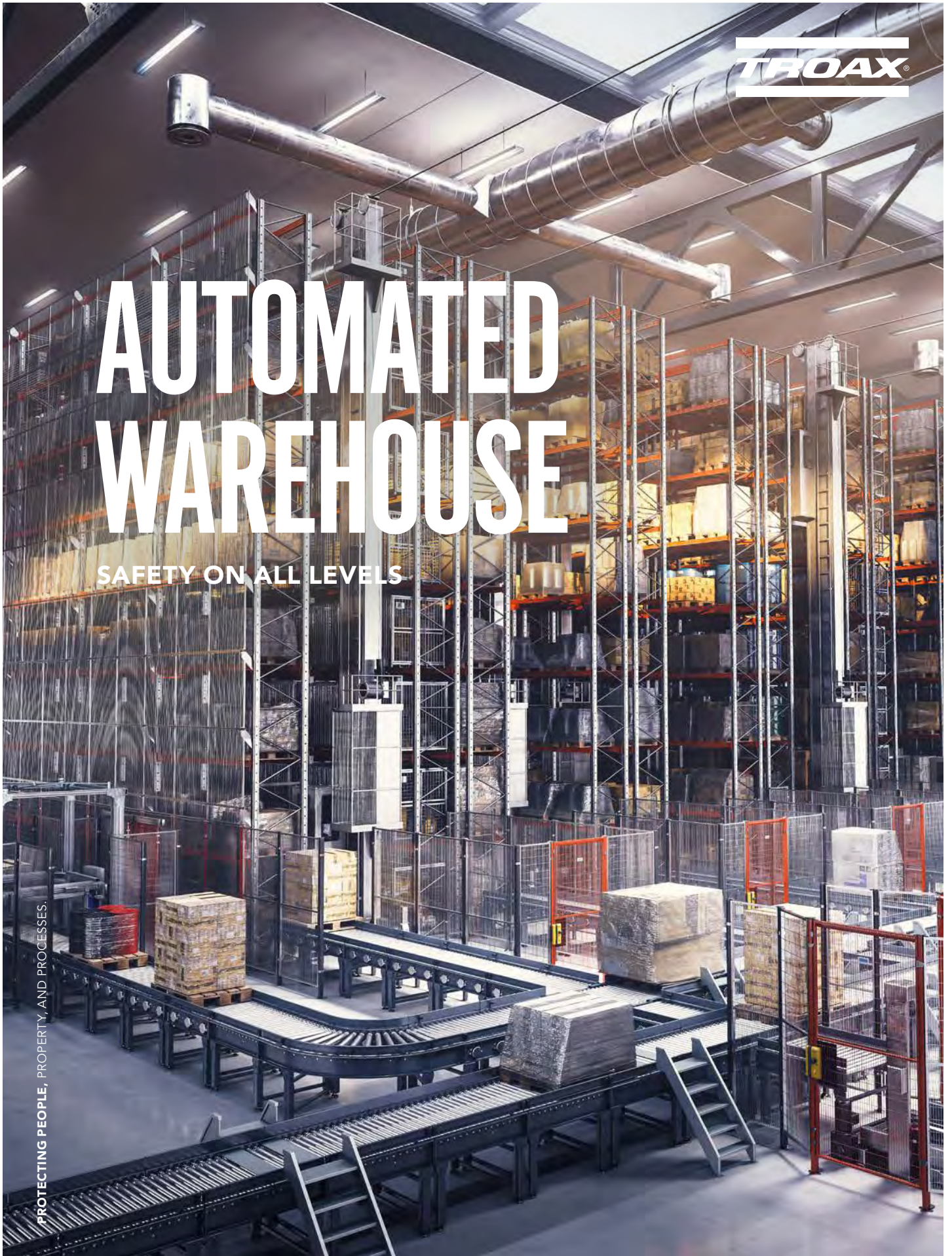


TROAX®

AUTOMATED WAREHOUSE

SAFETY ON ALL LEVELS

PROTECTING PEOPLE, PROPERTY, AND PROCESSES.



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SAFETY ON ALL LEVELS

THESE DAYS, EVERYTHING SEEMS TO MOVE AT A HIGHER SPEED; PEOPLE, IDEAS, AND LOGISTICS. AS CONSUMERS OF TODAY DEMAND MORE, SUPPLY CHAIN NETWORKS WILL NEED TO UNDERGO AN EXTREME TRANSFORMATION OVER THE NEXT FEW YEARS. THIS WILL CHANGE THE WAY WAREHOUSES ARE BUILT AND USED. WE'RE FACING A WHOLE NEW ERA WITHIN LOGISTICS. WE ARE REPRESENTED IN MORE THAN 40 COUNTRIES, AND OUR SALES & DESIGN PROFESSIONALS WILL HELP YOU FIND NEW, FUTURE PROOF SAFETY SOLUTIONS FOR YOUR LOGISTICS UNITS AND AUTOMATED WAREHOUSES.

