CHOPIN TECHNOLOGIES

a KPM ANALYTICS brand

Solutions for Flat Breads Manufacturers

Tools for measuring the primary criteria affecting final flat breads quality:

- Water absorption of flours
- Quantity and quality of proteins
- Dough characteristics (extensibility, elasticity, stickiness ...)
- Starch properties (damage, retrogradation)

INDUSTRY CHALLENGES

Traditionally, pita bread is made by a sour dough process but it can be made using manufactured yeast. If the sour dough process is used, a relatively large portion of sour dough (approximatively 20%) is used, giving a more rapid fermentation than most sour dough products.

There are many different types of flat breads and great variation in manufacturing processes. However, one process that could be considered representative consists of mixing flour, water, and salt, (sometimes with a little fat or sugar), followed by dividing the dough into balls which will then be flattened by rolling or pressing. These steps are then followed by baking on a plate or tunnel type conveyor oven. Varying periods of rest of the dough are common.

Because the recipe is relatively simple, the quality of the finished product depends greatly on the quality of the flour. In particular, it is important to have good **water absorption** capacity to mitigate problems with **stickiness**. The division of the dough can be done by volumetric dosing equipment that pump the dough.

At this stage, the dough **consistency** and **viscosity** should be optimal. During rolling or pressing, the dough should show the desired extensibility and avoid **over-elastic** doughs that will impact the size of the finished product. In order to preserve the freshness of the bread, starch **retrogradation** should be limited. Flat breads can be produced from white flours or whole flours.

Identifying the key elements that affect the final quality of the product is essential in order to implement effective quality control. There is a common knowledge base that can be applied; however, the influence of the mechanisms involved differs for each production line. A more modern approach is for a company to objectively measure what works on its lines, and to focus its quality control on the most important elements.

Master the Key Points of the Process

Water absorption:

This is the quantity of water that can be added to the flour to give it the necessary plasticity (firmness, extensibility, elasticity). If you do not put in enough water, the dough is dry, hard and brittle; if you put in too much, it becomes soft and sticky. The amount of water that any flour can absorb increases with higher levels of protein, damaged starch (particle size) and pentosans. It is very simple to measure water absorption directly using the **Mixolab 2**, the **Alveolab**, and the **SRC-CHOPIN**. A good estimate can be obtained by measuring starch damage (**SDmatic**, **SRC-CHOPIN**), protein levels (**NIR**: **Infraneo**, **Spectralab**), and pentosans (**SRC-CHOPIN**).

Stickiness:

Stickiness appears when the water added to the flour is not properly absorbed or retained by the dough. This phenomenon often occurs when starch damage or pentosan levels are too high and the protein levels are too low. Sticky dough causes process machine problems when rolling and shaping flat breads. Starch damage can be measured directly with the **SDmatic**, and protein levels are measured with **NIR** devices. The **SRC-CHOPIN** can simultaneously measure the quality of damaged starch, proteins, and pentosans.

Dough consistency:

Dough consistency depends on the amount of water added and the ability of the flour to absorb it. This consistency changes during mixing, reflecting the formation of the gluten network. For any given level of hydration, the consistency of the dough represents its firmness, its hardness. This depends, at the moment, on the quantity and quality of the proteins, the starch damage, and the pentosans. Mixing consistency may be measured by either the **Mixolab 2** or, after rolling by the Alveolab. It is also possible to individually measure the factors responsible for consistency: proteins (**NIR**, **SRC-CHOPIN**), damaged starch (**SDmatic**, **SRC-CHOPIN**) and pentosans (**SRC-CHOPIN**).

Extensibility:

This is the capacity of the dough to be stretched without breaking. For a given consistency, it depends mainly on the quality of the protein network. Dough that is not very extensible will not spread during rolling; conversely, dough that is too extensible will not hold shape well enough. Extensibility is measured directly when testing with the **Alveolab**.

Elasticity:

Elasticity is the tendency of the dough to return to its initial position after its shape is distorted, such as by rolling. It takes a certain level of elasticity for the dough to be machinable. If the elasticity is too low, the dough won't hold shape; if it is too high, the dough will tend to retract, which impacts the appearance of the finished product. Elasticity is measured directly and exclusively with the **Alveolab**.

Retrogradation:

After baking, the starch will tend to partially recrystallize. This phenomenon is called retrogradation and explains why the products become hard (stale). The faster the starch retrogradation, the faster the bread will lose its freshness. As a result, flours with slow retrogradation are favored. The beginning of retrogradation is very easily measured with the **Mixolab 2**. Damaged starch has the effect of reducing the speed of retrogradation, it is measured with the **SDmatic**.

Key point \ Solutions	NIR	SDMATIC	SRC-CHOPIN	ALVEOLAB	MIXOLAB 2
Water absorption	X	X	X	X	X
Stickiness	(X)	X	X		
Dough consistency	(X)	(X)	(X)	X	X
Extensibility				X	
Elasticity				X	
Retrogradation		(X)			X

X: direct measurement. (X): indirect measurement

CHOPIN TECHNOLOGIES' SOLUTIONS IDENTIFY THE KEY ELEMENTS AFFECTING THE QUALITY OF YOUR BAKING PRODUCTS

Measuring moisture and protein levels by near-infrared analysis (NIR)

The **Infraneo** is a near-infrared (**NIR**) analyzer that works on both whole and powdered grains. It uses transmittance and monochromator technology. Simple, reliable, and precise, it can rapidly measure many parameters that affect the **absorption of water**, such as humidity and protein content, as well as **stickiness** and **consistency**. The **Spectralab** is an **NIR** analyzer that operates based on reflectance. With a wider measurement spectrum, it also determines moisture and protein.

