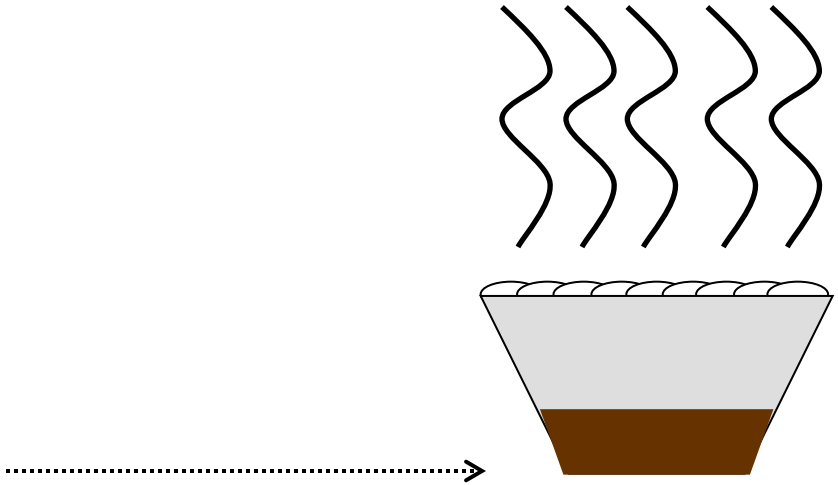


Does my Coffee Grinder affect my Coffee's Taste?

