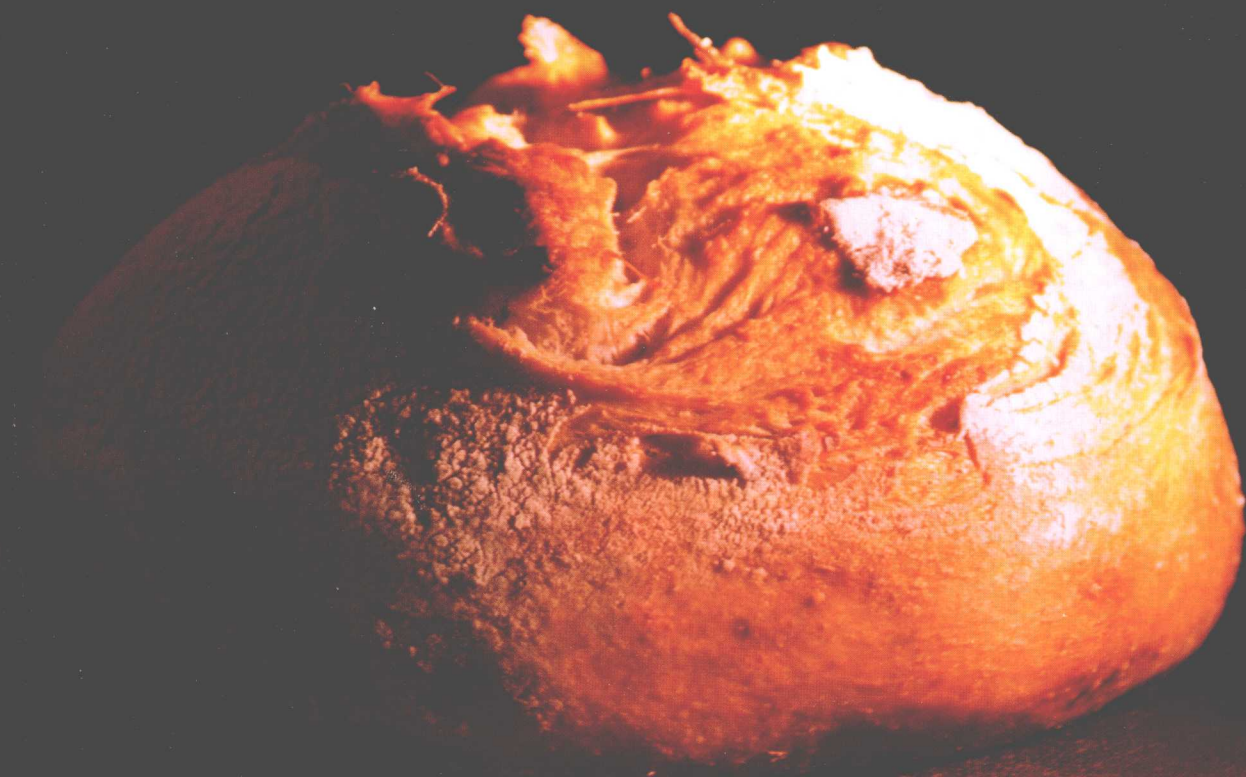


Artisan 面包教室 Bread

[法] Grégoire Michaud ● 著



辽宁科学技术出版社

*Artisan
Bread*



面包教室

[法] Grégoire Michaud 著



辽宁科学技术出版社

·沈阳·

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Greg,

It is a real pleasure for me to preface your work. So much more than a book, you are placing an important stone in the edifice of our profession. You are leaving your mark, a trail that others can follow. In writing this book, you are continuing the noble tradition of our forefathers by transmitting their precious savoir-faire.

For you as for me, in France, Switzerland or whatever the country, night time is reserved for us bakers. Our families and friends are sleeping, and discretely, our work begins. Our master-bakers guide us, the kneading machines are running, the ovens are warming, the leavens fill the kitchen with their particular aroma and our commitment to this art starts to rise.

This commitment today becomes part of you, and if you find that as a result of this book, you inspire other bakers, even just through one recipe, by giving them a hint or a simple idea, you have achieved your goal.

