

es from any number of bales in a warehouse. The method of bale management proposed is more realistic and capable of handling the imprecision that may be present in the boundaries between adjacent classes of cotton bales.



## Acknowledgment

Authors are grateful to the Government College of Engineering and Textile Technology, Berhampore, India, for providing infrastructural facilities during the progress of the work.

## References

1. Mogahzy YEE, Broughton R and Lynch WK. A Statistical Approach for Determining the Technological Value of Cotton Using HVI Fibre Properties. *Tex Res J.* 1990; 60: 495-500.
2. Kang BC, Park SW, Koo HJ and Jeong SH. A Simplified Optimization in Cotton Bale Selection and Laydown. *Fibers and Polymers* 2000; 1: 55-58.
3. Majumdar A, Sarkar B, Majumdar PK. Determination of the Technological Value of Cotton Fiber: A Comparative Study of the Traditional and Multiple-Criteria Decision-Making Approaches. *Autex Res J.* 2005; 5(2): 71-80.
4. Majumdar A, Sarkar B and Majumdar PK. A New Algorithm of Cotton Fibre Selection and Laydown Using TOPSIS Method of Multi-Criteria Decision Making. *Indian J Fibre Tex Res.* 2006; 31: 248-255.
5. Militky J. Proceedings of Beltwide Cotton Conferences, San Antonio, USA, 2006.
6. Xu B, Fang C and Watson MD. Clustering Analysis for Cotton Trash Classification. *Textile Res J.* 1999; 69: 656 – 662.
7. Lieberman MA, Patil RB. Clustering and Neural Networks to Categorize Cotton Trash. *Optic Eng.* 1994; 33: 1642-1653.
8. Ghosh A, Majumdar A, Das S. A Technique of Bale Lay down Using Clustering Algorithm. *Fibers and Polymers* 2012; 13(6): 809-813.
9. Zadeh L A. Fuzzy Sets, Information & Control 1965, 8, 338-353.
10. Ross T.J. *Fuzzy Logic with Engineering Applications*, 2nd Edition, John Wiley & Sons (Asia) Pte. Ltd., Singapore, 2005.
11. Johnson RA and Wichern DW. *Applied Multivariate Statistical Analysis*. 6th ed., Pearson Prentice Hall, New Delhi, 2008.
12. Anderson TW. *An Introduction to Multivariate Statistical Analysis*. 3rd Ed., John Wiley, New York, 2003.
13. Bezdek J. *Pattern Recognition with Fuzzy Objective Function Algorithms*. Plenum, New York, 1981.

Received 14.03.2016 Reviewed 11.07.2016



# INSTITUTE OF BIOPOLYMERS AND CHEMICAL FIBRES

## LABORATORY OF METROLOGY

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

### Other tests:

- for fibres
  - diameter of fibres
  - staple length and its distribution of fibres
  - linear shrinkage of fibres
  - elasticity and initial modulus of drawn fibres
  - crimp index
- for yarn
  - yarn twist
  - contractility of multifilament yarns
- for textiles
  - mass per unit area using small samples
  - thickness
  - tenacity
- for films
  - thickness-mechanical scanning method
  - mechanical 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:

- research and development work
- consultancy and expertise

### Main equipment:

- Instron Tensile testing machines
- Electrical Capacitance Tester for the determination of linear density unevenness - Uster Type C
- Lanameter



AB 388

### Contact:

INSTITUTE OF BIOPOLYMERS AND CHEMICAL FIBRES  
ul. M. Skłodowskiej-Curie 19/27, 90-570 Łódź, Poland  
Beata Pałys M.Sc. Eng.  
tel. (+48 42) 638 03 41, e-mail: metrologia@ibwch.lodz.pl