A PUBLICATION FOR THE COFFEE MARKET

Roller Grinder

3G Roaster

LILLA GAZETTE

SISTEMA DE GESTÃO
TÜVRheinland
Brasil
NBR ISO 9001
QUALIDADE

customer insight

DUTCH GROUP DRIE MOLLEN CONTINUES TO GROW UP

PAGE 2

ISSUE # 11 - WWW.LILLAROASTERS.COM

customer insight

DUTCH GROUP DRIE MOLLEN CONTINUES TO GROW UP

Lilla is pleased to announce that after only two years from the commissioning of its first Lilla coffee roaster Opus40 3G in Switzerland, Drie Mollen Group will install in the next months another 3G roaster with production of up to 2.700 Kg. per hour. That new acquisition, certainly, represents an excellent asset with the best Return On Investment rates.

The Drie Mollen Group is a Dutch-based company, established in 1818, whose activities include marketing, sales and production in six European countries: The Netherlands, Switzerland, Germany, Spain, France and England. Drie Mollen is one of the largest coffee roasters in Europe and a market leader in the private label sector. The group offers a broad range of established local brands and private label products to retail, top hotel and restaurant chains, food service and vending supplies.

With a history of almost two centuries in the market, Drie Mollen is an amazing and vigorous company. As one can see in the timeline below, the Drie Mollen Group has been consolidating its leadership in Europe by taking over several companies in different countries in the past three decades.

Time line:
2006 Take-over First Choice Coffee Ltd, (UK)
2004 Take-over Merkur Kaffee AG (CH)
2004 Divestment Koninklijke Olland Groep/ Thermo-Centre / Olland AB (SW)
2002 Take-over Giger Café AG (CH)
2001 Divestment Polish companies
2000 Take-over Thermo-Centre (NL)
2000 Take-over Rost (CH)
2000 Take-over Lyons (UK)
2000 Take-over Smit & Dorlas (NL)
2000 Majority interest in Kawomat (PL)
2000 50% shareholding in Kaiser's Kaffee-Geschäft (D)
1998 Take-over Cafés Campanini (FR)
1998 Take-over Koninklijke Olland Groep in Nieuwegein (NL) / Olland AB (SW)
1996 Take-over Cafés Excella (Fr), Union Tostadora (ES), F.C. Klipp (D)
1994 Take-over Agem Coffee & Tea in Best (NL)
1991 Shareholding in Prima SA in Poznan (PL)
1990 Take-over Knop en Co in Deventer (NL)
1990 Shareholding in Otter Coffee & Tea in Gorredijk and Nieuwegein (NL)
1987 Take-over Veka Coffee and Tea in Zoetermeer (NL)
1987 Take-over Calypsa in Dartford (UK), now Gala Coffee and Tea Ltd (UK)
1985 Concentration coffee and instant production in Bolsward (NL)
1982 Take-over coffee, tea and instant production from Hamido in 's-Hertogenbosch (NL)
1981 Take-over coffee and tea factory from Niemeyer in Bolsward (NL)
1818 Drie Mollen was founded in 1818 in a small shop in 's-Hertogenbosch in the south of Holland. Since the Second World War it developed from a shop roaster into an international industrial roaster.

For Lilla, being part of Drie Mollen Group, means being part of top worldwide coffee industry´s lead users.

anouncement

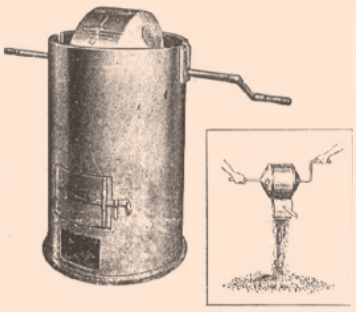
Lilla has appointed Mr. Fernando Oliveira as its new Director of International Sales. In his new role, Mr. Oliveira will lead the company's sales and marketing departments, as well as public relations. Mr. Oliveira has been with Lilla for over 15 years and his market knowledge and experience will be instrumental in helping Lilla to reach new markets.

WHAT IS THE IDEAL HEAT TRANSFER SYSTEM TO ROAST YOUR GOURMET COFFEE?

Nowadays, different from a not so distant past, there is a wide variety of roaster models, whose features may probably confuse the most experienced professionals of the coffee industry. All these options naturally lead people to the question: what is the ideal technology to get more from my coffees. Although the drum-type roasters still dominate the scene, the existence of various equipment with different roasting principles calls for another question: what really matters in the roasting process?

