Protea Series

The green fuel oil additives for power generation

System Separation


ISO 9001:2008
BUREAU VERITAS
Certification
BUREAU VERITAS
1828

SystemSeparation

SystemSeparation is an innovative speciality chemical company that provides a unique platform for creating more financial and environmental benefits for our customers in power generating, oil refining and the marine industry.

This platform is based on our Protea Series products, our in-house competence, extensive field experience, our knowledge of product applications and our global references.

Who we are

SystemSeparation Sweden AB is a wholly-owned subsidiary of CleanTech East Holding AB, operating in the Power Chemicals business area, with our head office located in Stockholm, Sweden.

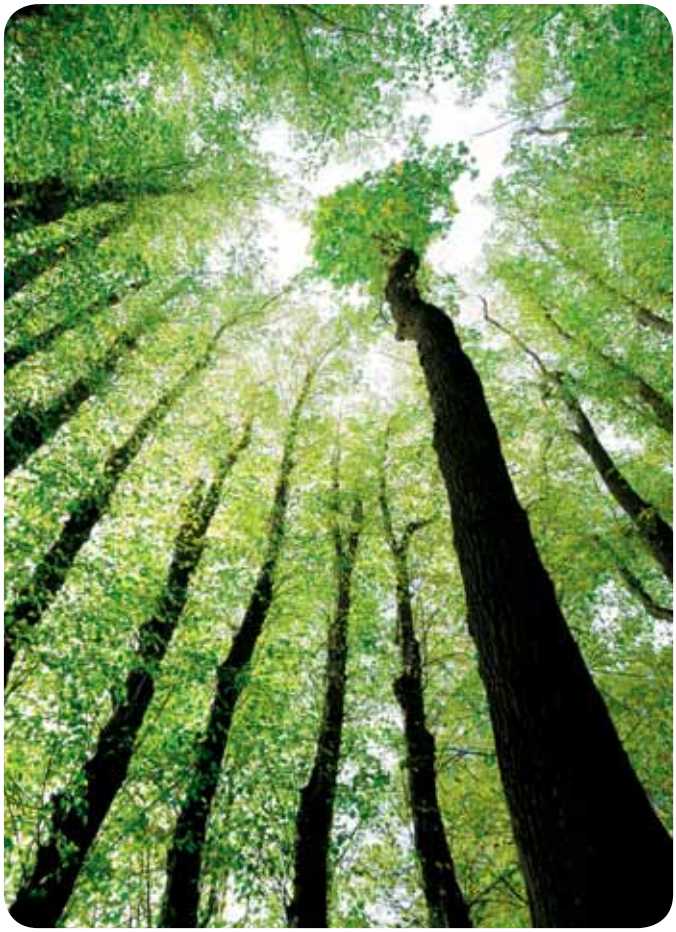
We develop, manufacture and market cutting-edge chemical products and services for customers that use fossil and biomass fuels. Products and services are developed and produced using the highest standard of quality, safety and environmental awareness.

Our business idea is to provide special chemical products, our Protea Series, and services to customers that use combustion technology. We aim to increase power plant or vessel profitability by increasing efficiency, operability and availability as well as reducing environmental impact.

Our strengths at SystemSeparation are not only our well-proven, innovative high-performance additives, but also our competence and our associated services.

Our core business areas for fuel additives are:

- gas turbine power plants
- steam boiler power plants
- oil refining
- marine industry



Our solutions

Power plant safety and operational excellence are important for us and our customers, and we aim to increase power plant profitability by increasing efficiency, operability and availability as well as reducing environmental impact.

Consequently, SystemSeparation has developed a state-of-the art product series for fuel oil additives called Protea Series. These products are developed to meet different needs in the power industries.

