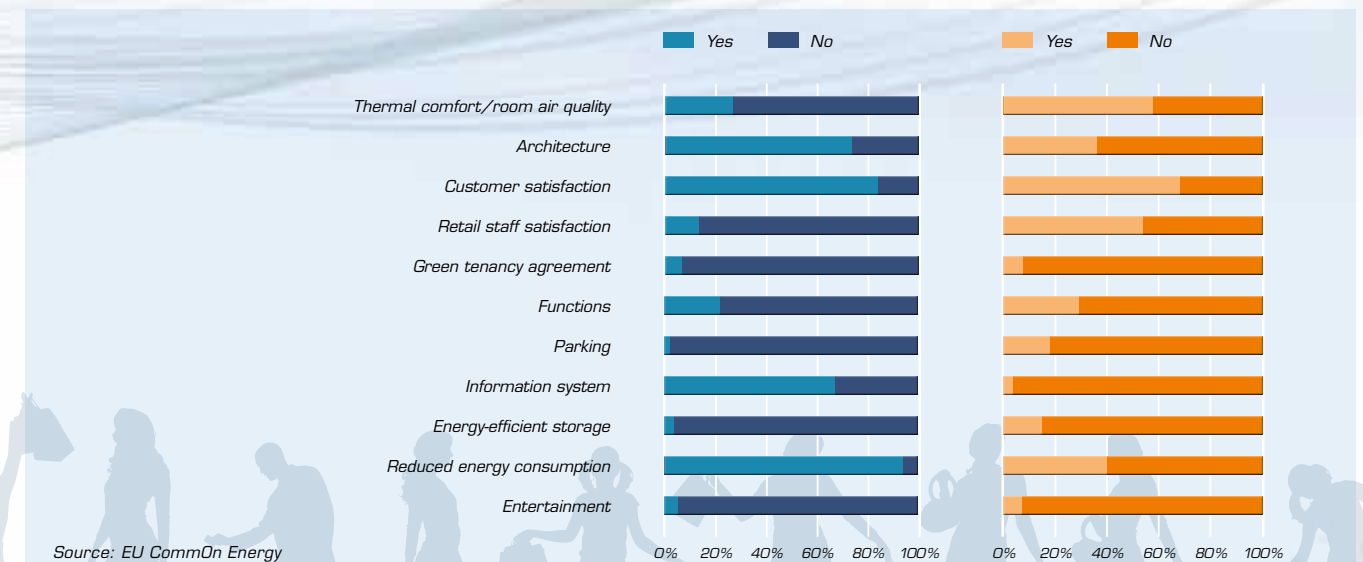
Focus on sustainability.

Sustainability was a major goal of the building owners. And sure enough, the building has been awarded a 'silver certificate' by the German Sustainable Building Council (DGNB). GERBER is one of the first projects of this size with a mixed use scheme that has undergone such a certification process.

Only low-emission and environmentally friendly materials were used for both the building structure and the interior, benefitting both the workers on the construction site and the tenants and visitors as the contaminant load is low.

It is expected that room air measurements will confirm this. Further, the design of ventilation and air conditioning had to meet very high requirements of efficiency and comfort. How significant room air quality actually is, even for a shopping centre, has been proven by a study which the EU initiated as part of the CommOn Energy project.

Importance of factors for improvement according to building owners and tenants:



Source: EU CommOn Energy



Ceiling diffusers such as **TDF SilentAir** are ideal for comfort areas due to their low sound power levels.

Demand-based volume flow control.

The occupancy of shops varies greatly and continuously. This is why demand-based control of ventilation and air conditioning is necessary; VAV terminal units ensure energy efficiency. The CO₂ level, measured with a sensor, indicates whether many or few people are present in a room; if only few people are present, a certain portion of air can be recirculated into the ventilation system. As more people enter the room, the portion of recirculated air is reduced, and the portion of fresh air is increased. With heating mode at night, the supply air is 100 % recirculated air.

Further energy savings potential is opened up by aerodynamically optimised diffusers, energy-efficient air-water systems that dissipate high heat loads, and heat recovery systems that make use of the energy of waste air.

Requirements of energy-efficient operation:

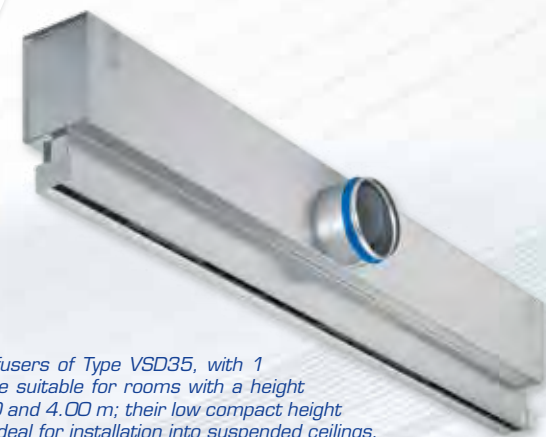
- Demand-based air treatment and discharge
- Minimal energy losses in air treatment processes, e.g. cooling and filtering, and in the distribution channels
- Integration of individual components into an efficient control system
- Combination of areas with the same or similar use into groups with the same ventilation requirements
- Maintenance of comfort room conditions such as temperature, humidity and air quality during the times of use
- Utilisation of energy gains in rooms (solar gain, internal loads)
- Central monitoring: Capturing of parameters such as energy consumption, and signalling in case any setpoint values are exceeded
- Use of regenerative energy resources



HESCO PROCONDIF
It was the goal of the **PROCONDIF** developers to create an innovative ventilation system with air discharge from the top, but with the characteristics of displacement flow ventilation.



Rectangular **VARYCONTROL** VAV terminal units of Type TVJ can be used for supply and extract air in variable volume flow systems.



VSD35
TROX slot diffusers of Type VSD35, with 1 to 4 slots, are suitable for rooms with a height between 2.60 and 4.00 m; their low compact height makes them ideal for installation into suspended ceilings.





TROX X-CUBE air handling unit on the roof of GERBER.

On a walk through GERBER we introduce the features of the ventilation and air conditioning system, including the components that are installed in this temple of consumerism, such as:

- Slot diffusers, floor diffusers, swirl diffusers, HESCO components
- Multileaf dampers, external weather louvres, non-return dampers
- Fire dampers, TROXNETCOM (AS-i)
- VARYCONTROL VAV terminal units
- Filter units, filter elements



The central BMS of GERBER monitors and controls all building services.

X-CUBE units provide healthy air.

A total of 30 X-CUBE air handling units are installed in GERBER. They provide treated supply air with volume flow rates of 3,200 to 33,000 m³/h to the shopping centre; five of the units are equipped with integral refrigeration systems of 50 kW each. Special filter systems ensure that the concentration of particulate matter, which is high in any inner city and particularly in Stuttgart due to its location, is effectively and efficiently kept outside. Clearly, clean air is essential for the well-being and the health of both visitors to the shopping centre and the staff working there.



Stuttgart – the capital of particulate matter pollution.

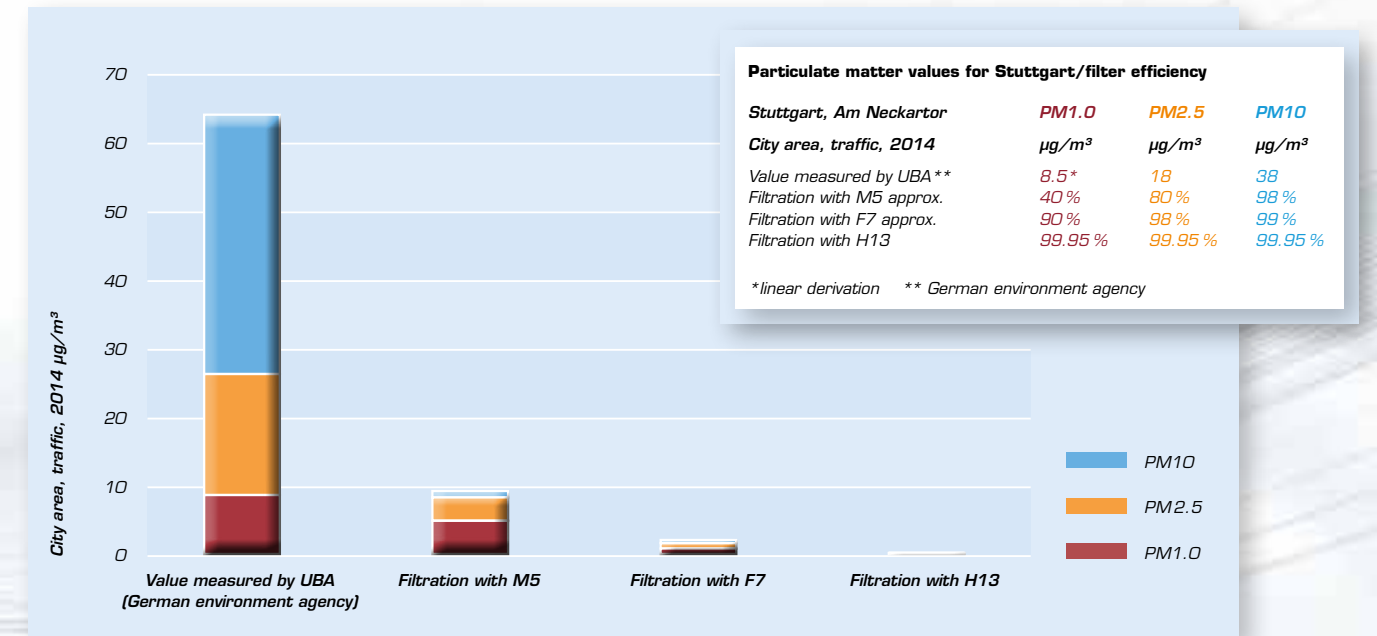
A city surrounded by forest and vineyards: this is how Stuttgart is often affectionately called. As far back as the Middle Ages, a chronicler wrote that Stuttgart would drown in wine if people didn't harvest the grapes. The fact that a big city such as Stuttgart, the capital of the southern German state of Baden-Württemberg, grows so much and then excellent wine is due to its particular topography. Stuttgart is situated in a basin and protected by the Black Forest and several other low mountain ranges; this results in fairly low wind velocities in the basin and in temperatures that allow for growing wine on its slopes.

