WHITE PAPER: MILLING-BAKING INDUSTRY REVIEW

KPM

Mixolab: A Historical Perspective in Flour & Dough Characterization

How a Simple Invention Evolved into an Internationally-Respected Analysis Technology

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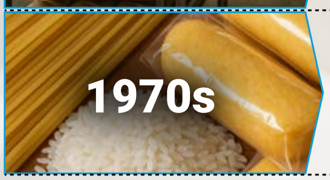
1950-1980: An Evolutionary Era for the European Milling Industry

Period	Baking Trends & Consumer Habits	Milling Industry Status	Flour Analysis/ Lab Technologies
 1950s	**Post-war priorities** were to manufacture as much bread as possible to feed the masses	Roller milling overtakes stone milling; electricity replaces hydraulic power	Some exist (Farinograph®, Alveograph) but limited in use.
 1960s	**An improving economy** additionally saw an increase in white bread demand	Trending toward fewer but larger mills	Generalization of the use of the Alveograph; the Falling Number test appears in 1962
 1970s	**Bread consumption drops,** replaced by rice, pasta, and processed baked goods	Thousands of small mills close as competition increases. International flour exchange begins to rise.	Rise of bread improvers and a growing need to analyze "specialty flours" leads to greater use of flour analysis technologies

Around the mid-1950s-60s, classical flour analysis tools invented in the late 1920s were still limited to the largest mills because they served a larger base of customers and bigger, more demanding industries. In the smallest mills, a traditional way to assess wheat quality was to extract gluten and "feel" its characteristics manually.

One action impacts the bottom line of all millers, big or small: their choice of the wheat they buy. Especially around this time, when the grain arrives, the millers must use it.

At this time, fertilization was starting to increase (there was a need to produce more to feed the population), but the turning point would arrive in the 1960s with fertilization techniques based on science and the appearance of semi-dwarf wheat varieties more resistant to adverse growing conditions.

But sometimes, nature can ruin a whole wheat field, and this is what farmers and millers call "wheat sprouting."

Sprouting happens when the wheat begins germinating before harvest, usually due to wet or humid conditions and warm temperatures. Sprouting risks are highest during the late ripening stage, usually 1-2 weeks before harvest. In these conditions, enzymes like α-amylases start breaking down starch, severely affecting the flour quality (sticky dough, poor loaf volume, red crust color…, etc.). It must be mentioned that, as is the most analyzed, wheat sprouting triggers all enzymatic systems.

Unless the germ is clearly visible in the most severe cases, sprouted wheat is not easily detected just by looking at it. Millers needed analytical tools to prevent these lots from entering the mill.

It is therefore not surprising that most of the tools aiming to measure wheat sprouting come from the northern part of Europe, where sprouting conditions were more likely to occur. Devices like the Falling Number, developed in Sweden, appeared in 1962 and became a standard in 1968 (ICC). Today, it is one of the most recognized tools for detecting spouted wheat. But it was not the only option.

ENTER: THE PETRINEX

In the 1960s, the northern part of France and Belgium saw the birth of a new device for flour quality analysis: the Petrinex. Due to its very regional and, therefore, limited impact, the device's life was short, ultimately disappearing from use sometime during the 1970s. But what did not disappear was the interest of millers from this area, who, 20 years later, were left searching for an alternative to the Petrinex.

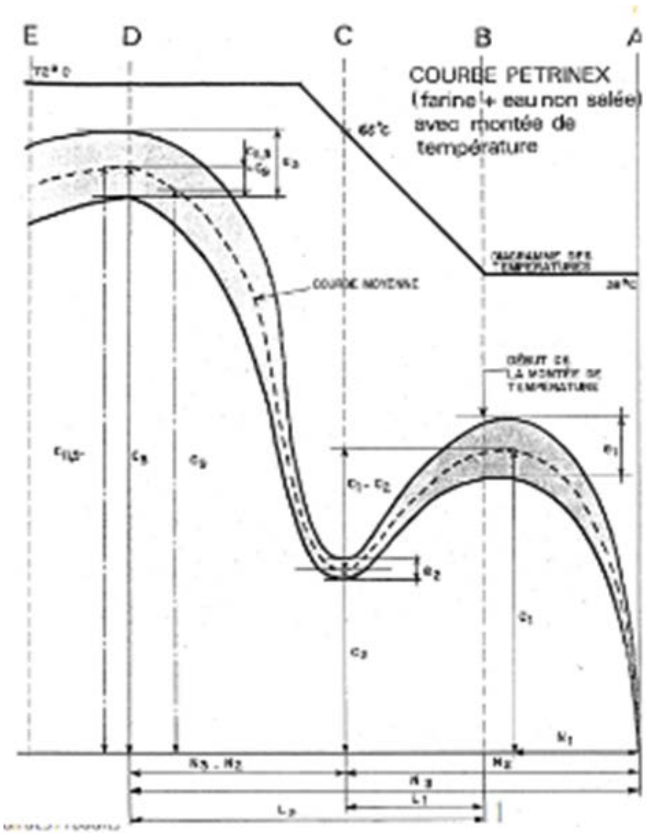


Figure 1: Data curve from a Petrinex.

WHAT WAS THE PETRINEX?

Figure 1 shows a typical curve obtained from the Petrinex, a mixing-recording instrument. The dough forms in a mixer with two blades, turning in a typical mixing motion. A drum attached to one of the blades records the dough torque as the product mixes.

The first part of the test is a simple mixing at 38°c that gives information about water absorption and dough mixing properties.

WHAT HAPPENED TO THE PETRINEX?

The Petrinex ultimately met is demise for two main reasons:

1. After its original inventor retired, so did the management and production of future instruments.
2. The Petrinex seriously lacked reproducibility. At the start, it was not an issue, as each miller was doing their own tests "in-house," so that use case was repeatable enough for Petrinex users at the time. But over the years, the market had shifted from "in-house" testing to more of a "data exchange" world. This shift increased the demand for precision incompatible with non-industrial production.

FROM PETRINEX TO MULTIGRAPH FFC

Quite logically, the idea of the Petrinex was reborn in Belgium in the mid-1990s. Marc Aelvoet and Luc Willems created this new system, the Multigraph FFC, supported by Georges Sinnaeve from CRA-W's scientific team.[1] (Gembloux, Belgium).

Figure 2 shows the Curves obtained from the Multigraph FFC.

