CHECK CONSIGMENT AT A SPECIFIC POINT OF DELIVERY

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Abstract

The main purpose of the solution is to design a consistency check of the consignment and to specify areas within the processing chain suitable for application of RFID technology. Custom solutions are in AMP environment in conjunction with logic processed in Excel environment. The application allows simplification of the control process in the specified areas as a substitute for visual inspection by workers. Verification of the integrity of the shipment is focused on internal use within the enterprise and linking the application to a complex intra-company system. The contribution is the characteristic of the solution and the application possibilities in the existing processes of the company.

Keywords: RFID technology, middleware**,** consignment check

1. INTRODUCTION

A processing chain is defined as the network of all individuals, organizations, raw materials, activities and technologies, including the creation and sale of the final product. From delivering the raw material from the supplier to the processor until the final delivery. For basic definition, it is appropriate to divide the definition according to the six basic parameters that are required from the functional chain. This definition defines processes, functionality, and chain outputs. The first point is to create a string either as a part of the network or as a separate network. The second point is the need to create a coherent information stream alongside a functioning physical string. The third point is the essential need to coordinate individual members of the chain. The fourth point is to prevent conflict arising from the nature of the material or the information structure. The fifth point is to create a balance between the running costs of the chain and the amount of service produced. The sixth point is to promote long-term relationships between the members of the chain [1].

In order to meet all the specified parameters, the integrity of the consignment in individual points is essential. There are several parameters that reduce the number of areas for deploying the solution in its specific form and scope. The application is to check the completeness of shipments against their accompanying order. Therefore, the parameters describe the need for this verification and the simplification and acceleration of verification itself. The first parameter is the need for the item to contain the exact quantity of items. More or less items. This parameter describes the output from the application specifying the exact number of items missing or extra. The computer can compare reads with a digitized order much faster than a regular worker. The second parameter is acceleration and simplification of control. The need for a control other than a visual control of the worker. This check is particularly lengthy in cases where items inside the item are not visible and scalable at first glance. In this case, the shipment must be dismantled [2].

In the methodology of the solution, a data collection application was developed and a subsequent experiment to determine the readability of the RFID system in the given conditions, which was successfully verified and used as a basis for the own design and other proven procedures. Given the extent of the contribution, the results are not part of it.

2. SELECTED AREAS FOR APPLYING THE APPLICATION

The basic proposal is divided into two main areas. One is on the supply side, where the item or component is doing right after completing the appropriate RFID chip. The item so labeled can be stored or immediately sent

for consolidation for the subscriber. The consignment may consist of one or more kinds of shipments according to the customer's order. Simulation was performed as part of the processing because simulation overcomes the conditions and limitations of the analytical models. It is more time-consuming to prepare input data, but thanks to the creation of a simulation model, it allows experiments to be performed. The simulations can draw conclusions from designers' decisions before they are implemented in real terms. [3]

After the consignment itself is consolidated either by machine or by employees, the consignment is placed on the antenna or in the gate where the check is carried out. The result of the check and any differences will be displayed on the display.

The second area is control of the customer after the transport. The check is designed to be carried out immediately after the unloading. Shipments are controlled by an antenna or eco-reader on individual pallets or other transport units. In this area, it is also contemplated to deploy a solution that consists of one additional RFID chip located on each unit of the parcel that results from the item database or the entire order for comparison. This eliminates the process of re-ordering the order to the system. The same principle can also be used when storing or removing pallets or other handling units in warehouse management. The basic issue that needs to be solved when implementing this system is the system of item designation and the location of the workplace for this purpose. It should be remembered that access to RFID technology gives a huge scope for solution creativity. [4]

3. APPLICATIONS FOR COMPLETENESS CHECK OF CONSIGNMENT

The solution is loosely linked to intelligent business and simulation studies [5] and to one of the possible output elements that support business process sustainability and factory of future [6].