The downside is that the particulate matter concentration is nowhere in Germany higher than in the Stuttgart basin since the wind

does not blow it away. On up to 89 days per year, a particulate matter concentration of more than 50 micrograms per cubic metre air is measured. On 35 days, this concentration violates EU laws.

It is no surprise, then, that buildings in the city centre require particularly efficient filter systems which keep the hazardous fine dust away from users. Particulate matter is also becoming an issue in international standards. While filter classification to EN 779 was based on a particle size of 0.4 µm in the past, filter efficiency is now tested with three different particle fractions of PM 1.0, PM 2.5 and PM 10. This is an important step towards avoiding particulate matter pollution.

Effective and efficient air filtration, Stuttgart city centre, Am Neckartor



The best possible filter system can only be designed after the dust composition at the installation site has been analysed. The relevant data is available from UBA (German environment agency). The data shows which particulate matter concentrations prevail and what type and arrangement of filters can separate the matter most effectively and most efficiently. We will explain this by way of an example. Imagine that several sieves are available to sieve sand; the sieves

have different mesh apertures, from small to large. To separate small stones and coarse particles, a sieve with a large mesh aperture is used; it requires less energy to provide the required separation (efficiency). Sieves with smaller mesh apertures are only used as required, depending on how fine the sand should eventually be. Air filters work like sieves. Depending on the requirements, filters of filter class M, F or H are used.

project report

Blends in with the city architecture: GERBER. GERBER draws its name from the quarter where it is located; the German word 'Gerber' means 'tanner', and the GERBER shopping centre is located in the quarter where you would find many tanneries in the old days.



Economical separation of particulate matter.

Building owners are obviously also interested in filter systems to be economical. The economic efficiency depends on the type of use, the prevailing dust concentration and the operating hours. For this purpose TROX has developed an LCC analysis tool which considerably simplifies selecting the best filter for an application.

Considering practical and location parameters simplifies and optimises the process for selecting the most efficient filter.

Adapting a filter to local conditions, e.g. air quality, by selecting the correct length or number of pockets, or the balancing between prefilters and final filters, achieves the optimum economic efficiency. In areas where the air is less polluted, filters with a lower filtration efficiency can be used which are less energy-efficient. If, however, the air is more polluted, a higher number of filter pockets may yield the desired result. The energy consumption depends mainly on the average differential pressure over the entire filter life.

Intelligent air handling unit for efficient room air management.

A TROX X-CUBE provides all rooms in the GERBER shopping centre continuously with treated fresh air. A total of approximately 450,000 m³/h. Apart from that, an air handling unit acts as the centre of the automation level. It determines, collects and evaluates all data for the air conditioning system with regard to its functions and the optimisation of these functions. The number of communication interfaces and data points on an existing central BMS could thus be drastically reduced, just like the installation and commissioning effort. Innovative air management systems with intelligent control components ensure the safe communication of the ventilation and air conditioning components. This facilitates the ventilation design considerably. Standard protocols are used for the integration with the central BMS.

devices separate the last few dust particles that might not have been separated by prefilters for reasons of energy efficiency, such that users eventually breathe clean air.

For shops with high heat loads, such as supermarkets, where the lighting, freezers and refrigerated display cases emit much heat, air-water induction units are the ideal alternative. Cooling a room with an all-air system requires large airflows, which incur high costs for air treatment and transport. Air-water systems contain heat exchangers that cool the warm air with water, hence more efficiently than with air. Less energy is required for the same cooling capacity.



Comfortable air discharge.

Diffusers with aerodynamically profiled blades discharge fresh, clean air to the individual shops in GERBER and offer maximum ventilation comfort in the occupied zones to both customers and staff. Many shops actually prefer the ventilation ducts and diffusers to be in full view as such a concept offers a high level of flexibility with regard to the interior decoration of a shop. Final filters in the air terminal

One-stop shop.

In addition to the air distribution, air treatment and air discharge, TROX also sees to the control systems including fire protection and smoke extract components and their intelligent control with TROXNETCOM. A ventilation and air conditioning system from a single source offers specialist consultants the decisive advantage that all components are perfectly complementary to each other. This reduces interface issues and minimises the design effort.

A total of 30 X-CUBE air handling units provide 450,000 m³/h of treated fresh air to GERBER.



Mall of Africa, Waterfall City.

Striking, sustainable
and prestigious.

A gigantic shopping centre with a retail area of 120,000 sqm is currently being erected in the Waterfall City pedestrian precinct near Johannesburg. Engineers and building owners wanted to implement a sustainable ventilation and air conditioning scheme in line with European quality standards and achieve a convincing balance of investment and operating costs.





Here, too, as in the case of the German GERBER shopping centre, engineers have decided to use everything from a single source. The main reason for choosing TROX was the very high quality required for such a prestigious project. In other words: The product quality for which TROX is known all over the world was the decisive factor for being awarded the contract.

These TROX products have been installed:

- Air handling units (TC)
- External weather louvres with acoustic lining (NL)
- Low-leakage steel doors (ST/XT)
- Splitter sound attenuators (XSA)
- Fire dampers (FDF, FKR)
- Ventilation grilles (AT, AR)
- Multileaf dampers (JN-B, JS-B)

Who was involved:

- **Real estate development:** Atterbury Developments
- **Architects:** MDS Architecture
- **Electrical engineering:** Rawlins Wales and Partners
- **VAC contractor:** Total Air Control (Eastern Retail) & Improvair Environmental Solutions (Western Retail) & Luft Technik (façades)
- **HVAC engineers:** Graeme Page Consulting Engineers and Wingrove Consulting
- **Project management:** GHC Africa
- **Site management:** Norval Wentzel Steinberg
- **Support structure:** Aurecon Ingenieure

Room air conditioning.

Not to be seen. Not to be heard. Not to be felt.

Architects and specialist consultants prefer the building services to blend in aesthetically with the architecture of a building. This explains why they have opted for solutions that could be smoothly integrated with the design of the mall. These solutions, made by TROX, ensure thermal comfort in the building. Invisibly, quietly and without causing any draughts.



TROX air handling units of Type TC, developed and manufactured in South Africa.



Fire protection and smoke extract systems for a high standard of safety.

While a high level of ventilation and air conditioning comfort is important, safety is even more important for both building owners and tenants. Intelligent fire protection and smoke extract systems not only help to save lives in

TROX fire dampers of Types FDF and FKR are developed and manufactured in South Africa according to local guidelines.



the event of a fire, but also to protect precious goods. It takes no more than a waste paper basket catching fire, which may be put out in no time, to completely destroy merchandise. The smell of smoke will stick to clothing forever. A mechanical smoke extract system can prevent such damage since it extracts hot fire smoke, thereby protecting the goods.



