

ERGONOMICS@WORK!®



SSI SCHÄFER: NO. 1 IN ERGONOMICS AT WORK

In distribution centers as well as in assembly, personnel expenses usually amount to at least 50% of the overall costs. Physical activity that puts stress on the musculoskeletal system leads to a performance decrease, elevated error rates and absence due to illness. SSI SCHÄFER's **ergonomics@work!**® concept counteracts these factors. Optimized processes with minimum physical stress not only increase productivity but also improve quality and reduce throughput times.

Hundreds of SSI SCHÄFER ergonomic workstations all around the world prove the efficiency and effectiveness of the **ergonomics@work!**® concept every day: relieving employees and increasing performance at the same time.

ONE STRATEGY - THREE WINNERS: ERGONOMICS@WORK!®

By assessing and analyzing every single working step, SSI SCHÄFER developed efficient solutions. This is how technical innovations such as the A-Frame, the carousel system or intelligent order control such as the Parallel Picking System were developed.

SSI SCHÄFER also sets standards where technology meets man. The optimization of the man-machine interface requires a technical analysis of all processes and surrounding conditions: the easier the activity is and the clearer the directions are, the more efficient and effective it becomes.

That is exactly what **ergonomics@work!**® does - the SSI SCHÄFER strategy for workplace design that perfectly integrates human motion sequences. A strategy with three winners.

EMPLOYEES. Ergonomically well designed workplaces and processes maintain the employees' health. **ergonomics@work!**® increases joy at work, reduces stress and improves motivation. The workplace is designed around the user and not vice versa.

COMPANY. Companies benefit from **ergonomics@work!**® workplaces in many respects: productivity increases at two-digit percentage rates and costs decline correspondingly. Quality increases as employees tire less quickly and follow clear user guidance. This leads to higher efficiency and shorter order lead times. For this reason, **ergonomics@work!**® is first of all the most economically advantageous solution.

CUSTOMERS. High-quality performance and increased reliability of **ergonomics@work!**® enhance your customer service. You reduce the error rate and thus the effort for your customers. Returns can go back on the shelf in no time.

PLANNING AND DEVELOPING WITH ERGONOMICS@WORK!®

Highest efficiency is achieved by combining various measures. For this reason, research and development at SSI SCHÄFER focus on all processes and facilities. A thorough analysis identifies efficiency potentials to ensure that SSI SCHÄFER workplaces hold the leading position on the market.

ergonomics@work!® for instance, contains a process analysis that breaks up manual activity into more than 30 individual steps.

Today, **ergonomics@work!®** is an integral part of product development at SSI SCHÄFER. This unique know-how is the result of intensive, long-term research at different workstations in warehouses and for various production processes.

At SSI Schäfer, **ergonomics@work!®** is an essential part of designing and planning.

ergonomics@work!® combines human motion sequences with innovative technology.

ergonomics@work!® provides concrete results:

- ▶ Reduction of non-productive activities
- ▶ Productivity increase, usually by up to 20%
- ▶ Quality increase by up to 300% at Pick to Tote workstations
- ▶ Further decrease of error rates
- ▶ Reduction of order lead times
- ▶ Health risks prevention
- ▶ Reduction of staff absence due to illness



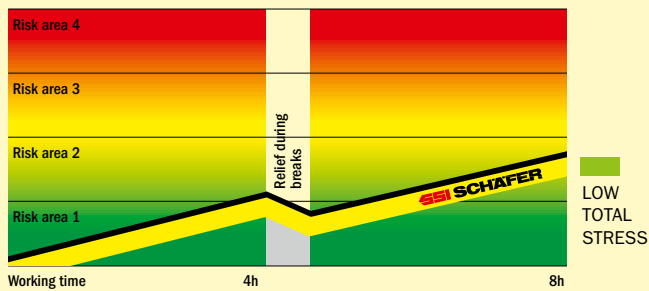
- ▲ Rounded edges and wood optimize the ergonomic workstation
- ▶ Picking always from top to bottom
- ▼ Light control minimizes picking errors



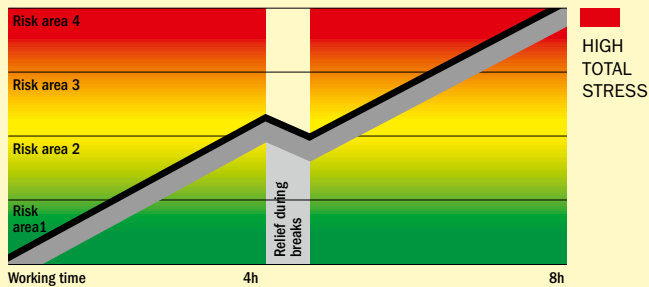
STRESS DIAGRAMS COMPARED

The stress diagrams below are based on 8 hours of work and prove that the overall stress of ergonomics@work!® workstations by SSI SCHÄFER is considerably lower and thus significantly reduces health risks.

