



TRUE HOPPING™

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MILESTONE
HELPING
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Metrohm
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InnBrew
THE BREWERS CONVENTION

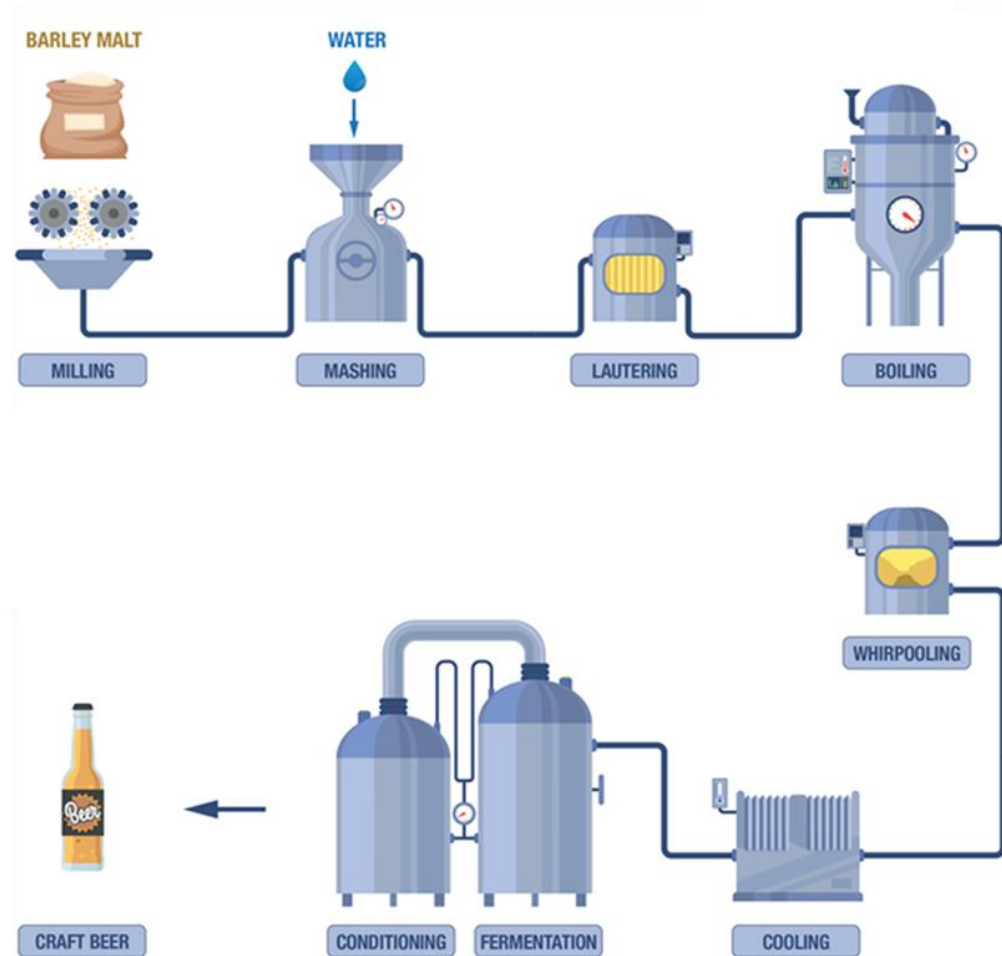
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KEY LEARNING OBJECTIVES

- Hops in the brewing process
- Dry hopping challenges
- Introducing True Hopping approach
- Why True Hopping
- Q&A session



THE HOP IN THE BREWING PROCESS



- Addition in kettle
 - Alpha-acids thermally convert in iso alpha-acids to get the right IBU
 - Very inefficient for hop flavor
 - At 100°C nearly all the volatile oil are lost!
- Dry Hopping
 - Dry-hopping is the cold, aqueous extraction of hops into beer
 - Dry-hopping achieves a distinctive aroma that is notably different from kettle or late-hop additions

DRY HOPPING



- Dry hopping is a relatively inefficient process
 - Poor extraction efficiency of volatile oil into beer
 - Negatively impact brewing yield
 - All alpha-acids are wasted
- Highly hop-forward beers such as IPA, double IPA etc, require massive dry-hopping
 - Very low brewing yield
 - Very high costs