At this stage, the objective was to propose a modern version of the Petrinex. The test provided the following information:

- Dough mixing properties (Blue area) determine Water absorption and dough mixing properties.
- Weakening (Green area) determines the gluten behavior when it is mixed and heated.
- Gelatinization (Pink area) determines a dough system's intensity of starch gelling.
- Enzymatic activity (Orange Area) determining the stability of the starch gel (less stability = higher α-amylase activity)

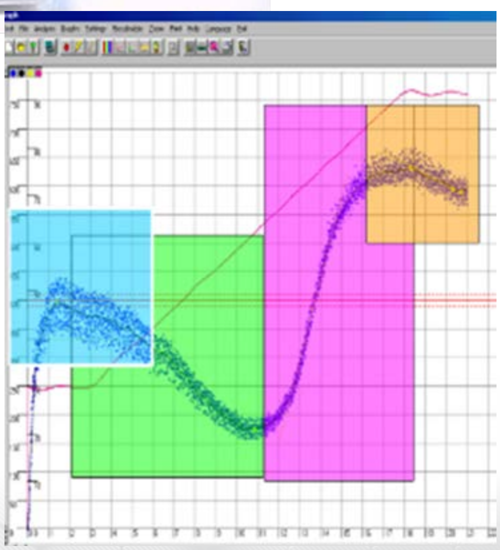


Figure 2: Multigraph FFC and a sample data curve.

1) CRA-W Centre Wallon de Recherches Agronomiques.

Concerning the protocol, **the Multigraph introduced essential improvements to the Petrinex:**

- First phase measures at 30°C (Vs 38°C on the Petrinex)
- The mixing phase was limited to three minutes but offered the possibility to extend the phase as needed.
- Use of FU (Farinograph® Units) and decision to center the curve at 400 FU to determine water absorption.
- Heating speed was 4°C/min (Vs "low performance control" on the Petrinex)
- Maximum temperature could reach +/-90°c (Vs 72°C on the Petrinex)

The device also included innovative technologies such as:

- Automated water addition pump.
- Water bath controlled to +/- 0.5°C (water used in the test)
- Improved control of mixer speed.
- Precise torque measurement coupled with dedicated software.
- Improved mixing bowl that was easier to dismantle and to clean.
- Price temperature within the mixer.
- Improved heating system with a safety lock.

Because of all these improvements, the device could provide exact, repeatable, and reproducible results. But its development was still slow for the same reasons that ended with the Petrinex:

- Limited production capacities
- Limited capacity to propose the device outside a limited geographical area.

As CHOPIN Technologies offered solutions to both aspects and as Multigraph offered guarantees that it could reach the quality level the brand supports, Multigraph entered the CHOPIN product line.

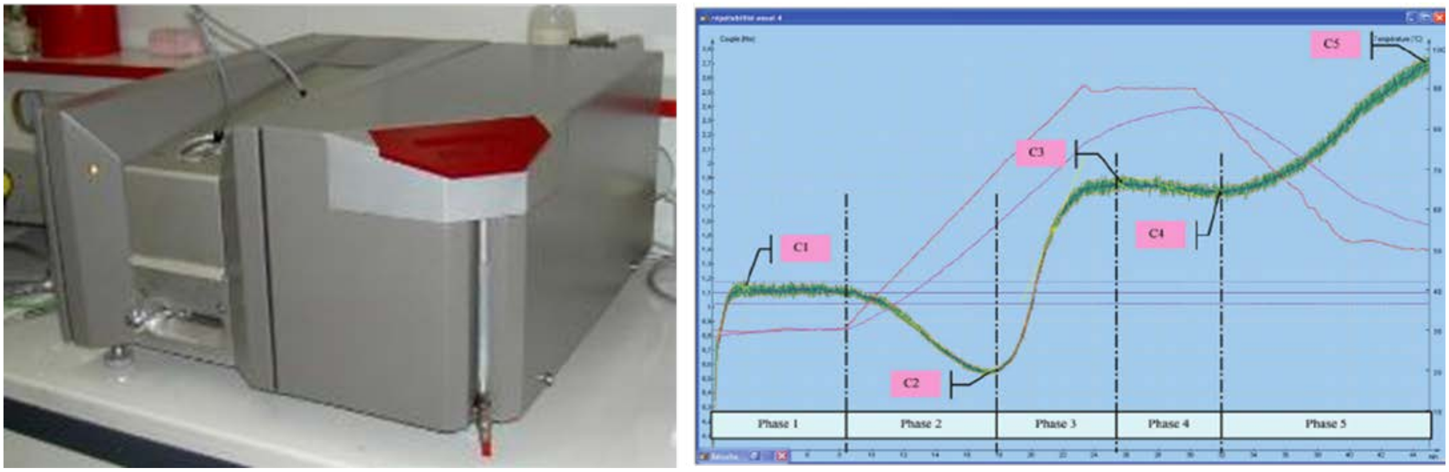


Figure 3: The original Mixolab and its data graph.

FROM MULTIGRAPH FFC TO MIXOLAB

As the engineering and applications teams started working on the Multigraph, they identified and worked on the following improvement points.

Protocol improvements:

- Replacement of the FU (Farinograph® Units) by Nm an internationally recognized unit for torque measurement.
- The addition of a cooling phase brings two significant benefits:
  - Capacity to measure the first moment of starch retrogradation.
  - Faster cooling of the mixer
- These benefits made the Mixolab a unique tool able to provide complete information from a flour sample:
  - **Water absorption** indicates the amount of water added to reach a certain consistency.
  - **Dough Mixing properties** [Phase 1] dough mixing time, stability, weakening.
  - UNIQUE: **Protein weakening induced by temperature** [Phase 2] showing how protein will resist (or not) during the oven jump.
  - UNIQUE: **Starch gelatinization** [Phase 3], showing how starch behaves in a water-limited environment such as dough. Understanding the impact on the crumb structure.
  - UNIQUE: **Starch Gel Stability** [Phase 4] Showing the impact of enzymatic degradation of starch (enzyme activity) and understanding the implications for crust color, volume, etc.
  - UNIQUE: **Starch retrogradation** [Phase 5], seeing the first moment of starch retrogradation in a dough system and understanding how this will impact shelf life.

Hardware improvements:

- Improved control of all elements directly participating in the measurement (mixer, torque recorder, mixer speed control, water tank temperature, water injection, etc.)
- Addition of a probe indicating the dough temperature
- Improved water injection nozzle
- The cover protects the user from touching the hot mixer and only opens when the mixer cools.

Software improvements:

- Proposal of a Standard testing method, but leaving the capability to create customized protocols.
- The ability to compare data, zoom, import, export, etc.

To help users differentiate from the previous device, the new tool was named Mixolab and launched in 2004 (**Figure 3**).

FROM MULTIGRAPH MIXOLAB TO MIXOLAB 300

The following 20 years saw the development of one of the most innovative tools in the industry, while Mixolab gained acceptance from users worldwide.

Mixolab 2: 2013-2025

Mixolab 300: Introduced in 2025.

