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RULING THE ROAST

Roast Right The First Time

How To Prevent Inconsistencies, Deficiencies and Errors

by Willem J. Boot

ONE OF MY PREVIOUS ARTICLES described various examples of roasting defects and how to deal with them in your coffee roasting business. In the past year, I have received a lot of feedback from roasters in and outside the United States who, after reading my articles, confessed that they had noticed many opportunities for change in their own roasting practice. Over the last year, I've also noticed that many roasters find it easy to take small errors and defects for granted. Most likely, this attitude stems from the fact that in the majority of specialty businesses, roasting is done very frequently; as a result, the roaster might easily fall into the habit of thinking that the consumer won't notice a slight variation in the roast degree or roast profile. Thus, it seemed like a good time to look at some additional common examples of roasting defects and explore simple strategies to help prevent them.

In the art and practice of coffee roasting, we deal with a number of factors that affect the outcome of the process. Some, such as the mechanical design of the machine or the airflow capacity of the roaster, cannot be controlled by the roaster operator. However, other factors can be directly controlled, including the time/temperature roasting profile, the applied cleaning procedures, and the facilities and conditions around the roasting machine. Generally, there is a greater likelihood for



roasting defects to occur when any of these factors is not adequately managed.

Roasting defects fall into three main categories:

- Roasting inconsistencies, the most common type and the easiest to prevent.
- Roasting deficiencies caused by ignorance of process or market requirements
- Roasting errors that actually damage the bean, like tipping, scorching, baking or bean cracks.

Roasting Inconsistencies

Roasting inconsistencies are the most common form of defect, and I see them more often than you might imagine. A perfect example: I recently visited a roasting company in Europe. The company has been in business for nearly 30 years and their roastmaster, a self-educated coffee and fine foods connoisseur, has been their coffee specialist for almost 25 years, a period during which the company grew steadily to an annual production of 220,000 pounds of roasted coffee. To prepare for further

continued on next page

expansion, the company recently hired a coffee-roasting apprentice who is being trained under the watchful guidance of the senior roastmaster.

While I was visiting the company, I had the great pleasure of observing not only the roasting process, but of completing some hands-on roasting with the roastmaster and his apprentice. All the coffee is roasted on a beautiful vintage Gothot-style roasting machine and the time-temperature roasting profiles are maintained in the artisan way, by utilizing the senses of sight, smell and sound. While the Gothot was slowly developing roast after roast, I followed both roaster operators in their roasting rituals. Every 90 seconds or so, they would smell the beans being roasting by pulling samples with the trier, evaluate the color of the beans and listen to the emerging sound of a first or second crack. Towards the end of the roasting cycle, the roastmaster or his apprentice would frantically take samples, quickly smell them and then, finally, finish the roast by starting the cooling cycle.

Despite my admiration for their true and genuine artisan approach to the roasting process, I quickly developed some doubt about the effective consistency of their protocols. In the late afternoon, I invited the roastmaster and his apprentice to join me in a basic quality inspection procedure by comparing whole-bean and ground samples of several batches of roasted coffee against the master color sample for each product type. The outcome was stunning. By utilizing a special light that I had purchased for the occasion, a full-spectrum 75-watt Verilux incandescent floodlight, we could immediately distinguish the inconsistencies between the various roasts which, under optimal conditions, should have been the same.

To help them increase the consistency of the roast color, I suggested they improve the lighting conditions around the roasting machine. This can easily be accomplished by installing one or more full-spectrum incandescent light bulbs. These bulbs, often marketed as full-spectrum or “daylight” bulbs, mimic the color of the light from the sky, not the direct beam of the sun.

Pictures A. and B. (right) show two identical coffee beans under different conditions of light. Picture A. illustrates the quality of illumination produced by fluorescent lights and picture B. shows the clear light spectrum created by the incandescent bulbs.

In addition, I suggested they develop a logbook for their roasting operation so they could register at least the roasting times and temperatures at several intervals during the roasting process.



Picture A. Fluorescent Light Conditions



Picture B. Full-Spectrum Incandescent Light Conditions

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Roasting Deficiencies

These errors are either market- or process-related and are mostly caused by the ignorance of the business owner and his roaster about the basic requirements of the market or about the fundamental criteria for the preparation of the coffee.

A typical process-related roasting deficiency is espresso coffee roasted so dark that the aromatic qualities and the sugars of the beans are decomposed, resulting in a bitter, burnt and bland cup of espresso with very little crema.

Another example of a roasting error—in this case a market deficiency—occurs when the owner or roaster doesn't understand basic market requirements. For example, my current hometown is situated in the Bay Area. Here, consumers like their coffee dark; the credo is "the darker the better." Now, imagine you are a Northern European roaster and, after having freshly moved to San Francisco, you decide to open a small wholesale coffee roastery utilizing the traditional roasting recipes and protocols you have applied in your hometown in Europe. Knowing that roast degrees are much darker in your new domicile, you still are convinced that things will work out as planned and you brand yourself as the European "Roast It Light" alternative.

