UDK 674.02
Assoc. prof. Ya.P. Bugayenko – NUFWT of Ukraine

ABOUT WOOD'S PROFILED GRINDING

In our case in order to receive good quality of the surface we used the sanding skin with grains no lower than №180. The quality of processed good didn't depend on the direction of grinding against the fibers. In our opinion, the described scheme shows us how we can also successfully perform grinding of products with curved surfaces: borders, cornices, skirting, etc. You can also upgrade the machine installing mechanic feeder with automatic supply of products and by doing that you will decrease the labour costs.

Keywords: wood's profiled, grinding, panel, machine woodworking.

Shape grinding of wood elements is an essential issue; it either requires a lot of manual labour or expensive equipment. Here is an example of shape grinding of panel's surface (fig. 1) [1, 2].. Those elements of doors, usually are made from different kinds of solid wood, glued wood or HDF, WFB, MDF, later profiled with decorative veneers. Thus the main problem before finishing the internal work – abrasive grinding of panel's periphery of a given profile (fig. 2) [3-7].

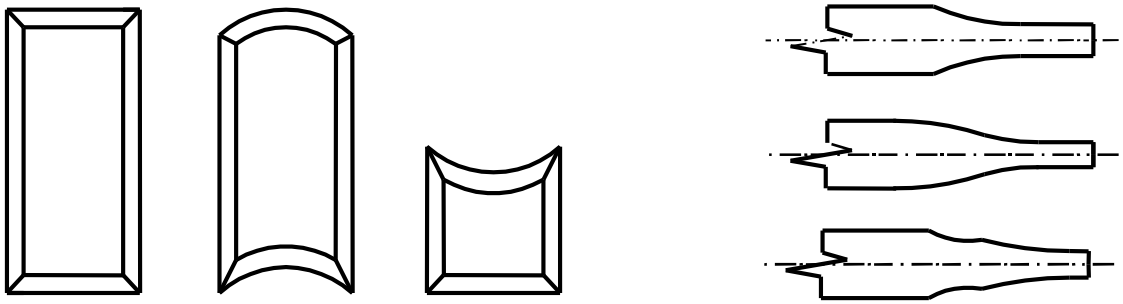

Fig. 1. Examples of different kinds of panel; Fig. 2. Possible variants of panel's section

A great variety of abrasive instruments are used for this type of work:

- brushing wheels, – elastic grinding wheels with pneumatic instruments;
- foam grinding sponges (for manual grinding);
- special profiled disks for grinding on CNC machines and milling machines;
- special abrasive fiber (Scotch-Bright.)

Each of those tools has its pros and cons. For instance, the brush instrument does not provide a sufficient flatness of processing, the softer the wood is the easier it is to remove the surface on the work piece (the opposite to that is flat grinding, when the material is limited by clamping ironing over the entire surface), meanwhile the sharp edges are rounded, which is often not predicted by technological process and designer's solution concerning the product. Elastic grinding wheels with pneumatic instruments are used in manual processing, and therefore also can not provide the desired flatness because of uneven pressure towards processing surface and because it is impossible to provide the even and stable force when working manually.

Foam grinding sponges fit on the surface that is processed, but they are not removing all the possible obstacles on the surface and, moreover, they have the same cons as the brush tool. Special profiled discs recently are actively filling the market profile of abrasive processing, but they are quite expensive, as they are made of the expensive basis (used for gluing the periodic grinding skin depending how it serves). Profiled disked should be renewed from time to time, at first every time when taking out to align the basis approximately 0,5…1,0 mm of material and replacing the worn abrasive material with a new one. Grinding period is relatively shorter then stability (between replacement of

worn material). This can be explained that the area of grinding skin, which is glued on surface of basic tool, is relatively small. Also you should consider the labour intensiveness of grinding skin's changeover and additional costs of glue. Special abrasive fiber also has plenty of described above cons, but it's really effective , for instance, for grinding coated surfaces before varnishing, in cases where there is no need to remove a thick layer of material, but only limit the removal of pile on minor irregularities.

