

Z praktyki przedsiębiorstw

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Model of product identification in a warehouse supported by Anteeo WMS

Model identyfikacji produktów w magazynie przy użyciu oprogramowania Anteeo WMS

Products should always be accurately identified, regardless of the type of warehouse and the specificity of stored products. Proper acceptance of a given product into a warehouse is the basis for the implementation of subsequent warehouse processes and affects the optimization of the entire logistics chain. Appropriate marking and marking of the location of products deposited in the warehouse is currently determined by an IT system that supports companies in organizational, technological and administrative activities. The aim of the article is to present a model of the process of identification of products accepted and placed on a warehouse using the Anteeo WMS information system.

Key words:

logistics, enterprise, warehousing, WMS, ZPLII.

Produkty powinny zawsze być dokładnie zidentyfikowane, niezależnie od rodzaju magazynu i specyfiki przechowywanych produktów. Właściwa akceptacja danego produktu w magazynie jest podstawą do realizacji kolejnych procesów magazynowych i wpływa na optymalizację całego łańcucha logistycznego. Odpowiednie oznakowanie i oznaczenie lokalizacji produktów zdeponowanych w magazynie jest obecnie określane przez system informatyczny, który wspiera firmy w działaniach organizacyjnych, technologicznych i administracyjnych. Celem artykułu jest przedstawienie modelu procesu identyfikacji produktów przyjętych i składowanych w magazynie przy użyciu systemu informatycznego Anteeo WMS.

Słowa kluczowe:

logistyka, przedsiębiorstwo, magazynowanie, WMS, ZPLII.

JEL:

Introduction

The correct identification of products is an important issue shaping the efficiency of storage processes. An essential element of the warehouse chain is quick and error-free identification of products. Each acceptance and issue of a given warehouse unit SKU (Stock Keeping Unit) should be fully controlled and automatically saved in the IT system. The more detailed identification of a given goods and the storage unit, the more efficiently the storage, picking and controlling processes take place, for instance product expiration dates (Waśniewski,

Borucka, 2011). The flow of goods throughout the logistics chain is enabled by barcodes, by means of which not only each product is marked, but also multiple packaging and formed logistics items prepared for issue. The aim of the article is to present the model of the process of identifying products located in the warehouse using the Anteeo WMS operating system. Achieving the goal was possible due to the use of the ZPLII label programming language and analysis of the storage process. The tool enabling the construction of the model was the Anteeo WMS IT system and logistic printers integrated with the operating system.

Organization of warehousing processes

According to the Polish Standard, a warehouse should be understood as each functional and organizational unit, which is intended for storing stocks in a specially adapted space (storage building), based on established technology, using technical equipment and means as well as knowledge of the manager, as well as a team of people equipped with appropriate skills (Norma PN-84 / N-01800).

Processes and organization of the entire warehouse inventory management are crucial to the functioning of logistics companies. They affect the company's financial result as well as its image. Inadequate organization of processes may result in a loss of the client or a decrease in competitiveness on the market (Brzeziński, Gawryluk, Głodowska, 2017).

In order to organize warehouse processes, they should first be identified. The warehouse process as a set of operational activities is related to the acceptance, storage, picking up and issuing of tangible goods in suitably adapted places and with the fulfillment of specific organizational and technical conditions (Waśniewski, Laskowski, 2016). The following is a schematic of the next elements of the process of receiving the product into the warehouse (scheme 1).

To acceptance goods to warehouse, it is necessary to unload the vehicle which delivered them. Unloading is an activity that is performed using appropriate internal means of transport and handling devices. The unloading process is influenced by (Grzybowska, 2010):

- the type and form of the load: EUR pallets, collective boxes, rolls,
- type of transport,

- type of reloading front: ramps, load bridges, special platforms.

The next step in the storage process is sorting products. The characteristics of the materials determine the sorting method (scheme 2).

Cross-belt sorters are the most scalable and can be expanded in most cases. Divided into vertical and horizontal sorters, they are constructed of individual modules: drive, return and middle. It is possible to extend the sorter and its total modification (<http://www.eurosort.com>).

Push Tray Unit sorters are devices guaranteeing the possibility of simultaneous sorting of many product categories stored in warehouses and distributed by its clients to the sales network (<http://www.distrisort.com>).

