

## Decorative facing of wood composite materials

OLENA PINCHEVSKA<sup>1</sup>, JÁN SEDLIAČIK<sup>2</sup>, ANDRIY PETILOV<sup>1</sup>

1) Department of Wood Processing of National University of Life and Environmental Sciences of Ukraine – NUBiP of Ukraine

2) Department of Furniture and Wood Products, Faculty of Wood Sciences and Technology, Technical University in Zvolen, Slovakia

**Abstract:** *Decorative facing of wood composite materials.* Chips from pine (*Pinus sylvestris*) branches were used as a covering material of wood composites. General synthetic adhesives were used for chips bonding, as well as the natural bone glue. The pressing parameters and various options for stacking chips on the veneer surface were stated. Proposed composites have very interesting decorative design and optimal technical parameters as planar stability and responsible physical and mechanical properties.

**Keywords:** pine branches, chips, veneer, adhesives, formaldehyde free, facing, decorative material

### INTRODUCTION

Wood products as environmentally friendly and conducive material to human have always been popular, especially if the resource base is continually updated. For the smooth operation of wood-processing companies, a constant supply of raw materials is necessary [1]. As for Ukraine, it's problematically not only because the country has the low percentage of forest cover – 16%, but due to the imperfections of the sale and export of logs. In addition, large-sized timber stocks are depleted, and interest is increasing in low-dimensional timber and logging waste.

Today low-grade wood is used as a raw material for the manufacture of fuel briquettes and granules. This is used mainly parts of trunk. As branches have large proportion of bark content, they are burned on the cutting area, and so there is about 1.66 million m<sup>3</sup> per year of lost material. However, juvenile wood branches amenable cutting to end, can serve as a coating material, may be an alternative to costly sliced veneer hardwood timber. In this connection it is made a device that allows vertical movement through a plane parallel to obtain thin cutter – 1 - 2 mm thick end sections (chips) of the branches with a diameter of 40 - 75 mm [2].

The aim of the laboratory work was to conduct exploratory research on the creation of decorative wood composite material faced with chips from pine wood.

### MATERIALS

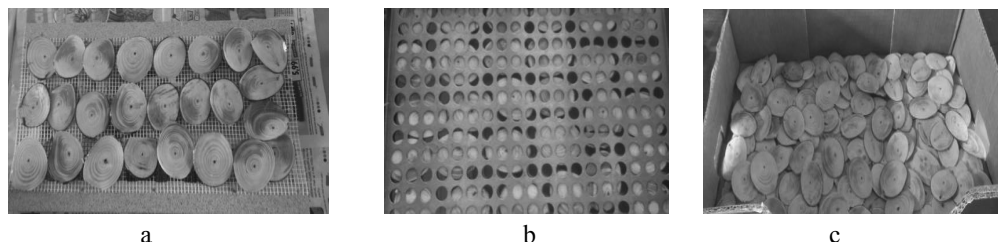
Obtained chips of pine wood (*Pinus sylvestris*) branches (with or without bark) with a diameter of 60 mm and moisture content of 60% were dried to an average moisture content of 8-12%. To avoid deforming, chips were dried in the clamped state.

As based material, veneers in size of 30×30×1,5 mm were used, and finished three-layer plywood from birch. Following adhesives were used – bone glue (BG), urea formaldehyde resin (UF), phenol formaldehyde resin (PF) and polyvinylacetate (PVAC) dispersion of D4 class.

### RESULTS

There is generally known that the adhesion to the cross section surface of the timber is minimal. To get a reliable adhesion of chips to the surface of wood composite material, chips

were impregnated with aforementioned adhesives without any hardener. Applied adhesives were diluted with water in the ratio 1:1. The impregnation was carried out by dipping, and then chips were left under ambient conditions for 7-10 minutes on the mesh tray to drain excess resin solution. Then chips were dried at a temperature of 60 °C for 10 min in clamped sections to mold stabilize (Fig. 1) in a thermostat oven with circulating air.



**Figure 1.** Preparation of pine wood chips surface layer: a - run-off excess glue; b - drying in clamped state; c - ready-dried chips

Formation of package was carried out as follows: chips were arranged symmetrically on both sides – front and back. The surface layers of chips were formed back to back, so that the background was on the substrate and overlapping, when the carpet of chips completely covered the substrate. There were used impregnated and non-impregnated chips. Pressing process of the composite was done in a heated laboratory press FONTIJNE (Fig. 2).