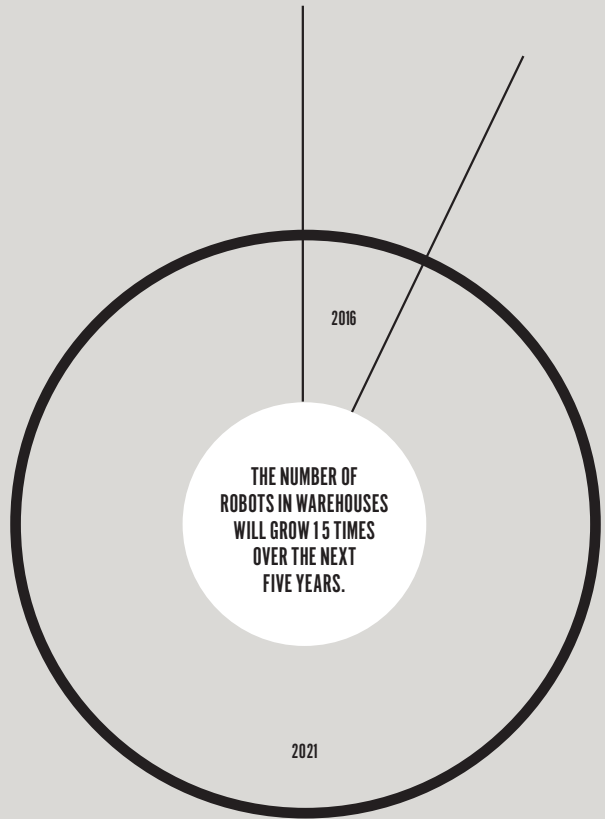


04

AUTOMATED WAREHOUSE TROAX

**TOGETHER
WE CAN
REACH NEW
HEIGHTS**

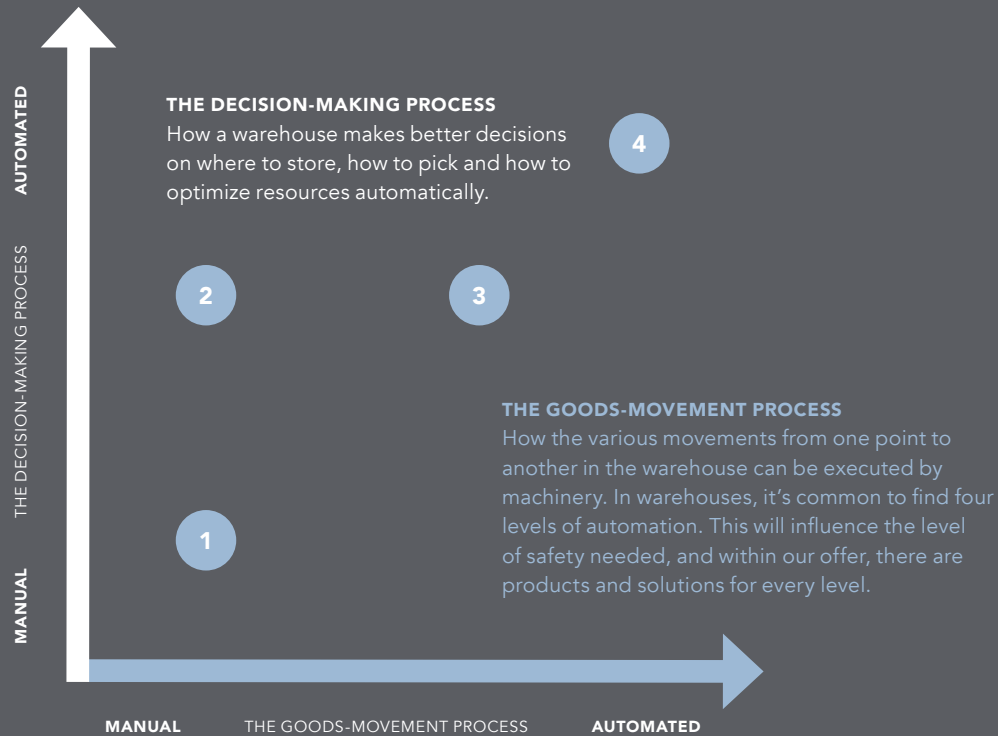
**WITHIN AUTOMATED
WAREHOUSES THERE ARE
STRICT SAFETY REQUIREMENTS,
AND NO MATTER THE NUMBER
OF PEOPLE WORKING WITHIN
THE FACILITY, THEY STILL
NEED TO BE SAFE.**



Automated Warehouses as a field of business is growing at breakneck speed, all of which is a result of rising costs due to operational challenges caused by higher consumer expectations.

