4.PROFILING

4.1 How to find your tasty roasting profile

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HOW ROASTING PROFILES DIFFER

- **ROASTING STYLE**
- **EXTRACTIVITY**
  Brewing method
- **BITTERNESS/ACIDITY BALANCE**
  Individual preferences
- **SEGMENT**
  Specialties, fine commercial
- **REGIONAL PREFERENCES**

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ESPRESSO

SINGLE ORIGIN
Revealing the terroir, lighter roasting

BLENDS
The idea is balance of taste, high sweetness

DAIRY
Idea: lower acidity, high extractivity

SEGMENT
Higher extractivity is required due to the design of the brewing units

ESPRESSO STYLE
Brew ratio 1,5; 2; 2,5

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4.PROFILING

4.2 Pilot roasting

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ROASTING AT 50% GAS AND 80 PA AIRFLOW PRESSURE

↘ **Goal: to understand the energy potential of the roaster, the task is to get the total roasting time within 10-11 minutes.**

SIGNIFICANTLY FASTER

We adjust the burner, gas-air mixture, select a lower modulation

SIGNIFICANTLY SLOWER

We select standard modulation (70-90%)

4.PROFILING

4.3 Protocol between roasts

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WHAT IT AFFECTS:

↘ **HITTING THE REFERENCE PROFILE**

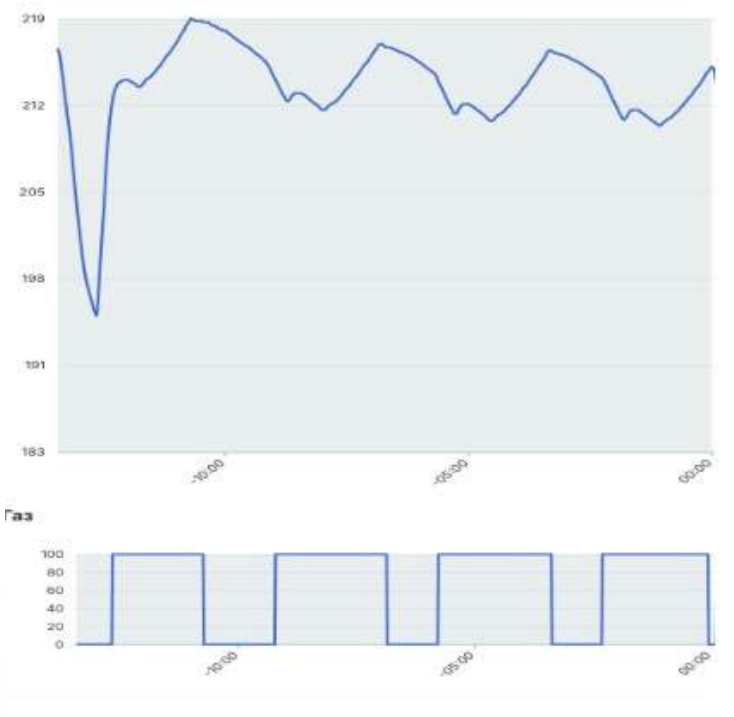
Stability again and again

↘ **WARMING UP THE ROASTER**

WARM-UP/ MORNING PROTOCOL

Example of protocol before the first roast:

For better heating of metal parts, a step-by-step heating protocol is used.



4.PROFILING

4.4 Drop temperature

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MAIN PARAMETER/ PROFILE PARAMETER OF COFFEE ROASTING

It determines what coffee you will have as result.

AN INCREASE AFTER THE 1ST CRACK DETERMINES:

- ↘ FILTER/ESPRESSO
- ↘ COLOR
- ↘ LEVEL OF CARAMELIZATION
- ↘ BALANCE OF BITTERNESS/ACIDITY

Increase – the difference between the 1st crack and drop.

If the crack is at 190 degrees, and drop at 200, increase at 10 degrees.

