Farinograph (Brabender)

The farinograph is the most universally used physical dough-testing instrument to measure the plasticity and mobility of the dough. It records the resistance dough offers to the mixing blades during a prolonged and relatively gentle mixing action at constant temperature by transmitting is to a dynamometer. The dynamometer, in turn, is connected to a lever and scale system and to a pen which traces a curve on a registered chart.

Basically, there are eight parts to a farinograph:

1. mixing bowl
2. dynamometer
3. lever system
4. scale system
5. recording mechanism
6. dashpot
7. thermostat
8. buret

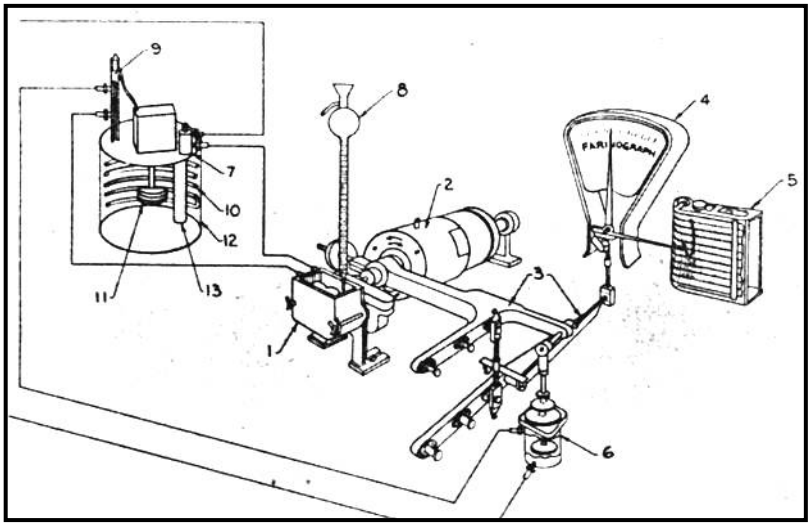

Figure 1. Diagram of the basic parts of the farinograph

The use of the farinograph: 1. evaluating flours baking quality
2. preparing dough at optimal stage for another tests (extensigraph, fermentograph, maturograph, baking test)

The farinograph indicated basically two important physical dough properties:

1. absorption or amount of water required for a dough to have a definite consistency
2. general mixing profile of the mixing behavior of dough or the tolerance of the dough to mechanical abuse.

Procedure: ISO 5530-1

1. flour weight of 300 g
2. distilled water tempered to 30 °C
3. titration curve registration – evaluation of flour water absorption
4. standard curve registration
5. curve parameters assessment

Seven basic types of curve shape (the farinograms):

1. short peak time and short stability
2. short peak time and long stability
3. medium peak time and short stability
4. medium peak time and long stability
5. long peak time and short stability
6. long peak time and long stability
7. double peak, swayback or dip in the early part of mixing.