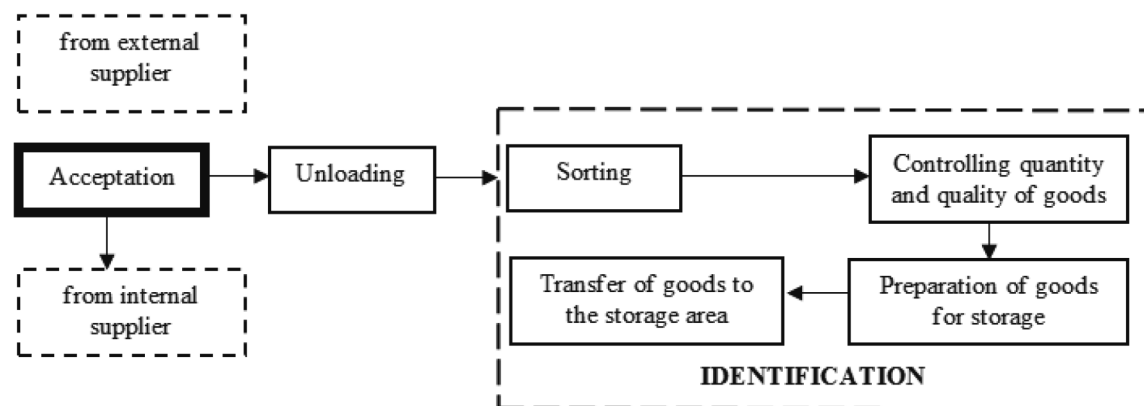
Tilt Tray Sorters are probably the most versatile of all sorting machines. Aimed at larger and irregular shaped items, they provide an inherent facility for recirculation of items which differentiates them from many other sorting technologies. Above all, they provide for very high levels of throughput with a highly controlled sorting action, designed to minimise damage to items which can be associated with mechanical handling processes (<http://www.distrisort.com>).

A bomb bay sorter drops the product directly over the tote or carton. It can be used for relatively small products as well as for larger items, such as apparel. The bomb bay sorter tends to be simpler in construction and mechanical design than other types of sorters, so it is quite reliable and often the least expensive of the various sortation options (<http://www.2wmc.com/Companion/KnowledgeSorters.html#BombBay>).

Sorting of products is usually understood as separating goods into specific groups due to the

Scheme 1

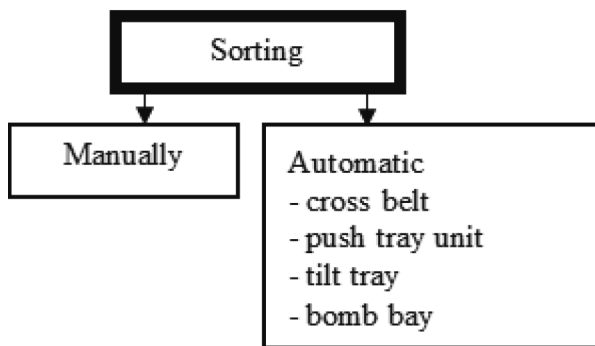
Model of the process of accepting the product for the warehouse



Source: own elaboration.

Scheme 2

Methods for sorting products in stock



Source: own elaboration based on: Hompel, Schmidt, 2007.

similarity of physical characteristics and the required storage conditions. In smaller companies and warehouses, this process is often performed manually by warehouse staff.

At the sorting stage, a physical quantity and quality control begins and at the same time the goods are prepared for accumulate in properly adapted storage areas located in the warehouse. From the moment of unloading the vehicle and moving the load to the sorting zone, the initial identification of each product follows. After documenting the quality and quantity control, the products are ready for storage. Before placing the products on the appropriate shelves, they are formally accepted for storage and appropriately marked.

The most common method of identifying a given product, storage unit or logistic unit is a bar code, which enables automatic reading of information about a given unit by means of an integrated IT system and electronic mobile terminals.

Identification of products placed in the warehouse with ZPL standard

In order to efficiently manage warehouse processes, it is necessary to quickly and thoroughly identify each product. Knowing where the product is currently located, in what quantity and in what condition it is extremely important to efficiently receive and release the product in accordance with the customer's needs. The basis for identifying products is their labeling using specialized logistic printers. An example is Zebra printers, which through properly integrated software meet individual customer requirements related to the identification of a given product (Krzyżaniak,

Niemczyk, Majewski, Andrzejczyk, 2013). ZPL (Zebra Programming Language) is a programming language and definition of labels with a very wide range of applications. It is also a specialized language for printer control. ZPL makes it possible to create both simple labels and those with a more complex format. They can contain a combination of text, bar codes and graphics in different label layouts. In order to generate and preview the logistic label using the ZPL language, you should open the <http://labelary.com/viewer.html> web browser. The following editing window appears on the screen (scheme 3).

The programming language of a given label is primarily the recording of specific information using codes. The saved commands identify the appearance, size and content of the information contained on the label. You can edit them freely and create brand new product identification labels. Below is an explanation to the specificity of information coding (scheme 4, 5, 6, 6).

