RESEARCH ON THE WORK ENVIRONMENT DATA ACQUISITION IN AUTOMATIC MODE AND USE OF THE ERP SYSTEMS


Abstract: The effective functioning of an automated system is dependent on its ability to gather information from the operating environment and to use enterprise resource planning in a more appropriate way. Information acquisition is done through sensors and hardware interfaces then transferred and stored on servers in the data stream of ERP systems through software interfaces. This paper aims to highlight how data is acquired from the work environment and its processing in order to be inserted in the flow of ERP systems.

Keywords: ERP, sensors, data acquisition, information flow

1. INTRODUCTION

An Enterprise Resource Planning (ERP) is a complex software package (Fig. 1), used in managing a variety of processes that occur in a company. In the production process [2] planning takes account of sale orders and sale orders raw resources for optimal use of existing production lines. Also in this category enter features such as demand or supply equipment for interfacing with various data acquisition and real-time monitoring of production parameters. Combining these features, ERP helps to shorten time to market a product, compliance orders production, increase quality and reduce costs, strategic objectives for any producer.

2. EXPERIMENTAL EQUIPMENT

Data acquisition for introduction in ERP systems (Fig. 2) was achieved in a manufacturing cell [3] whose structure consists of a Casting supply system - FMS 350 with three stations of storage and a drill GP 45 NC.

Fig. 1. Module ERP

Fig. 2. General block scheme corresponding to the application’s information system

2.1. Presentation of the general structure of the cell manufacturing

The main elements of the flexible cell (Fig. 3) are: storage positions (1) supply system, transportation, transfer (2) drill fitted with paddlelock on the table (3).

Fig. 3. Flexible manufacturing cell – virtual model

2.2. Description of power system functioning, transport, transfer FMS 350

Phases of work for the mass transfer pallets with semi-machine tools are described below:

a. Positioning of the transfer station right storage.

b. Extension arms transfer system to take over the blade with semi.
c. Blocking the transfer system palette followed by withdrawal of arms to Castings.
d. Rotating the transfer system and its positioning in the right workstation.
e. Extension arms with a view to transfer its semifabricating piece on machine table tools.
f. Blocking tool palette on the machine table.
g. Release of the transfer system palette.
h. Withdrawing arms transfer system.

2.3. General structure of power, transport, transfer FMS 350

Housing type parts are processed, the blades are positioned on the machine table by means of a locking system (Fig. 4).

Stocking stations, three in number, are embedded in a common support, position adjustment can be done individually. Each workstation is equipped with a second set of limiting the role of referral of this range (Fig. 5).

Blades, with sides of 350 mm, clamping surface have practiced M8 holes and holes for the transfer system and the inner surface of the guidance system and bilateral holes for connection to the system block (Fig. 6).

Robocar (Fig. 7) is made welded and can move in longitudinal direction on a stand with it. The grip on foundation support rails and storage stations is classic, allowing horizontal and vertical adjustment.

Actuators corresponding to the three kinematic chains are AC. Shelf guides are rolling elements. Bevel gear (Fig. 8) allows for rotation direction changing horizontal screw-nut mechanisms that move on both sides of the shelf-piece portblades.

2.4. Control system actuating power, transport, transfer FMS350

Power system control, is made from a PLC [4], power electronics is represented by relays of both actuators and linkages to help block range electromagnets on the transfer system and in the workstation. The electric scheme of drive system is shown in Figure 5.

DP-movetrolley;
RT-rotation of the pallets retrieval system;
TR-translation retrieval system pallets;
CST-moveto left;
CDR-moveto right;
BST-setleft electromagnet;
BDR-set right electromagnet;
1- Set the coil right;
2- Transfer-taking range;
3- Rotating blades system takeover;
4- Movetrolley;
5- Ground;
7- Turn left coil;
8- Contact activation movetoright;
9- Contact activation moveto left.

