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Provedennaya evaluation of STATUS Using vozobnovlyaeтыh energy sources (rivers, the wind, the sun, byomassы) in Ukraine. Done production analysis tehnycheskyh funds to obtain vozobnovlyaemoy energy to Ukrainian enterprises.

Byomassa, biogas, BIOETHANOL, toplyvnыe hranulы, Biodiesel engine, Vetrogenerator, Sun electric power, GES, green tariff.

Evaluation of status of use of renewable energy sources (rivers, wind, solar, biomass) in Ukraine. An analysis made of the production of technical facilities for the receipt of renewable energy at Ukrainian enterprises.

Biomass, biogas, bioethanol, fuel granules, biodiesel, wind generator, solar power, small HPPs, green tariff.

UDC 624.011.2

FEATURES DEREVYNNOSTRUZHKOVYH DEFORMATION OF PLATES IN BENDING STRESS CONCENTRATORS

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VB Berezin, a graduate student *
OO Ivchenko, student

A study of deformation and fracture processes derevynnostruzhkovyh plates without stress concentrators and stress concentrators in the form of round holes at three dot bend. As a result of *the mechanical tests, using optical methods set features changing field strain chipboard panels depending on the size of easing cross-sections.*

Deformation, fracture, derevynnostruzhkova plate, hub tension.

Problem. In order to reduce the cost solid wood increasingly used in the manufacture of products which traditionally was made of solid wood, becoming particle board, MDF, HDF, OSB, Thermal and others. [1, 2, 5, 6, 7]. In its mechanical characteristics are significantly different from natural materials [3, 4, 7]. In view of the above-mentioned structural heterogeneity of materials, their mechanical behavior under different load types will vary considerably. This installation features of deformation and destruction derevynnostruzhkovyh three plates at a point bending devoted to this work.

The purpose of research - Explore the features of deformation and destruction derevynnostruzhkovyh plates for the effects of stress concentrators with three dot bend.

Methods and materials research. Tests were conducted in the laboratory of the Department of static tests

* Supervisor - PhD MG Chausov

Mechanics and Strength of Materials of the National University of Life and Environmental Sciences of Ukraine on serial testing machine FM-1000 production VEB Thüringer Industriewerk Rauenstein (Germany). Specifications machines allow exert maximum load of 10 kN variable speed moving reference traverse from 2 to 90 mm / min. In this paper, reference traverse speed of movement was 2.5 mm / min.

The magnitude of the current efforts such as measured by tenzodynamometra DST-5 (measurement accuracy of ± 1%) (position 1), moving via Strain gauge IMDT-20 (measurement accuracy ± 0,5%) (Pos.2), the distance between supports to traverse (poz.3) was 200 mm (see. Fig. 1).

To determine the deformation fields used its own software as part of complex optical camera Casio Exilim EX-1, LED-projectors and specialized computer software for processing digital images [8]. As prototypes used derevynnostruzhkovi laminated plate thickness of 16, 18, 25, 38 mm. Cross-sectional samples had a square shape with a thickness equal to the size of the plate.

