

New method of humidity measurement in hops production

Humidity measuring system for drying and conditioning

By Martin Friedrich and Markus Hörder

Wolnzach/Löffingen. Especially in conditioning of hops, new avenues have opened with the application of PC measuring system. During visit to LfL, Hops working area in Wolnzach, the company HYGROSENS has introduced use of innovative PC based measuring system.

Air mixture control in the conditioning chamber

If the circulating air is checked only on the basis of relative humidity, then there is a danger of unwanted drying or excess drying effect, which means substantial loss of quality. This happens because the relation between temperature and relative humidity is not taken care of. The most important point with conditioning is to find a measured value, which remains constant during conditioning, and this value is to be used for controlling humidity balance in the hop. Thus a uniform and careful post treatment is achieved.

The solution to this problem is evaluation of circulating air on the basis of its absolute humidity. This property is calculated by the software based on measured values of temperature and humidity. To calculate optimum water content of the hop after conditioning, an accurate evaluation of humidity content of circulating air is carried out in the conditioning chamber. In addition, the absolute humidity of supply air (outside air or drying air) is also determined together with that of circulating air. As per this value, the required absolute humidity in circulating air is adjusted by adding outside air or drying air.

All measured and calculated values are nicely presented as graphs on the PC monitor. Hence, the complete process history is monitored, and this helps in assessment of the expected final state of conditioning. For simplifying the controls, each value can be assigned two limits. In this way, for example, drift in absolute humidity, which arises from deposition or release of water from hops can be timely detected and alarm can be raised before sacrificing the quality.

Since the PC measuring system can handle a good number of sensors, an additional measuring point can be introduced, for example, a hygrometer can be placed in the upper third section of hops feeder for improving the control on target values.

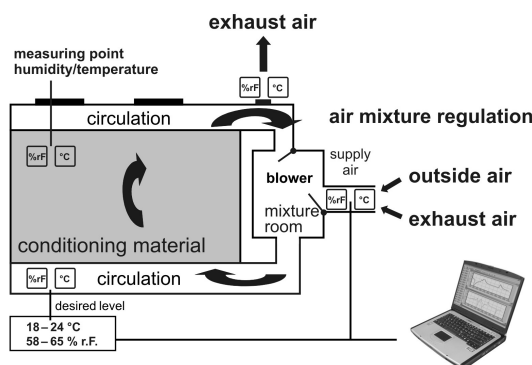


Fig 1: Air mixture control,
Source: LfL hops production Wolnzach

Humidity measurement system in drying kiln

Through measurement of humidity and temperature in the drying air, the drying process is further monitored in the feed strainer. The measurement is done at a representative location in the exhaust air of drying kiln. From the graphical representation of humidity curve, the drying status of hops in drying kiln is controlled and the optimum tilt point can be observed. Simultaneously, the measured value of "wire in feeder" can be displayed and monitored by the software to achieve the optimum water content in the hops as per requirement of drying process.

With the help of a PC, now all the measured values, which are important for drying process and conditioning, can be monitored at a central point, which considerably relieves the daily work. The software sequentially records all measured and calculated properties and fulfils the purpose of a measuring record book. In addition to graphical display, the measuring process can also be taken out in the form of a chart. For documentation purposes, for example for ISO 9000 requirements, archiving as a file or print out is also possible. Due to similarity and reproducibility of values, a detailed knowledge sharing is possible for the purpose of training or interaction in seminars.

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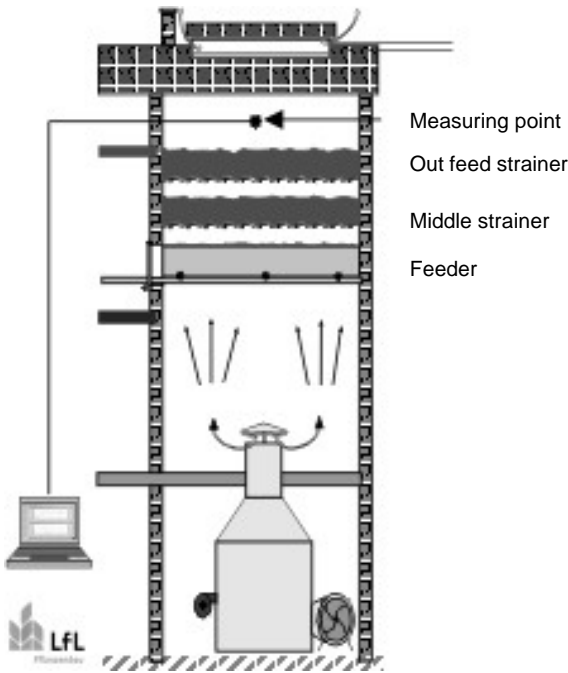


Fig 2: Humidity measurement in drying kiln ,
Source: LfL hops production Wolnzach

As an additional help, computation software is also available for calculation of climate related data. With this small support, the secondary climate data together with absolute humidity and moisture content in air can be calculated from temperature and relative humidity values. The calculation program and further information material can be obtained from the company HygroSens at Fax No. : 07654/8089699.



The system can be extended further in future to modify into a regulation system with relevant software. For example, it can be used to tilt the out feed strainer or raise an alarm on exceeding the limiting value.

The measuring system and related software require very low system resources so that trouble free operation is possible even with older computers. These hardware prerequisites can be fulfilled by most of the outdated office computers. All present day interfaces are supported for data communication.

Conclusion

By application of humidity measuring technique, the quality of drying process and conditioning can be considerably improved.

The PC based measuring system simplifies the work and enables analysis of recorded curves and process history.

The device has performed well in tough applications for the last many years and offers an optimum price performance ratio.

About the author



Martin Friedrich has been actively involved in the area of humidity measuring systems for over 15 years. In the context of co-operation with LfL, he has been mainly concerned with the drying technology in production of hops. He is managing director of the company HYGROSENS INSTRUMENTS GmbH situated in Löffingen.

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The article has been compiled after research results of LfL hops production, Wolnzach

