ASPECTS REGARDING THE OPTIMIZATION OF MANUAL HYDRAULIC PRESS CAPACITY GROWTH

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RESEARCH ARTICLE

Abstract

The purpose of this study was to optimize and improve the production capacity of the manually operated hydraulic press for applying solid endgrain wood edges on semi-circular tabletops.

This optimization process was carried out with the intention of increasing the production capacity at Aviva S.R.L. Commercial Company.

The test results showed the advantage of optimizing hydraulic presses by adding electrical components to the wooden templates for edge banding, which reduced the bonding time and increased production capacity.

Keywords: Hydraulic press, transformer, differential safety, electrical resistance

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INTRODUCTION

Pressing round wooden boards represents an ancient art and a modern technique that has captivated both woodworking enthusiasts and the furniture and interior decoration industry.

To bring life to these distinctive and elegant elements, manually operated hydraulic presses become an indispensable tool. These presses combine the craftsmen's skills with hydraulic force, enabling them to shape and precisely control semi-round wooden tabletops in a way that opens up new horizons in product design and wood processing. (Căpățână V. et. all, 2008)

Pressing round wooden tabletops with a manually operated hydraulic press is a specialized process that entails several considerations regarding the raw material and the operator's control skills. Here are some details about the pressing capacity of these tabletops using such presses:

Basic Materials: Pressing round wooden tabletops relies on the proper selection and preparation of basic materials. The wood used should be dry, straight, and free from significant defects to achieve optimal results in the pressing process.

Pressure Control: The manually operated hydraulic press provides the operator with the ability to precisely adjust the pressure exerted on the wood. This is crucial to avoid excessive squeezing of the material or its deformation during the pressing process. (Pavlov P., et. all,, 2018)

Use of Templates and Specialized Tools: To achieve the desired round shape for the wood, specialized templates and tools are used, which can be adjusted according to the desired size and design of the round tabletop. These must be crafted with care to ensure the quality of the finished product.

Consistency in Production: Using a manually operated hydraulic press in this context enables the production of round tabletops with remarkable consistency. With precise pressure control and the ability to adjust parameters in real-time, operators can ensure that each product adheres to the specifications.

Versatile Applications: Round wooden tabletops obtained through pressing can be used in various applications, including furniture production, the construction industry, and creative fields such as artistic woodwork. This versatility makes the manually operated hydraulic press a valuable tool in specialized workshops and factories.

Physical Effort and Operator Safety: As the operation is manual, operators need to exert physical effort to control the hydraulic press. It is important to pay attention to operator safety and ensure they are properly trained to avoid accidents during press handling.

Pressing round wooden tabletops with a manually operated hydraulic press is a process that requires precision and attention to detail. With the right technique and suitable equipment, this method can be used to create high-quality wood products with distinctive round shapes.

Next, we will explore this fascinating technique and present its benefits and applications in the world of wood processing, showing how manually operated hydraulic presses transform wood into functional works of art.

MATERIAL AND METHOD

The proposed method was implemented at Aviva SRL company, which involves applying the edge to round countertops by modifying the wooden templates used in the manually operated hydraulic press.

In order to increase the pressing capacity, the wooden templates for edge application on the countertop were modified by milling them on a CNC machine to incorporate the electrical elements that control temperature and pressing time.

This resulted in an increase in production capacity.