And basically the instrument is not contaminated in the process of using varnishes and paints. After grinding pros and cons analysis described above we came to conclusion that in order to meet the best probable results in massive production (more than 5 thousand panels a months) of abrasive processing the surface of product we should use combined style, and basically for profiled grinding of curved surfaces we should use specialized profiled disks with glued red stripes on prepared (exact profile) polyurethane surface (basis) and for profiled grinding of straight surfaces we should use apply the scheme of normal grinding machine like SHLPS using strong elastic grinding peel of Swiss manufacturer (SIA). Also in the design of the machine we should include the two-sided processing of the panel's surface using two sets of grinding belts: upper and lower one (fig. 3).

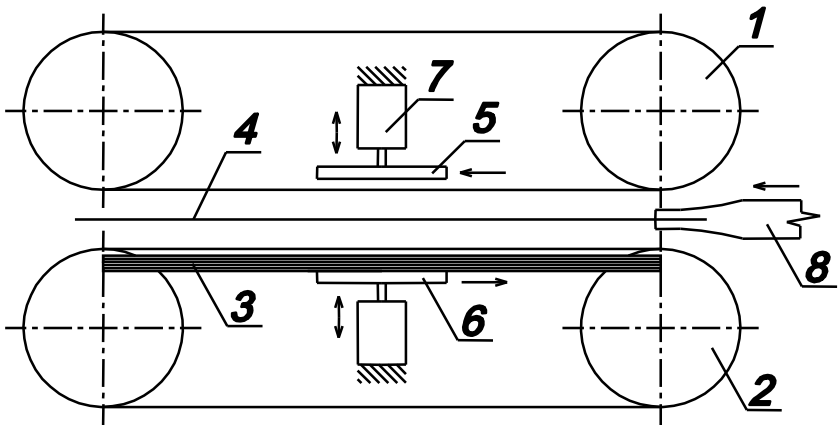

Fig. 3. The scheme of the machine for two-sided grinding of curved tafla's zones: *1 – upper grinding set; 2 – lower grinding set; 3 – table for product launch; 4 – ruler; 5 – the upper pressure pillow; 6 – the lower pressure pillow; 7 – pneumonic cylinder; 8 – tafla's launch*

Tape movement – in the opposite direction. Panel's launch – manually on the table. Panel's side sticks to the pointed side ruler, which is located between two abrasive tapes. Thus the worker, who works on that machine can manually move the workpiece along the table, and fit the side of the surface against the side ruler.

The movement resistance will be insignificant because the opposite efforts of upper and lower sets are approximately the same therefore the equilibrium exists. The pressure pillows with contra profile using pneumatic cylinder mechanism create pressure between grinding tapes and the surface of panel. Abrasive band when the workpiece is absent is moving freely and the clamp is taken away from the workpiece. The pressuring mechanism of skin pillow to the surface that is grinding is switched on or off when the flow of compressed air to pneumatic cylinders is regulated by the command of sensors on input and output zone of machine. In order not to have any contact between pneumatic cylinders' flow you should accumulate the minimal distance between grinding skins. In order to avoid the possibility of regrinding the panel on the input and output of the machine there is a prediction that at the moment of the grinding skin is pressed by the pillows to the surface of panel will happen at the time the panel comes under the sanding belt approximately half the length of pressuring surface and panel's output about 1/3 of the clamps zone. You can easily see that the length of the curved profiled surface depending on the type of panel in average is 3-4 times shorter than the length of the straight profiled surface (fig. 1).