The effect of the above, example coding is the logistic label identifying the product and consisting of the fourth part:

- the first part identifies the sender of the product. The name, address is specified, it is also possible to encode the sender's logo,
- the second part of the label identifies the recipient of the product. As with the sender, you can encode information regarding the name, address and sign of the recipient,
- the third part of the label contains the product code along with its parameters and sequence of digits,
- the fourth part of the label codes additional information and markings, e.g. reference codes or markings concerning the specificity of a given product.

For example, the logistic label generated is shown in scheme 8.

The programming language of logistic labels is relatively clear and simple in application. Appropriate identification of the product, characteristics of the sender and the recipient is the basis for the flow of reliable information throughout the entire logistics chain. The quality of information affects directly the time of logistic processes as well as productivity and efficiency of the entire company.

Generating labels identifying the product in a stock using Anteo WMS operational system

The functioning of the modern warehouse is currently based primarily on information technology,

Scheme 3

ZPL online dialog

Online ZPL Viewer

```

^XA
^FX Top section with company logo, name and address.
^CF0,60
^FO50,50^GB100,100,100^FS
^FO75,75^FR^GB100,100,100^FS
^FO88,88^GB50,50,50^FS
^FO220,50^FDInternational Shipping, Inc.^FS
^CF0,40
^FO220,100^FD1000 Shipping Lane^FS
^FO220,135^FDShelbyville TN 38102^FS
^FO220,170^FDUnited States (USA)^FS
^FO50,250^GB700,1,3^FS

^FX Second section with recipient address and permit information.
^CFA,30
^FO50,300^FDJohn Doe^FS
^FO50,340^FD100 Main Street^FS
^FO50,380^FDSpringfield TN 39021^FS
^FO50,420^FDUnited States (USA)^FS
^CFA,15
^FO600,300^GB150,150,3^FS
^FO638,340^FDPermit^FS
^FO638,390^FD123456^FS
^FO50,500^GB700,1,3^FS
    
```



- Redraw
- Add image
- Rotate
- Permalink
- Open file

Print Density: 8 dpmm (203 dpi)

Label Size: 4 x 6 inches

Show Label: 0 (0 = first label, 1 = second label, etc.)

Labels Available: 1

Source: <http://labelary.com/viewer.html>.

Scheme 4

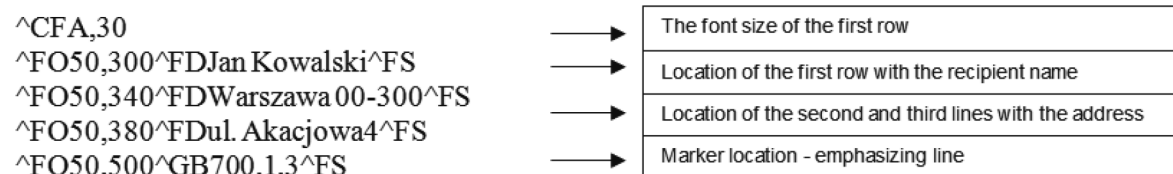
The first part of the label identifying the sender



Source: own elaboration.

Scheme 5

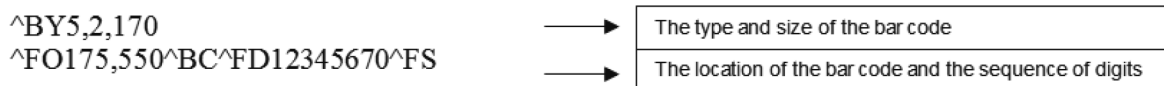
The second part of the label identifying the recipient



Source: own elaboration.

Scheme 6

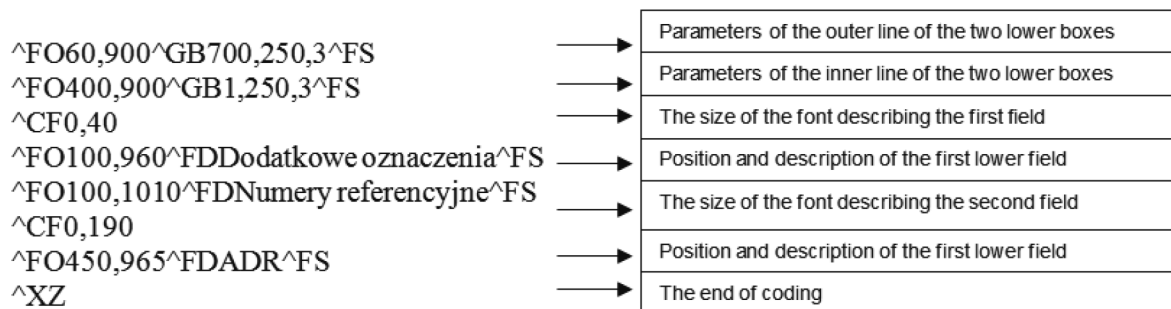
The third part of the label containing the product code



Source: own elaboration.