For our part, this development is less about logistics and automation, and far more about safety. No matter how automated the future becomes, there's one element that will not change. The human element. Regardless of the automation level applied, there still needs to be people on site to oversee operations, provide maintenance and to make decisions. In order to create a safe working environment for both processes and people, a combination of the Troax Machine Guarding and Warehouse Partitioning systems can be applied.

Over the past 60 years, we've learned that every project is unique. Just as there are different levels of automation, there are different and unique requirements when it comes to safety. So no matter what you, your people and your process need, Troax will help you develop the right solution for any project.



*Westnacher Knowledge Series, Whitepaper:
The Trend Towards Warehouse Automation, 2017.*

PEOPLE AND PROCESSES

FOUR LEVELS OF AUTOMATION

When investing in an automated warehouse, the safety mesh panel wall systems is generally a relatively small part of the total cost, but it cannot be overlooked.

Depending on the level of automation that applies to your warehouse solution, the level of safety with mesh fence protection needs to be diversified and adjusted. At Troax we will help you to create the optimized solution for your safety needs, covering both machine guarding and anti-collapse systems.

To follow the trend towards automation and to develop a warehousing strategy, one needs to understand the various types of automation and the type of technologies being used. Learn more about them here.

1

LOW AUTOMATION

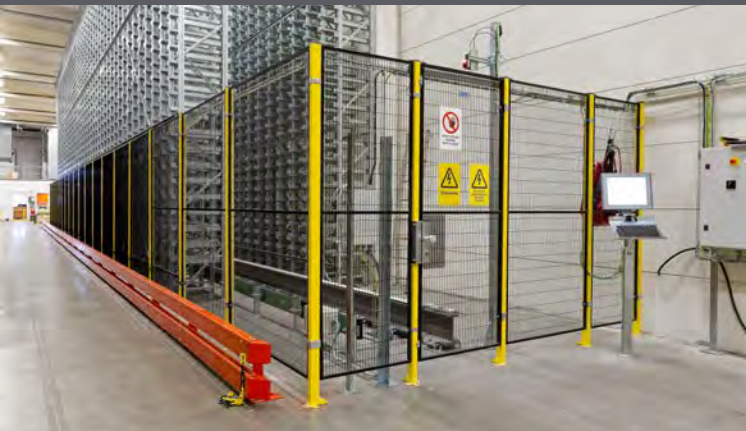
Usually, these warehouses mainly operate using printed papers. Decisions such as where to put specific products are made by humans. In general, workers need to travel long distances to put away or pick goods from shelves.



2

SYSTEM AUTOMATION

Warehouses that use system-directed work to automate decision-making. Here, a warehouse management system (WMS) is used to make decisions on where to put away or pick items and manage processes such as deconsolidation, and quality inspection. The system also optimizes decisions on when to perform the tasks, and who should perform the tasks.



3

MECHANIZED AUTOMATION

In these warehouses, both logic and goods movement are automated. All goods are transported to the worker (goods-to-person model), from point A to point B by a conveyor belt system and an automated storage/retrieval system (AS/RS). This both reduces travel distances and improves pick rates dramatically.

4

SOPHISTICATED AUTOMATION

The most sophisticated level of automation will use highly automated equipment to eliminate manual movements and streamline order-picking processes. Here, systems such as automatic sorters, robotic picking-systems, automated guided vehicles (AGV) and automatic palletizers will handle complex decision-making logic.