STANDARDIZATION OF THE CHOPIN+ MIXOLAB PROTOCOL

In the example of the Petrinex, we have seen that providing a tool that does not give reliable results not only impacts the user's benefit but can also lead to the end of such a product. Therefore, it is standard practice for serious companies to evaluate their tools by independent organizations. This is the most reliable source of information for documenting the precision one can expect from a particular instrument. **Table 3** summarizes some of the standards attached to the Mixolab.

The wide extension of standards concerning Mixolab illustrates the worldwide interest in the tool. One of the reasons resides in the precision of the results one can obtain. Variation coefficients range from 2-3% to 4-7% for repeatability and reproducibility, respectively.

As the device gained more industry acceptance, its uses expanded beyond pure wheat testing. These advancements led to a vast number of posters, presentations, and the publication of two reference books that summarize quite well the many possibilities offered by the Mixolab.

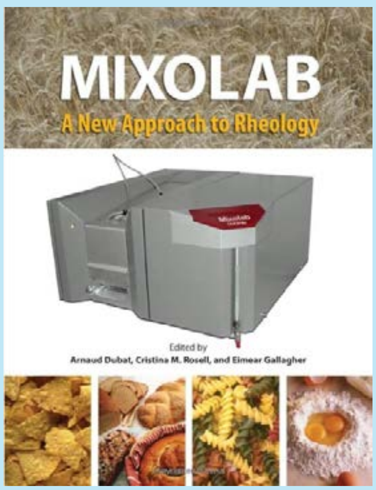
Organization	Standard Reference	Title	Year
ICC	No. 173/1	Whole Meal and Flour from T. aestivum – Determination of Rheological Behavior as a Function of Mixing and Temperature Increase	2007
Afnor	NF V03-764	Cereal and Cereal Product – Wheat Whole Meal and Flour (T. aestivum) – Determination of Rheological Behavior as a Function of Mixing and Temperature Increase	2010
GOST (Russia)	GOST R 54498-2011	Wheat Flour – Determination of Rheological Properties Using the Mixolab	2011
AACC	54-60.01	Rheological Properties of Wheat Flour Doughs Using the Mixolab	2013
ISO	17718:2013	Whole Meal and Flour from Wheat (Triticum aestivum L.) – Determination of Rheological Behavior as a Function of Mixing and Temperature Increase	2013
CEN	EN ISO 17718 :2014	Whole Meal and Flour from Wheat (Triticum aestivum L.) – Determination of Rheological Behavior as a Function of Mixing and Temperature Increase	2014
GB/T (China)	GB/T 37511-2019	Inspection of Grain and Oils – Dough Rheological Properties Determination of Wheat Flour – Mixolab Test	2019

Table 3: Main international standards concerning the CHOPIN+ protocol.

CORE MIXOLAB APPLICATIONS RESOURCES

The Mixolab Applications Handbook, written by the CHOPIN Applications Team in 2012, addresses topics such as:

- Different wheat applications
- Durum wheat applications
- Cereals and pseudocereals
- Gluten-free cereals
- Pulses
- Additives, enzymes, and ingredients



The AACC Mixolab Handbook: An innovative approach to rheology, published in 2013 and written with the support of renowned scientists, including Cristina Molina Rosell (University of Manitoba, Canada) and Eimear Gallagher (Teagasc, Ireland), including:

- Factors affecting the Mixolab curve
- Characterization of starch
- Vital wheat gluten analysis
- Amylase activity
- Bug-infested wheat
- Gluten-free applications
- Enzymes and technological help
- Using wheat breeding
- Durum wheat testing
- Applications for rice

DEVELOPMENT OF THE FARINOGRAPH® SIMULATOR MIXOLAB PROTOCOL:

One of the first reactions of users discovering Mixolab is whether it can give the same results as a Farinograph®. This question makes perfect sense, as both machines are mixing-recording tools. So, one can expect they should provide the same information; however, it is not that simple.

One thing that is the same is the water absorption because the target placed in the Mixolab to determine the consistency to reach (1.1 Nm) corresponds to 500 FU. This decision correction factor was made to allow the same reading of this parameter on both devices.

But this is where the comparison stops: The mixing energy of the Mixolab is entirely different from the Farinograph®:

- Higher speed (80 rpm vs 63 rpm)
- Different blade shape (Curved Paddles vs. Z-Shaped)
- Different sample sizes (50g Vs 300 g)
- Mixing chamber design (double cylinder on the Mixolab)
- Mixing time (8 minutes in standard Chopin+ Mixolab)

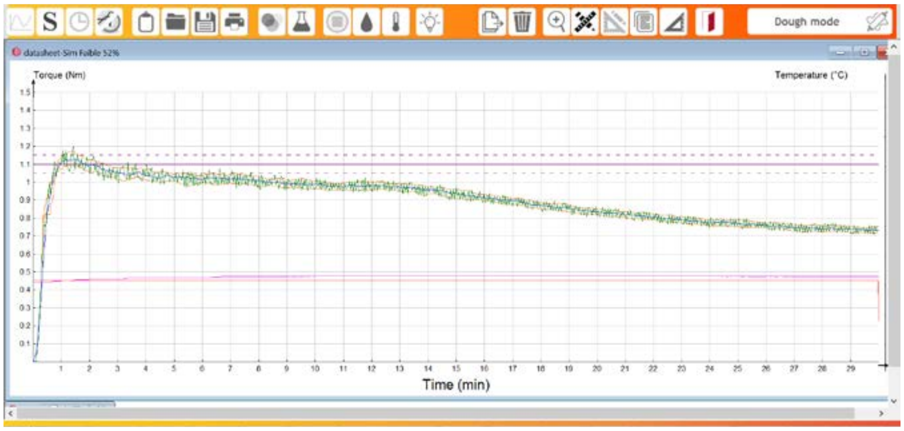


Figure 4: Example data curve from a Mixolab Simulator test.

A mixer does not just measure the dough; it co-creates the behavior it measures. The answer depends on the test conditions. For these reasons, and because of their fundamental conceptual differences, dough mixing on a Mixolab is not the same as dough mixing on a Farinograph. Mixing on the Mixolab is more intensive, requiring more stress on the dough.

To give an adapted answer to this question, the technical team developed a protocol specifically designed to provide Farinograph® data equivalent. The Mixolab Simulator protocol works based on the following concepts:

1) A dedicated protocol

The first necessary objective was to have a dedicated protocol that was as close as possible to the legacy instrument, even though the results could not be directly transposable due to the different mixer types.