I am often in the habit of presenting our profession as the coordination of the hand and the head.

Nothing worth doing comes without intense reflection.

The first few pages of the book discuss the theoretic approach of our profession. This is very important. Baking is evolving, and even if it is not necessary to look for a rational explanation for everything, if that aspect of magic subsists, we must do our best to understand, anticipate and plan ahead. Our mistakes must bring us enlightenment and the technology of baking is there to help us.

The values of bread are universal. You continue to show from your home in Hong Kong, that your commitment is intact. The trip you have embarked upon allows you to share your passion with others; it is now up to you readers to discover it.

My compliments to the baker-writer-traveller that you are.

Xavier Honorin

Champion du Monde de Boulangerie Bakery World Champion

用独特的超级烧木烤炉和石磨有机面粉做出欧洲风格的面包，虽然这种概念屡次在我的脑海中浮现，然而却没有机会付诸实行。事实上，我深信优质面包与个人感知和领悟力有不可分割的关系。无论如何，通过这本书，我寄望全世界一起努力，把面包工艺还原为一种烹饪艺术，还原面包昔日的松脆质感和美味。

感谢父亲伯纳德，在我年幼时，他让我参与用烧木的焗炉烘烤古老黑裸麦包。正如许多世纪前，工业革命前的面包工匠们是货品的主要生产者。这些宝贵经验燃起我今天对面包的热忱。

物理学家和美食专家 Nicholas Kurti 曾说：“文明带来的遗憾是，我们能够量度出金星的大气温度，却不知道舒芙列的内部产生什么变化。”

这对于面包也是同样要紧！事实上，烘烤面包是一门艺术和科学，需要丰富的知识，而我认为最重要的还是要有感觉和热情。

每个面团皆有各自的独特性和特质，更会因不同的处理手法有所变化。因此，在烘烤过程中要全面了解烘焙科学。

如今，面包工艺师慢慢拾回昔日制作面包的价值观和规范，让面包工艺开始返璞归真，渐渐恢复本貌。可惜的是，因为利润主导成本的原因，就算有心做好面包，也无奈地不能坚持到底的个案也有不少。

尝试按照本书的食谱，根据您的喜好而调校，混入个别材料作出不同测试，会令您有意想不到的惊喜。通过每天揉搓不同的面团，学习和看着面团发展和变化，日积月累的结果，您将会变成一个充满热情的面包工艺师。

Although the idea has crossed my mind more than once; far from me is the idea of advocating the unique supremacy of wood oven and stone milled organic flour in all continental style bakeries. Indeed, I believe that quality bread is very relative to personal perception. However, with this book, I am honored to participate in, what I hope would be a global effort to bring back the art and the science of producing the crusty and flavorful loaves that we once knew.

Thanks to my father Bernard, I had the chance during my childhood to participate in the baking of old fashioned rye bread in wood fire oven, just like they did centuries ago when Artisans were the main producers of goods; before the industrial revolution. This experience might have sparked the passion I have today for great bread.

The physicist and gastronome Nicholas Kurti stated: *'It is a sad reflection on our civilization that while we can and do measure the temperature in the atmosphere of the planet Venus, we do not know what goes on in our soufflés.'*

... And for that matter in our breads! Indeed, baking bread is an art and a science that requires great knowledge, but above all and from my point of view, it requires feeling and passion.

A dough has its own individual identity and its own character. Thus, it will react in a different manner every day and to understand the baking process, it is key to comprehend the science of baking from the work of the farmer to the influence of rheology in dough.

Today, thanks to motivated entrepreneurs, Artisan bakers are slowly coming back with the values and the discipline that makes bread what it should be. Unfortunately, still in many cases, the profit has taken over the reason and with it the crusty and flavorful loaves.

Try the recipes of this book, adjust it to your liking, make different tests, and add an ingredient that will surprise your guest, learn and evolve along the everyday kneading of the dough for you also, to become a passionate Artisan baker.