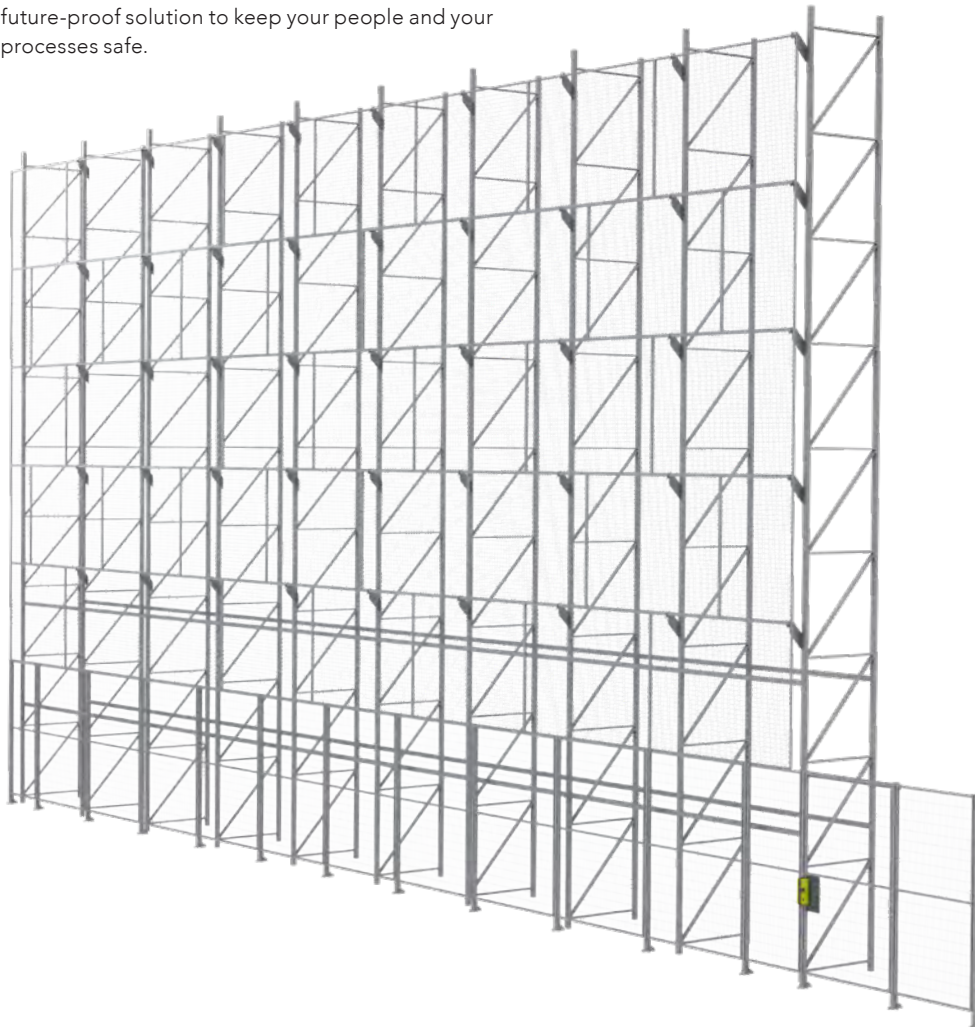


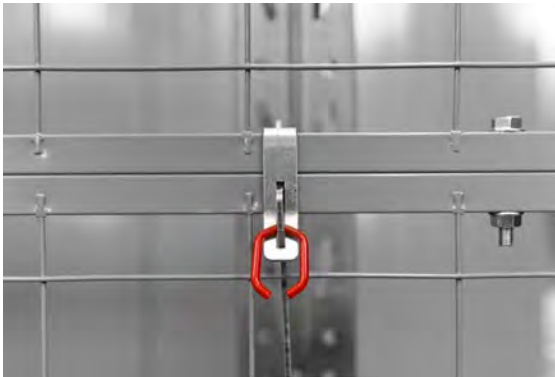
COMBINING THE BEST OF BOTH WORLDS

Whatever your safety needs may be, we can create a solution that will meet every aspect of your requirements. Our wall systems, suitable for automated warehouses, are developed, manufactured, and marketed through the product segments Machine Guarding and Warehouse Partitioning. These mesh panel systems can be combined in a number of ways to suit your material handling and logistics needs, providing the most cost effective and future-proof solution to keep your people and your processes safe.

08

AUTOMATED WAREHOUSE TROAX





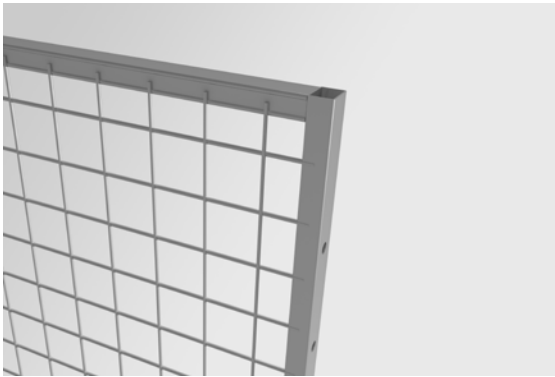
ANTI-COLLAPSE BRACKET WITH SECURE

The bracket together with our design protected secure red wire loop and clip, creates an extremely strong fixing system for our anti-collapse screen.



