Production of Thermally Modified Veneer with High Decorative Value

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ABSTRACT

Dark-coloured veneers are usually obtainable only by using tropical wood species. With a thermal modification also non-tropical wood species can be provided with a dark colour. The object of this investigation was the manufacturing of veneers from modified veneer flitches. It can be assumed, that the production of high decorative dark veneers with a thickness of approximately 0.5 mm is possible by using the lengthwise slicing technique. For this, the plasticization of the thermally modified flitches has to be adjusted. It's recommended to use an alternated tempered water bath. The received veneers show good mechanical properties.

INTRODUCTION

Veneer is considered to be one of the noblest things that can be made of wood. It presents the highest added value of the material and is often used as a surface coating because of its decorative appearance. Typical material thickness for this kind of application is between 0.5 mm and 0.6 mm. Two techniques in veneer production are distinguished, the rotary cutting and the slicing technique. The slicing technique can be divided into two variants: the plain slicing and the lengthwise slicing (Schramm 2003). In general slicing and different combinations of slicing and rotary cutting techniques perform the production of high-quality and decorative veneers respectively (Kollmann 1962). Usually dark-coloured veneers are only obtainable by using tropical wood species. With a thermal modification also non-tropical wood species can be provided with a dark colour. Besides the colour the reduced changes of dimensions due to moisture influence are beneficially. Thermally modified veneer is produced sparely presently. Its production is realized by a treatment of the completed veneer. For this treatment only thicker veneers (> 0.9 mm) of selected wood species can be used. The treatment of the thin material with high decorative value implicates problems. The object of this investigation was the manufacturing of veneers from modified veneer flitches. It is well known that the water absorption of thermally modified wood is reduced. Therefore, the plasticization of thermally modified flitches cannot be realized as known as for veneer manufacturing of unmodified wood. Hence initially opportunities for plasticization were investigated.

MATERIALS AND METHODS

The investigations were carried out with flitches of European Beech (*Fagus sylvatica* L.). The thermally modification was carried out in a laboratory thermo-chamber of the company Mahild at the Institut für Holztechnologie Dresden gGmbH (IHD Dresden

gGmbH). The flitches were treated for 4 h at 190 °C. Unmodified reference specimens were retained for following comparative inquiries. For the production of the veneers a lengthwise slicing machine (Amitec FV 13) was used. The principle of the lengthwise slicing technique compared to the plain slicing process is shown in Figure 1. During the slicing process the veneer is bended, whereby checks arise at the side of the veneer, which looks to the knife. Because of the higher bending strength of wood parallel to the wood fibre the lengthwise slicing process is the more advantageous variant concerning the check formation. The reference thickness of the veneers amounted 0.5 mm approximately.

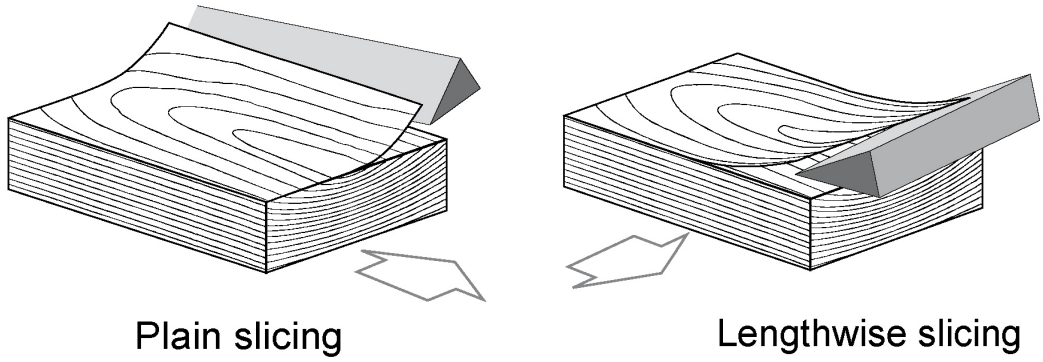

Figure 1: Principles of slicing technologies

Five variants of plasticization of the modified flitches were investigated (Table 1). The absorption of water was determined. The processibilty of the modified flitches was tested. In order to evaluate the plasticization method a power measurement was implemented. The evaluation criterion was the lowest consumed power.

Table 1: Variants of plasticization

Notation	Medium	Parameter		Comments
		Temperature	Duration	
1	water	80°C	7 days	
2	water	20°C	25 days	
3	water vapour	103°C	1 hour	
4	water vapour	103°C	5 hours	
5	water	75°C	3 hours	5 changes, duration
	water	20°C	3 hours	altogether 2 days

The evaluation of the veneers was carried out using a tensile test. The veneers were tested parallel and perpendicularly to the wood fibre. The latter corresponds with the tangential direction in the wood. The tests were done with a standard test machine and with samples of the size 14 mm x 120 mm x veneer thickness. The strain measurement was done with a video extensometer. All samples were conditioned to 22 °C / 60% relative humidity and tested under the same conditions.