4.PROFILING

4.5 Roasting time

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WE DECREASE/ INCREASE THE TOTAL TIME BASED ON:

↘ GREEN STAGE

Changes: extractivity, crack intensity

↘ YELLOW STAGE

Changes: extractivity, crack intensity

↘ DEVELOPMENTS

Changes: balance of bitterness/acidity

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4.PROFILING

4.6 Development time

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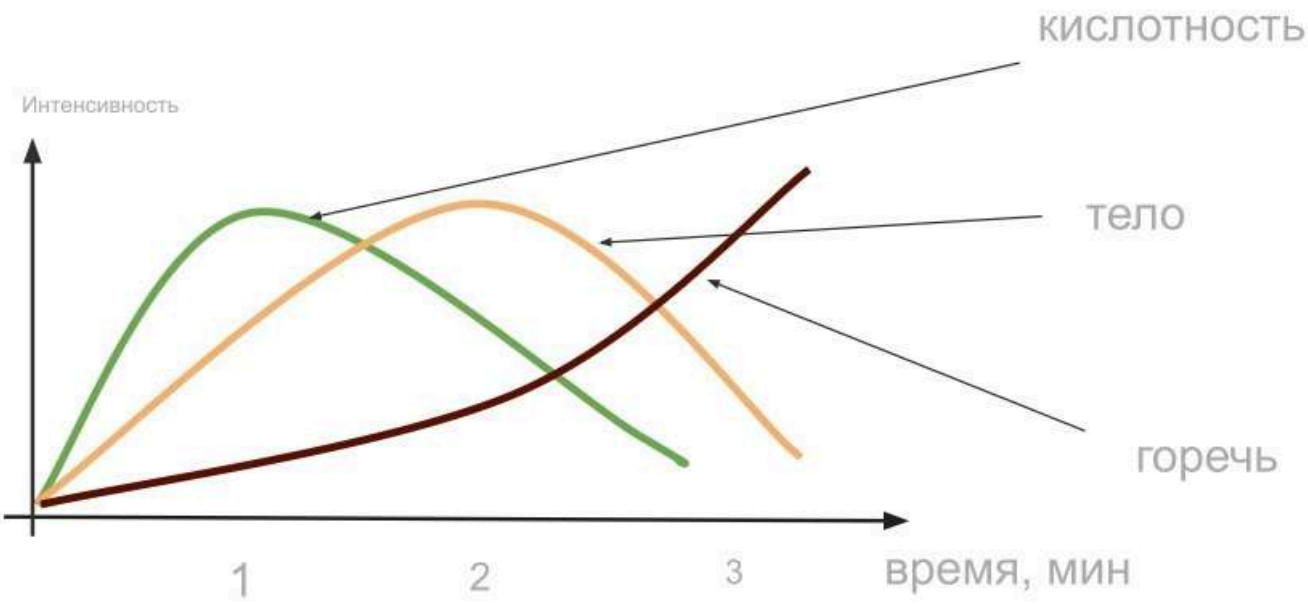
INCREASE
of development time

↘ The acidity decreases

DECREASE
of development time

↗ The bitterness increases



4.PROFILING

4.7 Burner modulation

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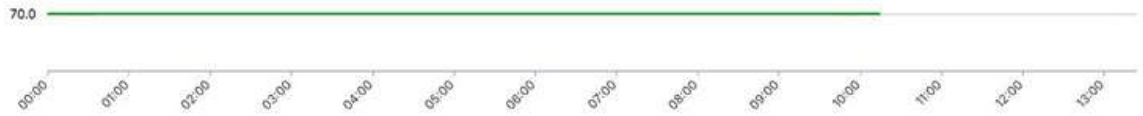
"LADDER" DOWN

"LADDER" UP

STATIC



4.PROFILING

4.8 Drum rotation speed/
Air-driving power

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RPM

Round Per Minute

- is a unit of measurement that indicates the number of revolutions that an object makes per minute. In the context of roasting, it usually ranges from 30 to 60 revolutions per minute, but can be adjusted depending on the requirements of the roasting process.

AFFECTS THE RATIO OF CONDUCTION AND CONVECTION

Average PRM recommendations:

Weight	**1 kg**	**5 kg**	**12 kg**	**30 kg**	**60 kg**
PRM	70-75	60-70	52-55	46-50	40-44

WHAT IT AFFECTS:

↗ ROTATION SPEED INCREASES

The energy balance shifts towards convection

In extreme cases, a centrifugal force occurs, so the beans “stick” to the drum and only conduction acts on them (a defect is inevitable).

↗ ROTATION SPEED DECREASES

The energy balance shifts towards conduction

The energy balance shifts towards conduction In extreme cases, the beans are not mixed by the blades, they remain at the bottom of the drum and only conduction works (a defectis inevitable).