ANTI-COLLAPSE CLAMP

A bracket that connect the panels together on the short side.



PANEL UR350 WITH MESH 50×50 MM

Strong anti-collapse panel, TÜV type approved for an impact of 2,500 Joules.



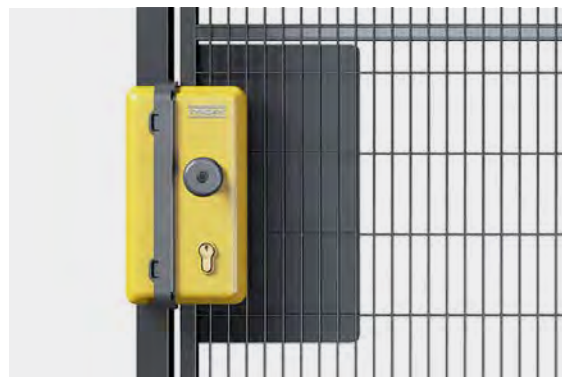
PANEL ST20 WITH MESH 100×20 MM

Strong machine guarding panel, TÜV type approved for an impact of 1,600 Joules.



SMART FIX SYSTEM

Easy and flexible assembly with a captive bolt, in accordance with the Machinery Directive.



SAFE ESCAPE LOCK

An anti-panic knob and handle Euro cylinder lock with integrated safety switch.

COMPLIMENTARY PRODUCTS TO ADD

TROAX OFFERS COMPLETE SOLUTIONS FOR YOUR ENTIRE LOGISTIC FLOW. OUR WAREHOUSE PARTITIONING APPLICATIONS WILL MAKE YOUR MATERIAL HANDLING BOTH SAFER AND MORE EFFICIENT. TROAX STEEL MESH PANEL SYSTEMS ARE THE MOST FLEXIBLE ON THE MARKET.

10

AUTOMATED WAREHOUSE TROAX

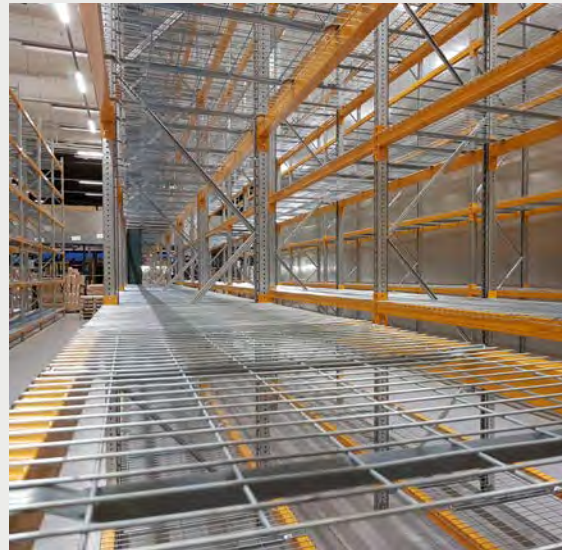


TROAX CAGE

Troax Cage is a quick and rigid anti-theft solution. The sturdy mesh panels of the cage allows great visibility and control over the stored items. Troax Cage is easy to assemble and can be used for both temporary and permanent installations.

SHELVES

Troax mesh shelves can easily be adapted to fit most warehouse solutions, including those with an integrated backstop and/or dividers. The shelf is designed with a safety factor of at least 1.3, it can be used for anti-collapse purposes, it allows water from sprinkler systems to penetrate and it provides with good visibility.





AEROSOL STORAGE

This solution is excellent for storage of explosive products. We offer mesh walls with 25×25 mm mesh to suit the particular requirement and specification. In case of an explosion, our small mesh size will protect both goods and people in the warehouse, from flying objects.

PARTITION WITH PANELS

Areas or goods that need to be separated are effectively protected by our modular partition wall system with mesh or steel sheet panels. Our wall systems can either be built to reach the existing ceiling or be combined with our mesh ceiling.



MEZZANINE GUARD

For fall protection, the Mezzanine system can be used in elevated working areas, in close connection to automated robot cells. With mesh panels and kick plates, the safety increases compared to only using a handrail. It protects both people and loose objects from falling down.