Measuring starch damage

The **SDmatic** allows for simple, fast, safe analysis of starch damage. Based on the measurement of iodine absorption, it works on 1 gram of flour and provides results in only 10 minutes. The reliability of the **SDmatic** has been confirmed in international collaborative studies. It is a standardized method recognized by AACC, ICC, ISO, CEN Afnor, Gost, etc. Starch damage affects **water absorption**, **stickiness**, **consistency** and **retrogradation.**

Measuring flour functionality

The **SRC-CHOPIN** is a means of measuring hydration based on the increased swelling capacity of the various flour polymers when they are in contact with particular solvents.

It performs 4 measurements in one automated test:

- **Water absorption** (Solvent: Distilled water)
- **Glutenins** (Solvent: Lactic acid)
- **Damaged starch** (Solvent: Sodium carbonate)
- **Pentosans** (Solvent: Sucrose)

The **SRC-CHOPIN** is a method recognized by the AACC. It allows one to measure **water absorption** and factors influencing the **stickiness** and **consistency** of dough.

CHOPIN TECHNOLOGIES' SOLUTIONS IDENTIFY THE KEY ELEMENTS AFFECTING THE QUALITY OF YOUR BAKING PRODUCTS

Measuring firmness, extensibility, and elasticity

The **Alveolab** has been an internationally recognized method (AACC, ICC, ISO, CEN, Afnor, Gost, and others) for many years; it measures the characteristics of dough during the swelling of a bubble.

Completely adaptable, the Alveolab directly measures:

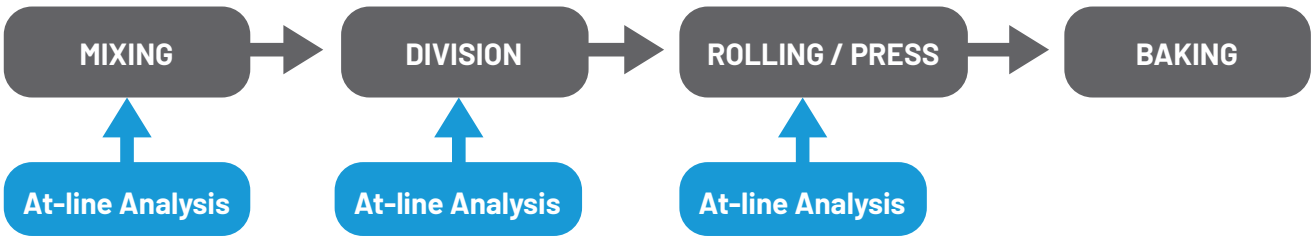
- **Firmness** (the resistance of the dough to deformation, its consistency)
- **Extensibility** (the ability to stretch the gluten network)
- **Elasticity** (the tendency of the dough to return to its original position after stress)
- **Force** (the work required to deform the dough)

The **Alveolab** allows one to work with both constant hydration and adapted hydration. It measures **water absorption** and characteristics of the dough such as **extensibility**, **elasticity**, and **consistency**.

Measuring the characteristics of the dough during mixing and baking

The **Mixolab 2** is the only internationally standardized device (AACC, ICC, ISO, CEN, Afnor, Gost, etc.) that can perform a complete analysis of dough that is subjected to temperature increase. It measures **dough hydration**, mixing behavior (**consistency**, development time, stability, and so on). It is the only device that allows you to observe the changes in the dough at the beginning of heating as well as during gelatinization and starch **retrogradation**. By working on representative doughs, the **Mixolab 2** allows one to get as close as possible to the actual conditions of use of the flours.

"AT-LINE" CONTROL*

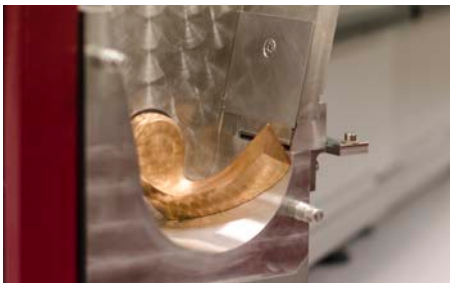


*A typical example; other processes and control points can be imagined.
Depending on the technical constraints encountered, it is possible to adapt the analysis protocols

The tools:

Mixolab 2 Dough sample kit

The dough sample kit makes it possible to introduce, and to analyze simply, samples of about 100 grams of dough directly taken from the line.



Alveolab Kneader

The Alveolab kneader is suitable for receiving and extruding samples of approximately 300 grams of dough.

OUR TEAM IS HERE FOR YOU. CONTACT US!

Every manufacturing process, every factory, is different.
We'll help you:

- Define acceptance characteristics for the finished product.
- Define the key steps in the manufacturing process that influence the success of the finished product.
- Put in place effective quality control for these key steps (at-line control).
- Characterize your raw materials and assist you in setting up specifications based on what genuinely has an impact on your production.

HOW SHOULD I PROCEED?

Make a request on our website (*www.chopin.fr)*, and a technician will contact you to define the scope of your request.

Following this initial contact, an appointment (physical or virtual) will be scheduled which may lead to the establishment of a contract, possibly involving the provision of equipment* and the presence of an on-site technician* to assist you.

(Subject to availability)*

CHOPIN TECHNOLOGIES
a KPM ANALYTICS brand
20 Avenue Marcellin Berthelot,
92390 Villeneuve-la-Garenne, FRANCE
Tel: 01.41.47.50.00 *Sales@kpmanalytics.com*