

Using a universal dough characterizer instrument (Mixolab 2), Wooden Bakery compares flour quality against their miller's specifications, helping improve their relationship. (Photo credit: Wooden Bakery)

How millers & bakers can use technology to speak a common language of quality

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Grain milling and bread baking are two ancient crafts traced to the beginnings of documented history. Because of this, the relationship between millers and bakers spans thousands of years. Despite this legacy, the relationship between millers and bakers has always been challenging.

Historically, the miller has been the authority figure in the relationship. Millers can adjust flour formulations and meet the specifications needed by the baker, making them a gatekeeper of quality control.

However, millers are disadvantaged in this role by no fault of their own. Bakers quickly blame the flour when baked goods do not bake as they should. Then, the usual retort from the miller is to point to the flour specifications (protein, starch, ash, etc.) the baker had accepted. There is rarely a conversation on "why" or "how" the flour at its agreed specifications led to its result.

Quality is Not Achieved Only by Meeting Flour Specifications

The thinking among many bakers today is that "X" type of wheat will yield "Y" type of flour, and thus, that flour is best suited to produce "Z" type of product. When you consider the science of baking and its many nuances, there is much more involved in developing the "ideal" baked product than a balance of flour specifications. And even still, the "ideal" baked product for one baker may be very different from another.

While this way of thinking is difficult to change, the baker best knows their specific process, formula, and experience to produce products at their highest standards. If the baker can objectively create a link between product quality and flour performance – presuming all other aspects in their production process remain constant – they are in the best position to establish their flour

specifications. This, in turn, will help improve their relationship with their miller, leading to improved product consistency, reduced waste, and less frustration.

There's Good News: Technology is Here to Help

Flour has several measurable properties influencing how it adapts to produce its baked product. The invention of the alveograph test over 100 years ago was the catalyst for more methods to analyse the complexities of flour and dough to determine its quality. As research and technology have advanced, more tools and techniques have emerged to help develop a clearer picture of flour quality between millers and bakers. In general, all flour analysis technologies generally fall into three core categories.

The first category of technologies is compositional analyzers, which provide quantitative analysis of what parameters are in the flour. These parameters include flour moisture, protein, ash content, and water absorption. There are a variety of compositional analysers – some offer specific parameter measurements, like ash furnaces to measure ash content. Many bakers have begun incorporating near-infrared (NIR) instruments to measure various flour parameters, typically in under one minute of analysis and using just a small flour sample size.

Rheological analyzers are in the following category and likely the most well-known out of the group. These technologies measure the physical properties of flour mixed with water. The alveograph test, mentioned earlier, falls into this analysis category, which analyses the viscoelastic properties of gluten in the dough. Additional rheological analysers also help characterise flours by simulating the baking process. For instance, the Mixolab 2 dough characteriser helps bakers measure the constraints a dough undergoes from mixing through baking, even providing expectations for product shelf life. This allows the baker to develop rheological "profiles" for each product, streamline baking tests, and more efficiently verify flour quality from their millers.

Similar processes exist for measuring the proofing properties of dough, such as with the Rheo F4 device.

Even if the flour has similar parameter counts and rheological properties from one delivery to the next, it can still exhibit different results on a process line. This is why the third category of flour analysers – functional analysers – provides the final step of a comprehensive flour and dough quality control program. When brought into contact with certain solvents, these technologies measure hydration based on the increased swelling capacity of a flour's different polymers – glutenins, damaged starch, and pentosans. This is the basis behind the Solvent Retention Capacity (SRC) method – now automated with the help of devices such as the SRC-CHOPIN 2 device – which can help the baker anticipate the water absorption potential of flour.

How Bakeries are Taking Charge

Wooden Bakery's headquarters is in Lebanon, which has endured its challenges in recent years. And now, with the Russian/Ukraine conflict, two of the leading exporters of wheat to the region, Wooden Bakery continues to adapt its methods and keep its promise of top-quality products to its consumers.

A few years ago – before the current struggles impacting flour availability – Wooden Bakery used the Mixolab 2, a universal dough characteriser, to audit their miller's specification for flour quality.

