



AN INTRODUCTION TO NEXT-GENERATION LINE SORTER TECHNOLOGY

Combining the simplicity of line-based sorting with the advanced handling capabilities of a high-speed cross-belt sorter creates a radically new type of line sorter technology, which raises the benchmarks for material handling in mid-volume facilities.

EMERGING BUSINESS TRENDS

Successive generations of material handling systems have focused on addressing core performance issues such as increasing productivity and reducing maintenance costs. Now, the next generation of systems needs to respond to new business imperative: making more efficient use of space. This white paper outlines the latest advances in line sorter technology, which enable material handling companies to address these issues.

The new benchmarks are achieved by combining energy-efficient technologies used in the latest high-speed loop sorters with innovative features for more efficient and flexible line sorting. The result is a new line sorter which delivers significant improvements in key performance criteria:

- › More flexible handling mix
- › Reduced noise levels
- › Reduced maintenance costs
- › Higher system availability
- › Plug-and-play systems and controls

EXTENDING THE HANDLING MIX

It is widely recognised that different sorters are better at handling different types of parcels. For example, some conventional line sorters use a sliding-shoe discharge mechanism to push items off. This makes conventional line sorters suitable for handling standardised items, such as cartons and plastic totes, but not for handling fragile items, high-friction items or thin items such as small polybags.

In comparison, the belts used in cross-belt sorters are comprised of short transverse sections which have a higher grip to hold items in place during sorting and roll sideways to discharge items. These features mean that cross-belt sorters can handle standardised cartons or totes in addition to small, loose, or curved items which are not easily handled on conventional line sorters.

The next-generation line sorter introduces active slat-belt technology which achieves the handling capabilities of a cross-belt sorter within the simplicity of a line sorter. This enables material handling companies to fill the gaps in the handling matrix by handling items that range from the lightest polybags to duct-taped shipments of car tires on a single, next-generation line sorter.

FIELD-PROVEN AND ACCURATE: ACTIVE SLAT-BELT TECHNOLOGY

The cross-belt mechanism used in slat-belt technology provides gentle handling at discharge whilst the texture of the belts ensures precise positioning of each item throughout the sortation process. The sorter can also discharge items to either side of the belt without the need for additional alignment prior to discharge.

The sorter cart and slat-belt are manufactured as a single, combined unit using belts of a standard pitch size and length. The pre-tensioned belts eliminate the need for constant adjustment and servicing whilst also ensuring durability. The endurance of these belts has not only been confirmed in tests but has been field-proven in live BEUMER Group sortation systems where they handle billions of items worldwide.



LEADING-EDGE DRIVE TECHNOLOGY

The next-generation line sorter also overcomes many of the traditional challenges of chain-driven line sorters, such as the high levels of noise and the frequent maintenance which results in high Product Life-Cycle Costs (PLCC). In comparison, the new BG Line Sorter adopts Linear Synchronous Motor (LSM) drive technology developed by BEUMER Group and used so effectively in state-of-the-art high-speed loop sorters.

Linear synchronous motors use permanent magnets to generate magnetic fields, which drive the chain of slat-belt units inside the frame. The technology has been widely adopted by the material handling industry in recent years as a fast, energy-efficient, durable and highly controllable method of propulsion with a low noise level.

ULTRA-LOW NOISE LEVEL

With no contact between stationary parts and moving parts of the drive, LSMs achieve ultra-low levels of acoustic noise to ensure a safer and more comfortable working environment for staff. The noise level of LSM drives is far below the typical levels experienced within material handling facilities.

REDUCED MAINTENANCE AND HIGHER AVAILABILITY

The use of specially designed, highly durable and lightweight components, means that the next-generation line sorter also requires significantly lower maintenance compared to conventional line sorters.

Every component within the new BG Line Sorter has been selected to achieve an ultra-low wear-and-tear profile. This includes the LSMs, which are designed to operate with no mechanical contact between the cart and stator, and the drum motor which drives the slat-belts without gears, toothed belts or pulleys. Each slat-belt unit is also equipped with life-lubricated driving wheels designed to offer less rolling resistance to extend operational life.