4.PROFILING

4.9 Air pressure

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AIRFLOW FUNCTIONS:

↘ ENERGY TRANSFER

To convections

↘ REMOVING THE "HUSK"

↘ REMOVAL OF COMBUSTION PRODUCTS

Units of measurement Pa - 1 Pascal is equal to the pressure caused by a force equal to one newton, uniformly distributed over a surface normal to it with an area of one square meter: 1 Pa = 1 N/m2

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WHAT TASTE DEFECTS SHOULD BE AVOIDED?

SMOKY NOTES

If Airflow is too low (below 30Pa)

Reason: coffee is in a smoky environment and absorbs it.

DRYNESS

If the Airflow is too high (above 140Pa)

Reason: the air flow blows out useful energy.

The operator increases the modulation, exposing the upper part of the bean to burning.

4.PROFILING

4.10 Charge temperature

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THE CHARGE TEMPERATURE IS AFFECTED BY

ROASTER DEVICE

- For double wall roasters and air roasters charge temperature can be higher.

ROASTING INTENSITY

- For quick profiles less than 10 minutes you need to load higher - 200+.

BEAN DENSITY

- For hard beans, charge temperature is higher, and vice versa.

BEAN MOISTURE

- For beans with high moisture content, the charge temperature is lower.

PROCESSING

- For washed products, the charge temperature is higher, for the rest with residual sugars - lower.

POSSIBLE DEFECTS

- When scorching and tipping, you need to reduce the charge temperature.

4.PROFILING

4.11 Taste modulation

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MODULATION OF THE YELLOW STAGE

EXTENSION OF THE YELLOW STAGE	SHORTENING THE YELLOW STAGE
GAS MODULATION OPTIONS AT THE YELLOW STAGE	STANDARD PROCESSING OF THE YELLOW STAGE

MODULATION

YELLOW STAGE

Gas, air

- ↘ **Lengthening of the yellow stage**
- ↘ **Shortening of the yellow stage**

This is the basic idea behind profiling: to give a coffee a certain ratio for acidity/body to create a roasting style:

Short yellow – light, bright coffee
Medium and long – increasing extractivity and parameters for richness/body/caramelization group

4.PROFILING

4.12 Angle of attack

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ANGLE OF ATTACK

determines the roasting style at the final stage

Temperature graph angle from the start of the first crack:

TEMPERATURE GRAPH ANGLE AFTER THE START OF THE 1ST CRACK	ROR AFTER 1st CRACK STARTS	DEVELOPMENT	BALANCE
Smooth	5	Long	Risk of "overdevelopment"
Average	7	Normal	Bitterness/Acidity Balance
Acute	10	Short	Risk of "undevelopment"

ANGLE OF ATTACK

↘ ACUTE

ROR at 1st crack 10+ - risk of "undeveloped" (Scandinavian)

Bright bouquet, intense acidity

↘ SMOOTH

ROR at crack +-5 - risk of "baked" (Italian)

The balance is shifted towards
bitterness and sweetness

↘ AVERAGE

ROR at crack 7

Balance of bitterness and acidity

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4.PROFILING

4.13 ROR

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ROR

Rate of Rise - growth rate

- a value calculated by a computer that predicts where the temperature graph will go in a set unit of time.

FUNCTIONS

- Shows that it hits the standard
- Reacts to the change of exothermic and endothermic reactions
- Shows forecast for the time passing of roasting stages

↘ GENERALLY ACCEPTED FACTS about ROR

- ROR should drop smoothly during the roasting profile.
- A rise (peak) in ROR during the roasting profile will result in a bad flavor.

↘ BASIC MISCONCEPTIONS about ROR

- ROR shows the "future"
- ROR affects taste

Main idea: ROR shows the present (it already takes into account all factors) and changes in heating parameters (gas, air) will lead to a reversal of ROR.

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ROR DROPS

Sharp drop in ROR after the start of 1 crack without obvious changes in heating parameters.