SSI SCHÄFER ERGONOMICS@WORK!® WORKSTATIONS



WORKSTATIONS BY COMPETITORS



ASSESSMENT CHART

Risk area	Points	Description
1	<10	Low stress, health risks posed by excessive physical strain is unlikely.
2	10 to <25	Medium stress, excessive physical strain of persons who are less able to cope with physical stress possible. For these persons design measures should be taken.
3	25 to <50	Elevated stress, excessive physical strain even of persons who are able to cope with physical stress possible. Design measures should be taken.
4	≥50	High stress, excessive physical strain is likely. Design measures must be taken.

RELIEF POTENTIAL OF ERGONOMICALLY OPTIMIZED WORKING CONDITIONS

MENTAL WELL-BEING DUE TO IMPROVED OVERALL CONDITION

ACOUSTIC AND OPTICAL PERCEPTION

CERVICAL VERTEBRAE AND SHOULDER JOINTS

BACK, ARM AND SHOULDER MUSCLES

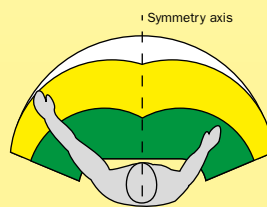
SPINAL COLUMN

ARM AND WRIST JOINTS

SACRUM AND HIP JOINTS

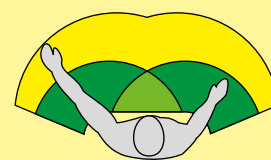
KNEE AND ANKLE JOINTS

Workspace



- Small workspace
- Maximum physiological workspace
- Maximum geometric workspace

Working areas



- One-Hand area
- Two-Hand area
- Extended workspace

ERGONOMICS@WORK!® IS ALMOST BARRIER-FREE

The extraordinary quality of ergonomics@work!® workstations is also obvious as they are suitable for persons who are less able to cope with physical stress (see TÜV assessment) – in working times of up to 4 hours even people with disabilities can be deployed.

ONLY AT SSI SCHÄFER: TÜV EXPERTISE

SSI SCHÄFER is the only provider with an objective TÜV expertise.

Two showcase **ergonomics@work!**® workstations were critically assessed by a specialist for occupational health. The report below shows the positive assessment result for SSI SCHÄFER.

Simulations and practical tests have proven the comprehensive benefits of **ergonomics@work!**® workstations already during the development phase. Employees, companies and customers alike benefit from the developed concept. Today, the entire SSI SCHÄFER product range reflects the unique **ergonomics@work!**® strategy.

Assessment Summary

Zusammenfassende Beurteilung:

Am 17.03.2010 haben wir die Arbeitsplätze „WE-AP (Wareneingangsarbeitsplatz)“ und „PTT (Pick to tote)“ begutachtet und nach der „Leitmerkmalmethode zur Erfassung von Belastungen bei manuellen Arbeitsprozessen“ beurteilt.

Conclusion

Ergebnis:

An beiden Arbeitsplätzen sind die **aktuellen ergonomischen Standards umgesetzt** und die Belastungen für den Bewegungsapparat minimiert.

Am Arbeitsplatz „WE-AP“ ergab sich ein Wert von 24, am Arbeitsplatz „PTT“ ein Wert von 24.

The workstations implement up-to-date ergonomic standards.

Health problems due to excessive physical strain are not to be expected.

Gesundheitsschäden durch Überbeanspruchung sind an beiden Arbeitsplätzen daher bei gut geübten, in ihrer körperlichen Belastbarkeit nicht wesentlich eingeschränkten Personen, auch bei vollschichtigem (8-stündigem) Einsatz, nicht zu erwarten.

