



Achieving Sustainability in Distilleries

Leveraging advanced process analysis to optimize efficiency and reduce/revalue co-products and waste.



Who We Are

World Class Engineering, Innovative Solutions, and Quality Project Execution, Every Time.



- 3.5+ billion gallons of alcohol produced each year using FQT technologies
- 400+ projects completed by the FQT team
- 75+ industry-leading energy savings and debottlenecking projects
- Team of 35+ engineers and technical team members to drive value for your company
- Active projects and client support in North and South America, Europe

FQT Integrated Approach Delivers Successful Outcomes

- Complete Greenfield Alcohol Plant Design
- Detailed Integrated Engineering & Technology Packages
- Process & Technical Support Throughout
- Plant Acquisition and 3rd Party Due Diligence
- Commissioning, Startup, System Training, and Performance Auditing Services
- Turn-key Full Construction



Sustainability

Distilleries face resource-heavy operations, but sustainability can be enhanced by leveraging advanced process analysis and automation

What is it?

Sustainability in distilleries focuses on reducing the environmental footprint through efficient resource use, minimizing waste, and revaluing co-products

Importance

The distillery industry faces increasing pressure to adopt sustainable practices due to consumer environmental concerns and evolving regulations



Sustainability Goals

Key Metrics in a Distillery Process

Reducing water usage

- Significant water needed for mashing, cooling, and cleaning

Optimizing energy consumption

- High energy demands for distillation, mashing, heating, and cooling

Re-evaluating co-products like spent grains, corn oil and waste streams

- Co-products like spent grains and corn oil are often underutilized

Environmental and regulatory pressure

- Regulatory bodies will make us change if we don't make improvements



Water Optimization

- **Minimize Water Addition:**
 - Use indirect heating when possible and remove live steam injection
 - Recycle water when possible
- **Water Use Monitoring:**
 - Use real-time sensors to monitor water use across processes
- **Automated Water Recycling:**
 - Utilize clean condensate and reuse water in the cooling and cleaning processes
 - Use membrane filtration to purify process water to use in mashing



Bottom Line: Less water added means less water to dispose of.



Energy Optimization

Heat Recovery:

- Assess and optimize the re-use of spent heat energy
- Utilize indirect heat exchangers for high temp boiler feed water
- Capture waste heat from distillation and reuse it to drive other columns or front-end

Automated Control Systems:

- Use sensors and software to optimize energy-intensive steps like distillation
- Build a block-flow energy diagram

Predictive Maintenance:

- Audits and PM can detect equipment inefficiencies, reducing excess energy consumption

Energy Savings Impact:

- Automation and heat recovery can reduce energy use by up to 20%



Turn By-Products into Co-Products

Assess production and use of spent grains

- Spent grains can be revalued and used in animal feed, bioenergy, or fertilizers, turning waste into a valuable resource

Drying DDGs

- DDGs < 10 % moisture and thus more stable
- can be shipped further and more cost effectively
- great animal feed and source of protein and fiber

New co-products – Corn Oil

- New revenue stream for distilleries from what was once considered a waste



Advanced Process Analysis

Leveraging Data for Optimization

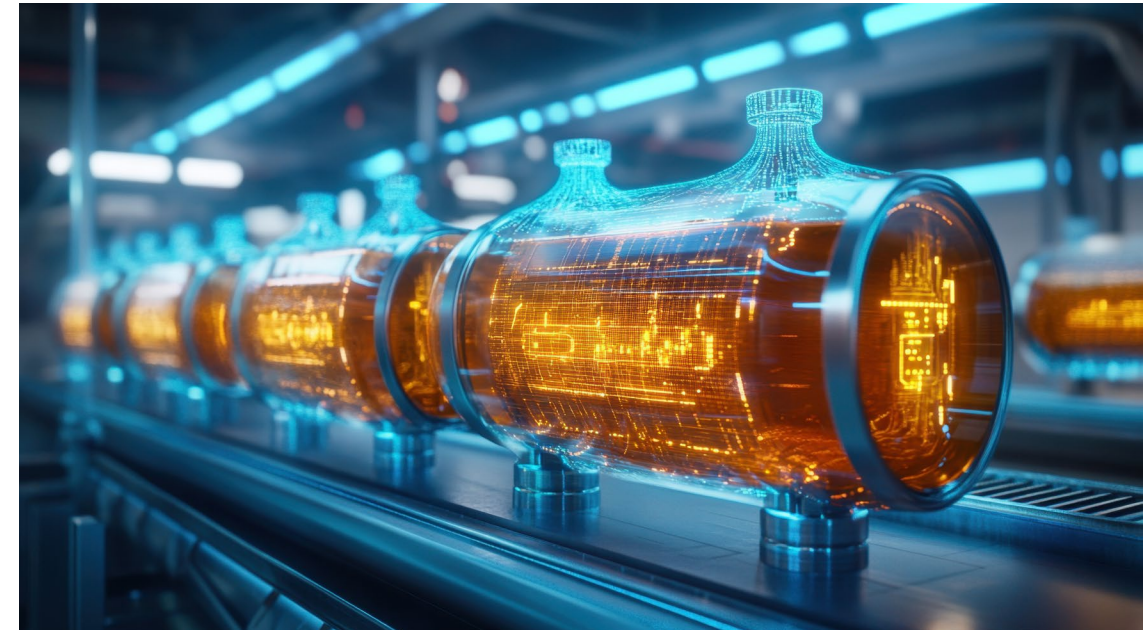
- Advanced process analysis using AI, machine learning, and real-time data collection

