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Design and Development of Water Absorptivity Measuring Instrument

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Abstract

In pursuit of enhancing the efficiency and precision of water absorptivity measurements for paper materials, a novel instrument is conceived and developed in this work. This innovation seeks to streamline the testing process for both sized and unsized papers, categorically addressing their distinct surface properties. Conventionally, the Cobb testing method is employed for sized papers, optimizing surface characteristics to reduce water absorbency, while the Klemm method is utilized for unsized papers, which inherently exhibit higher water absorbency and are not recommended for material having a capillary rise of less than 5mm. This instrument integrates both testing methodologies into a singular apparatus, minimizing the need for separate equipment and human intervention. The primary challenge lies in reconciling the conflicting attributes of sized and unsized papers within a unified design. Three conceptual designs were considered to achieve this, with the final selection prioritizing versatility and accuracy. Noteworthy innovations in the selected design include combining Cobb and Klemm methods, ensuring comprehensive testing capabilities for a diverse range of paper materials. The traditional brushing or wiping methods for excess water removal have been replaced by a rolling process, further refining the accuracy of measurements. The overarching goal of this instrument is to mechanize the manual testing procedures, significantly reducing the time required for measurement while elevating the precision of results. This report elucidates the evolution of the design process to propel the field of water absorptivity testing for paper materials into a new era of efficiency and reliability.

Keywords: *Water Absorptivity, Sized and unsized paper, Cobb test, Klemm method*

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