# Comprehensive Analysis of theAutomaticBiscuit Production Line: Raw Materia Processes, and Technological Innovations

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## Introduction

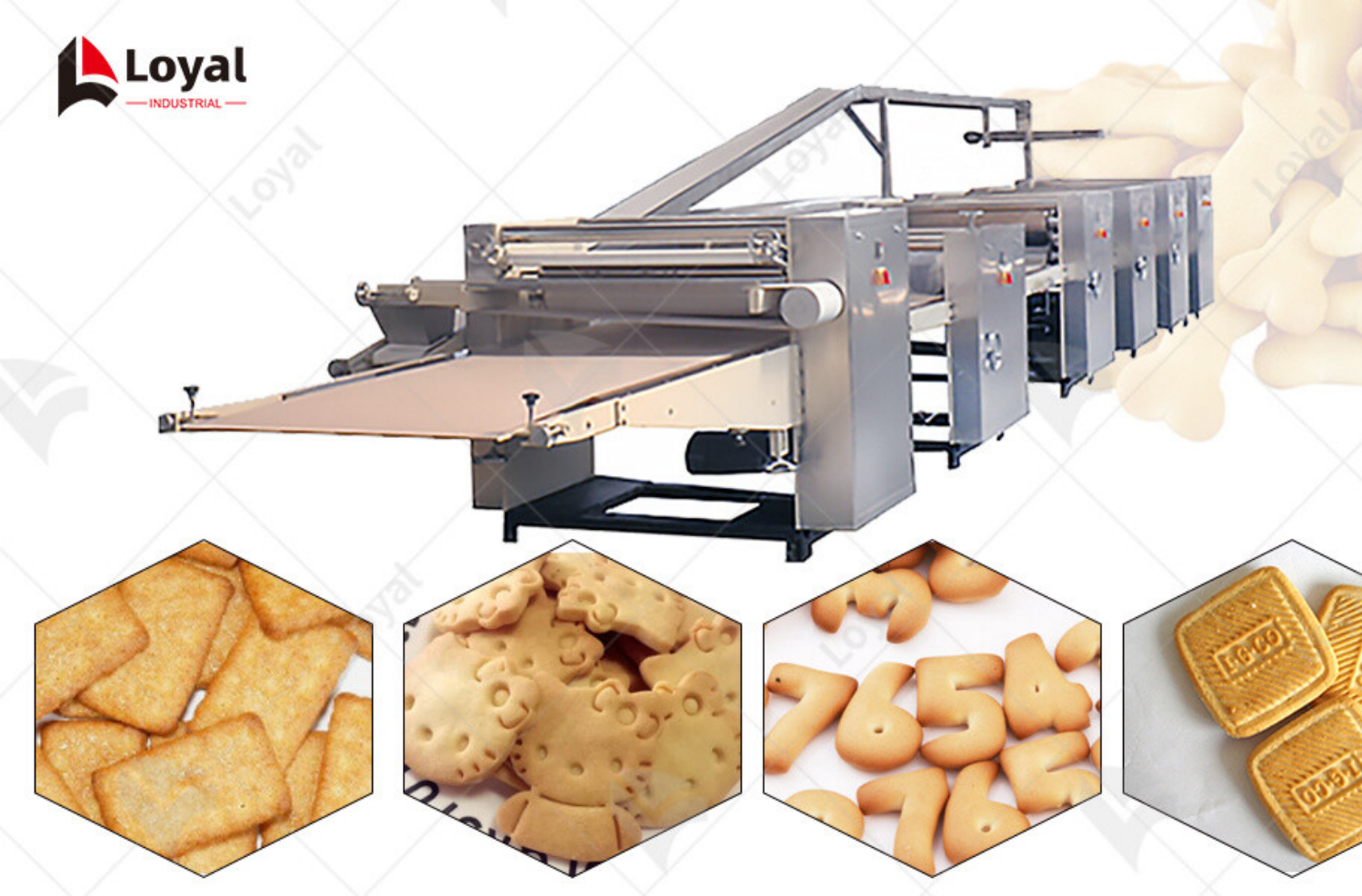
In the global snack food market, biscuits have always held an unshakable position. According to Statista data, the global biscuit market size exceeded $125 billion in 202 a stable compound annual growth rate of over 4.5%. China, as the world's second-la consumer market, produces more than 8 million tons of biscuits annually, making it o the core engines driving the food industry's growth.

However, under the impact ofconsumption upgrade and the health eating trend, the traditional biscuit industry is facing dual challenges: on one hand, consumers' require for product quality are becoming increasingly stringent, shifting from 'filling snacks' to sugar, low fat,' and 'gluten-free' functional needs; on the other hand, rising labor cost energy pressures are forcing companies to seek more efficient and smarter productio solutions.