Scheme 7

The fourth part of the label containing additional information and markings



Source: own elaboration.

Scheme 8

ZPL online dialog box for an example of a logistic label generated

Online ZPL Viewer

```
^XA
^CF0,60
^FO220,50^FDFirma logistyczna WAT^FS
^CF0,40
^FO220,100^FDWarszawa 00-200^FS
^FO220,135^FDul. Klonowa 3^FS
^FO60,220^GB700,1,3^FS


^CFA,30
^FO50,300^FDJan Kowalski^FS
^FO50,340^FDWarszawa 00-300^FS
^FO50,380^FDul. Akacjowa4^FS
^FO50,500^GB700,1,3^FS

^BY5,2,170
^FO175,550^BC^FD12345670^FS

^FO60,900^GB700,250,3^FS
^FO400,900^GB1,250,3^FS
^CF0,40
^FO100,960^FDDodatkowe oznaczenia^FS
^FO100,1010^FDNumery referencyjne^FS
^CF0,190
^FO450,965^FDADR^FS
^XZ
```

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 ul. Klonowa 3

Jan Kowalski
 Warszawa 00-300
 ul. Akacjowa4



12345670

Dodatkowe oznaczenia Numery referencyjne	ADR
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Print Density:

Label Size: x

Show Label: (0 = first label, 1 = second label, etc.)

Labels Available: 1

Source: own elaboration based on: <http://labelary.com/viewer.html>

which acts as a specialist advisor. Acceptance and issue of goods from stock, inventory, as well as picking, sorting and charging storage charges is conditioned by the correct identification and registration of each product in the warehouse.

One of the specialist programs supporting work in the warehouse is the Anteeo WMS system. The system is a logistics platform unique on the Polish market supporting the cycle of warehouse processes in any type and any size of warehouse space. This solution is dedicated to companies that provide logistic services for products owned by other business entities (<https://softsol.com.pl/anteeo-wms>).

Identifying the product at the time of its acceptance into the warehouse is a multi-stage process. The following there is presented a model of conduct in the case of marking the adopted product and placing it in the warehouse using the Anteeo WMS system.

The first stage of product identification is the generation of a label identifying the location of the product in the warehouse, i.e. the storage field. When logging in to the Dispatcher Panel of the Anteeo WMS system, it is necessary to switch into the lower panel to the area of storage infrastructure (arrow A). According to screen 1, select from the list the infrastructure of a specific company that ordered the product to be taken into the warehouse (arrow B).

In order to add a new location for the received product, choose the "plus" icon and define a new location by specifying the next parameters (screen 2):

- Description rule: Storage field,
- Designation: PP01,
- Display of the field's location: size: 2.50 x 3.50; dimension: 3.00 x 8.00,
- In the "ownership" tab, specify the code's capacity.

Refreshing the location structure, we prepare the printer for printing. We fill with a suitable 100x60 paper, configure the printer and print a label (screen 3).

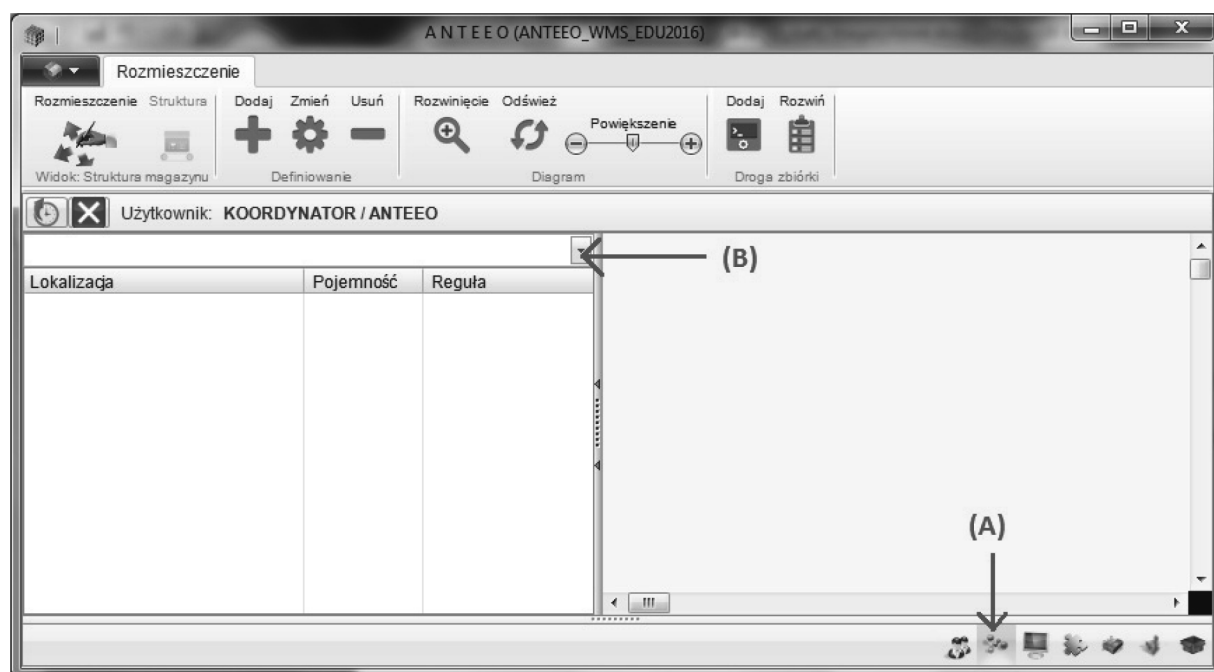
The next step in the product designation is to generate a label identifying the storage unit. For this purpose, in the lower warehouse panel (arrow A), the interface for generating labels for storage units should be called (arrow B — screen 4).

