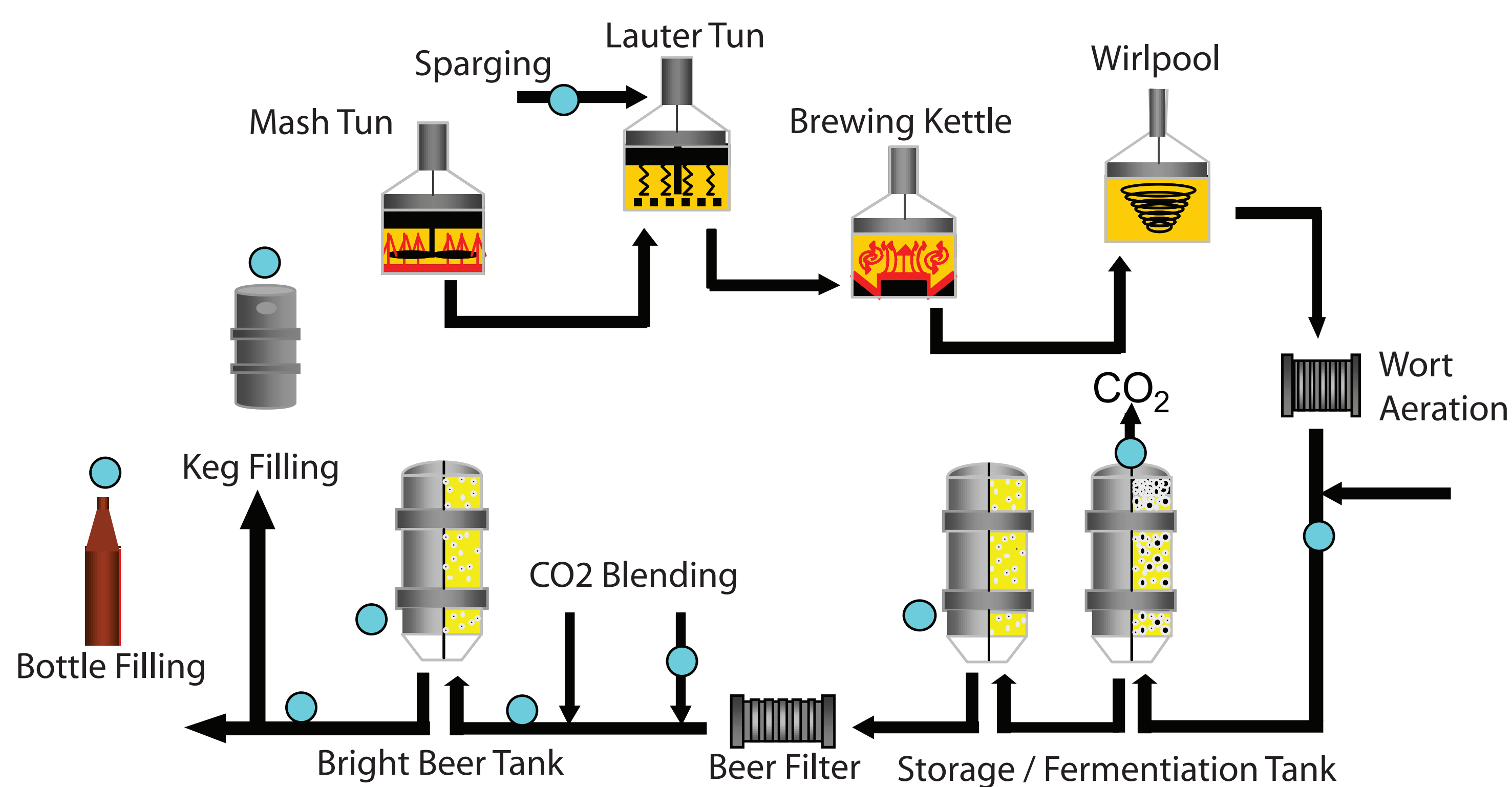


Total O₂ Management optimizes production processes in the beer and beverage industries

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Why is Total O₂ Management needed?

Oxygen (O₂) is the most important parameter affecting the beer shelf-life and flavor stability. Therefore it is very important during the entire production process to avoid any oxygen pick-up and ensure a low DO (dissolved oxygen) levels. In order to get the DO profile under control, the brewer needs an O₂ measuring and monitoring program which takes into account all the areas where O₂ is or can be present. Such a program helps beer and beverage producers to have a clear view of the process and save on energy and product losses.



Example of Total O₂ Management in a brewery

Tools for Total O₂ Management

Good Total O₂ Management needs to have in-line and at-line capabilities to measure and monitor DO. This enables a brewer or beverage producer to maximize the production process from the first to the last step. By strategically monitoring the oxygen within the process a brewer or beverage producer can plan and maintain his process in the most effective way with as result achieving consistent quality and high flavor stability during the product's shelf life.

Application	Brewhouse	Fermentation	Storage	Filtration	Packaging	Lab
In-line	✓	✓		✓	✓	
At-line	✓	✓	✓	✓	✓	✓
Laboratory						✓

Tab. 1: Overview of positions of O₂ measurement

DO measurement in-line

Technologies and instruments used to measure DO in-line must meet the process condition requirements, such as temperature, pressure and product speed. It is also very important that the used technology has a hygienic design and doesn't interfere with the product composition.

The in-line DO measurement enables the breer and beverage producer to identify the trends in the DO values during the process and is therefore a good tool for early-warning in case of negative trends.

DO measurement at-line

Once a problem has been identified in the DO management, the at-line or portable equipments help to track and trace the weak point in the process and point to the problem cause. This enables the brewer to efficiently identify the problem root and trouble-shoot with as low product loss as possible.

DO measurement in utilities

Around primary production process, there are other processes linked to the beer and beverage process where oxygen plays a key role; such as water de-aeration, carbonation and CO₂ recovery. It is crucial to ensure that the oxygen levels in these processes are also very low, in order to avoid any additional O₂ pick-up once in contact with the beer and beverages.

Norit Haffmans Total O₂ Management

Norit Haffmans has a commitment to serve the brewing and beverage industry and help them to achieve a high product quality on an efficient and more sustainable way.

Norit Haffmans has developed a novel technology to measure oxygen in liquid and gas; by means of an optical principle. This technology can be applied in all applications: in-line, at-line and in the laboratory.

The high speed and low maintenance level of this optical technology change the daily life of an operator by cutting down the operational costs and increasing the process efficiency and quality assurance.



Total Package Oxygen Analyzer with optical technology, c-TPO

Benefits of Total O₂ Management using optical technology

The benefits of Total O₂ Management using the optical technology are:

- Complete overview of O₂ in production process
- Effective process management
- Reduction of product losses
- Fast process trouble shooting
- Increased product quality
- Low operational costs

Costs Saving with Optical technology compared to the Membrane method

Parameters	Membrane	Optical
Measurements per year	5,000	5,000
Frequency of maintenance	12	4
Savings on measurement		60%
Savings on maintenance		75%
Overall savings*		61%

* Product losses not taken into account

Tab. 2: Total O₂ Management cost savings on measurement

Summary

DO is a key parameter for the beer quality. It is of a high importance the DO is monitored entirely throughout the brewing and beverage production process (brew house, fermentation, storage, filtration, packaging and lab). Measurement speed, accuracy and repeatability are major aspects of a good Total O₂ Management program. The latest optical technology, to measure O₂ in beer and beverages, offers a lot of benefits with operational saving up to sixty percent.