↘ REASONS

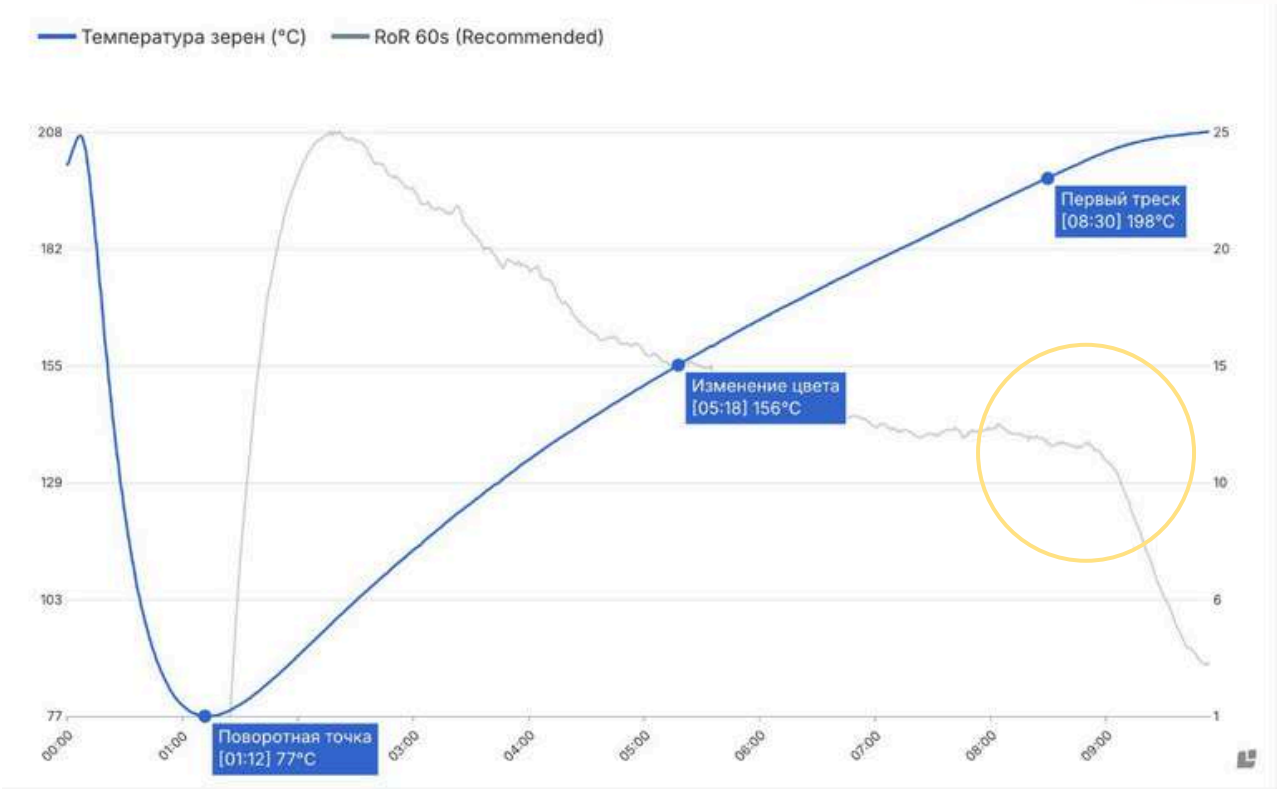
1. At the beginning of 1 crack, a large amount of residual moisture is released from the bean in the form of water vapor, and this vapor cools/affects the temperature sensor readings. At the same time, the coffee continues to roast.
2. Reducing of burner power to 0% (I do not recommend turningoff the gas during the profiling).

↘ SOLUTION

- Increase the green stage time to reduce moisture before 1st crack.
- Increase the overall time by reducing the modulation at the beginning and middle.
- Compensate decrease by increasing the Airflow pressure.
- Increase burner power by about 1 minute or 10 degrees until 1st crack begins.

ROR DROP

after the start of 1st crack is associated with the release of a large amount of residual moisture



ROR FLICKS

ROR "flicks" before 1st crack or after a significant amount of development time after the start of 1st crack.