The storage unit SKU as a unique code assigned to a given product in order to identify it in a warehouse is helpful primarily in the ongoing tracking of inventory. Each product accepted on the warehouse slope receives an individual number assigned by the system, which is presented by means of a bar code adapted for quick reading through terminals and hand scanners.

SKU consists of two basic components: product identifier and location identifier in which this product occurs. For example, it can be 'XYY bicycle' (Product ID = 100500), which is produced in a plant located in Warsaw (Location ID = =9000). You can enter your own system for assigning SKU codes to products, but you need to ensure their consistency and recognition (Antosik, 2016).

Screen 1

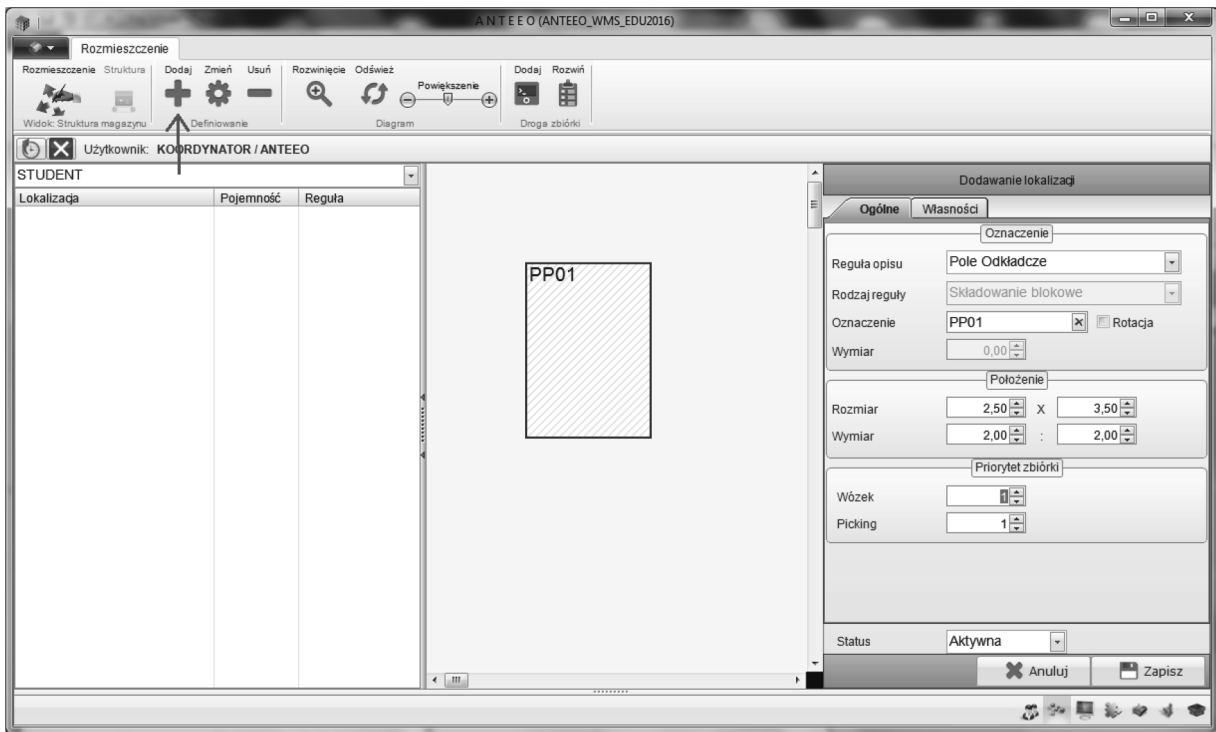
Selection of warehouse infrastructure in the Dispatcher Panel of the Anteeo WMS system



Source: own elaboration based on Anteeo WMS.

