



HAFFMANS ETHANOL RECOVERY



BREAKING THE ETHANOL LOOP

OPTIMIZING ETHANOL CONTENT IN SCRUBBER BOTTOM

Many bioethanol production sites are challenged with ethanol loss caused by traditional fermentation gas scrubbers. Due to the conventional packing and high water consumption, low concentration ethanol is collected in the scrubber bottom and recycled back to the fermenters or further upstream, which creates an inefficient ethanol loop.

Bioethanol production sites that wish to expand to meet market demand and/or run more cost-effectively may need to meet revised venting norms, ideally without impacting the water balance. Unless a change is made to the gas scrubbing process the plant will continue to operate with higher water consumption, which negatively impacts revenue. The Pentair Haffmans' Ethanol Recovery System removes the heat, ethanol and water vapor in the fermentation gas for more complete recovery and a positive effect on revenue.

Pentair Haffmans' Ethanol Recovery System is a cost-effective, proven method that uses a counter flow water wash system to remove ethanol from vented fermentation gas. The application of structured stainless steel packing provides maximal gas-water contact time and a minimal pressure drop. By recirculating chilled scrubber water over the packing, ethanol concentrations of more than 12 percent vol/vol can be achieved, with reduced water consumption. This ethanol can be pumped directly to either the beer well or distillation column instead of being recycled back to the fermenters or further upstream.

Benefits

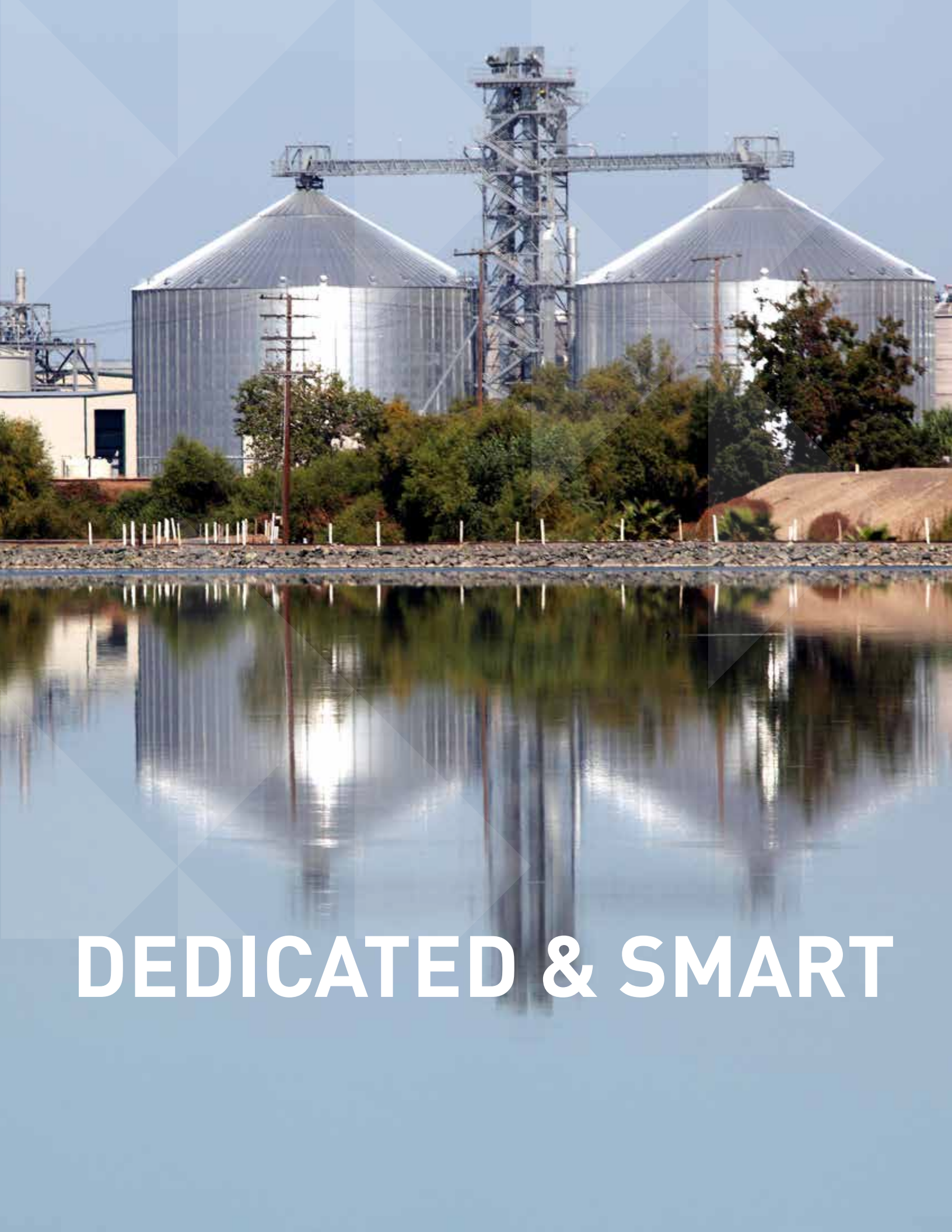
- Low ROI < 1 year achieved
- Water savings
- High ethanol content > 12 v/v% in scrubber bottom
- Free up capacity
- Retrofittable – Easy integration
- Potential heat recovery
- Low pressure drop



