MILESTONE
HELPING CHEMISTS

TRUE HOPPING: MAXIMIZE BREWING YIELD

ETHOS™ X line

True Hopping Extraction for Breweries

OPTIMIZED
EXTRACTION EFFICIENCY

HOPS COST
REDUCTION

INCREASED
BREWING YIELD

EASIER
BLENDING

MAIXIMIZED
HOPS UTILIZATION

ENABLING MORE PROFITABLE BREWING

EFFICIENT HOP EXTRACTION

Beer is made from water, malt, hops and yeast. Hops cones are used in beer as they provide components that improve microbiological stability, bitterness, flavor, aroma as well as improve head retention. Hop aroma has become a key parameter to define a distinctive flavor of a craft beer and is primarily driven by the volatile oils found within the hop cones. Dry hopping has become a popular practice for craft brewers who produce hop-forward beers, enabling them to achieve a distinctive aroma that is notably different from kettle or late hop additions where volatile oils are lost due to the high temperatures involved. Despite that, dry hopping is a relatively inefficient process due to the poor extraction efficiency of volatile oils into beer. Additionally, hops pellets are also very hydroscopic and when high dry-hopping rates are used, beer loss becomes a critical variable for brewing yield. The innovative True Hopping technique delivered by the Milestone ETHOS X 2.0 and ETHOS XL enables brewers to maximize hops utilization by using the essential oils extracted from their own hop varieties. This reduces the amount of raw hop pellets added in dry hopping, increasing brewing yields and delivering consistent flavor profiles and blends to their craft beers. It also creates a valuable tool for new product development where beers with very different flavour profiles can be created from a single brew in a very short time.

TRUE HOPPING

The ETHOS X 2.0 and ETHOS XL have been designed to enable a fast implementation into the brewing process. The two systems differ in terms of their productivity, addressing the requirements of different brewery sizes.

MAXIMIZE FLAVOR EXTRACTION FROM HOPS

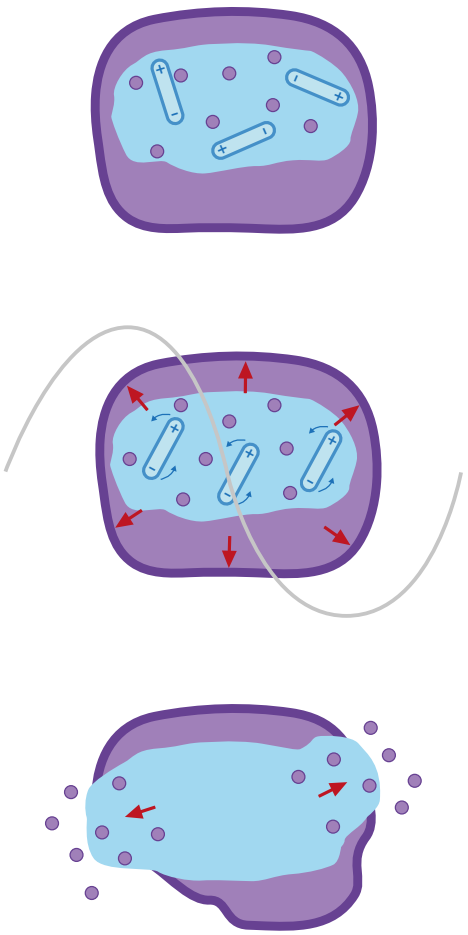
THE MICROWAVE EXTRACTION

To improve the hop flavor extraction efficiency of the conventional dry-hopping process Milestone has applied a novel hopping technique called True Hopping which uses the well-established solvent-free microwave extraction (SFME) approach. This is based on the ETHOS X line dedicated to essential oil extraction and takes advantage of the unique microwave selective heating mechanism. The internal heating of water within the sample distends its cells and leads to rupturing of the glands and oleiferous receptacles. This process frees the strain-specific hop essential oils contained in the hop cones which are then evaporated with the in-situ water of the botanical in a very efficient and controlled process that prevents any kind of extract oxidation.