This part of the solution characterizes the design of the application itself, its proposed processes, software coverage, and, last but not least, its functionality and the possibility of real use in practice. Two software interfaces have been used to create the application, which have been linked to design and calibration by processes graphically depicted in a schematic designed to help you understand the application's features more easily.

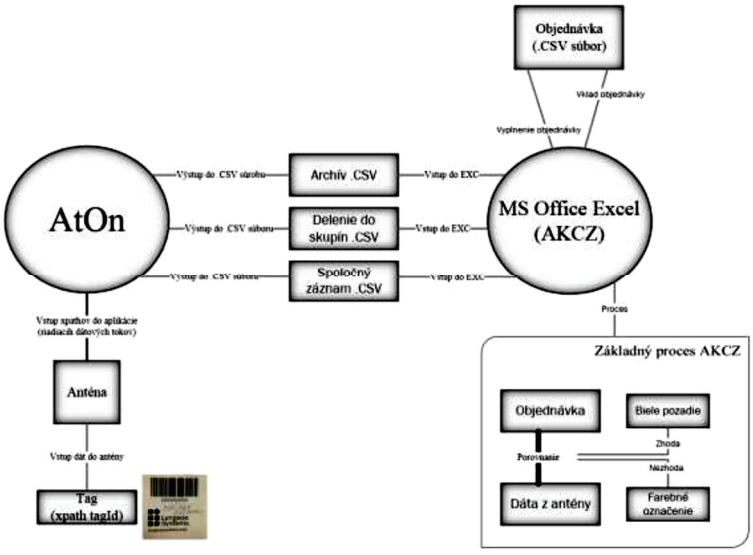

Figure 1 Basic application schema [3]

The basic principle of the application is the visual output of the match or disagreement of the antenna loaded and the data entered into the application in the form of an order. The app evaluates the items from the antenna and from the order, and colorfully indicates items that are either extra or missing [7].

This application design is primarily a prototype that captures the processes needed to extract data from the chip, depict and compare it. It is a core that can be upgraded and adapted to the needs of the application.

The use of simulation was a suitable tool because it does not have any predetermined procedure, the use of which would automatically find the optimal solution. Rather, it is one of the supporting tools for verification of intentions, thereby increasing the quality of decision making and reducing the risk of choosing wrong decisions. [8]

The application consists of two basic parts that were graphically represented in the image - they are the AtOn ID midleware and the MS Excel Excel interface (**Figure 1**).

The AtOn graphical interface schema of an application consists of several basic strings that perform processes with data coming from antennas and other possible software. Each branch has its own specific processors adapted to the needs of the process. This part mediates the data read from the chip and modifying them through processors (**Figure 2**).

