

# INTERRELATION OF LOAD-DEFORMATION BEHAVIOR AND SOFTNESS OF TISSUE PAPER

Rubens Chaves de Oliveira<sup>1</sup>

<sup>1</sup>Professor and Researcher, PhD  
Pulp and Paper Laboratory  
Federal University of Viçosa  
Brazil

## 1. INTRODUCTION

A significant portion of eucalyptus pulp fiber produced by Brazilian industries is designated for tissue papermaking. The technological characteristics of eucalyptus pulp fibers for tissue production has always being well accepted. Since long years ago up to this time, the appreciation of tissue quality is based on the empirical evaluation of interaction with human being. The tactile perception is considered the most important test to evaluate tissue softness. However, many cases to perform these empirical and subjective analyses tend to become impractical and costly. Therefore, we will present some theoretical procedure in order to suggest the development of a reasonable physical method that has potential to show sufficient correlation with tactile evaluation. In early literature on tissue (1), the properties of softness was mostly determinates in a very broad sense, describing the general impression of softness obtained by hand feeling the material. This tactile impression of softness could mean surface feel, compressibility, smoothness, bending stiffness, flexibility, etc. However, from about the latest 20 years, the terms surface softness and bulk softness have being larger used. Thus, the surface softness has been defined as the perception of softness obtained when the fingertips are lightly touched over the surface of the tissue sheet. Accordingly, bulk softness definition has been commonly accepted as the perception of softness obtained when the hands crumple the tissue sample. It has been reported in literature (2) for a measurement procedure for softness, namely, as a direct and indirect method. The indirect method means collecting and combining, in proper way, the results of a number of existing physical determination to find at a parameter showing an acceptable correlation with the tactile evaluation. Tissue paper is a thin web with a grammage not more than 25 g/m<sup>2</sup>. It is composed of fibers of a fibers aligned at various angles and with low degree of bonding. A thin layer of the individual fibers, their arrangement with respect to one another, and the e extent to which they are bonded usually characterizes tissue sheet

structure in the web. Thus, the properties of the web reflect its structure, which in turn depends on the nature and pretreatment of the fibers and on the process used to form and finish the network. Therefore, a method that allows structure to be related to mechanical properties will bring significant contributions to evaluation and understanding of the relationship between structural changes and properties changes.

## 2. EXPERIMENTAL APPROACH

In this presentation will be discussed an experimental approach to perform in compression the load-deformation on tissue player sheets. From the load-deformation curve will be derived some strength and elastic properties. It will be used to correlate with empirical bulk softness. The Figure 1 shows the theoretical approach. Additional information will be providing during panel section.

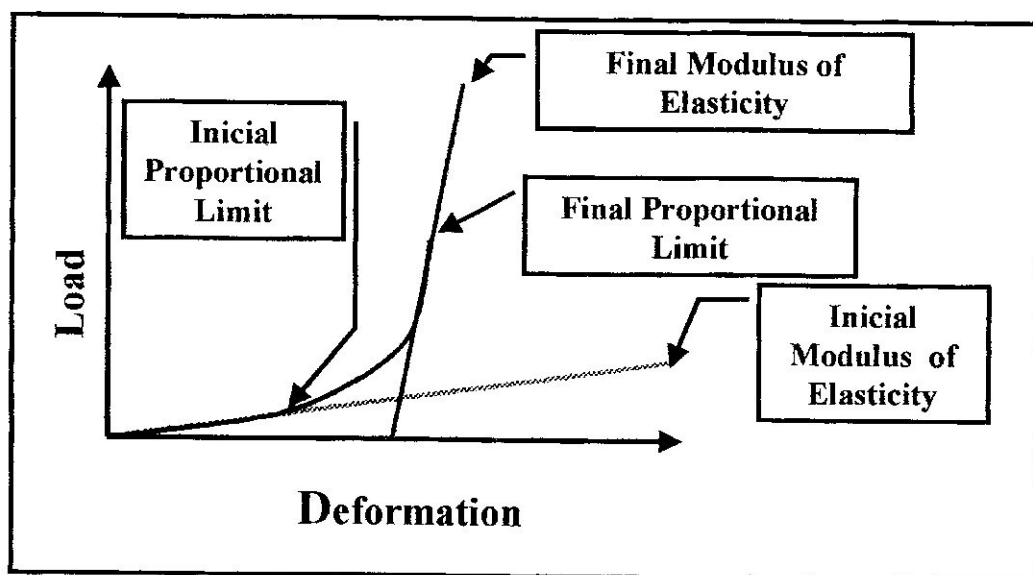


Figure 1: Interrelation of Load-Deformation curve.

## 3. REFERENCES

1. Rowe, S. and Volkmann, R. J. Thickness measurement of sanitary tissues in relation to softness. Tappi 48:54A-56A. 1965.
2. Hollmark, H. Mechanical properties of tissue. In: Mark, R. E. Handbook of physical and mechanical testing of paper and paperboard. New York: M. Dekker, 1983. Vol.1, p. 497-521.