UP TO 95% EXTRACTION EFFICIENCY

EASY TO IMPLEMENT

OXIDATION UNDER CONTROL



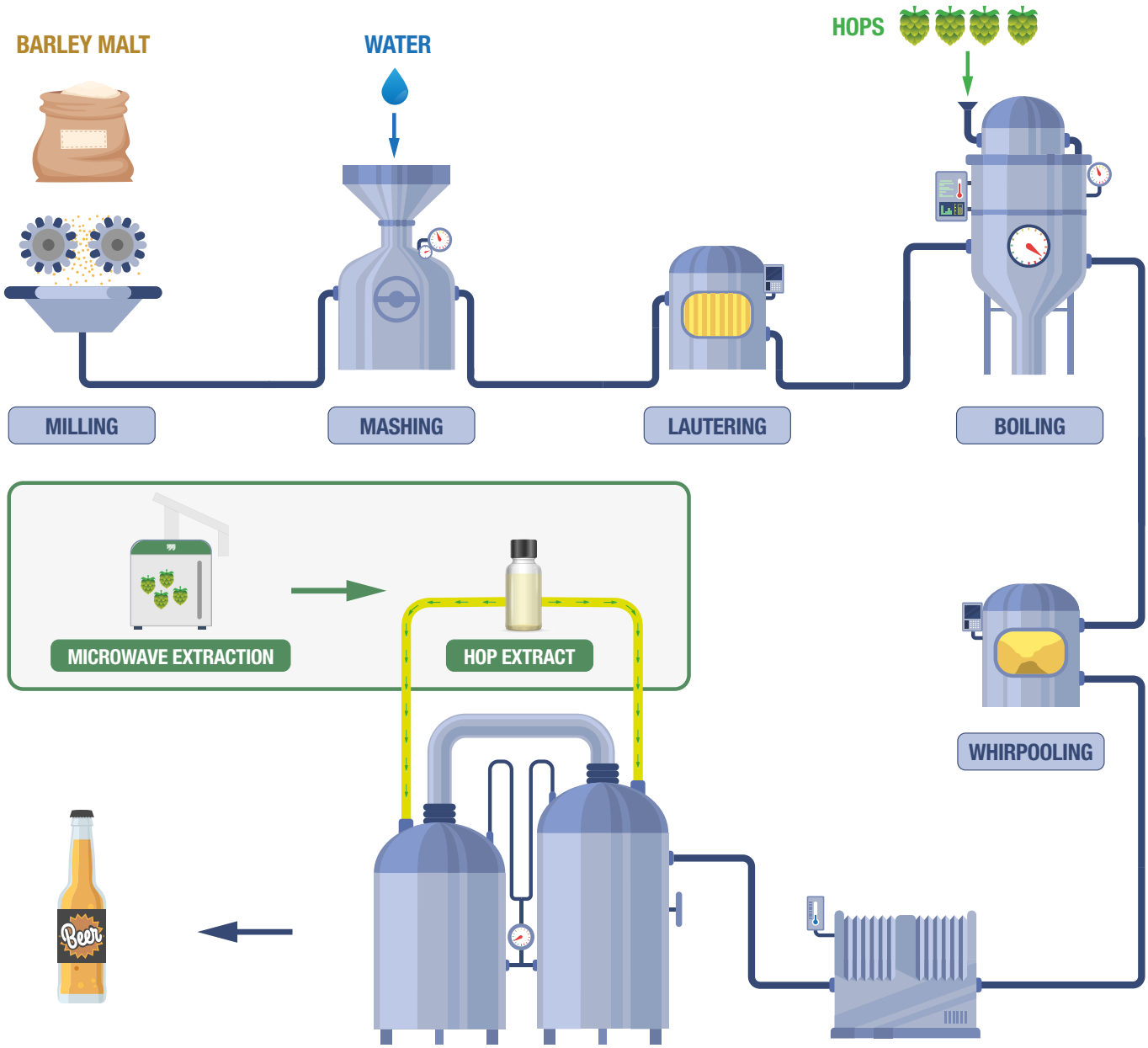
The microwave selective heating process

THE EXTRACTION PROCESS

After loading the reactor with material and setting the extraction parameters using the dedicated interface, the extraction process begins. The system applies microwave heating to the plant material to quickly evaporate target compounds and water content. The vapor then recondenses into a dedicated water-cooled apparatus, which automatically separates hop terpenes from water according to density. Water is then removed and the hop terpenes are collected from the burette.