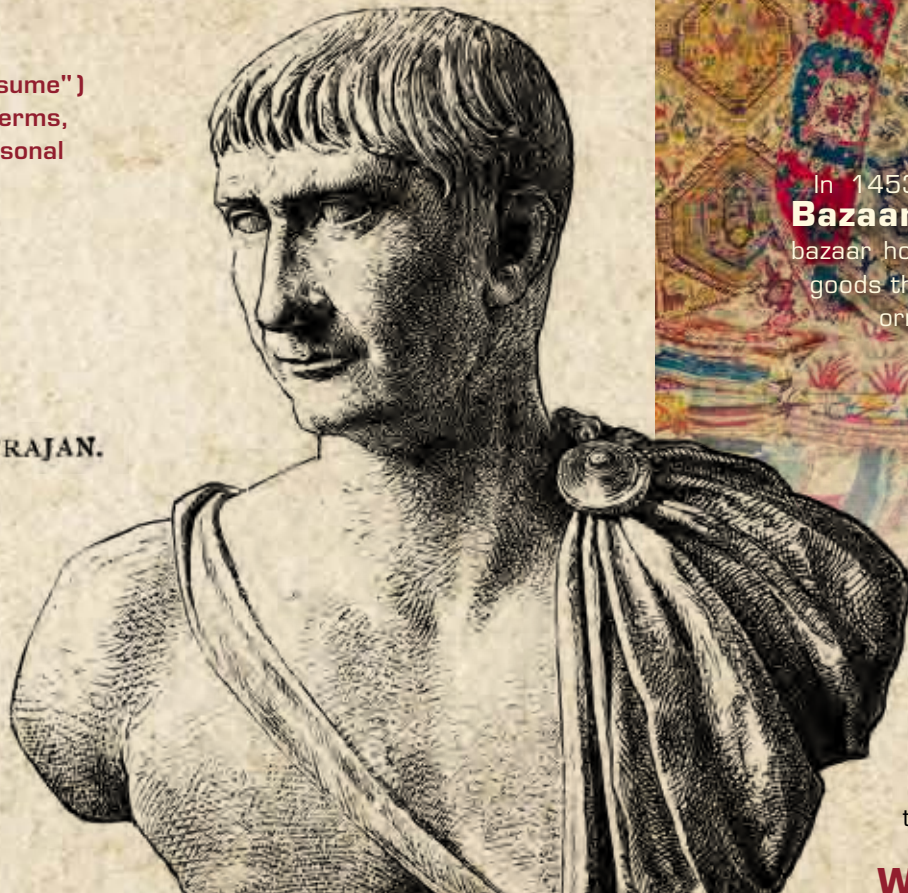
A gigantic shopping mall is currently being built in Johannesburg.

The history of the consumer society.

The term **consumption** (lat. consumere "to consume") means the use of goods and services. In economic terms, it refers to the purchase of goods for private or personal use by consumers (households).

Trajan's Market of ancient Rome is the ancestor of the modern shopping centre. At the time of Emperor Trajan (98–117 AD), like a shopping centre, it had everything under a single roof: more than 150 small businesses in a space of 2000 m², across multiple floors and connected by passages. The halls also played host to concerts and speeches. The roof has a vaulted structure raised on piers, which allows sunlight to shine down into the shops. For two hundred years, all manner of goods were sold in this market: from wine, olive oil, fruit, vegetables and other foodstuffs to spices, fabrics and clothing.

TRAJAN.



In 1453, over 1300 years later, the "**Grand Bazaar of Istanbul**" was built. Today, the bazaar houses around 4000 shops with a range of goods that covers everything from tourist kitsch to ornate carpets, top-quality leather and silk wares, as well as gold and silver. Other attractions include the many banks, mosques, fountains, hamams, restaurants and coffee shops.

The **individual consumer society** developed in England during the 15th century. New printing technologies and the thriving cotton trade quickened consumer behaviour. In this new-age consumer society, people no longer only bought what they needed to survive, but also things to increase their quality of living.

Weekly and annual markets first appeared during the 18th century. Here, people bought what they were unable to make themselves. There was still no fixed price structure at this point and buyers haggled over every price. Conspicuous consumption also took place then, even if only amongst the rich nobility: luxury goods such as fine

spices and materials were very much sought after. The demand for mass consumer goods, such as beer, tea, soap and printed clothing, was also on the up. There were even a few fashion magazines, which further increased consumer demands amongst customers.

The first **department stores**, which were characterised by the fact that they offered fixed prices, were built at the end of the 19th century. Increased choice and intense advertising – promotional materials such as the advertising column had been invented – spurred on consumer demands and the growing appetite for consumerism.

The industrialisation of the 19th century and the economic prosperity of the 20th century following the Second World War were both factors that sparked **mass consumption**. What had previously been considered luxury goods were now becoming mass merchandise. This was the beginning of the globalisation of consumption.

Consumption is as old as man. This is because we have always used goods.



highlights

Consumo ergo sum. Consumer worlds.

The 19th century saw the rise of the traditional inner-city **department stores** in the metropolises of the industrialised countries. The early stages were the roofed shopping arcades of the early 19th century, which, based on the oriental style, housed hundreds of retailers all selling their wares together; for example, the Grand Bazaar (1825) in Paris that accommodated over 300 individual businesses.

Le Bon Marché in Paris is considered the mother of department stores and has been a symbol of luxury and joie de vivre for over 150 years. From 1852 onwards, it was where mass-produced goods were sold at a fixed price for the first time. The prices were cheaper than those of the retailers. Translated from French,

"Bon Marché" actually means "good deal". Nowadays, the display windows once again exhibit exclusive brands without exception.

In 1865, **Harrods** opened in London. The philosophy of the department store also spread into continental Europe and shaped the shopping scene up to the end of the 20th century.

The **Southdale Center**, built in Minneapolis, USA, in 1956, is considered to be the origin of the modern mall. It was the first completely enclosed, air-conditioned shopping centre in the USA. It was designed by Victor Gruen, who had intended for it to be the realisation of his vision for a city replacement with landscaped open spaces, auditoriums, nursery facilities, post offices, doctor's surgeries and office buildings.



The virtual department store.

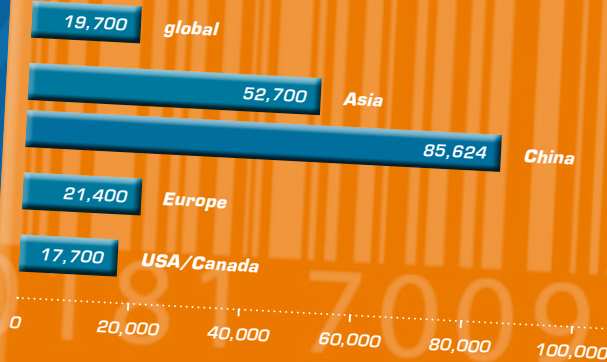
With the advent of the Internet, consumer and purchasing behaviour has changed radically. The Internet can be used to purchase goods directly from the manufacturer, from other countries and, above all, from the comfort of your own home. Now, you can purchase furniture without ever stepping foot outside your door. **Virtual reality** makes it possible. This software projects the sofa for your living room into an image of the room on a smartphone or tablet. As a result, virtual pieces of furniture can be moved around the room with your finger tip, whilst automatically adjusting to different perspectives.

In the State of the World Report 2010, the Worldwatch Institute indicates that global consumption is the top climate killer. If everyone on Earth lived like the Americans do, for example, the planet would only be able to support around 1.4 billion people (instead of the current population of over 7 billion).

The 10 biggest shopping centres in the world

Nine out of the ten biggest shopping centres in the world are in Asia. They offer much more than just "shopping opportunities". They are increasingly turning into amusement parks and lifestyle centres with shops attached. In February 2012, Emporis put together a ranking of the world's biggest shopping centres and analysed the current trends.

Average sales areas of SHOPPING CENTRES



* Source: Cushman & Wakefield Retail Research

The mega malls of the world.

1. New South China Mall, Dongguan, China:	600,000 m²
2. Golden Resources Mall, Peking, China:	557,000 m²
3. SM City North EDSA, Quezon City, Philippines:	482,200 m²
4. Utama, Selangor, Malaysia:	465,000 m²
5. Central World, Bangkok, Thailand:	430,000 m²
6. Persian Gulf Complex, Shiraz, Iran:	420,000 m²
7. Mid Valley Mega Mall, Kuala Lumpur, Malaysia:	420,000 m²
8. Cevahir Mall, Istanbul, Turkey:	420,000 m²
9. Dubai Mall, UAE:	350,000 m²
10. West Edmonton Mall, Canada:	350,000 m²

Based on gross rental area (m²)

Source: Emporis

i A gigantic, **740,000 m²** shopping centre is planned in **Dubai**.





Consumer climate.

Trade in transition.



*Sources: 1 Jones Lang LaSalle, 2 deals.com, 3 eMarketer, 4 EEC Köln

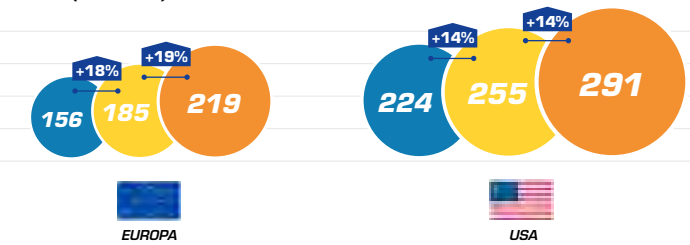
Across the world, shopping malls are showing above-average levels of investment – and the trend is growing.

The rate of renovation amongst shopping malls is almost four times as high as that of residential buildings. In Europe, as far as construction investment is concerned, commercial buildings make up the strongest segment with 20%¹. Jones Lang LaSalle estimates that by 2020, 160–180 billion US dollars will be invested in retail property. That corresponds to an increase of 30 to 50 percent compared to 2011. Last decade, the total value of commercial properties traded across the world was around one trillion dollars, with capital movements increasingly shifting into the Asian Pacific region due to favourable demographic developments and growing buying power. But how long can this continuing trend last? Will e-commerce lead to the death of traditional shopping centres in the future?