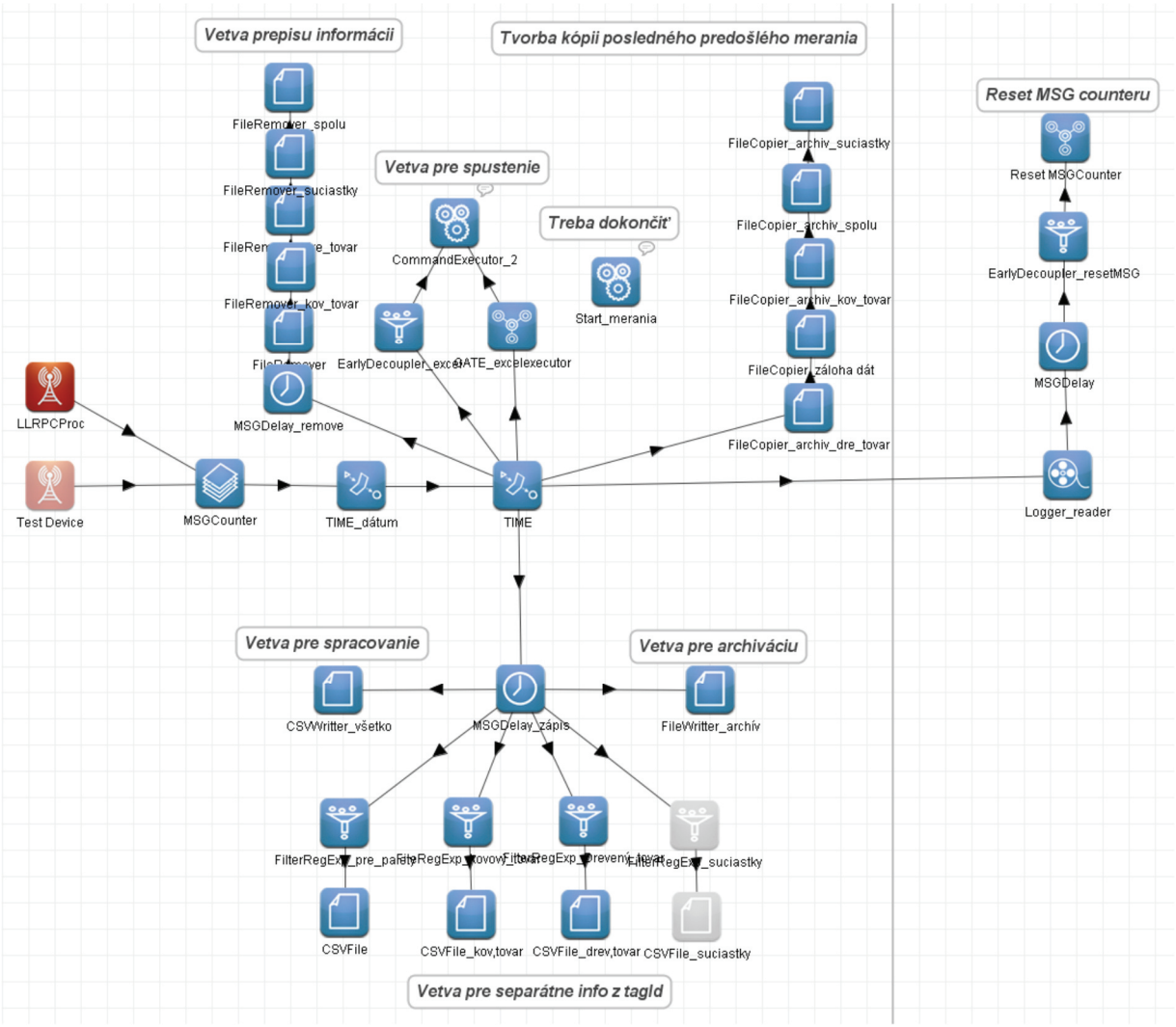

Figure 2 Schematic of application logic in AMP environment [3]

Due to the scope of the post, it is not possible and convenient to tell the settings of each processor. There is also no description of data queries, the relationships of individual strings and the justification of their outputs, which also leads to the output of data from the entire part of the application. In the following figure, the overall schema application is in AMP middleware [9].

The second part is MS Excel, it serves to compare the order data through a simple environment controlled by the macros inserted into the buttons. The resulting comparison is compiled into a color-state table. This part of the application is intended for the user environment at the application's location. The basic control is through the menu displayed on the **Figure 3**.

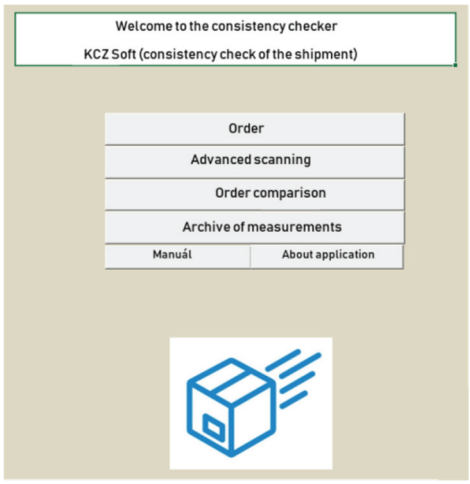

Figure 3 Main application in Excel

The order and insertion part serves to assemble and paste the shipment into a comparing process with the retrieved data. The process begins when the order is arranged according to the column, where the selected item is picked up via the classic copy function, and the order column in which the item is inserted through the insertion function. The menu column also provides a search function through a text box and a macro designed for it.