These highly durable components support lighter maintenance schedules which allow the next-generation line sorter to provide a higher level of overall system availability.

LOWER PRODUCT LIFE-CYCLE COSTS

The ultra-low maintenance levels mean that the new line sorter can deliver a significant reduction in PLCC.

The combination of extended component life-times and a smaller overall parts list allows a reduction in the number of parts in the spares inventory.

With only a few moving parts, the wear and tear is kept to a minimum and, to further optimise the product life-cycle costs, the easy accessibility of the drive units within the frame also means that maintenance is faster, leading to a reduction in labour costs.



The simplicity in design allows for easy access to wear parts for fast replacement; for example easy maintenance access to each slat belt unit and drive unit without having to disassemble the chain of slat-belt units.

INDUSTRY-STANDARD CONTROLS

The next-generation BG Line Sorter is based on scalable system architecture and uses industry-standard software and controls.



The low level control system is based on a centralised PLC control with distributed I/O. The ProfiNet ensures stable and reliable communication with a high degree of flexibility. The BG Line Sorter features infrared data communication (IrDA) to and from the carrier controllers as well as the possibility to integrate BEUMER Group's SCADA system.

THE BEUMER GROUP HIGH LEVEL CONTROL SYSTEM INTEGRATES SEAMLESSLY WITH HOST SYSTEMS SUCH AS:

- › Warehouse Management Systems (WMS)
- › Material Flow Control (MFC)
- › Warehouse Control Systems (WCS)
- › Subsystems and peripheral equipment

The system is designed to ensure easy access to vital management information. Data exchange of sort tables, advanced sorting logic and integrated, customer-defined business logic are made available using the BEUMER Group system controller.

The information system supplies statistics and status reports. The BG Line Sorter can be accessed, monitored and controlled via the BG Fusion user interface and even from a remote workstation to increase flexibility and productivity.

SPACE EFFICIENCY

The new line sorter integrates many features which are designed to allow the system to achieve the highest throughput per cubic metre of space. The line sorter's ability to handle items across a diverse range of shapes and sizes provides the first step towards increasing the efficient use of available space. The standard modular units, based on a common platform, also enable significantly higher design flexibility which reduces the system footprint in addition to reducing installation time and costs.

These features enable the next-generation line sorter to be configured to increase throughput when extending or replacing existing systems, or to ensure the most efficient use of space in new-build projects.

PLUG-AND-PLAY INSTALLATION

The modular design allows the new line sorter to offer almost plug-and-play installation. Each module integrates the mechanical and electrical components, as well as low- and high-level controls. The BG Line Sorter is built, pre-tested and certified off-site prior to delivery. With fewer connection points, installation is fast and can ensure minimal disruption to the normal operation of the existing system.



TECHNICAL MAIN SPECIFICATIONS: BG LINE SORTER

- › Sorter capacity: 1,500-10,000 items/hour.
- › Sorter velocity: Up to 3.0 m/sec.
- › Drive units: Linear Synchronous Motors (LSM).
- › Belt activation device: Brushless DC drum motor.
- › Communication: Infrared (IrDA).
- › Main machine frame: Steel plate.
- › Temperature range: 0 to +45°C.

This approach also allows for rapid commissioning by minimising the time required for on-site testing in addition to enhancing reliability and system availability. The sorter's modularity also provides the flexibility to increase capacity to support future growth, or allow the sorter to be re-positioned or moved to a new facility.

SUMMARY

By combining the simplicity of a line sorter with the handling capabilities of advanced cross-belt sorters, the next-generation BG Line Sorter allows material handling companies to meet the demand for higher space availability in existing or new-build facilities. Old or worn roller conveyors are easily replaced with the more flexible BG Line Sorter which offers more functionality at a lower cost. The use of LSM technology and durable, lightweight components ensures a reduction in maintenance costs and benchmark product life-cycle costs.

As a replacement for conventional line sorters in companies operating midsize-capacity systems, or in new-build projects, the next-generation BG Line Sorter supports the new industry objectives of greater space and efficiency.