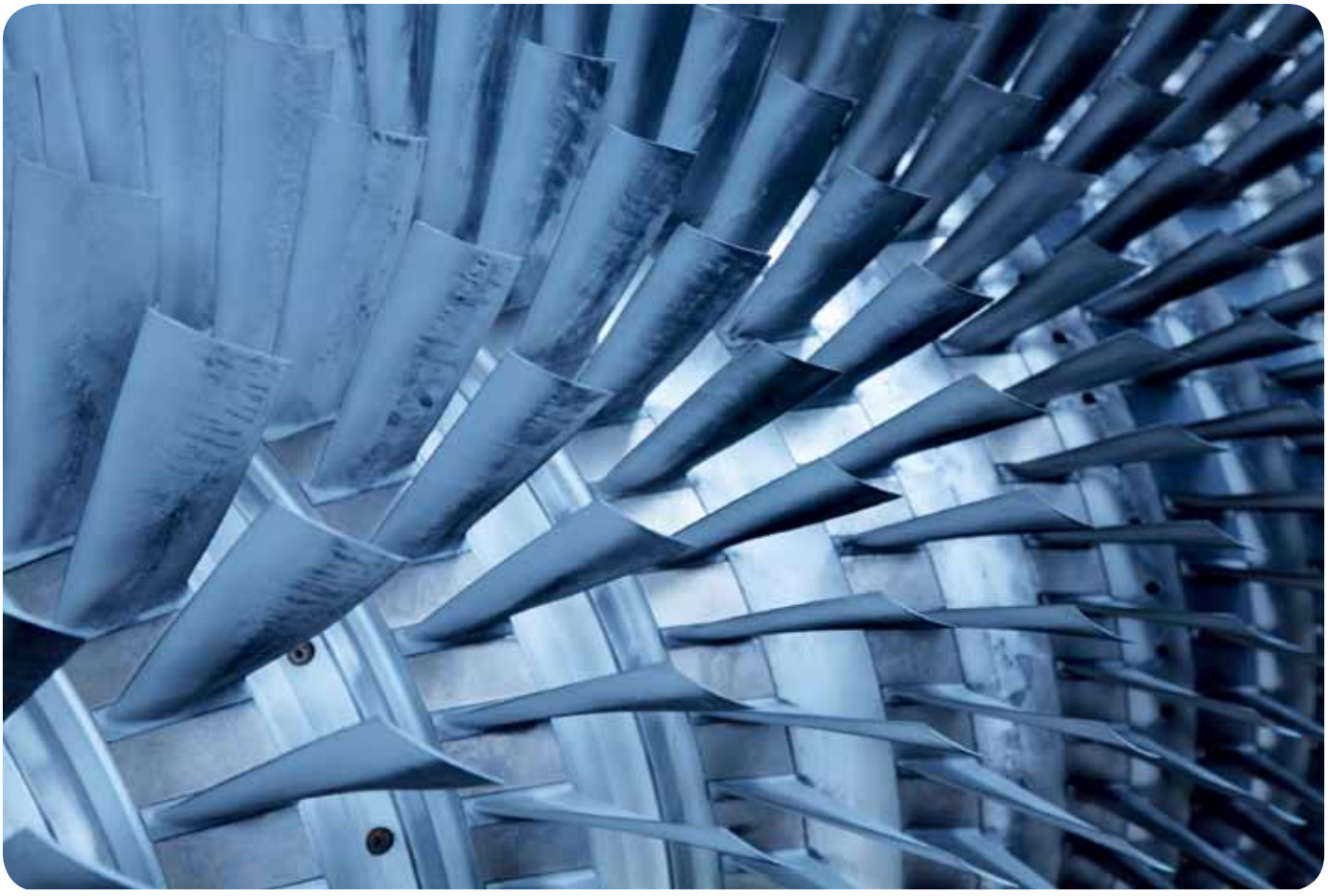
The Protea Series is divided into the following categories:

- dispersants/stabilisers/PPD (R-series)
- combustion improvers (RF-series)
- demulsifiers/emulsion breakers (WO-series)
- vanadium/corrosion inhibitors (M-series)
- combustion catalysts (F-series)

Our Protea Series is used successfully in gas turbine and steam boiler power plants throughout the world.