Screen 2

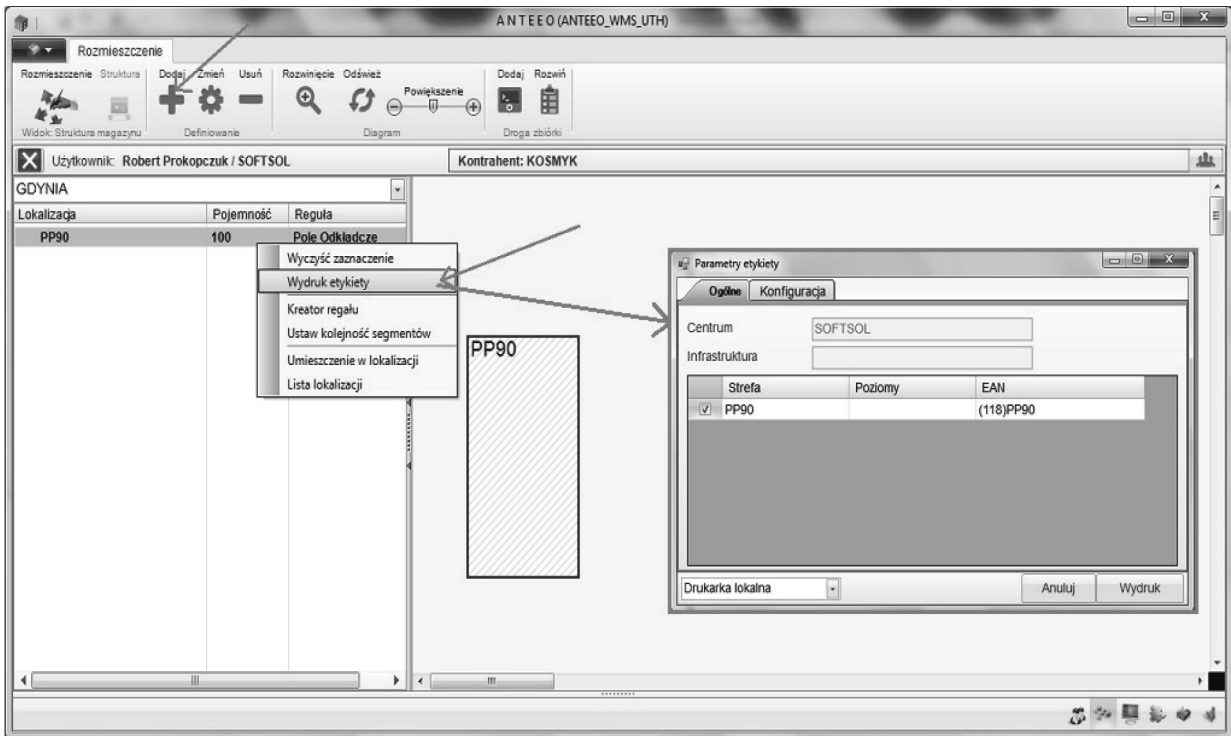
Generating labels identifying the storage field



Source: own elaboration based on Anteo WMS.

Screen 3

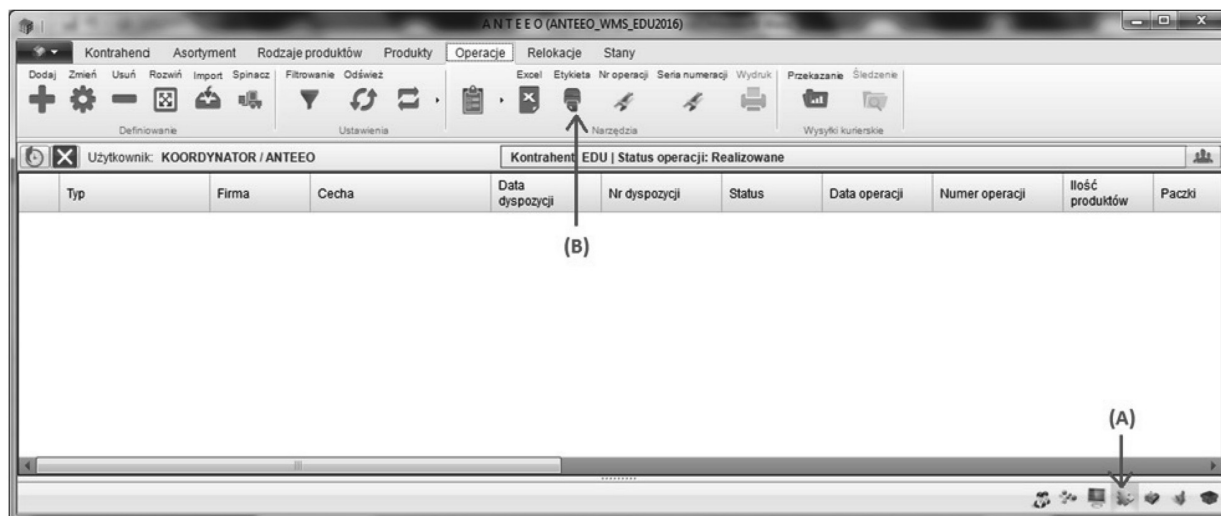
Generating labels identifying the storage field



