Fried Instant Noodles and Air Dried Noodles Processing Technology

Liu Jun
From Grain to Noodles

Grain Logistics → Milling Process → Noodle Process → Customer Final Products
Customer Final Noodle Products

Fried Instant Noodles

- Packing Type
- Noodle Shape
Customer Final Noodle Products

Air-Dried Noodles

- Packing Type
- Noodle Shape
Customer Final Noodle Products

Air-Dried Noodles

- Packing Type

Air-Dried Noodles

- Noodle Shape
Fried Instant Noodle Technology

Flowsheet

Continuous dough mixing system
(Incl. scales for flour and additive adding, cont. high speed and dough mixer)

Water mixing and dosing

Centralized control system

Fried instant noodle line
(from ripening conveyor to collecting conveyor before packaging)
Fried Instant Noodle Technology
Layout - Capacity of 200'000pcs/8h as Reference
Air-Dried Noodle Technology

Flowsheet

Continuous dough mixing system
(Incl. scales for flour and additive adding, cont. high speed and dough mixer)

Water mixing and dosing

Centralized control system

Air-dried noodle line
(from ripening conveyor to collecting conveyor before packaging)
Air-Dried Noodle Technology

Layout - Capacity of 170’000pcs/8h as Reference
Raw Materials and Technical Functionality - Wheat Flour

Characteristics that favor the gelatinization of starch and the gluten network in noodles

**Gluten Network:**

- High protein content
- Quality of gluten
- Low coagulation temperature of the proteins
- Presence of thermally unstable soluble proteins
- Uniform distributions of the proteins
- High gelatinization temperature of the starch

**Gelatinization of Starch:**

- Quality of the starch
- Low starches damages
- Larger diameters of the starch granules
- Lack of preventative polymerization of the gluten
- Unequal distribution of the proteins
- Presence of coagulated mass proteins
Optimal Flour for Noodle production

Chemical and physical data

<table>
<thead>
<tr>
<th>Moisture (%)</th>
<th>Protein content (%db)</th>
<th>Wet Gluten (%)</th>
<th>Gluten Index (%)</th>
<th>Ash (%db)</th>
<th>Falling number (sec)</th>
<th>Starch damage (%)</th>
<th>Farinogram stability time (min.)</th>
<th>Wet gluten extensibility (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13~14</td>
<td>&gt;10</td>
<td>30~32</td>
<td>60~90</td>
<td>&lt;0.6</td>
<td>&gt;300</td>
<td>&lt;10</td>
<td>&gt;4</td>
<td>&gt;10</td>
</tr>
</tbody>
</table>

Granulation:

![Granulation Graph](image)
Raw Materials and Technical Functionality
Refined, Bleached and Deodorised Palm Oil in noodles

RBDO’s Functionality in frying
- Remove the moisture
- Make noodle strands microporous
- Fix product gelatinization degree
- Promote the flavour

Benefit
- Extended product shelf life
- Fast rehydration time, easy to cook
- Easy to cook
- Increase the oily and fine taste

Physicochemical data

<table>
<thead>
<tr>
<th>Colors</th>
<th>Smells</th>
<th>Moisture (%)</th>
<th>Acid value (mgKOH/g)</th>
<th>Peroxide value (meq/kg)</th>
<th>Iodine value</th>
<th>Free fatty acid (%)</th>
<th>Rancidity test</th>
<th>Melting point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light yellow</td>
<td>Normally and no unpleasant</td>
<td>≤0.05</td>
<td>≤0.2</td>
<td>≤2</td>
<td>51-55</td>
<td>&lt;0.4</td>
<td>Negative</td>
<td>24-39</td>
</tr>
</tbody>
</table>
## Raw Materials and Technical Functionality

### Food additivities - Examples

<table>
<thead>
<tr>
<th>Additivities</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edible salts</td>
<td>● Promote the protein absorbing more water and expanding to enhance dough viscoelasticity and extensibility</td>
</tr>
</tbody>
</table>
| Blended alkali(K$_2$CO$_3$,Na$_2$CO$_3$,NaHCO$_3$) | ● Enhance dough elasticity and extensibility  
  ● Promote the starch gelatinization to enhance rehydration  
  ● Decrease noodle gelatinization viscosity to make the noodle smoother  
  ● Biosyntheses makes the noodle better appearance and flavor  
  ● Reduce the cooking loss |
| Thickener (Guar gum, Na Carboxyl Methyl Cellulose, Locust bean gum, etc.) | ● High viscosity makes noodle taste smooth, reduce the cooking loss, improve the cooking tolerance  
  ● High water binding capacity improve the dough absorbing water and good for network forming, increase the gelatinization |
## Raw Materials and Technical Functionality