DRY HOPPING – EXTRACTION EFFICIENCY

OIL STILL RETAINED ON SPENT HOPS [%v/v]		
Hop Variety	Range	Mean
Amarillo	35-68	57
Cascade	30-60	41
Centennial	39-65	51

Average extraction efficiency 30-40%

- Extraction media is water with a low alcohol content
 - Poor extraction efficiency of volatile oil into beer
- Approximately from 30 to 70% v/v of volatile oils remain in spent hops
 - Today wasted!
- High variability of oil still retained
 - Poor flavor standardization

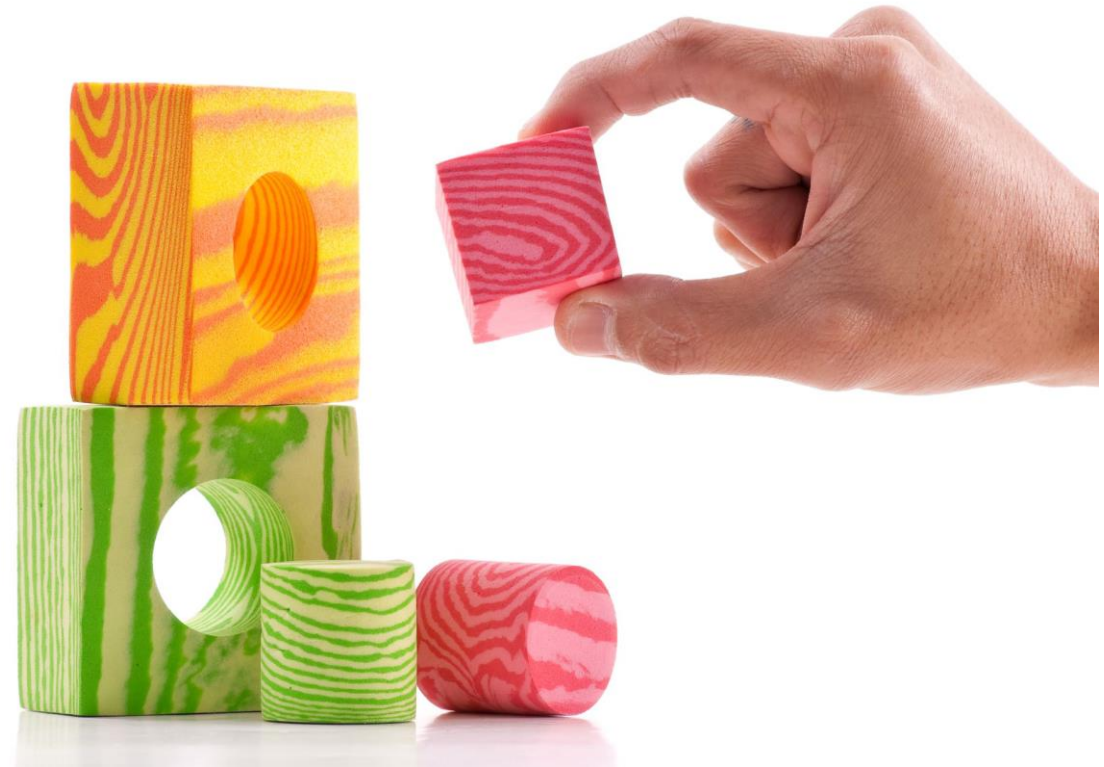
DRY HOPPING – BEER LOSS



- Hop pellets are highly hygroscopic
 - Hop pellets can absorb approximately 8-10 times its weight
 - Adsorption depending on beer styles such as IPA, double IPA etc, require dry-hopping at high rates, up to 15 g/L
- High beer loss
 - Approximately 10-25% w/w beer was lost during the process!
- All alpha-acids are wasted

