THE GRAPHIC CONTROL AND SIMULATION OF A EUROPALLET KICK-UP WORKING

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Abstract: *The graphic interface presented in this paper is meant for the computer aided control of an installation of canting the europallets within an automatic line of making europallets. The installation has been designed for the canting, within the line, all the europallets from one face to the other or only the even europallets. By means of the graphic interface one can easily change the control manner and watch on the computer screen the animated development of the movements made by the kick-up and europallets.*

Key words: *wood industry, canting installation, graphic interface, computer aided control.*

1. Introduction

The present paper aims at the improvement of an installation within a europallet making line through the gradual passage to the control and computerized observation of the development of the technological process.

2. Theoretical Considerations

Europallets are made of wood and are standardized both constructively and dimensionally. They are employed as bases for the furniture packages which are not usually assembled, for apparatus, installations, or machines in order to be easily stored and handled. The wooden species used for making the europallets, according to the EPAL requirements, are the resinous species: especially fir-tree, spruce and pine at a dampness of maximum 22%. Figure 1 presents the aspect of a europallet which is made in our country's factories.

The canting installation is a part of a line which assembles europallets and it is made in two versions:

- The 1st Variant of the installation performs the canting for each europallet and is used within the actual process of making europallets.

- The 2nd Variant of the installation is placed within the line before the automatic piling installation and is meant to cant only the even europallets from one face to the other.

This supplementary procedure is necessary for piling the europallets one into the other, thus occupying as small as possible a space for storage and transport. The normal and imbedded piling is shown in Figure 2. In the

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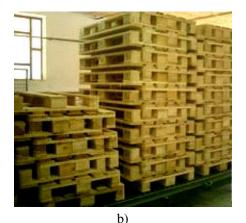
a)

b)

Fig. 1. *The aspect of the europallet* (a); *The europallets and the way in which they are piled up* (b)
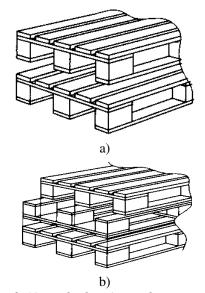

a)

b)

Fig. 2. *Normal piling* (a - *without canting*) *and imbedded piling* (b - *the odd europallets are canted*)

second case the width of the pile is slightly larger, but the number of pallets is much greater.

3. The Functional Description of the Europallet Canting Installation

The canting installation consists of a longitudinal carrier on which the europallet moves until it gets between the two arms endowed with pressure-actuated motors for fixing (Figure 3). When the pallet obturates the light beam which gets to a couple of light-sensitive cells, the pneumatic motors perform the advance movement fixing the pallet; then the arms perform a 45° angle vertical rotation. The arms are activated by a gearmotor. The uplifting motion stops when the electrical limiting devices, noted as 3b and 4b, respectively, are touched [3].

Other two motors posted on the arms are controlled by performing the advance movement and through a rack gear wheel mechanism they determine the rotation of the pallet retaining device. As a result, the pallet is rolled from one face to the other.

After a short delay the gearmotor is put into operation again, the arms of the installation move down and the pallet is placed onto the carrier. When the arms are in a lowered position, other two electrical limiting devices, noted 5b and 6b, are operated, which causes the gearmotor to stop functioning for the fall of the arms, and the first two pneumatic motors release the pallet onto the carrier by performing the reverse motion [4]. While the pallet is moved by the carrier to the automated piling installation, the rotation gear of the fixing devices returns to the initial position as a result of the reverse motion of the pneumatic motors positioned on the arms.

With the next pallet the movement is made on the carrier without performing the swinging process from one face to the other. This process is resumed for the next pallet.
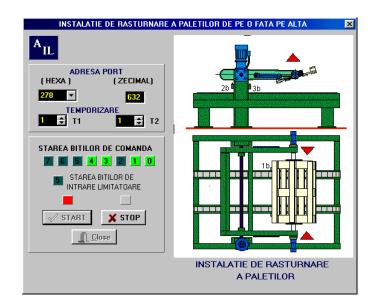
Fig. 3. *The Graphic interface for controlling and watching the functioning of the europallet canting device*

The installation is also used within the line for the canting of all the pallets from one face to the other for the purpose of some technological operations. The graphic interface of the computerized control was initially meant for this installation, and then it was adapted with slight alterations to serve another purpose: the canting of only the even pallets to obtain the imbedded piling.

4. The Description of the Control Graphic Interface of the Canting Device

The graphic interface (Figure 3) was made in Delphi and it is designed for the computerized control of both variants of pallet canting devices [2]. The graphic interface was conceived to work with our own electronic interface of 8 bit numerical inputs and outputs connected to the parallel port of PC compatible computer.

The communication with the computer is feasible through one of the base addresses: 278H, 378H and 3BCH respectively. The drives form the photoelectrical sensors or the electrical limiting device are signaled on the graphic interface through the input 5 bit as well as through the controlling elements on the graphic representation of the installation from side and up view.

The state of the output bits for the control of the actuators (the carrier sprocket feed motors, the linear pneumatic motors for pallet fixing, the gearmotor for the uplifting and lowering of the arms, the linear pneumatic motors for the rotation of the pallet fixing elements).

On the bottom side of the graphic interface are the apparent buttons for START, STOP and CLOSE, respectively:

- The START button determines the operation of the installation transport which results in the start of the working cycle;

- The STOP button determines the halt of the canting installation in every stage of the duty cycle.

- The CLOSE button determines the interruption of the work and the programe exit.
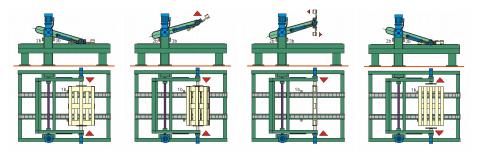
Fig. 4. *Animated sequences used by the graphic interface*

The graphic representation on the right side of the graphic interface during the work of the installation is animated performing the movement of the pallet on the horizontal plane, the movement of the pallet and the arms with a 45º angle on the vertical plane, the rotation of the pallet from one face to the other etc.

All these movements are controlled by means of the numerical input interface, by the sensors and limiting devices extant on the real europallet canting installation. In Figure 4 a part of the animated sequences used by the graphic interface is represented [1].

5. Conclusions

The present study based on practical experiments aims at bringing up-to-date some extant technological lines. Due to the computerization of the processes, the automation electrical boards are simplified from the complexity viewpoint; however, specialized software and adequate electronic equipments are necessary.

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