3. DATA ACQUISITION IN THE WORKING ENVIRONMENT

Identification of parts that are to be processed is using radio frequency identification [6]. Thus each pallet is placed at a tag that allows identification.
The main elements that enter into the structure of the information system for data acquisition in the working environment (fig. 10) are: RFID reader (1)-data acquisition board [7](2)-computer (3)-software interface-specific data acquisition card-specially designed software interface for data storage. All system components are supplied from the power supply (4) connected to the voltage (5). Figure 10 is denoted by A - links between data acquisition board and computer and B - the power of the board of acquisition [5].

Main features of the RFID tag used are:

a. 32-bit unique identifier - non-reprogrammable;

b. Frequency of 125 kHz reading;

c. EM4001 RFID chip is based on ISO;

d. Manchester encoding.

Main features of the RFID reader [9] used are:

a. 5V power;

b. Frequency of 125 kHz reading;

c. Compatible with 64-bit mark EM4001 RFID;

d. 9600bps TTL and RS232 output;

e. Simulation of magnetic strip;

f. The reading range of 200mm;

g. Dimensions: 38x40x7mm.

Stream transmission of signals from the RFID reader ERP system is: RFID reader reads the tag's code located on each range and is transmitted to the radio board. This signal is passed to the server. Specially designed software interface allows you to write in a *txt file directly into the database, for each signal separately, time, date code of sensor signal that was transmitted with the ability to select and other types of information we can select to start running the program.

Writing source code initializes the hardware interface microcontroller RS232 communication protocol and set the input used to connect the RFID reader. Considering the functional specifications of the application was made following interface (fig. 11):

Explanation of work areas:

a. Select the COM - workspace to select the port for connection to data acquisition modules.

b. Timer - this area is to specify the number of milliseconds after which it will be writing data in files placed in the database.

c. Writing data - area where you can select the data written in the database or files.

d. The overall structure files - area to specify the folder structure where data will be written to the file;

e. Connection database - this area to specify the settings necessary for connection to the database if they will write data in the database.

f. Memberships acquisitionsensor/sensordatabase - area which will specify the number of sensors corresponding to a workstation and you have their ID in the database.

g. Control - this area which will select the order ID that will add data taken;

h. Messages - this area where you can track messages by RS232 communication and operations performed by the application.

To connect the RS232 communication protocol between the application and acquisition module is necessary to select the COM port communities acquisition module connected. Writing data to files or database is performed using a timer. Determining the number of milliseconds that the timer function to use for writing data in files or database is made by introducing a number of a working timer.
Files. If no data is written to the file then it will create a new file.

Following the acquisition of data files were made in the figure. The folder structures specified in the general structure of this file. The contents of a file is shown in figure 14.

Thus using the Tables Generator created a database in SQL Server with the configuration shown in figure 15.

In this structure, all entered data from each station pays measurement data to an event. The software allows connection of 5 sensors, so the columns of this table will be provided the following data:

- a) IDdm - ID registration;
- b) IDpost - JobID from which retrieved data;
- c) IDs1-IDs5-ID the five sensors on this post;
- d) VALs1-VALs5 - taken from measurement value from these sensors;
- e) DATAdm - date of event measurement was taken;
- f) ERRdm - an error code if an error occurs in the data input.

Data to be entered into the database will be set up work area connection to the database. Data acquired by the application are thus introduced into the appropriate database table LIP_DM.

5. CONCLUSION

The control panel of the supply, transport, transfer systems has been upgraded to operate in automatic mode. RFID tags have been mounted on pallets so any palette can be identified.

Using the RFID readers have been taken information regarding the highlights positioned on the pallets. These information refer to weight, shape and the number of operations made on one object. After acquisition, the data is automatically processed in specially designed tables in Priority, the enterprise resource planning software. Therefore, these tables will contain information about each highlight.

Further more, the data base transfer of the ERP would need the restructuring of the data and reports flow.

In future, the data acquisition will be made using more complex structures which will include processing centers, supply, transport and storage systems.

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