2013 Ethanol Recovery Project

ABOUT PENTAIR PLC

Pentair plc (www.pentair.com) delivers industry-leading products, services and solutions for its customers' diverse needs in water and other fluids, thermal management and equipment protection. With 2014 revenues of \$7.0 billion, Pentair employs approximately 30,000 people worldwide. Pentair Haffmans, is one of the market leaders in state-of-the-art technology and custom-made solutions for CO₂ recovery and management. Pentair Haffmans' proven products and technologies are used in the brewing, soft drink, wine, distillery, bioethanol, and biogas industries to recover foodgrade CO₂ from the fermentation processes. Whether you need a standard-size system or custom-designed solution, Pentair Haffmans manufactures and solutions.



DEDICATED & SMART

THE RIGHT SOLUTION

Pentair Haffmans provides and executes smart solutions tailored to your specific needs. As a project and solution driven company with more than 60 years' experience, we effectively implement these solutions in partnership with engineering firms or the end customer.

Our in-house project management and on-site engineers work in close cooperation with your team to ensure that your project runs smoothly and is successfully implemented.

Standard Systems

Pentair Haffmans' provides standardized, compact and ready-to-run installations. Standard systems come in fixed operating ranges and offer very cost efficient CAPEX and OPEX. The standard dimensions and deliverables make planning small scale installations easier. Specifications such as gas inlet data including gas composition, flow, temperature and pressure EtOH concentration, and temperature in the beer well are available from your sales representative.

Custom Solutions

Pentair Haffmans' tailor-made installations are individually designed to meet a plant's specific needs. Our experienced project managers supervise each project from order placement through the Site Acceptance Test (SAT). As a project-driven organization, Pentair Haffmans has extensive experience with project management.

Lifecycle Management

In addition we offer Lifecycle Management through our global professional service network. With a detailed service plans we gather insight about the operation of your installation that allows us to react fast.





TALK
TO THE EXPERTS

LIFECYCLE MANAGEMENT

Through comprehensive lifecycle management, we ensure that your system continues to meet your expectations. We offer custom-made service plans that range from maintenance contracts to full Service Level Agreements. An experienced service team works with you to create the service program that is right for you.

Original spare parts

Pentair Haffmans provides competitively priced original spare parts. Spare part packages and stock consulting, based on more than 60 years of experience. Help you reduce costs and keep your plant in operation.

Certified global service teams

Pentair Haffmans has a presence in more than 150 countries. No matter where your plant is located, our global network of professional service engineers with extensive know-how and experience ensures maximum system performance.