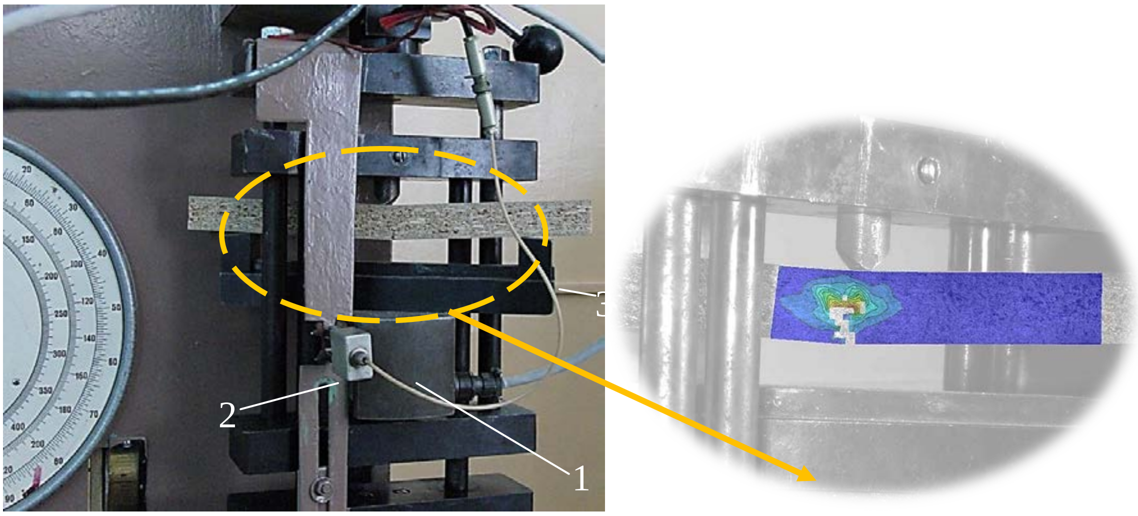

Fig. 1. View of the test setup for bending test: a - general view of loading system; b - sample deformation field in the area of application of the load; 1 - tenzodynamometr; 2 - Strain gauge; 3 - traverse.

Record Chart deformation performed in real time by a computer measuring system FastReg (see. Fig. 2) [9]. For processing signals from strain gauges used normalizers signals 3016 Adam and analog-to-digital converter 9113 DAQ PCI modem 8912.

Results. Typical Stress-strain curve derevynostruzhkovyh three plates at a point bending is shown in Fig. 2. The nature of Stress-strain curve is elastic-plastic looking, failure occurs suddenly, almost fragile.

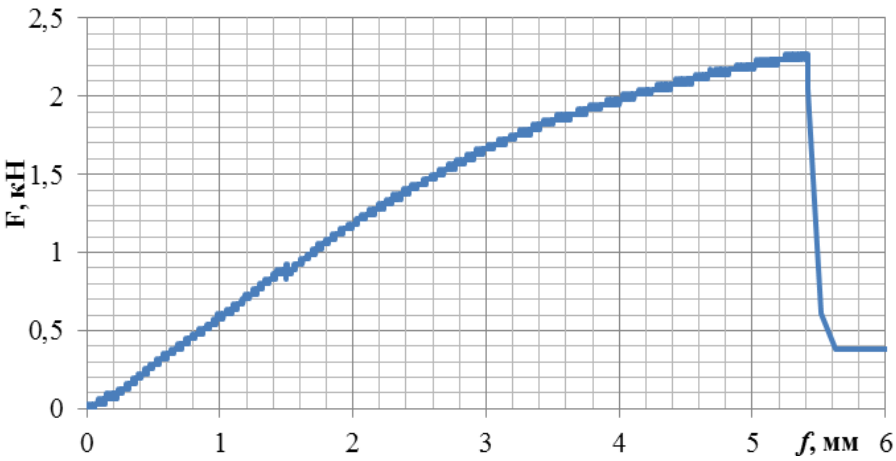

Fig. 2. Stress-strain curve of the sample without the stress concentrator derevynostruzhkovoyi plate thickness of 38 mm.

Qualitatively shape deformation diagrams samples of stress concentrators slightly different from the deformation diagrams solid samples destruction in this case is nearly as fragile. To clear explanations of changes in carrying capacity of samples with different stress concentrators and cut slabs of different thicknesses in Fig. 3. The values of destructive activity.