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bread evolution

面包的演变

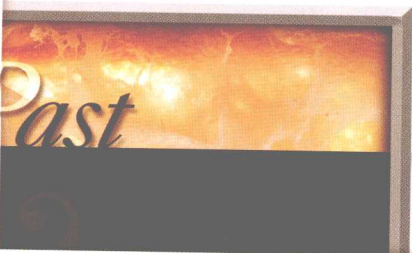
据知，面包已有五千年的历史。当初磨碎的谷物混合了水，置放在热源附近，混合物自然膨胀起来，人们就知道了做面包的原理。几世纪前，通过长时间和天然发酵的方法，生产出发酵的面包。到了 1680 年，天然酵母已研究成功。第二次世界大战期间，随着科技进步，制造出干酵母，从此面包可在较短时间内做出来。

1961 年开始，出现了生产面包的新方法，使面包制作得以大跃进发展。这种方法利用强力的机械以密集式搓揉面团的方法制造面包，在烘焙不同制品时能有效地节省时间。

20 世纪末的产业革命，引发出许多快捷方法、生产机械、多种改良剂，所有一切的目的是达到最佳的生产边际成本、最大的产出，不过却对品质带来破坏。

由搅拌器到焗炉，所有器具演变成高效率工具，以协助烘焙师应付大量日常工作，减少劳动，让工艺更具吸引力。另一方面，工会的创立影响人们投放在工作的时数，从而影响员工的灵活性。

面粉加工厂趋于现代化，使烘焙师能较明了面包制作过程，这有赖于磨坊主人提供不同的分析。



近年，我们看到许多家庭采用本土面包制造机器来做面包。这个课题留待日后探索；不过，自做面包普及化让人联想起市场上缺乏优质面包，或是消费者只能买到一般水准的面包。

过去，上流社会才能享用白面包而草根才会吃黑面包。然而，踏入 20 世纪，与白面包的营养价值比较，黑面包倒成为超级营养价值之选。

自从千禧年后，技术、生物工程和市场发展迅速影响到人们品尝和欣赏食物的态度。就人们对质素的感观而言，优质面包已经没有单一定义了。

Bread as we know it today dates from over 5000 years ago when water and crushed cereals mixture was left near a heat source and rose naturally. A few centuries ago, this was still the case where leavened bread was produced; following a long and natural leavening method. In 1680, natural yeast was already being studied. Dry yeast was created with the advancement of technology during the Second World War period and from that point on, faster production methods were available.

A major development affecting what bread would become today occurred in 1961 with the development of today's most used bread production method in modern industrial bakeries: The Chorleywood Bread Process (CBP). This method used an intense kneading of the dough with strong mechanical processes. The result of this practice reduced considerably the time taken to produce any baked goods.

The industrial evolution of the end of the 20th century brought its lot of faster methods, more productive machinery, enhanced improvers, all of this to achieve better margins and greater productivity; quality started to suffer.

From mixers to oven, all the equipment became more efficient and helped the baker to make his daily tasks less physical, making this craft more attractive.

On the other hand, the creation of workers union influenced the time people would spend at work and thus flexibility of staff became an issue.

Flour processing plants became modernized and consequently the baker could better understand bread process thanks to different analysis from the miller.

Recently, we also saw that domestic bread maker machines were becoming popular in households. This topic requires further investigation but can certainly be linked to the lack of freshly baked quality bread available on the market or to the general level of convenience that the consumer has reached.

For generations, the ethics of eating bread was that white bread was considered the preferred bread of the upper class while the poor ate dark bread. However, in the late 20th century, dark bread became the favorite with its superior nutritional values while white bread became linked with a category of consumer ignoring its poor nutritional values.

Since the new millennium, technology, bio-engineering and to great extent marketing have influenced the way people taste food and see food. Quality of bread has therefore lost its single definition to people's own perception of quality.