Scott Will

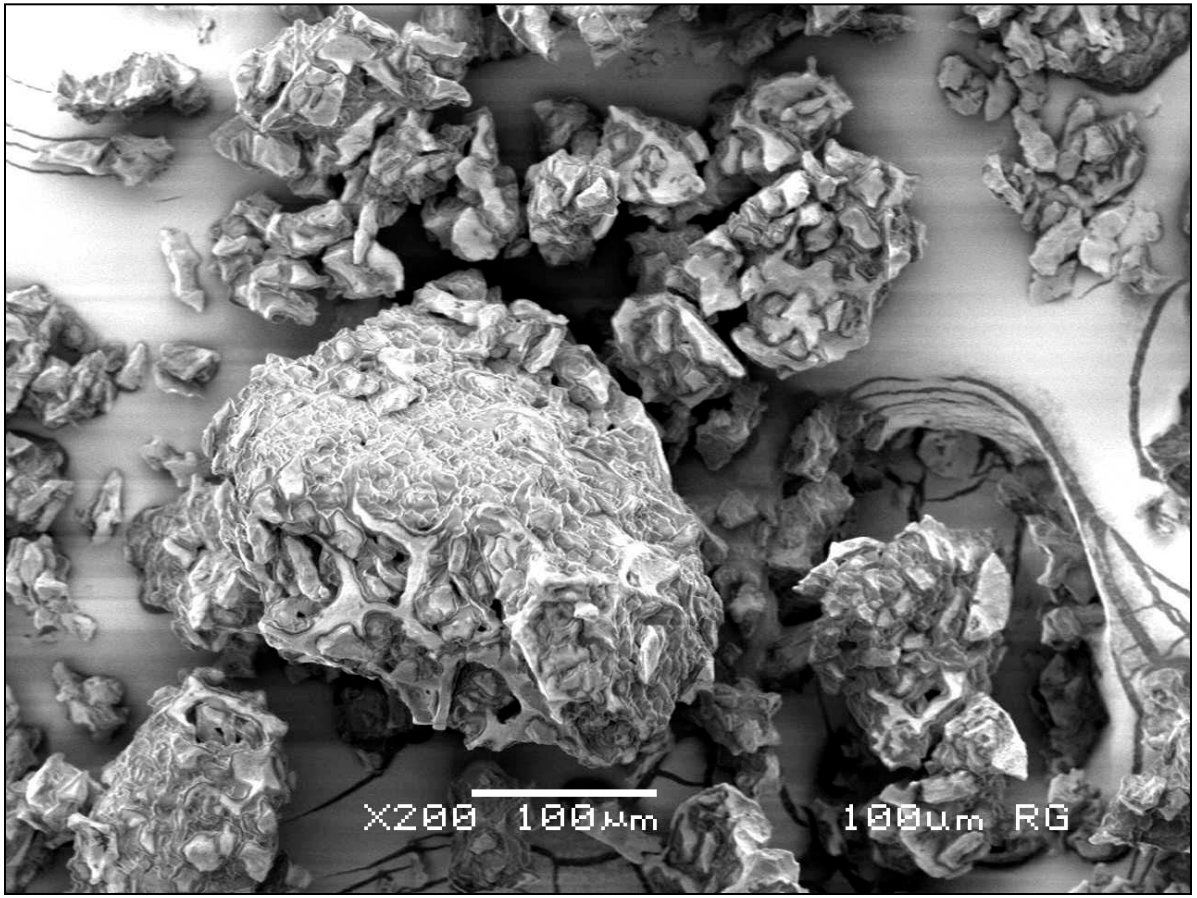
Modern Process Equipment

Presentation Outline

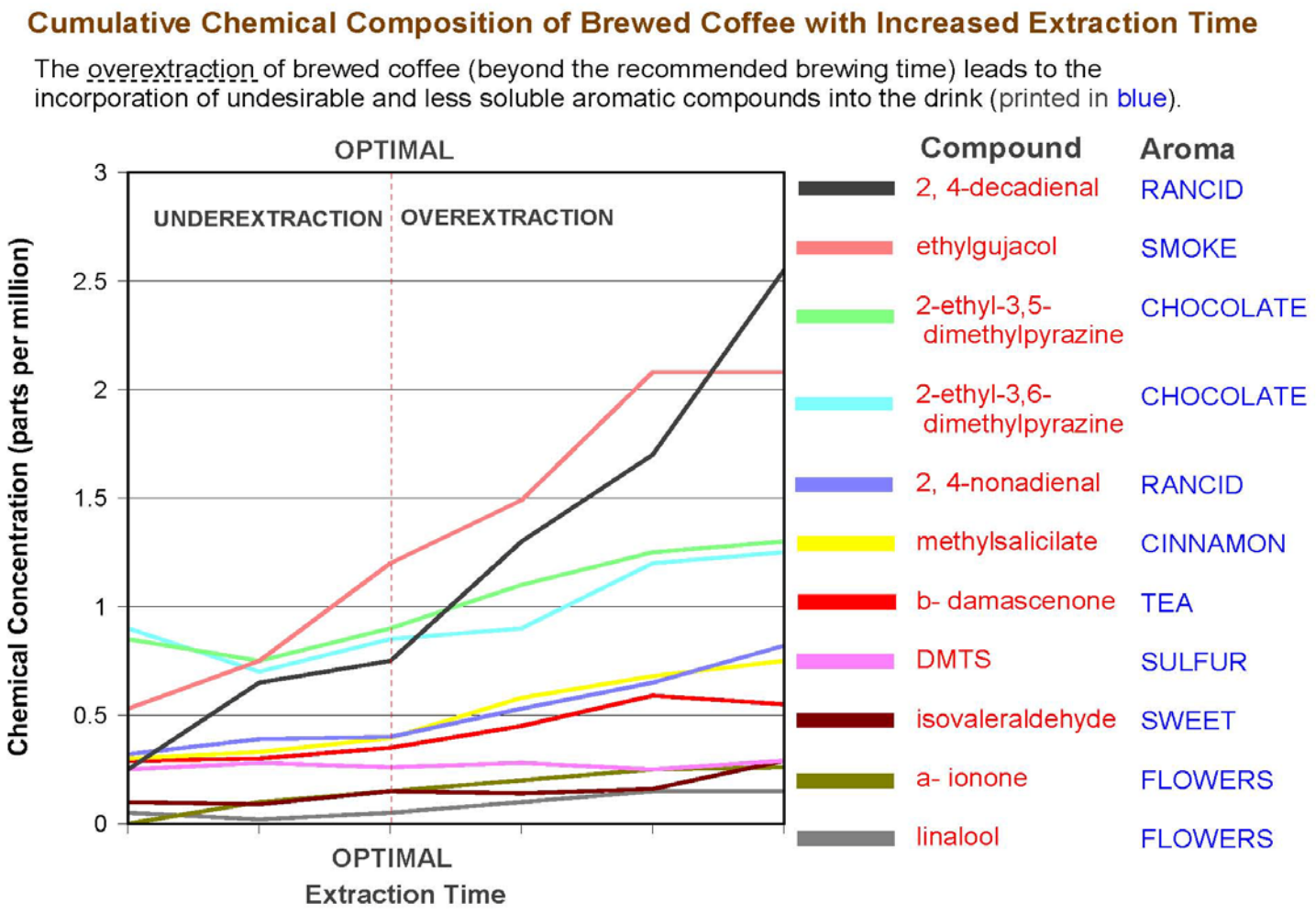
- What we are trying to Extract from the Bean
- Grind Size and it's part in Coffee Extraction
- Grinder Analysis
  - Blade Grinder
  - Cone Grinder
  - Roller Grinder

This is a much magnified view of a ground coffee particle using an electron microscope.

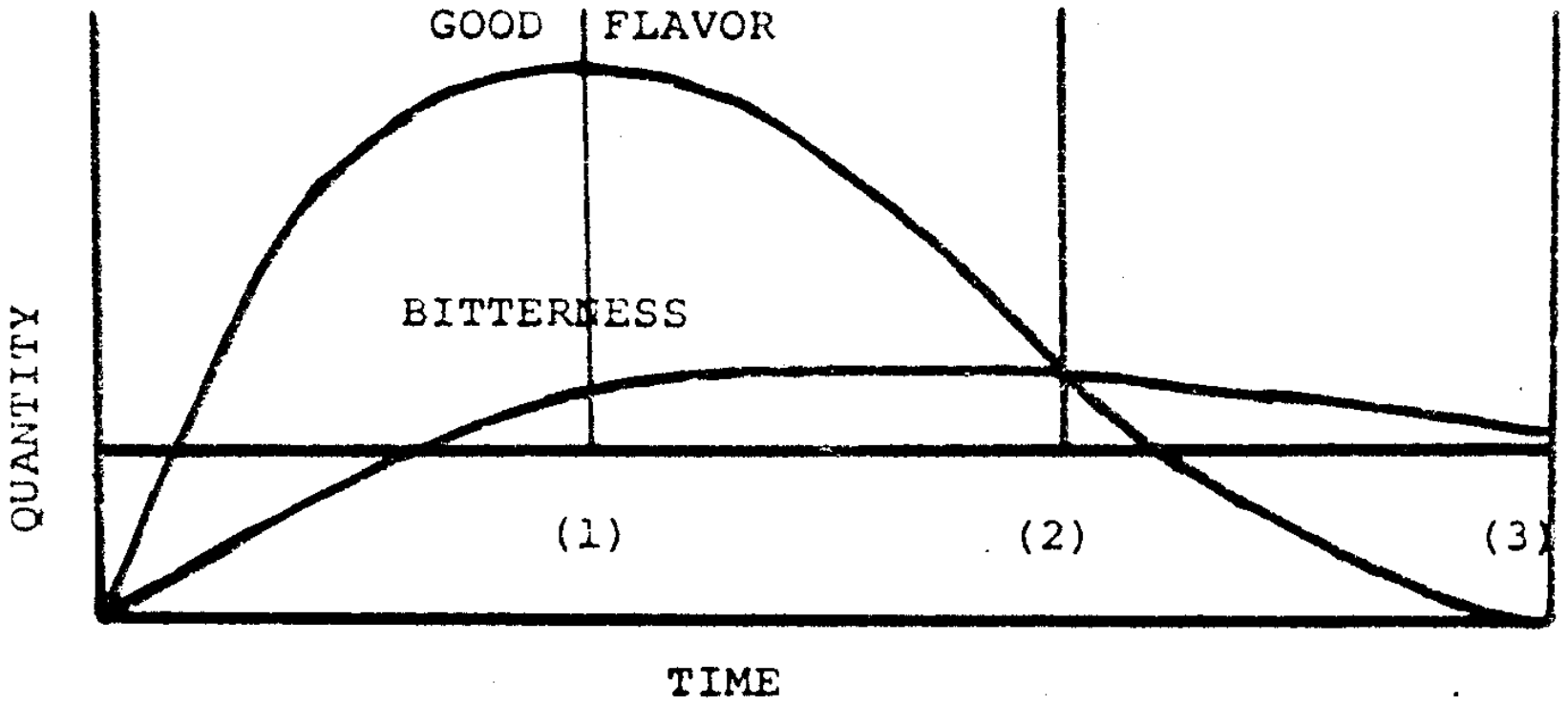
The cellular walls are about 30 microns in diameter, and the colloidal material fills the voids within the ground coffee and cellular structures. Part of this colloidal material is what we want to extract, but with a limit.