Benefits of Protea Series

- increase in power plant efficiency
- reduction in fuel consumption
- less power degradation
- increase in operating time between washing cycles
- reduction in maintenance costs
- improved combustion
- fewer emissions and less environmental impact



Protea product range

R-series – dispersants/stabilisers/PPD
The Protea R-series includes products that improve the handling of fuel and crude oils, along with products that stabilise fuel oils and prevent the formation of sludge in pipes and tanks. The R-series also has pour point depressants to prevent the crystallisation of paraffins and waxes at lower temperatures.

RF-series – combustion improvers
The Protea RF-series improves the handling and combustion of fuel and crude oils due to the high performance of combination stabilisers and combustion catalysts. The products combine the best performance and benefits from both the F-series and the R-series.

WO-series – demulsifiers/emulsion breakers
Protea Aqua Split, WO-series, is a unique range of products which are used in fuel oil treatment systems (fuel washing) for gas turbine power plants. The products ensure a good separation of water from the fuel oil, which enables the reduction of sodium and potassium to less than 1 ppm as specified by gas turbine manufacturers. As well as providing dry oil with low salt content, the WO-series also reduces the amount of oil in the spent effluent water.

M-series – vanadium/corrosion inhibitors
The Protea M-series is an oil soluble vanadium and corrosion inhibitor based on magnesium, which is designed to increase the melting point of deposits on surfaces and make them porous and more friable, which results in reduced energy losses. The products prevent hot corrosion and reduce hard deposit build-ups in oil-fired gas turbines and steam boilers. The products also protect against acidic corrosion on the cold end side of steam boilers.

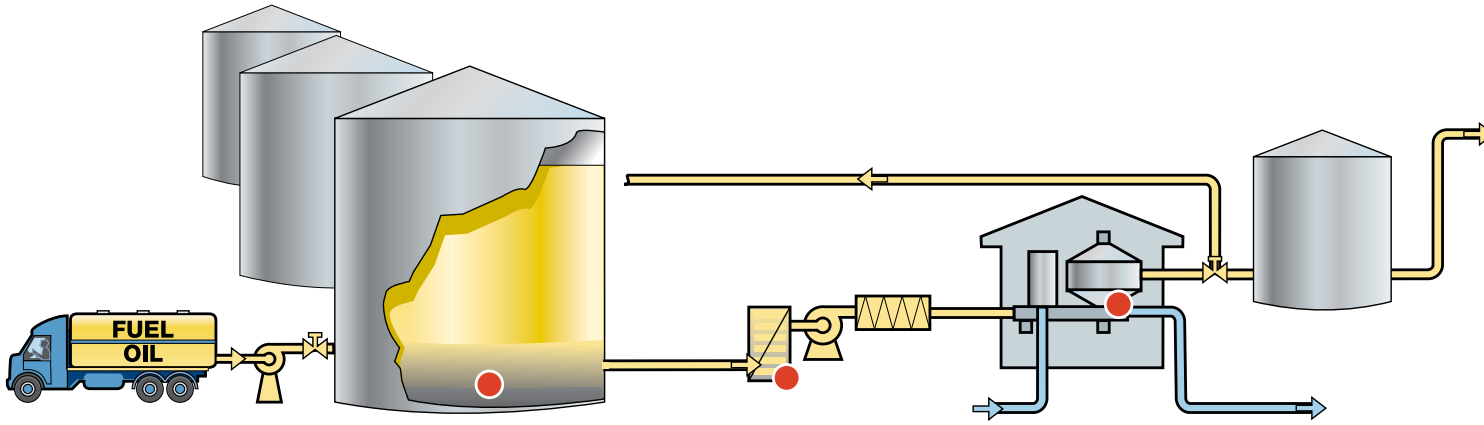
F-series – combustion catalysts
The Protea F-series improves combustion and reduces emissions of soot and unburned carbon at lower air excess. Along with a more complete combustion of the fuel oil, it not only increases combustion efficiency, it also prevents and reduces the formation of deposits on tubes and corrosion on the cold end side of the boiler system.