小麦的种植者对影响面包制品的因素负有责任。首要的步骤便是挑选谷类的种类，然后才能产出优质面粉。接着，选出最纯正的杂类种子，避免太多其他种子混合在一起，结果使面粉品质下降。

有许多因素会影响到小麦谷粒种植。先从播种到土壤说起，不要拣选含有毒素或已受感染的土壤种植小麦。土壤营养依赖本土农田的自然特质，种植者的影响有限。有许多可控制的事项，农夫采用不同的肥料以影响谷粒生长。例如小麦在绿叶时会用氮肥，到了花期时需要增加蛋白质成分达到 11%。如果蛋白质水平过低，那些谷粒磨成的面粉就不适合做面包。

按照挑选出的小麦种类计算出成熟期所需时间，然后配合天气统计数字计算生长期。以硬红春麦为例，从种植至收成期，全程都在春季，所以寒冷的温度直接影响到谷物的成长。当小麦处于生长期，水分太多会降低收获，但是它却增加了蛋白质的含量。倘若这里的土壤已受到感染会影响到谷粒的大小。过浓的雾同样会对小麦生长带来负面影响，特别是在小麦才完成花期的时候。

一般而言，小麦处于收成期时，湿度必须达到 12%~14.5%。谷物太湿会因发霉和昆虫或是霉菌毒素等使它们变坏。种植者会正确选择收成的日子，预计从播种至小麦收成的湿度情况，并用上特别工具作品质控制。农夫们会以每千克小麦含有多少谷粒作计算，然后估量谷物的收成。

适合制造面包的谷类

小麦、黑裸麦、大麦、燕麦、黍、粟米和大米等是最适合做面粉的谷类，不过，从制造面包角度而言，小麦和黑裸麦的组合成分才是适合研磨成面粉的谷类，也是现今工业的基本面粉。其他谷类不能单独用于面团，需要配合黑裸麦或小麦的面粉使用。两种谷物的成长，小麦的需求量相对地大于黑裸麦。培植黑裸麦与小麦的天气条件趋于两极化，而生长黑裸麦的土壤品质绝对不适合小麦生长。

不要只从做面包的角度出发，以上提及的其他谷类也可被应用，因为它们独特的香味和性质，能吸引面包师改善面包的气味和质感的冲动。



The grower of wheat has the responsibility of a few factors that will affect the end product in bread making. The first important step is the selection of the type of cereal that he will grow in order to produce an excellent grade of flour. To do so, he will select the purest mix of seeds, avoiding too many other seeds mixed together that would result in a decreased quality of flour.

There are many factors affecting the growth of wheat cereal starting with the soil where the seeds are being planted. It must be ensured not to be soiled with high level of pesticides and other contaminants. The soil nutrition depends on the location of the field and on its natural characteristics in which the grower has little influence over the facts. In more controllable matters, the farmer can influence the development of the grain by using different fertilizers such as nitrogen at planting or flowering period to increase the protein content to a level above 11%. With a low level of protein, the grain wouldn't be suitable for bread flour making.

The planting period is calculated according to the maturity time of the selected kind of wheat; following the weather forecast statistics. For quality bread flour for example, Hard Red Spring wheat is planted during the fall to be harvested during the spring-the cold temperatures are having a positive influence on the development of the crops. During the growth, too much water will decrease the grain yield, but increase the protein content. There are also diseases that can affect the size of the kernels. Excessive frost can as well have negative effects on the growth of wheat, especially just after the flowering period.

As a general rule, the humidity level of the harvested wheat must be between 12% and 14.5%. A grain that is too wet might be subject to deterioration by mould and insects or even severe mycotoxins. The grower will choose a date of harvesting that was forecasted at sowing to harvest its wheat with an optimal humidity condition. To control the quality, using special equipment, the farmer will check the yield of grain, counting how many grains are in one kilogram for example.

CEREALS SUITABLE FOR BREAD MAKING

Wheat, Rye, Barley, Oat, Millet, Corn and Rice are the most suitable cereals to make bread flour, however, from a bread-making point of view, wheat and rye are the only cereals that have a composition suitable to make bread flour used on their own in today industry. The other cereals can't be used alone in a dough and need to be mixed with either rye or wheat. At growing, rye is less demanding than the wheat. Rye is cultivated as a main cereal where the climate is extreme and the quality of the soil is not good enough for the wheat.