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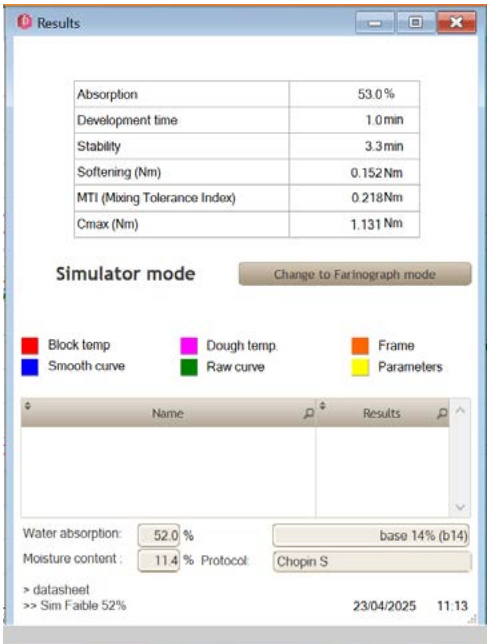
The Chopin-S (for Simulator) is a fundamental dough mixing-recording protocol.

- Constant Speed: 80 rpm
- Constant Temperature: 30°C
- Constant analysis time: 30 minutes
- Constant dough weight: 75 g

The test requires a target to determine water absorption. We



chose a consistency of 1.1 Nm because it corresponds to 500 FU on a Farinograph®.

The operators obtain a Torque vs. time curve with this protocol to calculate parameters such as water absorption, mixing time, stability, weakening, and other steps, like a Farinograph® reading.

2) Calculation algorithms

As all the calculations are based on the observation of the actual measurement on the Chopin-S curve, weakening and MTI are expressed in Nm, which was sometimes confusing for users.

To answer this request appropriately, the CHOPIN application team compared hundreds of samples analyzed on the Mixolab, using the CHOPIN-S, and on the Farinograph®. Adding some statistical and chemometric skills, they had calculation models that "interpret" Mixolab results into Farinograph® equivalents.

3) Farinograph curve reconstruction

The last part of the work consisted of recreating the curve from the data to provide a visual analysis of the results corresponding to a curve that a Farinograph® user could easily understand.

It is remarkable that the curve here is based on the results, rather than the opposite, as is usually the case. But remember that this curve is a reconstruction for easier data interpretation.

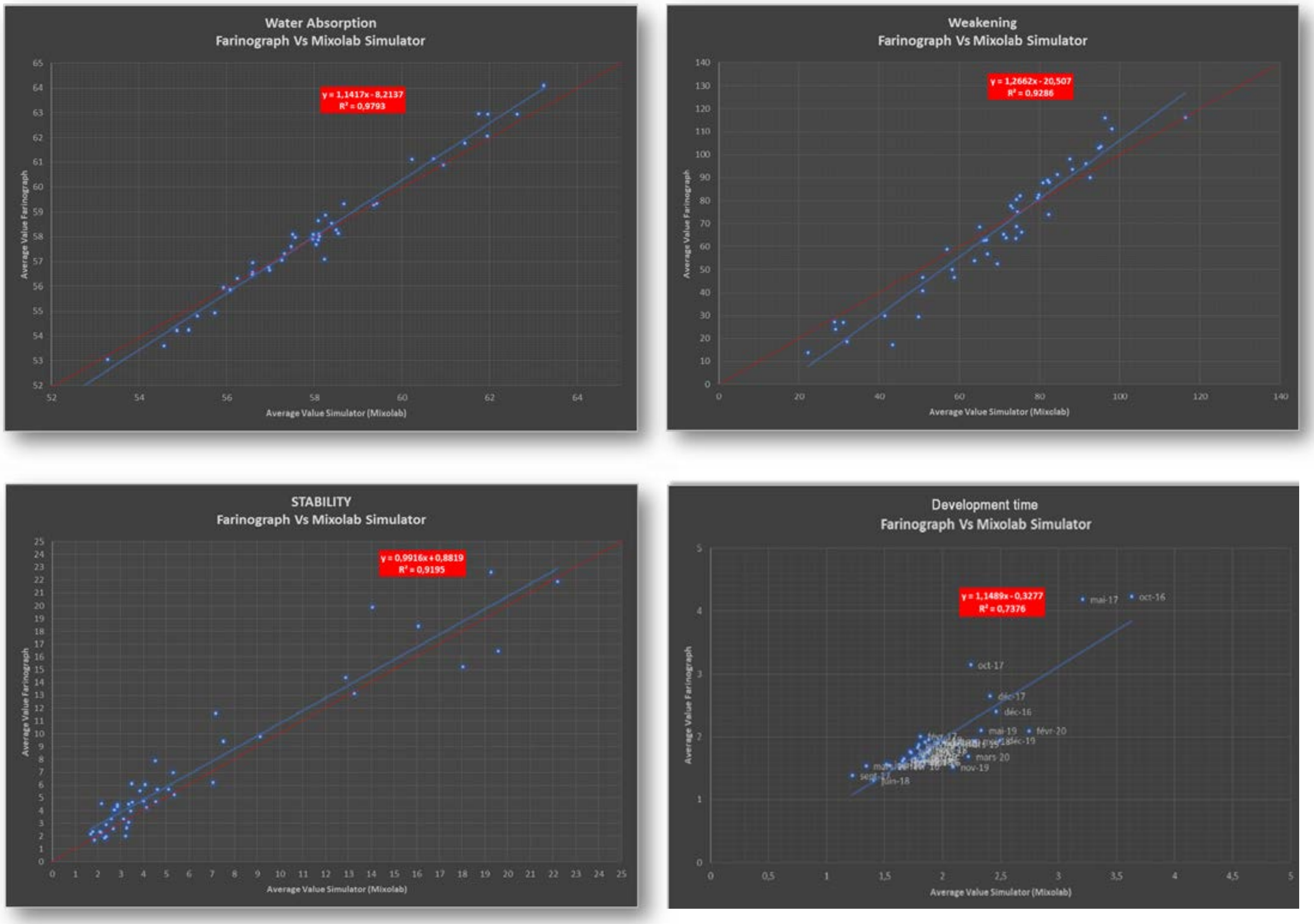


Figure 5: Comparison of Mixolab CHOPIN-S Data Vs Farinograph® Data

4) Performance of the CHOPIN-S (Simulator) protocol

Many prior Farinograph® users could agree that the CHOPIN-S protocol easily integrated into their typical workflow. For reference, **Figure 5** compares the average of a Mixolab Population vs. a Farinograph® population from the Proficiency Testing Program (PTC) BIPEA. This evidence shows that the CHOPIN-S (Simulator) provides results like the Farinograph® to the extent that both devices have participated in the same circuit for many years.

However, using Mixolab just for the Simulator protocol is a pity, as it does not provide any added information to help the user understand the complete picture of flour quality. The Simulator protocol is excellent for communicating with third-party laboratories that are still using legacy tools. Mixolab's benefits reside in its capacity to provide extensive information that helps support better documented decisions.

