Engineering

FORMING AND PRESSING TECHNOLOGICAL LINES OF THE COMPOSITE PACKAGES FOR CHIPBOARDS PLATED WITH ALUMINUM FOIL (PAL-Al)

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ABSTRACT:

BASED ON EXISTING DOCUMENTATION IN THE LITERATURE, AND OF THE DOCUMENTATIONS SOME FORMING AND PRESSING LINES OF SOME TYPES OF STRATIFIED PRODUCTS, WERE CONCEIVED MORE TECHNOLOGICAL LINES THE CORRESPONDING THE REALIZATION OF COMPOSITE STRUCTURE OF THE CHIPBOARD PLATED WITH ALUMINUM FOIL.

IN THE CONTENT OF ARTICLE ARE SHOWN 4 TYPES OF FORMING AND PRESSING LINES OF THE PACKAGES OF LAMINAE ON WHICH CAN ACHIEVED IN CONTINUOUS FLOW THE COMPOSITE STRUCTURE OF THE PRODUCTS, AS WELL AS THE HOT PRESSING. IN THE CASE OF EACH LINE ARE GIVEN TECHNICAL DATES SPECIFIC TO EACH EQUIPMENT HOW AND THEIR FUNCTIONING MODE.

ARTICLE PART FROM CONTENTS A RESEARCH PAPERS, RESPECTIVELY DOCTORAL THESIS "THE TECHNOLOGY AND THE CHARACTERISTICS OF THE COMPOSITE CHIPBOARDS PLATED WITH ALUMINUM FOIL".

KEY WORDS: COMPOSITE STRUCTURE, THE PLATE PAL-AL, SINGLE DAYLIGHT PRESS, PLATENS

INTRODUCTION

Chipboards plated with aluminum foil (PAL-Al) are composite products stratified, which consist from a support (PAL), plated on one or both sides with aluminum foil, glued with an adhesive by a hot-pressing process.

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These types of plates are part from category the ennobled plates, such as the melamine plates, PAL-Al being much superior due to characteristics aluminum foil.

Technology the plates of type PAL-Al has appeared and developed in the purpose of producing some superior semi-products with a wide use.

In this sense we mention: small interior furnishings aluminum and glass, commercial and medical furniture, equipping interior of the automobiles, ships, boats and even of airplanes.

LINE EQUIPPED WITH SINGLE DAYLIGHT PRESS FOR PLATING THE CHIPBOARDS WITH ALUMINUM FOIL.

In the case of this line (Fig. 1) the powering with chipboards is made through putting the pallets with plates conditioned on a platform with hydraulic drive.

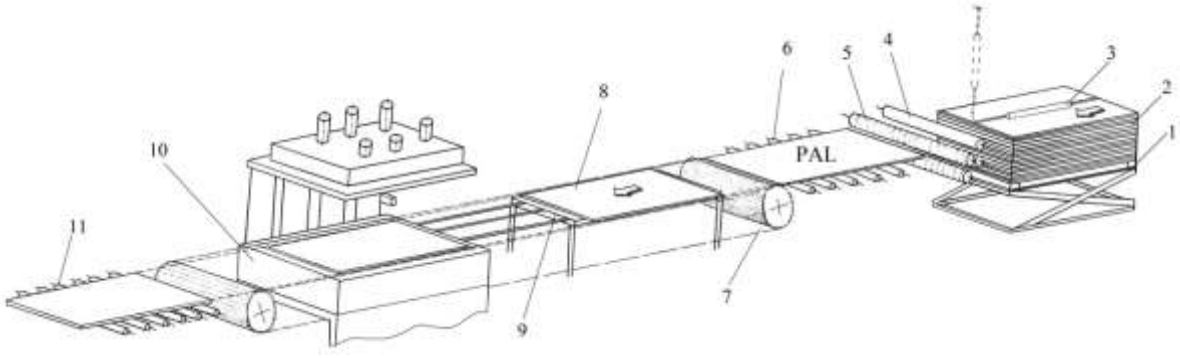


Fig. 1: Line equipped with single daylight press for plating the chipboards with aluminum foil: 1-vertical moving platform; 2-chipboard; 3-pusher device; 4-advance cylinders; 5-brushing cylinders; 6-roller conveyor; 7-chain conveyer; 8-composite package; 9-platform for the forming of the packages; 10- single daylight press; 11- roller conveyor.