ADDRESSING DRY HOPPING CHALLENGES

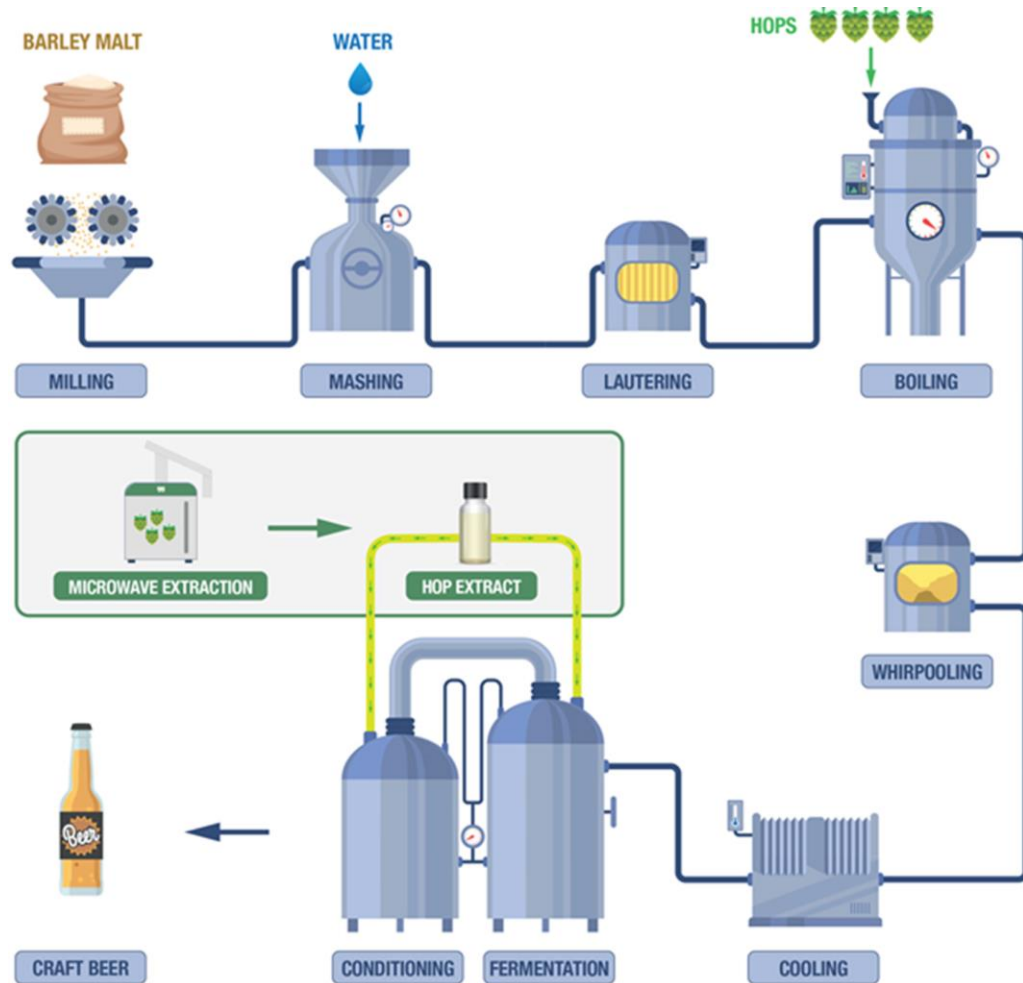
- Different addition strategies
 - Challenges in standardizing the process
 - More additional steps involved
 - Always a matter of equilibrium
- Use of additional equipment
 - Expensive
 - Maintenance is required
 - Compromise strategy
- Use of commercial extracts
 - Few varieties available
 - Restored with additional terpenes when quality is poor or extraction is partial



INTRODUCING MILESTONE TRUE HOPPING



THE MILESTONE TRUE HOPPING PROCESS PRINCIPLE



Milestone true hopping process principle

- Head brewers select hops species and suppliers they trust
- Production of hops terpene extract with Microwave-assisted distillation
- Add terpene hop extract in conditioning and fermentation steps instead of directly using hops pellets