Shopping 4.0. The death of in-store commerce?

One thing is clear: the growth of online shopping is unrelenting and growth rates are always in double figures.² Last year, over 1.3 trillion US dollars were spent online across the globe. More than one billion people shopped online around the world.³ Experts are estimating sales of almost 1.6 trillion for 2015, and in excess of 2 trillion in 2017. The Asia-Pacific region has surpassed North America as the region with the highest sales, which above all, is down to the high double-digit growth in China, Indonesia and India, as well as the high sales level in Japan and North Korea.

Online trade sales in Europe and the USA (in € billion)



Development 2013 – 2015 [forecast]

Source: deals.com

The trend towards multi-channel shopping.

Nowadays, customers' shopping habits are very much dependent on their mood: they use every channel possible, not just sticking to either in-store or online shopping. Studies suggest that customers like to get information about potential purchases online and then buy in-store or the other way round. Around 40 percent⁴ of all in-store purchases follow a search on online shops. This has particular importance for shop-based traders: if customers are unable to find you online, to them, you might as well not exist at all.

CONSUMER TRENDS

Style Guide

London is a melting pot of cultures and ethnic groups from all over the world. That's why this British metropolis is also one of the most popular shopping destinations and always has something new and exciting to bring to shopping culture.



Carnaby Street
1968



London: the place to be.

In the Sixties, it was Carnaby Street in London's Soho where world-famous fashion designers such as Mary Quant created the iconic pieces of the Swinging Sixties. And in the Seventies, the area had a magical pull on the flower power generation. The Marquee Club was the springboard into the international music industry for the entire blues rock scene. Every evening, the venue hosted two live acts. All the legends of rock, at one time or another, performed in this small, nondescript club: from the Stones to Jimi Hendrix and Eric Clapton, to Pink Floyd, Queen and The Who.



Grinding coffee like Granny used to.
Photo: ©Manufactum

And the British metropolis still has that very special something about it. It's considered the British nucleus for new trends and styles. Its multicultural influences shape the international shopping scene. That's why it's also a popular destination for anyone looking for the next big thing. TROX life has tracked down the hottest trends for you there and other places, too.

Organic and authentic.

There is an obvious growing trend for natural, authentic products. More and more, consumers are turning to locally sourced and produced goods. The popularity of original products is also on the up: consumer focus is now on authenticity rather than artificial consumer worlds. In a fast-paced world, established and trusted brands are once again providing security and direction.



Gail's in London has become the embodiment of authentic food.

We're longing to go back to the good old days. Known as "vintage", this is the current trend of choice. As well as being increasingly reflected in people's kitchens with the resurgence of traditional kitchen accessories and materials, such as wood and stone, the vintage style also has a very strong presence in the gastronomy and food trade sector. Bakeries look like bakeries again and have stopped trying so hard to be cool and different.

Restaurants are remembering the quality of locally and sustainably sourced produce.

Vintage style:
Grandpa's briefcase makes a come-back.



The "Shopper" from Anderson turns the shopping trolley into a modern shopping companion.



Photo: © Andersen

And even fashion is now picking up on this growing trend. The marketing façades of Abercrombie & Fitch are crumbling to pieces. Losses are reported whilst a passion for going back to real values and sustainability is enjoying ever-growing popularity. So it's not a surprise that even the unconventional OnePiece onesie for adults from the trendy Norwegian tailor's has become the pinnacle of chill-out clothing since Justin Bieber and Ronan Keating were admired wearing the quirky all-in-ones. But even everyday items that went out of fashion long ago are suddenly cool again: think your Granny's shopping trolley, for example, but this time with a quirky printed motif.



Cool fashion in one item: the onesie from OnePiece
Photo: ©OnePiece



London sets trends.
Photo: ©StoryDeli



Consuming in good conscience.

Ethical consumption has become a mega trend. And that's not surprising when you think about pollution, impending climate catastrophes and the atrocious working conditions in the workshops of Bangladesh, China and Pakistan. Consumers are finding their conscience again and no longer consuming everything that comes their way. Greed isn't cool any more.

Companies are increasingly bowing to public pressure and seeking out ethical opportunities and products. As a result, "good" products are experiencing a boom. This trend is even being seen in the automotive sector, which was previously dominated by horsepower frenzy and petrol-filled air. BMW is on the way to becoming the world's most sustainable automotive manufacturer. The processes for manufacturing and driving the i3 are claimed to be as environmentally friendly as is currently possible. With the mega city vehicles of the i series, BMW is starting off in a brand new direction. A radical change of course, which, in light of growing cities in China, India and Brazil that are in danger of choking on exhaust fumes, is intended to lead to lower CO₂ emissions. The seat covers in the i3 are made of recycled polyester. Leather is tanned in an olive-leaf extract, materials for the door panels are extracted from natural hemp fibres and the body is made of high-tech material carbon, which weighs around 50% less than steel and 30% less than aluminium. As production in the USA, where the innovative plastic passenger cabins are being produced, uses a lot of energy, the production facility is powered by a hydroelectric power plant. The assembly plant in Leipzig, Germany, is powered by electricity generated by wind turbines located at the production site.

Last-minute food by app.

Around 80 kg of food is thrown away per person in industrialised nations each year. Francesco Ardito from Turin, Italy, has developed a wonderful app* as a way of putting a stop to waste on this scale. It supplies freshly prepared fine food with a limited shelf life, such as pasta, on a last-minute basis. Customers can use their smartphone to purchase food just before its expiration date easily – and at a significantly lower cost. It's a win-win for everyone: retailers are happy that they don't need to throw away food any more and get new customers; buyers are happy because they get quality, fresh food at an attractive price. 22 retailers have already registered and over 25,000 customers are already using this smart app.

*www.lastminutesottocasa.it

Casual and healthy dining.

A new form of fast food has sprung up in buzzing cities where business people rush around from meeting to meeting with little time for eating. It represents a counter-movement against the classic fast food joints such as McDonald's, Burger King and Kentucky Fried Chicken. Restaurants like these have been feeling the pain of the growing competition from these new competitors. And since they've come to the table, fresh foods and individually prepared snacks have been enjoying all-time-high levels of popularity. Ethic and ethnic food are what's in and fatty burgers that are bad for the environment – and not to mention your waistline – are out. People are paying increasing attention to where their meat and vegetables come from, their effect on the environment and how they can show their support for human rights. Mono-concepts, that offer a clear but individual range, such as Burger & Lobster, are particularly trendy.





Toppling the walls of fixed shopping malls.

It's easily improvised and put together. Artificial shopfronts and façades are out. Pop-up stores and malls are turning retail on its head. Situated in the heart of London's East End, Boxpark, which sits on a plot of unused land where the old goods yard used to be, is a shopping centre created from 61 disused shipping containers. However, it has a limited shelf life and in five years it will move on. Luxury apartments and office buildings will be built in its place.

The concept of this pop-up mall provides retailers and the creative industries with a promising platform for their wares. With a prime location in one of London's hottest districts, Boxpark offers impressive benefits such as short tenancies, reasonable costs and a great deal of flexibility. And this strikes a chord with the current trend towards sustainability. What's more, since it was built, it has become the place to be for London's cool scene.

Gimmicks that no one really needs ...

... but everyone wants. The Gyro Gearlooses of this world are always coming up with surprising – some might say unnecessary – inventions, which are desirable not least because they are unusual, but also because they meet our need for sustainable solutions, too.



1. petpointer GPS tracking system Keep your dog or cat in check with the petpointer GPS tracking system. **2. Solar smartphone charger** Sustainably generate power for your smartphone with the window solar charger from XD Design.



_3



_4



_6



3. Smartphone handset receiver Make calls like in the good old days with the retro mobile handset receiver. **4. RavPower** Use induction to transfer power to your smartphone without cables. **5. Wipowerband for the Apple Watch** The Apple Watch has only just hit the market and it already has accessories: the Wipowerband extends the watch's battery life. **6. Bluelounge Cablebin** The Bluelounge Cablebin does away with cable clutter.

Tips for your London shopping trip:

BOXPARK
2-10 Bethnal Green Rd, London, E1 6GY, UK

ORGANIC FOOD STORES
- Natural Kitchen, 77/78 Marylebone High Street, London, W1U 5JX, UK
- Daylesford Selfridges Food Hall, 400 Oxford Street, London, W1A 1AB, UK

CASUAL DINING, AUTHENTIC FOOD
Cicchetti London, 215 PICCADILLY, London, W1J 9HL, UK

CARLUCCIO'S
2a Garrick Street, Covent Garden, Central London WC2E 9BH, UK

GAIL'S BAKERY
209 King's Road, London SW3 5ED, UK

STORY DELI
123 Bethnal Green Rd, London, E27 DG, UK

Sales psychology.

The tricks of the
secretive seducers.

Selling is a science all of its own: it is constantly coming up with new, psychological sales strategies that are surprisingly effective at getting us to part with our cash with the promise of happiness and recognition.



feature

The Chivas Regal effect.

This whisky only became popular when it significantly increased its price. Well, you get what you pay for, after all! And that's why we subconsciously come to the conclusion that the expensive stuff is the good stuff.