After each introduction of a plate on the plating line, the platform is raised with a distance equal to the thickness of the plate [2]; Removal of the dust particles ensures a high roughness of the PAL-Al plates.

Pusher device consists of a pneumatic cylinder, which pushes the plates successively in the wood brushing machine.

The wood brushing machine, consists of two advance cylinders covered with rubber and two rotating cylindrical brushes made from perlon wires. The brush superior pressed elastic on the plate surface can be adjusted depending on the thickness. Further, the

[2] Istrate Virgiliu, *Utilajul şi tehnologia fabricării plăcilor din aşchii şi fibre de lemn*, Editura Didactică şi Pedagogică, Bucureşti, 1967.

chipboards are taken over by roller conveyor and pushed towards the platform for the forming of the packages.

Roller conveyor which serves to the powering of the single daylight press, is composed of two chains, which are mounted at distances corresponding to the length the plates, a series of transversal bars which executes the displacement of the composite package on the forming platform in floor the press.

Single daylight press, with hydraulic drive of the superior platen, executes the hot pressing of the composite package to the temperature of 145 ^{0}C and the 12daN/cm^{2}specific pressure.

At the end of the regime of pressing and opening the press, are commanded the evacuation of the plates by means of transversal bars that carried loading the press, these being pushed on roller conveyor, which serves to stacking of the plates on pallets, and bright finished sheets are placed on lift truck upright to transport them to the cabin cooling.

LINE EQUIPPED WITH SINGLE DAYLIGHT PRESS POWERED WITH CONVEYOR TYPE TABLET, FOR PLATING THE CHIPBOARDS WITH ALUMINUM FOIL.

In the case of this line (Fig. 2) the powering with chipboards is made by putting on the pallets with conditioned plates on a platform with hydraulic drive.

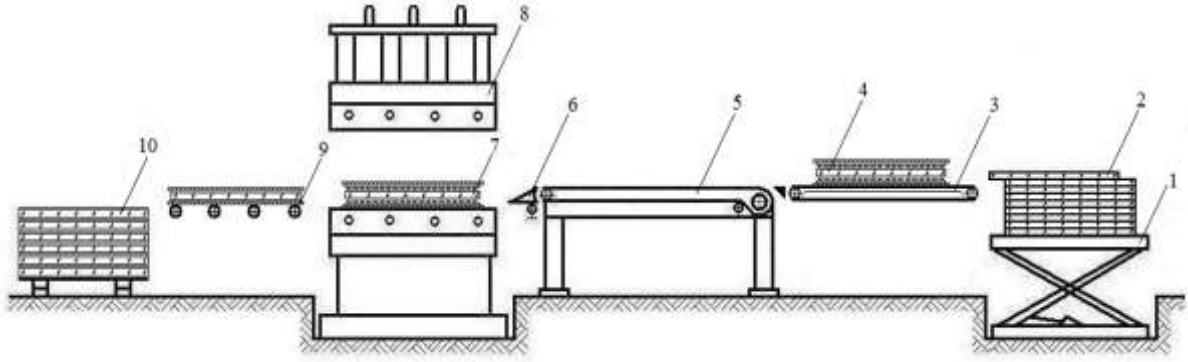


Fig. 2: Line equipped with single daylight press powered with conveyor type tablet, for plating the chipboards with aluminum foil: 1-vertical moving platform; 2-chipboard; 3-belt conveyor; 4-composite package; 5-conveyor type tablet; 6-transfer plate; 7-composite package; 8- single daylight press; 9- roller conveyor; 10- stacking pallet.