Aus arbeitsmedizinischer Sicht sind diese Arbeitsplätze bei kürzeren Einsatzzeiten (< 4 Stunden) **auch für Menschen, die in ihrer körperlichen Belastbarkeit eingeschränkt sind (z. B. behinderte Menschen), gut geeignet.**

The workstations are also suitable for workers with disabilities.

Risikostufe	Punktwert	Beschreibung
1	<10	Geringe Belastung, Gesundheitsgefährdung durch körperliche Überbeanspruchung ist vernachlässigbar.
2	10 bis <25	Mittlere Belastung, eine körperliche Überbeanspruchung ist bei vermehrt belasteten Personen möglich.
3	25 bis <50	Zentrale Belastung, körperliche Überbeanspruchung ist bei belasteten Personen möglich, Gesundheitsmaßnahmen sind anzulegen.
4	>50	Hohe Belastung, körperliche Überbeanspruchung ist vernachlässigbar, Gesundheitsmaßnahmen sind anzulegen.

Freiburg, 09.04.2010

U. Fiedler

Facharzt für Arbeitsmedizin
Arbeitsmedizinisches Zentrum Freiburg
TÜV SÜD Life Service GmbH



The extraordinary ergonomic characteristics of the assessed workstations were achieved with the following measures:

LIGHT SIGNALS FOR USER GUIDANCE

NOISE REDUCTION

ADJUSTABLE WORKING PLATFORM TO ADAPT TO THE WORKER'S BODY HEIGHT

PICKING ALWAYS FROM TOP TO BOTTOM - NO LIFTING

INCLINED COMPARTMENTS

SHORT LIFTING MOVEMENTS IN SEVERAL DIRECTIONS AVOID UNEVEN STRAIN

CONTACT SURFACES MADE OF WOOD

HANDRAIL ALONG SECONDARY PICKING DIRECTION TO SUPPORT MOVEMENTS

LUNGES PREVENT MONOTONOUS WORKLOAD. FLOOR MATS FOR TIRELESS STANDING

ERGONOMIC QUALITY OF PICK TO TOTE, GOODS-IN WORKSTATION & CO

TÜV took two examples of the comprehensive SSI SCHÄFER product range, the goods-in workstation and the Pick to Tote system, and assessed the occupational health benefits of **ergonomics@work!**[®]. Manual workstations include pick@work, E-Pick or the returns workstation. Examples for semi-automatic picking workstations are Pick to Bucket or the Parallel Picking System.

GOODS-IN WORKSTATION

▼ Goods-in workstation



▼ Returns workstation



▼ E-Pick



THE FOUR ERGONOMICS@WORK!® OBJECTIVES

Optimum ergonomics through design processes of manual and semi-automatic workstations – **ergonomics@work!**® has four main objectives:

- ▶ **Loads are only moved horizontally or downwards by means of gravity.** Processes and workstations are designed to reduce physical strain as far as possible.
- ▶ **Avoiding movements that are not necessary for the work process.** Workstations are arranged “around the work”, reduce steps and arm movements; and thus increase the overall performance.
- ▶ **Clear design of the workstation.** Simple, optical user guidance and integration of sensors increase quality.
- ▶ **Forms and materials focus on the work process, facilitate free movement and avoid injuries.** For this purpose elements and edges are rounded and contact surfaces are made of wood.

GOODS-IN WORKSTATION

Goods are shifted onto the work table with the help of a height-adjustable pallet station, transferred to the warehouse system (graphical menu) by scanning the barcode and then placed in storage totes. The totes are pushed over onto a conveyor belt that runs at the height of the work table and are transported to the storage location. A further conveyor belt removes empty cartons; integrated waste containers for plastics and waste as well as anti-fatigue floor mats complement the goods-in workstation.

PICK TO TOTE

Goods are picked from storage totes at chest height down to order totes. Light-controlled picking guidance facilitates great freedom of movement and high picking performance in continuous operation. Light curtains above the filling slots guarantee reliable high quality. Contact surfaces are made of wood.