↘ REASONS

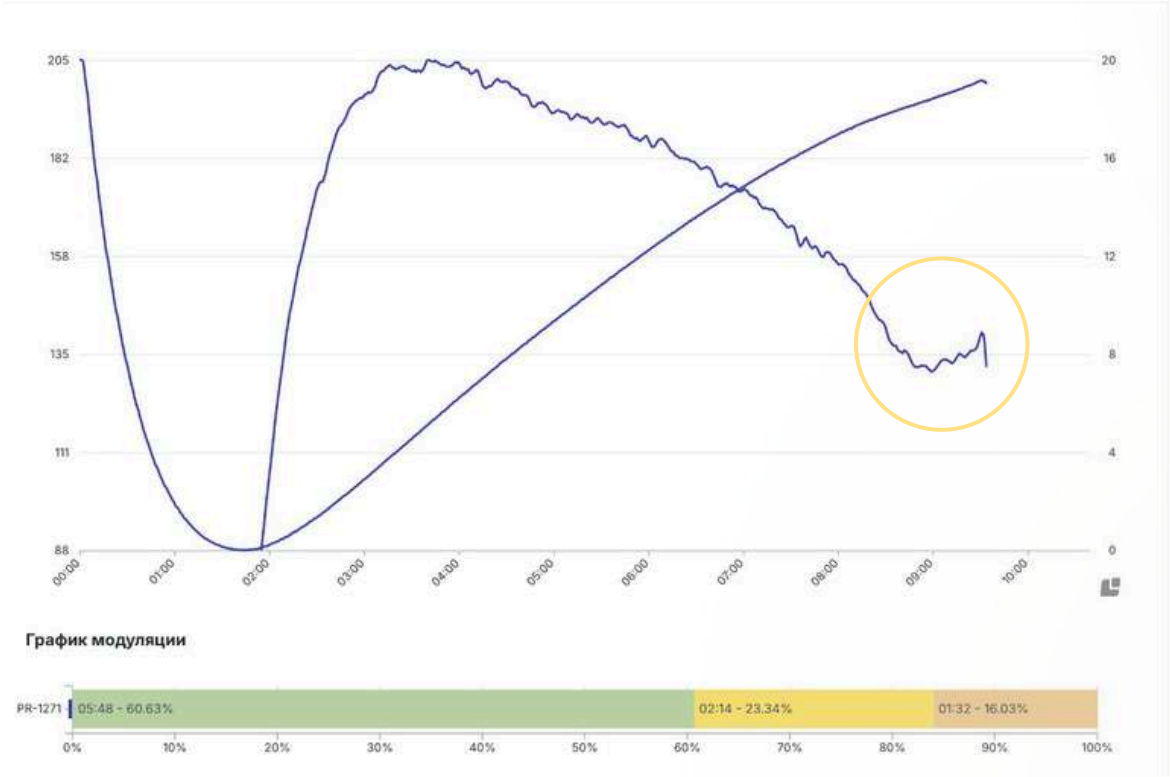
Change of reaction from endothermic to exothermic. Risk of getting extra bitterness.

↘ SOLUTION

Reduce overall roasting intensity by modulating gas and Airflow.

ROR FLICKS

ROR "flicks" before the crack or after a significant amount of development time after the start of 1st crack.



4.PROFILING

4.14 Espresso and filter roasting

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WHAT IS THE DIFFERENCE

SELECTION OF VARIETIES

↘ Speciality, Fine commercial (Q-grade 83-84), commercial

THE NECESSARY EXTRACTIVITY

↘ Bright espresso, developed espresso, filter, Turk

BLENDS OR SINGLE ORIGIN

THE IDEA OF TASTE

↘ Bright, full, milky

DIFFERENCES

in profiling

1. Color
2. Time of development
3. Roasting Stage Ratio (Taste Idea)
4. % weight loss

↘ **There are no fundamental differences in roasting espresso and filter coffee - there are only ideas about the taste you want to achieve.**

1. Bright/acid (short yellow, short development, more air)
2. Balance (% development 14-16, total time 9-11 minutes)
3. More "coffee-like" (long development, high gain after crack)

All these ideas are achieved by following the principles of profiling and testing.

