BEST: Journal of Recent Trends in General Engineering & Research (BEST: JRTGER)
Vol. 2, Issue 1, Jun 2017, 25-38
© BEST Journals

THE EFFECT OF OVERALL DENSITY ON THE MECHANICAL PROPERTIES OF FLEXIBLE POLYURETHANE FOAM

OYETUNJI O. R. & HAMMED B. M

Department of Mechanical Engineering, Ladoke Akintola University of Technology, Ogbomoso

ABSTRACT

The comfortable mattress is said to be an essential ingredient in a good night sleep, but we have little understanding of the desirable properties (especially, the mechanical properties) of a quality mattress and as a result, when allowed to test mattresses in a typical showroom, individuals choose a mattress that does not minimize overnight motion and maximize perceived sleep quality. Many of the symptoms people suffer from are being caused, in part; by the way they sit, stand and sleep. In order to have a good understanding of how to choose the appropriate mattress, both for seating or bending application, which will help solve these problems, a vibrant knowledge of the major indicator of mattress quality is of paramount importance and this is the purpose of this research work.

A series of laboratory tests were carried out on four samples of flexible polyurethane foams of zero, four, seven and fourteen years of usages and of different manufacturers (to allow for variation of density) to determine the relationship between the foam's overall density and other mechanical properties of the foams such as the support factor, compression modulus, resilience, tensile strength, etc , all of which are the major indicators of the quality and performance of any flexible polyurethane foam.

The results obtained for these laboratory tests showed significant variation in the values of support factor, compressibility modulus, resilience, tensile strength, percentage elongation and hardness factor with respect to variation in the foams' densities. These factors improve as the foam's density increases, except for the compression set and hardness factor which were found to decrease, indicating they are not function of foam's density.

A study of the trend of variation of these factors with density shows that the major determinant factor of flexible polyurethane foam's quality is its density and not necessarily its age.

KEYWORDS: Mattress, Overall Density, Mechanical Properties, Polyurethane Foam