▼ Pick@Work



PICK TO TOTE

▼ Pick to Tote workstation



▼ Pick to Tote spherical



▼ Pick to Bucket



▼ Parallel Picking System



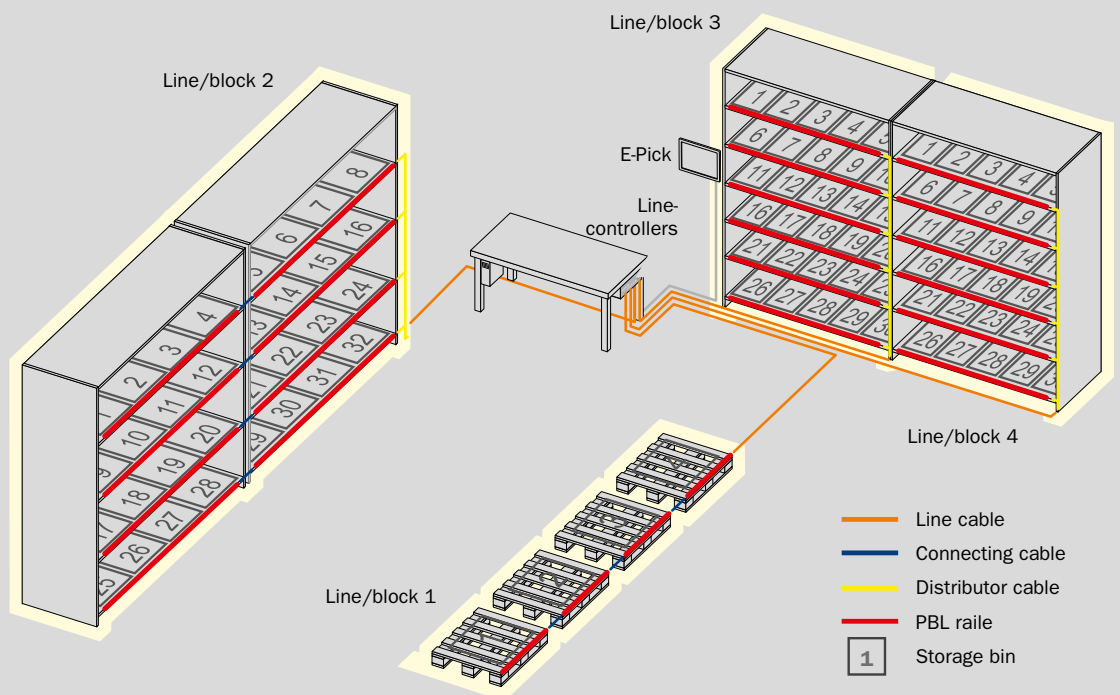
E-PICK – EFFICIENCY INCREASE IN THE WAREHOUSE

Light-controlled picking system minimizes searching times. E-Pick is an entry level solution or simple handling and installation for warehouses with up to 800 storage locations.

E-Pick totally or partially equips a professional warehouse with Pick by Light by means of a simple, cost-effective modular system - without significant programming effort.

The user independently installs the entire application with the help of a graphical user interface - no special IT knowledge required.

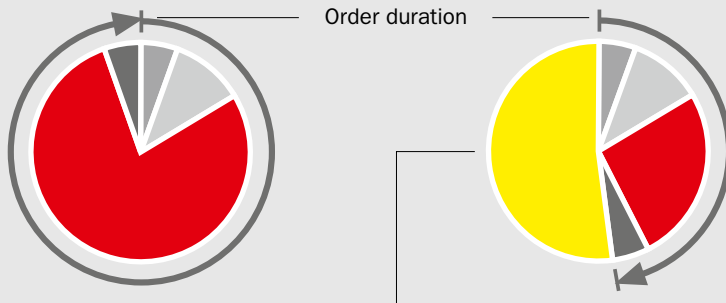
E-Pick increases the picking performance by 200% and more, as compared to conventional picking methods. At the same time, the picking quality increases tenfold.



Lead times of picking with E-Pick and pick lists compared

Common paper-based picking

Efficient picking with E-Pick



- Order start
- Walking time
- Searching and picking
- Order completion

Time saved with E-Pick

Comparison of picked lines per hour. E-Pick doubles performance!



- Picking productivity with E-Pick
- Picking productivity paper-based



XXL EFFICIENCY AND QUALITY INCREASE WITH PICK@WORK

Complex installation operations must permanently reflect economic factors.



The pick@work technology optimizes work processes, increases efficiency and raises quality standards, always considering the ergonomic aspects - for the health of your employees.