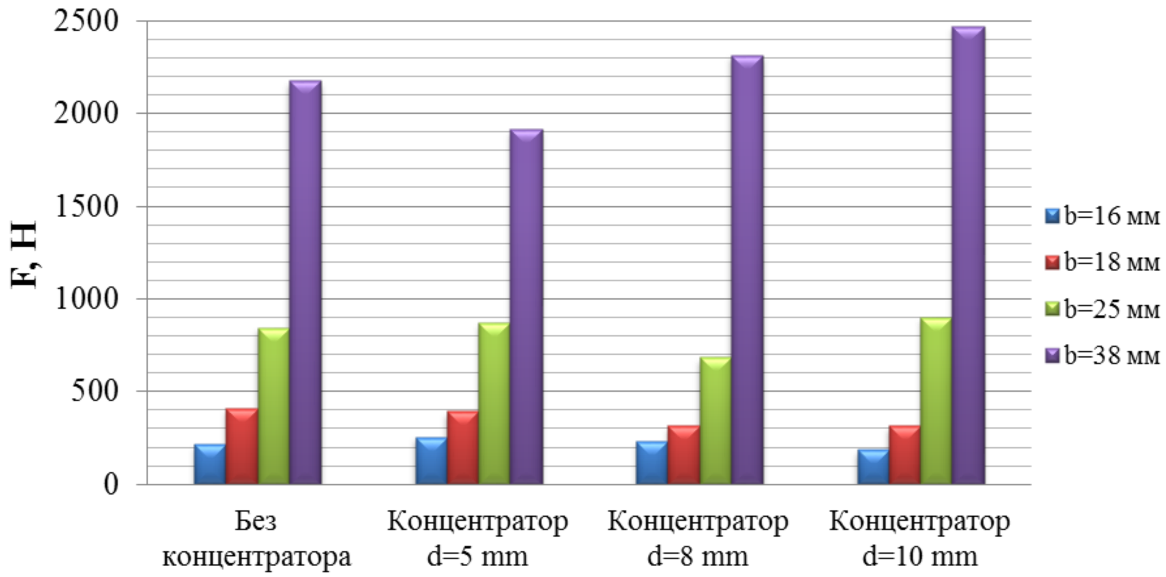

Fig. 3. The breaking load bending chipboard for different thicknesses depending on the size of stress concentrators.

Average bending stress determined by the formula $\sigma_{зг} = \dfrac{M}{W_y}$ [4, 10]

M - Bending moment; W_y - Axial moment of resistance minimum cross-sectional sample.

Typical examples strain diagrams without stress concentrators cut from slabs of different thickness are shown in Fig. 4.

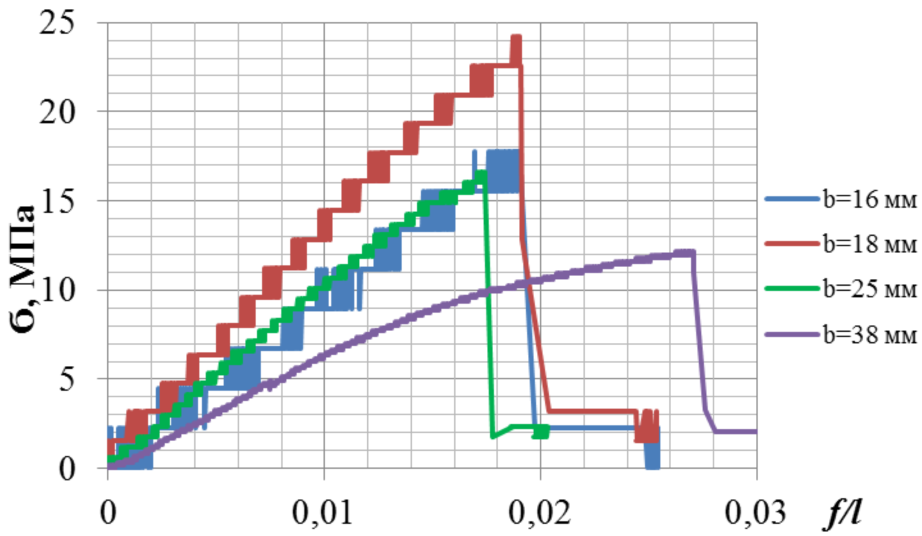

Fig. 4. Diagrams strain derevynostruzhkovyh plates without stress concentrators thickness of 16, 18, 25, 38 mm.

Analysis of the results showed that the greatest strength is fixed at 18 mm thick samples (on average tensile strength reached 24.2 MPa stress), the lowest - 12.1 MPa for samples with thickness of 38 mm.

The largest deformation to fracture recorded on samples with thickness of 38 mm, the maximum deflection in this case the order of 5.5 mm (relative deflection $f/l = 0,027$), Minimum - on samples of 25 mm - the maximum deflection ~3.4 mm (relative deflection $f/l = 0,017$).

The test results derevynnostruzhkovyh plates three point bend found that a strict relationship between the strength and thickness of plates samples from which they were made, does not exist. This is an interesting result and can be explained by structural and dimensional heterogeneous composite material plates. For example, samples without bending stress concentrators best combination between factors identified for plates with thickness of 18 mm (see. Fig. 5).

As stress concentrators chose the most common diameter holes 5, 8, 10 mm used in the joints of wooden products.

