

HK INSTRUMENT SYSTEMS

Pittsburgh, PA

INDUSTRY: SOYBEAN PROCESSING

- APPLICATION:** TO MEASURE THE %H₂O OF SOYBEANS IN A CHUTE, BEFORE AND AFTER DRYING.
- INSTALLATION:** THE HK-1 MICROWAVE INSTRUMENT SYSTEM WITH NON-CONTACTING HORNS WAS INSTALLED ON A METAL CHUTE WITH PLASTIC WINDOWS. THE CHUTE HAS A TWELVE (12) INCH DIAMETER ALLOWING FOR AN ADEQUATE MEASURING PATH.
THE HK-1 SYSTEM WAS INSTALLED IN AN OUTSIDE AREA. FOR THIS REASON, AN OPTION WAS ADDED TO THE UNIT TO COMPENSATE FOR CHANGES IN AMBIENT TEMPERATURE.
COMPENSATION FOR CHANGES IN PRODUCT TEMPERATURE IS ALSO REQUIRED AND WAS ADDED TO THE SYSTEM.
- TESTING:** THE HK-1 MICROWAVE SYSTEM WAS INSTALLED ON THE INLET AND OUTLET SIDES OF A DRYING SYSTEM. THIS ALLOWS THE USER TO MEASURE THE MOISTURE CONTENT BEFORE AND AFTER DRYING.
- RESULTS:** CORRELATION BETWEEN THE OVEN DRIED SAMPLES AND THE MICROWAVE MOISTURE IS VERY GOOD. A TYPICAL ACCURACY FOR THIS MEASUREMENT WOULD DEPEND QUITE HEAVILY ON THE QUALITY OF SAMPLING AND OVEN DRYING.
IF THE LAB SAMPLING HAS AN ACCURACY OF +/- 0.4% AT 95% CONFIDENCE, AND THE MICROWAVE SYSTEM HAS AN ACCURACY OF +/- 0.2% AT 95% CONFIDENCE, THEN THE OVERALL MEASURED ACCURACY WOULD BE AROUND +/- 0.45% AT 95% CONFIDENCE INTERVAL. THIS MEANS THAT 95% OF THE READINGS WILL BE WITHIN +/- 0.45% OF THE READING WHICH WAS DETERMINED THROUGH OVEN DRYING. THIS TYPE OF ANALYSIS IS REQUIRED BECAUSE OF THE ERRORS DUE TO SAMPLING AND OVEN DRYING.
THE REPEATIBILITY OF THE MICROWAVE INSTRUMENT SYSTEM IS +/- 0.2% TOTAL MOISTURE. IT IS NOT POSSIBLE TO PERFORM REPEATIBILITY TESTS FOR AN ON-LINE SYSTEM LIKE THIS ONE.
AS THE GRAPHS DEMONSTRATE, THIS MEASUREMENT IS AT LEAST AS GOOD AS STATED HERE, AND MAY BE EVEN BETTER THAN GUARANTEED.
- CONCLUSIONS:** THE HK-1 MICROWAVE INSTRUMENT SYSTEM IS A VERY GOOD TOOL THAT CAN BE USED TO MONITOR AND CONTROL THE %H₂O OF SOYBEANS IN A CHUTE.

THESE SYSTEMS CAN BE USED AT THE INLET OR OUTLET OF A DRYING SYSTEM. THERE ARE TWO CHARTS ATTACHED WHICH SHOW RESULTS FROM BOTH SITUATIONS.
THESE SYSTEMS CAN ALSO BE USED TO MEASURE MOISTURE IN THE SOYBEANS BEFORE GOING TO STORAGE.

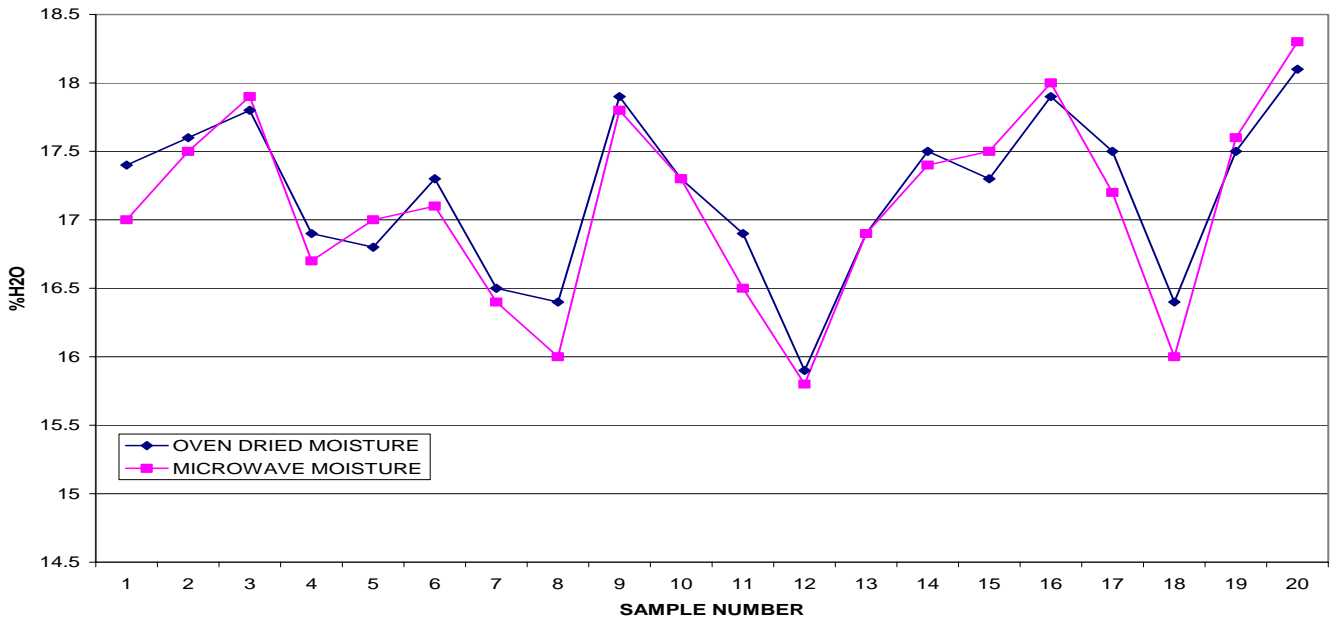
THE MEASUREMENT RESULTS ARE EXCELLENT AS CAN BE SEEN BY THE ATTACHED GRAPHS.

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BEFORE DRYING

SOYBEANS %H₂O (OVEN VS. METER)



AFTER DRYING

SOYBEANS %H₂O (OVEN VS. METER)