DEVELOPMENT OF THE MIXOLAB PROFILER

As shared earlier, Mixolab brings way more information thanks to its unique capacity to heat up and cool down a dough system. To facilitate the use of so much information, in 2008, the CHOPIN Technologies Application Team proposed a Mixolab feature that characterized a CHOPIN+ data curve into a comprehensive and easy-to-use system to establish a Certificate of Acceptance (COA).

This feature became the Mixolab Profiler. Developing the Mixolab Profiler consisted of analyzing several hundred flour samples from all over the world with a Mixolab and documenting the spread of sampled parameters. Next, the user would rank the behavior of the dough in a specific area of the curve on a scale of 0 to 9, depending on our observation. Finally, the results would be displayed in a "profiler" graph, or a "spider web," as many Mixolab Profiler users call it today.

WHAT MAKES A MIXOLAB PROFILE?

Mixolab Profiler Index 1: Absorption

The Mixolab Profiler's Absorption Index is based on the water absorption value determined to center the curve at 1.1 Nm at the beginning of the test. The higher the water absorption, the higher the index. Note at this stage that higher values do not mean better products; some will need high values while others require lower values.

Mixolab Profiler Index 2: Mixing

The Mixing Index covers the first eight minutes of the test, when dough temperature is maintained at 30°C. The Mixing Index displays the dough development time, the resistance to mixing (stability), and all parameters related to traditional dough strength. The more the dough resists, the higher the index will be.

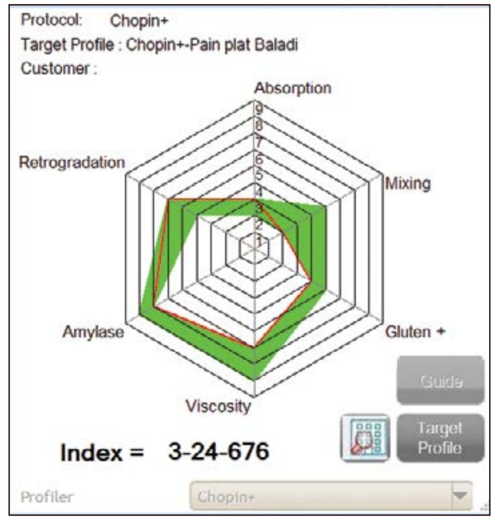


Figure 6: Example Mixolab Profiler.

Mixing indexes can be associated with **dough strength** and fair value, depending on the product type and manufacturing conditions.

Mixolab Profiler Index 3: Gluten+

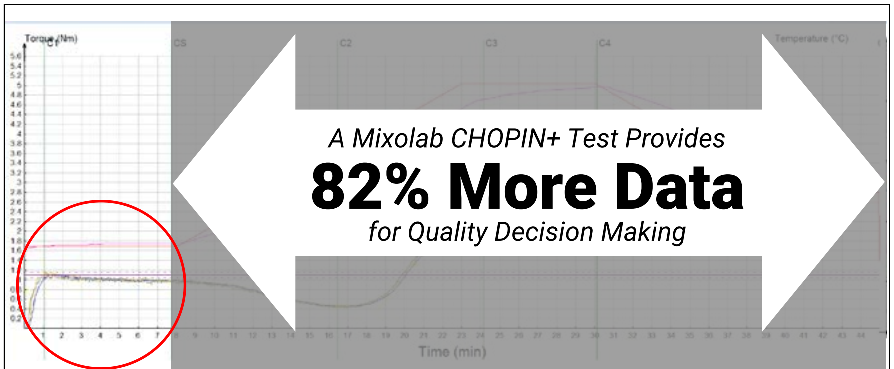
The Gluten+ Index corresponds to the behavior from the characteristic point "Cs" to the lower point "C2". It corresponds to a temperature increase from 30°C to approximately 60°C.

Science tells us that during this heating phase, the gluten (protein) weakens. Why is that important?

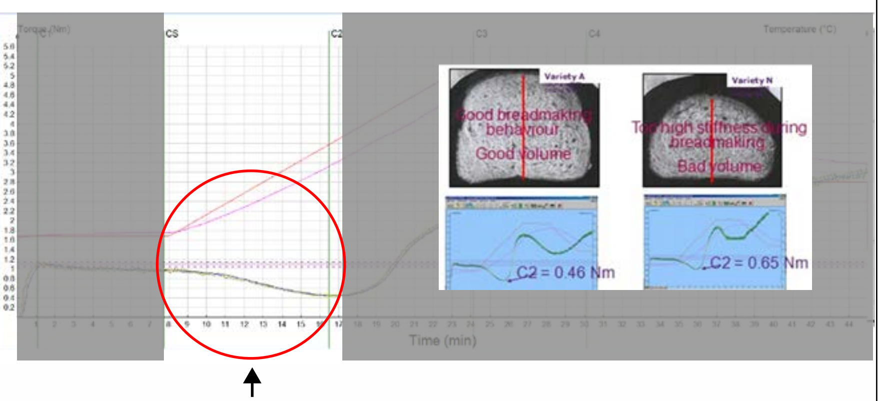
Think about when the dough temperature rises to 60°C in an oven. Bakers call this period the "oven rise" (or cookie spread for another industry). The gluten+ index (not to be confused with the Gluten index) shows how the dough behaves during this critical stage:

- If the gluten weakens too much, the dough will not be able to hold the expanding gas, resulting in a low bread volume.
- If the gluten resists too much, the alveoli will not develop properly, leading to a dense and low-volume loaf.

This unique information, only available on the Mixolab, is beneficial as bad volume can result from the gluten's behavior while heating. The same gluten can exhibit similar data when mixed at 30°C.



Data you already get with a Farinograph® test
Water absorption
Mixing time
Protein stability & weakening

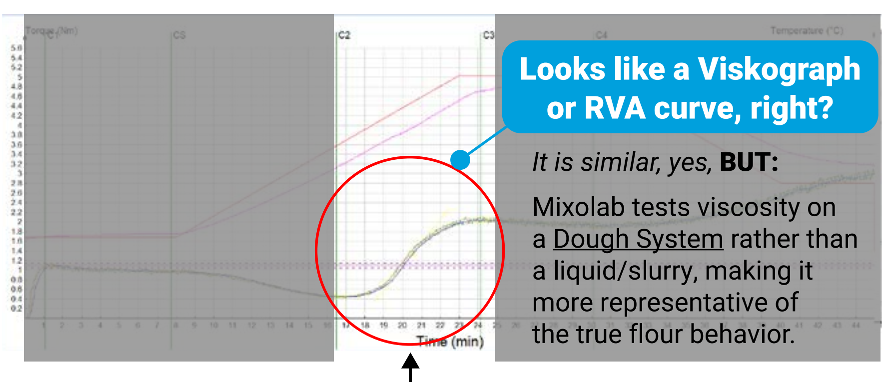


Protein Softening
Capturing how protein weakens during the first moments of baking has critical impacts on final products.