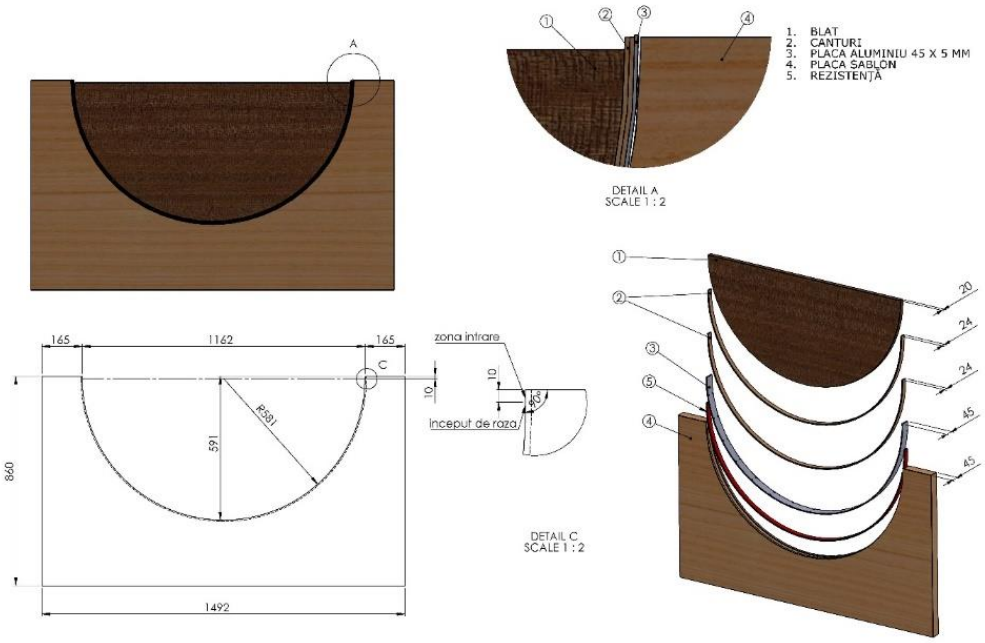

Figure 1. **Location of the Valea Mare forest road (processing after www.googleearth.com)**

The bonding time with the unmodified templates was 25 minutes at a temperature of 20^0-22^0C. (figure 2) The wooden templates were CNC-milled, creating a 30x20 mm channel along the entire arc.

The area for the power cable was also milled, and then the channel was sealed with thermal silicone. (figure 3)

Figure 2 **The hydraulic press with unmodified templates**

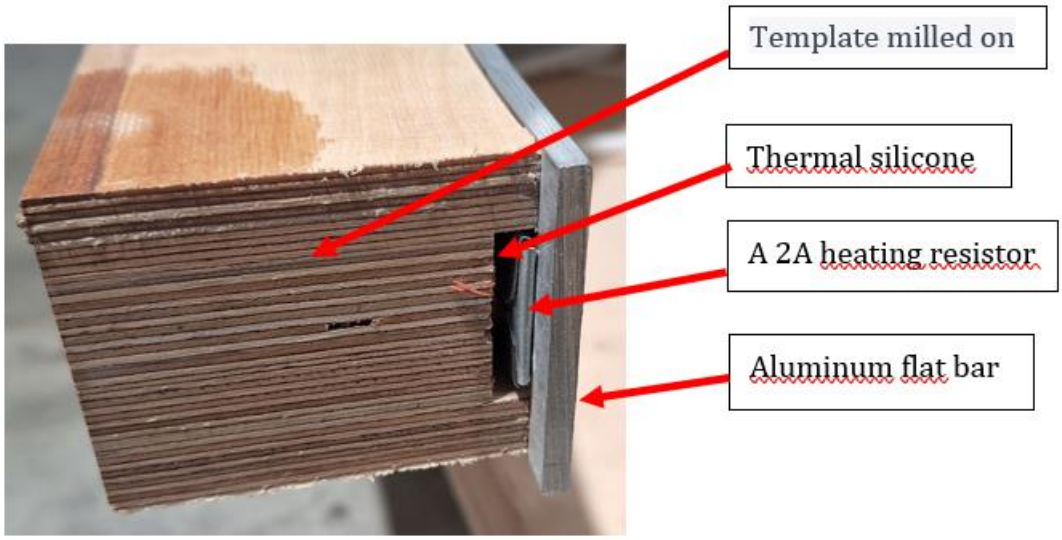

Figure 3 **The milled template**

RESULTS AND DISCUSSIONS

In the structure, 2 resistors rated at 2A were inserted, and they were covered with an aluminum strip measuring 2300x60x5 mm to facilitate the transfer of the heat generated by them. (figure 4, 5)

Figure 4 **Electric resistors**

Figure 5 **The aluminum strip 2300x60x5 mm**

A temperature probe has been installed in the structure to determine it in real-time, enabling fine control of the optimal edge bonding temperature.