Gas turbine application

Protea fuel oil additives

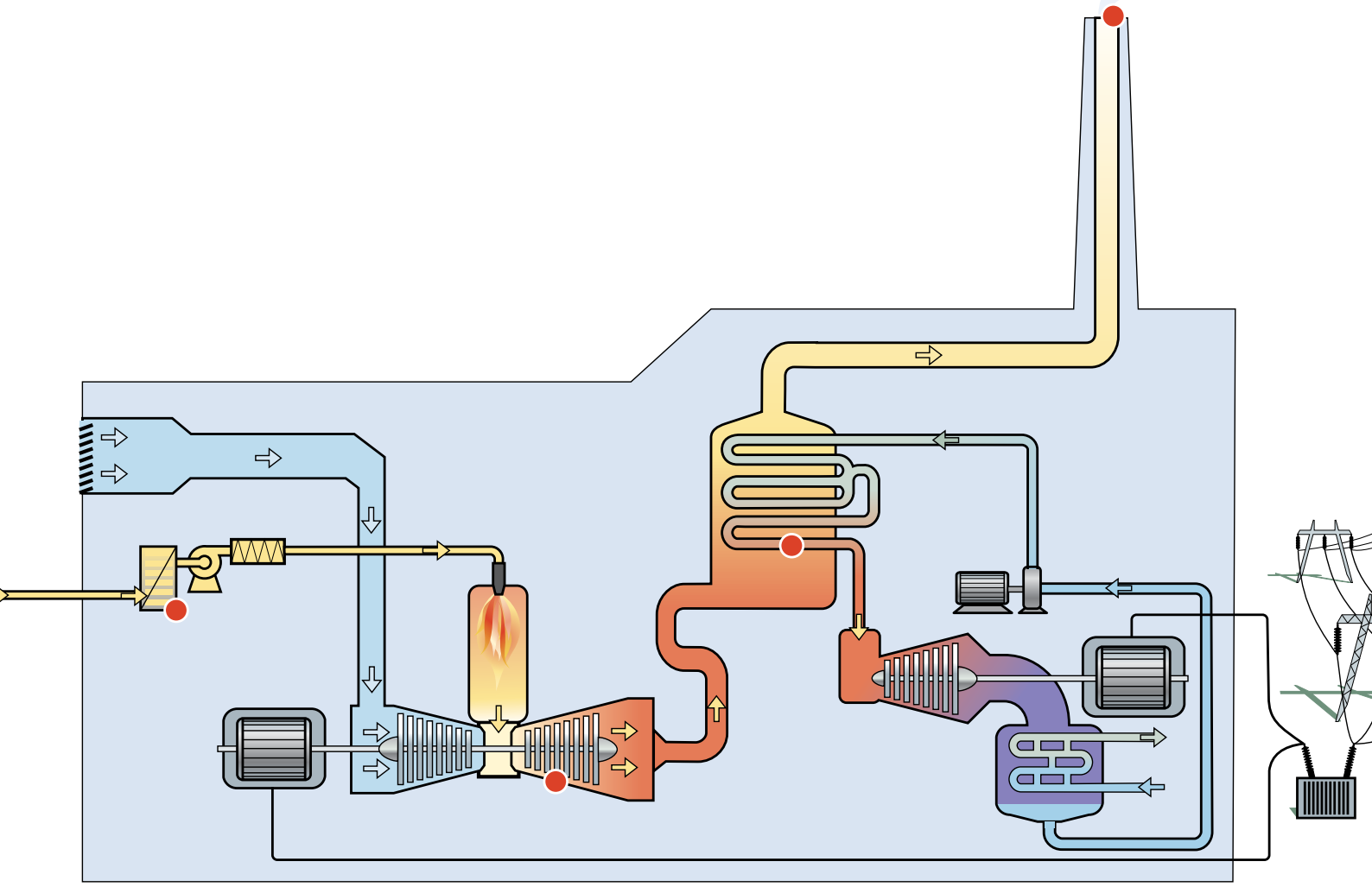
Gas turbine power plants that utilise crude or heavy fuel oils suffer from combustion-related problems due to the presence of vanadium, salts and other contaminants in the fuel oil. These compounds increase power degradation due to deposit build-ups and risk hot corrosion on turbine blades. Other problems relating to fuel oils include the sedimentation of asphaltenes in storage tanks, filter plugging and the coking of fuel pre-heaters.

