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requires continuous digitization of the value
added supply chain

Smart Logistics (4.0): End-to-end optimization based on maximum data transparency

WITRON

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The distribution logistics is currently undergoing a paradigm shift. First and foremost, the change is driven by the market itself: Food and non-food consumers have completely new possibilities to cover their needs with E-Commerce and online trade. The good old supply chain has long developed to a consumer-controlled demand chain. Moreover, technical developments such as Big Data, Predictive Analytics, or Smart Logistics (4.0) create the conditions to practically realize concrete solutions for partially new business models. These issues have top priority for WITRON and its national and international customers, as well – many of these issues have already been implemented successfully today – and challenging issues are in the pipeline.

Integrated data transparency in real-time and on all levels

Horizontal and vertical data transparency is the foundation for the right decisions in the demand chain. It is decisive to react quickly to changed requirements or to anticipate potential developments in due time. The prerequisites for an integrated data transparency and the digitization of the entire value added supply chain in logistics have long been established.

As general contractor, WITRON is fully responsible for the design, IT, control, mechanics, maintenance, and the system operation of its projects. With almost 45 years of market experience and more than 2,000 realized projects, the company knows the horizontal supply chain of many industry sectors in detail: From the supplier, over receiving, the distribution center, transportation, and through to the supply of the goods to its destination, as for example the store shelf or direct home delivery. Since WITRON has its origin in the development and integration of warehouse management and control software, the company also has extensive knowledge of the vertical supply chain: From

the ERP system, over the WMS, the WCS, the PLC, mechanics, drives, and through to sensors and actuators.

The structuring of gathered information will create a "transparent logistics center" with a great amount of relevant data that is used as extensive knowledge database to benefit WITRON's customers: For an optimal and efficient system and shift operation, as action recommendation for strategic logistics decisions, as design basis for additional projects and flexible adjustment to market changes, the creation of exact analyses and visualizations for the efficient and sustainable use of mechanics elements, the development of innovative software features, for maintenance, and much more.

But the fast and correct interpretation of all available data has another effect as well: A way will be paved towards an autonomously controlled system. The consequence: A logistics process with consistently high optimization on all levels and in all areas.

The modern logistics center will be steered with and from a leading-edge control center. A master control software developed by WITRON and created based on many information from the warehouse management system automatically provides action and operating recommendations for the operator by means of numerous interfaces to internal and external systems. This allows data transparency over all distribution channels, an intelligent purchase and inventory optimization, as well as a global inventory management over all internal and external warehouse locations through to items stored at the supplier's site. It also allows an integral forecast for processes of all warehouse areas – from receiving, over order picking, and through to dispatch – with corresponding optimization measures related to manpower requirement and shift occupations.

System-controlled empties handling: Always the optimal number of load carriers in the material flow.
(Image: WITRON)

Communication of SKU to machine: The conveyor system adapts its speed automatically to the individual product. (Image: WITRON)

In the future, WITRON will be able to provide its customers even more detailed forecast and basis for decision-making processes. The consequence: The view of the warehouse management system will not only be focused on pure intra-logistics, but on the entire business process of the customer, for example, with an intelligent and dynamic integration of the route scheduling. Moreover, the WMS receives insight into the purchase / sale systems and identifies evaluations of current or historic store data. It also has access to information about marketing campaigns and the handling of returns with the goal to evaluate all possible impacts on logistics.

Direct and integrated communication between products, machines, and systems

If a highly dynamic WITRON distribution center connects all products, areas, and elements – from receiving to dispatch – in a logical and IT-supported manner, it allows a real-time optimized order processing that runs largely without staff intervention. The result is a "flowing" logistics process: If master data, departure times, store layouts, machine, or frame conditions change, also order processing or prioritization will change in a flexible and automatic manner, and in real-time. The core of the idea is that all units and/or parties involved in the entire system (as for example machines, SKUs, stores, tours) are directly linked with each other, communicate with each other, and that dynamic changes flow into the process in a decentral manner and in real-time.

The following is a typical example for the "independent control and integrated communication" within logistics based on the handling of PET bottles: The incoming goods pallet will not only be checked for completeness and quality by the system before it is automatically stored, at this point the logistics system already knows, if it is a toteable product, a bulky product, if the item can be picked fully automatically, or if it has to be picked manually. Based on the existing customer orders, the system already knows in the receiving area if the product is currently a fast mover or a slow mover. Storage in the high bay warehouse is done accordingly. If ABC curves change,

new optimizations will have immediate effect. Subsequently, the items are provided to the OPM area on demand.

With regards to WITRON's solutions, even the individual SKUs are directly communicating with the logistics system and the corresponding mechanical elements. In the course of the depalletizing and separation process, the product "signalizes" according to what parameters it needs to be "handled". The depalletizer knows for example the maximum intensity of the contact pressure and the mechanics systems knows for example that an item needs to be placed and not laid onto a tray, and much more. When transporting the item to the tray AS/RS, the conveyor system automatically adapts its speed to the individual product – bottles will therefore not tilt for example. The warehouse management system generally knows where the individual case is physically located in the warehouse. This is also visually verified by a product image for every single case. For a store-friendly order picking, the packaging unit will be transported in the right sequence from the AS/RS to the COM machine. If necessary, it will be re-adjusted automatically before it receives its assigned location on the order pallet or roll container - depending on the individual shop layout of the store. Since bottle necks are not stable storing positions for additional products, the OPM system knows via master data and stacking algorithm, that a slip sheet needs to be placed onto the bottles first. Then, additional products will be picked without any error. Error-free, because the entire system is monitored via sensor technology and because the physical position and quality of the individual products is permanently compared with the theoretical stacking design.