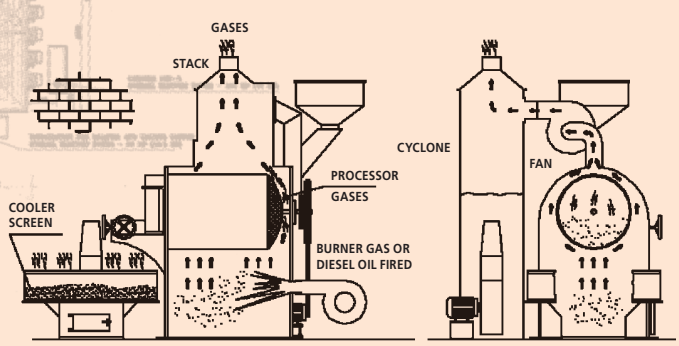
A brief description of the evolution of the roasting machines

The multiple roasting technologies available today in the market represent a new era, inaugurated with the invention of the sphere roaster in the middle of the 19th century. That roaster was the only equipment used over the decades to follow. It was basically composed by a metallic sphere (containing beans inside) submitted to the direct flame generated from the burning of either wood or coal. It was possible to detach it from the mainframe (see picture below) and then discharge and spread the roasted beans on a plain surface for cooling. This basic design remained almost the same until the beginning of the 20th century, being the inclusion of an electric motor to drive the drum the only improvement worth mentioning.



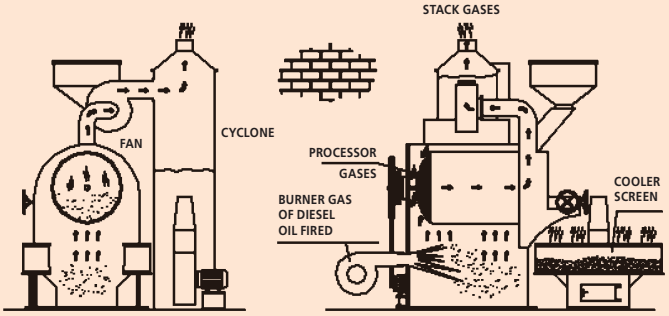
In that roaster, the hot air passed around the metal sphere, heating up its steel sheet and then, the coffee in contact with it, by the conduction principle[1]. In order to avoid the roast to become too uneven, the sphere was constantly rotated in such a manner that the hotter beans could get mixed with the cooler ones. Therefore, one can say that the heating source of that roaster was the direct fire under the sphere by which the heat was transmitted to it by the principles of radiation[2] and convection[3]. Nevertheless, the heat transfer from the drum to the beans was pure conduction (direct contact of the beans to the sphere). A good quality roast could be reached in about 30 minutes or more.

The generation that followed the sphere roasters was developed in the first half of the last century, based on the forced ventilation around a roasting drum. In that system, an electric fan was responsible to pull the hot air generated by a gas or diesel-fired burner positioned under the roasting chamber. This air passed around the drum and was, finally, released to the atmosphere through a stack. As one can see in the picture below, besides the inclusion of a fan, the roaster manufactured at that time also presented an external cooling tray with paddles (still used by some manufacturers) to cool down the roasted beans.



At that time the evolution of the roasting technology was only apparent, since the heat transfer to the beans was pure conduction still. In spite of the fact that there was forced ventilation around the roasting chamber, inside of it nothing had really changed. The coffee kept being roasted by direct contact with hot steel.

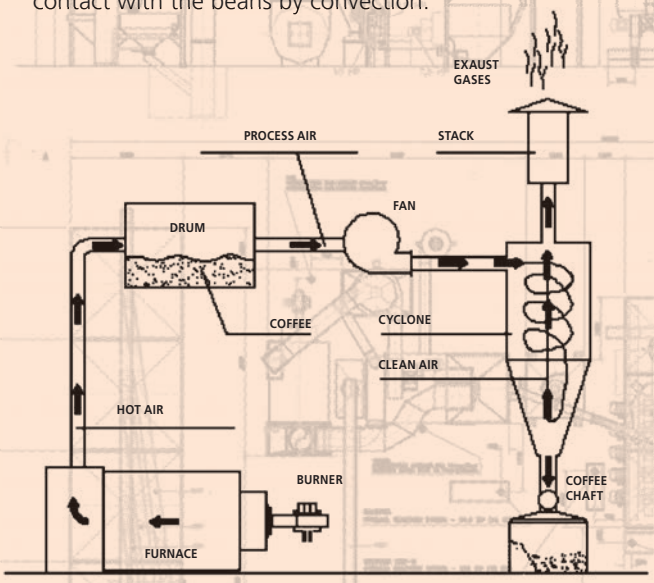
The first significant effort to improve the roasting quality was made still in the first half of the 19th century, with the introduction of a roaster with forced air flow inside the roasting chamber. That technological innovation employed another principle of heat transfer: the convection, by which the hot air was forced to come inside the drum and then passed through the beans. However, the two systems still co-existed: the old conduction method and the newer convection system. As one can see in the next picture, the hot air still touched and heated the surface of the drum considerably before entering it. Moreover, as the heat source continued being positioned under the drum, radiation from the flame heated the drum even more. Therefore, a great part of the heat continued to be transferred by conduction by contact of the beans to the hot steel walls of the drum.