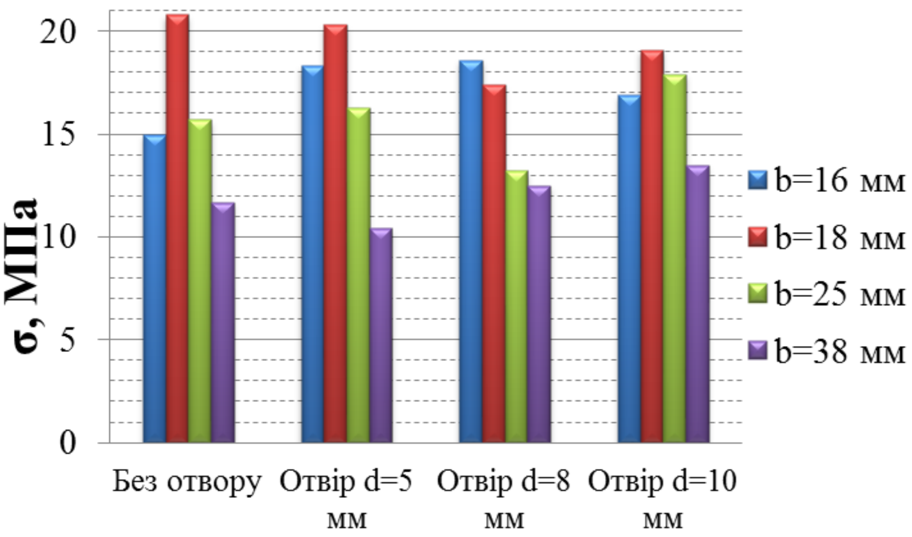

Fig. 5. The value limits the strength derevynnostruzhkovyh plates depending on the size and thickness of the stress concentrator plate.

In testing samples of different sizes stress concentrators remains a general tendency that the maximum voltage withstand sample thickness of 18 mm. However, the mechanical behavior of the samples in the presence of stress concentrators diameter of 8 mm is not subject to the general trend. The greatest influence on the strength ratios in samples from 16 mm plates does stress concentrator diameter of 10 mm. For samples with thickness 25 mm and 38 proved the most dangerous, respectively, stress concentrators diameter of 8 mm and 5 (see. Fig. 5).

Given this complex situation with changing strength ratios depending on the diameter of the hub stress, there is a need of more detailed clarification features deformation of the material samples over the entire height sections. For this purpose the software package was used to study the deformation field based on the method of digital image correlation [10,11,12,13,14,15]. Typical examples of pattern deformation fields without stress concentrators and they obtained through software system, shown in Fig. 6-9. As an evaluation index test results taken maximum principal strain tensor defined on the basis of Lagrange.

Analyzing the distribution pattern of the field strain (Fig. 6), draws attention to the fact that in samples without the stress concentrator 16 mm deformation localization initially observed in inclusions and inhomogeneities (original small concentrators acute form), followed by the creation of these zones cracks which are then combined into one macrocrack in the stretched area. It is with this in our view, and a reduction in the strength of these samples, compared with the thickness of 18 mm. Fig. (Fig. 6 a) shows the deformation field sample thickness of 16 mm.