Forming of the composite packages for pressing is carried out manually onto the belt conveyor. Further, the conveyor type tablet is loaded with the composite package, by activating of the belt with a speed equal to that of the belt conveyor.

After the composite package was sitting on conveyor type tablet, it enters in the press opened, at the same time pushing with its forward edge, the PAL-Al plates with the bright finished sheets, towards part of the exhaust of the press, on the roller conveyor.

Single daylight press, with hydraulic drive of the superior platen, executes the hot pressing of the composite package to the temperature of 145 ^{0}C and the 12daN/cm^{2}specific pressure.

Table 1 is shown the technical characteristics of the single daylight press [3,4]

Table 1

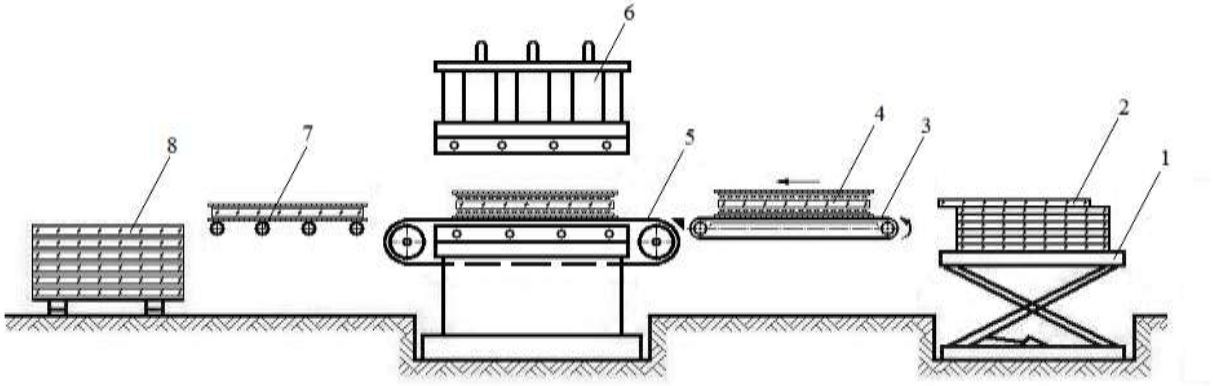
The technical characteristics of the single daylight press

Characteristics	U/M	Value
Platens sizes	mm	2800x 1800
Movement speed of band conveyor to the withdrawal from the press	m/min	50
Movement speed of band to loading	m/min	14

After pressing, bright finished sheets are placed on lift truck upright, in order transport them to the cabin cooling and the PAL-Al plates are placed on stacking pallets, in order transport them to the line cutting to the format of the plates.

Plating the PAL-Al plates can execute also in multi daylight presses, where is ensures high productivity compared with single daylight presses.

LINE EQUIPPED WITH SINGLE DAYLIGHT PRESS AND METALLIC BELT CONVEYOR CONTINUOUS, FOR PLATING THE CHIPBOARDS WITH ALUMINUM FOIL. This type of line is shown in figure 3.



[3] Istrate Virgiliu, *Tehnologia produselor aglomerate din lemn*, Editura Didactică şi Pedagogică, Bucureşti, 1983.

[4] Istrate Virgiliu; *Utilajul şi tehnologia fabricării plăcilor din aşchii şi fibre de lemn*, Editura Didactică şi Pedagogică, Bucureşti, 1967.

Fig. 3: Line equipped with single daylight press and metallic belt conveyor continuous, for plating the chipboards with aluminum foil: 1-vertical moving platform; 2-chipboard; 3-belt conveyor; 4-composite package; 5-metallic belt conveyor; 6-single daylight press; 7-roller conveyor; 8-stacking pallet.

Forming of composite packages for pressing is carried out manually on the belt conveyor, which is made of plastic material and which is resistant to high temperatures.