EVERY NEW INVENTION STARTS WITH THE SEARCH FOR A SOLUTION

12

AUTOMATED WAREHOUSE TROAX

WE BELIEVE THAT OUR RANGE OF PRODUCTS IS NEVER COMPLETE. WE'LL ALWAYS WORK TO IMPROVE OUR PRODUCTS AND THE REASON IS SIMPLE: WE WANT TO CONTINUE TO FIND NEW SOLUTIONS, DEVELOP NEW IDEAS AND GROW TOGETHER WITH OUR CUSTOMERS. HERE ARE A COUPLE OF EXAMPLES OF INNOVATIONS TAKING US FURTHER IN TERMS OF MAKING YOUR WORLD SAFE.

TROAX INNOVATION CENTER

At first glance, what we do might seem plain, but beyond the visuals, there are decades of knowledge and technical expertise invested in the improvement of our products. Throughout the years we've attended to the most intricate and accurate details and been driven to offer products of the highest quality and also exceed the safety standards.

We develop our products to suit different applications and environments all over the world. Our development team is constantly working on new ways to meet customer challenges and requirements. Sometimes the storage and movement of boxes needs some thinking outside of boxes.

SPEED BOLT

SPEED BOLT IS A PERFECT COMPLIMENT TO OUR ANTI-COLLAPSE SYSTEM. THE NEW SPEED BOLT WAS HIGHLY REQUESTED, SO LISTENED AND DEVELOPED ACCORDINGLY. WITH NO SEPARATE NUT OR BOLT, THE INSTALLATION PROCESS BECOMES EASIER AND FASTER, AND THEREFORE GENERATES INCREASED EFFICIENCY.



EASIER ASSEMBLING
FROM THE FRONT

WITHSTANDS
2,500 JOULES

ONLY ONE ITEM

SAFE ESCAPE LOCK

Safe access. Safe Escape. As automating warehouses become more necessary and more popular, needs and safety demands will continually evolve. The new Troax Safe Escape Lock is developed in close collaboration with our customers and designed to bring together the aspects of safety AND security.