**Figure 2.** Laboratory press

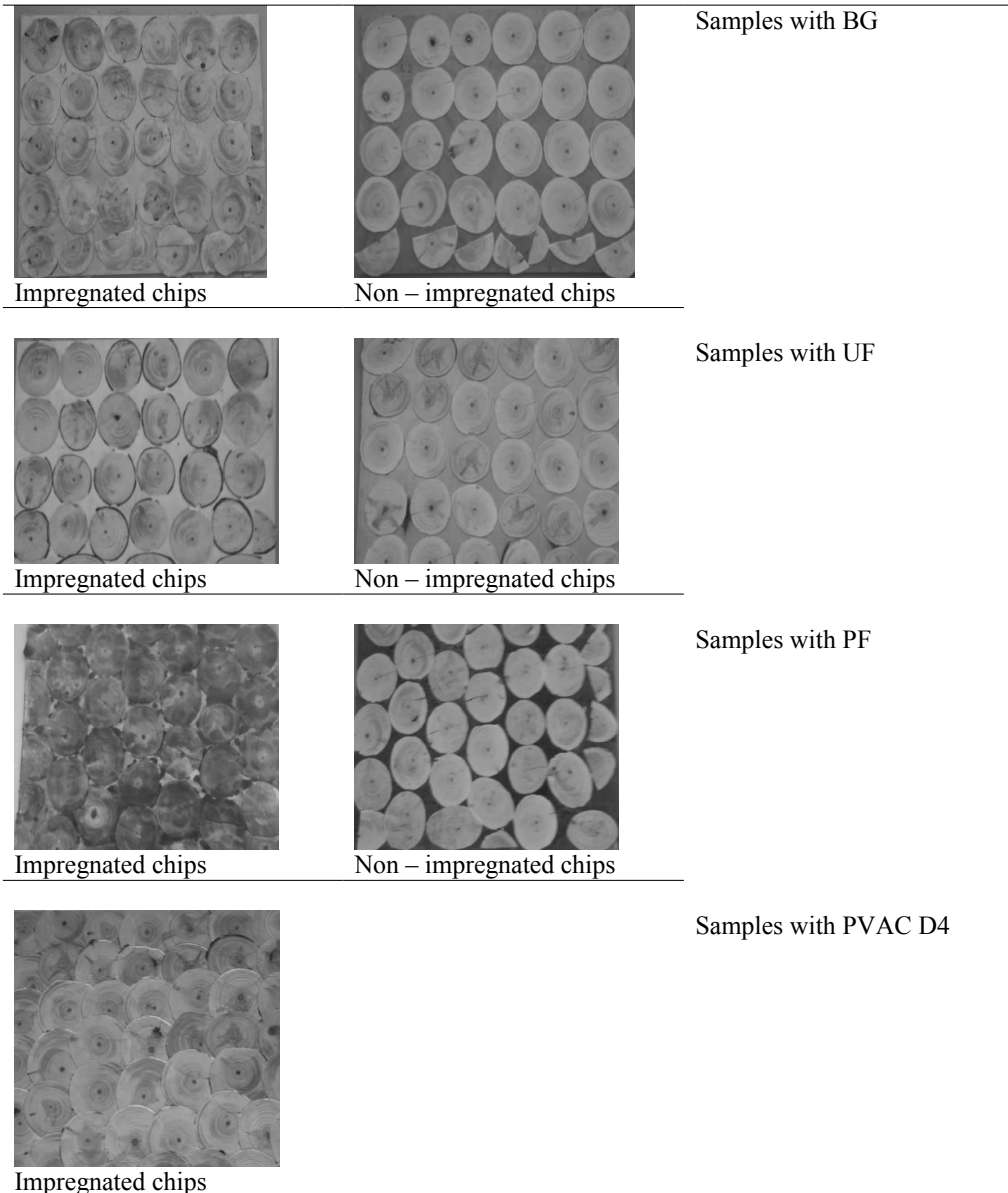
Compression parameters for all embodiments' samples are given in Table 1. Fig. 3 shows the samples of the decorative material. Visual assessment of samples showed that the smallest decorative properties have samples with PF adhesive, although mold saving them was the best. Moreover, there had sufficiently smooth surface because chips in impregnated and non-impregnated form were pressed into veneer.

Application of bone glue for impregnation the chips gave them yellow color. The impregnated and not impregnated sections had reliable gripping to veneer, and warping was small. Chips were not pressed into the material – the finished three-layered plywood with UF adhesive has not been uniform.

**Table 1.** Pressing schedules for samples of the decorative material

Type of adhesive	Press temperature °C	Pressure MPa	Pressure time min
Bone glue	50	1,0	45
UF	105	1,8	8
PF	145	1,8	8
PVAC D4	70	1,8	30

In the manufacture of samples with UF adhesive, chips with or without bark were used. The presence of bark enhances the decorative material properties. Gripping both kinds of chips to the substrate was high. With the simultaneous pressing of the three-layer plywood with impregnated chips, their indentation was observed and the surface was smoother than in the untreated slices bonding for finished plywood.



**Figure 3.** Samples of decorative material with pine wood chips facing

## CONCLUSION

The highest decorative properties had sample with overlap coated slices. The surface was quite smooth. Presented search study has shown the ability of facing material from wood branches with a variety of facing layer design solutions manufacturing. Further research in the application of different species of wood for the manufacture of chips, investigation pressing schedules and surface finishing allow to formulate the requirements for the design production line of decorative material from waste wood. All physical and mechanical properties were appropriate to standard requirements. Application of PVAC dispersion adhesive provided harmless formaldehyde free wood decorative composite material.

## ACKNOWLEDGEMENTS

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**Streszczenie:** *Dekoracyjne wykończenie materiałów drewnopochodnych. Użyto zrębków z gałęzi sosnowych (*Pinus sylvestris*) jako materiału wykonczeniowego do materiałów płytowych. Do klejenia używano równo żywic syntetycznych jak i naturalnych klejów kostnych. Określono parametry prasowania oraz sposób ułożenia materiału na powierzchni płyt. Proponowane kompozyty mają interesujący wzór oraz odpowiednie parametry fizyczne i mechaniczne.*

Corresponding authors:

Olena Pinchevska  
Department of Wood Processing  
National University of Life and Environmental Sciences of Ukraine,  
Kyiv, vul. Geroiv Oborony 15, 03041, Ukraine  
email: [OPinchevska@gmail.com](mailto:OPinchevska@gmail.com); phone: (+38044) 527 81 67

Ján Sedliačik  
Department of Furniture and Wood Products  
Technical University in Zvolen  
Masaryka 24  
960 53 Zvolen, Slovakia; [sedliacik@tuzvo.sk](mailto:sedliacik@tuzvo.sk)

Andriy Petilov  
Department of Wood Processing  
National University of Life and Environmental Sciences of Ukraine,  
Kyiv, vul. Geroiv Oborony 15, 03041, Ukraine; email:  
[vale\\_go@gmail.com](mailto:vale_go@gmail.com); phone: (+38044) 527 81 67