The Advanced Scan Sheet displays items loaded over an antenna that converts them through the MS Excel conditioner to a text string that is comprehensible to the normal user. Divide items into predetermined sections. For our needs, we have simulated 3 sections and one additional, expressing the possibility of any number of sections. In addition, it also provides additional parameters for individual items, such as their weight, price, and volume. Last but not least, it calculates the price and weight of the items you load. The spreadsheet contains two macros, one for inserting data scanned through the antenna, which has been stored in the text files by sections marked with the Data Recovery button via the AMP OnID portion of the application. The second macro to clear all columns marked with the Clean button.

AKCZ data comparison is a key part of the entire application. Compares the data from the text file created by AMP On ID with the portion of the app without partitioning to the individual sections with the data entered through the Order Sheet. Summarizes the comparison in a table that consists of simple MS Excel features. These are COUNTIF and IF. Using conditional formatting for the Additional and None columns, denotes the legend under the table. It also has four buttons in which the process control macros are mounted on the sheet. The Accuracy Checker button inserts the data into a spreadsheet and the comparison result is automatically displayed in the spreadsheet. The spreadsheet also provides a previous measurement call through the Previous Measure button. Column cleanup ensures the remaining two Clear and Clear previous buttons.

In my opinion, I do not think the purpose of the post is a detailed description of the activities of individual parts of the application. Let's look at a possible application in practice.

4. IMPLEMENTATION OF THE DATABASE FOR APPLICATION NEEDS

The basic factor is the application functionality schema for integrity check. There are processes in it between the parts as shown in the following diagram (**Figure 4**).

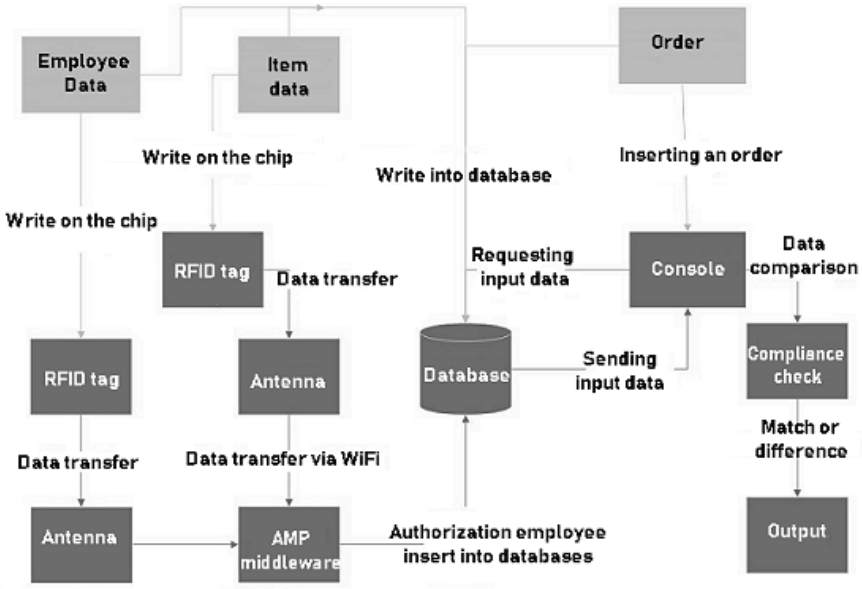

Figure 4 Schematic of the consistency check application

The process description from an item or product viewpoint from the creation of the data string to the output of the correctness contains:

- accepting a standardized order, entering a database, and assigning an identification number,
- create a standardized data string for the product,
- storing the string in the database,
- assign additional information to the string in the database,
- storing the string into the chip.

Reading of chip information by antenna and data transfer to computer:

- edit data in middleware and then send it to the database,
- placing an order identification number in the console,
- order request and current console measurement,
- sending requested data to the database,
- comparison of data by a console,
- standardized Output Conformity Check.

