

The lower real density of real alpaca wool compared with sheep's wool confirms this.

Knowledge of the real density of the fibres - ρ in g/cm^3 and their diameter - d in μm makes it possible to determine the fibre linear density T_t in tex:

$$\begin{aligned} T_t &= \pi/4 \cdot d^2 \cdot \rho \cdot 10^{-3} = \\ &= 0.7854 \cdot 10^{-3} \cdot d^2 \cdot \rho \end{aligned}$$

■ Summing up

The results of studies of the external and internal structure of alpaca fibre allow to state that the structure of alpaca fibre differs a lot from that of sheep wool fibres: The external surface of alpaca fibres is more delicate with smaller and less pronounced scales. Moreover the cross sections are mostly oval in shape with a clearly defined channel of core structure.

The real density of the fibres of alpaca wool is lower than that of sheep wool fibres.

The physical and mechanical properties, linear density, strength, tenacity, elongation at break, length and diameter of alpaca fibre are varied in particular samples, the reason for which is uncontrolled herd breeding.



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Current research topics:

- Modelling and identification of the mechanical properties of textile composite materials
- Optimisation of the mechanical and thermal properties of fibre reinforced composites
- Sensitivity analysis and optimal design of the shape and thermomechanical properties of structural elements
- Identification and computer oriented simulation of defects in structures using thermographic methods and modal analysis

Area of research activities:

- Mechanics of textiles, textile structures and composites
- Theory and application of textile and structural mechanics
- Sensitivity analysis and optimal design of structures subjected to thermal and mechanical loads
- Numerical methods in textile and structural mechanics
- Computer-oriented analysis, synthesis and optimisation of materials and structures
- Operation of textile machinery and its reliability
- Application of computer science in textile and mechanical engineering

Research achievements:

- Creation of a scientific school with varied approaches to optimal design, identification and sensitivity analysis of structural elements, textile products, composite structures subjected to thermal and mechanical loads
- Creation of principles for the modelling of textile products subjected to static and dynamic loads
- Computer oriented analysis and synthesis of textile products, composite structures and structural elements subjected to mechanical and thermal loads

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