In this context, the value of new type automatic biscuit machine production line for co becoming increasingly prominent. Through scientific innovation in raw material formu precise control of production processes, and the large-scale application of fully autom equipment, biscuit manufacturing has not only achieved a leap from 'experience-drive 'data-driven,' but also opened up new possibilities in texture, flavor, and health attribu

This article will delve into the core links of the biscuit production chain: from the differentiated application of raw materials such as wheat flour and tapioca starch, to t underlying logic of crumbly/elastic biscuit processes, and finally, how fully automatic production lines reshape industry standards through technological innovation, providi

practitioners with a reference guide that combines theoretical depth and practical valu




Core ingredient analysis:wheat flour vs. tapioca starch

The flavor and texture of biscuits are determined by more than 60% of the ingredient
Among these, wheat flour and tapioca starch, as the two main base ingredients, signi
influence the product's positioning and process design due to their different chemical
properties.

Wheat flour: The backbone builder of traditional biscuits

Chemical properties:
Wheat flour is made from grinding the wheat endosperm and consists mainly of starc
75%) and protein (8-15%). Its core value lies in gluten protein (Gluten), which forms a
dimensional network when water is absorbed by gliadin and glutenin, giving dough el
and extensibility. Based on protein content, wheat flour can be classified into:
• High-gluten flour (protein ? 12%): Suitable for hardbiscuits, requiring strong kneadin
• Low-gluten flour (protein ? 9%): Used for softbiscuits, avoiding overdevelopment of

Craftsmanship
During baking, gluten networks interact with starch:

• Shape support: Gluten denatures and solidifies between 60-80?, forming the biscuit structure;
• Moisture control: Starch gelatinization absorbs free water, affecting crispness and s life;
• Maillard reaction: Proteins and reducing sugars generate caramelized flavor compo temperatures above 140?.

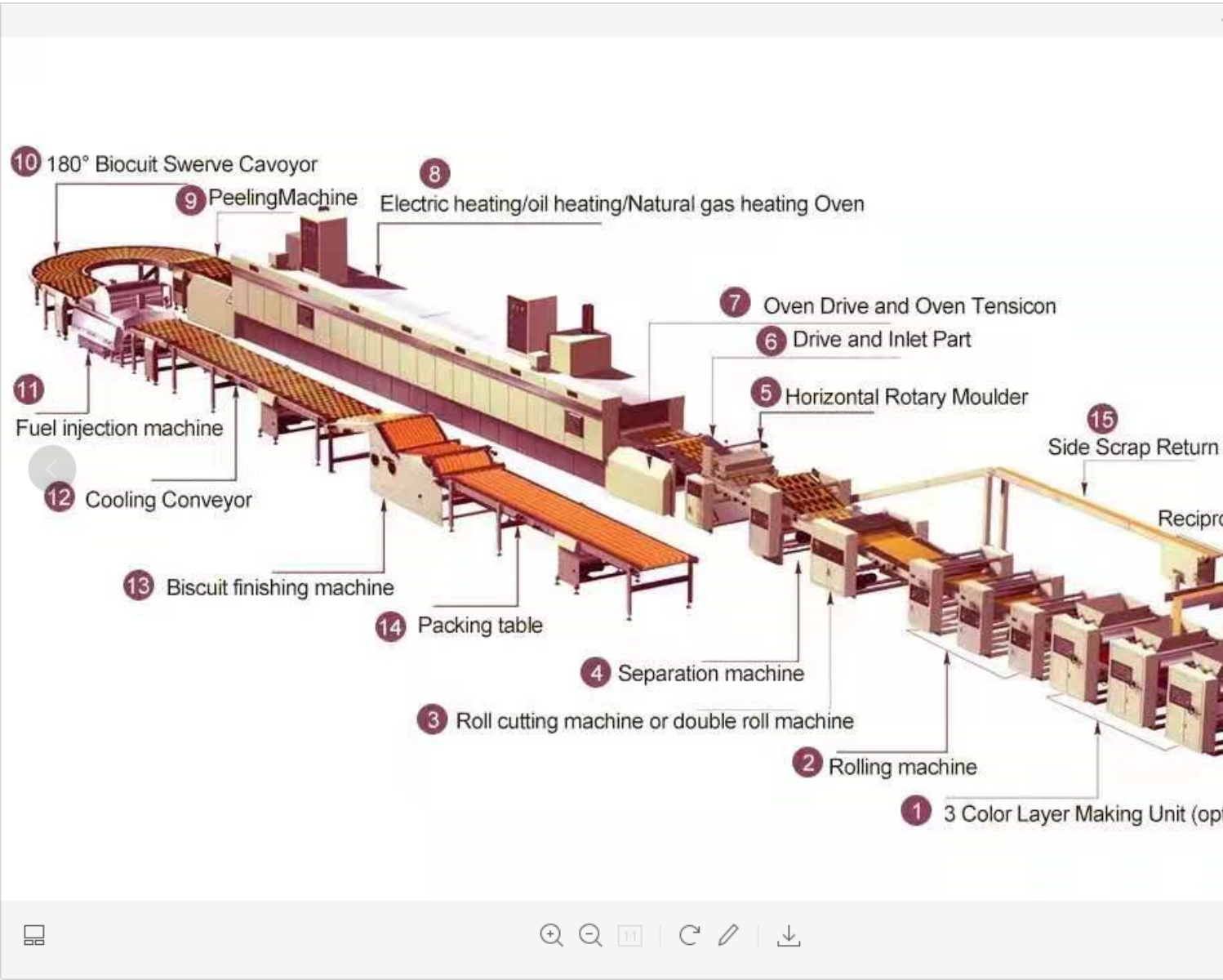
Industry applications
Traditional hardbiscuits, such as soda crackers, rely on the extensibility of high-gluten forming dense layers through rolling and folding. In contrast, softbiscuits use low-glut to reduce elasticity and combine it with high fat content (20-30%) to block gluten connections, achieving a melt-in-your-mouth crispiness.