Figure 6 **The temperature probe in the aluminum strip**

The electrical panel designed for this procedure contains the following components

Figure 7 **Transformer 230V to 230V with 2A**

Figure 8 **Thermal relay**

Figure 9 6A **differential safety switch with a trip current of 10mA**

Figure 10 **Digital control display.**

Figure 11 **Electrical panel**

The adhesive used is polyurethane type. The required pressure for the press is 20 bars.

After the structure was completed, the temperature changed, reaching 50°C, and consequently, the pressing time decreased significantly to 10-12 minutes.

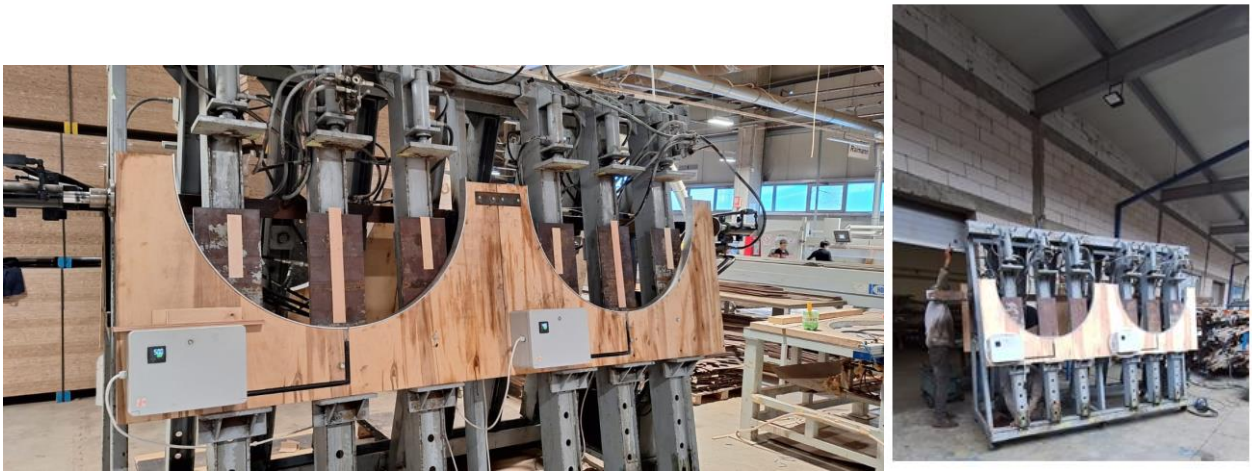

Figure 12 **The hydraulic press with the proposed solution for the templates**

RESULTS AND DISCUSSIONS

Based on the tests conducted, a significant difference was observed between the production carried out over 8 hours for pressing round wooden tabletops using hydraulic presses equipped with simple templates and the production carried out for pressing round wooden tabletops using modified hydraulic presses