MICROWAVE ASSISTED DISTILLATION OF HOPS

- True-hopping uses solvent-free microwave extraction (SFME)
 - Based on Microwave-assisted hydrodistillation
 - Patented technology by Milestone
- High quality terpene extracts from hops you trust
 - Fast and efficient extraction
 - No oxidation
 - Controlled isolation of strain-specific hop essential oils
- Water saving



ETHOS X 2.0

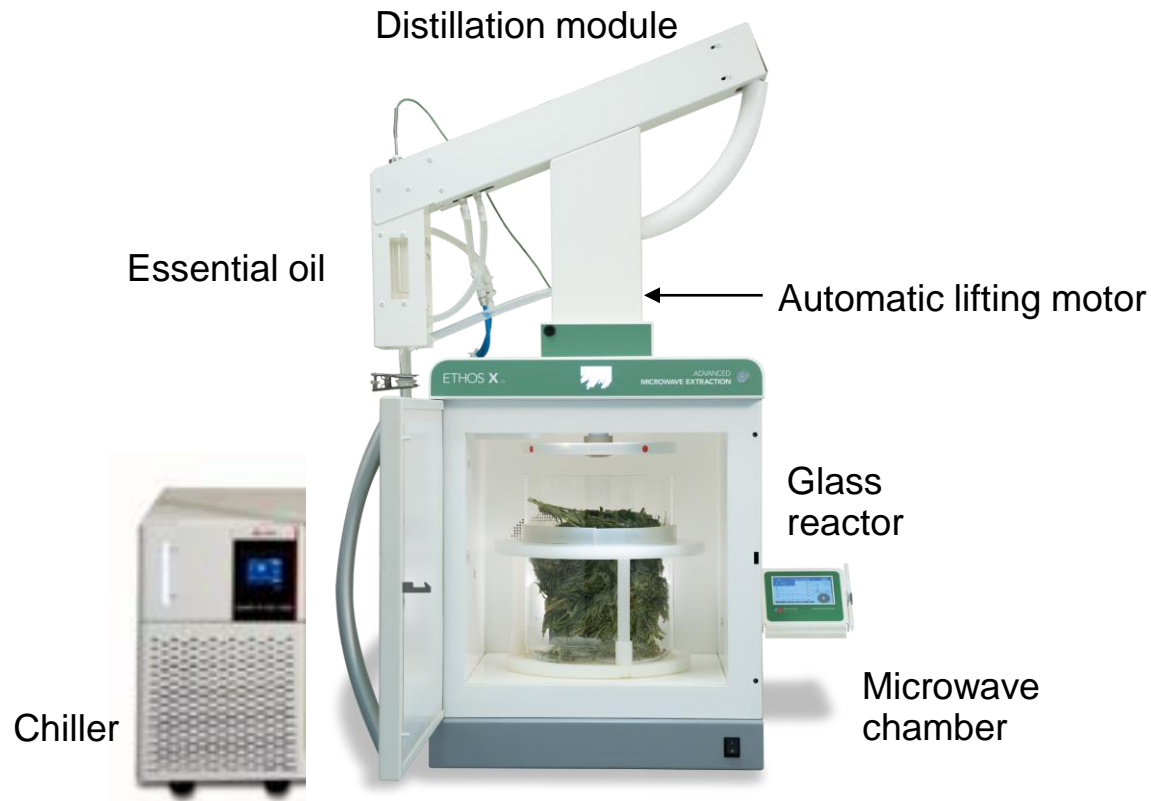
- Material processed per shift
- 3.5 - 4kg (0.8-1kg per run)
 - 2 hours/run



ETHOS XL

- Material processed per shift
- 10 - 12kg (3,5-4kg per run)
 - 3 hours/run

SOLVENT-FREE MICROWAVE EXTRACTION (SFME)