YOUR ADVANTAGES:

- ▶ High-quality product by the world market leader for internal logistics
- ▶ Reduction of errors due to easy step by step installation
- ▶ Simple self-assembly
- ▶ Easy integration of charts, plans, pictures etc
- ▶ All from one supplier

Three operation options are available:

- ▶ Stand-alone operation (data exchange with USB, without database connection)
- ▶ Extended operation (with SQL database connection, without ERP connection)
- ▶ High-end operation (with SQL database connection, with ERP connection and automatic feedback functions)

EASY INTEGRATION OF THE PICK@WORK SYSTEM INTO YOUR WAREHOUSE MANAGEMENT SYSTEM

XML file

The XML control files (order data, warehouse coordinates) required for operation are loaded to the terminal using the two USB interfaces.

Direct connection to the database

If you already have an SQL compatible database, you can release tables or views (image data) and query them directly with the pick@work software at the assembly workstation. With this connection and by assigning an IP address, you make the pick@work system an integral part of your existing IT network. Handling is extremely easy. pick@work supports the following SQL compatible databases: MS SQL Server, Oracle, PostgreSQL, My SQL, and PervasiveSQL.

SAP@SSI

Optimize your assembly process, increase your productivity and reduce your process costs by connecting the light-controlled assembly system pick@work and SAP. In production planning, we are your reliable partner for the integration of SAP solutions. Contact us, we are happy to help.

WebService

You can enable a web service that communicates with pick@work software to query order data.

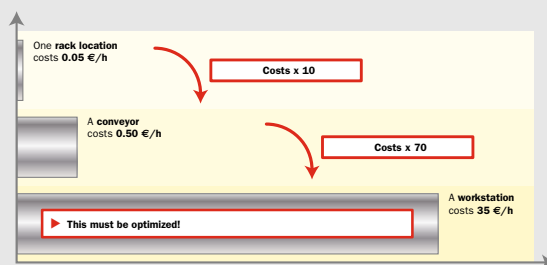
PICK@WORK – INCREASED QUALITY IN ASSEMBLY

A LIGHT-CONTROLLED ASSEMBLY SYSTEM MAXIMIZES PERFORMANCE AT THE MANUAL ASSEMBLY WORKSTATION. PROCESS DATA AND INTEGRATED ASSEMBLY INSTRUCTIONS OPTIMIZE YOUR WORK PROCESSES.

The innovation: The system combines ergonomic workstations and Pick by Light. A display guides the user step by step through the assembly process.

The employee selects the orders on a display causing the storage locations to light up in the correct assembly sequence. Images or drawings of the assembly steps introduced to the system, guide the employee step by step, through the work process. The complexity of the work process becomes apparent, the error rate is minimized and quality is guaranteed.

Intelligent picking and assembly strategies provide for optimum processes, increased productivity and ergonomics at the workstation.



Increased employee satisfaction, less absence due to illness and enhanced productivity. These are the proven results of the pick@work concept.



AUTOMATIC PICKING SYSTEM

For years SSI SCHÄFER has been deploying picking automats with channels for fast-moving products. It is the worldwide market leader in this field. The picking automat combines low costs with high performance and model ergonomics. Without interrupting the picking process the automat can be replenished during operation. The **ergonomics@work!**® construction principles have been applied here too:

- ▶ High quality due to simple, clearly structured user guidance. A clearly visible lamp shows that replenishment is required; the filling levels of the individual channels guide the user. Additionally, a numeric channel display is available.
- ▶ The automat's ejectors are fully protected and so designed to assure the picker's security even in the case of an operating error.
- ▶ Short distances for replenishment increase productivity and contribute considerably to the excellent cost/performance ratio of SSI SCHÄFER automats.

LOW NOISE CONVEYING SYSTEM

An excessive noise level around a logistics workstation is a significant cost factor because noise affects the concentration and leads to more errors and less performance. Therefore the new "low noise conveying system" by SSI SCHÄFER forms an integral part of **ergonomics@work!**®. The silent conveying system consists of a whisper tote with a new, patented contact surface and noise reduction equipment for the FT+ conveying system. It is therefore possible to reduce the noise level of either the entire system or particularly sensitive areas, for instance those near highly efficient workstations. The development has been carried out in a way to allow retrofitting of conveying systems previously installed by SSI SCHÄFER.