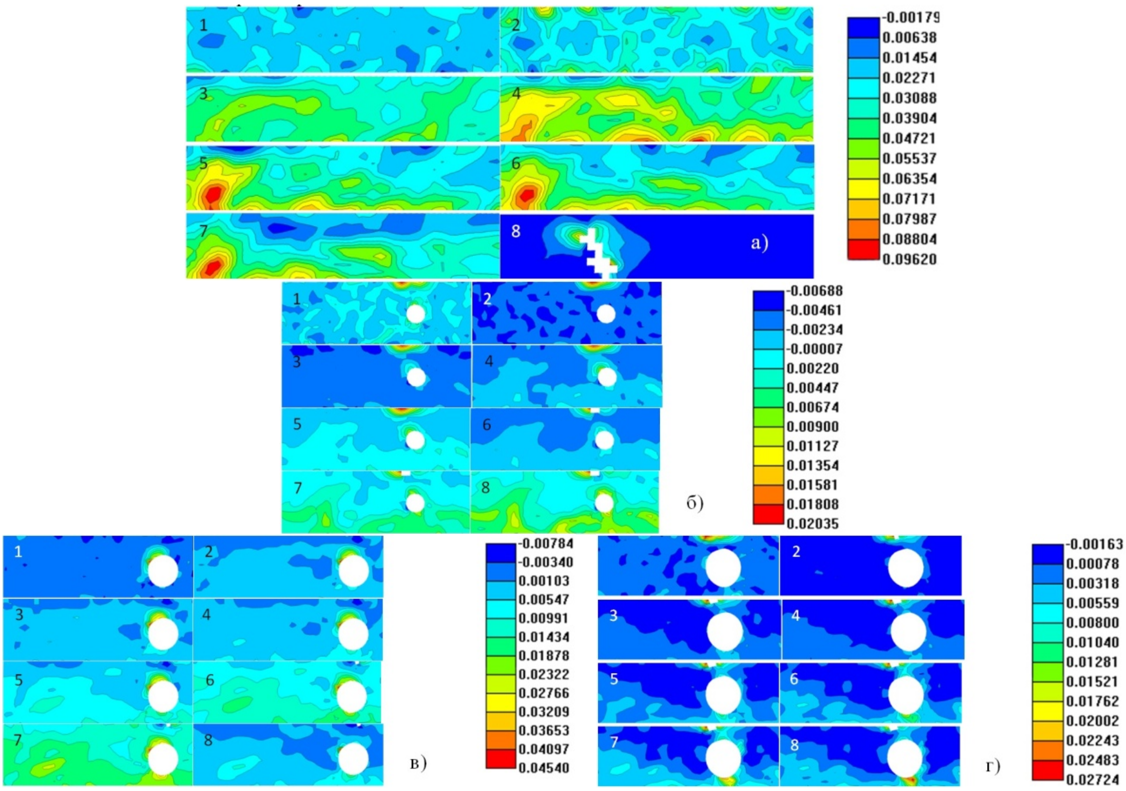

Fig. 6. Field of deformation of the sample thickness of 16 mm, and - without the stress concentrator; - with stress concentrators in a hole with a diameter of 5 mm; c, d - similarly with stress concentrators, respectively, 8 and 10 mm.

If the hub in a round hole maximum strain values are at the point of application of the load (in the compressed area above stress concentrators) (see. Fig. 6, b, c, d), and only in the sample with a hole diameter of 10 mm is moved to the stretched zone the end of the deformation process, which reduces the strength of the sample (see. Fig. 5, 6, d). Among the specimens with stress concentrators maximum principal strain (for Lagrange tensor) found in a sample with a hole diameter of 8 mm (toughest) they are 0,045, which is less compared to the continuous model, where they were 0.096.

Similar to the previous case, the distribution pattern of deformation fields and continuous sample thickness of 18 mm, strain localization occurs in the final stages of deformation in the tension zone. However, in this size group solid sample was strongest. He was also the least malleable - the main deformation were at 0,008 (Fig. 7, a), the maximum principal strain recorded in the sample with an aperture of 10 mm - 0.231 (Fig. 7, d), which once again indicates satisfactory agreement sizes of structural elements and the thickness of the plate.