Effect of Extraction Time on Taste



Effect of Cycle Time on Taste



Courtesy of the Coffee Brewing Center

How do we obtain this “Optimal Extraction”?

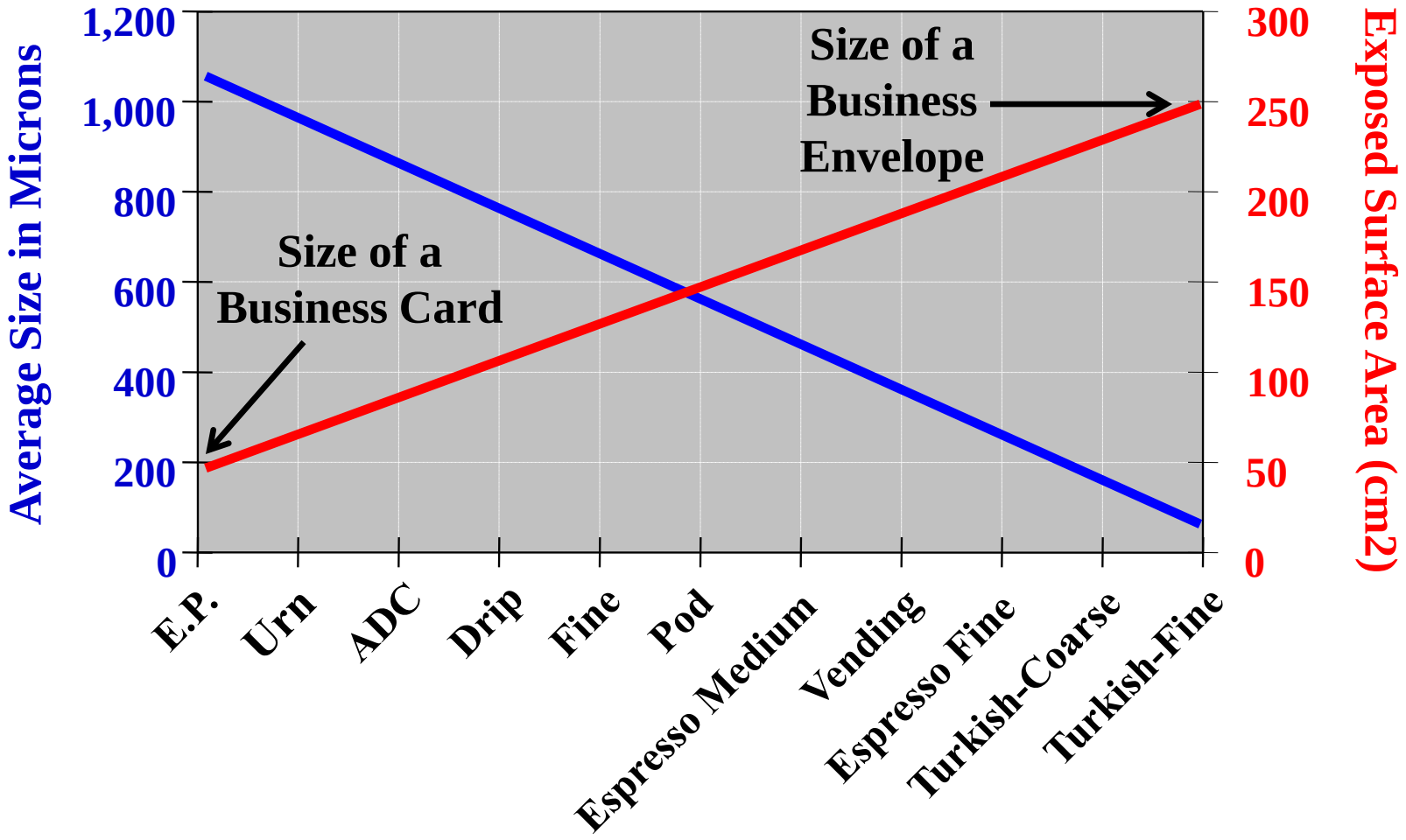
It Depends on the Brew Method, but Optimal Extraction is always a function of:

1. **Grind Size**
2. **Grind Uniformity**
3. **Hot Water Exposure Time**
4. Amount of Coffee Used when brewing

Average Size vs. Surface Area

(1 Bean = 3.4 cm^2 = Size of a Postage Stamp)

Surface Area Increases as Brewing Time Decreases!



Grind Technical Points

- The rate of soluble solids extraction is directly related to the amount of exposed surface area to the hot water.