Often forgotten in bread making, the above mentioned other kind of cereals are often used in this book since they bring special aromas and feature to bread that are very attractive for the Artisan.



the wheat 小麦

从植物学划分，世界上有超过 30,000 种小麦。小麦分类可超过 20 大类，在众多小麦中，斯佩耳特小麦和硬粒小麦都是广为人知的，然而一般小麦粗略计算也有 200 多种主要品种适合磨成面包粉。

Botanically, there are more than 30,000 varieties of wheat. Wheat (*Triticum*) falls into more than 20 categories; amongst others are the Spelt and the Durum that are widely known, but Common Wheat, that counts more than 200 species is the main kind of wheat used for producing bread flour. It is a grass that is cultivated in most countries around the world.



胚乳 ENDOSPERM

胚乳占全粒麦粒总重量的 83%，也是白面粉的淀粉质来源。一颗麦粒包含 20 000 个白面粉微粒，所以胚乳占全粒小麦最大部分蛋白质。

It represents about 83% of the kernel weight. It is the source of white flour due to the starch; there are about 20,000 particles of white flours in one grain. The endosperm contains the greatest share of the protein in the whole kernel.

麦麸 BRAN

麦麸占全粒麦粒重量约 14.5%，它包含了全麦粉，可独立使用。麦麸是微粒粉层磨成粉末后的主要副产品。

The bran is about 14.5% of the kernel weight. Bran is included in whole wheat flour and is also available separately. It is the protective layer of the kernel and the main by-product from flour milling.

胚芽 GERM

胚芽占全麦粒重量的 2.5%，它是胚乳或嫩芽的种子部分。由于它的脂肪会限制贮藏期，让面粉品质改变，一般会被分隔。

The germ is about 2.5% of the kernel weight. The germ is the embryo or sprouting section of the seed, usually separated because of the fat that limits the keeping of quality flour. Wheat germ is available separately and is included in whole wheat flour.

糊粒层 THE ALEURONE LAYER

糊粒层是单一细胞层，围绕胚乳种子的软性纤维质。谷类含有淀粉胚子，如小麦或黑裸麦，它们的糊粒层约含 30% 的颗粒蛋白质。

The aleurone layer is a single cell layer that surrounds the endosperm tissue of the seeds. In cereals with starchy endosperm such as wheat or rye, the aleurone layer contains about 30% of the kernel's proteins.

蛋白质 THE PROTEINS

小麦谷粒有两组蛋白质，水溶性蛋白分为球形蛋白和清蛋白（前者的蛋白成分提供人类日常所需的营养）。

另一种蛋白属非水溶性蛋白，从成分中的麦筋和麦胶蛋白胶结而成为网状面筋。这种面筋特质在面团中扮演着重要角色。面筋在搓揉面团时产生弹性，容易发酵并给于烘焙制品以特定质感。弹性面筋按比例含有筋性。

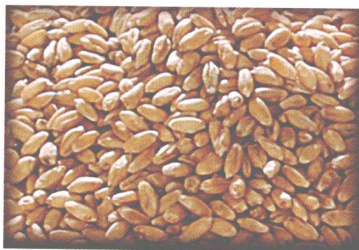
There are two main groups of proteins in the wheat grain. The water soluble proteins are globulin and albumin-precious proteins in the human diet.

The other proteins are non-soluble in water and they are the glutenin and gliadin that together form the gluten. The gluten plays a key role in the making of bread dough. Gluten gives kneaded dough its elasticity, allowing leavening and contributing to form a certain texture in baked products. The elasticity of gluten is proportional to its content of glutenins.

different kinds of wheat 不同种类的小麦

用以做面粉的小麦，主要来自美国、加拿大和澳洲，其他国家均出产小麦，不过主要生产国均来自前述的北美和澳洲等地。一般常用的小麦种植种类如下：

Mainly, wheat used for bread flour originates from the USA, Canada and Australia. Other countries are also producing wheat, but in general, they also import wheat from these countries. The most popular kinds of wheat grown for the production of flour are:



冬天硬红麦 Hard Red Winter

优质蛋白质层，适合研磨和能配合烘焙特质。一般用作生产发酵面包。

Fairly good protein levels; good milling and baking characteristics. Used to produce leavened bread.