The result is then a virtually inaudible conveying system with a noise level of about 10 dB(A) under that of a typical warehouse.



▲ Specially coated base of totes for the low noise conveying system
▼ Short distances between A-Frame and replenishment rack



▲ Shortens distances: the gate
▼ Optimized working heights, short distances for lifting



IT AND VISUALIZATION

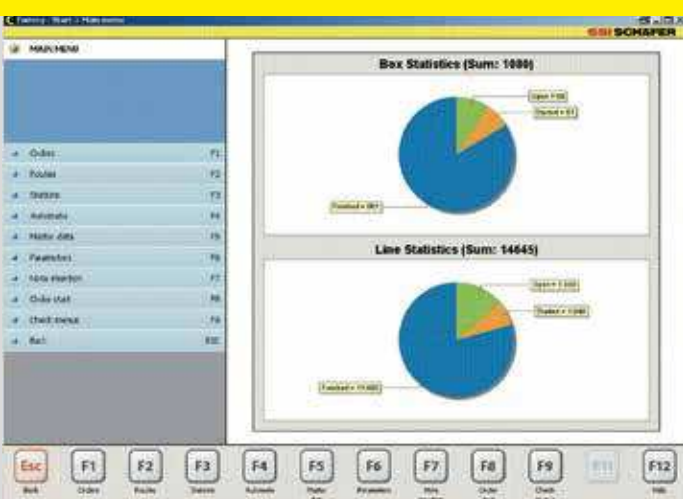
ergonomics@work![®] has also made its way into IT solutions. Users who are familiar with Windows operating systems or MS Office products can immediately work with the SSI SCHÄFER IT user interface. The interface design of the SSI SCHÄFER IT software was developed together with ergonomics experts and designers to achieve the best possible user guidance.

HANDLING SYSTEMS

The comprehensive range of SSI SCHÄFER handling systems aims to bring relief from physically demanding or monotonous tasks.

- ▶ Stackers and destackers process up to 1,400 totes per hour in continuous operation.
- ▶ Tote emptying machines provide more than 2,000 emptied totes per hour.
- ▶ Different kinds of insertion machines do not tire out, not even when processing 1,300 totes per hour or up to 2,000 printed pages per hour. It is even possible to combine automatic address insertion with lidding.

ergonomics@work![®] in handling systems does not only mean relieving workers from physically demanding or monotonous tasks, it also entails sophisticated user guidance for operation and maintenance.



- ▲ Straightforward screen layout for ideal user guidance
- ▼ Graphical error messages with PLC visualization