The Protea Series from SystemSeparation provides solutions for many problems relating to heavy fuel oils. The excellent performance of these fuel oil additives improves operations in power plants due to fewer problems during handling and combustion. Customers benefit from more efficient power production with enhanced combustion efficiency, increased power output and less wear on vital components, which prolongs the life of the power plant. Environmental aspects also improve due to fewer emissions into the atmosphere.



Gas turbine flow chart

Area	Storage Tank	Strainers / Filters	Fuel washing
Problems	• Sedimentation	• Plugging	• Salt content too high after treatment
Reasons	• Low quality fuel • Asphaltenes • Waxes and paraffins	• Asphaltenes • Waxes and paraffins	• Emulsions
Consequences	• Waste handling	• Frequent cleaning	• Alternative fuel or shut-down
Solutions	• Protea R-series	• Protea R-series	• Protea WO-series (Aqua Split)
Dosing point	Tank	Tank	Online



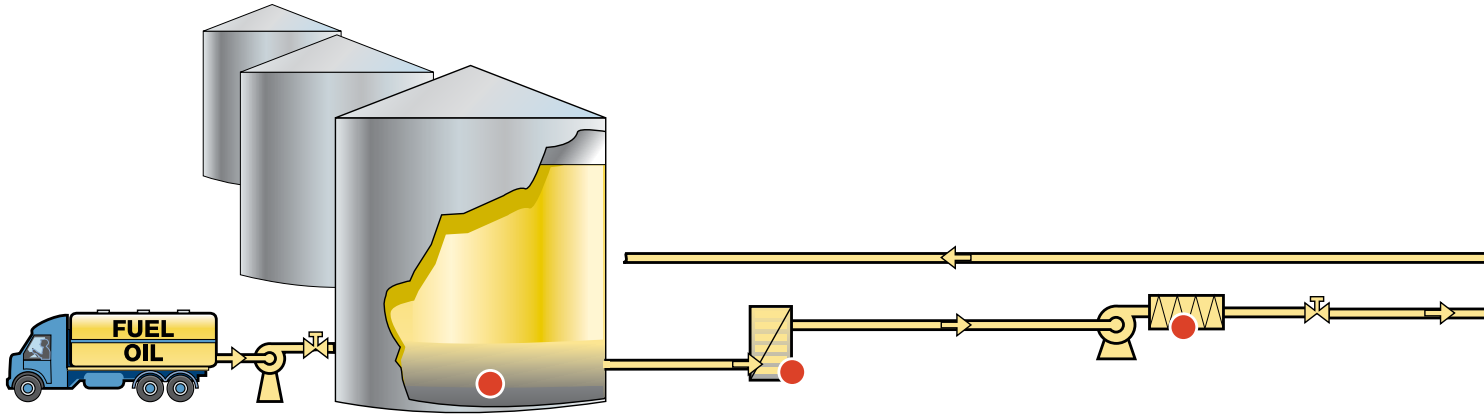
Fuel pumps, filters and heaters	Gas turbine	Heat recovery unit	Emissions
• Plugging • Coking	• Hot corrosion • Deposit build-ups	• Fouling on heat exchanger tubes	• Black smoke • High CO
• Plugging filters • Coking on pre-heaters	• Vanadium impurities in fuel oil	• Vanadium impurities in fuel oil and soot	• Incomplete combustion
• Low preheating temperature	• Maintenance cost • Power degradation	• Less heat recovery	• High environmental impact
• Protea R-series	• Protea M-series	• Protea M-series • Protea F-series	• Protea F-series
Tank	Online	Online	Online

