Reference solution

Fire protection in high-bay warehouses

OxyReduct® with TITANUS®

Perfect fire protection for precision scales in a newly built automated warehouse

WAGNER®

THE CUSTOMER

The KERN & SOHN weight and scale factory has specialised in developing and manufacturing precision scales for over 170 years. The company operates on an international level and is already in its seventh generation of family ownership.

The family-run company owned by the Sauter family has been producing analytical balances and precision scales in southern Germany since it was founded in 1844.

The company's great capacity for innovation, tightly organised sales division and resultant ever increase in demand has made KERN & SOHN (and later the entire South Württemberg region) the driving force behind the largest centre for precision scales in Germany. Even at that time KERN & SOHN was already producing an impressive 10,000 scales a year. With its workforce of over 100, the company has been headquartered in the Swabian town Balingen since the year 2000. KERN & SOHN has sold over a million scales in its first ten years at the new location. With an export share of roughly 60 percent, the company is now making the majority of its sales outside of Germany.

THE PROPERTY

KERN & SOHNS principle for success:
"Quick, competent, dependable, versatile!"

Up to now, KERN & SOHN distributed its goods from four small warehouses. The construction of the high-bay warehouse at the company's headquarters in Balingen consolidated them into a single building. The process of centralising the logistics included expanding the warehouse capacities. The new, fully automated high-bay warehouse comprises 50,000 m³ with 26 m high shelf system and was directly annexed to the newly constructed factory building. The warehouse went into operation just one year later after construction started in October 2014: precision scales, counting scales, pallet jack scales, test weights and coating thickness gauges, as well as electrical components for scales, are logistically managed there and packaged for worldwide shipping. Thanks to strong business development, "it is expected that even this warehouse will quickly reach its full capacity," says Albert Sauter, Managing Director of KERN & SOHN. The foundation for a potential expansion by 2020 has already been laid.

Cutting-edge warehouse equipment

The fully automated high-bay warehouse is divided into two areas: small parts storage and palette storage. Specifically in the small parts storage, the storage and retrieval machines have to work extremely precisely, which, considering the shelves' great height and the required work pace, can only be achieved using special drive technology. This was designed specifically for use at KERN & SOHN. In addition to this investment, the company also invested in a specially developed load suspension machine. Since the products have to be put into storage in different sizes and packaging, the load suspension machine has to be able to pick them up and lift them onto the conveyor belt in a flexible manner. "There's nothing like this anywhere else," says Albert Sauter. The warehouse is connected to the logistics area on the ground floor by pipe conveyor belts.

KERN & SOHN has supplied precision scales since it was founded in 1844: from analytical balances in the half-microgram range to floor scales in the ton range.

RISK ANALYSIS

The great proportion of automation technology increases the risk of fire – meaning that the extent of damage would also be enormous.

Fire risk analysis indicates that the scales and scale elements stored in KERN & SOHN's new high-bay warehouse do not themselves pose a risk of fire. Aside from sabotage, arson or lightning strikes, the only sources of spontaneous combustion in question are electrical elements such as the lighting system or conveyor technology. These could ignite a fire in the event of defects or short circuits. This estimate factors in the result of a study conducted by the German Insurance Association, which indicates that the most common causes of large-scale warehouse fires are overloaded electronic components, such as drive motors or shelf operation machinery. Inside the warehouse, the packaging material (primarily cardboard) presents a high fire load. High shelves and narrow spaces between them also create ideal conditions for a fire to quickly spread up to the warehouse ceiling, hindering conventional fire extinguishing with foam or water. Extinguishing the high levels would also be nearly impossible for fire fighters. If a fire breaks out in full force, the extent of damage would be enormous: losing the specialty, ready-to-ship scales as well as the highly valuable warehouse technology would have dire consequences for KERN & SOHN's process and supply chain. "The goods are precious and actually being ready to ship them is even more valuable to us. That's why we've chosen to invest in good fire protection via fire prevention," is how Sauter justifies his decision to use the fire protection solution from WAGNER.

THE PROTECTION GOAL

Maximum storage capacity with maximum protection

KERN & SOHN needed a solution which:

- **minimises the business risk of a fire breaking out and spreading**
- **provides protection for its purpose-built products for laboratory, industrial and medical applications, floor and palette scales, test weights and measuring instruments**
- **safeguards the investment in the new building and special automation technology**
- **enables maximum usage of the storage capacity**
- **can be flexibly adapted if the high-bay warehouse is expanded**

THE SOLUTION

"It makes no difference whether our goods are destroyed by fire or water – fire prevention is obviously better."

The original fire protection concept for the construction project initially involved a sprinkler system. But the architect in charge of the new warehouse construction already had experience with the innovative fire prevention technology OxyReduct® from WAGNER Group GmbH and recommended the company to go with the alternative from Langenhagen. He convinced company head Albert Sauter of the system's advantages, arguing that the use of a fire prevention system would not restrict the warehouse's storage capacity, as would be the case with a sprinkler system. Furthermore, the effect of extinguishing water falling on the shelves would have to be considered from a structural engineering perspective, which would have required stronger shelf system constructions. "Damage from sprinkler water must be avoided at all costs," says Albert Sauter.

The implementation

Two vacuum pressure swing adsorption (VPSA) systems producing 240 m³/h nitrogen each were installed for fire prevention via oxygen reduction. Operating the systems in an energy-efficient manner

The TITANUS® system's air sampling smoke detectors (19 units in total) were installed in a row with the OxyReduct® system's oxygen sensors (circled in red). This means that maintenance can be conducted from a convenient central location.