### Food additivities - Examples

<table>
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<th>Functionality</th>
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</thead>
<tbody>
<tr>
<td>Emulsifiers (LC-soy lecithin, GMS-Mono stearin)</td>
<td>● Improve gluten quality</td>
</tr>
<tr>
<td></td>
<td>● Prevent starch aging</td>
</tr>
<tr>
<td></td>
<td>● Spread oil and fat evenly</td>
</tr>
<tr>
<td>Blended phosphate group</td>
<td>● Retention of water</td>
</tr>
<tr>
<td>(NaPO$_3$, Na$_5$P$<em>3$O$</em>{10}$,Na$_4$P$_2$O$_7$)</td>
<td>● Improve starch gelatinization and gluten quality</td>
</tr>
<tr>
<td></td>
<td>● Improve noodle elasticity and surface smoothness</td>
</tr>
<tr>
<td></td>
<td>● Reduce cooking loss</td>
</tr>
<tr>
<td>Antioxidants ( Vitamin E)</td>
<td>● Prevent oxidation of oil</td>
</tr>
<tr>
<td></td>
<td>● Prevent the fat contained in noodles</td>
</tr>
<tr>
<td>Fortifier dietary supplements</td>
<td>● Nutrient enrichment</td>
</tr>
<tr>
<td>( Vitamin B$_1$,B$_2$, Calcium, etc.)</td>
<td></td>
</tr>
<tr>
<td>Colors (Gardenia yellow, Carotene etc.)</td>
<td>● Improve the noodle appearance</td>
</tr>
</tbody>
</table>
Main Equipment
Continuous Dough Mixing System

- Differential Dosing Scale
- High-speed Mixer
- Double-shaft Continuous Dough Mixer
- Water Dosing System

Water, etc.
Dough
Flour, etc.
Main Equipment
Noodle Production Line

- Compound + Continuous Rolling Unit
- Steaming Unit
- Cutting Folding / Dropping Unit
Main Equipment
Noodle Production Line

Frying Unit

- Heat Exchanger
- Oil Tank
- Main Fryer
- Fryer Lifting
- Control Panel

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Main Equipment
Noodle Production Line

Drying Unit
Main Equipment
Auto-Packaging Line

Packaging Machine
Pouch Dispenser
Noodle Complementary Device
Servo feeder
Main Equipment
WinCos Control System

- Powerful database
- Ethernet Latest communication technology: **OPC**
- Process interlocking, equipment- and process control
- Profibus
- Management level for recipes, jobs, products etc.
- **Graphical** processes with actual values

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## Quality Control

<table>
<thead>
<tr>
<th>Items</th>
<th>Critical Control Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Materials quality control</td>
<td>● Residual agriculture chemicals and veterinary drugs</td>
</tr>
<tr>
<td></td>
<td>● Food allergy testing</td>
</tr>
<tr>
<td></td>
<td>● Carcinogens</td>
</tr>
<tr>
<td></td>
<td>● Food poisoning bacteria groups</td>
</tr>
<tr>
<td></td>
<td>● Radioactive substances</td>
</tr>
<tr>
<td></td>
<td>● Heavy metals</td>
</tr>
<tr>
<td></td>
<td>● Irradiation verification</td>
</tr>
<tr>
<td>Processing Control</td>
<td>● Quality Management system</td>
</tr>
<tr>
<td></td>
<td>● Manufacturing practices</td>
</tr>
<tr>
<td></td>
<td>● On-site inspection</td>
</tr>
<tr>
<td></td>
<td>● Food safety and Hygiene management</td>
</tr>
<tr>
<td></td>
<td>● Maintenance</td>
</tr>
<tr>
<td></td>
<td>● Cleaning activities</td>
</tr>
</tbody>
</table>
## Physicochemical data

<table>
<thead>
<tr>
<th></th>
<th>Fried Instant Noodle</th>
<th>Air Dried Noodle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colors</td>
<td>Milk white/Faint yellow</td>
<td></td>
</tr>
<tr>
<td>Smells</td>
<td>Odorless</td>
<td></td>
</tr>
<tr>
<td>Impurities</td>
<td>No visible</td>
<td></td>
</tr>
<tr>
<td>Moisture (%), ≤</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Fat (%), ≤</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>NaCl (%), ≤</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Acid value (in fat) (mgKOH/g), ≤</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Peroxide value (in fat) (meq/kg), ≤</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>IOD value, ≥</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Rehydration time (min.), ≤</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>
Thank you!