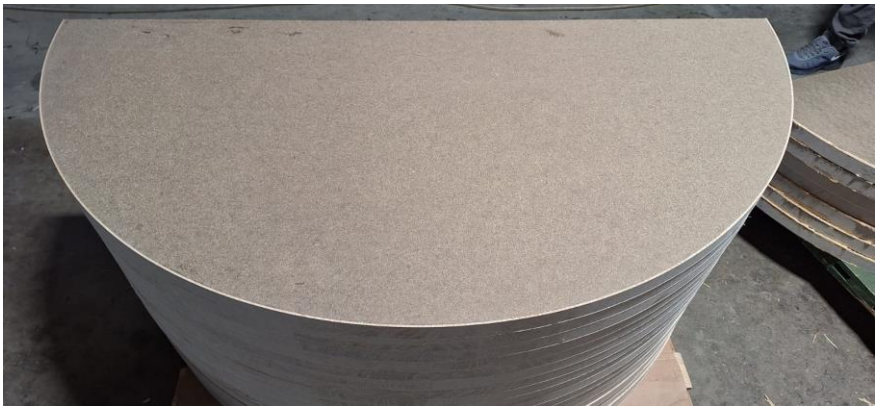

Figure 13 **Round tabletops**

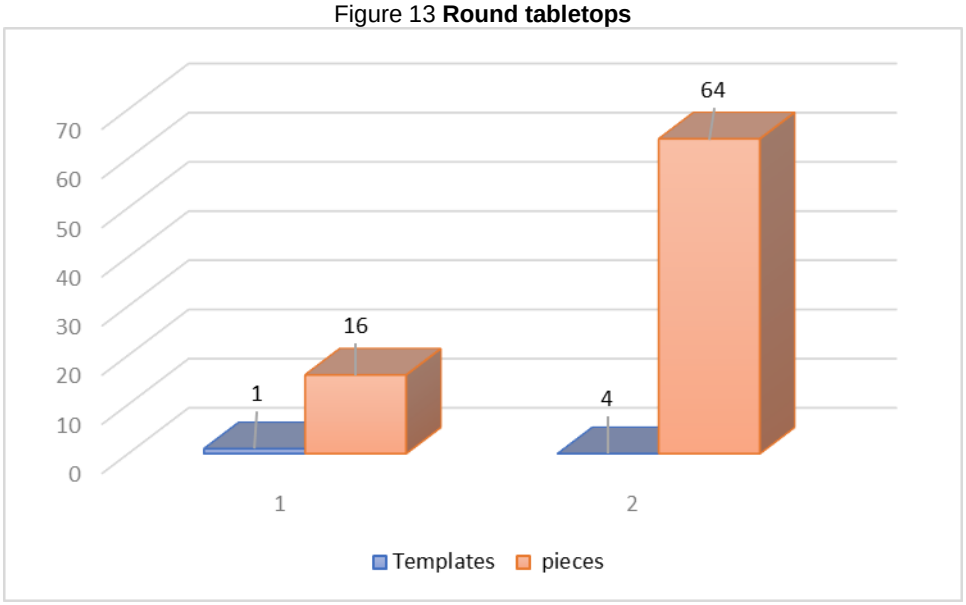

Figure 14 **The production capacity chart for the hydraulic press without modifying the template structure**

According to the chart, it is evident that initially, 16 tabletops could be produced in 8 hours using a single template, and by simultaneously working on 4 templates, 64 tabletops were produced