Remote service

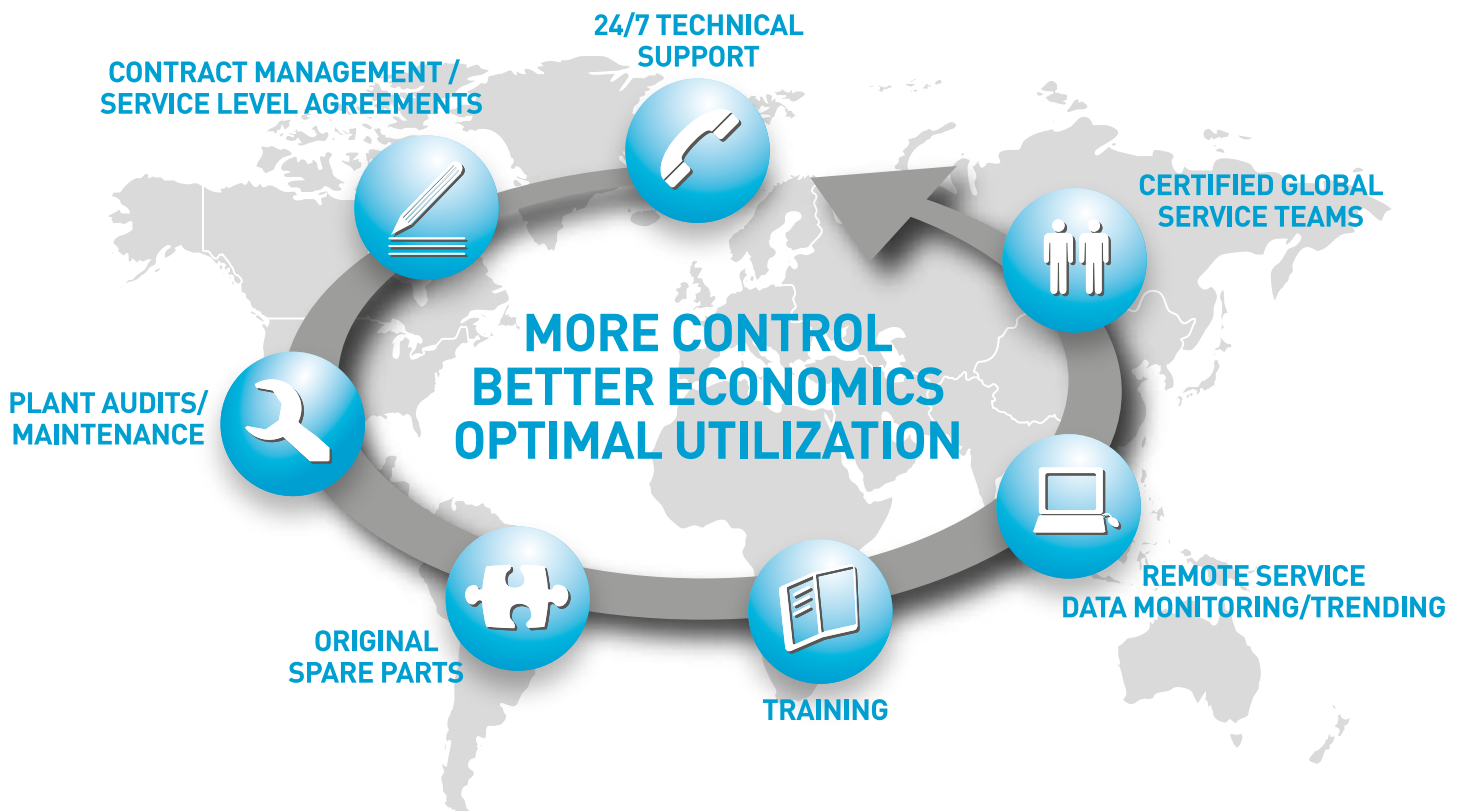
At our control center a data connection line instantly puts Pentair Haffmans' experts online with your system. This service maximizes your plant's uptime.

Plant audits/maintenance

On-site inspection and preventive maintenance of your system is an efficient way to maximize your plant's performance. All visits include a detailed report on the status and performance of your plant.

24/7 technical support

Pentair Haffmans offers unparalleled customer service and technical support. To help you achieve maximum plant efficiency, product specialists are available 24/7 by phone, email, Skype™ or remote service.





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