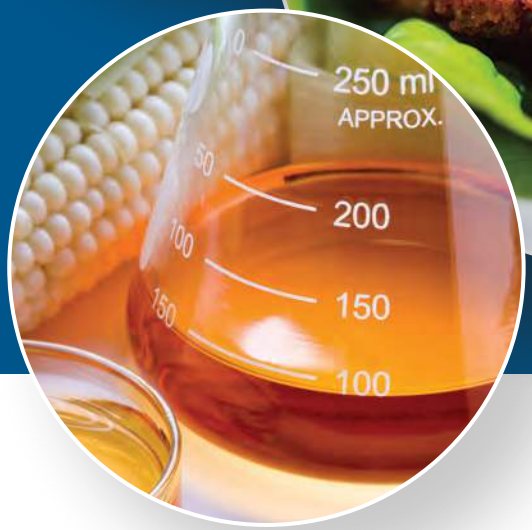
Fermentation Products

Downstream Solutions for
Food, Beverage and Industrial Processes



KOVALUS
Separation Solutions™

The KSS Advantage

KOVALUS SEPARATION SOLUTIONS™ (KSS) is transforming the landscape of separations by leveraging synergistic technologies such as membrane filtration, ion exchange, evaporation, and drying. Our comprehensive, start-to-finish solutions are tailored to improve product quality, increase process efficiency, and drive down costs in dairy, food and beverage, life science, and industrial markets around the world.

Excellent Efficiency in Downstream Fermentation Processes

We work closely with our customers to understand their unique processing needs and offer a complete package solution that meets their goals, eliminating the need for multiple equipment vendors. KSS helps customers drive down operating costs while producing a more competitive product through traditional, biomass, or precision fermentation.

The KSS Advantage

Integrated Solutions

Partnering with KSS allows customers to gain access to trusted separation technology, customer focused R&D capabilities, field service, process monitoring, and long-term support. We optimize efficiencies in downstream fermentation processes by leveraging the synergistic capabilities of combined separation technologies, resulting in significant reductions in energy consumption and operating costs. Working with KSS as a complete solution provider simplifies maintenance and support while offering a higher degree of control over your operation.

Collaborative Innovation

KSS partners with our customers to work collaboratively, combining our deep applications knowledge with their unique process expertise to identify the best-fit solution. Maintaining long-lasting partnerships with our customers allows us to develop and optimize new products and solutions to achieve a cycle of mutually beneficial progress.

EARLY-STAGE DEVELOPMENT

- Understand challenge & identify desired outcomes
- Evaluation of separation properties & bench testing
- Access to Process and R&D experts

FIELD TESTING

- Pilot testing
- Process optimization
- Full scale costing and design recommendation

FULL-SCALE EXECUTION

- Project management & execution of capital projects
- Construction and installation
- Commissioning and operator training