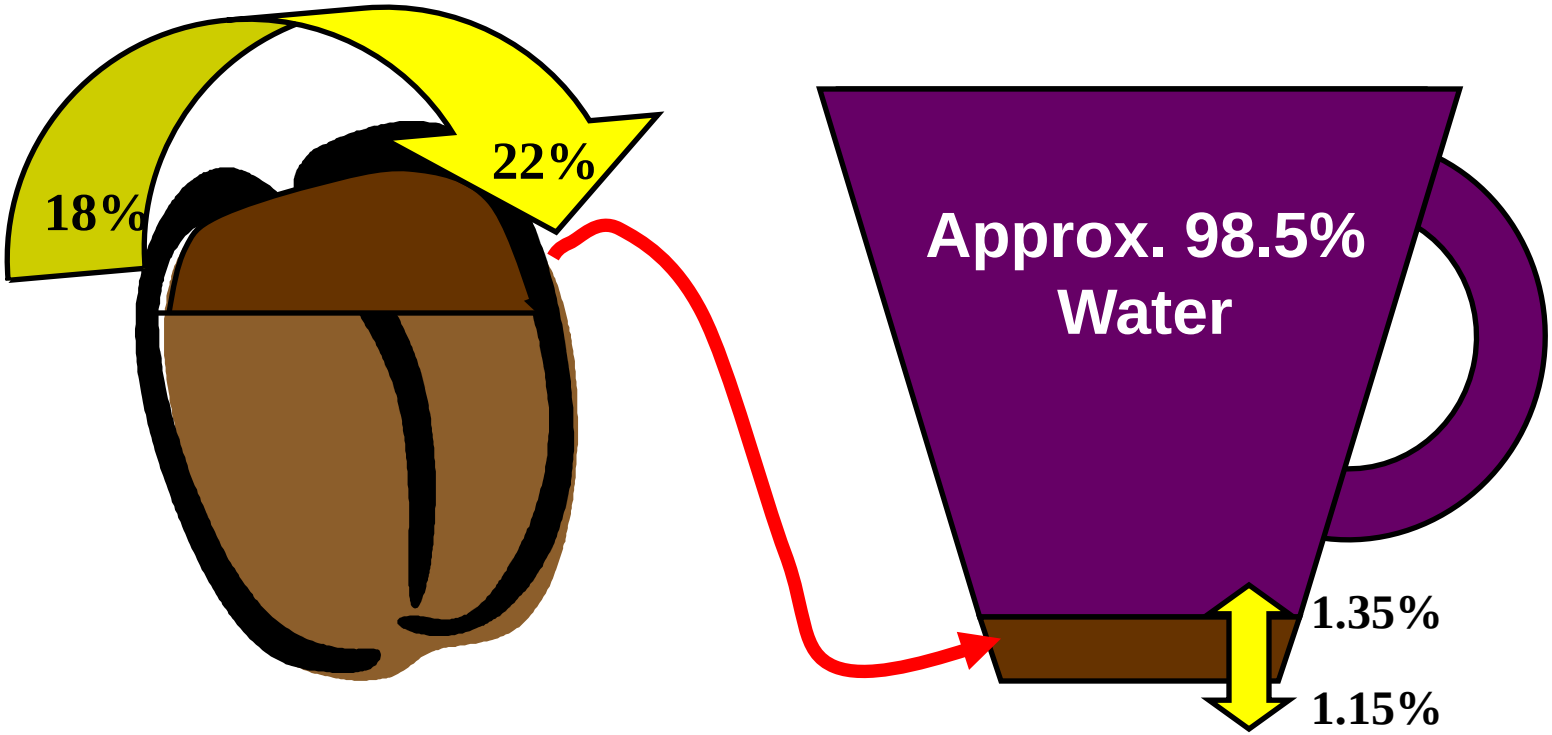
  Think of how sugar dissolves into water.

  – Fine Sugar – Quick Dissolution

  – Coarse Granular Sugar – Slow Dissolution

- If **particle size, uniformity, brewing time, and amount of coffee usind** are matched correctly, one can achieve an optimal **20% extraction.**

Proper Extraction and Strength



Ideal Extraction of the coffee particle's soluble solids is 18-22%

Ideal Brew Strength is 1.15-1.35% brewed solids

Macro Grind Challenge

64 oz. H_2O

Extract for 4 min.

