

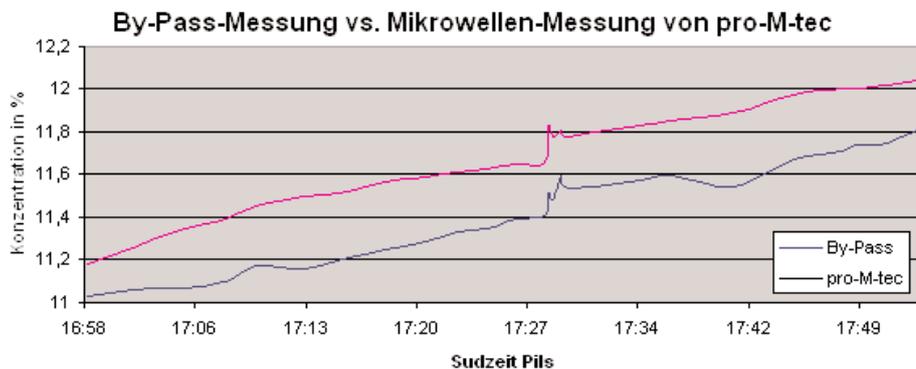


### Application Report: Total solids content measurement in the Wort boiler

Precise measurement of the total solids content allows highest possible process continuity and repeatability. Higher process continuity ensures better product quality while saving time and money.

The proMtec microwave concept measures total solids content directly in the Wort boiler. Two parallel sensor probes (microwave emitter and receiver) installed with sanitary flange or weld-in sleeves measure over the entire volume between them. True process concentration values are thus ensured even while hops and acid malt are being added.

Once the microwave probes and Pt-100 process temperature probe have been installed, the installation requires no further attention. With proMtec technology no bypass is there to plug and disturb the measurement. Directly immersed in the process you measure total solids content in real time and with highest possible precision.



The time lag generated by sensors concepts that require a bypass results in process regulation imprecision.

The graph to the left shows a comparison of the process continuity generated by a sensor installed in a bypass to that produced by proMtec real time process control. Clearly the process curve is smoother for the microwave sensor immersed directly in the Wort boiler.

Over the entire batch process the proMtec measurements correspond well with the true Wort concentration values. Even after the addition of Hopps and acid malt the measurement holds closely to the linear trajectory of the cooking process.

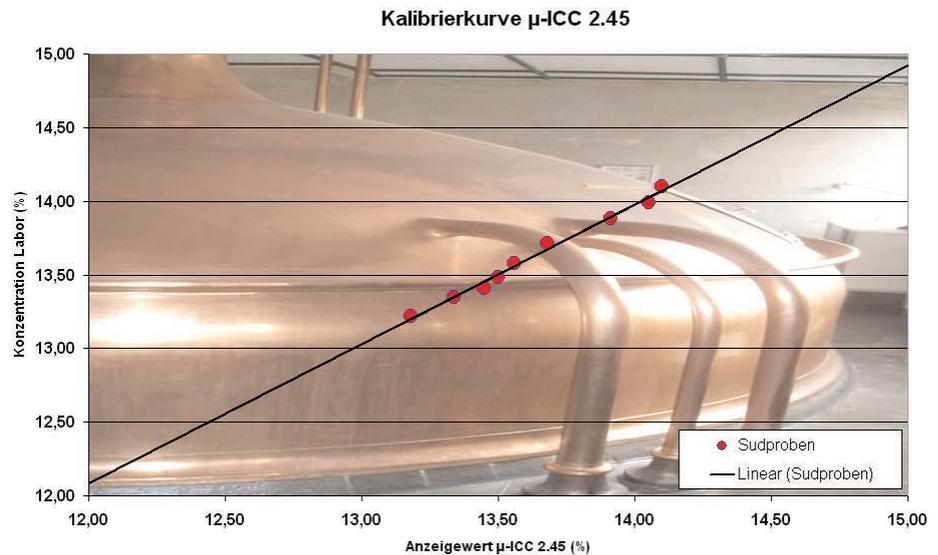


Over the last few years proMtec has been working in close collaboration with the Ziemann Pilot Brewery for Research and Development to better understand concentration measurement in the Wort boiler. This research has widened significantly our experience with this application and has produced very encouraging results.

First installations in production breweries have also confirmed our pilot project experiences. The microwave measurement concept has been confirmed as a highly reliable solution for total solids concentration measurement directly in the Wort boiler.

Several beer types can be measured with the same reliable results. Whether Export, Pils oder Weizenbier, proMtec ensures measurement precision and reproducibility. The precision is comparable with

what you expect from laboratory analyses. Results from a typical calibration are shown in the graph (above). The calibration curve corresponds exactly to the laboratory analyses taken from the same run.



Flexibility in the sensor position and the possibility to connect four sensors to a single electronics unit make this concept ideal for process control directly in the Wort boiler.

This simplicity of the installation offered by the standard flange and weld-in probe set forms are shown in the diagram (right). To complete the measurement a microwave module per sensor and a single central evaluation electronics unit are provided.

Any possible influences of temperature variations on the measurement is eliminated by a dedicated process temperature measurement in the immediate vicinity of the sensor probes.

Every installation is carefully calibrated using process samples taken from each product process. With proMtec you will get to know your process like never before.