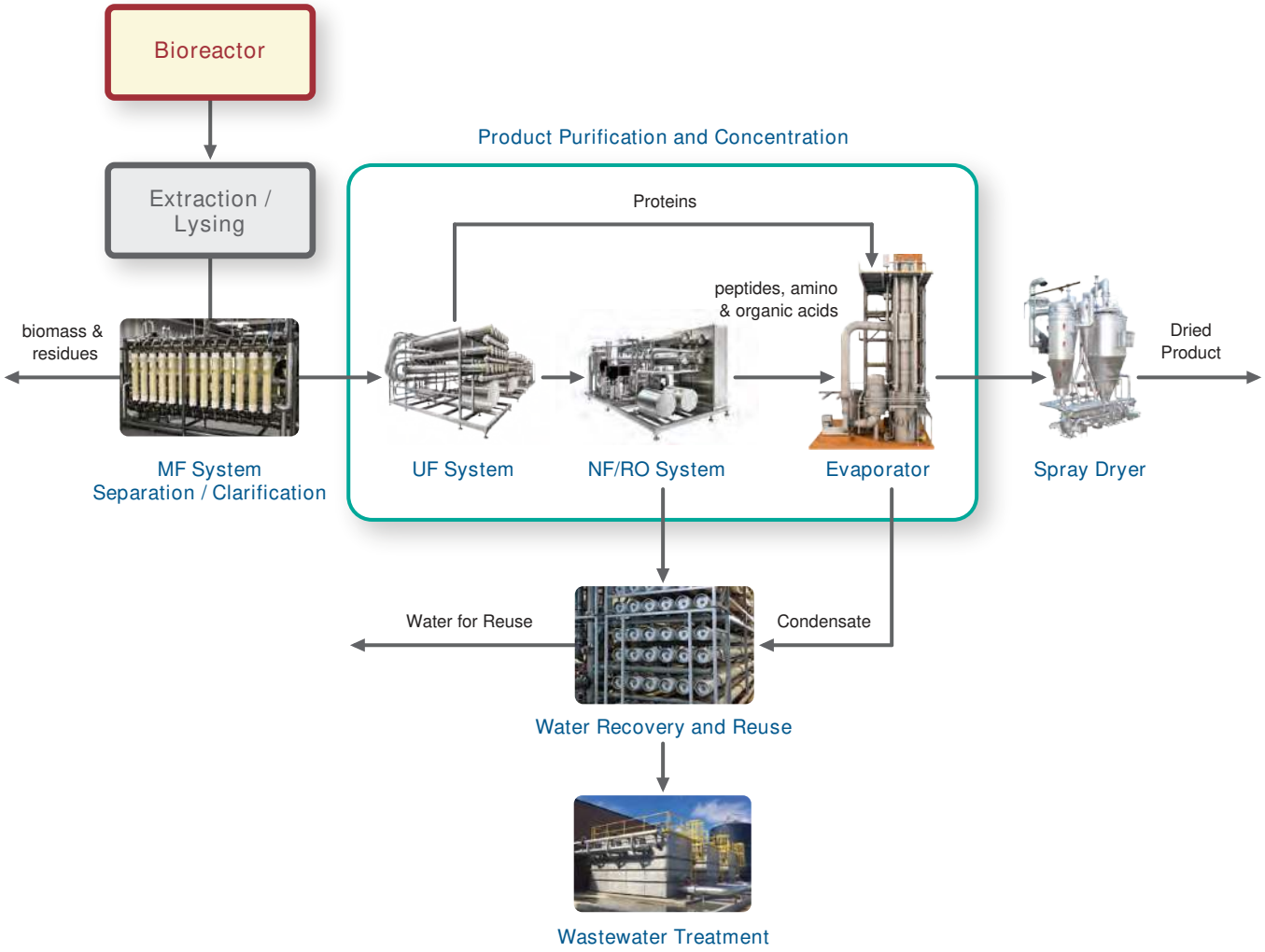
LONG-TERM SUPPORT

- Complete after-sales services
- System troubleshooting
- Performance optimization through remote digital monitoring program

Major Applications

Fermentation for a Sustainable Future

At KSS we recognize the critical role of fermentation processes in our planet's future. We aid those striving for sustainability by helping to streamline production of biofuels, bioplastics, animal-free ingredients, and other products that improve our society.



KSS helps customers optimize a variety of downstream fermentation processes:

- **Downstream processing of precision fermentation products:** KSS combines membrane and thermal technologies to produce specialized fermentation-derived products with high purity and functionality.
- **Enzyme purification, concentration and drying:** Large enzyme manufacturers rely on the specificity and efficiency of KSS membrane systems to recover and concentrate their products.
- **Clarification, concentration and purification of amino acids and organic acids:** Major producers of amino acids trust KSS separation solutions to help them produce a high purity product and improve their process efficiency.
- **Value creation from waste streams of biofuel production:** KSS helps customers create high value products from stillage, turning waste streams into revenue.

Major Applications

Clarification, Concentration and Purification

Leading producers of fermentation products worldwide prefer KSS technologies for key applications including clarification of fermentation broth and purification and concentration of target molecules.

- **Clarification:** Our wide portfolio of products and extensive process knowledge allows customers the flexibility to customize their clarification solution through microfiltration (MF) membrane technology or centrifugation.
- **Concentration:** Spiral ultrafiltration (UF), nanofiltration (NF) and reverse osmosis (RO) membrane systems are a gentle and energy efficient method for concentration of products. Combining membrane concentration with evaporation enables customers to reach higher concentrations with reduced energy costs.
- **Purification:** With a broad range of membrane types and molecular weight cutoffs, KSS membrane systems can purify target molecules by removing contaminants with precision. Diafiltration can aid in removal of impurities.

Advanced Technologies

As a complete solutions provider, KSS is positioned to offer best-fit, integrated technologies to meet customers' unique processing needs. We manufacture and fabricate a variety of separation technologies and partner with suppliers to provide additional capabilities, ensuring the most effective solution for our customers.

