

How Krispy Kremes Work

by Tom Harris

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In the southern United States, sweets fans have been scarfing down Krispy Kreme doughnuts for more than 50 years -- in many families, they're a weekly ritual! The rest of the country finally got a taste in the '90s, when Krispy Kreme launched new doughnut stores coast to coast, to much fanfare. The company's unique snacks have also crept into pop culture over the past few years, appearing in several TV shows and in dozens of national magazines. On top of that, Krispy Kreme has been making headlines in the financial world -- it was one of the best performing initial public offering stocks in 2000.



All this, as well as some grumbling stomachs, seemed like a good excuse to stop by our local Krispy Kreme for a peek behind the scenes. In this edition of HowStuffWorks, we'll see how the Raleigh, NC, "factory store" transforms raw ingredients into Krispy Kreme's signature doughnut, the "original glazed." We'll also see how the store's doughnut-makers get chocolate filling in the middle of doughnuts, and find out a little bit about Krispy Kreme's distribution structure.

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Mixing and Extruding

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The Raleigh Krispy Kreme is one of Krispy Kreme's many factory stores, bakeries that make doughnuts for walk-in customers as well as for local grocery stores. All the factory store's ingredients are prepared in a Krispy Kreme manufacturing facility in Winston Salem, about two hours away. In the factory store back room, we found stacks of doughnut mix, sugar, yeast, doughnut filling and other packaged ingredients.



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A batch of original glazed starts with Krispy Kreme doughnut mix, water and yeast, the same single-cell fungi used to make bread rise. The yeast is what makes the original glazed so light -- it puffs the dough up with air, so it's not dense like a cake doughnut. (More on this in the next section).

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The bakers mix the ingredients to form a dough, which they pour into a hopper. The hopper feeds into an extruder, the device that forms the dough rings that eventually become doughnuts. The extruder machine uses pressurized air to force dough through

a ring-shaped cutter -- a cylindrical cutter around another round cutter. Since the cutter forms doughnuts in the shape of a ring, there is never really a cut-out hole in Krispy Kreme doughnuts. The extruder deposits the ring-shaped dough directly onto a rack conveyer belt that takes the doughnut to its next stop, the proof box.

The Factory Store

The factory store model goes back to the very first Krispy Kreme, established in Winston Salem, North Carolina, in 1937. The founder, Vernon Rudolph, originally set up a doughnut distribution factory without a storefront, but customers kept dropping by asking for hot doughnuts. He built a window into the factory wall and started selling doughnuts fresh off the line.

The Proof Box

- 6 The proof box, or proofer, is a tall glass case that houses a doughnut conveyer belt. The conveyer belt carries doughnut trays slowly up and down in a zig-zag motion all the way through the proof box. The purpose of the proof box is to surround the doughnuts with heat and humidity. Humidity and low heat make the yeast organisms more active without killing them. When the yeast becomes active, it eats sugar and releases carbon dioxide gas as a waste product. The carbon dioxide expands, creating air pockets all through the dough (see How Bread Works for more info).



In order to heat the doughnuts to just the right temperature, the proof box machine has to keep the heat and humidity at very specific levels for a certain amount of time. If it gets too hot or humid, the machine opens up vents in the side of the proofer to let some air out. Krispy Kreme doesn't publicize the exact proofer settings, as they're part of the secret recipe. The dough spends 15 to 20 minutes in the proof box.

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As the conveyer belt carries the dough through the proof box, the yeast transforms the dough from a thin ring to a full size, puffed-up doughnut. When the doughnut has fully expanded, it's ready to be cooked.

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Frying

- 9 The conveyer belt tips each doughnut tray over at the end of the proofer run, dropping the doughnuts onto another conveyer belt that takes them through the rest of the preparation process. The second conveyer belt and the proofer belt are connected by a gear train so they'll always move in unison.



The first step after the proofer is to cook the dough. Like most doughnuts, Krispy Kremes are fried (cooked in oil). Frying cooks the dough rapidly from the outside in to give the doughnuts their distinctive crispy texture.

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The conveyer belt carries the doughnuts through a vegetable oil bath heated to between 355 and 360 degrees Fahrenheit (about 180 C). The doughnuts actually float in the bath as they're pushed along

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by the bars connected to the belt. Since the doughnuts are floating, the bath only cooks one side at a time. After the first side cooks, the doughnuts pass over a rotating arm that lifts them up and tips them over. After they're cooked, the conveyer pushes the doughnuts out of the oil onto the cooling belt.

- 12 The bakers have to fry the doughnuts for a very specific amount of time in order to ensure the right taste and texture. At several points during the day, the manager will actually time and check the process to make sure the doughnuts are cooking just right. The doughnuts have to be cooked to 85 to 87 degrees Fahrenheit (about 30 C), which takes about 45 seconds for each side.

Glazing and Cooling

- 13 The final step for doughnuts sold in the store is glazing. The glaze is a mixture of sugar, milk and other ingredients. Bakers prepare the glaze in a large mixing container and then pump it out to the glazing waterfall reservoir.

- 14 Another pump draws glaze up from the reservoir to the top of the waterfall, where it falls down over the doughnuts on the conveyer belt. As each doughnut passes through the waterfall, it's completely coated in glaze. When the machine's running, walk-in customers can get the cream of the crop, hot doughnuts fresh from the glazing machine. The rest of the doughnuts, marked for delivery, stay on the conveyer belt. The belt takes them up a ramp and all the way around the factory room.



16 The long, slow ride (it lasts about 40 minutes) gives the doughnuts plenty of time to cool before they're packed in boxes and on trays for delivery. This is an important step in the process -- packing hot doughnuts immediately would simply be too messy.