Information you are seeking	What is in the flour?	How do the flour components behave together?	Why does the dough behave this way?
Type of analyzer	Compositional Analyzer	Rheological Analyzer	Functional Analyzer
Parameters measured	Raw flour properties (protein, ash, damaged starch, etc.)	Dough properties (gluten, protein, and starch) as well as proofing behavior	Hydration of flour polymers (Glutenins, damaged starch, and pentosans)
How this improves the baker & miller relationship	<ul style="list-style-type: none"> • Bakers & millers can verify flour specs quickly & accurately • Bakers can make data-driven production decisions based on flour quality 	<ul style="list-style-type: none"> • Bakers can develop their own "product profiles" for quality • Millers can match their data with the baker's data to better align with their production process 	<ul style="list-style-type: none"> • Bakers can define and enhance their specifications book • Bakers can verify the conformity of delivered flours • Millers can verify their flour specifications against the baker's

As this table explains, it takes a combination of multiple analysis methods to completely assess flour quality, and thus, improve the communication between bakers and millers

It is not uncommon for a delivery of flour to arrive out-of-spec occasionally. However, there was a particular period when one of Wooden Bakery's millers frequently missed specifications. Over time, this began to take a toll on the company's productivity.

At this point, the quality team at Wooden Bakery sat down with their miller and showed them how they could assess flour qualities for specific products with the dough characteriser. Since they were one of the miller's largest customers, they convinced them to invest in a dough characteriser. Given the volume of flour they purchase from them, the miller was able to pay for their

system in a short time.

Now, the miller includes a datasheet of values from their instrument, which Wooden Bakery can use to audit against their analysis. Through this interaction, Wooden Bakery and their miller can speak a common "language" of quality, which has dramatically helped their relationship and productivity.

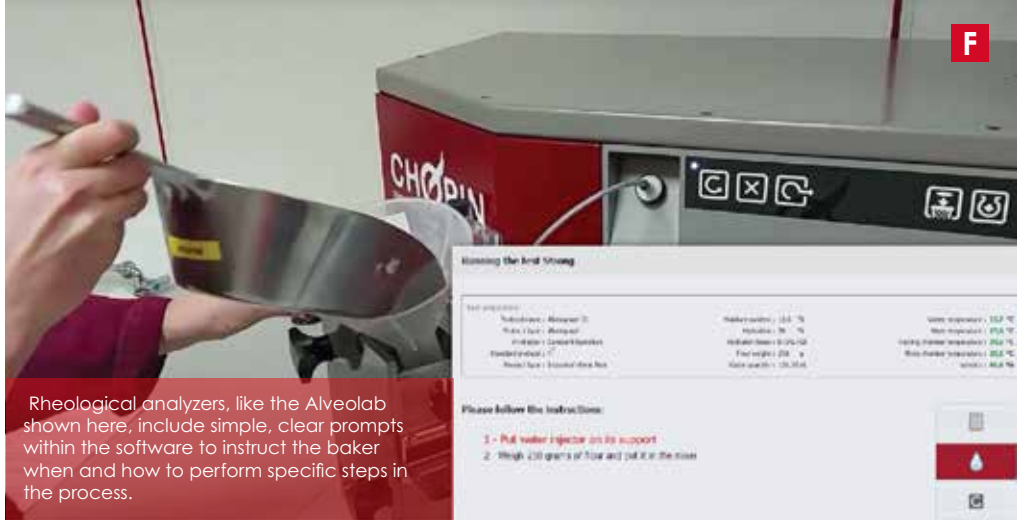
Now with their current wheat and flour market, Wooden Bakery uses the instrument less to audit flour deliveries and more to make in-process adjustments to their formulations. This helps the company ensure consistency even if high-quality flour is not readily available.

Fortifying the Miller & Baker Relationship Stronger with Technology

It is always interesting for bakers to ask themselves, "who decides the quality parameters and specifications of my flour? Why these parameters and not others? Who decides the level of specifications and the acceptable tolerances?" and the most important one, "Why is my flour conforming to specifications, but still presenting issues online?"

The truth is many bakers need more equipment to test the incoming flour. Many of these technologies have been around for decades. Still, they are primarily found in the miller's quality testing labs – not the bakers.

The millers are doing a great job providing flours that are adaptable. However, millers cannot test their flours in the baker's



Rheological analyzers, like the Alveolab shown here, include simple, clear prompts within the software to instruct the baker when and how to perform specific steps in the process.

exact production environment or process constraints. By this logic, how can a miller define what is required or know what would be the best for this specific baker?

Thankfully, internationally recognised tools and methods, many of which are available as automated devices, exist to help bakers collect objective data to provide a complete picture of flour quality. These technologies are designed to be easy to use and deliver clear information to help bakers understand how their flour adapts to produce their products. Then, this information can be shared with their miller, who can match their specifications with their baker customers to close the loop on quality control.

With the help of their millers, who can assist in developing these protocols, bakers can quickly realise the benefits of innovating and achieve paybacks to their business in many ways.