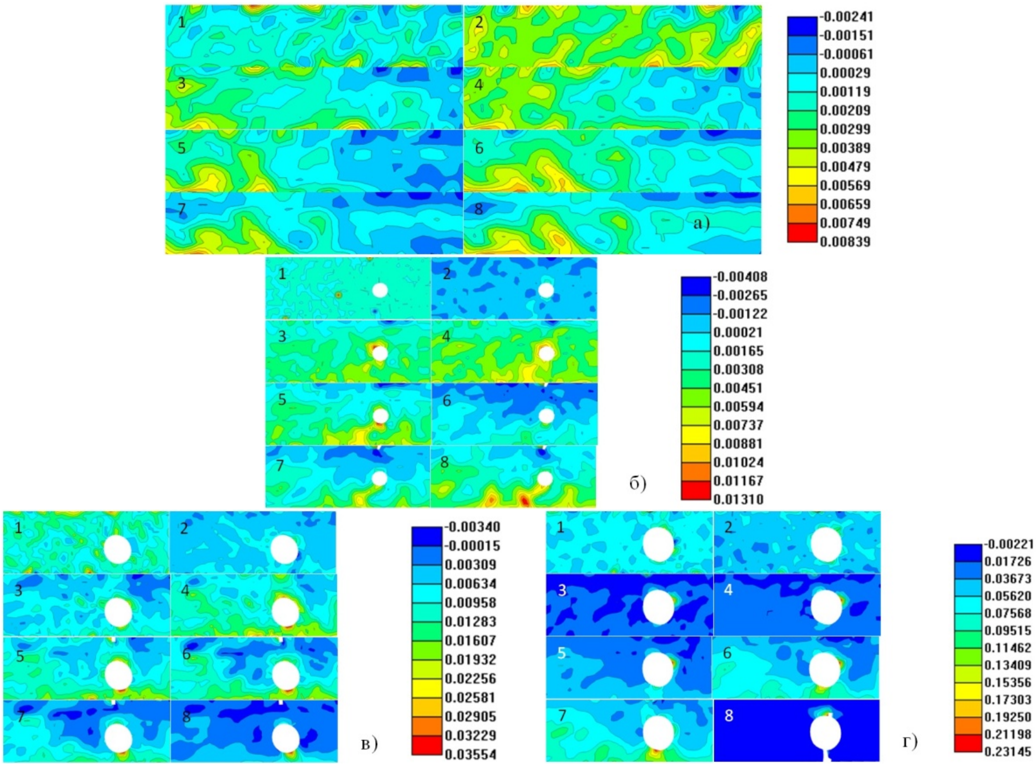

Fig. 7. Field deformation of the sample thickness of 18 mm, and - without a hub; - with stress concentrators in a hole with a diameter of 5 mm; c, d - similarly with stress concentrators, respectively, 8 and 10 mm.

Pictures deformation field distribution in solid samples 25 mm similar to the previous ones, they also observed structural heterogeneity of the material plates, their area of concentration during deformation also shifted downwards. The maximum values are at full strain laminate and structural inhomogeneities. A similar situation is observed on samples with holes 5 and 8 mm. A somewhat different picture is observed in the sample with an aperture of 10 mm, where the concentration field strain moves up and macrocrack distributed in this direction. Therefore, the specimen was the most durable of maximum deformation 0,032 (see. Fig. 8 d).

The nature of the deformation of specimens made of slabs of thickness 38 mm, similar to the sample thickness of 25 mm. The greatest value of the main deformation recorded in the sample with an aperture of 10 mm - 0.157, which also was the most stronger. For samples with stress concentrators smaller maximum strain localization shifted traditionally stretched zone, which is reflected in their strength (see. Fig. 5, 9, b, c).

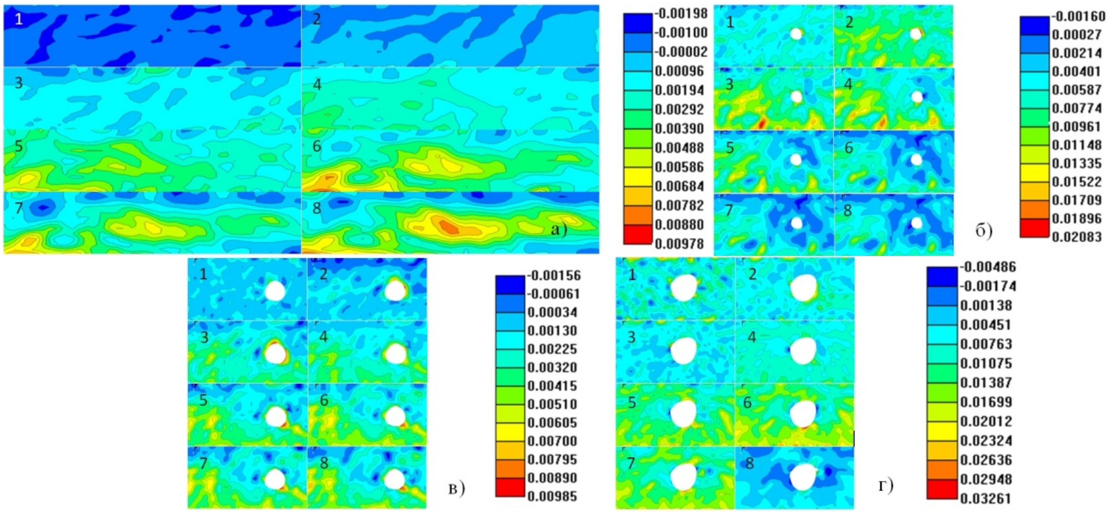

Fig. 8. Field of deformation of the sample thickness of 25 mm, and - without a hub; - with stress concentrators in a hole with a diameter of 5 mm; c, d - similarly with stress concentrators, respectively, 8 and 10 mm.