4.PROFILING

4.15 Roasting coffee with milk and automatic coffee machines

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METHODS

of fine-tuning the roasting profile

INCREASE OF TOTAL TIME

↘ Due to the yellow stage

INCREASE OF DEVELOPMENT TIME

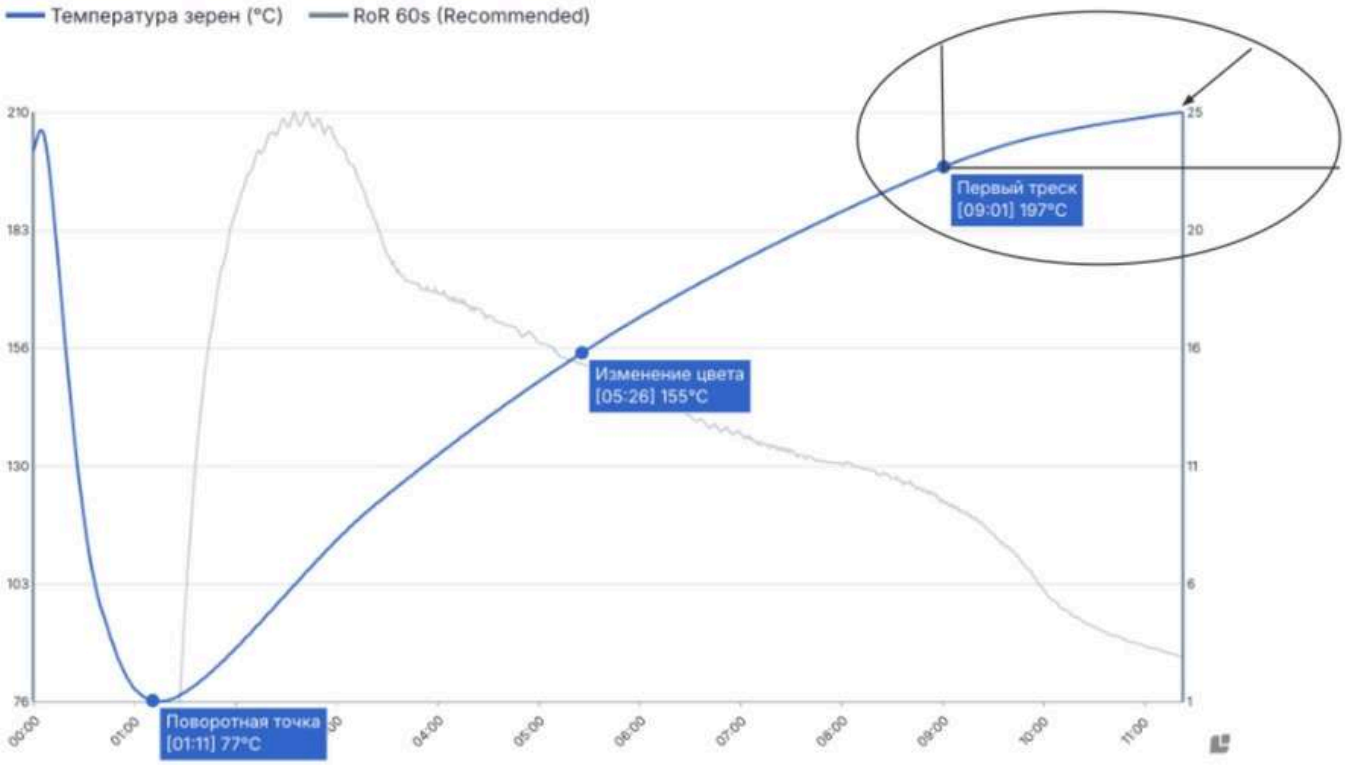
↘ No increase in gain after the crack (smooth angle of attack)

INCREASED AIRFLOW MODULATION

DRUM ROTATION SPEED

MAIN REASONS FOR CREATION:

- **Coffee gets lost in milk**
- **The acidity of the coffee does not go well with the milk.** ("sour taste")
- **Aggressive acidity in an automatic coffee machine**
- **Weak extraction in an automatic coffee machine**


Температура зерен (°C)
RoR 60s (Recommended)
210
183
156
130
103
76
25
20
16
11
6
1
00:00
01:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
Первый треск
[09:01] 197°C
Изменение цвета
[05:26] 155°C
Поворотная точка
[01:11] 77°C

4.PROFILING

4.16 Roasting Championship

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COMPETITION STAGES:

- Sample roast
- Training roast
- Single-origin roasting and description
- Mixing, cupping and description
- Green coffee grading