Steam boiler application

Protea fuel oil additives

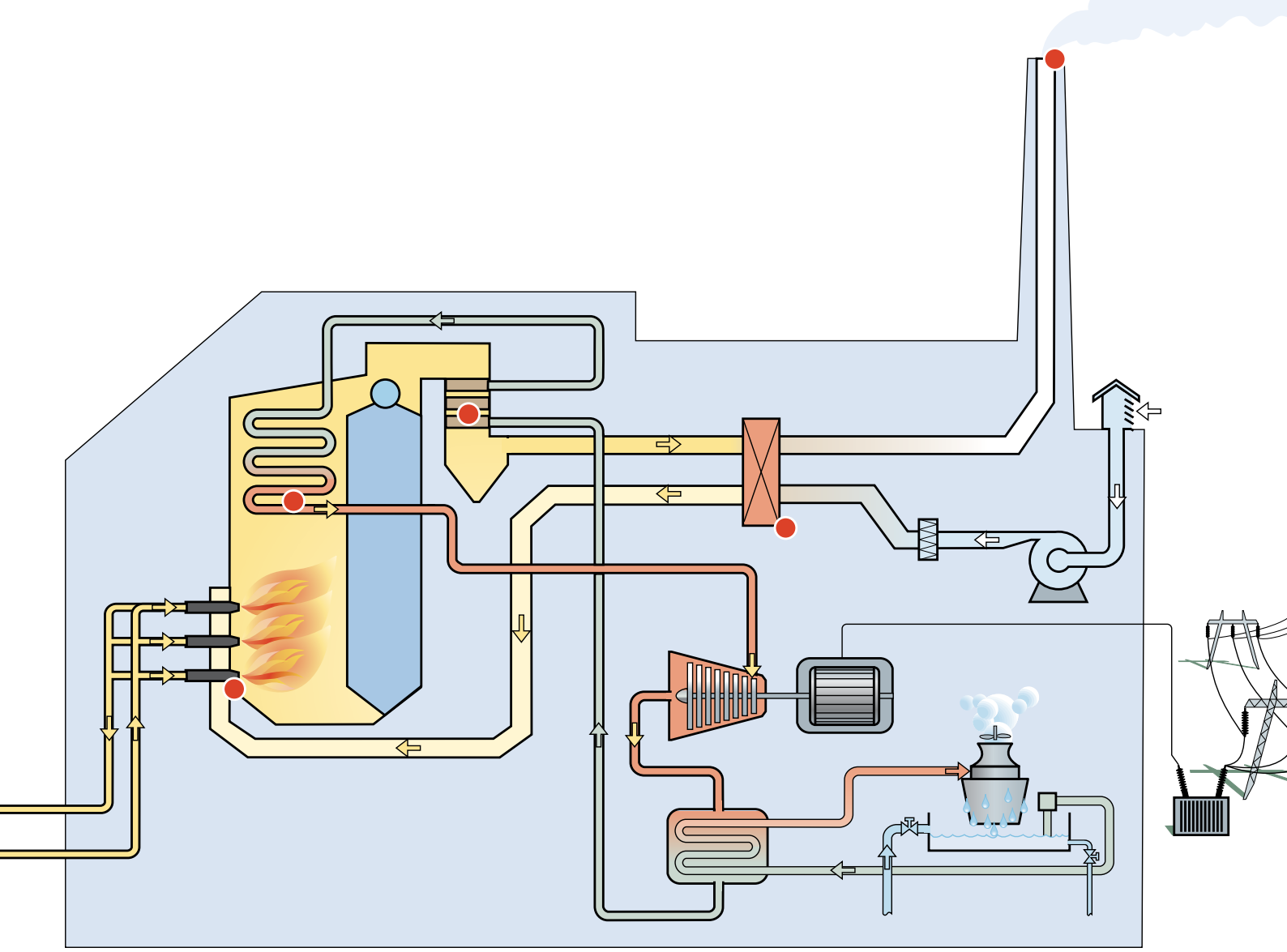
Steam boiler power plants that utilise crude or heavy fuel oils suffer from different combustion-related problems due to variations in quality and contaminants in the fuel oil. The presence of vanadium, sodium and sulphur causes problems with high and low temperature corrosion. Asphaltenes and other heavy hydrocarbons cause problems such as sedimentation in storage tanks, filter plugging and coking of fuel pre-heaters. These heavy carbons are also more difficult to combust, which results in further problems, such as the formation of deposits and high emissions of soot and unburned carbons. These problems reduce power plant performance and profitability over time.