Description of the scheme from the point of view of the security identification of the authorized person / employee:

- assigning an identification chip in the form of a key or employee card,
- placing employee identification data into the database,
- assignment of identification data to the allocated card data string,
- before using the application, the employee identifies himself by attaching his chip to a dedicated antenna,
- the data sent through the middleware is confronted with database data in the database,
- Allow authorized worker to work with the application.

The last part deals with the centralization of the database for data collection from several projects. A database linked to a complex company system translates individual order labels and their content into measurement stations that, based on measurements and comparisons, generate an output document for the comparison of the shipment with the order under which additional shipments are carried out. The document is then sent back to the centralized database and archived under its specific back-up number. The endpoint is the design of a

RFID-based security system using the same chip as a walk-through system produced as a read-across LF in the vicinity of the chip and antenna. Such security prevents unauthorized manipulation of the measuring station and application (**Figure 5**).

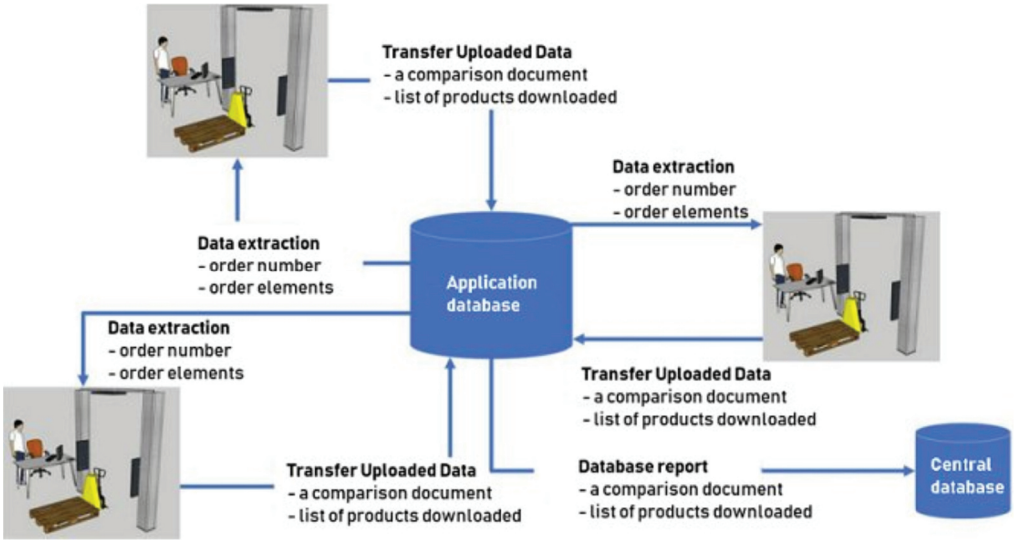

Figure 5 Collaboration between databases

5. CONCLUSION

The result of the solution was the application design for checking the integrity of the shipment from a technological point of view. Describes the individual issues the application should address. One is the time-consuming control of workers. The second is the quality of the control and the size of the risk of errors. The proposal describes the processes that accompany the consistency check of the shipment, how to synchronize them with one another, what sequence they give them and what the final result will be.

The custom solution describes the possible implementation of RFID technology for wider deployment needs across businesses. Part of the solution was, for example, the design of technical equipment for a measuring station where pallet transfers are carried out using forklift trucks and therefore the design of the measurement portal must be secured against overturning and sufficiently massive to avoid serious collisions in the event of a collision.

The equipment also includes the antenna type, its attachment to the portal, and the method of moving the data downloaded from the antenna to the middleware. The solution also deals with data storage within a database system that is designed only for this purpose, and for linking the database to a complex database system that exists in an enterprise. An important feature is, for example, the type, type and specialty of a chip embedded in the form of a label that can be printed on additional information such as an EAN code with GTIN tag and other complementary visual information is an ideal form for a wider logistics chain and within which RFID is used EAN technology for identification.

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