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References

- 1. Bisagni Ch, Di Pietro G, Fraschini L, Terletti D. Progressive Crushing of Fiber-Reinforced Composite Structural Components of a Formula one Racing Car. Composite Structures 2005; 68: 491-503.
- 2. Abid A. Shah, Ribakov Y. Recent trends in steel fibered high-strength concrete. Materials and Design 2011; 32: 4122-4151.
- Dębski H. Experimental investigation of post-buckling behavior of composite column with top-hat cross-section. Eksploatacja i Niezawodność – Maintenance and Reliability 2013; 15(2): 106-110.
- 4. Dębski H, Kubiak T, Teter A. Experimental investigation of channel-section composite profiles behavior with various sequences of plies subjected to static compression Thin-Walled Structures 2013; 71: 147-154.
- Dębski H, Teter A, Kubiak T. Numerical and experimental studies of compressed composite columns with complex open cross-sections. Composite Structures 2014; 118: 28-36.
- Barbero EJ, Madeo A, Zagari G, Zinno 6. R, Zucco G. A mixed isostatic 24 dof element for static and buckling analysis

of laminated folded plates. Composite Structures 2014; 116: 223-234.

- Hassan Mehboob, Seung-Hwan Chang. 7. Application of composites to orthopedic prostheses for effective bone healing: A review. Composite Structures 2014; 118: 328–341. doi:10.1016/j.compstruct.2014.07.052.
- Bienias J, Gliszczynski A, Jakubczak P, Kubiak T, Majerski K. Influence of autoclaving process parameters on the buckling and postbuckling behaviour of thin-walled channel section beams. Thin-Walled Structures 2014; 85: 262-270.
- Zangenberg J, Brøndsted P, Koefoed M. 9. Design of a fibrous composite preform for wind turbine rotor blades. Materials and Design 2014; 56: 635-641.
- 10. Fujihara K, Teo K, Gopal R, Loh PL, Ganesh VK, Ramakrishna S, Foong KWC, Chew CL. Fibrous composite materials in dentistry and orthopaedics: review and applications. Composites Science and Technology 2004; 64: 775-788.
- 11. Kumar D, Singh SB. Effects of flexural boundary conditions on failure and stability of composite laminate with cutouts under combined in-plane loads. Composites: Part B 2013; 45: 657-665.
- 12. Avalle M, Belingardi G. A theoretical Approach to the optimization of flexural stiffness of symmetric laminates. Composite structures 1995; 31(1): 75-86.
- 13. Mangalgiri PD. Composite materials for aerospace applications. BullMaterSci 1999; 22(3): 657-64.

- 14. Heidari-Rarani M, Khalkhali-Sharifi SS, Shokrieh MM. Effect of ply stacking sequence on buckling behavior of E-glass/ epoxy laminated composites. Computational Materials Science 2014; 89: 89-96.
- 15. Nam-II Kim 1, Dong-Ho Choi. Super convergent shear deformable finite elements for stability analysis of composite beams. Composites: Part B 2013; 44: 100-111.
- 16. Jones RM. Mechanics of composite materials. Ed. London: Taylor & Francis, 1999.
- 17. Rośkowicz M, Smal T. Research on durability of composite materials used in repairing aircraft components. Eksploatacja i Niezawodność. Maintenance and Reliability 2013; 15(4): 349-355.
- 18. Ghannadpour SAM, Ovesy HR, Zia-Dehkordi E. An exact finite strip for the calculation of initial post-buckling stiffness of shear deformable composite laminated plates. Composite Structures 2014; 108: 504-513.
- 19. Wei Wang, Guo S, Nan Chang, Wei Yang. Optimum buckling design of composite stiffened panels using ant colony algorithm. Composite Structures 2010; 92: 712-719.
- 20. Kołakowski Z, Mania RJ. Semi-analytical method versus the FEM for analysis of the local post-buckling of thin-walled composite structures. Composite Structures 2013; 97: 99-106.

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The Laboratory is active in testing fibres, yarns, textiles and medical products. The usability and physico-mechanical properties of textiles and medical products are tested in accordance with European EN, International ISO and Polish PN standards.

Tests within the accreditation procedure:

linear density of fibres and yarns, a mass per unit area using small samples, elasticity of yarns, breaking force and elongation of fibres, yarns and medical products, I loop tenacity of fibres and yarns, I bending length and specific flexural rigidity of textile and medical products

Other tests:

- for fibres: I diameter of fibres, I staple length and its distribution of fibres, I linear shrinkage of fibres, I elasticity and initial modulus of drawn fibres, a crimp index, tenacity for yarn: yarn twist, contractility of multifilament yarns, tenacity,
- for textiles: mass per unit area using small samples, thickness
- for films: Thickness-mechanical scanning method, Thechanical properties under static tension
- for medical products: determination of the compressive strength of skull bones, determination of breaking strength and elongation at break, suture retention strength of medical products, perforation strength and dislocation at perforation

The Laboratory of Metrology carries out analyses for:

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Main equipment:

Instron tensile testing machines, electrical capacitance tester for the determination of linear density unevenness - Uster type C, ■ lanameter