Pre-hydrate flour with Rapidojet by Dr. Lin Carson and Dr. Gary Hou

Method

Control: Bread dough was mixed and baked using 63% water absorption
Test 1: Pre-hydrate flour with Rapidojet to 63% water absorption at low pressure (56 bar)
Test 2: Pre-hydrate flour with Rapidojet to 70% water absorption at high pressure (85 bar)

Bread Formulation

INGREDIENTS	Control (%)	Rapidojet (%, 56 bar)	Rapidojet (%, 85 bar)	Rapidojet (%, 56 bar)
Flour	100.00	100.00	100.00	100.00
Water (15^0C)	**63.00**	**63.00**	**70.00**	**70.00**
Instant Yeast (Red)	1.10	1.10	1.10	1.10
Salt	1.60	1.60	1.60	1.60
Sugar	5.00	5.00	5.00	5.00
Shortening	3.00	3.00	3.00	3.00
J&K Dough conditioner	0.25	0.25	0.25	0.25
Ca Propionate	0.25	0.25	0.25	0.25

Procedure

- Traditional dough
  1) Place all ingredients except for shortening into spiral mixing bowl and mix at low speed for 2 min. Add shortening after 1 min.
  2) Mix till the dough is developed (~5 min.). Desired dough temperature is 27ºC. Remove dough from the bowl.

- Rapidojet dough

1) Place Rapidojet dough and all other ingredients into spiral mixing bowl and mix at low speed for 30 sec.
2) Mix till the dough is fully developed (3 min.). Desired dough temperature is 27ºC. Remove dough from the bowl.
3) Divide into 500 grams pieces for open top loaves. Round dough pieces to smoothen the surface and cover with a plastic sheet to prevent crusting.
4) Allow an intermediate proof time of 15 minutes for the dough to relax.
5) Flatten the dough pieces and pass them through the dough molder.
6) Place molded dough pieces into oil-sprayed pans.
7) Proof at 38ºC and 85% R.H. till the dough surface touches the template (3-cm height) (60-70 min).
8) Bake at 216ºC (420^{0}F) for 23 minutes.
9) Remove from the pans and cool on the sample rack for 30 min.
10) Weigh bread and determine volume and specific volume
11) Slice bread and measure for moisture, water activity and texture

Results

1. Reduced dough mixing times

The control dough was mixed for 2 min. at low speed and 5 min. at high speed in a spiral mixer. Tests 1 and 2 were mixed for 30 sec. at low speed and 3 min. at high speed. This is a 50% reduction in mixing time.

Figure 1. Flour being pre-hydrated with the Rapidojet

Figure 2. Mixing of the Control dough

2. Increase in volume and softness

Figure 3. Profile view of the loafs

Figure 4. Cross section of the loafs

Table 1 – Bread Physical Attributes Comparison

	Control	Test 1	Test 2
Dough water absorption (%)	63	63	70
Bread firmness (24 hr, g)	437	320	337
Water activity	0.959	0.961	0.955
Bread moisture (%)	42.01	40.21	40.96

3. Moisture and texture

It may seem that the control bread has more moisture. However, they were all baked at the same time and temperature. This information shows that with the same amount of energy, Rapidojet samples had greater bake out, mostly due to its open grain. This means that more time would be needed to bake the control sample to get it down to 38% (FDA's regulation for buns and rolls).

Rapidojet samples produced also produced softer bread, and this indicates a better shelf life in terms of texture.

Conclusion:

Pre-hydration of flour by Rapidojet resulted in 50% reduction of dough mixing time, a substantial increase in loaf volume, and an increase in crumb softness without affecting water activity.