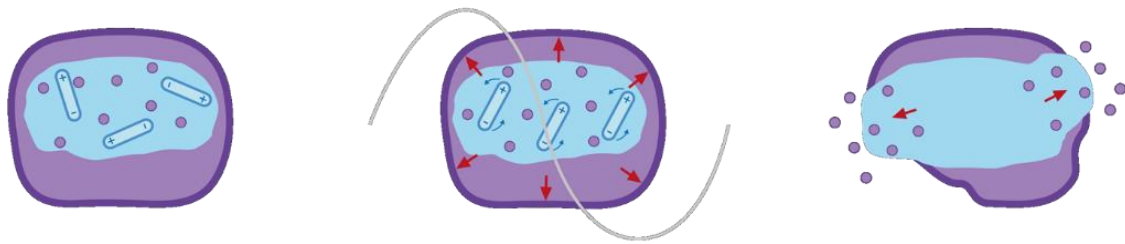
- Robust construction
 - Industrial design
- Semi automated operation
 - Load hops pellet in the reactor
 - Add water approximately 8-12 times its weight
 - Push start button
 - Collect pure hops oil
- Full extraction control for limited oxidation

TRUE HOPPING - BENEFITS

True hopping enables to brewing highly hop-forward beers with high efficiency and profitability trough



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1. Maximize extraction efficiency of flavor from hops

TRUE HOPPING - BENEFITS



True hopping enables to brewing highly hop-forward beers with high efficiency and profitability trough

1. Maximize extraction efficiency of flavor from hops
2. Reduce hop pellet usage by working with personal flavor extract

- Dry Hopping, extraction efficiency: 30%
- True Hopping, extraction efficiency: 95%
- Negligible oils amount retained in spent hops treated with True Hopping, less than 5%

TRUE HOPPING - BENEFITS

SAMPLE TYPE	MOISTURE [%w/w]
Hop pellets	9.03
Spent hop pellets	75.8 ± 2.7

- Hop pellets absorb approximately 8-10 times its weight
- Less hop pellets usage ends up in less beer adsorbed by the hopping process

True hopping enables to brewing highly hop-forward beers with high efficiency and profitability trough

1. Maximize extraction efficiency of flavor from hops
2. Reduce hop pellet usage by working with personal flavor extract
3. Increase brewing yield

TRUE HOPPING - BENEFITS

Hop variety	Certified α -acids content [%w/w]*	Iso- α -acid content on MW spent hop [%w/w]	α -acid content on MW spent hop [%w/w]
SIMCOE	12.6	8.3	3.1

- The spent microwaved hop contain iso- α -acids
- It can be added into kettle at the end of the boiling for bittering

True hopping enables to brewing highly hop-forward beers with high efficiency and profitability trough

1. Maximize extraction efficiency of flavor from hops
2. Reduce hop pellet usage by working with personal flavor extract
3. Increase brewing yield
4. Dual purpose – hops is used 100% both for flavor and alpha acids

TRUE HOPPING - BENEFITS



- Iso- α -acids available in microwave spent hop
 - No need of boiling for isomerization process
- Reducing maturation time
 - No need to wait for dry hopping extraction
 - No need to wait for hop sedimentation
- Higher throughput, faster production

True hopping enables to brewing highly hop-forward beers with high efficiency and profitability trough

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2. Reduce hop pellet usage by working with personal flavor extract
3. Increase brewing yield
4. Dual purpose – hops is used 100% both for flavor and alpha acids
5. Increase brewing capacity

TRUE HOPPING - BENEFITS



- Essential oils from different hop varieties and botanicals
- Efficient flavor enrichment and standardization
- Very fast way to experiment rather than making boil additions

True hopping enables to brewing highly hop-forward beers with high efficiency and profitability trough

1. Maximize extraction efficiency of flavor from hops
2. Reduce hop pellet usage by working with personal flavor extract
3. Increase brewing yield
4. Dual purpose – hops is used 100% both for flavor and alpha acids
5. Increase brewing capacity
6. Easier blending and flavor enrichment