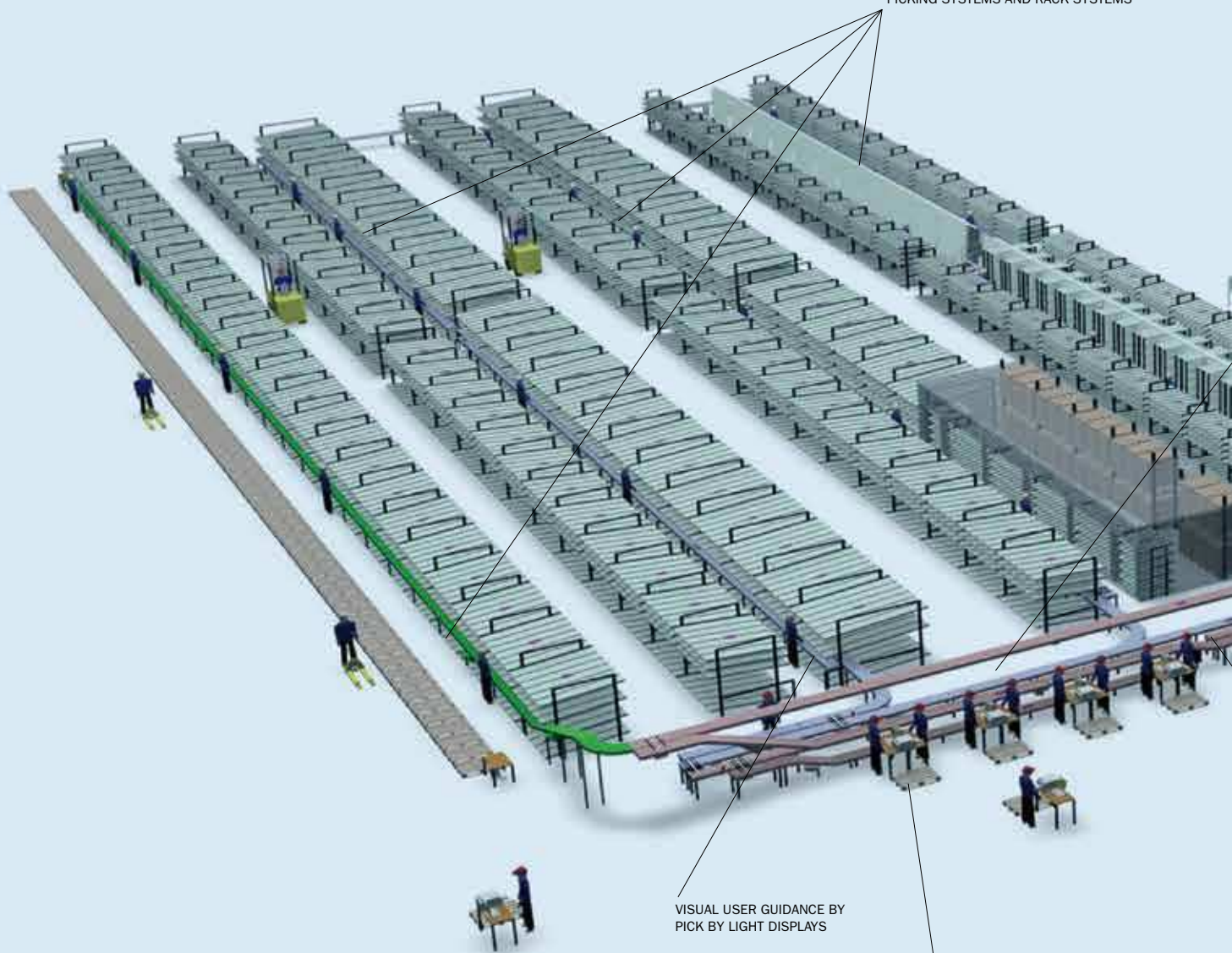


- ▲ Fully automatic document insertion minimizes errors
- ▼ Tote stacker/destacker and lidding machines increase performance and relieve staff