Key Technologies Involved

- Laboratory technologies: HPLC, GC, rtPCR
- Process technologies: sensors, data analytics software, and control systems
- Use analytical software to analyze for trends and find opportunities

Maintenance and Equipment Up-Time

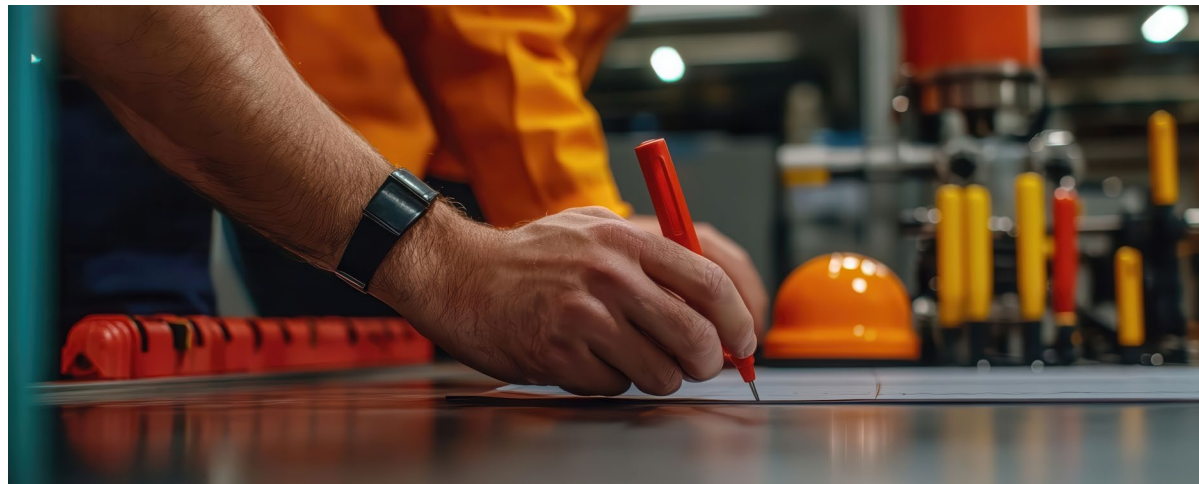
- Collect proper equipment performance data to look for equipment degradation trends
- Analyze data to look for possible equipment failure modes
- Reduce unplanned downtime with predictive maintenance



Advanced Process Analysis

Benefits of Advanced Process Analysis

- Reduce operational costs, energy consumption, and environmental impact, while maximizing product yield and co-product recovery.
- Generate mass and energy balance for the distillery to optimize energy and water usage
- Look at heat integration and how to minimize energy waste
- Analyze process flows and look for process bottlenecks
- Use data models to forecast resource demand and adjust operations accordingly



Summary

Key Takeaways and Recommendations

- Automation and process analysis are key to energy and water savings in distillery production

Call to Action:

- **Evaluate** energy/water use
- **Implement** advanced process analysis
- **Revalue** co-products for additional revenue
- **Continuous monitoring** for waste reduction
- **Collaborate** with stakeholders to achieve long-term sustainability goals

Next Step: Partner with sustainability expert such as FQT to audit operations and identify opportunities





THANK YOU



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