Source: own elaboration based on Anteo WMS.

Screen 4

Generating labels identifying the storage field



Source: own elaboration based on Anteeo WMS.

Subsequently, product labels are generated. The Anteeo WMS system contains a list of products of a given customer, highlighting the product from the list, print its product label by selecting the "label" window (arrow, screen 5).

The final stage of full product identification is the generation of the GS1 logistic label. The GS1 logistic label is used to mark a logistic unit in a standard manner according to GS1 system rules, for the needs of all participants in the supply chain. The GS1 logistic label contains data encoded in the barcode (standard is

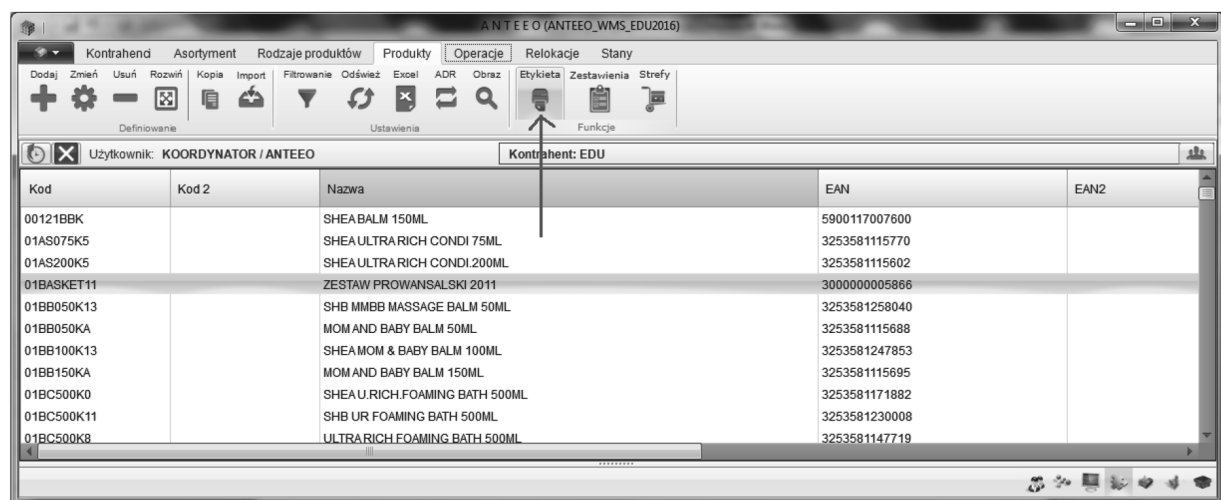
GS1-128) and visually legible data describing the content of each logistic unit. The GS1 logistic label uniquely identifies each logistic unit via an individual 18-character SSCC (<https://www.gs1pl.org>).

In the Anteeo WMS system, in the "storage" panel it is needed to add a new warehouse operation for accepting products. Fill the individual fields with the following values:

- a) type of operation: External reception,
- b) order numer,
- c) date of order.

