Technology and methods of making decorated balusters

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Abstract. Woodworking companies looking for a simple solution to simplify and speed up the whole process of making a carved balusters. Tech solution is the replacement of threaded elements solid wood balusters on plastic threaded overhead items secured by adhesive to the surface of the workpiece chiseled. This solution allows to reduce the cost of manufacturing carved balusters, without resorting to a woodcarver and using expensive equipment. Through further improvements, such as painting, patina, it turns out a product that is difficult to distinguish from solid carved balusters.

1. Introduction

The starting point was the investigation of the claimed idea of developing designs and technologies to produce a "massacre" balusters of composite materials that reduce the complexity of manufacturing and accelerate the production process. Such technology could be the example of the high resource efficiency and is a useful model that has the potential to be implemented in the near future.

With the development of low-rise construction in Russia (cottages, townhouses) is a growing demand for the manufacture of wooden stairs, invitations pillars, columns, balusters, making it necessary to find new manufacturing techniques [1, 2].

Baluster - support column railing, made in the form of a columnar shape. Traditional wooden baluster is manufactured by turning on the universal lathe wood lathe or copying machines for wood with manual control (Figure 1). This profile chiseled surface can be quite varied, and the actual process of turning a relatively cheap.

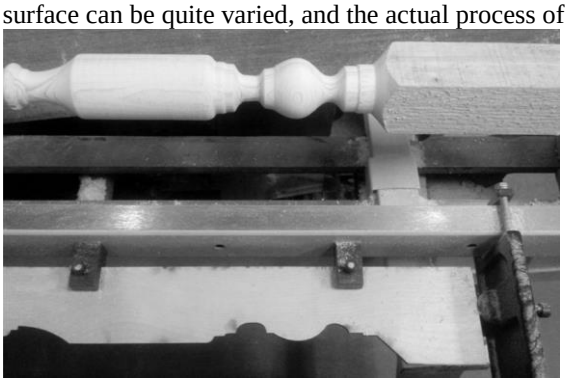

Figure 1. Production of balusters on the universal lathe for wood

Carved wooden balusters performed woodcarver for milling and copying machine with manual control (single or multi-position) or lathes with computer numerical control (CNC) (Figure 2). The cost of manufacturing such balusters becomes very high.

Figure 2. Production of balusters on a lathe CNC

Besides the basic functions - security stairs, balusters perform decorative function [1, 2]. To create a complex carved balusters necessary work of the artist-technologist (Figure 2). A large number of customers prefer painted

or patinated stairs and balusters, hide the texture of wood. At the same time the customer wants to see the unique carved balusters, which no one has. The proposed technology allows the manufacturing process to make a "massacre" balusters relatively cheap and fast enough.

The main technological method of decorating the baluster is the imposition of the relief decoration of plastic or sealant to the prepared surface chiseled [3]. The curvature of the surface is different, so it is very important decorative element plasticity. Plastic tends to remain pliable, with a special component ratio. In addition, by adding colorants in a plastic mass can be obtained deco coinciding in color with chiseled workpiece. Considering the aforementioned advantages the plastic can be concluded that it is a suitable material for forming a decor. The article described in detail the technology of creating a plastic decoration and carved balusters in general.

2. Technology

The process of manufacturing plastic decorative elements:

1) Creating a model element in the (scanning);

2) Construction of an electronic model, with a software module Artcam or any other 3D-design program to produce the output file with the stl, which can be opened in Artcam;

3) Production of wooden models on the three axis machines with numerical control (CNC);

4) Further development of the model by hand engraver, if you want to identify the shadow surface of the model, which cannot be obtained in a simple three-axis CNC machines;

5) Production of matrix. It will be appreciated that the matrix materials, for the manufacture of plastic decoration or decoration on the basis of the sealant will be different. Silicone and gypsum, respectively. In this case, we used a two-component silicone brand Compound "Super silicone" Blue:

• Place a wooden model in a box;

• Measure the necessary amount of base and catalyst in a ratio of 100: 5. Stir stick until smooth;

• Slowly pour the material in the box to the mixture evenly spread over the model, which will minimize the amount of air bubbles. Additionally, you can apply this process some vibration, which will provide more intense output of air bubbles;

• Allow material to harden at room temperature for 2-3 hours;

• Remove the model from the cured silicone matrix [4].