Mixolab Profiler Index 4: Viscosity

The Viscosity Index analyzes the area between around 60°C and 90°C between characteristic points C2 and C3. Again, this index is an indicator of what could happen while baking.

Science tells us that during baking, there is a transition from a Gluten-supported structure to a Starch-supported structure. The increase in viscosity tells us how thick and resistant this starch phase is. There are other ways to measure starch gelatinization, but they all use extremely diluted batters, where starch can express 100% of its capacity. With Mixolab, users observe how starch behaves in an actual dough environment where access to water is limited, thus limiting starch gelatinization.



Starch Gelatinization
Pasting; relates with bread volume and crumb structure

This information is important because this interaction impacts the crumb structure. Research shows that higher starch viscosity favors an open, uniform, and soft crumb when low starch viscosity does the opposite. Interaction with gluten and starch damage modulates these effects, emphasizing the need for comprehensive control tools such as Mixolab.

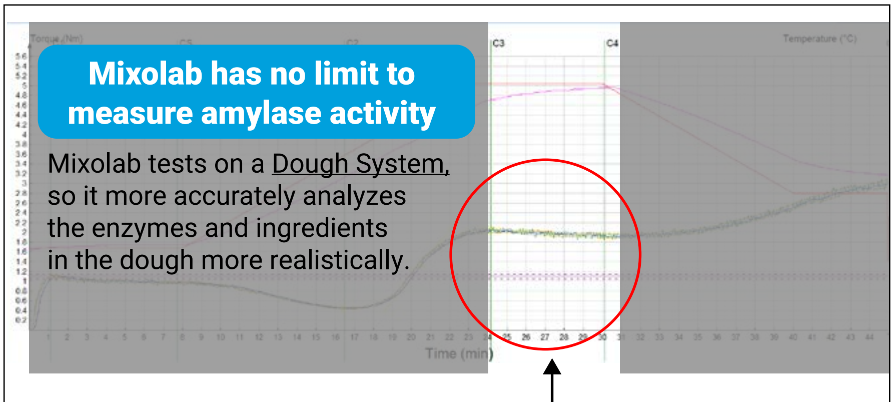
Viscosity indexes can be associated with the **final product's internal structure and fair value**, depending on the product type and manufacturing conditions.

Mixolab Profiler Index 5: Amylase

The Amylase Index happens between characteristic points C3 and C4 when the temperature is between 85°C and 90°C, where viscous starch gel stability is measured.

This stability is modified by what happens during the heating phase, particularly by the action of the α-amylase.

This data, along with the starch damage level, is used as an indicator to fine-tune the addition of exogenous α-amylase, which helps enhance oven spring, improve texture, and adjust the crust color.

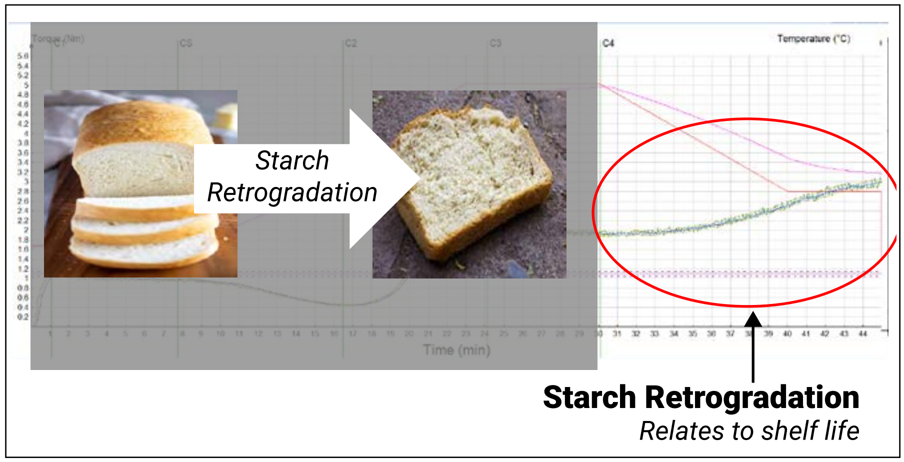


Gel Resistance
Capturing baking stability related to amylase activity

Amylase indexes can be associated with final product volume, structure, color, and fair value, depending on the product type and manufacturing conditions.

Mixolab Profiler Index 6: Retrogradation

The Retrogradation Index occurs between point C4 and C5, where the dough undergoes a cooling phase from ~ 90°C to ~50°C. Dough resistance to mixing occurs, which relates to the starch of the amylose chains (the linear part of starch) beginning to re-associate and crystallize. This is the first stage of starch retrogradation, one of the main drivers affecting product shelf life. Bread firming takes more time as it involves other phenomena and molecules, but the observations made here are excellent indicators of the potential product shelf life. Practically, the higher the increase during this phase, the lower the shelf life.



HOW TO USE THE MIXOLAB PROFILER

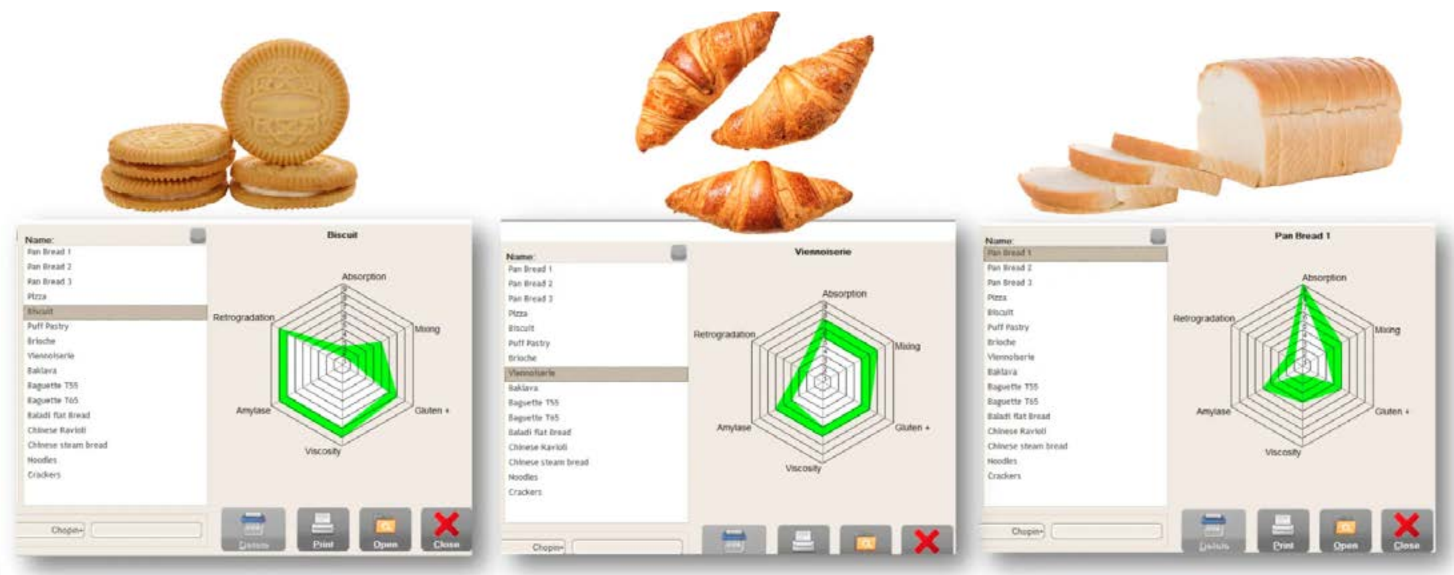
The Mixolab Profiler is an outstanding method for enhancing communication between bakers and millers based on broader information, especially the very functional 70% of the flour (the starch), which is mostly absent from most COAs today.