Screen 5

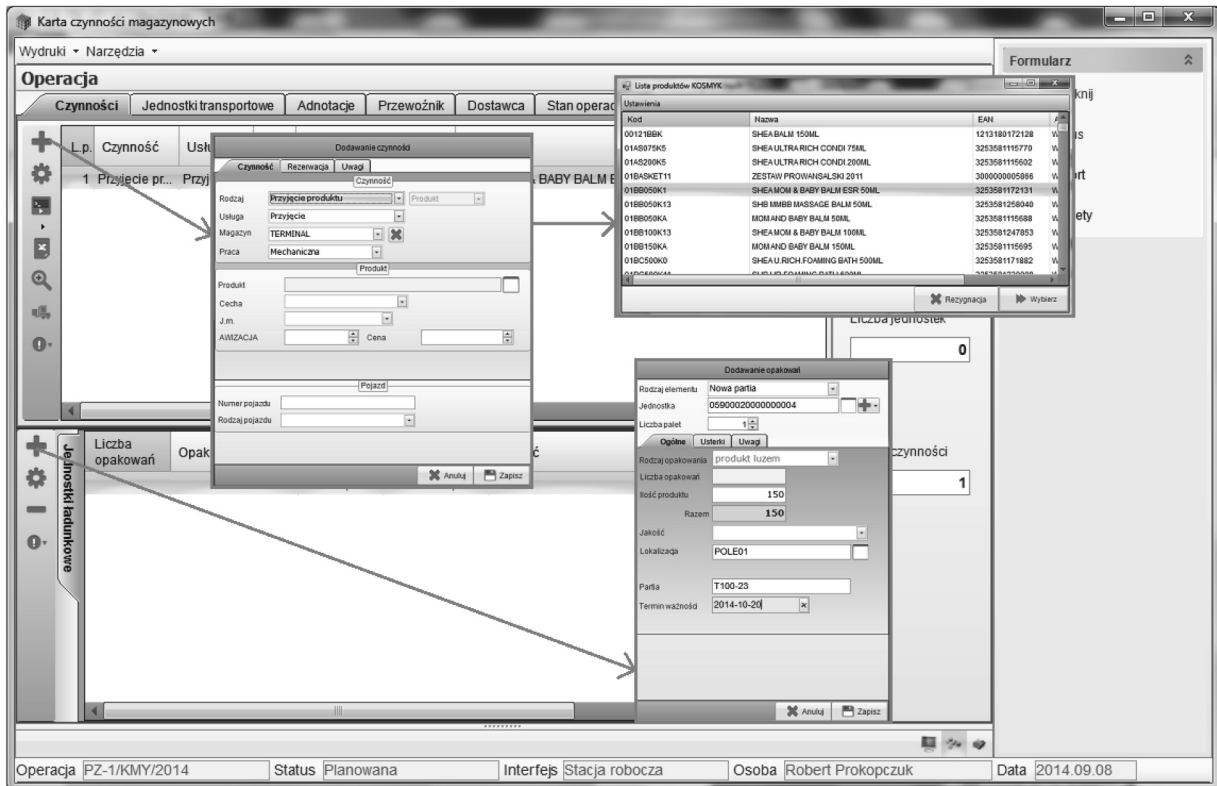
Generating labels identifying the storage field



Source: own elaboration based on Anteeo WMS.

Screen 6

Generation of the GS1 logistic label



Source: own elaboration based on Anteo WMS.

After confirmation, the function of adding actions to the operation should be called. Indicate the product being accepted and start sending the loading units to each item on the document (screen 6).

The unit load is defined in the Anteo WMS system by entering further data:

- individual unit number which is assigned automatically by the system,
- the quantity of the product,
- location, specifying a particular rack, the field in which the product will be located,
- product lot,
- the expiration date.

After preparing the printer, it is necessary to define the GS1 unit, i.e. to pack different storage units to one logistic unit (screen 7).

The effect of the product identification model described above are labels identifying (screen 8):

- storage field,
- storage unit,
- the product,
- logistic unit GS1.

Identifying products is a basic element of efficient information flow in the logistics chain. The benefits of using product identification and their

location mainly relate to (Kwaśniowski, Zając, 2010; Dudziński, Kizyn, 2000):

- reduction of the time of accepting delivery from the outside in comparison with the adoption carried out by traditional methods,
- unified language, which is also used by producers, traders and carriers, in all phases of commodity trading,
- allowing unambiguous identification of shipping units, regardless of their composition, with homogeneous and diverse content, for administrative, registration, logistic and control purposes, in particular to track the movement and origin of goods, i.e. the so-called "traceability",
- enable automatic data reading, which results in error-free and instant identification and registration,
- minimizing the costs of registration and control activities in storage and distribution.

Conclusions

There are many tools to design labels and represent them graphically. The role of computer

The model of the process of identifying products placed in the warehouse presented in the article was created using the specialist Anteo WMS program. Using logistic printers integrated with the system, it was possible to fully identify the product, storage unit and storage area. The application of the program is extremely useful for managing complex warehouse processes, i.e. acceptance, packaging, storage, picking, inventory and release.

IT programs in the era of today's development are becoming an indispensable element of a well-functioning enterprise. They are the basis for minimizing errors and losses at every stage of the storage process. They facilitate a quick summary of costs, affect the level of service of editions, and increase the productivity of resources. The implementation of IT systems supporting work in a warehouse seems therefore necessary and justified.

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