春天硬红麦 Hard Red Spring

含有丰富蛋白质，这种极品小麦经细心研磨成面粉，可以制造出极品面包。

Contains the highest percentage of protein, making it an excellent wheat for bread flour with superior milling and baking characteristics.



冬天软红麦 Soft Red Winter

高收成，但是蛋白质含量不高，可用于制作蛋糕。

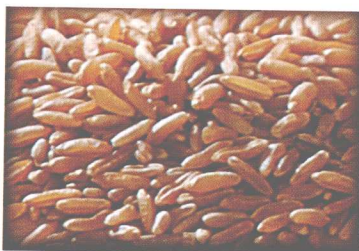
High yielding, but moderately low in protein. Used for cake flour.



硬粒小麦 Durum

一种很硬的小麦，主要用于制作粗面粉以生产意大利式粉面类制品。

One of the hardest kind of wheat; mainly used to make semolina flour for pasta production.



硬白小麦 Hard White Wheat

与红小麦特质差不多（除了颜色基因），这款小麦柔软、含甜味、纤维质平均等，研磨及烘焙特质相类似。

Closely related to red wheat (except for color genes), this wheat has a milder, sweeter flavor, equal fiber and similar milling and baking properties.



软白小麦 Soft White Wheat

它的用途与冬天软红麦类同（除了造面包，也适合一般烘焙制品）。蛋白质含量低，但属高收成的小麦。

Used in the same way as Soft Red Winter (for bakery products other than bread). Low protein, but high yielding.

从谷类植物转变成面包粉，早已有五千多年历史。初时，人们利用两块石头来研碎谷粒而变成面粉。时至今日，部分面包师仍沿用石头磨粉，不过，大部分面包师会以自动化机械操作来取代人工操作。研磨技术自动化对面粉的黏度有正面影响。

The transformation of the cereals into bread flour is one of the most ancient trades dating of more than 5000 years. At the beginning, flour was produced by grounding cereals kernel between two stones. Today, there are still some Artisan miller's using stones, but mainly, the process is fully automated. The automation of the milling had a positive impact on the consistency of flours.

品质的标准 QUALITY CRITERIA

除了收成绝对影响品质的标准外，磨坊主人必须混合不同谷物来调制出指定面粉。这是一个复杂的研究分析，因为会涉及质量、浓厚、湿度物质和个别谷粒的硬度。

蛋白质成分和硬度是谷粒的最基本品质方向。基本上，如果软谷物的蛋白质含量低，适合制造饼干和酥点；如果软谷物的蛋白质成分比较高，适合制作淀粉和需要带筋性的制品。

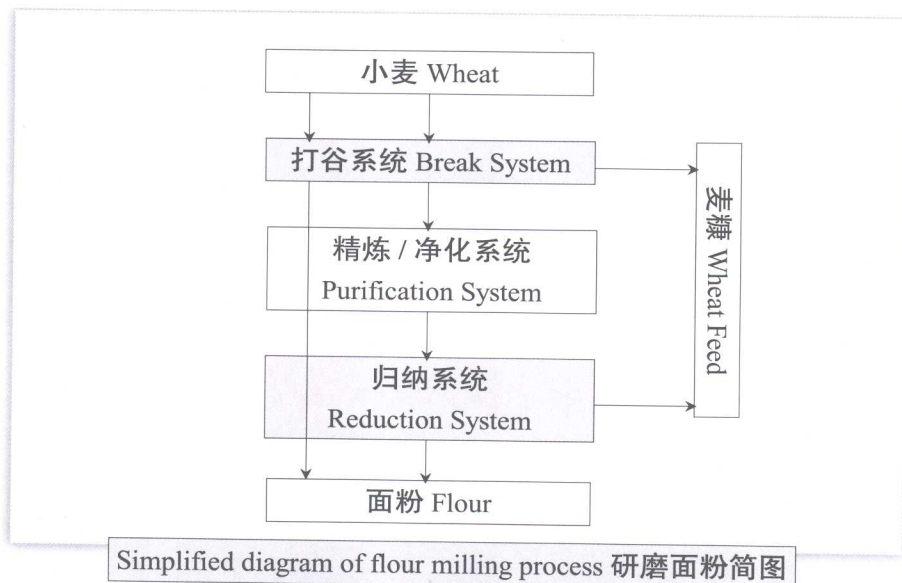
谷物的品质下降是由于种植期和收成期受到瘟疫和天气的影响。贮藏不当、昆虫和鼠患也会严重影响品质。

Apart from the harvest strict quality criteria, the miller's responsibility is to define the right mixture of grain in order to have the targeted flour. A complex analysis in laboratory will be carried to define the mass, thickness, moisture content and hardness of individual grain kernels.