Gifts mean bigger tips.

That sweet piece of chocolate with the bill or that free espresso: these aren't just kind gestures, they're calculated, tactical devices that waiters use to increase their tips by 14% on average.



First the trousers then the belt.

Men's outfitters will always sell the suit first. Once that's in the bag, they offer the customer a belt. The order is important as the customer will automatically use the first, high price for the trousers as a reference point; compared to that, 99 pounds for a belt seems like a bargain.



Shelves at eye level.

We pay more attention to products positioned at heights between 150 and 175 cm. This has a great impact on product placement: ultimately, an item placed in this "golden zone" will sell 50 to 80% more frequently than if the same item were placed at ankle level.

The magical growth of the shopping trolley.

Baskets in shopping trolleys have gradually got bigger and bigger: so gradually in fact that the change has gone mostly unnoticed. Bigger baskets create the illusion of having bought less. And this illusion is reinforced by the fact that the bottom of the basket now slopes down towards the pusher, which makes the goods roll out of view.



Music makes you buy.

The musical genre affects what we perceive to be expensive or cheap. According to one study, in an American wine shop, consumer willingness to spend tripled when classical music was played compared to the Top 40 that was played before – with the same amount of bottles sold.

Psychological tricks for increasing sales.

Scores of market researchers go out and about to develop these kinds of seductive sales strategies. Around 12,000 young men and women from around the world were asked about their sexual fantasies and flirting tactics for the Lynx brand (or Axe as it's known in some countries). Market researchers went into trendy pubs to find out about the mating behaviour of young people. Using the results of this study meant that the company was able to successfully position the brand: Lynx leads to success with the women.





The reproductive instinct influences consumer behaviour.

This was the conclusion reached by Vldas Griskevicius, social psychologist. On days when they were fertile, female students were significantly more likely to choose sexy outfits. That meant seductive miniskirts rather than austere trousers and high heels instead of flat, sensible footwear. This was especially the case when other attractive women – potential competitors – were nearby. And when there was a shortage of women, men spent considerably more money.

Pleasant air and a pleasing scent encourage visitors to stay longer.

Studies have shown that good room air quality encourages visitors to stay longer in shops. What's more, many shopping venues are not only ventilated, they are also scented.

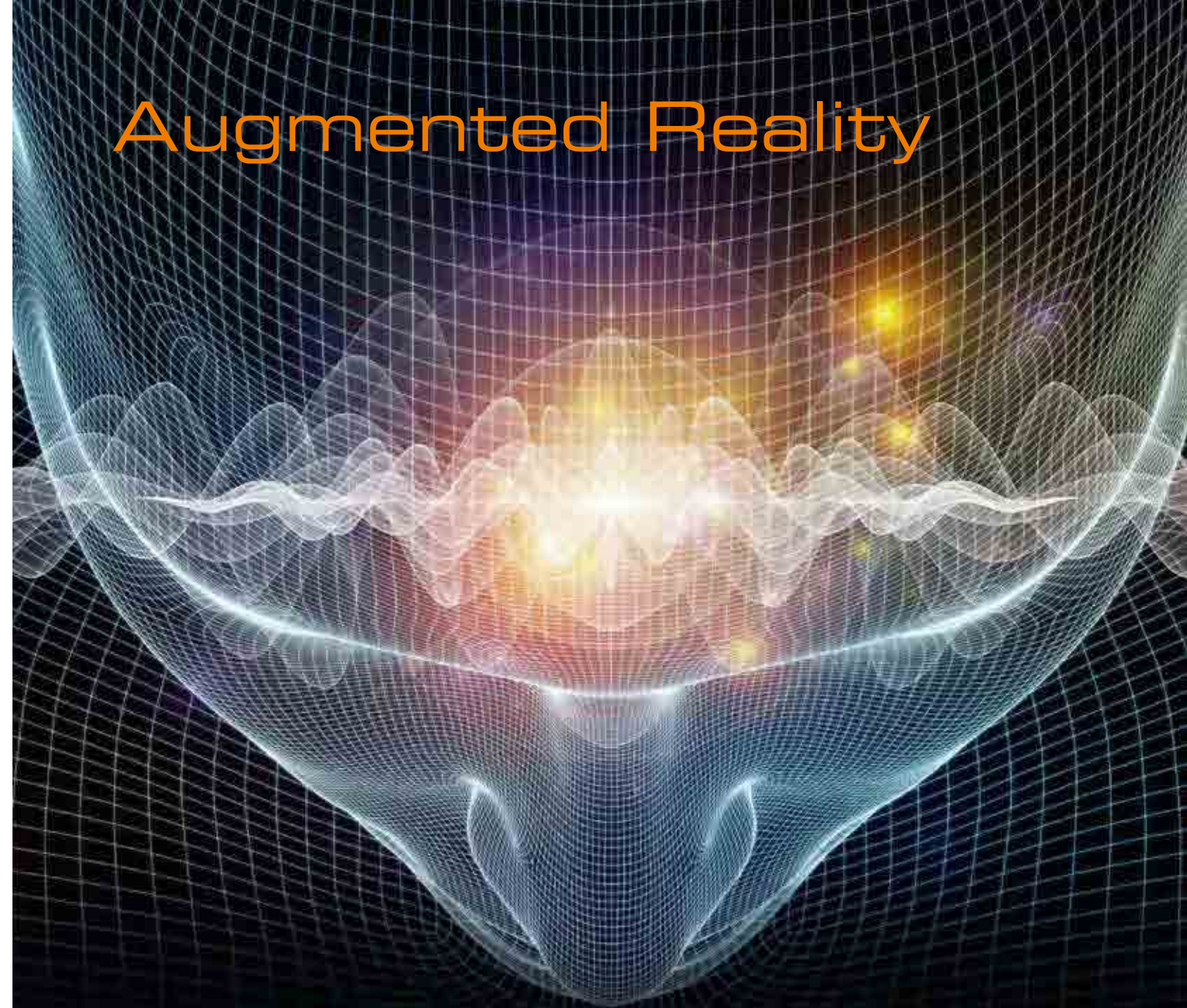
Smells have an unconscious long-distance effect. Supposedly, vanilla scents encourage women to spend money, whilst consumer behaviour amongst men is spurred on by spicy aromas. This is why DIY stores smell like grass. Customers stay in scented sales rooms for around 16% longer and their willingness to shop increases by 15%.*

But it can also have the opposite effect: one department store in Japan used scents that have been proven to induce fear – in their complaints department. Scared by the smell, customers accepted the explanations of the employee in charge and left the department store without asking for a refund.

*Study from the University of Paderborn, Germany



Augmented Reality



Augmented reality (AR)

Augmented reality is the computer-supported expansion of what we perceive to be real. Frequently, however, we only think of it in terms of the visual representation of information; i.e. adding to images or videos by overlaying them with additional computer-generated information or virtual objects.



Unibail- Rodamco Germany

Shopping centre specialist

An interview with
Michael Prior,
Head of Technical
Building Services



Unibail-Rodamco Germany – known up until its rebrand in August as mfi management für immobilien AG – is a leading German shopping centre company with its headquarters in Dusseldorf, Germany. It currently manages 27 shopping centres, nine of which belong to the company itself. The majority owner is Unibail-Rodamco SE, Europe's largest listed commercial property company. We spoke with Michael Prior, Head of Technical Building Services, about the shopping centre market.

Has the traditional shopping mall concept become a dinosaur, threatened with extinction by the growing number of Internet purchases?

Well, unlike the dinosaurs, we always keep our eye on trends in society, and anyone can see how these are reflected in our shopping centres. Alongside consumerism, nowadays the demand for entertainment, relaxation and well-being experiences play an increasingly important role. These days, a successful shopping centre has to offer its customers a unique shopping and recreational experience. Shopping centres have become a place to meet friends, enjoy good food, relax to a backdrop of a pleasant soundscape and feel inspired to stay a while. If a shopping centre is able to do that, it will stay relevant on the market and not die out.



Can you illustrate that with an example?

Interior architecture has taken up a key role: it has the task of defining the character of the experience through the medium of design. This combination of shopping and experience is called the "customer experience". Customers have to feel like they are welcome in our shopping centres, like they are guests who we've invited in to stay a while. For example, we've introduced a 4-star service label – a commitment that we've set ourselves to deliver an excellent quality of customer experience with consistently high service standards. In the Minto shopping centre, which opened in Mönchengladbach, Germany, in March 2015, we have a streamlined customer guidance system, a large reception area with multilingual receptionists, interactive multimedia terminals as well as attractive toilet facilities with baby lounges. The interior design of the centre has been shaped by attributes such as cosy, inviting, tasteful, sensual and magical, and these are reflected in the top-quality materials used for the floor, the comfortable lounge area, which offers rest and relaxation, and an extensive food court. The shop design is also a focal point of the interior architecture. Thanks to our ultra-modern shops, some of which feature our "iconic shopfronts" that span multiple floors, we are able to offer our customers a unique shopping experience.