Another revolutionary aspect of the Mixolab Profiler is that it prioritizes the baker's needs. Instead of "guessing" flour quality, the Mixolab Profiler fosters "measuring," and all information comes from the bakers' observations.

Creating a Mixolab Profile is quite simple. First, analyze between 10 and 20 well-performing flours. A well-performing flour is defined by the baker and refers to a batch that allows us to have the perfect product with no process issues. By analyzing these samples, as there is always natural variation, the user can define an optimum area that gives the fingerprint of the "ideal flour." This same principle applies to any baked product produced with white wheat flour.

The example shows that, depending on regional consumer tastes, the same product type will not require the same flour type.

The reason is simple: Each production plant is unique, with different raw materials, recipes, equipment, etc. This is why the old approach of telling the baker what they "need" without first taking the time to measure and establish what the baker needs is likely to fail.



Example Mixolab Profiler profiles for various baked product types.

THE DEVELOPMENT OF THE MIXOLAB 300 DOUGH TESTING SOLUTION

Over 20 years after Mixolab was introduced, the KPM Analytics Applications Team has turned its sights towards expanding the application spectrum for analyzing dough online, including cake or wafer batters.

While making the link from flour to final product is great, analyzing the baker's dough, with all its ingredients, could provide a greater depth of analysis to help the baker better command their process. This concept was first proposed with the Mixolab Dough Kit that allowed users to measure the interest of such a tool and the impressive amount of information this can bring to the whole cereal chain.

In 2025, KPM launched the Mixolab 300, which adds all the features of the traditional Mixolab but the capability to analyze dough in optimized conditions.

The dough analyzer part is composed of two elements:

1. Dedicated hardware includes a tight mixing bowl, enabling analysis of any dough type from dry crumbles to liquid batters.
2. Optimized software allowing measuring according to two testing methods:
    - Instantaneous consistency helps bakers to make sure their dough reaches the expected requirements.
    - Long testing applying heating/cooling cycle to understand better how ingredients impact the flour behavior. This allows:
        - Establishing a link between flour quality and dough quality can help us understand how flour and/or dough recipe influences us the most.
        - Define what a "good dough" is for a specific process line and better understand the critical impacting factors.

Mixolab 300 includes a novel dough introduction design for analyzing all types of dough consistencies including, sticky doughs, crumbly doughs, and batters.

THE "INSTANT CONSISTENCY" DOUGH TEST

Even in the largest bakeries, manual observation is still the primary method to assess dough at-line. Master bakers who have developed high skills "feel the dough" and take corrective action as needed based on their expertise. This practice comes from a long baking tradition, but is impractical in today's baking operations for two important reasons:

1. Multiple plants may produce the same products, thus introducing variation. This means, theoretically, each master baker at every plant throughout the organization should maintain the same "feeling" technique to ensure product consistency—a feat that is nearly impossible to achieve.
2. Expertise in baking plants is disappearing by the day because:
    - Master bakers are retiring, and
    - Newcomers do not stay long enough to reach the expertise of existing master bakers.

Many brands use the strategy of putting numbers on the master bakers' feelings before they leave the company. This requires an objective measurement: The Mixolab 300 perfectly answers this need.

Here is an example from a Donut manufacturer (**Figure 7**). KPM Analytics worked with this company on this analysis method, determining that the best results for their products could happen when the dough consistency is in the area [0.69-0.80 Nm] after only two minutes. How did we get there? Simply by analyzing a dough sample taken after the mixer and looking at the final product characteristics. It rapidly became apparent that stiffer dough was not allowing for the creation of a uniform hole in the donut's center.

As the plant operates batch mixers, inadequate consistency can be easily corrected, limiting the overall product loss.

The same procedure can be done at various stages of the production chain to "map" how the process impacts the dough.

This practice is particularly useful for understanding why a dough entering the target consistency after mixing may still result in a non-conforming final product. Something changed along the way that only objective measurement can tell. It is also extremely useful for comparing various production lines in the same plant.

THE "FULL" DOUGH TEST

The Full Dough Test unleashes the Mixolab's complete and unique potential to heat up and cool down the production dough. This feature is significant for NPD or R&D departments wanting to understand.

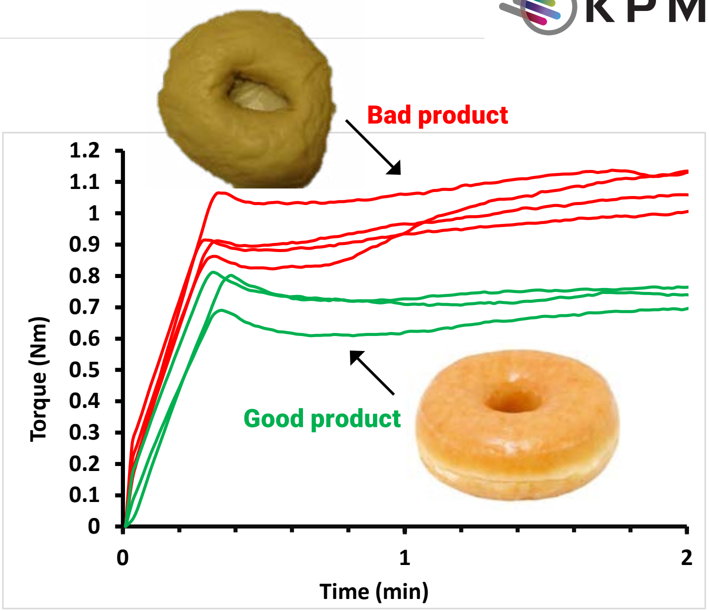


Figure 7: KPM worked with a donut manufacturer to develop a simple dough analysis test, helping the customer anticipate final product quality after two minutes of testing.