The protein content and the hardness are the basic quality aspect of grain. Basically, we recognize softer grain type to have lower protein content and therefore producing flours suitable for biscuits and pastries and harder grains with higher content of protein suitable for starch and gluten based products.

Grains can have a decrease in quality due to disease, weather during the growing process and poor harvesting process or storage. Insects and rodents can also be a threat to quality.

研磨过程 MILLING PROCESS



Simplified diagram of flour milling process 研磨面粉简图

小麦处理前的准备 PREPARING WHEAT

小麦粒运到磨坊前，先利用不同的清洁程序以除去不要的物质，也需过滤和清除其他谷物如大麦或燕麦。

麦粒的调温是磨粉前的重要步骤。在这段期间，注水于谷物是协助分离麦麸和胚乳的工序。湿度标准则取决于小麦的种类。例如硬小麦类的湿度会是 16.5% 而浸泡时间颇具弹性，按谷物的硬度而调节，一般的硬麦浸泡时间约 10~36 小时。

Wheat kernels are received at the mill and cleaned through different processes in order to remove any foreign matters. They are also being filtered to remove other kind of grains such as barley or oats.

Tempering the wheat kernels in one of the most important step in flour milling. At this stage, water is added to the grains in order to facilitate the separation of the bran layer and the germ at a later stage. The level of humidity depends on the kind of wheat; for hard wheat used for bread flour, the level is about

16.5% and the time of soaking is also variable according to the hardness of the grain. For hard wheat it is between 10 to 36 hours.

打谷系统 THE BREAK SYSTEM

第二阶段，把小麦的胚乳打破成小颗粒和做第一次麦麸分离。这个工序是利用两个不同速度的滚筒交替运作来完成。正因如此，粗麦粉由此产生和做进一步的归纳。它的作用是筛去大颗粒和未能过筛的物质，然后再次研磨，这样可剔除没价值的物质，也可减少麦麸的损坏，遗留下的残物转变成麦糠；主要有用的物质会被磨成面粉。

The second stage is the breaking of the endosperm into smaller particles and a first separation of the bran. The process happens between 2 rolls turning at different speed with a tooth profile. At this point, coarse semolina is produced for further reduction. The result of this grinding is sieved and the larger particles that are not passing the sieve are undergoing a second grinding until the leftover particles are not worth processing again. With a minimal level of damaged bran, the leftovers are transferred to the wheat feed, the main co-product of flour milling.

精炼 / 静化系统 THE PURIFICATION SYSTEM

这个工序会应用 3 种机器：静化器、研磨滚筒和过筛。静化器功能是按不同要求分隔物质，诸如大小、空气阻力和特别重的颗粒。它倾向于用摆动式过筛来分离较轻的麸颗粒和麦糠，比较重的颗粒会被打谷系统程序再次研细。

This step comprises of three machines: the purifiers, roller mills and sifters. The purifiers are separating the particles on different attributes: the size, the air resistance and particle specific gravity. Purifiers are inclined sieves that are oscillating with an air current that is going upward to separate the light bran particles back to the wheat feed. The heavier particles are then grinded similarly to the break system process.

归纳系统 THE REDUCTION SYSTEM

这是生产面粉的主要过程，利用磨器以机械方式弄破小麦，因而取得淀粉，不过这取决于吸纳多少水分而把麦粒研磨到所需颗粒的大小。如果未能达到预期的尺码，那些颗粒会再次回送到生产线研磨。一般的颗粒会经过 11 次的研磨程序，留下的麦麸会被送到收纳麦糠的位置。