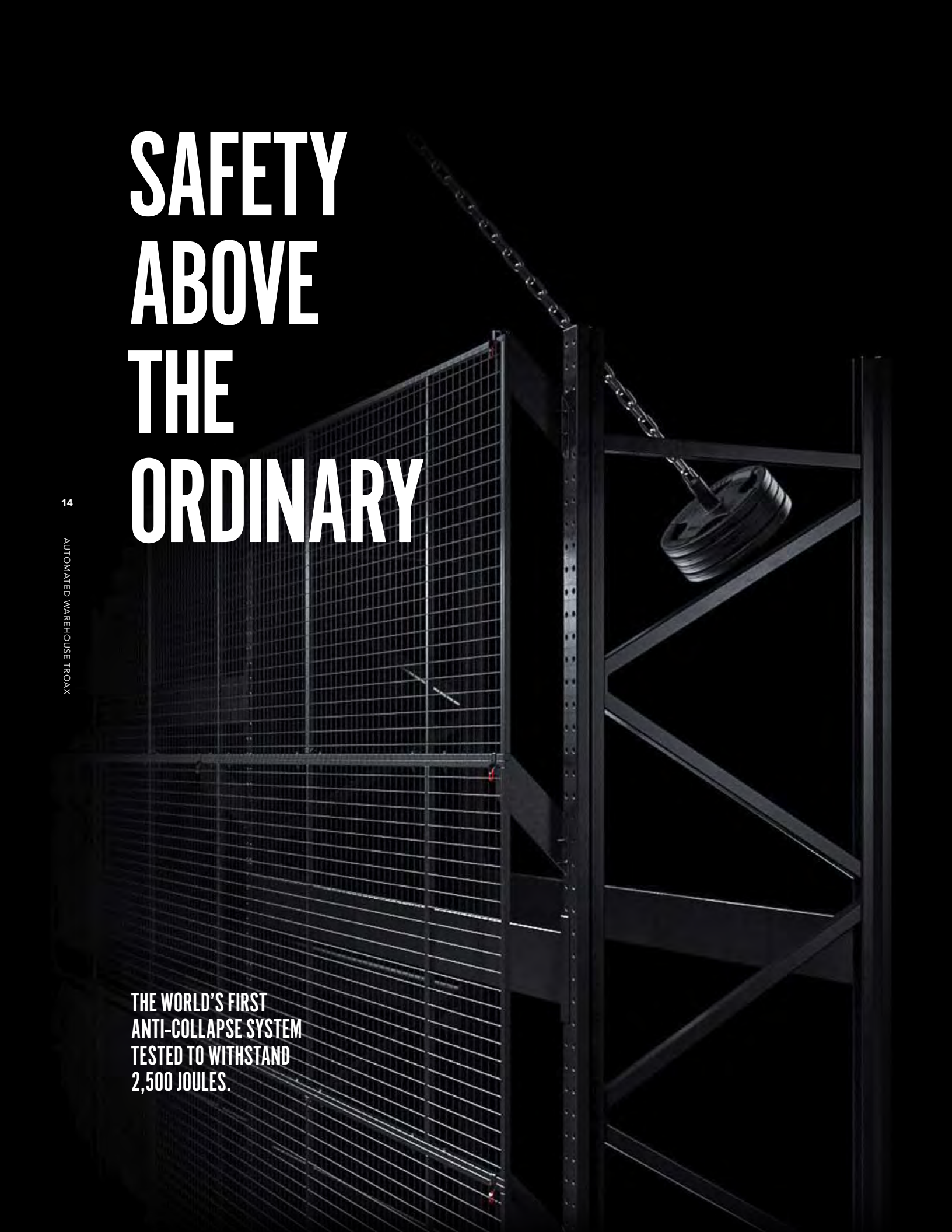


SAFETY ABOVE THE ORDINARY

14

AUTOMATED WAREHOUSE TROAX

**THE WORLD'S FIRST
ANTI-COLLAPSE SYSTEM
TESTED TO WITHSTAND
2,500 JOULES.**



REACHING THE HIGHEST LEVEL OF SAFETY

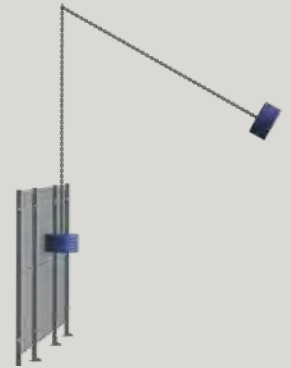
Our Anti-Collapse System is the strongest on the market and prevents risk of spillage and overloading in high stacking situations. It is suitable for pallet racks of any height and with any number of beam levels. The sturdy brackets, together with our secure Musca system are available rack stand-offs from 0 to 400 mm.

OUR PENDULUM TEST METHOD

When testing our products, we use a method that itself is certified by TÜV. The purpose of the pendulum tests is to document the effect of high-energy impact tests. The Anti-Collapse System with bracket is tested with an impact of 2,500 joules, approximately 160 kilograms at 20.1 km/h. Success, the system withstood the impact and no parts became air born. This becomes the industry's first TÜV type approval.

Our Machine Guard System Smart Fix is tested in accordance with the test method stated in ISO 14120. The system is type approved by TÜV and withstands an impact of 1,600 joules. In the pendulum test, a weight of 100 kilograms hits the fence at 20 km/h.

WE PUT OUR TEST TO THE ULTIMATE TEST.



THERE ARE NO SHORTCUTS WHEN IT COMES TO SAFETY

INDEPENDENT TESTING

The core of our business is to make your world safe. For that to happen AND provide the highest quality product possible, we don't take chances. We don't take shortcuts. We don't take your people, your property and your processes for granted. We test. Then test again. Then again till it's perfect. Safety starts with quality and delivered via performance.

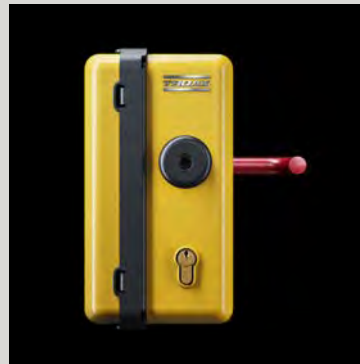
We collaborate with the organization TÜV Rheinland to certify both our products and our test methods. They're a third-party testing institute, with independent consultants who validate the safety of products and services of all types. The goal, protect people and the environment against hazards. TÜV Rheinland has very strict approval requirements for the approval and their certification is one of the strongest, most reputable quality marks globally.



CASE

COLLABORATIONS FOR A SAFER FUTURE

WHEN A CUSTOMER TOLD US THEY WANTED
A NEW TYPE OF SAFE ESCAPE LOCK,
WE LISTENED — AND CREATED IT TOGETHER.



“The idea for the new Safe Escape Lock came up when we had a meeting with our customer’s engineers about a year ago,” said Erik van der Meer, Troax Holland. They told us; »We want a special lock including a safety switch to secure logistics units within automated warehouses«. And together with the Troax Research and Development team, this journey could begin. And now, after a period of research, design, development, and quality testing, it’s available and introduced to the market. The reactions has been very enthusiastic. “We believe in working close with our customers, as it will lead to more creative innovations, taking all of us forward,” said van der Meer.