2.Cassava starch: an innovative carrier for the gluten-free revolution Chemical proper

Chemical properties:
Cassava starch is extracted from cassava roots and contains up to 83-88% starch, w almost no protein or fat. It has low levels of amylose (17-20%) and a gelatinization temperature (52-64°C) that is significantly lower than wheat flour (58-68°C), resulting transparent and hard gel structure when cooled.

Advantages of the process:
• Increased crispiness: The small granules of cassava starch expand rapidly and burs high temperatures, creating honeycomb-like pores;
• Low oil absorption: The gluten-free network reduces fat adsorption, allowing for a re in fat content by 15-20%;
• Strong stability: Wide pH tolerance range (4-10), suitable for adding acidic flavor components such as fruit acids.

Health transformation
The global gluten-free food market is expanding at an annual growth rate of 11.5% (G View Research, 2023), with tapioca flour becoming the preferred choice for celiac dis patients and low-carb diet enthusiasts. For instance, a certain brand has launched ta based sea salt biscuits that incorporate potato protein to enhance structural strength, achieving a 90% taste resemblance to gluten-containing biscuits.




Biscuit Forming Process

DOUGH MIXING MACHINE SOFT&HARD BISCUIT SHAPING MACHINE TUN

OVEN SPRAYING MACHINES COOLER

Multifunctional biscuit make machine process is a precise manufacturing procedure t integrates food science with mechanical automation. The entire production line, from material mixing to finished product packaging, is meticulously designed to ensure the product achieves optimal taste and quality standards.

The automatic biscuit production line begins with the flour mixing stage, which is carr by professional mixers. The mixer combines high-quality wheat flour, fresh eggs, fine and various seasonings according to strict proportions. Through the rotational moven dual stirring paddles, all ingredients are thoroughly blended. Modern mixing equipme typically includes temperature control systems that maintain the mixture's temperatur

an ideal range, ensuring the dough has the perfect elasticity and consistency. After 1
minutes of thorough mixing, the uniform dough is automatically conveyed to the next

The shaping process varies depending on the product type. For hard biscuits, a rollin
is used to press the dough through multiple rollers into uniform sheets of consistent
thickness, which are then cut with specially designed molds that often feature various
or innovative shapes such as circles, squares, or hearts, each meticulously crafted to
precision and aesthetic appeal. Soft biscuits are shaped using a stamping machine, v
the dough takes on patterns from engraved rollers, creating beautiful three-dimensior
designs on the surface of the biscuits, which may include flowers, animals, or other ir
decorations, adding a touch of elegance and charm to each piece. During the shapin
process, advanced visual inspection systems continuously monitor the shape integrity
each biscuit, automatically removing any substandard semi-finished products to ensu
quality and consistency of the final product, maintaining the brand's reputation for exc
and customer satisfaction.

Baking is the crucial step that determines the final quality of biscuits. Tunnel ovens ar
designed with multiple temperature zones, through which biscuits pass through prehe
baking, and browning sections. The preheating zone maintains a temperature of 120-
with warm air gently enveloping the biscuits to initially set their internal structure, grad
making them soft and elastic; the baking zone increases the temperature to 180-220°
where high heat triggers the Maillard reaction, releasing rich aromas and causing the
surface to turn a tempting golden color; finally, the browning zone precisely controls t
surface color, adjusting temperature and time to achieve the ideal shade, ensuring th
biscuits are not overly burnt while retaining their luster. Modern ovens are equipped v
air circulation systems to ensure even temperature distribution within the oven, with a
temperature difference not exceeding ±3°C, allowing each biscuit to bake under optir
conditions, resulting in a crispy texture and fragrant aroma.