The process-controlled product handling continues in the dispatch area. Automatic dispatch buffers provide the truck driver the order pallets and order roll containers via gravity conveyors just-in-time and in the right sequence for loading: optimally adapted to the loading volume and the allowed load capacity of the trailer through a shipping space calculation. "Empties" such as totes, pallets, and roll containers returned by the truck driver, will automatically be returned into the material flow, cleaned if required, returned or buffered in the internal logistics cycle with an optimum quantity.

Store pallets: Consolidated fully automatically based on the respective store layout.
(Image: WITRON)

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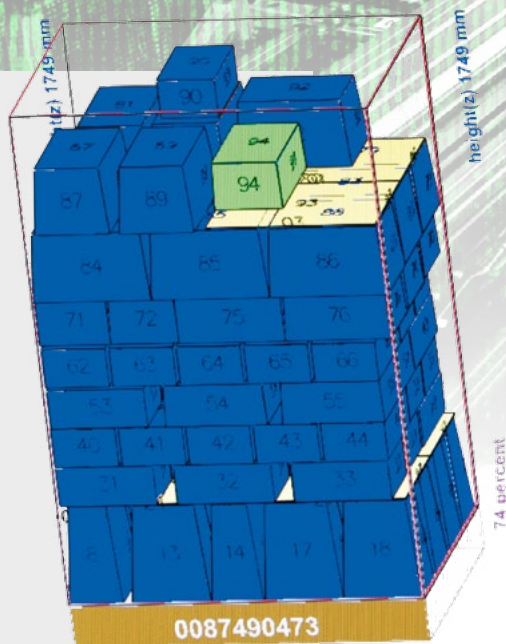
Dynamic stacking algorithm:
Basis for error-free and
store-friendly order picking.
(Image: WITRON)

Forecasting + optimizing / order processing
within order picking

The central element of a logistics center is and will remain the or-
der picking process. This is precisely where data consistency gives a
high optimization potential. The order picking process starts with a
preceding simulation that determines the necessary picking capacities
on the basis of workload and order structure. The data model also includes dispatch,
route scheduling, and the car pool management. Subsequent to Predictive Analytics
under consideration of all influencing factors, the order picking process will be holis-
tically optimized and handled in a process-controlled manner. This means: Manpower
requirement, shift schedules, and machine run-times will be defined by the system,
and replenishment from the high bay warehouse to the respective sub-systems will
be controlled. Order priorities and order start will be considered at the same time.
Load carriers are provided at the picking workstations in the right quantity. A workload
balancing – a distribution of order peaks to the available picking resources – will also
be carried out. All proactive analyses are dynamic: If influencing factors and frame
conditions change, the processes will immediately be optimized independently by the
system based on the new definitions.

Whether it concerns tote items, piece pick, case pick, bulky products, or temperature-
controlled items – automated or semi-automated order picking is done dynamically,
store-friendly, and basically without any errors. This is ensured by highly efficient
stacking algorithms that generate an optimal stacking design for every order based
on the article master data and customer demands. Basically, an "intelligent" stacking
algorithm continually receives the sum of all data and factors that are relevant for a
cost-efficient order picking – that is not only SKU and store specifications, but also
criteria that concern transportation. If, for example, it concerns a "long" tour, for
which the trailer has to cover many miles, the focus is on very densely packed pallets

/ roll containers in order to save transportation costs. In case of "shorter" tours, the focus is more on "store-friendly" picking. Here too: If parameters change, the system will optimize automatically with regards to the new requirements. Another important part of the simulation process is the consolidation. The bundling and integration of different business models at WITRON is generated through efficient order consolidation from the different sub-systems and the consolidation to one customer order using all synergies. Thus, solutions designed by WITRON enable the handling of store business, Multi-Channel business, and online business with the same logistics modules from one central logistics center.

WITOOLs optimize service and maintenance

Operators require investment protection. This means that systems of specific industry sectors have to run 24 hours a day, 365 a year - for 25 to 30 years. To ensure these high requirements, WITRON developed the web-based and applicatory Service Management Software WITOOL. Therefore, WITRON's digital end-to-end strategy does not end in the dispatch area. The software also includes an integrated maintenance processing. Also, in the field of service and maintenance, the trend clearly goes towards self-learning systems. It is about creating an extensive data pool, optimizing processes with the existing data, identifying trends based on the available data and processes, and creating exact action recommendations for the maintenance team based on these trends. WITOOL enables this overall transparency over all service and maintenance tasks: The organization of active and proactive maintenance based on an efficient operating data registration, a resource management for the entire maintenance team, a professional fault removal, the spare parts management, recommendations for health and safety, and much more. In consequence, WITOOL stands for high cost-efficiency, cost control, effectiveness, and

Modern system service:
Direct machine communication
via smart phone.
(Image: WITRON)

timesavings and at the same time simple implementation and user-friendly handling. Flexible cloud hosting models as well as open interfaces allow for smooth implementation in a variety of maintenance areas. The most important dialogs are optimized for the mobile usage by means of tablets or smart phones. An own server and database infrastructure on-site or special technical expertise is not required.

The basis of the maintenance tasks carried out by WITRON is the Risk Based Maintenance (RBM) and Reliability Centered Maintenance (RCM) strategy. The user revives support with his or her decision whether to exchange parts proactively or reactively: Where do higher costs arise - due to the parts consumption (proactive) or due to downtimes (reactive). Moreover, the complete networking and the available operating data, production planning, machine data, and resource planning in connection with intelligent analysis functions allow the automatic creation of maintenance schedules, the definition of optimal spare parts requirements, and employees receive their work orders for maintenance and system support directly on their smart phone.

Conclusion:

Through the intelligent networking of all "parties involved" within the entire internal and external value added supply chain, logistics solutions from WITRON enter into a new dimension – and create new perspectives for WITRON customers.

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