What is the likelihood for success of this courageous roaster? Despite my personal preference for lighter coffee, I do not expect that this roaster will succeed, simply because he is ignoring prevailing market conditions.

To prevent roasting deficiencies—either market- or process-related—I suggest frequently applying product and market research to your own products. A small company or coffeehouse can begin product research by forming a small team of tasters and inviting these folks to taste the coffee products in a somewhat controlled setting, after which you can ask them for their honest feedback and opinions.

Roasting Errors

I have described roasting errors extensively in a previous article (see *Roast*, May/June 2004), but I receive many questions by roasters about the interior scorching and its proper prevention, so I would like to cover it in more detail.

Scorching is a defect that is easy to see in the beans. Pictures C. and D. show coffee beans that appear to be scorched inside. On top of that, the interior development of the coffee bean is very inconsistent, resulting in an internal bean color darker than the outside color. Now, compare the internal roast colors on picture A. (page 2); the left half of the bean appears to be roasted darker than the right half. As we concluded during our cupping evaluation, the outcome in the cup was bitter with a slightly burnt aftertaste.



Picture C. Interior Scorching



Picture D. Interior Scorching

After more in-depth research into the causes of this type of defect, I concluded that interior scorching might be related to improper drying techniques of the green coffee bean. The drying process of parchment coffee (the green bean with the parchment husk) has the objective to lower the moisture content of the bean to 12 to 13 percent.

Summarized, there are two basic approaches to drying: mechanical (in large revolving cylinders with hot air moving through) or static (in the open air by utilizing the radiation heat of the sun). If the drying process is completed too fast for any reason, then this can result in an uneven internal moisture content of the green beans. In this case, the free moisture is dispersed unevenly throughout the cell structure of the coffee bean. As a result, there are

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groups of cells that contain less moisture and groups of cells (where the drying process did not evolve efficiently) that contain more moisture.

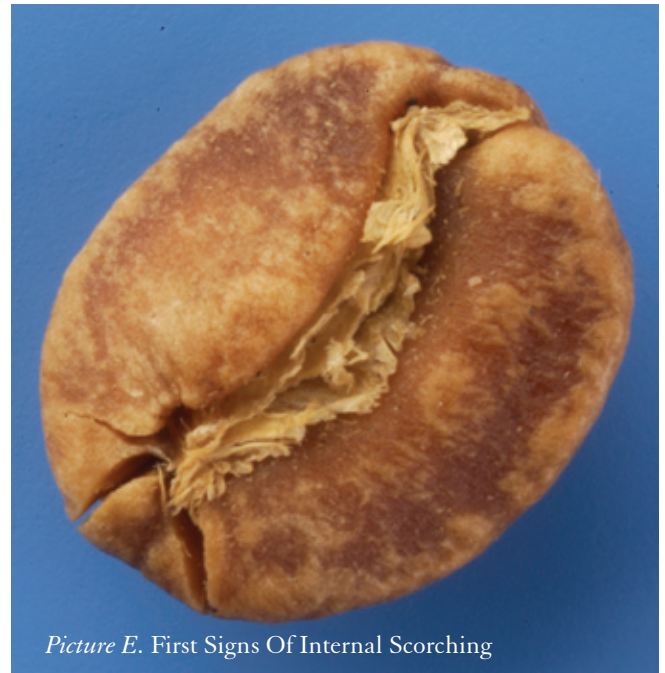
So, what is the impact of the uneven drying on the roasting process? Improperly dried coffee beans will most likely develop unevenly and inconsistently during roasting; the interior bean sections with more moisture will roast slower and the areas with less moisture will easily roast too fast, resulting in internal scorching.

Now we come to the key question. How do you know that the green beans you're roasting were properly dried? The answer: you can't! At least, it is nearly impossible to deduct this from the green coffee beans before roasting. However, during the first part of the roasting process (before the first crack), you can check if there are any major inconsistencies in the exterior development of the bean color. Picture E. shows a coffee bean after three minutes of roasting. You can already see darker and lighter spots on the surface of the bean; this could be a first sign of internal scorching.

The best prevention for internal scorching is to ensure a very slow roasting process in the first stage, followed by a moderately fast process in the second stage. Make sure there are at least three minutes between the start of the first crack and the second crack or, if you roast relatively light, keep at least three minutes between the start of the first crack and the end of the roast.

In addition, there are a few other simple techniques to establish a quality assurance protocol in your roasting department:

- Schedule roasting plans at the beginning of each production day
- Fill out roasting logs with temperature profiles, roasting time, shrinkage and color for each batch
- Perform (Agtron) color tests of each individual roast
- Review roast profiles with the roastmaster
- Maintain a preventive maintenance schedule for your roasting equipment
- Perform quarterly cleanings of the entire roasting system



Picture E. First Signs Of Internal Scorching

Last but not least, a stringent cupping routine will help you to improve the consistency of your roasted coffee. I recommend documenting the target flavor profile for each coffee type, which should be compared against the production results using effective cupping protocols.



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