Metal band is a belt conveyor that passes through the press with its upper branch, using as a base of settlement for composite package the surface of the upper platen.

After pressing, the PAL-Al plates with bright finished sheets are removed from the press, being pushed onto the roller conveyor and then stacked on pallets for stacking.

LINE EQUIPPED WITH SINGLE DAYLIGHT PRESS AND PLATFORM OF SUPPLY FOR PLATING THE CHIPBOARDS WITH ALUMINUM FOIL. This type of line is shown in figure 4.

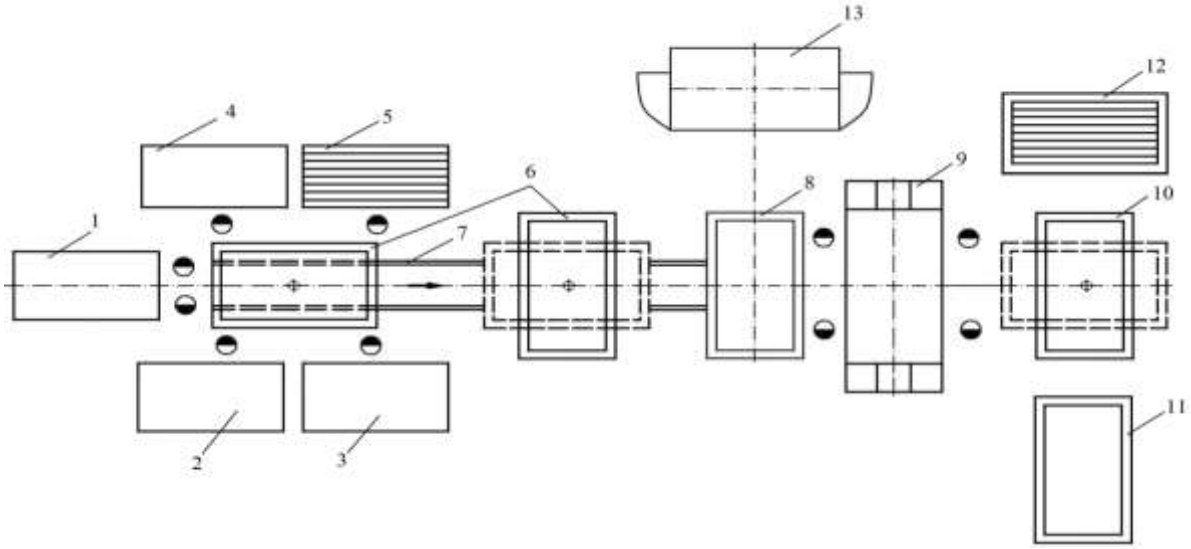


Fig. 4: Line equipped with single daylight press and platform of supply for plating the chipboards with aluminum foil: 1-chipboard; 2-barrier film; 3-adhesive film; 4-aluminum foil; 5-bright finished sheets; 6-platform of packages format for press; 7-rolling track; 8-supply platform (storage) of the packages; 9-single daylight press; 10-rotating platform for downloading the press; 11-pallet for stacking PAL-Al; 12-lift truck for the stacking of the bright finished sheets; 13-cabin for cooled bright finished sheets.

Forming of composite packages for pressing is carried out manually on platform of packages format. Figure 5 is shown putting the package between the platens of the press.

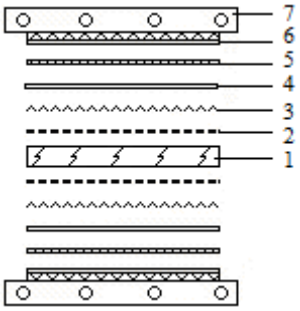


Fig. 5: Putting the package between the platens of the press: Chipboard plated on both sides with aluminum foil: 1-chipboard; 2-barrier film; 3-adhesive film; 4-aluminum foil; 5-bright finished sheets; 6-compensation cushions and protection plate; 7-platens.

