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The ranges of local influence of PUR 555.6 preparation and load-carrying and stiffness of furniture joint elements

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Abstract: *The ranges of local influence of PUR 555.6 preparation and load-carrying ability and stiffness of furniture joint elements*. The paper shows macroscopic and microscopic evaluation of influence of PUR 555.6 nanopreparation in particle board. The application of the preparation was performed on special specimens prepared for pin screwing type Twinstart (Titus). Moreover, as an experiment the influence of dosage of preparation on load-carrying ability and stiffness of furniture joint elements was estimated.

Keywords: particle board, joint furniture, local strengthening, load, stiffness

INTRODUCTION

Upgrading of material features of particle boards directly influence advantageous change of joints properties and as follows whole furniture construction [1, 4, 10]. The possibility of influencing particle board properties in the area of joints gives application of PUR 555.6. This one component preparation on the basis of polyurethane results in local changes of material structure [12] and upgrading of particle board parameters. The up till now research confirms advantageous influence of this preparation on static and rheological properties of joints [5, 6, 7, 8, 9, 11]. A very interesting matter from the point of view of practical usage is evaluation of range of influence and changes of basic load-carrying parameters depending on the quantity of nanoreparation.

MACRO- AND MICROSCOPIC EVALUATION OF LOCAL MODIFICATION RANGE

During the research were used specimens of particle boards (used in earlier tests of joints with Twinstart pin by Titus) [5, 6, 7, 8, 9, 11]. The dimensions of wholes were Ø5×12.5 and were made from front side.

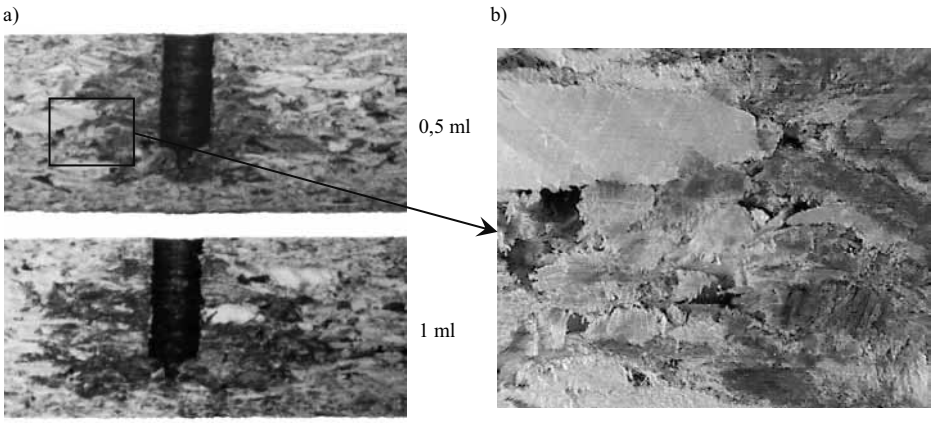
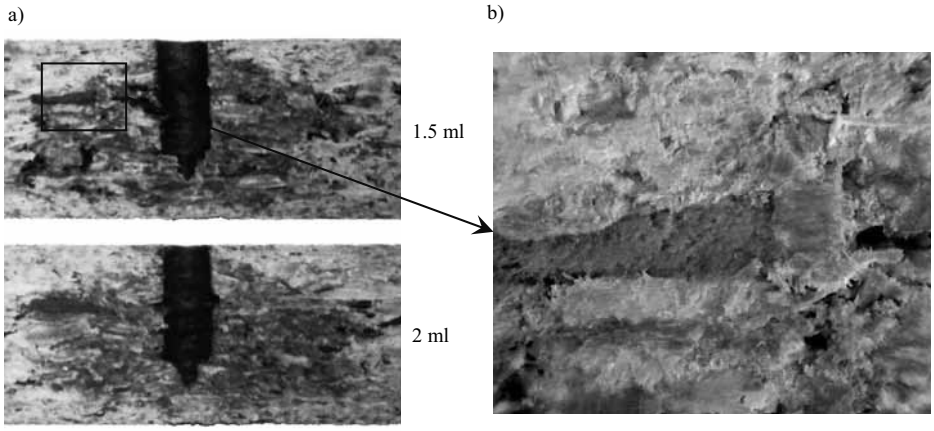


Fig. 1 Local influence of PUR 555.6 preparation: (a) comparison of range of influence depending on preparation dose (blackish area) (b). microscopic picture of board with penetrating preparation coloured with Sudan black (×50).



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In the wholes set in vertical position was dosed by syringe respectively 0.5ml, 1ml, 1.5ml, 2ml of preparation. For preparation colouring Sudan black micro was used which is widely in biological and chemical tests. Fig. 1 shows a set of Picture of cross sections of samples made in the axis of whole. The samples were cut on saw disc.

CHANGES OF LOAD-CARRY ALLOWANCE AND STIFFNESS OF JOINTS ELEMENTS ACCORDING TO PREPARATION DOSE CHANGES

Tests on effect of preparation dose influence, on static parameters of joints were held by universal testing machine Tinius Olsen H5K-T [5, 6, 7, 8, 9].Earlier experiments with use of above mentioned machine showed that the loading speed of pin in pulling out test only imperceptibly influences stiffness and non-linear strengthening [2, 6]. For comparative tests the support speed was of 1.5 mm/min. The samples had identical geometrical features with ones used until now. [5, 6, 7, 8, 9]. Moment of pins screw home was for samples with non-strengthened area and strengthened area (independently from dose) respectively 1 Nm and 2.2 Nm. As a result of tests of pulling out of pins the characteristics of loaded elements were obtained. Below the obtained characteristics averaged with earlier characteristics of pulling out performance are shown [6].