THE TRUE HOPPING IMPLEMENTATION

The ETHOS X 2.0 and ETHOS XL easily integrates to your brewery process regardless of the hops variety chosen. To obtain the pure extracts from hops variant, you only need to load the material into the system and press start. The extract can be stored in glass at -18°C to ensure flavor stability for several months. When needed, the distilled hop oil is mixed with a carrying agent and added into fermenter and/or in whirpooling/ sedimentation tank for hopping, while extracted hops matter can be added in kettle for bittering in the last 10 minutes of the boil. We call this approach True Hopping, as it maximises hops utilisation, thereby significantly reducing the amount of hops pellets used to achieve the same beer flavor profile. True Hopping then considerably increases the production yields which effectively reduces the beer production costs.



ENHANCED BLENDING FLEXIBILITY AT LOWER COSTS

REDUCED HOPS CONSUMPTION

The True Hopping process allows a very efficient and controlled isolation of strain-specific hops essential oils from hops pellets. The extraction efficiency of ETHOS X 2.0 and ETHOS XL enables to recover up to 95% of the hop terpenes. Then allows us to achieve very hoppy flavor profiles using up to 40% less hops pellets.

INCREASED BREWING YIELDS

Hop is commonly stocked and delivered all around the world in form of dry-pellets. Hop pellets are highly hygroscopic and can adsorb approximately 8-10 times their weight in water. As a consequence of this, dry hopping can potentially cause losses of up to 25-30% beer loss during the process depending on beer style.

HOP SAVING

UP TO **40%**

Considering that in highly hopped and dry hopped beer production hop impacts on 25-35% of total beer production cost, the annual hops cost saving can be very significant. In addition to that, True Hopping allows a more sustainable brewing process, where less spent hops must be disposed, impacting positively to the overall supply chain and contributing a reduction of the related side costs.

BREWING YIELD

UP TO **10%**

For example, among american craft brewers, dry hopping rates can range well above 2kg/hL for double IPA styles, causing a beer adsorption on hops that can exceed 18L/hL of beer produced. The Milestone True Hopping technique permits a significant reduction in hop pellets usage reducing the volume of beer adsorbed in the hopping process. Beer production yields are therefore increased up to 10% with an important gained revenue due to more beer available for selling.

EASIER BLENDING AND FLAVOR ENRICHMENT

As hoppy beer styles increased in popularity with consumers throughout the 21st century, brewers from the craft beer industry have been using dry hopping at an increasing rate, trying to enhance the hoppy aroma combining several hop varieties and even other botanicals to reach different aromatic tastes. The True Hopping approach can be easily implemented and integrated into any craft brewery. This approach provides an innovative tool for flavor creation where essential oils from different hops varieties can be easily collected and blended, allowing an easier flavor standardization and a more efficient flavor enrichment, compared to the standard hops pellet addition. Furthermore, it gives brewers a flexible solution to experience in a very fast way new blends and aromas using also other botanicals.

DUAL PURPOSE – HOPS ARE USED 100% BOTH FOR FLAVOR AND α-ACIDS

The SFME of hops essential oils is quickly accomplished by a distillation process where hops in-situ water is heated at 100°C, avoiding the oxidation of the oil. Under this temperature condition, α-acids conversion into iso-α-acids takes place, allowing the usage of the spent microwaved material to get the right IBU in boiling. Thanks to this approach, hops can be used with a dual purpose, getting 100% the authentic taste from a specific hop variety as well as added into kettle at the end of boiling for bittering. The recycling of microwaved spent dry-hops for bittering could provide an additional opportunity for brewers to simultaneously improve the economic/ environmental sustainability of craft beer production and differentiate themselves by offering a novel product.

TRUE HOPPING PRODUCTIVITY

The ETHOS X line consists of two units dedicated to different brewing scales. The ETHOS X 2.0 processes 1 Kg of hop pellets per run while the ETHOS XL 2.5 Kg. The ease of use of the systems and the short processing time of 1-2 hours ensures high productivity required to match the output of craft breweries.

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Established in 1988, Milestone is headquartered in Italy with its R&D and manufacturing centre in Germany and Switzerland and offices in the United States, China, Japan and Korea. We operate worldwide through a network of over 100 exclusive distributors, all providing our customers with premium application and service support. Milestone's mission is to help chemists by offering them the most advanced instrumentation for sample preparation and direct mercury analysis in the world. Our industry-leading technology, in combination with fast, responsive service and applications support, allows Milestone to support our goal of giving you the highest return on investment possible.

ADDITIONAL MILESTONE SOLUTIONS

ETHOS X 2.0

Microwave Terpenes Extraction

ETHOS XL

Microwave Terpenes Extraction for Processing

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