After finishing the formation operations of composite packages, the platform mobile that moves on two rails is moved toward the press, and the packets with platform is rotating with 90^0, so that the large size of the packets to be parallel with the large size of the platens the press[5].

Platform of supply (storage) of the packages is mounted on the a hydraulic lift, which raises the package until at the level of platen, after which the composite package is manually put in the press. Further, is commanded the pressure of the regime of pressing. After pressing, PAL-Al plates with bright finished sheets are removed from the press, being stacked on the rotating platform of download.

After unloading the platform is rotating in a convenient position and start separating the bright finished sheets of PAL-Al plates as follows: After pressing, bright finished sheets are placed on lift truck upright, and the PAL-Al plates are placed on pallets of stacking for cooling.

After passing the cooling time (loading time of the press), the PAL-Al plates are transported to the line cutting to the format of the plates and bright finished sheets are transported to the cabin cooling.

Cooling the bright finished sheets, which after pressing have a high temperature is necessary for that during when takes place the formation of the package and powering the press not occur a premature polymerization of the adhesive film (due to the temperature of

[5] Istrate Virgiliu, *Utilajul şi tehnologia de fabricaţie a produselor stratificate din lemn*, Editura Didactică şi Pedagogică, Bucureşti, 1966.

the plates), which would lead to gluings of poor quality. Cooling is made using a current of cold air blown of a fan.

After pressing, the PAL-Al plates will be conditioned. The conditioning has as purpose the cooling of the PAL-Al plates in the view the balancing internal tensions. Cooling PAL-Al plates occurs immediately after removal from the press.

The PAL-Al plates are stacked on pallets and stored in spaces with necessary equipments for conditioning of the air, ie for temperature adjustment of 20-22 ^{0}C and humidity of 60-65%.

After cooling, the PAL-Al plates will be cut to format with a circular saw equipped with hardmetal tips (to cutting with low roughness) [6].

After cutting to format, the PAL-Al plates are stacked on pallets and protected with self adhesive foil [7].

CONCLUSION

Presentation the forming and pressing technological lines of the lamina packages for plates with composite structure, reveals using for pressing of the single daylight presses, having regard to the reduced time of the pressing cycle.

Between the types of lines conceived is that presented in figure 4, inspired after a line currently used in the manufacture of the plywood glued with adhesive film (phenol film).

This line was used for achieving semi-industrial of the experimental plates.

From the presentation of the forming and pressing lines, results that currently, the PAL-Al plates can produced and in Romania.

[6] STAS 12284-1984, *Scule pentru prelucrarea lemnului. Pânze circulare cu plăcuţe din carburi metalice. Dimensiuni.*
[7] *Documentație tehnică* , SC Silva Carpat Prodimpex SA, Ghimbav, Brașov,2012.

REFERENCES

1. **Istrate Virgiliu**; *Utilajul şi tehnologia fabricării plăcilor din aşchii şi fibre de lemn* Bucureşti: Editura Didactică şi Pedagogică, 1967;
2. **Istrate Virgiliu**; *Tehnologia produselor aglomerate din lemn*, Bucureşti: Editura Didactică şi Pedagogică, 1983;
3. **Istrate Virgiliu**; *Utilajul şi tehnologia fabricării plăcilor din aşchii şi fibre de lemn*, Bucureşti: Editura Didactică şi Pedagogică, 1967;
4. **Istrate Virgiliu**; *Utilajul şi tehnologia de fabricaţie a produselor stratificate din lemn*, Bucureşti: Editura Didactică şi Pedagogică, 1966;
5. ***STAS 12284-1984, *Scule pentru prelucrarea lemnului. Pânze circulare cu plăcuţe din carburi metalice. Dimensiuni.*
6. ****Documentație tehnică*, SC Silva Carpat Prodimpex SA, Ghimbav, Braşov, 2012.