It was not until the 1930´s that the first drum roasters with external source of heat were invented. This was the first time that roasting processes could be accomplished without the use of conduction heat transfer. The surface of the drum was

Continues on page 4

no longer receiving direct heat (see picture below). In that system, hot air passed through the drum and came in contact with the beans by convection.



After the convection technological advance of the 1930's, shapes and designs of roasters went through many changes. Some presented different methods of moving the coffee beans, but all used convection as the primary heat transfer system.

It is worth mentioning that during the last few decades, the increase of air volume, as well as speed inside the roasting chambers have become very important factors in the improvement of roast quality. The increase of air volume and speed improved the flexibility of heat transfer by convection, and allowed some roasters to work with a wider range of heat transfer during the roasting process. Based on this new technological trend, fluidized and semi-fluidized bed roasters were introduced to the market. The latter is found in several different forms and designs and there are also some drum-type roasters that can work with that principle.

Why is the convection heat transfer superior to the conduction?

Heat transfer by conduction essentially depends on direct contact between two bodies, where the hot steel wall of the drum transfers heat to the beans when they touch it. If the heat is transferred to a round-shaped body, coffee beans, for instance, the areas of contact are critically small. Thus, the heat transfer will occur through the points of contact, producing an uneven roast of the bean body. The heat transferred in Calories per square millimeter in the points of contact are extremely high when compared to the average heat per square millimeter transferred to a whole bean. Therefore, equipment that use conduction and high rates of heat transfer are not adequate for roasting, unless quality is not a concern and tipped beans[4] are acceptable.

The limitation of the heat transfer rate imposed to the process conducted by 19th century direct flame roasters could be clearly noted by their long roasting time: 30 minutes or more. At that time, if a roast was completed in less than 30 minutes, the coffee would present undesirable bitterness due to tipped beans.

Heat transfer by convection is qualitatively superior to conduction. In the first, as the hot air completely involves the beans, the surface to transfer the heat is infinitely larger if you take into consideration the points of contact in the whole bean. Therefore, what is considered a medium-low rate of transfer per square millimeter in the convection process, is "too high" in the conduction process when one considers the area or point of heat transfer. In other words, the same level of heat transfer that in a conduction system causes tipped beans, in a convection system, would gently roast them. The conclusion is that convection allows for faster roasts and better quality.

Since the 19th century, the use of convection has changed the pattern of what is considered to be the ideal roasting time. The replacement of the sphere roaster, only externally heated, by drum roasters with direct heat and air flow passing through the roasting chamber allowed reduction of roasting times from 30 to 20 minutes or even less. With that new generation of roasters, the convection principle started to partially be used in the roasting process and faster and better quality roasts could be accomplished. However, the direct heat under the drum, that is, roast by conduction, still imposed a tremendous limitation to the roasting process.

With the advent of the roasters that work exclusively with convection heat transfer (external source of heat), the limitations in the roasting process have been eliminated and new researches already show what would be the ideal heat transfer rates, as well as roasting times for multiple different purposes. The latest findings indicate that roasting times shorter than 20 minutes produce better results in terms of quality of the process, more complex taste and aroma. Over the last years, some people have made extreme experiments with roast profiles reaching times shorter than 2 minutes. However, there is some consensus that the profiles in use today may reach the best standards of quality with times ranging from 8 to 14 minutes. Obviously, the ideal profiling and roasting time depend on the raw material and the specific characteristics desired in the final product.

The most important conclusion of this analysis is that the best qualitative way to roast your coffee is related to the exclusive use of heat transfer by convection, but this statement hides a contradictory reality. In many cases, the finest green beans are roasted by small coffee companies, some of them with limited investment resources that end up choosing hybrid roasters which employ heat transfers by conduction - direct heat under the roasting chamber– and convection – because of their relatively lower prices and construction simplicity. But how can they produce extraordinary quality with equipment that in the best case will result in only ordinary roasting quality? Shouldn't the best raw material be roasted with the best roasting process? The answers to these questions must be given by the entrepreneurs of our age.

1 The definition of the term conduction is the heat transferred from a hotter body to a colder one by direct contact.

2 The definition of radiation is the heat transferred by electromagnetic waves. This type of heat transfer is related to the heat we can feel from the sun light shining on our face or from the fire when we get close to it.

3 The definition of convection is the heat transferred to or from any kind of fluid moving over any surface

4 The points of the beans in contact with the high temperature of the sheet of the drum get burnt.

Lilla Gazette is a publication of Cia. Lilla de Máquinas Ind. e Com. for the coffee market • **Address:** Rua Constâncio Colalillo, 382 - Guarulhos - SP - 07024-150 – Brazil • **Phone:** +55 11 3511-4488 • Fax: +55 11 3511-9424 • **E-mail:** adm@lilla.com.br
Supervision: Marketing Department • **Graphic Project:** Idéia e Imagem Comunicação • Read the electronic version of this publication in our Web Site: **www.lillaroasters.com** • Issue # 11 - December 2009.