The tests were not performer on dose 1.5ml because of insignificant influence in comparison with other doses. On the basis of obtained characteristics the initial stiffness of tested samples was determined. The initial stiffness was defined for two characteristics points representing 10% and 40% of limit load [3, 6]. Te stiffness (c_F) and maximum pulling out forces (F_{max}) were compared (Fig 3). Parameters c_{FS} and F_{maxS} regarded locally strengthened elements.

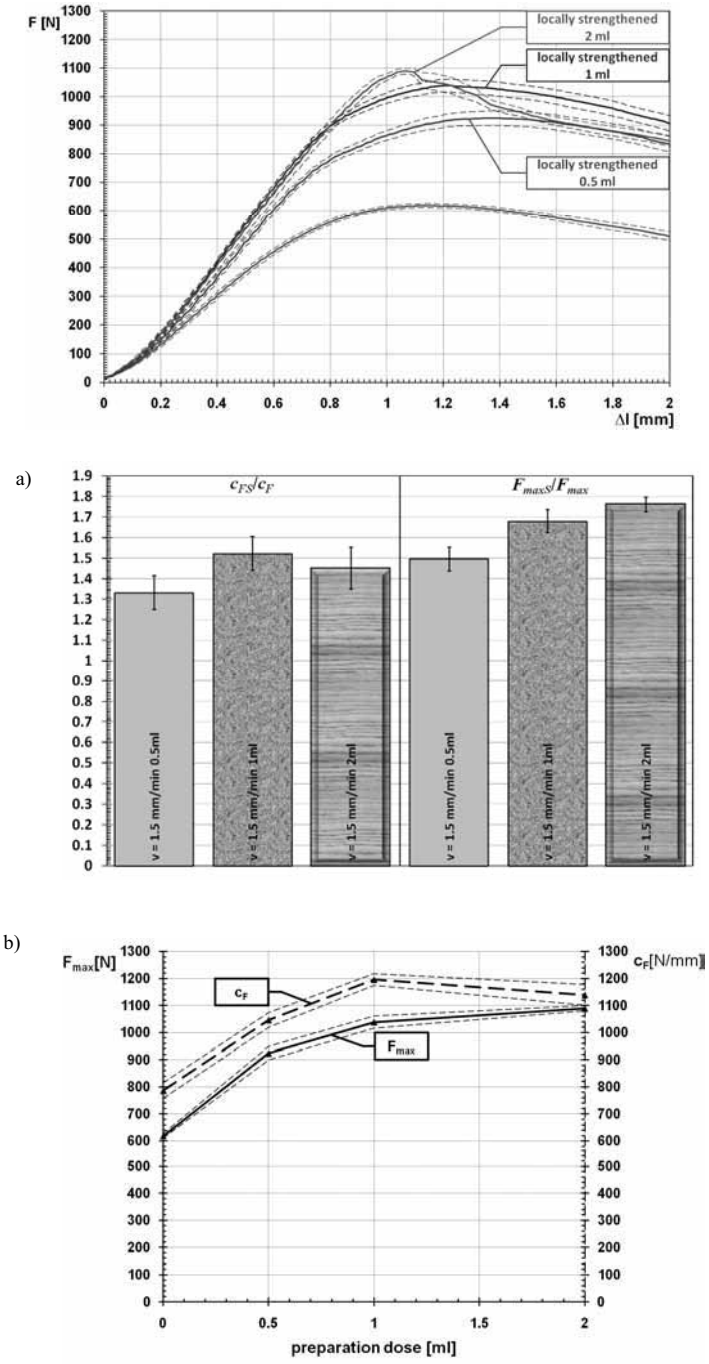

Fig. 3. (a) comparison of stiffness of tested samples and maximum pulling out forces of pins. (b) values of forces pulling out pin and stiffness's in function of preparation dose.

CONCLUSIONS

The performed experiment showed that the sphere of influence of PUR 555.6 nanopreparation is not proportional to applied quantity (Fig. 1). Load-carrying ability and stiffness in pin pulling out sample have similar reactions. Excessive dose of preparation does not bring significant changes in basic resistance parameters (Fig. 3). On the basis of characteristics (Fig. 2) one can presume that to large dose leads to unfavourable effects. The accuracy of data obtained could be affected by manual dosage of preparation. A very important matter is also the structure of area operated by preparation, time of cross-linking and also influence of time and temperature on the degree of crystallization.

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Streszczenie: *Zasięg lokalnego oddziaływania nanopreparatem PUR 555.6 a nośność i sztywność elementów połączeń meblowych*. W pracy przeprowadzono makroskopową i mikroskopową ocenę strefy oddziaływania nanopreparatem PUR 555.6 w płycie wiórowej. Aplikacji preparatu dokonano w przykładowe próbki przygotowane do wkręcania trzpienia typu Twinstart (Titus). Ponadto eksperymentalnie oszacowano wpływ dawki preparatu na nośność i sztywność elementów połączeń meblowych.

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