Good Grind Goal:
20% extraction of soluble solids

Approx. 6 oz. water retention in grounds

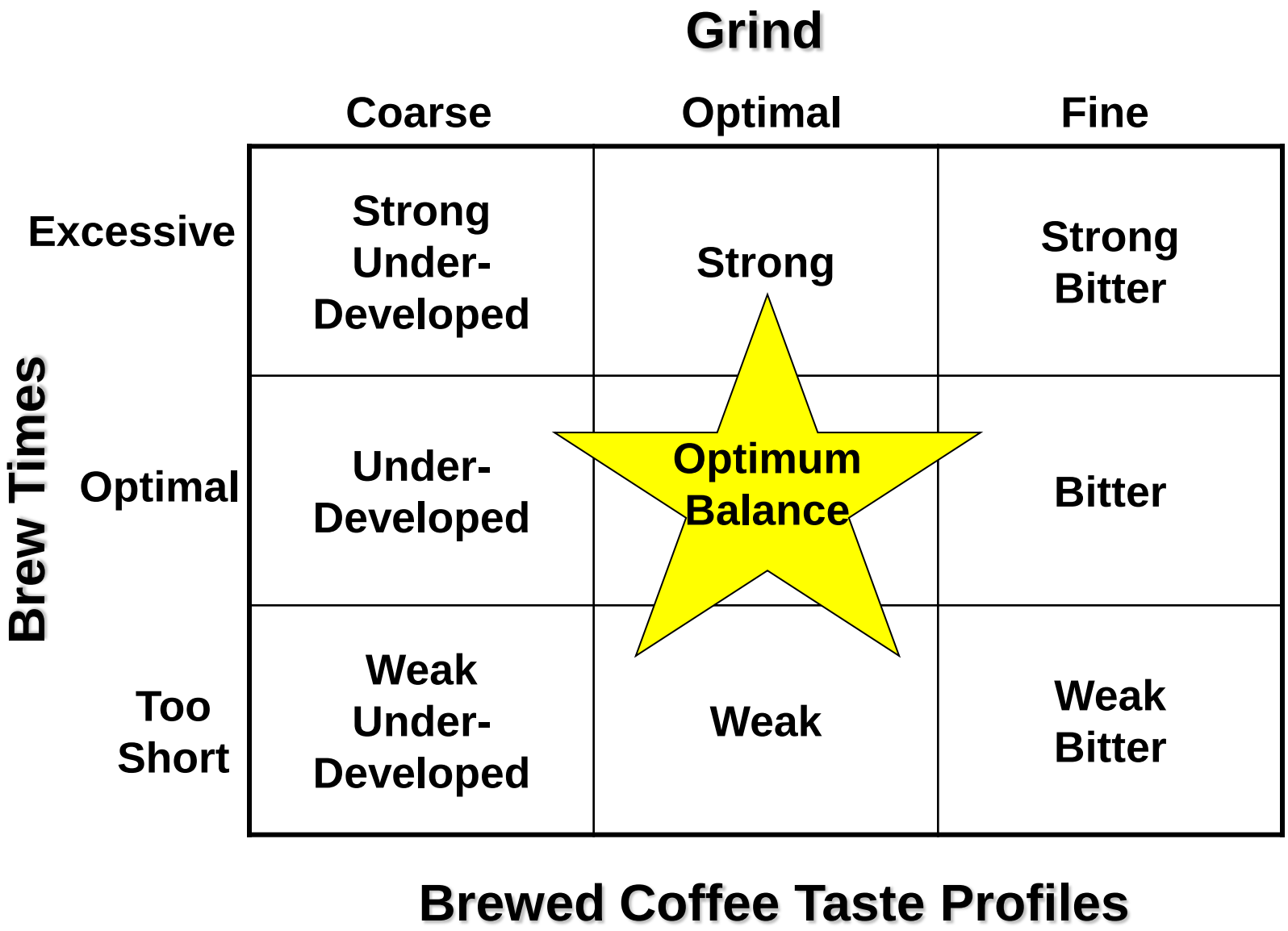
3.75 oz.

58 oz. liquid
(64 oz. – 6 oz.)

Soluble Solids:
1.3%
(0.75 oz./58 oz.)

20% * 3.75 = .75 oz.

Ideal Matrix of Grind vs. Time



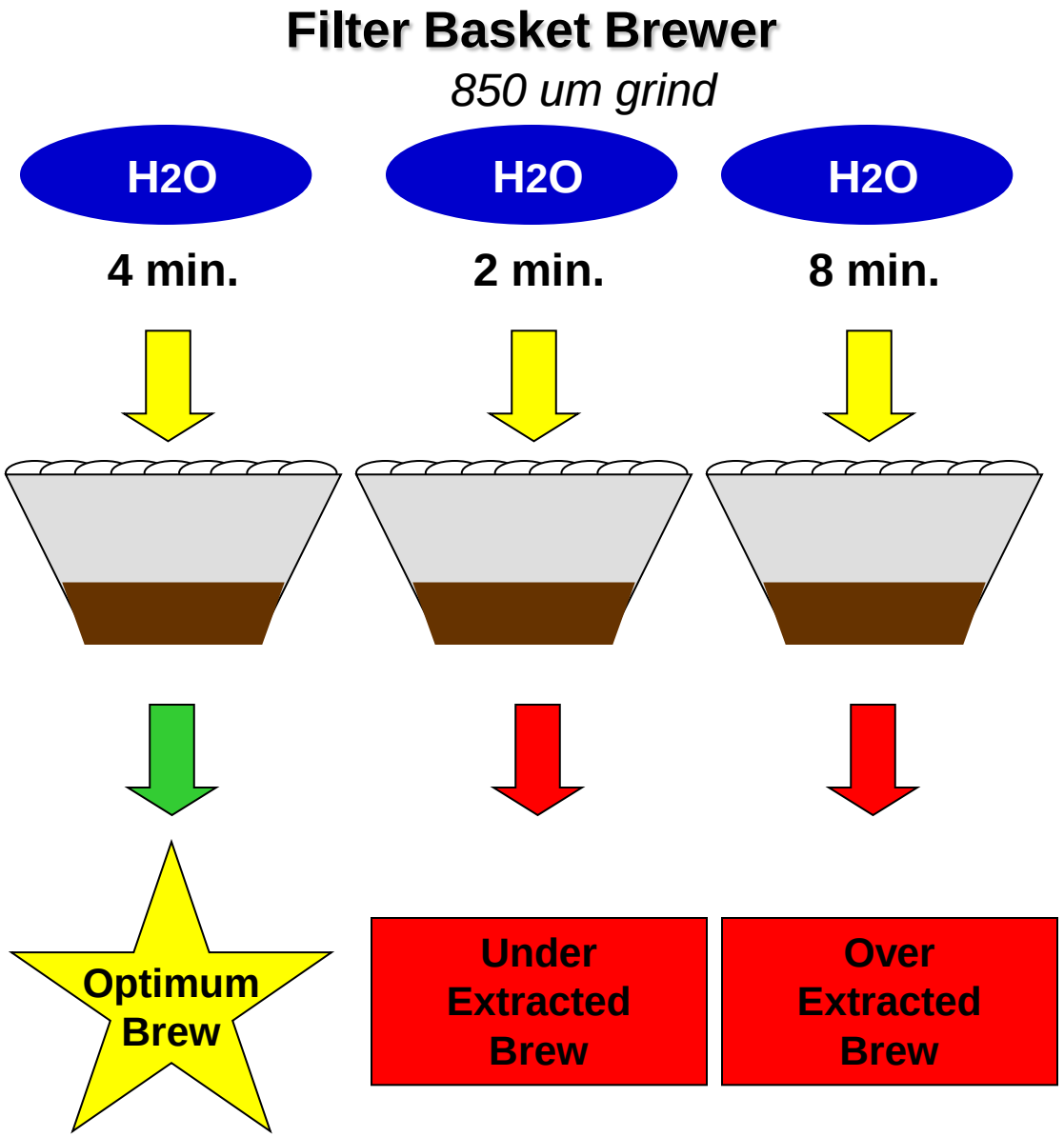
Macro Analysis of Extraction

By the “Gold Cup” Brewing Standard:

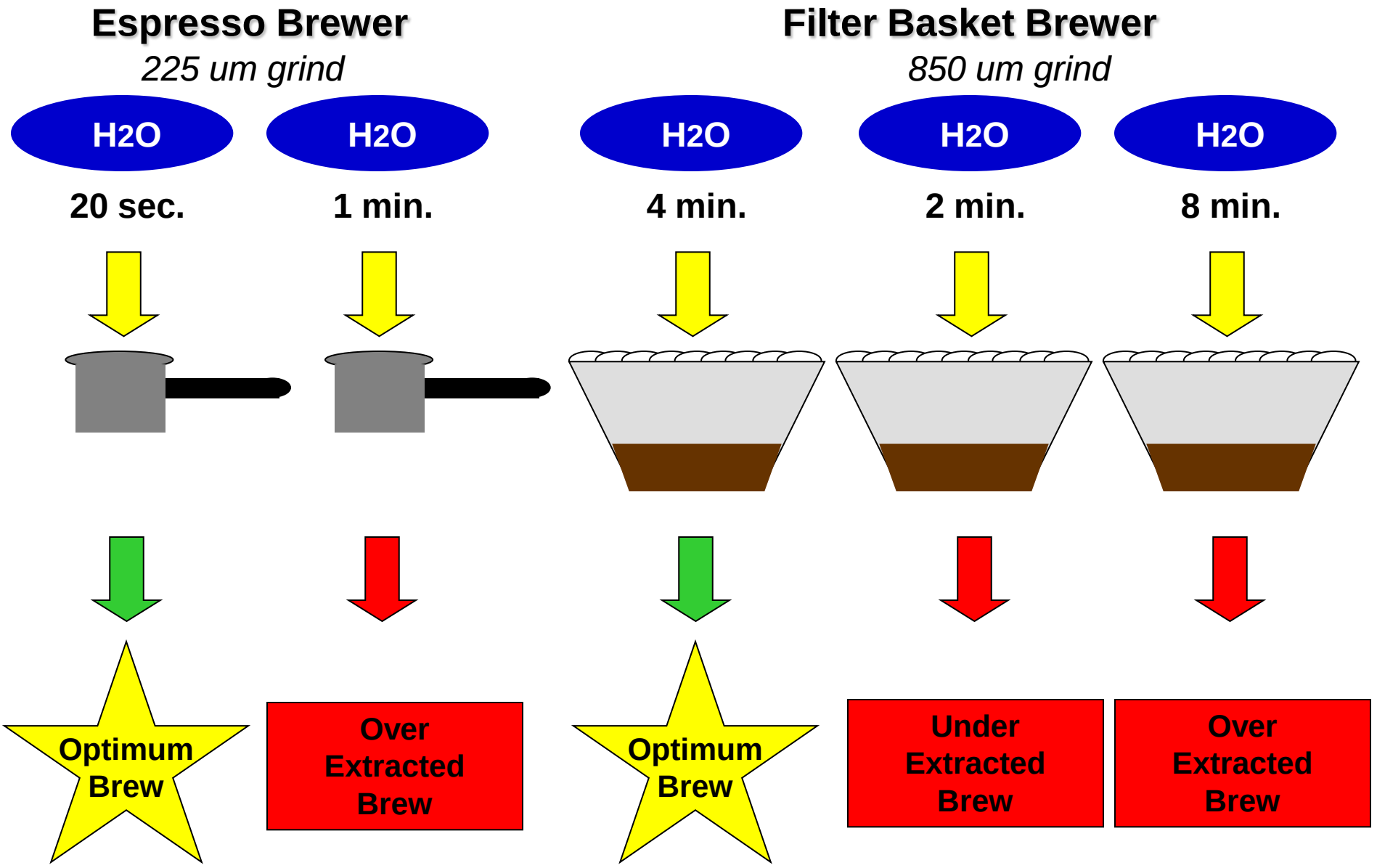
-**64 oz. of water (8 cups), requires**

-**3.25–4.25 oz. of coffee (92-120 grams)**

This translates to around **2 heaping spoons** of coffee per cup of water.