6) Production of plastic element. To work was selected two-white liquid plastic polyurethane brand Smooth-Cast 300:

• Equal volumes of components A and B are thoroughly mixed in a container (metal, glass or plastic);

• Slowly pour the plastic mass in the box to the mixture evenly spread over the model that will minimize the risk of air bubbles (Figure 2). Additionally, you can apply this process some vibration, which will provide more intense output of air bubbles;

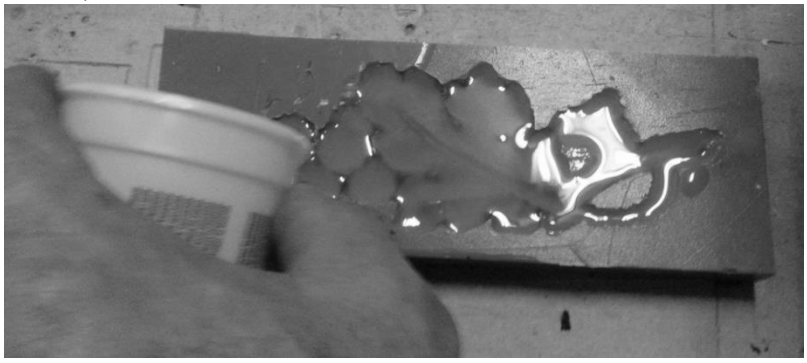

Figure 2. Fill in the form of plastic masses

Remove the product from the matrix after a time calculated according to the formula, to ensure its plasticity (Figure 3):

$$t_{2.} = t_1 \cdot {}^{3}/_{4},$$

where t_2-time extraction,

t_1-curing time.

For the two-component liquid plastic grade white Smooth-Cast 300:

$\mathbf{t_1} = 10$ minutes;

Figure 3. Removing a decorative element of the matrix

• Apply the product to the desired surface carved balusters, neatly fixing stretch film, or other alternative materials. After curing separate element (Figure 4). The hardened elements do not lose their shape;

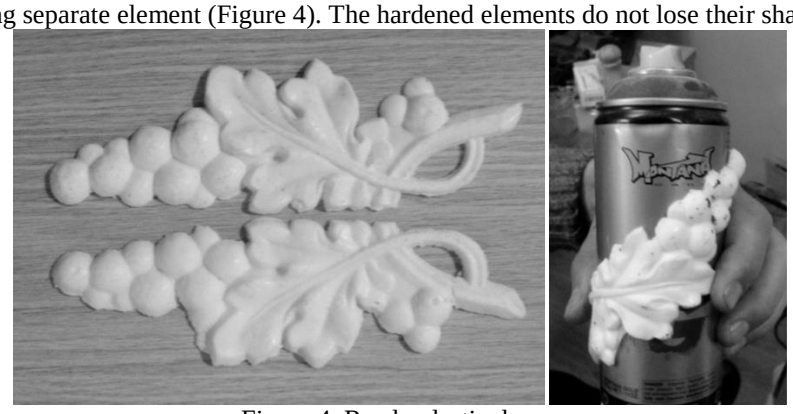

Figure 4. Ready plastic decor

7) Make any other necessary accessories and decorative objects, repeat the steps above;

8) Decorate chiselled baluster prefabricated elements, pasting them, for example, the adhesive COSMOFEN CA 12 (Figure 5). Elements glued to the place where they are fixed for their final solidification in the manufacturing process;

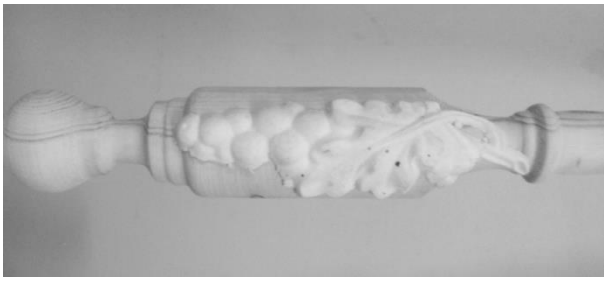

Figure 5.Zakreplenie decorative element on the surface of balusters

9) Paint the baluster to the desired color (Figure 6).

Figure 6. Ready balusters and possible overlay on the flat surface of the product

The required set of elements for decorating balusters allows different options to combine them and arrangement relative to each other and to get an excellent alternative to a decorative thread [5].

3. Conclusion

The study has been developed and investigated a new technology decorating balusters, based on the fact that plastic and plaster are the good alternative to thread, excluding the work of the engraver and turning and CNC milling machines. The advantage of this technology - reducing time spent on production of carved balusters and correspondingly low cost of finished balusters, against the carved balusters, obtained by milling on turning and milling machines. Monochrome painting and patina for easily hides the difference between textures of wood and plastics. The described technology allows increasing the diversity of the range of products and their aesthetic expression while minimizing manufacturing costs. The equipment allows you to place production on a smaller area, resulting in reduced costs. Documented in the technology can be applied to the decoration of wooden stairs, columns, pillars invitation ladders, wooden furniture.

References

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