The Protea Series from SystemSeparation provides solutions for many different problems relating to heavy fuel oils. The excellent performance of these fuel oil additives improves operations in power plants due to fewer problems during handling and combustion. Customers benefit from more efficient power production with enhanced combustion efficiency, increased power output and less wear on vital components which prolongs the life of the power plant. Environmental aspects also improve due to fewer emissions into the atmosphere.



Steam boiler flow chart

Area	Storage Tank	Strainers / Filters	Fuel pumps and heaters
Problems	• Sedimentation	• Plugging	• Plugging • Coking
Reasons	• Low quality fuel • Asphaltenes • Waxes and paraffins	• Asphaltenes • Waxes and paraffins	• Asphaltenes
Consequences	• Increased waste handling	• Frequent cleaning	• Low preheating temperature
Solutions	• Protea R-series • Protea RF-series	• Protea R-series • Protea RF-series	• Protea R-series • Protea RF-series
Dosing point	Tank	Tank	Tank



Burners	Boiler tubes	Economizer and air preheater	Emissions
• Coking	• Hot corrosion • Deposits	• Cold corrosion • Deposits	• Black smoke • NOx • High CO
• Fuel instability • Low preheating temperatures	• Vanadium impurities in fuel oil • Incomplete combustion	• High fly ash content • Acid condensation	• Incomplete combustion
• Incomplete atomization • High emission of soot	• Less heat recovery • Increased maintenance	• Increased maintenance • Increased differantial pressure	• High environmental impact
• Protea R-series • Protea F-series • Protea RF-series	• Protea M-series • Protea F-series • Protea RF-series	• Protea M-series • Protea F-series • Protea RF-series	• Protea F-series • Protea RF-series
Tank / Online	Tank / Online	Tank / Online	Tank / Online

Other applications

Our broad product range includes products for marine and diesel power applications, as well as oil refineries.

Oil refineries

The increase in demand for lighter petroleum fractions and improved refinery processes has resulted in heavier residuals and a higher content of impurities. Producers of heavy fuel oils, bunker fuels etc. are therefore facing new problems in blending processes to fulfil fuel standards, requirements and expectations in the handling and combustion of the fuel oils. Our Protea fuel additive technology has been developed to help customers overcome problems with fuel stability, sedimentation, coking and uncompleted combustion.

Marine and diesel power application

Our Protea products for marine and diesel power applications have been specially developed to treat crude and marine bunker fuel. Our broad product range can help and solve many complex problems during the handling, storage and combustion of fuels at sea and on shore. Protea Marine and Diesel additives optimise engine performance and reduce the cost and time of maintenance.

Service and support

SystemSeparation also provides associated services and support linked to our Protea fuel treatment. Our concept is to provide our customers with a complete solution to overcome problems relating to heavy fuels and combustion. We have broad experience in power plant operation and performance optimisation. We can proudly offer the following services:

Dosing system

Suitable dosing systems can be provided to give an accurate and optimised performance of the fuel treatment.

Testing

The performance of the combustion is measured, tested and evaluated before and after treatment using well-known test methods and instruments.

Inspections

Inspections can be performed by our technical group which has extensive experience in the treatment of fuel and crude oils for gas turbines and boilers.

Optimising combustion

In combination with our Protea fuel treatment, combustion efficiency can be optimised and fine-tuned with help from our Technical Service Group which has many years of experience in power plant operation.

Laboratory testing and analysis

The analysis of fuel oils, deposits and fly ashes is evaluated to offer the best recommendations in terms of finances and performance.

Ellens Byrålåda 2009.11

System Separation

Sjöängsvägen 15
SE-192 72 Sollentuna, Sweden
Phone: +46 (0)8 501 294 40
Fax: +46 (0)8 501 294 41
e-mail: info@systemseparation.com

www.systemseparation.com