Macro Analysis of Extraction



Grinder Analysis Comparison

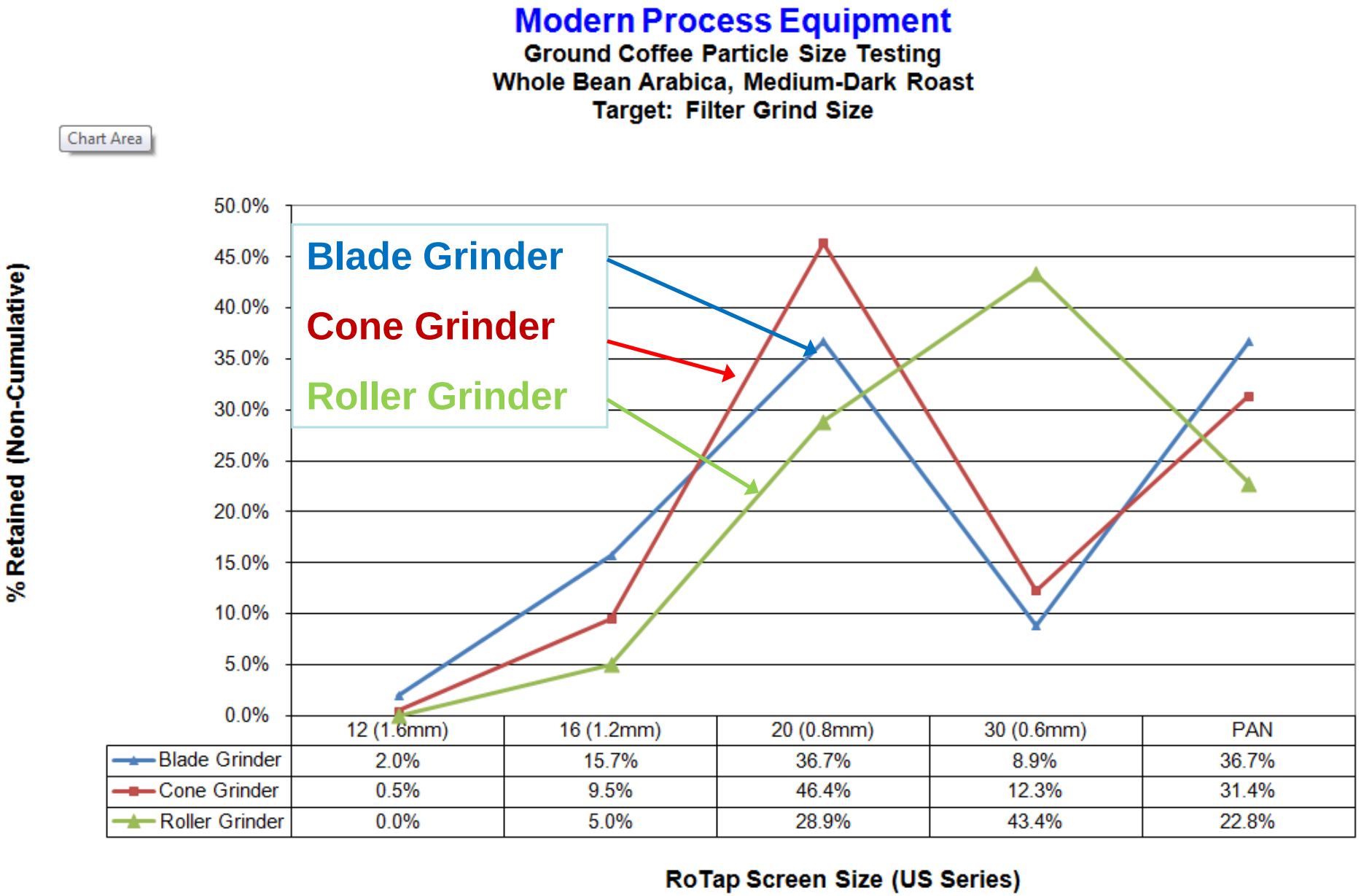
Mr. Coffee Blade Grinder

Capresso Cone Grinder

MPE Roller Grinder

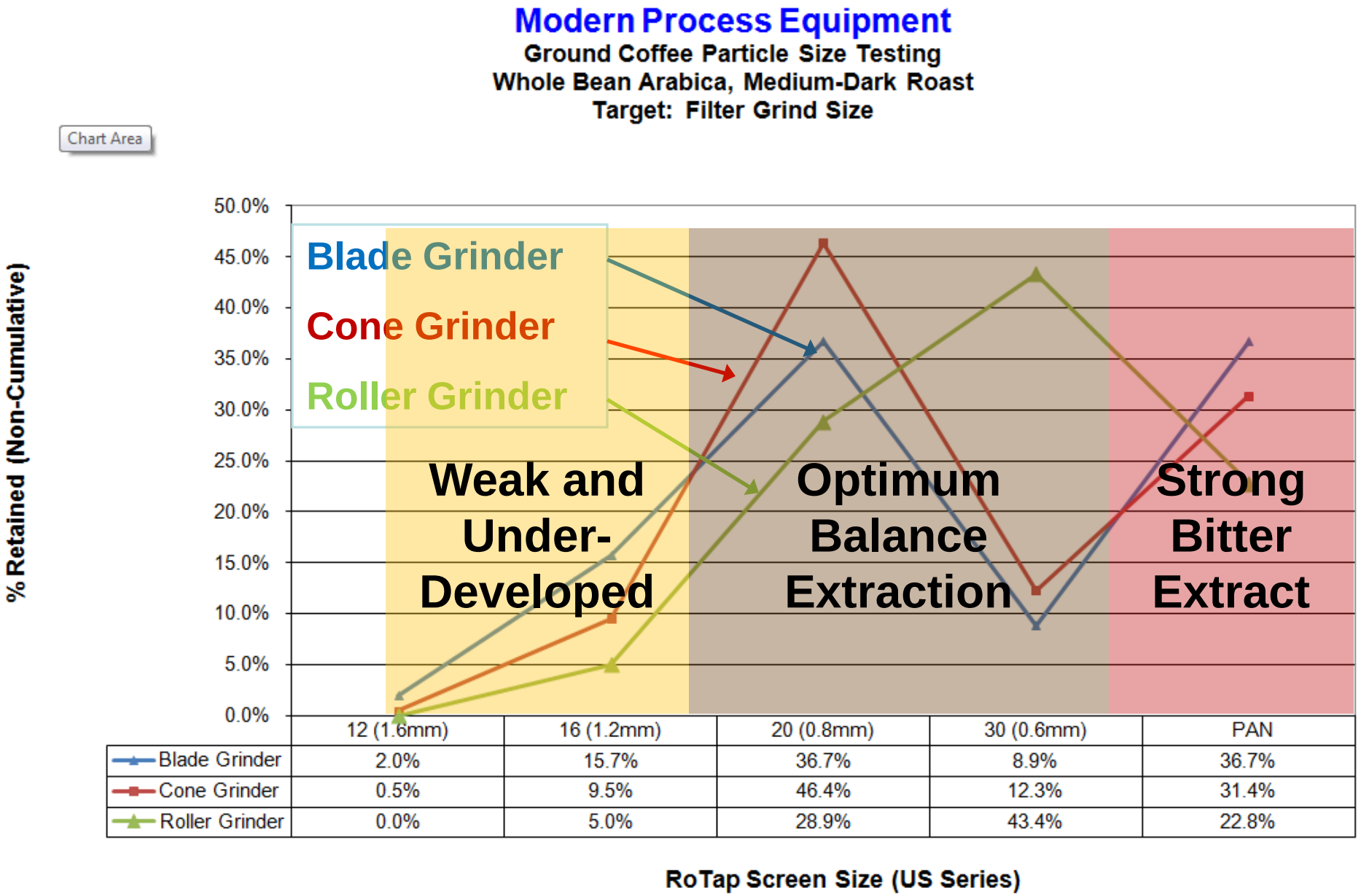
The Ro-Tap Method

Ro-Tap Particle Size Comparison



	12 (1.6mm)	16 (1.2mm)	20 (0.8mm)	30 (0.6mm)	PAN
Blade Grinder	2.0%	15.7%	36.7%	8.9%	36.7%
Cone Grinder	0.5%	9.5%	46.4%	12.3%	31.4%
Roller Grinder	0.0%	5.0%	28.9%	43.4%	22.8%

Ro-Tap Particle Size Comparison



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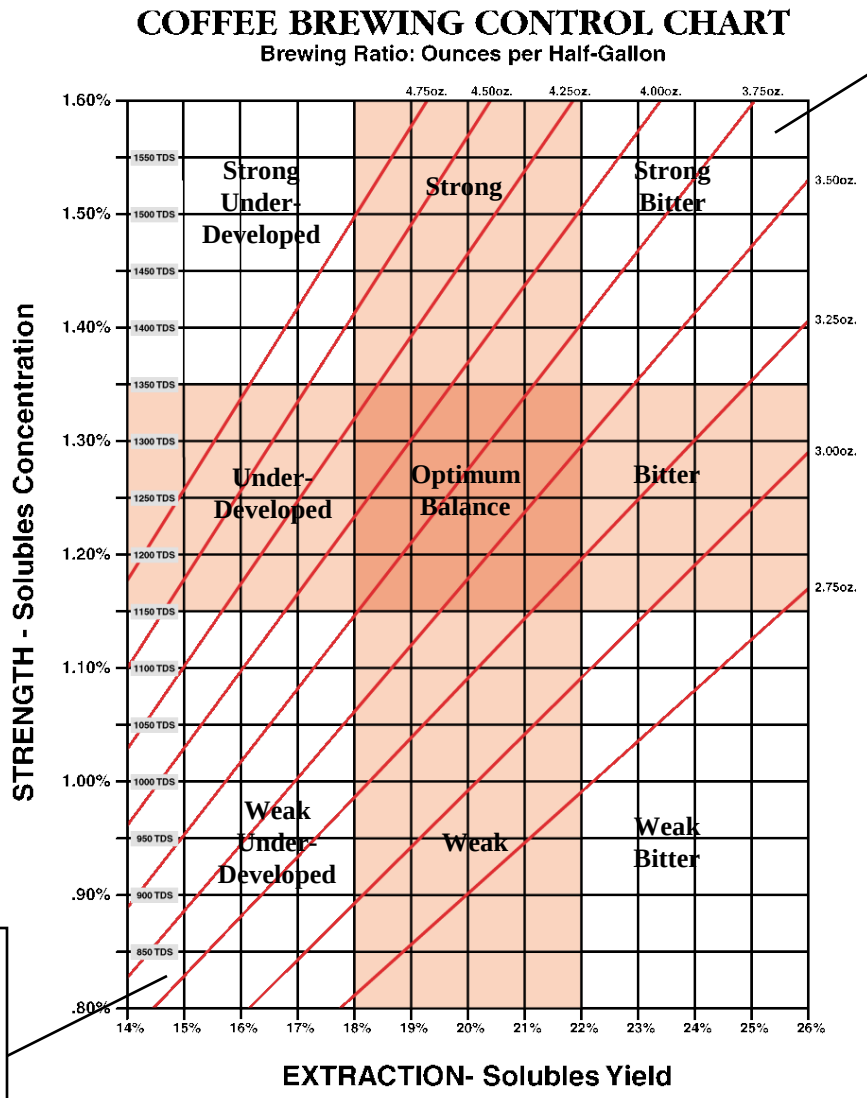
Takeaway Points

1. **Achieve a Uniform Grind Size**
   - Roller Grind (Store Purchased Ground Coffee),
   - Cone or Burr Grind if ground at home,
   - Avoid Blade Grinders

2. **Configure the Grind Size for the Brew Method**
   - Espresso (0.2 – 0.3 mm average, sand size)
   - Filter (0.6 - 0.9 mm average)
   - French Press (~1.0-1.2 mm average)

3. **Use the appropriate amount of coffee** to control the brew strength

The “Gold Cup” Standard Calculation



Too Fine so Extraction Rate Too High

Too Coarse so Extraction Rate Too Low

How do we calculate brewed solids?

1. Use 64 oz. of water for brewing
2. Subtract water absorbed in coffee grounds (6 fl/oz.)
3. Use 3.75 oz. of ground coffee to extract 20% solids
4. Brew to “Gold Cup” Standard that will extract 20% of solids:
   20% x 3.75 oz. = 0.75 oz.
5. Calculate brewed solids as percentage of liquid:
   0.75 oz./58 oz. = 1.3%

Evaluation of the same grind (average particle size) but different uniformities

Particle Size/Particle Uniformity:

645 um/1.35 σ ***(Good Quality Grind)***

650 um/ 3.0 σ ***(Poor Quality Grind)***