Panel's grinding with profiled disks is done side by side. But using the machine with elastic skin we are working on those two sides simultaneously. Thus, processing panels consistently on two machines we managed to achieve high productivity of grinding on each working place using almost the same amount of time on each machine per one panel. Using the described working scheme and full shift load when grinding profiled panels with decorative oak veneers, we have to make only one changeover of sanding skin on profiled disks per shift, and the elastic skin is capable of working five shifts in a row (processing the surface approximately 3-5 time more area than profiled disks). If you want to use similar structure in some cases you need to pay your attention to the pressuring pillows, which should accurately repeat the profile of the surface, which is being grinded. On working surface of those pillows you must stick graphite tape, because therefore you will minimize the friction of skin against the pillow. If you need to apply 'soft' pressuring of sanding skin to the processed surface you should put a thin (1-3 mm) layer of fiber under the graphite tape on the pillow and adjust the pressuring force of the pneumatic cylinders.

In our case in order to receive good quality of the surface we used the sanding skin with grains no lower than №180. The quality of processed good didn't depend on the direction of grinding against the fibers (along or across fibers). You can see the machine described above for grinding panels on fig. 2. In our opinion, the described scheme shows us how we can also successfully perform grinding of products with curved surfaces: borders, cornices, skirting, etc. You can also upgrade the machine installing mechanic feeder with automatic supply of products and by doing that you will decrease the labour costs.

References

1. **Гайда С.В.** Матеріали для виготовлення виробів з деревини. – Львів: ВМС.– 2000,– 160 с.
2. **Гайда С.В.** Раціональне конструювання виробів з деревини. – Львів: ВМС. – 2001,– 93 с.
3. **Гайда С.В., Кшивецький Б.Я., Войтович І.Г. Прокопович Б.В.** Тлумачний словник з деревооброблення. – Львів: НЛТУ України. – 2002. – 280 р.
4. **Гайда С.В.** Проблема деревної сировини у Європі та Україні / Ліс. госп-во, ліс., папер. та деревооб. пром-сть / наук.-техн. зб. – Львів: НЛТУ України. – 2007, вип. 33. – С. 55-63.
5. **Гайда С.В., Максимів В.М.** Аналіз, особливості, проблеми та досвід використання додаткових ресурсів сировини – відходів та вживаної деревини / Ліс. госп-во, ліс., папер. та деревооб. пром-сть / наук.-техн. зб. – Львів: НЛТУ України. – 2007, вип. 33. – С. 63-72.
6. **Гайда С.В., Максимів В.М., Туниця Т.Ю.** Розроблення класифікатора вживаної сировини / Ліс. госп-во, ліс., папер. та деревооб. пром-сть / наук.-техн. зб. – Львів: НЛТУ України. – 2008, вип. 34. – С. 55-68.
7. **Гайда С.В.** Хімічний склад та ступінь забруднення – основа систематизації ВЖД / Ліс. госп-во, ліс., папер. та деревооб. пром-сть / наук.-техн. зб. – Львів: НЛТУ України. – 2008, вип. 34. – С. 68-79.

УДК 674.02

Доц. Я.П. Бугаєнко, канд. техн. наук – НЛТУ України

До питання профільного шліфування деревини

Встановлено, що профільне шліфування елементів з деревини є надзвичайно актуальним, оскільки, як правило, вимагає або багато ручної праці, або дорогого обладнання. Проаналізовано, що для даного виду робіт переважно використовують найрізноманітніший абразивний інструмент: щіткові круги, еластичні шліфувальні круги в парі з пневмоінструментом, шліфувальні губки на поролоновій основі (для шліфування вручну), спеціальні профільні диски для шліфування на верстатах з ЧПУ та на фрезерних верстатах, спеціальний абразивний матеріал на волоконній основі (скотч-брайт). З'ясовано, що найоптимальнішим варіантом абразивного оброблення периферійної профільованої поверхні вказаних деталей за умови крупносерійного виробництва (понад 5 тис. шт. тахель щомісячно) слід застосувати комбінований варіант. Верстат для оброблення погонажних виробів можна ще й обладнати механічним подавачем з автоматичною подачею деталей і, тим самим, зменшити витрати робочої сили.

Ключові слова: дерев'яні профілі, шліфування, тахля, деревообробні верстати.