



OxyReduct[®] TITANUS[®]

Reference solution
Fire prevention and
early fire detection in
a cold storage

A combination of active fire prevention and early fire detection ensures safety in a new high-bay cold storage for frozen ready-baked goods.

THE CUSTOMER

La Lorraine's goods and logistics processes in the Czech Republic town of Kladno need reliable protection from the effects of fire.



Kladno suffered a severe fire. The fire broke out in an old warehouse which was being renovated at that time – and quickly spread to other parts of the facility. The fire department intervened quickly, preventing the fire from spreading to other important production lines and the new deep-freeze high-bay warehouse. Fortunately, no one was injured – but the fire still had serious consequences for the company: Damage from smoke, soot and the fire itself meant that the entire production had to be stopped. The power supply system was damaged, and it took several weeks to restore normal operations and fully meet the company's delivery commitments.

“A passion to share” is the motto that guides the La Lorraine Bakery Group (LLBG). The Belgian group has a passion for one thing above all: bread, rolls and all kinds of sweet and savoury pastries.

La Lorraine supplies over 1,500 supermarkets with freshly baked goods as well as retailers and catering businesses with deep-frozen bakery products every day. The Belgian market leader also runs its own shop concepts, such as The Coffee Club and Deliway, as well as approx. 250 sandwich shops under the brand name Panos. Furthermore, the company runs

Brabomills, making it one of the largest producers of flour (mostly wheat and rye flour).

Continuous annual growth over the past 15 years has led to a workforce of 2,700 and a turnover of € 566 million in 2013. LLBG is expanding in 25 countries and runs a total of 11 production facilities, four of which are in Europe; Belgium, Luxembourg, Poland and the Czech Republic.

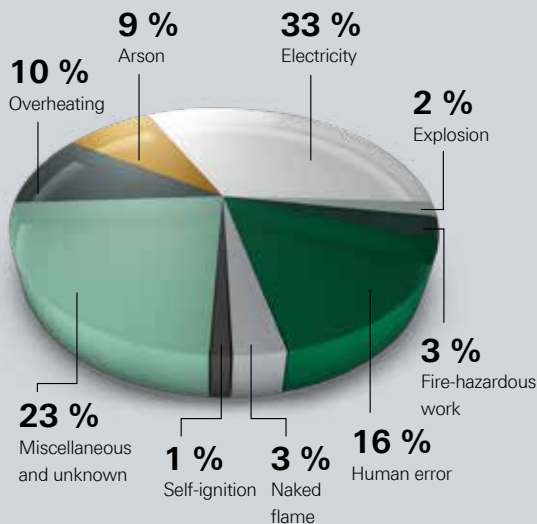
A fire can have far-reaching effects

On January 31, 2014, an unprotected production plant of La Lorraine in the Czech town of

Higher safety levels in the newly built warehouse

This experience made it clear to La Lorraine that they made a couple of correct decisions whilst building the new high-bay cold storage warehouse at the fire-struck Czech site. The new warehouse has 4,337 m² of space and 165,892 m³ of volume to store frozen ready-baked goods. It went into operation in August 2013 and is protected by an OxyReduct® fire prevention system as well as TITANUS® air sampling smoke detectors for very early fire detection to prevent fires from breaking out and spreading.

THE RISK ANALYSIS



Source: Institute for Damage Prevention and Loss Research of Public Insurance Providers (IFS)

A study by the German Insurance Association showed that roughly one third of severe fire damages in industry and commerce take place in warehouses. The most common causes are sparks from overloaded electronic components such as drive motors and electrical storage and retrieval machinery, as well as technical defects. The narrow passages, high-bay shelf systems, long conveyor belts and greatest possible volume of goods packed into the smallest possible area (some of which are packaged in flammable materials) increase the risk of a fire spreading rapidly.

Risk of fire in fully automated pallet warehouses

High-bay cold storage warehouses are at particular great risk due to the high level of automation and additional machinery such as cooling and heating units. The structure, a self-supporting shelf

If a fire breaks out, the extent of damage must be reduced to the absolute minimum

system with 27,000 pallet spaces, requires maximum protection from fire so that the entire high-bay warehouse won't be at risk. If a fire breaks out, it would spread even faster due to the tall and narrow passages, dry air and low temperatures. At the same time, the conditions in the warehouse are a special challenge for the fire protection solution. For instance, the temperatures are far below zero, which impairs the functioning of conventional smoke alarms, as they only work down to temperatures of -20°C . Moreover, cold storage makes it impossible to use the conventional water-based extinguishing systems usually installed in warehouses. Water containing antifreeze would contaminate the stored food products, rendering them unsuitable for sale. This means

cold storage requires a fire prevention solution which is specifically tailored to the specific conditions.