Shopping centres have big energy requirements. What measures is UR Germany taking to keep power consumption within limits?

In our corporate philosophy, we see ourselves as a sustainable operator and owner that has a permanent responsibility to provide sustainable concepts and therefore ensure that the value of the property constantly increases. For this reason, a large part of our focus is dedicated to balancing economical and ecological factors when designing and building shopping centres. There is a great number of aspects to consider in this process: these include laying out the building in a way that is conducive to producing a favourable climate, using renewable energy sources, getting the right lighting concept, as well as many other factors such as using highly efficient HVAC systems. Currently, in the air conditioning and ventilation sector, innovative technologies help us to exploit huge energy saving potentials. Intelligently linking these components is a huge part of this because it makes efficient, demand-based energy management possible.

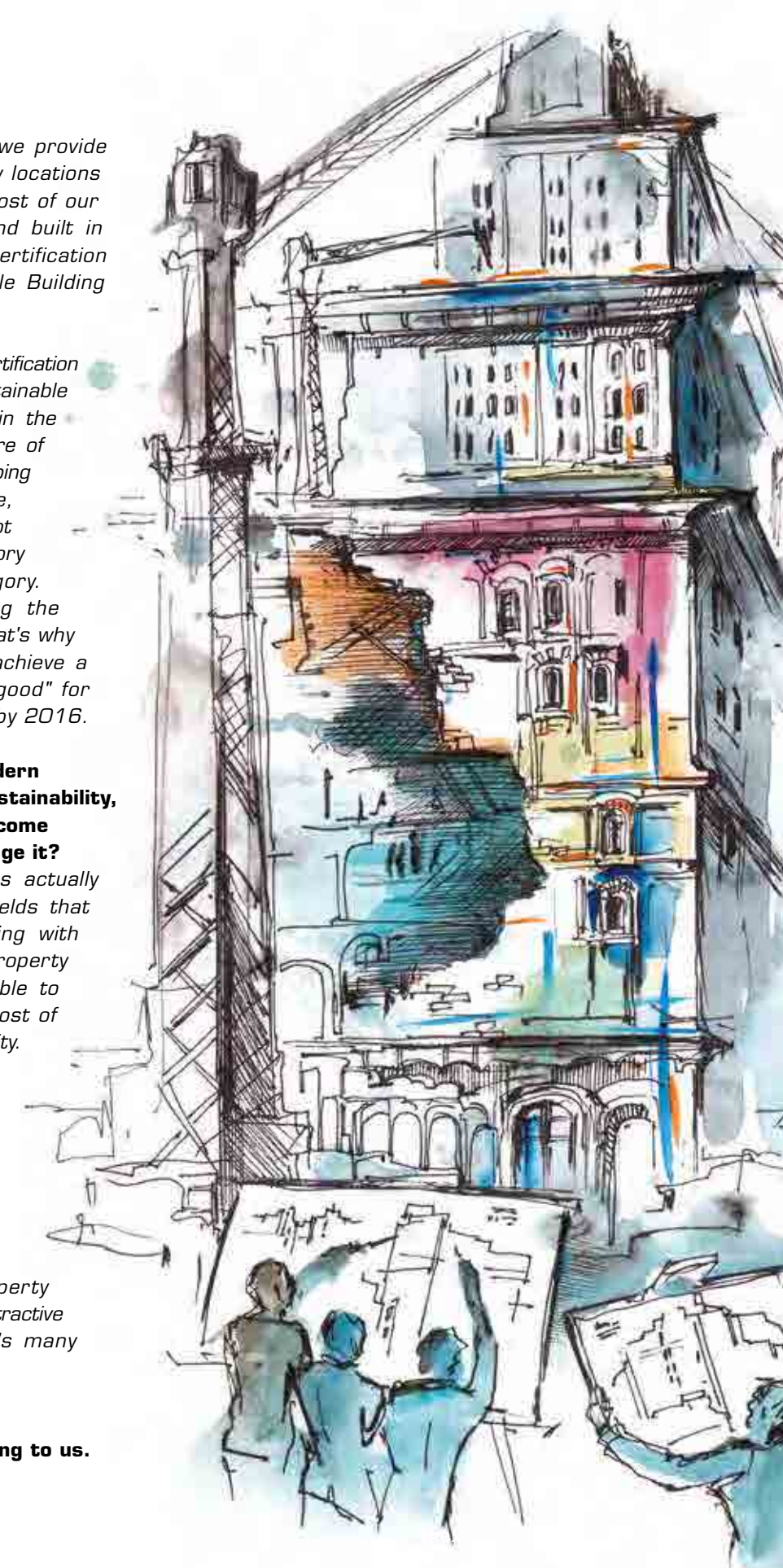
With regard to energy management, we provide the facility managers of the UR-Germany locations with intensive training. What's more, most of our current projects are being designed and built in line with guidelines from international certification bodies, such as the German Sustainable Building Council (DGNB).

The internationally recognised BREEAM certification – a holistic approach for evaluating sustainable properties – is also a fixed component in the sustainability strategy and company culture of Unibail-Rodamco. The Pasing Arcaden shopping centre in Munich, Germany, for example, has recently been rated "excellent" in not one, but two categories: the "Asset" category and the "Building Management" category. We're constantly working on improving the performance of our existing buildings. That's why Unibail-Rodamco's main objective is to achieve a BREEAM certification of at least "very good" for no less than 80 percent of its portfolio by 2016.

In light of ever-growing demand for modern architecture, cost effectiveness and sustainability, designing large-scale properties has become a highly complex task. How do you manage it?

Nowadays, designing shopping centres actually requires a great deal of expertise in fields that didn't even exist ten years ago. Working with specialists in every sector relevant to property management and development, we're able to further refine our skills and make the most of every single technical and design possibility. What's more, over 25 years, we have developed a strong network of international architects, specialist consultants and designers who are always on hand with their specialist knowledge on specific technologies, design styles and local requirements. Our majority owner Unibail-Rodamco also boosts us in terms of a strong international position on the property market. We want to create an even more attractive market presence and benefit from UR's many years of expertise in this field.

Mr Prior, thank you very much for talking to us.



Heinz Trox.

The art of handling air.



From left to right: photos from the 64-year-old family history: from the founding of Gebrüder Trox GmbH in 1951 in a hall measuring 110 m², to 56 years of Heinz Trox at the company, on international trips and at meetings and trade fairs, right up to prizes and honours, such as the best business report in 1991, and the award ceremonies for the Rietschel Diploma in 2007 and the Order of Merit of the Federal Republic of Germany (Verdienstkreuz am Bande der Bundesrepublik Deutschland) in 2014.

On 1 October, Heinz Trox passed away at the age of 81. We were deeply saddened and shaken to hear of his death. The death of a great businessman like Heinz Trox is a tragic loss for our sector. Over a period of 56 years, he shaped the industry like no other. He turned TROX into a global leader in ventilation and air-conditioning technology.



In 1959, Heinz Trox and his brother Klaus went into their father's business, which had been founded by Heinrich Trox and his brother Friedrich in 1951 on his private property in Neukirchen-Vluyn, Germany.

Heinz Trox studied mechanical engineering and business economics in Munich, Germany. He then moved to the USA. His years of travelling and learning in America certainly gave him a feel for international markets and showed him how necessary internationalisation was for the company. By the end of the 1960s, the first foreign subsidiary companies had been founded. The company began building its own research and development centres for acoustics, fire protection, filter technology and aerodynamics.

Heinz and Klaus Trox were appointed as CEOs and assumed responsibility for the company in 1968. By the end of the 1970s, TROX had become the market leader in Europe. After the death of his brother Klaus in 1988, Heinz Trox became Chairman of the Board of Management before moving to the Supervisory Board in 2001.

Heinz Trox was as an excellent businessman but remained a good man above all else. He was, as attested to by many employees, a very approachable boss. Not

always easy, but steadfast in his convictions and his actions. He was a constant for his employees, who he always treated with a great deal of respect and value, following the motto: "no one can walk through life alone." A pugnacious stickler in business, but never unapproachable. "Mr Trox was honest, polite and easy to talk to," said one employee. He was someone that placed great value on the little things: "In the lift or at office doors, he always let the employee go first". The hole that he has left behind is unfathomable and he will be missed.

Heinz Trox had a dry sense of humour that was always able to lighten the mood, break the ice and encourage and motivate business partners. I remember one editorial meeting for TROX life a few months ago when he responded to someone asking "Are you well, Mr Trox?" with a mischievous smile and a "No!" followed by a long pause. "I'm very well."

He always emphasised that he was blessed with unfathomable luck. This is why, although he was a true businessman through and through, he was also a human being with a tremendous sense of social responsibility towards his employees as well as towards his social environment. He stayed grounded and attached to his hometown, and promoted educational projects and associations.

Heinz Trox looked ahead. In 1991, he founded the Heinz Trox Foundation with the view of continuing the TROX company. He put his shares into this Foundation with the aim of preserving his life's work for the long term and guiding it into a safe future.