After baking, the biscuits undergo an oil spraying process that imparts a unique flavo
sheen. The automatic oil spraying system uses high-pressure atomization technology
evenly spray edible oil on the biscuit surface, with the amount of oil controlled by a pr
metering pump to be between 0.5 and 1.2 grams per biscuit. Some premium products
add flavored oils or nutritional enhancers at this stage to increase their added value.

The cooling process is equally crucial, as freshly baked biscuits need to pass through
cooling conveyor belt that is 15 to 20 meters long. This specially designed conveyor s
is equipped with temperature and humidity control devices, using a combination of na
convection and forced ventilation to gradually reduce the biscuit temperature from arc
80°C to room temperature. During this process, moisture inside the biscuits continues

distribute evenly, ultimately achieving the ideal crispy texture. At the end of the conve
belt, a metal detector performs the final quality check.

What are the advantages of this line?

A complete soft and hard biscuit production line , which can make all kinds of biscuit
various shapes, just change the mold.

?Soft & Hard Biscuits: Adjust dough consistency, baking time, and temperature to pro
chewy, crispy, or layered biscuits.

?Multiple Shapes & Designs: Simply change the mold to switch between round, squa
animal-shaped, or custom-designed biscuits.

?Wide Recipe Compatibility: Works with various dough types, including sugar-based,
savory, gluten-free, and high-fiber recipes.

The biscuit production line can be customized according to the customer's workshop
biscuit making technical requirement

?Adaptable Layout: The machine can be adjusted in size, conveyor length, and confi
to fit small, medium, or large workshops.

?Tailored Technical Specifications: Customize baking time, temperature zones, and c
speed based on your biscuit type.

?Optional Add-ons: Additional modules like chocolate coating, cream filling, or double
baking can be integrated.

Have different heating sources for your operation (Electric, gas, Diesel oil)

?Electric Heating: Best for stable temperature control, suitable for indoor factories wit
electricity supply.

?Gas Heating: Cost-effective for large-scale production with consistent heat distributi

?Diesel Oil Heating: Ideal for areas with limited gas or electricity access, providing hig
thermal efficiency.

It is full automatic, advanced technology, easy to operation, high quality,save energy
labor,  reasonable price to win customer reply and reputation.

?PLC Touch Screen Control: Easy-to-use interface for adjusting speed, temperature,
baking time.

?Energy-Saving Design: Optimized heat circulation and insulation reduce power
consumption.

?Minimal Labor Requirement: Automated feeding, forming, baking, and packaging re
manual work.

?Smooth & Stable Performance: Precision-engineered components ensure low maint
and long service life

?In today's increasingly competitive biscuit industry, (company name) focuses
challenges in production and helps customers :

a. Reduce energy costs
b. Improve yield
c. Gain small-lot flexible production capacity

This automatic biscuit production line, developed through the careful integration of ad
Japanese technology, features cutting-edge equipment design. It boasts a sleek, c
and robust structure capable of withstanding rigorous daily operations while maintain
automation. The line efficiently manages every step of the biscuit-making proces
evenly distributing dough during feed rolling to precisely shaping biscuits, followed b
recycling, thorough drying, delicate coating, and final cooling, all in a seamless co
operation. The feed rollers ensure the dough is uniformly spread, creating co
thickness and texture. The shaping unit employs precision mechanisms to form
designs and patterns, enhancing the visual appeal of each biscuit. Waste recycling s
collect excess dough and re-integrate it into the production cycle, minimizing wa
maximizing efficiency. The drying phase utilizes gentle heat to achieve optimal m
levels, ensuring crispness without compromising flavor. Delicate coating stations
variety of toppings, such as chocolate, sugar, or nuts, with pinpoint accuracy. T
cooling stage stabilizes the biscuits, preserving their shape and enhancing their s
Users have access to hundreds of molds for various shapes and sizes, along with do
carefully crafted formulas, enabling versatile and customizable production. By
changing the mold and adjusting the process recipe, manufacturers can easily pro
wide range of popular high-end biscuits with unique textures, rich flavors, and ap
appearances, catering to diverse consumer preferences. Each biscuit emerges from
with a perfect balance of crunch and softness, inviting consumers to savor the d
combination of taste and texture.

The fully automatic biscuit production line achieves dual breakthroughs in efficien quality through precise process control, such as differentiated dough preparat segmented temperature control during baking, as well as intelligent equipment like molds. In the future, with the integration of low-carbon energy-saving technolo personalized customization needs, biscuit production will evolve towards bein efficient and environmentally friendly.