Rapidojet for oily dough

IN THE BOOMING SNACK MARKET, DOUGH CONTAINING OIL IS USED MAINLY FOR ASIAN TYPE PRODUCTS. THIS DOUGH CAN BE PRODUCED WITH THE RAPIDOJET

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A very close look is required to comprehend what is happening within a fraction of a second. Flour freely falls down through a mixing tube and air wetted with a liquid stream is discharged from a nozzle at about 350 km/h speed. The mixture is thrown against the mixing chamber's wall and ejected at the bottom. The dough is then collected in a hopper. This is the end of the hectic rush. From here the dough is slowly pumped to where it is needed for further processing. It seems a pity that the entire process takes place in a closed apparatus. The process is only recognizable by the uniform sound of the high-pressure pump and the rotating nozzles. Talking to someone in a quiet voice, while standing right next to the machine is no problem at all. The equipment is remarkably quiet. The small version of the machine can produce 650 kg dough per hour, with the energy consumption being only 1.5 kW.

The only openings in the system below the flour feed are the dough discharge and an exhaust air hose which is rather uncommon for a mixer. This hose is necessary because the high pressure jet stream develops a large suction effect. Air is sucked in as a result of the Venturi effect, and almost casually creates the requirements for the good oxidative dough development. A costly oxygen impregnation of the water is no longer necessary. This is one of the reasons why dough made in the Rapidojet is different. The second reason is the optimum wetting. During free fall, the surface is enlarged and the individual flour particles are easily accessible for the quickly moving water droplets. During the impact at the wall an enormous impulse transition takes place. The velocity is decelerated from the speed of a Formula 1 car to almost zero. The result: the water completely penetrates the flour particle instead of just wetting the surface. It does not require kneading as in conventional mixers.

The liquid used also deserves a second look. It contains all soluble and suspendable ingredients including salt and yeast. A direct comparison with conventionally prepared dough confirms that the yeast will survive the short high-pressure process without any damage. On the contrary, the proofing performance increases slightly because of the optimized wetting. Mixing salt and yeast in the water are not a problem. Despite the fact that experience has demonstrated that both ingredients in their pure forms are not compatible, but in the liquid they are present in the same ratio as later in the dough.

The possibility of using significant amounts of oil in the liquid is comparatively new. Traditionally, oil can only be mixed into liquid dough when using high-shear mixers or adding emulsifiers. In the Rapidojet the homogenizing effect of the high-pressure nozzle is advantageous. In a premixing container, oil and water are pre-emulsified by a small stirrer. Alternatively, the pre-emulsion can also be made by a simple pumping process. This pre-emulsion is fed via high-pressure pump into the nozzle and homogenized upon discharge from the nozzle. This way the flour comes into contact with an already stabilized emulsion. The general difference compared to a conventional kneading process is that the emulsion does not have to be produced in the dough,

which is fairly difficult and requires drastic processing conditions, but rather comes into contact with the flour while it is already stabilized. When comparing the creaming velocity of the pre-emulsion from the pre-mixing vessel with the emulsion stabilized by high-pressure in the Rapidojet, it can be proven that the stability has increased by factor 10 approximately. Thus it takes 10 times longer until a visible separation of oil and water takes place. Since flour will bind both components, no oil is excreted on the dough's surface during the processing period, even if the dough has to rest for several hours in the cooling chamber.

It is already known that the Rapidojet is perfectly suitable for the production of pre-ferments. Most important benefits in this field are a higher dough yield, enhanced proofing stability and stronger oven spring.
With the option to incorporate oil in the dough in a stable form another application becomes possible, apart from bulk products such as bread and rolls, and that is namely convenience and snack products. The latter ones include for example Asian specialty products such as spring rolls and samosas as well as soft pretzel products (pretzel sticks), pancakes, crackers and wafers.

For the production of firmer doughs that cannot be pumped, the pump below the discharge opening of the Rapidojet is replaced by a vat or conveying belt. The process itself is no longer limited to the production of soft dough or batters, as even crumbly masses for pasta production can be made in this way. +++

++ **figure 1**
Rapidojet

++ **figure 2**
Dosing station