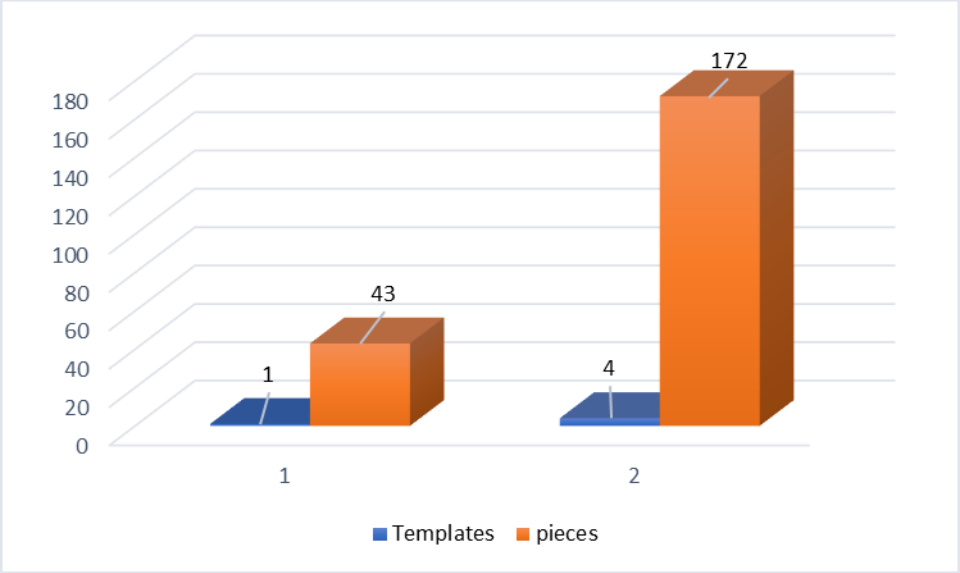

Figure 15 **The production capacity chart for the hydraulic press with modifying the template structure**

After implementing the proposed solution, 43 tabletops are produced per template in 8 hours, and with 4 templates, 172 tabletops are produced.

CONCLUSIONS

After the tests it was concluded that:

- Through the proposed solution, we have achieved a much more efficient technological flow, both in terms of quality and quantity.
- With the proposed solution and the implementation of the new structure on the templates of the manually operated hydraulic press, there was a noticeable reduction in the edge gluing time for round tabletops, decreasing from 25 minutes to 10-12 minutes.
- Thus, in the same 25-minute time frame, there was an increase in production of 537,5%

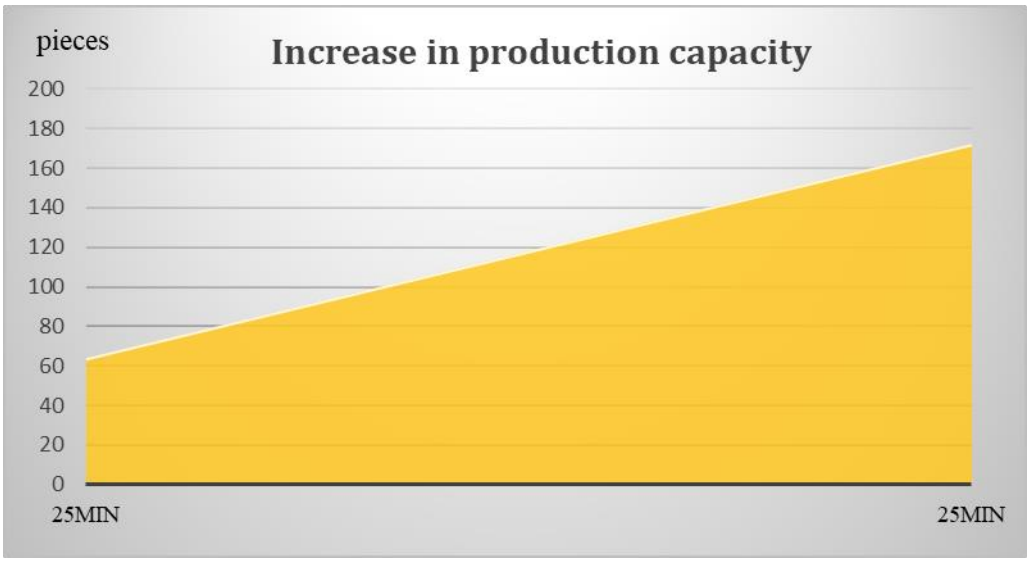

Figure 16 **Production capacity increase chart**

- The introduction of electrical components into the structure to increase the temperature required for pressing from the ambient temperature of 20^0-22°C to a temperature of 50°C for applying the edges to the round tabletops was the ideal solution to achieve the previously mentioned results.
- In conclusion, the manually operated hydraulic press is a powerful tool for shaping and pressing round tabletops, providing precise control, versatility, efficiency, and superior quality. This technology remains an essential element in the wood processing industry, playing a significant role in the production of curved elements

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