Mrs Trox is also on the Foundation Council which is chaired by Prof. Dr Fleisch. This Council appoints the Supervisory Board, which is chaired by Prof. Rainer Kirchdörfer. The Foundation Council, the Supervisory Board and the Board of Management, which consists of Udo Jung (Sales, Technology and Production) and Thomas Mosbacher (Finance and HR), will continue to work together to lead the TROX GROUP with its 3700 employees, 14 production sites and 30 subsidiary companies how Heinz Trox would have wished.



TROX's unique march towards success all started in 1951 with this ventilation grille.

We will miss you, Mr Trox!

TROX life magazine



- N°5 **Museum air.**
The art of handling art.
- N°6 **Hospital air.**
The healing effect of efficient ventilation.
- N°7 **Office air.**
For a climate of efficiency.
- N°8 **Education air.**
For high marks in the classroom.
- N°9 **Clean room air.**
Ultimate purity.
- N°10 **Shopping air.**
Shop 'til you drop in fresh room air.

The 10th TROX life.

ISH/Aircontec, March 2011: the first issue of TROX life was published just in time for the world trade fair in Frankfurt, Germany. In keeping with the occasion, how could the first issue of the new TROX customer magazine have been about anything other than trade fairs and exhibitions with their huge range of ideas and events.



- N°1 **Exhibition air.**
Architecture needs to breathe. TROX and Hall 11 in Frankfurt am Main.
- N°2 **Hotel air.**
The World a Guest at TROX.
- N°3 **Airport air.**
The art of handling Airports.
- N°4 **Stadium air.**
Stadiums and their particular flair.

It is at this point that we would like to offer our sincerest thanks to our loyal readers and to the many planning offices, scientific institutes and establishments, as well as the many interesting interviewees and "suppliers" who have supported us with this magazine.

We have used the occasion of our 10th issue as an opportunity to republish our previous issues and give you the chance to reorder them at your convenience just in case you missed any.

Go online and use our interactive order form or just write to us and order the TROX life magazine(s) of your choice.

Previous issues have been:

- | | |
|-------------------|-------------------|
| 1. Exhibition air | 6. Hospital air |
| 2. Hotel air | 7. Office air |
| 3. Airport air | 8. Education air |
| 4. Stadium air | 9. Clean room air |
| 5. Museum air | 10. Shopping air |

We hope you stay loyal and continue to enjoy TROX life.

Your TROX life Team

TROX life magazine



The individual issues of TROX life are conveniently available online to order or download for free. You can find every available issue at: www.troxlife.com

TROX. The system.

Specialist consultants think integration and systems. They don't want to deal with interface issues between technical building services and components. This is why the market requires complete, perfectly complementary ventilation and room air conditioning solutions and suitable control systems.

TROX has now designed a complete room air conditioning subsystem in which the X-CUBE air handling unit acts as the centre of the automation level. All the ventilation components and the fire and smoke control components are connected via X-CUBE control, the overall control system. This is where all system parameters are monitored and analysed. Based on the results of this analysis, the air handling unit sends data to the individual system components, e.g. operating mode preset values. This procedure considerably reduces the number of communication interfaces and data points, and hence the costs.

It ensures reliable communication between the individual components of the room air conditioning system. This is crucial when it comes to integrating ventilation and air conditioning with building automation. Integration with building automation is based on standardised bus systems such as

Modbus or BACnet. Yet the room air conditioning system can also function independently, in small or medium-sized buildings without a central BMS.

Room air conditioning is an organism.

Room air conditioning has to be thought of like an organism, divided into subsystems and connected to the central building automation system via the 'nervous system', or bus system:

- **Control system** (brain, nerves)
- **Ventilation and duct system** (cardiovascular system)
- **Air distribution and discharge** (breathing)
- **Air treatment** (kidneys, liver, etc.)

An organism is characterised by interactions between the organs. For example, the digestive system is provided with blood by means of blood vessels (cardiovascular system) it is controlled by stimulation (nerves), and it is supported by the muscles (musculoskeletal system).

And just like the receptors in a human body, sensors in a room air conditioning system detect states (air temperature, humidity, volume flow rates, CO₂ content, pressure) and signal them to other systems. This information is analysed in the room air conditioning control system and triggers reactions by the actuators, e.g. in fans and volume flow controllers, which are in a constant state of exchange. The 'organs' of an air conditioning system are adjusted accordingly, e.g. volume flow rates are decreased based on demand, which ensures an efficient energy management.

X-CUBE control: the control system for air handling units

The 'brain' of the air conditioning system where all information is processed. Intelligent air management ensures demand-based air supply.

Airways

Multileaf dampers prevent unwanted airflows. External louvres prevent the ingress of rain, leaves or birds.

Air discharge/volume flow control

Aerodynamically optimised air terminal units discharge air into the rooms.

Air transport

Energy-efficient fans take in fresh air and transport it through the ventilation ducts.

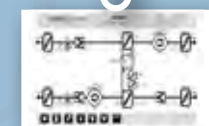
Shut-off

Fire dampers isolate fire compartments, smoke exhaust fans ensure that smoke fumes are removed safely.

Air treatment

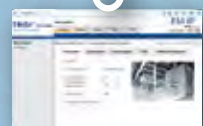
Effective and energy-efficient filtration ensures clean air in each room.

System solutions from a single source.
Control. Safety. Efficiency.



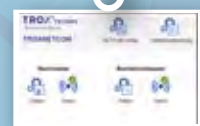
X-CUBE control

The X-CUBE control system monitors and controls all relevant functions of the X-CUBE air handling unit, provides automatic balancing and monitors all ventilation and fire protection components.



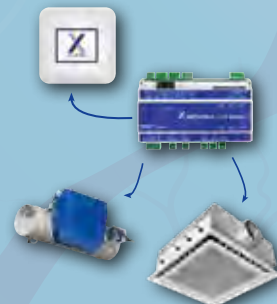
LABCONTROL

The LABCONTROL system monitors and controls volume flow rate and room pressure extremely fast, particularly in critical areas such as hospitals and labs.



TROXNETCOM

TROXNETCOM communication and automation systems can be combined with TROX fire and smoke protection components; they detect fires quickly and ensure safe isolation and smoke extract.



X-AIRCONTROL

X-AIRCONTROL allows for demand-based, individual room control strategies. Supply and extract air volume flow rates and water circulation for air-water systems are controlled based on occupancy, room air quality, temperature and/or humidity.

Smart systems.

The climate conditions for a building are continuously changing: solar gain, occupancy, internal loads, to name but a few. The air conditioning system has to take these parameters and create the best possible room climate. For example, to achieve a higher temperature in a building it is possible to turn the heating up or the cooling down. It is only logical that more cooling is required on a hot summer day.

Intelligent control means that the fan speed is based on damper blade positions, recirculation dampers are set according to the room air quality, and the performance of heat exchangers depends on the room temperature.

Up with comfort, down with costs

The system's main focus is on the individual, demand-based control of supply and extract air volume flow rate and water circulation (air-water systems) for a room. Measuring and evaluating the temperature, air quality, humidity level and occupancy not only improve air quality and comfort in a zone, but also drive costs down. What is more, all data points in the system are matched, thereby significantly reducing the coordination effort between the various trades. This saves installation time and, even more important, costs. Communication between X-AIRCONTROL and the central BMS is possible via the common bus systems BACnet/IP and Modbus/IP.

X-AIRCONTROL zone modules combine information from humidity, air quality (VOC), temperature and PIR sensors and ensure the perfect interaction of all air handling components in a room. The system recognises all digital sensors automatically and uses measured values to initiate control procedures. No matter what type of system is installed, an all-air system or a combination with air-water components such as TROX DID, X-AIRCONTROL will always ensure the control optimum. Yet the system does not require any programming by users.

X-AIRCONTROL – The benefits

- Individual room control
- Optimisation of the air handling unit based on ventilation and air conditioning parameters
 - Fan speed control based on the damper blade position of VAV terminal units
 - Control of the recirculation damper based on the air quality
 - Centralised air conditioning (heating/cooling) based on actual room temperatures
- Centralised alarm management and display of actual operating values
- Cost optimisation due to reduced number of data points
- Easy commissioning