Why

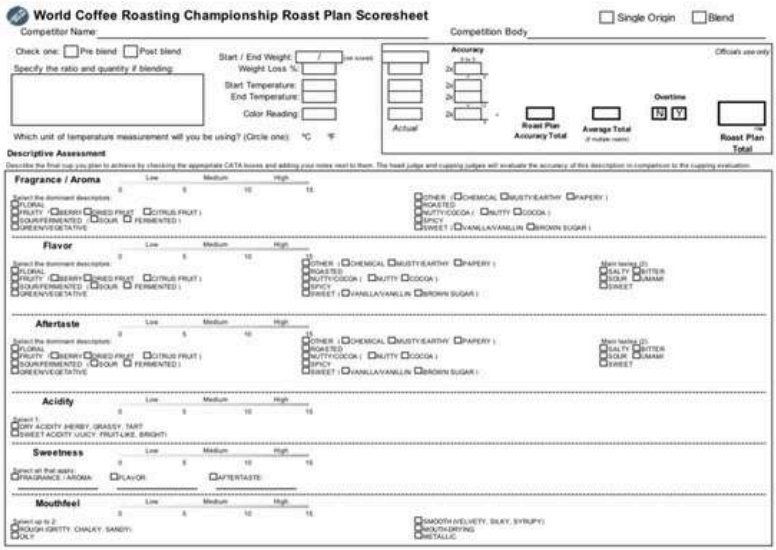
CHAMPIONSHIPS ARE GOOD

- New experience of working with bean and equipment
- Sharing experiences with colleagues
- Additional motivation
- Benefits for brand/company promotion
- Objective feedback from judges
- Experience gained during preparation

WHAT IS JUDGED AT THE ROASTING CHAMPIONSHIP?

- Working with green bean
- Ability to describe taste
- Sample roast
- Experience in operating roasting equipment
- Creating a Roasting Plan
- Blending skill
- Hitting the roasting plan
- Skill in working with laboratory equipment

ROASTING CHAMPIONSHIP SCORE SHEET



World Coffee Roasting Championship Roast Plan Scoresheet

Competitor Name: _____ Competition Body: _____ ☐ Single Origin ☐ Blend

Check one: ☐ Pre blend ☐ Post blend

Specify the ratio and quantity if blending:

Start / End Weight: ___ / ___ (see scale)

Weight Loss %: ___

Start Temperature: ___

End Temperature: ___

Color Reading: ___

Which unit of temperature measurement will you be using? (Circle one): °C °F

Accuracy — Official's use only

Actual | Roast Plan Accuracy Total | Average Total (if multiple roasts) | Overtime [N] [Y] | Roast Plan Total

Descriptive Assessment

Describe the final cup you plan to achieve by checking the appropriate CATA boxes and adding your notes next to them. The head judge and cupping judges will evaluate the accuracy of this description in comparison to the cupping evaluation.

Fragrance / Aroma — Low / Medium / High — 0 5 10 15

Select the dominant descriptors:

☐ FLORAL ☐ FRUITY ☐ BERRY ☐ DRIED FRUIT ☐ CITRUS FRUIT ☐ SOUR/FERMENTED ☐ SOUR ☐ FERMENTED ☐ GREEN/VEGETATIVE

☐ OTHER ☐ CHEMICAL ☐ RUSTY/EARTHY ☐ PAPERY ☐ ROASTED ☐ NUTTY/COCOA ☐ NUTTY ☐ COCOA ☐ SPICY ☐ SWEET ☐ VANILLA/VANILLIN ☐ BROWN SUGAR

Flavor — Low / Medium / High — 0 5 10 15

Select the dominant descriptors:

☐ FLORAL ☐ FRUITY ☐ BERRY ☐ DRIED FRUIT ☐ CITRUS FRUIT ☐ SOUR/FERMENTED ☐ SOUR ☐ FERMENTED ☐ GREEN/VEGETATIVE

☐ OTHER ☐ CHEMICAL ☐ RUSTY/EARTHY ☐ PAPERY ☐ ROASTED ☐ NUTTY/COCOA ☐ NUTTY ☐ COCOA ☐ SPICY ☐ SWEET ☐ VANILLA/VANILLIN ☐ BROWN SUGAR

Main tastes (2): ☐ SALTY ☐ BITTER ☐ SOUR ☐ UMAMI ☐ SWEET

Aftertaste — Low / Medium / High — 0 5 10 15

Select the dominant descriptors:

☐ FLORAL ☐ FRUITY ☐ BERRY ☐ DRIED FRUIT ☐ CITRUS FRUIT ☐ SOUR/FERMENTED ☐ SOUR ☐ FERMENTED ☐ GREEN/VEGETATIVE

☐ OTHER ☐ CHEMICAL ☐ RUSTY/EARTHY ☐ PAPERY ☐ ROASTED ☐ NUTTY/COCOA ☐ NUTTY ☐ COCOA ☐ SPICY ☐ SWEET ☐ VANILLA/VANILLIN ☐ BROWN SUGAR

