A Non-Invasive Moisture Measurement Instrument for Gins

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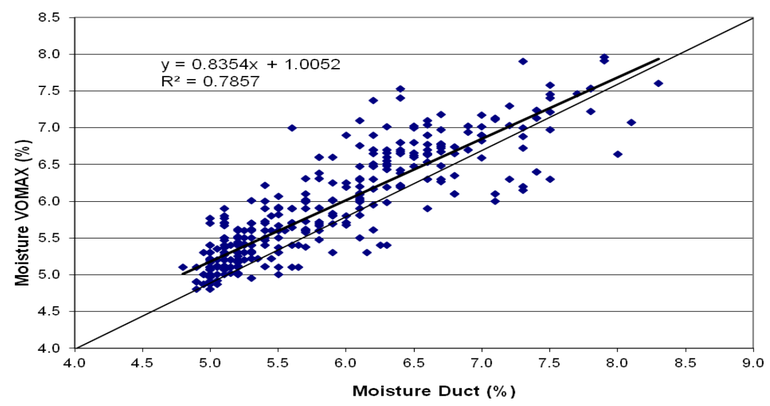
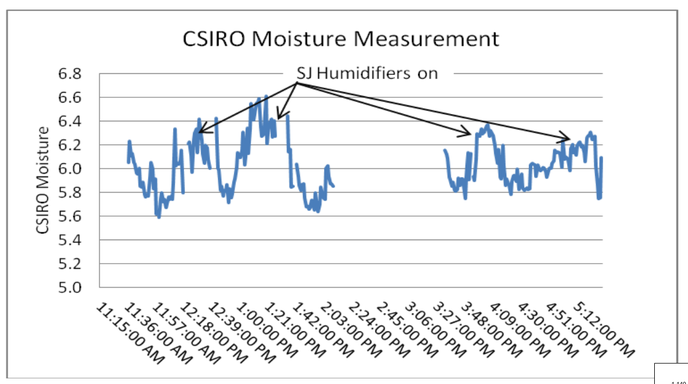
Management of moisture in cotton during ginning is important in determining fibre quality and the energy cost to the ginner. CSIRO with help from the Cotton Catchment Communities (CCC) CRC, the CRDC and Australian gin partners has developed a new moisture meter for gins. The meter measures the moisture content of seed-cotton or lint as it is moved quickly by air (up to 20 m/sec) through transport ducts between gin machines. Very good responses to fluctuations in cotton moisture indicates the meter can be used as a moisture controlling device. Such a system can be used to control driers and humidifiers.

By continuously examining the moisture in cotton and using dryers and humidifiers to control moisture content to a set level, fibre quality can be preserved and energy costs reduced. Simulations using real time measurements showed positive fibre quality affects and reduced energy costs when cotton was kept at 6% moisture. The value of these benefits to a standard Australian gin was in excess of $AUD40,000/12 weeks of operation.

The picture above shows the moisture meter fitted in the gin duct between the gin stand and the first lint cleaner. Independent supports insulate the meter from movement, which improves the meter's accuracy.

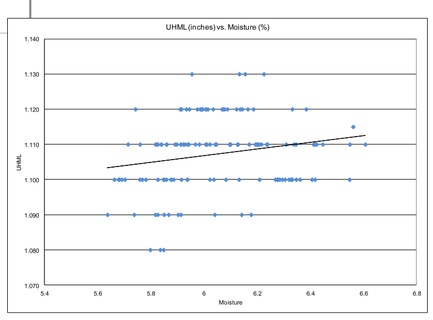
Results from the meter correlate very well with off-line measurements; the standard error (SE) around this regression is ±0.3%. This compares well against other in-line moisture meters, which have SE in the range of ±0.4%—0.8%.

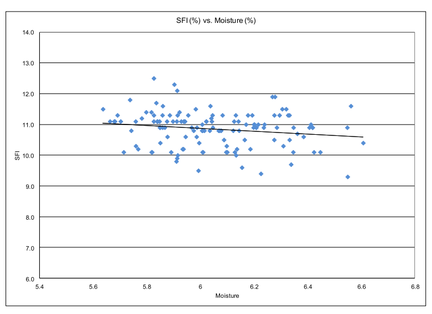


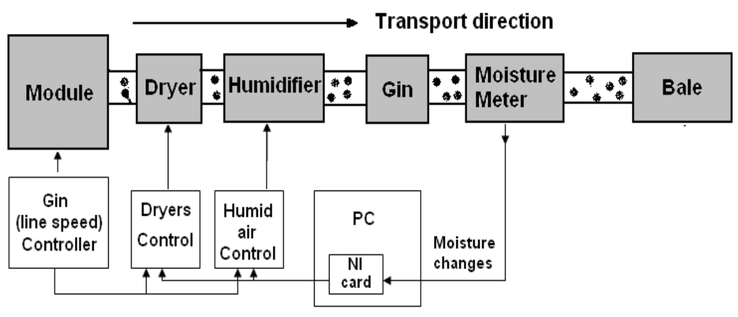


The picture on the left shows moisture traces detected by the meter when gin humidifying hoppers were switched on and off. The traces closely match the moisture content of the fibre in the duct.

The figures on the right show the effect of using moisture content to optimize fibre quality; improvements in length and SFI are shown.







The picture on the left illustrates the application of the meter as a dryer/humidifier controller able to optimize (reduce) gas consumption, largely by reducing the volumes used in drying.

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