RESULTS AND DISCUSSION

The results of the investigations of the plasticization variants are shown in Figure 2. The best results could be obtained with bedding in an alternated tempered water bath. This

option showed a high water absorption and low power consumption combined with short plasticization duration.

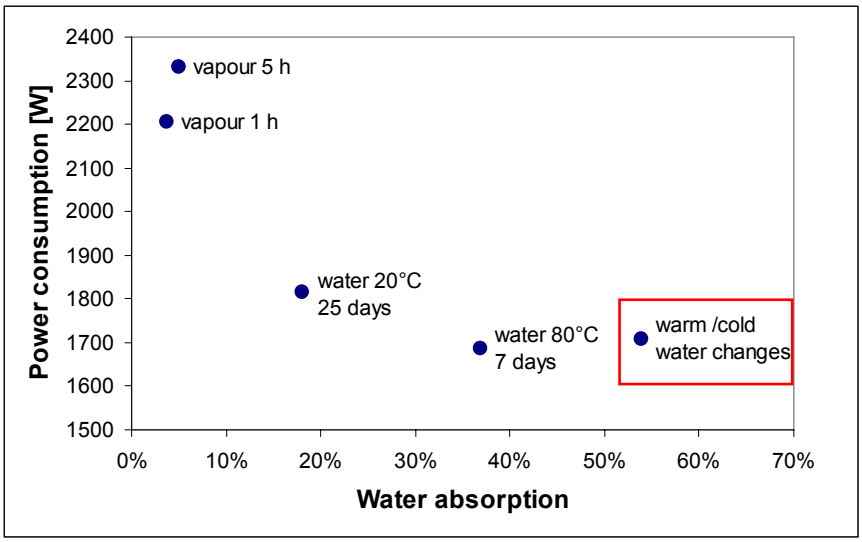

Figure 2: Water absorption and power consumption of plasticizated thermally modified beech

Using the alternated tempered water bath thermally modified flitches were plasticizated and veneers were manufactured. From the same log veneers are made as unmodified comparison samples. The tensile strengths parallel and perpendicular to the wood fibre of both, modified and unmodified veneers are shown in Figure 3.

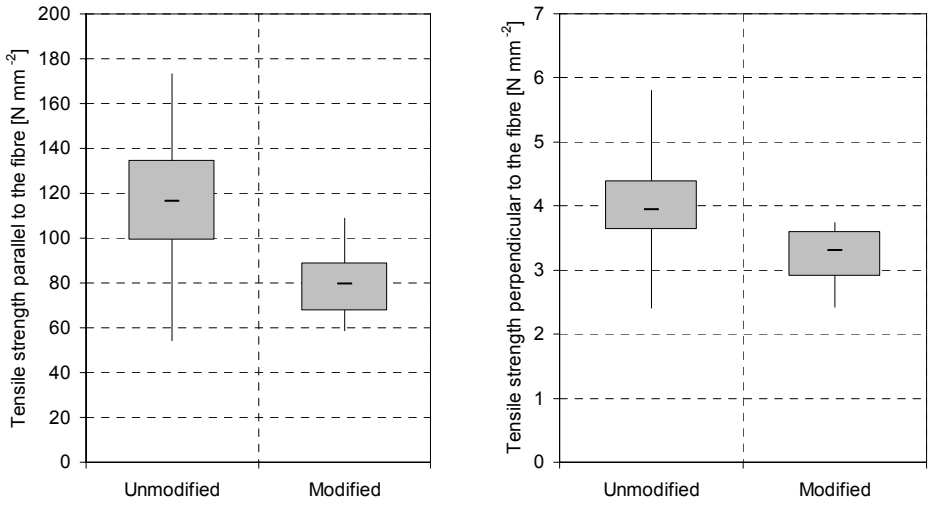

Figure 3: Comparison of tensile strength of modified and unmodified samples

As expected clearly reduced strengths are the result of the modification. But altogether the mechanical properties are good. There are a few cracks as a result of the modification or the veneer manufacture. The produced veneers were evaluated subjectively under optical and haptical aspects. Using a lengthwise slicing machine thin sliced veneers with decorative character can be produced. Compared to the rotary cutting process, witch is been conventionally used for the production of thermally

modified veneers, the lengthwise slicing process generates high decorative veneers with attractive textures as shown in Figure 4.

Figure 4: Beech veneer, left unmodified, right modified

CONCLUSIONS

It can be assumed, that the production of high decorative dark veneers with a thickness of approximately 0.5 mm is possible by using the lengthwise slicing technique. For this, the plasticization of the thermally modified flitches has to be adjusted. It is recommended to use an alternated tempered water bath. The received veneers show good mechanical properties. Further investigations are being carried out in a current research project.

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