Damage reduction

The risk analysis conducted before La Lorraine's new warehouse was built estimated that it was unlikely that a fire would break out in the high-bay cold storage warehouse. But if one did, it would cause severe and widespread damage – as the fire in the old, unprotected production facility in January 2014 clearly demonstrated. It was absolutely essential to prevent staff from being injured, goods and storage equipment from being damaged or lost, processes from being interrupted and the company's ability to deliver from being impaired – all of which could have disastrous financial effects.

THE PROTECTION OBJECTIVE

Project planning for La Lorraine's new, fully automated cold storage warehouse defined the protection objectives as follows:

- Prevent fires from breaking out or spreading to minimise the degree of damage

- Enable early reaction or intervention in the unlikely event of fire

- Use an extinguishing agent which will not damage the goods and warehouse equipment

- Maintain processes and ongoing operation

THE SOLUTION

WAGNER's decades of experience in fire protection resulted in a tailor-made fire protection concept which is a major advantage for La Lorraine.



TITANUS® aspirating smoke detection systems (image above) monitor the areas protected by OxyReduct® (image on the right)



The primary protection goal of preventing a fire from breaking out or spreading demanded an active fire prevention system in the on-site fire protection concept at La Lorraine's new, 38.25 m high cold storage warehouse in Kladno.

So the company opted for OxyReduct® from WAGNER – the only oxygen reduction system which is approved in the Czech Republic. Another major asset was WAGNER's Czech OxyReduct® partner EUROALARM, which helped overcome the language barrier and knew the local fire protection requirements, which was an advantage for the customer when applying for the building permit.

Greater safety in the new storage

Controlled nitrogen supply reduces oxygen levels in the warehouse far enough to minimise and limit a fire's development in an early phase. The concentration of remaining oxygen was set at 15.2 vol% and was determined based on conducted fire tests as well as on the requirements of the insurance underwriter. The nitrogen required to reduce the oxygen level in the 165,892 m³ protected area is taken directly from the ambient air on-site using Vacuum Pressure Swing Adsorption (VPSA) technology. This is achieved by three nitrogen generators, manufactured by WAGNER, each of which produces 120 m³/h of nitrogen. Highly energy-efficient

VPSA technology can cut energy costs by up to 80 % compared to systems with conventional membrane technology. The installation of a fourth generator would meet La Lorraine's requirement of redundancy. The failure of one system must not affect the level of protection.

OxyReduct® is capable of compensating for nitrogen losses during loading and unloading, which in this case amounts to about 660,000 times per year. The oxygen concentration in the storage area is monitored by oxygen sensors. The OxyControl unit ensures that nitrogen supply and oxygen content are perfectly balanced.

Cold storage warehouses are generally leak-tight, which means that the oxygen concentration can easily be kept below 17 vol% for over 36 hours, even if an oxygen reduction system completely fails (due to a power breakdown, for instance). This level will significantly reduce a fire's behaviour. One nitrogen generator is additionally connected to the emergency backup power supply, so that the protective level can still be maintained for long periods of time.

Localising the fire source while the fire is only in an early stage

The storage area and loading zones are monitored by 22 TITANUS PRO·SENS® air sampling smoke detectors with a total of 42 detector modules ready-to-use in cold storage installations. This early fire detection system enables highly sensitive,

false alarm-proof detection, thus providing a head start in localising and eliminating potential fire sources. The TITANUS® family air sampling smoke detectors are not only 2,000 times more sensitive than conventional point-type detectors, they are also ideal for use in problem areas such as high and hard-to-reach places, as well as at extremely low temperatures down to -40 °C (without heating) – where other systems are beyond their limits.

Once a fire is detected, an alarm will immediately trigger the central fire alarm system connected.

Summary

The combination of active fire prevention and very early detection provides La Lorraine with the high-

est possible level of protection for its high-bay cold storage warehouse. WAGNER is currently the only fire prevention system provider with VdS and ÖNORM accreditation and local approval in the Czech Republic by the accredited test center for fire protection products PAVUS, a.s. headquartered in Prague.

Renewed confidence

La Lorraine's next new warehouse in Nowy Dwór Mazowiecki, Poland, will also be equipped with an OxyReduct® fire prevention system.



FIRE PREVENTION SYSTEM FOR COLD STORAGE

The fire prevention system **1** reduces the oxygen level in the cold storage area by introducing nitrogen, distributed by the ventilation system **2**. This balances losses from the building envelope and the loading docks **3**. Sensors positioned at different heights monitor the oxygen concentration **4** and report this to the OxyControl unit **5**. In the warehouse a total of 5.2 kilometres of intake pipes are in use. A light indicator over the door notifies the personnel of the reduced oxygen concentration in the warehouse area **6**.

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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 (VisuLAN®)