FROM INNOVATION TO INSTALLATION

The cooperation between Troax and the customer—a large European pallet rack manufacturer—has been going on for some years now, and after a couple of meetings we became their partner. “This is a keyword. To us, being a partner is somewhat different from being a traditional supplier. We are selling a small part of all the products needed in these large projects. But the products we deliver are about safety and they need to be taken seriously,” said van der Meer. “We try to be a total supplier, both in terms of a high service-level and being a partner.

STAY SAFE. STAY HAPPY.

Today, Troax is a global company and deliveries can be made world-wide. “Europe is ready for Automated Warehouses, and this market is growing rapidly. As a result, the need for safety panels is also increasing”.

*“We believe in working close
with our customers, as it will lead
to more creative innovations,
taking all of us forward,”*

Troax’s focus within this line of business is the safety panels, and we have an expertise on everything concerning mesh panel systems. “The customer will tell us what they need, and we provide them with the right products. They know that what we offer is safe, and that their pallet racks and the mesh panels from Troax is a good combination, which the end user is happy about when it’s finished. Then they are safe, and happy,” said van der Meer.

CASE

HEADING TOWARDS NEW HEIGHTS

FOR NEARLY A DECADE, TROAX HAS WORKED CLOSELY WITH ONE OF EUROPE'S LARGEST FOOD DISTRIBUTORS. THE COLLABORATION HAS RESULTED IN NEW INNOVATIONS THAT HAVE BEEN USED IN AUTOMATED WAREHOUSES WHICH IS AN AREA OF GROWTH.



Generally, the safety mesh panel wall system is a relatively small part of the total investment within an automated warehouse; but it can not be overlooked. "When a business is starting up, safety is an extremely important factor, and keeping our promises for the installation is crucial. Major investments are at stake, and it is crucial

to have a continuous and open dialogue around the delivery," said Viktor Göhlin, Automated Warehouse Expert at Troax. For the past ten years, Troax has worked with one of Europe's largest food distributors on projects including solutions for automated warehouses on a large scale. For Troax's part, the project will be more about safety than logistics and robots.

"In automated warehouses people and robots work side by side, and this means safety becomes a key issue within every logistics unit."

MACHINE GUARDING IN LOGISTICS UNITS

As for this case, the need for a well-founded solution that suited the application and the company's wishes became clear. To date, over 15 kilometers of safety mesh panels have been delivered and installed.

"Automated warehouses include both robots and humans, and a combination of solutions within the Machine Guarding and Warehouse Partitioning segments could be applied. We also believe that the demand for high-quality safety solutions in automated warehouses will continue to grow as the market is expanding." Following the customer's growth, new solutions have been developed. The scope of the project has placed high demands on both production and delivery, but the resources and people at Team Troax have delivered at each challenge and opportunity.

"The customer has been able to fully rely on us to find the right safety solution. In total, the project has resulted in almost 20 km of Machine Guarding fence with approximately 1,000 Safety Doors, and 15,000 m² (equivalent to two football fields) of Anti-Collapse screens." said Viktor Göhlin.

THE RIGHT SOLUTION FOR EVERY PROJECT

Within automated warehouses, it is crucial that every specific detail, along with the solution itself, is thoroughly designed, and properly carried out in the required time table in order to prevent delays and potential extra costs that may be incurred. Over time, a close collaboration between Troax and the customer has emerged.

"In automated warehouses people and robots work side by side, and this means safety becomes a key issue within every logistics unit."



QUICK QUOTATIONS



**CREATE THE IDEAL
SOLUTION FOR YOUR
REQUIREMENTS**



**WE WILL HELP
YOU DRAW YOUR
APPLICATION**



EASY FLOW FROM IDEA TO ORDER

It can be hard to imagine how your solution will look before it has been delivered and assembled. At Troax, we use a comprehensive drawing and rendering program. This allows you to view our proposal as 2D and 3D generated drawings before placing your order.

Read more about Troax at www.troax.com—where you will also find product data sheets, 3D files and other downloadable material.

VIEW YOUR TROAX SOLUTION BEFORE ORDERING

MAKING YOUR WORLD SAFE SINCE 19 55

For more than 60 years, Troax has been developing high-quality, metal-based mesh panel solutions to meet the ever changing needs for safe and secure storage, machine guarding, and warehouse partitioning. Today, Troax is the market leader and our products protect people, property, and processes worldwide.



Troax was founded 1955. Throughout the years, growth has always remained strong in terms of international expansion, products, and sector providing security equipment for industry, storage, and property.

Today we are represented all over the world, and we are continuously developing our operations on all continents.

MAKING YOUR WORLD SAFE



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