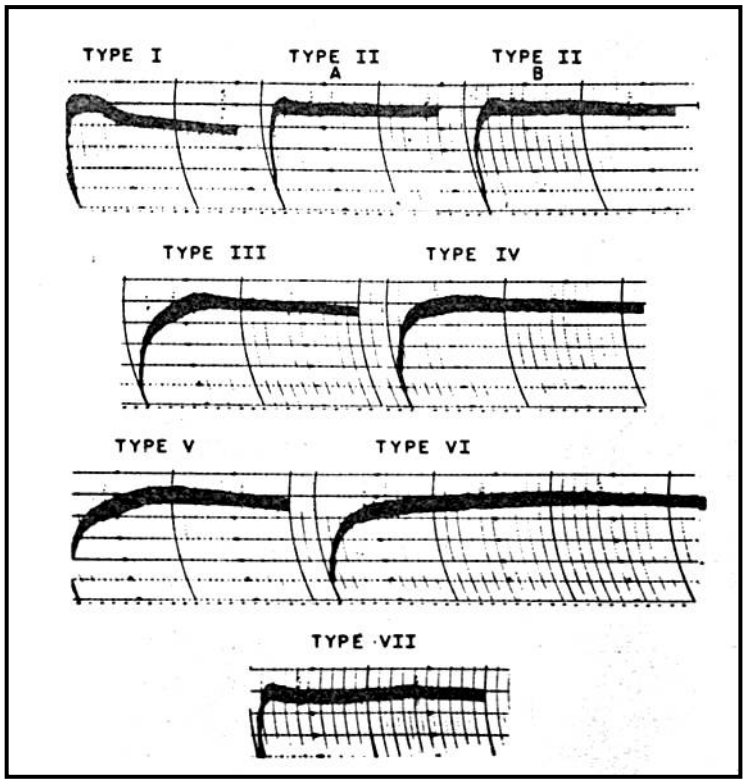

Figure 2. Farinogram curve types

Readings from a farinogram:

1. **Arrival time** – is the time required for the top of the curve to reach the 500 Brabender unit (BU) line after the mixer has been started and the water introduced. This value is a measurement of the rate at which the water is taken up by the flour. Generally, for a given variety of wheat, the arrival time increases as the protein content increases.
2. **Dough development** – is the time from the first addition of the water to the development of the dough's maximum consistency, or minimum mobility, measured to the nearest half-minute. This value is also referred to as "peak" or "peak time". Occasionally, two peaks may be observed, the second should be taken as the dough development time. This value gives some indication as to the development time or mixing time of the flour.
3. **Dough stability** – is the difference in time, to the nearest half-minute, between the time when the curve first intercepts the 500BU line (arrival time) and the time when the curve leaves the 500 BU line (departure time). It is generally accepted that longer stability of a flour, the more tolerance is to mixing.
4. **Mixing Tolerance Index (MTI)** – is the difference in BU from the top of the curve at the peak to the top of the curve measured 5min after the peak or the drop off or 20 min drop-it is the difference in BU from the 500BU line to the center of the curve measured 20min after the addition of the water. Flours with low MTI have a good tolerance to mixing, while flours with high MTI's are critical to mixing and especially to overmixing.
5. **Departure time** – is the time from the addition of the water to when the curve leaves the 500BU line. Long departure time indicates flour with good tolerance to mixing.
6. **Absorption** – is the amount of water required by a given weight of flour to yield dough of given consistency. The usually accepted consistency corresponds to a curve that centers on the 500 BU line. The farinograf absorption value may be correlated with bake absorption within limits.

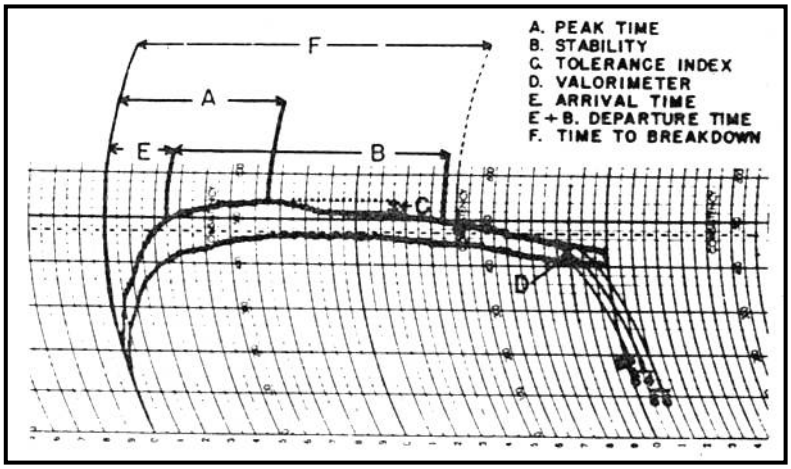

Figure 3. Readings from a farinograph

References: The Farinograph Handbook, ed. W.C Shuey, AACC 1972