17 Right at the end of the line, the doughnuts pass through the chocolate icer, which the bakers use to make chocolate-covered doughnuts. The icer is sort of like the glaze waterfall, but it coats the doughnuts with chocolate. After the icer, the doughnuts pass through the cooling tunnel, a refrigerated, enclosed area where the chocolate hardens rapidly. The machine-iced doughnuts are for delivery shipments. Krispy Kreme hand-dips the doughnuts sold in the stores.



After the cooling tunnel, the doughnuts are ready to go. Packers load them in boxes and on trays, and then stack them onto carts. When it's time to run the route, employees roll the carts onto the delivery trucks. At the Raleigh factory store, the delivery drivers run 14 different routes, serving about 26 merchants each.

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Snack Stats

Krispy Kreme reports these statistics on its Web site:

Every day, Krispy Kreme makes about 5 million doughnuts.

Every year, they make about 2 billion doughnuts.

Every week, they make enough doughnuts to reach from New York to Los Angeles.

Every year, they use up two Olympic-sized swimming pools worth of chocolate.

Every year, they use about 1 million pounds of sprinkles.

Collectively, Krispy Kreme's stores could make a doughnut stack as high as the Empire State Building (that's 1,454 feet or 443 meters) in only two minutes.

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How Krispy Kremes Work

1. What is the purpose of paragraph 1?
 - a. To describe a Krispy Kreme doughnut
 - b. To create interest in the Krispy Kreme topic
 - c. To give the history of the doughnut
 - d. To persuade the reader to buy Krispy Kremes
2. What is *most likely* meant by the word “signature” in paragraph 2?
 - a. A person’s name
 - b. The act of signing one’s name
 - c. Unique
 - d. Cursive writing
3. How is the original glazed doughnut different from a cake doughnut?
 - a. It’s larger.
 - b. It’s lighter.
 - c. It’s heavier.
 - d. It’s sweeter.
4. In paragraph 1, what does the word “scarfing” most likely mean?
 - a. gobbling
 - b. nibbling
 - c. tying
 - d. buying
5. Why did Vernon Rudolph build a window into his factory wall?
 - a. So customers could see the doughnuts
 - b. To let in fresh air
 - c. Because his door became jammed
 - d. To allow him to sell doughnuts directly to customers
6. How does the doughnut change as it passes through the proof box?
 - a. It becomes smaller and denser.
 - b. It becomes larger and lighter.
 - c. It becomes colder.
 - d. It becomes darker and sweeter.
7. What might happen if the air in the proof box became too dry?
 - a. The doughnut wouldn’t rise properly.
 - b. The doughnut wouldn’t be sweet.
 - c. The doughnuts would stick together.
 - d. The doughnut wouldn’t be crispy.
8. What technique does the author use to make the selection easier to understand?
 - a. Putting important words into italics
 - b. Giving definitions of important words
 - c. Providing captions for the pictures
 - d. Using bold faced headings to divide the sections
9. What is the main reason Krispy Kreme doughnuts are so light in texture?
 - a. The dough is mixed for many hours which makes it light
 - b. Yeast becomes active and releases a gas which makes air bubbles in the dough
 - c. The high temperature of the frying oil causes the dough to become light
 - d. The speed of the cooking process causes it to become lighter
10. About how long ago were Krispy Kremes first made?
 - a. 75 years ago
 - b. 45 years ago
 - c. 20 years ago
 - d. a century ago
11. What does the word “ritual” most likely mean in paragraph 1?
 - a. ceremony
 - b. religious practice
 - c. regular habit
 - d. form of worship
12. What is the purpose of the extruder machine?
 - a. To shape the doughnuts into rings
 - b. To mix the ingredients to form dough
 - c. To cover the doughnuts in glaze
 - d. To ensure that the doughnuts are light

13. The relationship between the extruder and the dough is most like which of the following?
- hamburger and cheese
 - egg and egg carton
 - hose and water
 - glass and milk
14. Where would you look for more information about the Krispy Kreme company?
- An Internet website with the address www.krispykreme.com
 - A book titled *How the Doughnut was Invented*
 - An article called "Doughnut Facts"
 - A chart of nutrition facts about doughnuts
15. In what order is the information in the selection presented?
- Problem and solution
 - Cause and effect
 - Sequential
 - Most important to least important
16. What book would most likely be the best source of information on how to make doughnuts at home?
- History of Doughnuts*
 - Comparison of Doughnut Brands*
 - Kids' Breakfast Cookbook*
 - Krispy Kreme Nutrition Facts*
17. What happens to the doughnuts immediately after they leave the proof box?
- They are cooled before packing.
 - They pass through the glazing waterfall.
 - They are shaped into rings.
 - They are fried in oil.
18. What causes the crispy texture on the outside of the doughnut?
- The glaze
 - The frying process
 - Time spent in the proof box
 - Quick cooling
19. Which of the following steps is completed after the others?
- mixing the dough
 - passing the doughnuts through the chocolate icer
 - glazing the doughnuts
 - frying the doughnuts
20. What does the word "transforms" in paragraph 8 most likely mean?
- heats
 - changes
 - chills
 - cooks
21. In paragraph 14, what do the words "cream of the crop" most likely mean?
- stickiest
 - best
 - cheapest
 - sweetest
22. According to the Snack Stats, how long would it take the Krispy Kreme factories to use up one Olympic-sized pool of chocolate?
- 2 years
 - 1 year
 - 2 months
 - 6 months
23. How long would it take Krispy Kreme to make 20 million doughnuts?
- 4 years
 - 4 days
 - 1 week
 - 1 month
24. What is *most likely* the author's main purpose in writing the article?
- To persuade the reader to buy Krispy Kreme doughnuts
 - To inform the reader about the process of making doughnuts
 - To inform the reader about the history of doughnuts
 - To convince the reader to invest money in the Krispy Kreme company

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