ERGONOMICS@WORK!® SSI SCHÄFER PICKING SYSTEMS AND THE ERGONOMIC ASPECTS AT A GLANCE

SHORT DISTANCES AND OPTIMIZED WORKING HEIGHTS OF AUTOMATIC ORDER PICKING SYSTEMS AND RACK SYSTEMS



VISUAL USER GUIDANCE BY PICK BY LIGHT DISPLAYS

GOODS-IN WORKSTATIONS - OPTIMIZED WORKFLOW AND ERROR-FREE SORTATION BY LIGHT GUIDANCE

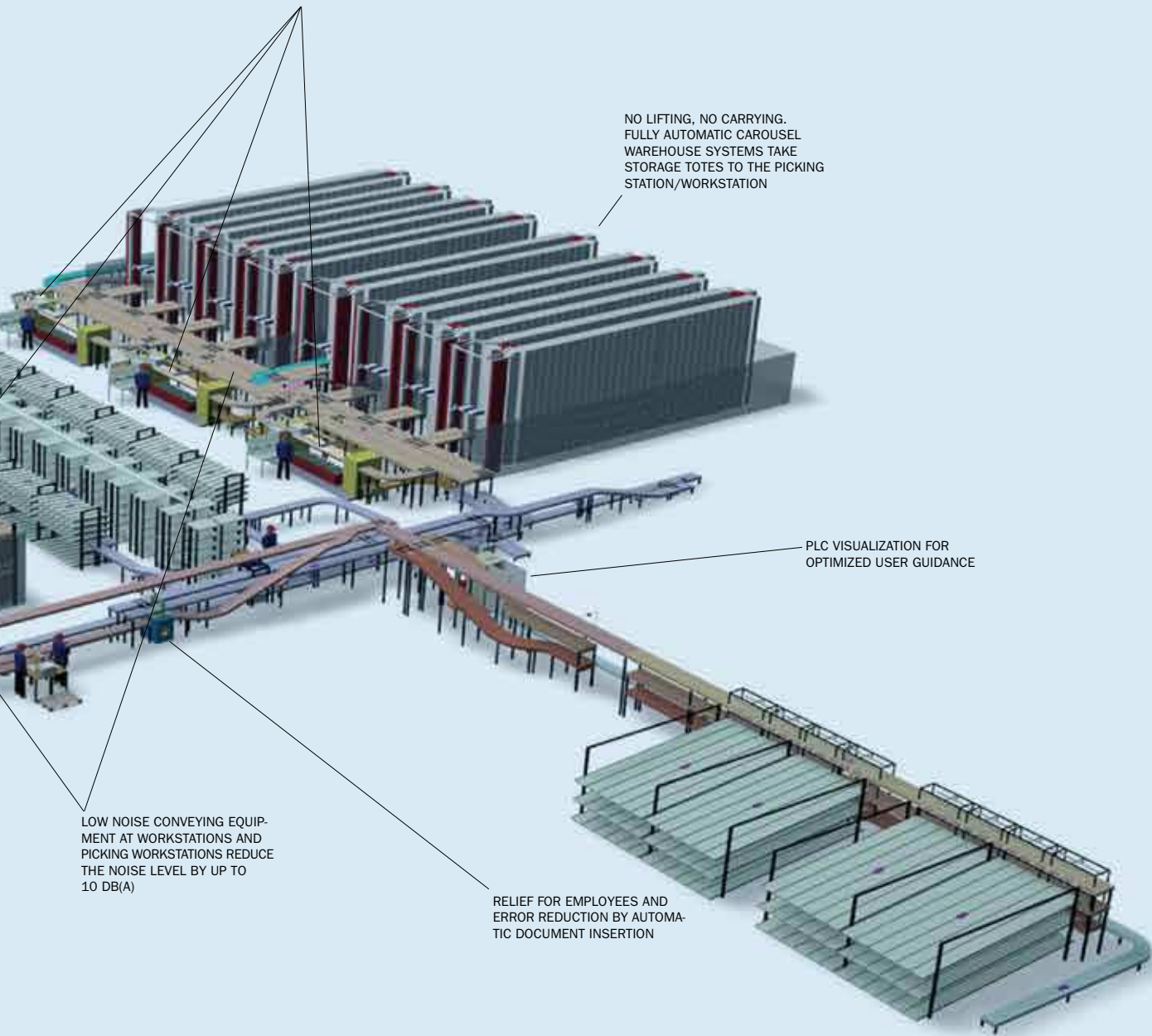
OPTIMIZED MOVEMENTS.
PICKING FROM TOP TO BOTTOM AT ALL
WORKSTATIONS. WOOD AND ROUNDED
EDGES AT PICKER'S SIDE. OPTIMIZED WORK-
ING HEIGHTS. MINIMIZED DISTANCES.
LIGHT SIGNALS FOR USER GUIDANCE.
LIGHT CURTAINS FOR ERROR REDUCTION

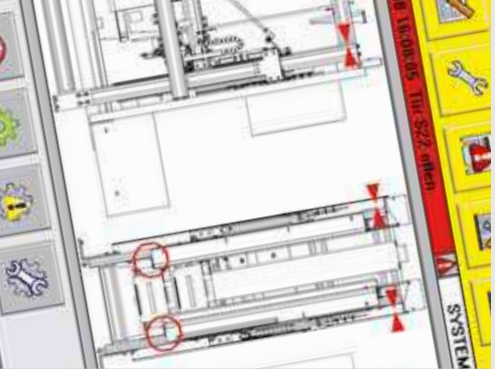
NO LIFTING, NO CARRYING.
FULLY AUTOMATIC CAROUSEL
WAREHOUSE SYSTEMS TAKE
STORAGE TOTES TO THE PICKING
STATION/WORKSTATION

PLC VISUALIZATION FOR
OPTIMIZED USER GUIDANCE

LOW NOISE CONVEYING EQUIP-
MENT AT WORKSTATIONS AND
PICKING WORKSTATIONS REDUCE
THE NOISE LEVEL BY UP TO
10 DB(A)

RELIEF FOR EMPLOYEES AND
ERROR REDUCTION BY AUTOMA-
TIC DOCUMENT INSERTION





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OHSAS 18001:1999 NR. 001601/C

 **LISTED**
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