Main tastes (2): ☐ SALTY ☐ BITTER ☐ SOUR ☐ UMAMI ☐ SWEET

Acidity — Low / Medium / High — 0 5 10 15

Select 1:

☐ DRY ACIDITY (HERBY, GRASSY, TART)

☐ SWEET ACIDITY (JUICY, FRUIT-LIKE, BRIGHT)

Sweetness — Low / Medium / High — 0 5 10 15

Select all that apply:

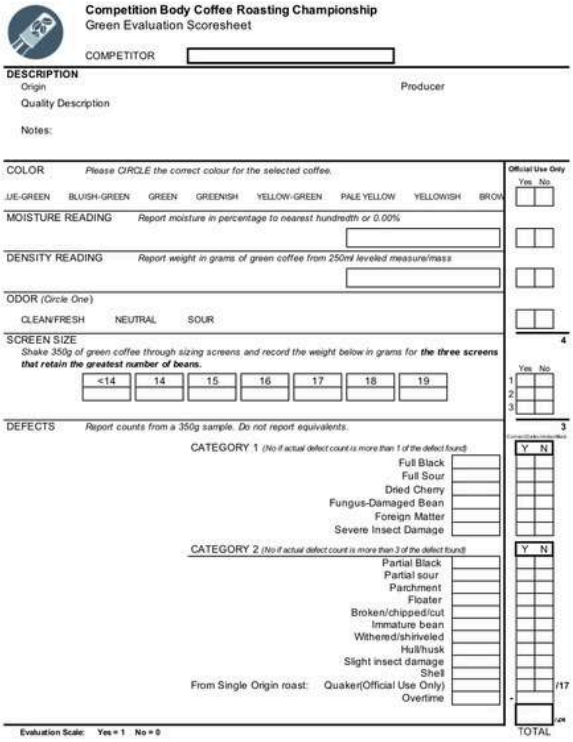
☐ FRAGRANCE / AROMA ☐ FLAVOR ☐ AFTERTASTE

Mouthfeel — Low / Medium / High — 0 5 10 15

Select up to 2:

☐ ROUGH/GRITTY, CHALKY, SANDY) ☐ OILY

☐ SMOOTH (VELVETY, SILKY, SYRUPY) ☐ MOUTH-DRYING ☐ METALLIC



Competition Body Coffee Roasting Championship

Green Evaluation Scoresheet

COMPETITOR _____

DESCRIPTION

Origin Producer

Quality Description

Notes:

COLOR *Please CIRCLE the correct colour for the selected coffee.*

.UE-GREEN BLUISH-GREEN GREEN GREENISH YELLOW-GREEN PALE YELLOW YELLOWISH BROW

MOISTURE READING *Report moisture in percentage to nearest hundredth or 0.00%*

DENSITY READING *Report weight in grams of green coffee from 250ml leveled measure/mass*

ODOR *(Circle One)*

CLEAN/FRESH NEUTRAL SOUR

SCREEN SIZE

Shake 350g of green coffee through sizing screens and record the weight below in grams for ***the three screens that retain the greatest number of beans.***

<14	14	15	16	17	18	19

DEFECTS *Report counts from a 350g sample. Do not report equivalents.*

CATEGORY 1 *(No if actual defect count is more than 1 of the defect found)*

Full Black
Full Sour
Dried Cherry
Fungus-Damaged Bean
Foreign Matter
Severe Insect Damage

CATEGORY 2 *(No if actual defect count is more than 3 of the defect found)*

Partial Black
Partial sour
Parchment
Floater
Broken/chipped/cut
Immature bean
Withered/shriveled
Hull/husk
Slight insect damage
Shell

From Single Origin roast: Quaker(Official Use Only)
Overtime

/17

TOTAL

Evaluation Scale: Yes = 1 No = 0

4.PROFILING

4.17 Sample Roast

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The sample needs to be roasted as consistently, standardly, and repeatably as possible.

EXAMPLE

roast sample 100g

- **Total time – 8-10 minutes**
  Development – 55-1:10 (cupping)
  Color – 90-95 filter

PROFILE TRANSFER

of roasts from sample roaster to production roaster:

1. The first reference point is the color according to the colorimeter.
2. The second benchmark is the weight loss percentage.
3. The total time will not be the same.
4. % of stages will be close but not the same.

You can calculate the roasting stages as a percentage, because depending on the size difference, the roasting profile will change (total time), but NOT proportionally.