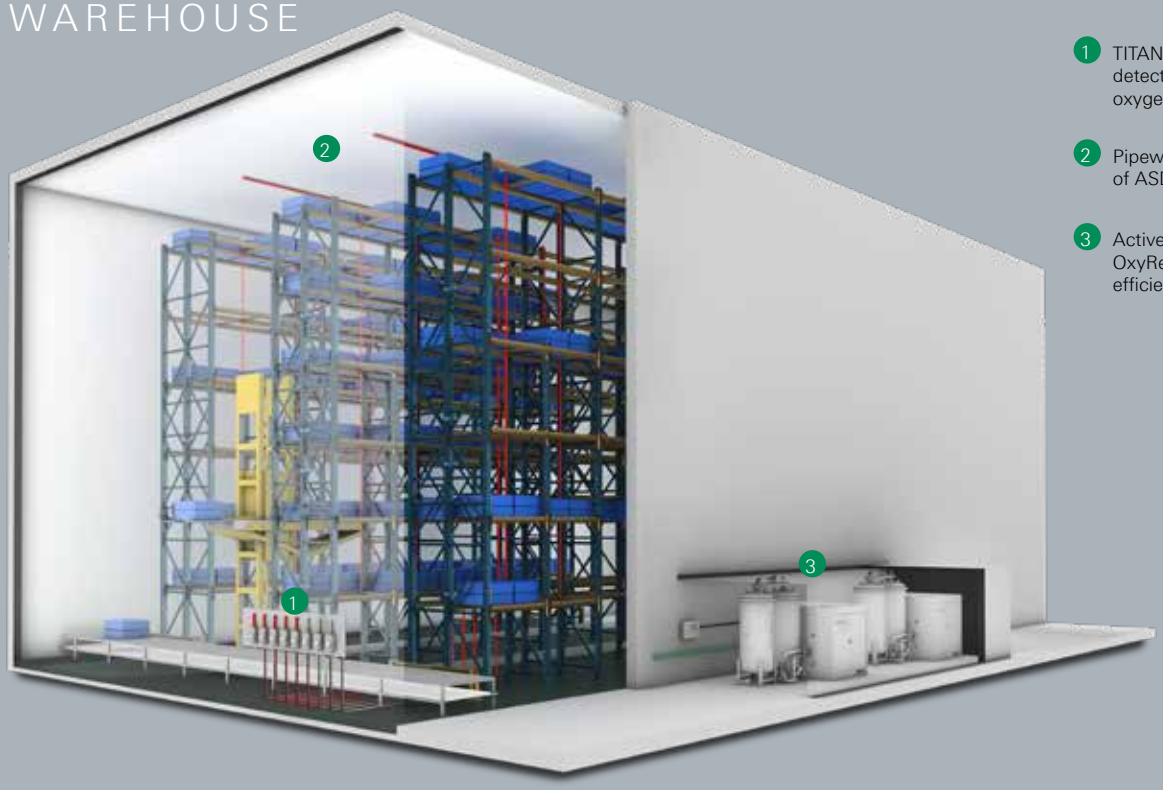
The two OxyReduct® systems get their nitrogen from the ambient air. This nitrogen is then fed into the protected area through a distributor pipe network.

requires the hall to be sufficiently leak-tight – the n50 value. This ensures that the residual oxygen concentration can reliably be kept at a constantly low level in order to create a fire-retardant protective atmosphere. The complete automation of the loading and retrieval systems reduces the oxygen proportion in the warehouse from 20.9 vol.% (normal ambient air) to 13.7 vol.%. The residual oxygen level for fire prevention is specified by VdS Schadenverhütung GmbH and is based on the fire risk of the goods stored in ready-to-ship boxes. However, the warehouse remains accessible to authorised personnel so that work such as maintenance can still be conducted. In addition, TITANUS *PRO·SENS*® air sampling smoke detectors were installed for earliest possible fire detection. This is ensured by continuous air sampling. Since even the tiniest traces of smoke can damage the scales, the manufacturer decided to use highly sensitive smoke detectors. These detectors are up to 2,000 times more sensitive than normal point detectors and are also less susceptible to false alarms.

Summary

With its OxyReduct® active fire prevention, WAGNER provides the company KERN & SOHN with a fire protection solution which is not only individually tailored to its specific warehouse, it also protects the company's goods and investments in the long term and thus safeguards its delivery obligations.

EXAMPLE OF A SYSTEM IN AN AUTOMATED HIGH-BAY WAREHOUSE



1. TITANUS® air sampling smoke detectors and *OXY·SENS*® oxygen sensors
2. Pipework with sampling vents of ASD system
3. Active fire prevention system OxyReduct® VPSA for energy-efficient nitrogen generation

The goods are stored on 26 m high shelves. KERN & SOHN invested in specially built shelf operation and load suspension machinery for automated loading and retrieval.

A BRIEF INTERVIEW WITH...

Albert Sauter, Managing Director, KERN & SOHN GmbH

Your company is expanding worldwide. What was your reasoning that led to your decision to build this new central warehouse?

As the number of warehouse locations increases, the complexity of manual logistics rises not linearly, but exponentially. For this reason, we found ourselves at a dead-end, which could only be resolved with a tightly packed, automated central warehouse.

What fire protection options did you take into consideration at the outset?

We examined the possibilities of sprinkler technology versus oxygen reduction.

Why did you decide to go with an active fire prevention system from WAGNER?

The main reasons were the active fire prevention function of the oxygen reduction system and the fact that it takes up less space. It makes no difference to us whether our goods are destroyed by fire or by water – which is why fire prevention is obviously better.

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WAGNER sets standards in fire protection – with innovative and comprehensive solutions

Fire detection and alarm systems

Very early fire detection systems (TITANUS®)

Active fire prevention (OxyReduct®)

Fire extinguishing (FirExting®)

Hazard management (Visu*LAN*®)

BETTER SOLUTIONS IN FIRE PROTECTION

WAGNER®