System components X-AIRCONTROL



X-AIRCONTROL zone module



VAV terminal unit



DID active chilled beam



Control panel with 2" touch display



Temperature and humidity sensor



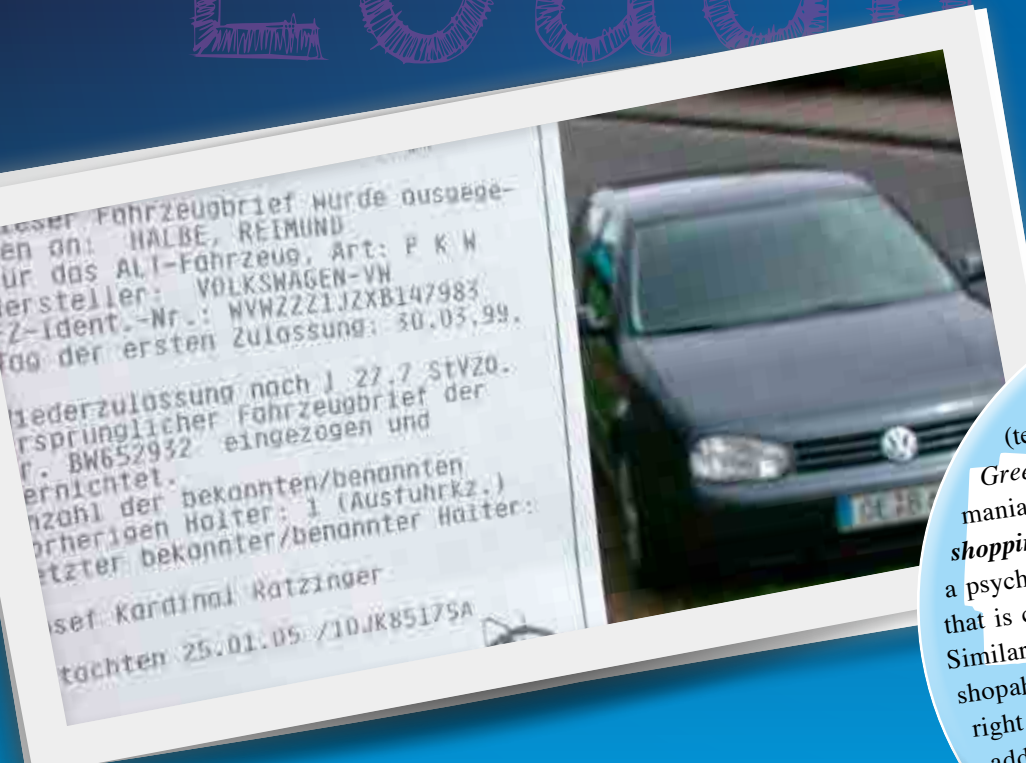
VOC air quality sensor

Shopping: the weird and the wonderful.

Shopping 4.0

When shopping online, you can find all kinds of weird and wonderful things. Since eBay* provided users with a sales platform, the craziest offers and purchases imaginable have sprung up on the web. TROX life has put together a selection of the curiosities to be found on the viral shopping mall that is the Internet.

Chancellor Merkel's old VW Golf sold for 130,000 euros but the old Golf that Pope Benedict XVI once drove beat even that, fetching an impressive 190,000 euros. The "popemobile" was bought at auction by the Golden Palace online casino. The seller raked in a whopping profit of 180,500 euros believe it or not. And the Internet casino hit the headlines again when a young American woman offered up her head as an advertising space. She now has a tattoo of the casino's web address on her forehead.



SHOPAHOLISM

(tech. Oniomania, from the Ancient Greek ὄνιον = onios "for sale" and manía = mania insanity), also known as **compulsive shopping disorder, CPD** or **pathological buying**, is a psychological disorder found amongst consumers that is characterised by an obsession with shopping. Similarly to gambling addictions or workaholism, shopaholism is not seen as an illness in its own right, but is counted amongst non-substance-related addictions or obsessive compulsive disorders. It is estimated that in industrialised nations approximately one percent of the population suffer with this illness.



What to do when money gets tight?

Arnold Schwarzenegger auctioned off unceremoniously government property to fill up the Californian state coffers. The Governor sold off a large portion of the state's car fleet and state-owned mobile phones on eBay and made 1.6 million US dollars.

However, auctions can also be used for good causes, such as for selling football memorabilia for charity. The famous penalty cheat sheet that Jens Lehmann kept in his sock in the World Cup quarter finals fetched one million euros for the "Ein Herz für Kinder" children's charity gala. The original can now be viewed in the German Football Museum in Dortmund. A crumpled up piece of paper on the pitch had a huge impact on the UEFA Cup match between the HSV and Werder Bremen football clubs, as it changed the direction of a pass. It went under the hammer for a good cause and brought in 4150 euros. A curious fake, however, which was at one point going for over 200 euros, was the chewing gum supposedly spat out by Jürgen Klopp in the German Football Association (DFB) cup quarter finals against Wolfsburg.

Fancy an expensive toy?

If you want the 1994 Benetton Formula 1 car, you'll have to fork out 1,100,650 euros. Even a pair of jeans discovered in a mining town was sold for 46,532 US dollars. It's probably the oldest pair of jeans in the world and comes from around the 1890s. The jeans were purchased at auction by their original manufacturer and are now on display in the company museum. The old Hollywood letters up on the hills of Los Angeles were replaced in 1978 and purchased by a nightclub owner, who put them on eBay and raked in a cool 450,000 US dollars.

Not even villages are safe from Internet auctions. 3 hectares of land, a graveyard, a post office and around a dozen houses went under the hammer back in 2002. Bridgeville, the village in question, is located in California, USA, and was sold for around 1.2 million US dollars.

A letter penned by Albert Einstein in 1954, in which the scientist expresses his views on religion, was purchased for almost 2 million more than that.

*Quelle: presse.ebay.de

About this magazine:

Publisher:
TROX GmbH
Heinrich-Trox-Platz
D-47506 Neukirchen-Vluyn
Tel.: +49 (0)2845 2020
Fax: +49 (0)2845 202265
E-mail: trox@trox.de
www.troxtechnik.com

Realisation:
TR advertising
Schanzenstraße 6-8
40549 Düsseldorf, Germany

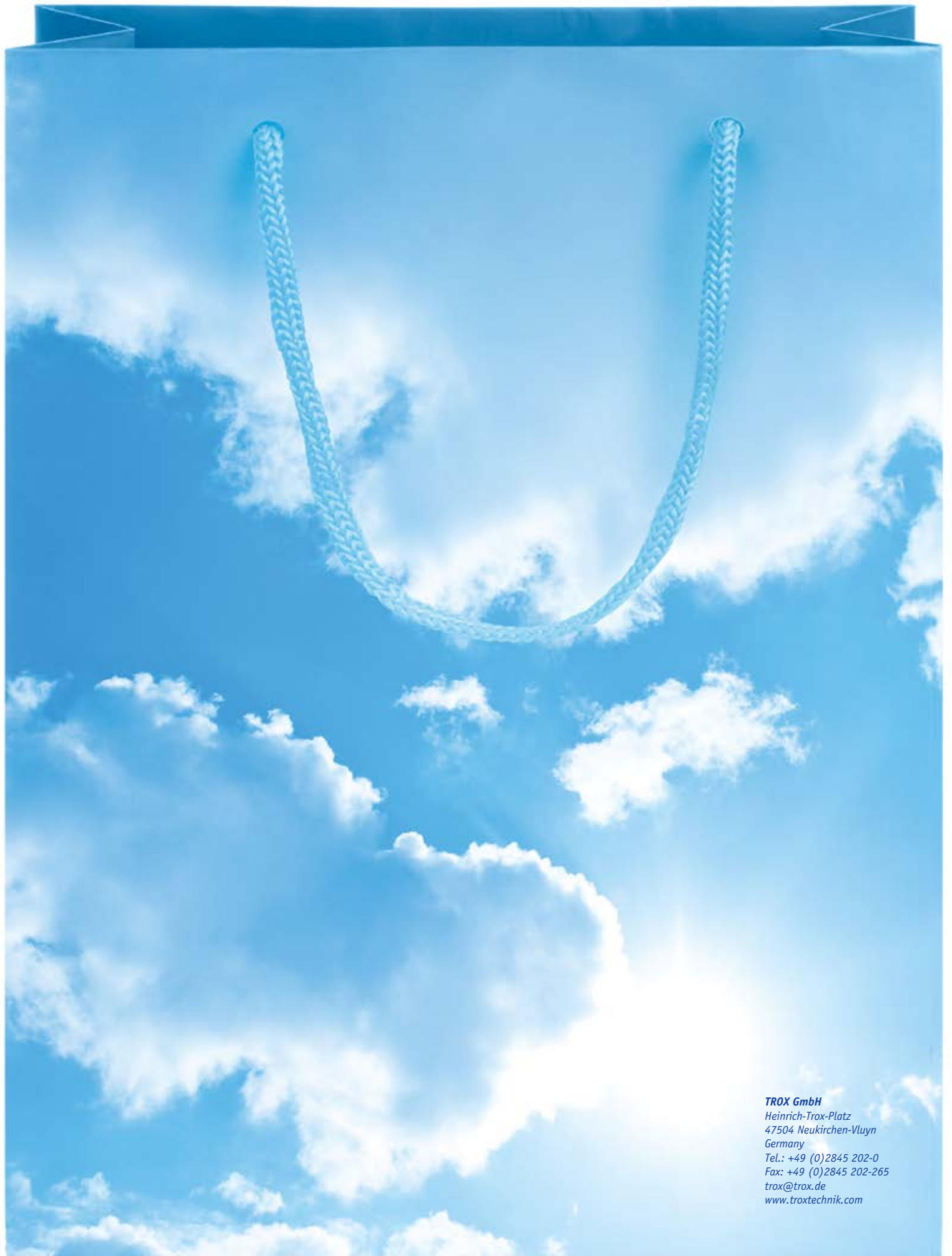
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