TRUE HOPPING - BENEFITS



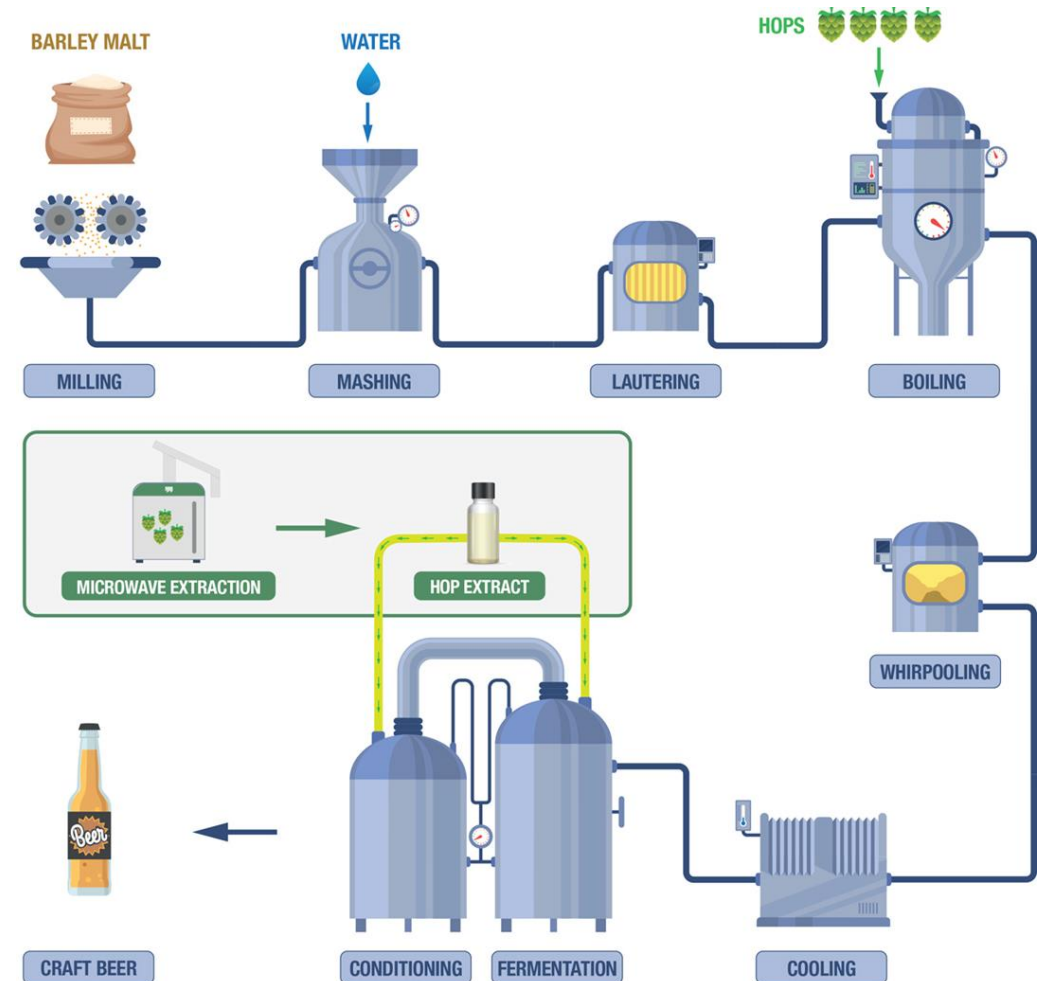
- Increased stability by adding less vegetable material and oxygen
- Product stability is a must when working with Ho.Re.Ca. industry

True hopping enables to brewing highly hop-forward beers with high efficiency and profitability trough

1. Maximize extraction efficiency of flavor from hops
2. Reduce hop pellet usage by working with personal flavor extract
3. Increase brewing yield
4. Dual purpose – hops is used 100% both for flavor and alpha acids
5. Increase brewing capacity
6. Easier blending and flavor enrichment
7. Longer shelf-life

SUMMARY

- True-hopping enables to brew highly hop-forward beers with high efficiency and profitability through
 1. Maximize extraction efficiency of flavor from hops
 2. Reduce hop pellet usage working with personal flavor extract
 3. Reduce beer loss
 4. Dual purpose – hops is used 100% both for flavor and alpha acids
 5. Increase brewing capacity
 6. Easier blending and flavor enrichment
 7. Longer shelf-life
- ROI estimated in 12-18 months





WOULD YOU LIKE TO LEARN MORE?

Contact me: lorenzo.rossi@milestonesrl.com



SCAN ME!