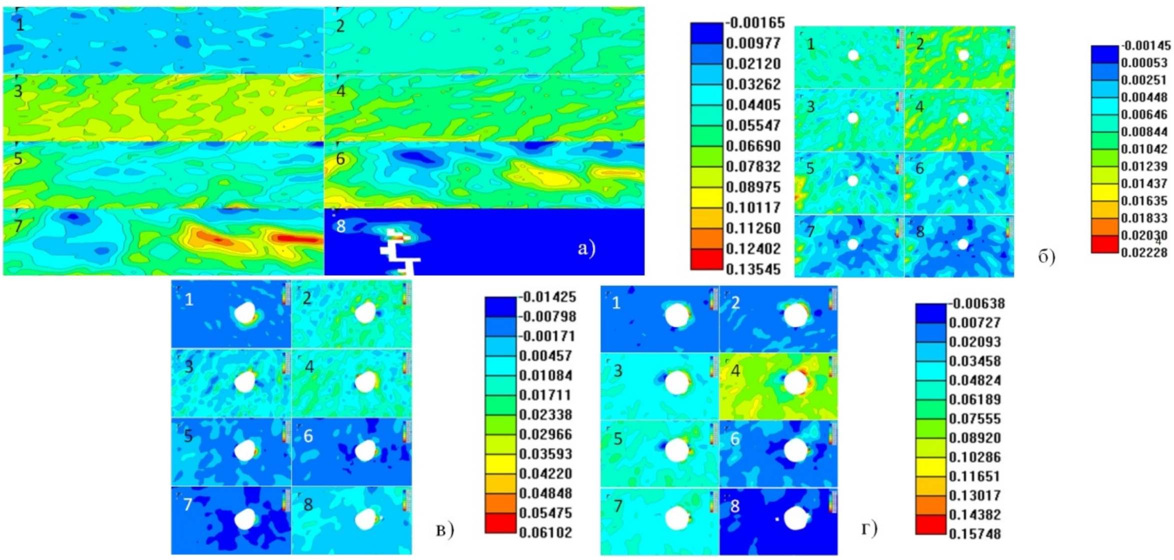

Fig. 9. Field of deformation of the sample thickness of 38 mm, and - without a hub; - with stress concentrators in a hole with a diameter of 5 mm; c, d - similarly with stress concentrators, respectively, 8 and 10 mm

Conclusions

1. With the increase in the thickness of the plates derevynnostruzhkovyh tendency to decrease their strength.

2. There is some correlation between the thickness of plates and structural elements of size slabs under which maximizes strength.

3. Localization of deformation in bending chipboard is on structural inhomogeneities and sometimes their value far exceeds the localization of stresses around the hub round.

4. Reported that in some cases the presence of stress concentrators round shape improves durability by reducing the DSP curvature hubs (caused by structural structure DSP) smaller but more intensive.

5. Disclosure of the specific characteristics of deformation and fracture derevynnostruzhkovyh plates bending with stress concentrators in the form of holes requires further detailed studies.

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An Investigation of deformation processes and razrushenyya drevesnostruzhechnyh plates without kontsentratorov tense and tense with hubs in video kruhlыh otverstyy Trejo at a point yzhybe. As a result of conducting tests of mechanical, optical methods s Using, ustanovlenы Changed Features DSP boards deformation field in dependence from velychynы oslablenyya poperechnыh Széchenyi.

Deformation, razrushenye, drevesnostruzhkovaya plate, hub voltage.

Investigation of deformation and destruction processes in flake board with concentrator as round holes at three point bending is carried out. In results of mechanical tests, using digital image correlation, features of deformation fields evolution in flake board depending on magnitude of cross-section reduction are shown.

Deformation, destruction, flake board, Concentrator, pressure.

UDC 629.3.027.5

CLARIFICATION OF MECHANICAL MODEL elastic WHEELS

SP Pozhidayev, Ph.D.

Elastic wheel can not be regarded as a monolithic hardened body balance equation which make the use of dynamic range. It should be seen as two solids pivotally connected

a - wheel drive and lever angular velocity which is slightly higher than the disc. This model leads to the use of the calculations rolling radius rather than the dynamic range. You can also use the model and elastic wheel as monolithic deformed body with radius equal to the radius of the wheel bearing elastic.