



Pilot Plant Services help to develop new processes and products, and to minimise risks and costs on the way from the laboratory to industrial production.

VTT Culture Collection (<http://culturecollection.vtt.fi>) maintains and delivers microbial strains for various applications.

Nutritech

solutions for intelligent nutrition

Nutritech Industrial Platform (www.nutritech.fi) keeps our customers informed about activities in the field of nutrition and well-being.

Additional information

Malting and Brewing

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New technologies for malting, brewing and beverages

Natural ingredients, efficient processes and enjoyable beverages

VTT's research expertise covers the entire barley-malt-beer chain from field to consumer. Our services cover all the important stages of the innovation process from technology and market foresight to commercialization.



Exploring malting ecosystems

The malting process can be considered as an ecosystem consisting of germinating barley grains and a diverse microbial community naturally colonising the barley. If the malting process is to be successfully controlled, both barley and microbes have to be taken into account.

Our recent research activities include:

- technologies that restrict the growth of harmful microbes in malting, such as producers of gushing factors, premature yeast flocculation (PYF)-factors and toxins
- microbial community profiling
- explaining the impact of barley micro-structure and physiology on processability, malt quality and yield
- transcriptional profiling of both barley and microbial activities

Efficient fermentation processes

Beer product quality, process efficiency and economy are greatly dependent on yeast performance. Our yeast physiologists and biochemists have extensive experience and know-how of improving fermentation processes and yeast strains. Our recent research topics are:

- advanced strain improvement including classical and targeted mutagenesis as well as metabolic engineering
- management of yeast responses to high ethanol and osmotic stress
- development of practical conditions for very high gravity (VHG) fermentation
- evaluating and improving the quality of cropped yeast
- on-line monitoring of fermentations
- transcriptional profiling (TRAC)

Enjoyable and functional beverages

The food and beverage industries are facing new challenges in delivering solutions of well-being, health maintenance as well as convenience to consumers. We help our customers to create new products and services for the promotion of consumer well-being through improved nutrition.

We have expertise in:

- natural ingredients from cereals and berries
- beverages enriched with dietary fibre
- fermentation technologies for improved flavour and stability
- selection and characterisation of multifunctional starters and probiotics

- satiety and health effects
- market potential for new product scenarios
- consumer acceptance, beliefs, attitudes and values

Managing microbes in the barley-to-beer chain

Beer production at its different stages from field to consumer involves a wide range of microbes including both essential and harmful species. Our objective is to understand microbial ecology of the malting and brewing processes for better process management, product quality and safety. We help our customers to control or exploit microbes in their specific processes.

We have expertise in:

- identification, deposit and delivery of bacteria, yeasts and moulds
- studying and managing microbial bio-films
- understanding microbial communication (quorum sensing) and community dynamics
- total chain microbiota management with physical, chemical and biological means

Sustainable malting and brewing

We help our customers meet the requirements of sustainable development. We combine technologies from our wide knowledge-base to create new innovations and world class technologies. Our expertise includes:

- assessment and improvement of process energy efficiency
- solutions for energy efficient buildings
- energy production from side-streams
- chemical, mechanical and enzymatic fractionation of side-streams for added value
- wastewater/water purifications and process water circulation
- eco-efficient packaging materials
- modelling, simulation and optimisation of production and transportation logistics
- sustainability assessments including Life Cycle Assessments (LCA), Carbon Footprint and Water Footprint
- assessments of social and economic impacts

Innovative solutions