Technology	Applications	Features and Benefits
Centrifuge	Clarification	• Separation of particulates • Low cost • Rapid separation • Simple operation
Ceramic membrane system	Clarification	• Separation of particulates and some dissolved solids • MF & UF cutoffs • High solids tolerance • High temperature and chemical tolerance • Excellent effluent quality
Hollow fiber membrane system	Clarification	• Separation of particulates and some dissolved solids • MF & UF cutoffs • Excellent effluent quality
Spiral membrane system	Clarification, concentration, purification	• Separation of particulates and dissolved solids • MF, UF, NF & RO cutoffs • Moderate to high temperature tolerance • Low cost • Small footprint • Excellent effluent quality

All KSS systems feature advanced remote monitoring and control options as well as unparalleled customer service and support through aftermarket services.

Advanced Technologies

Evaporation

RELCO® evaporators offer a flexible and efficient method for concentrating fermentation products further than can be achieved with membranes alone. Combining membrane concentration with evaporation effectively produces stable concentrated products with reduced energy and operating costs.

Features & Benefits

- Available in tubular or plate configuration
- Thermal (TVR) or Mechanical (MVR) vapor recompression
- Custom engineered with flexible design options for capacity variation, total solids concentrations, CIP & sterilization options, and more
- Capital and operating costs greatly reduced when paired with a membrane system

Drying

RELCO spray drying technology is the ideal solution for creating a powdered form of your fermentation product. Coupling evaporation and drying systems reduces energy costs and can also lower the negative impacts of heat on the product.

Features & Benefits

- Customizable design to meet customer specific product requirements
- Designed with operator safety and feasibility in mind
- Effective mixing and optimized moisture control
- Low capital and operating costs
- Suitable for standalone operation or integration with evaporation systems

Powder Handling & Packaging Equipment

For a complete processing solution, we provide conveying systems, packaging systems, bulk bag fillers, powder gassing and blending equipment.

- High-rate transfer of fragile powders by dilute phase or vacuum phase
- Hygienic semi-automatic or automatic powder packaging lines
- Stable and accurate bag filling, simplified bag transport, and robust bag unloading

Advanced Technologies

Caustic Recovery

KSS Causti-COR® nanofiltration membrane systems offer a cost-effective, environmentally friendly way to recover the expensive caustic solutions used to clean process equipment. Causti-COR systems feature our patented SelRO® membranes, and can recover up to 95% of caustic for reuse by removing low molecular weight organic and inorganic contaminants.

Water and Wastewater Treatment

KSS is an industry leader in sustainable and energy efficient water and wastewater treatment solutions. As part of our start-to-finish solutions, we offer process water treatment, RO for water reuse and waste minimization, and MBR treatment for a variety of wastewater. KSS water and wastewater treatment solutions help customers meet stringent wastewater discharge standards, produce high-quality water for reuse at their facility, and meet their overall sustainability goals.

Process Water Treatment

- Low maintenance, cost-effective, and reliable water treatment solutions
- Optimal separation properties for high quality water production

Wastewater Treatment

- KSS offers a variety of advanced hollow fiber and tubular membrane configurations for optimized system performance, footprint, and low cost of ownership
- Extensive experience designing and building external and submerged MBR systems for discharge or reuse

High-Purity Water

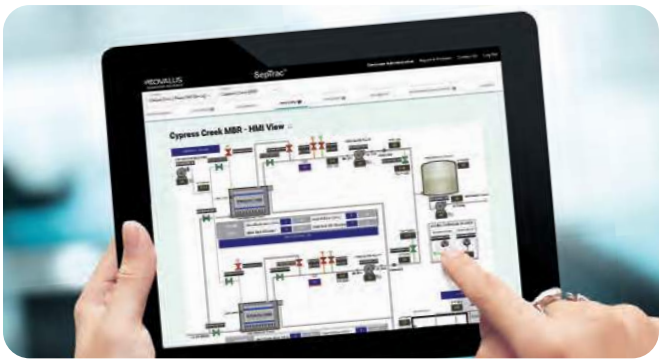
- Polishing of MBR, MF, and UF effluents, as well as evaporator condensate, to produce high quality water for reuse
- Pre-engineered or custom-designed systems

KOVALUS SEPARATION SOLUTIONS

KOVALUS SEPARATION SOLUTIONS™ (KSS) is a global leader in separation technologies. With best-in-class domain expertise, technologies and systems, KSS is uniquely positioned to help customers purify and recover valuable process streams and achieve sustainability goals across food and beverage, life science, and general industrial markets.

Services & Support

After-Sales Services & Maintenance Programs • SepTrac™ Smart System



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KOVALUS
Separation Solutions™

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