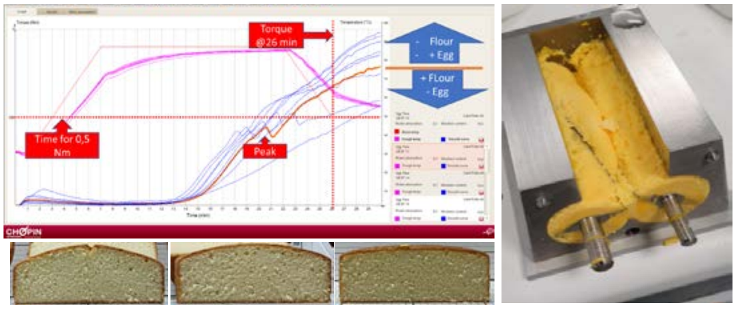
- How do different ingredients impact the overall dough behavior?
- Evaluate what happens when changing ingredients in a recipe (e.g., choosing a new supplier to save operational costs).
- Understand how the process impacts the dough. In the above example, resting time clearly impacts the protein and starch phases of a complex cracker dough. This is especially useful information that would remain unknown without the use of adapted and objective control tools.

As this example "Full" Dough Test of a cracker dough indicates, dough consistency can change significantly over time.

FIRST-OF-ITS-KIND APPLICATIONS MADE POSSIBLE WITH THE MIXOLAB 300

Cake batter testing

The cake industry was missing adapted tools for insights into their unique dough/batter system. Either they use tools designed for bread dough in a “dry” environment or tools dedicated to starch analyses and why too hydrated (liquid doughs). Thanks to its unique tight mixer, the Mixolab 300 fills this gap, opening new possibilities to analyze cake batters.

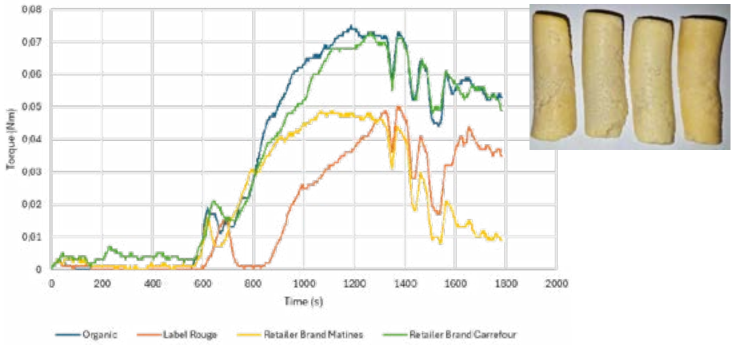


Cake batter test results.

Egg quality testing

One of the many benefits of the new dough analysis capabilities with Mixolab 300 is its applications for new matrices. For instance, some bakers may or may not know that egg coagulation can depend upon the source.

The KPM Analytics Application Teams performed the first pioneering work, measuring not only differences within different egg provenances but also how egg temperature influences coagulation temperature.



Comparison four different egg types and brands on their coagulation properties.

Cheese quality testing

Why stop with only baked product testing when the Mixolab 300 Dough Analysis Capabilities can do much more? In fact, the Mixolab 300 was recently used in a study analyzing cheese melting. While this application is still in its very early stages of industry acceptance, it is an excellent example of Mixolab’s capacity for adaptation.


Mixolab 300 used for mozzarella cheese melting tests.

MIXOLAB: A LEGACY BUILT ON SEEKING ANSWERS TO UNIQUE INDUSTRY NEEDS

Mixolab is a legacy built on seeking answers to unique industry needs. In the early days, it was mostly to serve the miller’s needs, but now, bakers, bread improvement manufacturers, and wheat breeders are all growing Mixolab user groups.

Mixolab is one of the few genuine flour or dough analysis innovations in the last 30 years. Its unique features represent as many opportunities as possible to understand better the flour, the dough, and the process, or to develop new products based on a new analytical perspective. It is 100% customizable, making it an excellent tool for quality control and a powerful support for research and development.

Being the innovative Mixolab tool, many may think the Mixolab can do the same job as Tool “A” or Tool “B”. In principle, this mindset is not wrong, considering that the Mixolab test begins much like a Farinograph® (mixing) and continues like an RVA (starch properties), with a bit of falling number in the middle. However, advertising that Mixolab can replace or do a better job than these tools is misleading because:

- It does not consider the significant mechanical and analytical differences between Mixolab and those other tools.
- It sometimes treats Mixolab as a “super substitute” for all legacy tools, which can lead to disappointment.
- It limits the use of the Mixolab to “what one knows” (for example, a Farinograph® curve) and eliminates the opportunity to add something different to the industry’s many analytical needs.

Mixolab is a device that adds knowledge, not a tool aiming to replace existing data. Mixolab is a one-of-a-kind device because it offers:

- **Unique information:** Mixolab provides unique measurements on a dough system. It focuses on gluten but also starch (which is 70% of the flour sample), enzymes, and interactions.
- **Precision:** Independent experts who publish international standards worldwide confirm the precision of this tool, which obtains data with exceptional accuracy.
- **Simplicity:** Using a Mixolab is extremely simple, does not require extensive knowledge or training, and is not operator-dependent.
- **Versatility:** The Mixolab offers many possibilities for creating protocols adapted to analyze different matrices; more are in development today.
- **Adaptation:** With adapted features, the Mixolab can
  - Measure the characteristics of dough directly coming from the production line.
  - For example, measuring batters thanks to the tight mixer opens a new way for cake manufacturers.
  - Work with vastly different matrices to understand complex systems, such as the sourdough and the impact of the sugar/egg proportion on a cake batter.
  - Work on products outside of the cereal industry

This is just a start, as many Mixolab potentials are still unexplored. Each technical innovation opens the way to new protocols and matrices that fully meet the needs of a rapidly evolving world.

About the Author

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Arnaud holds a Master in Sciences and Techniques for the agro food industry and a Master in International Marketing and Strategy. His original background comes from Biochemistry and he also holds a miller's degree from the French Milling School (ENSMIC).

He started working for CHOPIN Technologies, a KPM Analytics brand, in 1989. His various occupations in the company (he started as an after sales technician) puts him in constant contact with flour producers or users worldwide.

Arnaud is a standardization expert for AFNOR, ISO and CEN. He is active with the BIPEA, corporate member representative for ICC and is also actively involved in Cereals and Grains standardization working groups.

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