ES8.

DEVELOPMENT OF AN INEXPENSIVE HUMIDITY TRANSDUCER

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The two most important parameters which govern the environment are temperature and relative humidity. These, collectively alter the moisture content of food commodities. Therefore, continuous monitoring of relative humidity and temperature has become extremely important in many applications where food produce such as grains are stored under controlled environments. Relative humidity measurement is also a very important component in weather monitoring that provides information on most favourable conditions for plant growth and optimum yield.

The design and development of a new sensor for monitoring humidity of air was carried out. Upon considering the types of transducers and their characteristic features, it was decided to construct a new sensor, primarily based on the technique used in the hair hygrometer. This method was considered to be one of the most simple and versatile with respect to the transducer mechanism and possible application areas.

A band of hair was obtained by attaching each strand to two supports. A low tension was maintained so that all the strands were uniformly stressed under tension. A fast drying glue (*Super-Glue*) was used to affix hair to the supports at both ends. The band of hair (length 27 cm and approximately twenty four individual strands) thus prepared was used in this research to obtain the moisture dependent displacement. A piece of a high carbon steel hack-saw blade of length 5 cm was used to transform the deflection caused by the hair band due to its common availability and good mechanical properties. In order to detect the mechanical deflection caused by the contracting and expanding band of hair, strain gauges were affixed to both sides at one end of this blade. A 30 cm long, 5 cm high L-shaped Poly Vinyl Chloride (PVC) frame was prepared and used as the supporting frame for the hair band and the steel blade.

The sensor was calibrated and tested in the laboratory along with a standard wet and dry bulb type relative humidity measurement system. The moisture level was varied by using an air-conditioner output and adding heat and moisture to the flow stream as required.

The designed moisture sensor worked successfully providing a voltage output that varied linearly with the relative humidity of the surrounding environment. The device was inexpensive (total cost: Rs. 985.00) compared to the other devices available. The analog voltage output provided by the sensor was compatible with all automated data logging systems. The sensor could be used to measure relative humidity values with an accuracy of ± 2.3 %RH, and it was found to work successfully within the full range of relative humidity levels used during calibration (from 20% to 95% RH).