



akvOLA

TECHNOLOGIES

Steel Industry Capabilities



Technology Innovation Award 2017



Water Innovation
Award Europe 2016

akvoFloat™ Steel Industry Capabilities

COKE PLANT – LIGHT OIL RECOVERY

Problem: low light oil production

Solution: feed custom tar treatment emulsion breakers and separation aids

CASTING OPERATIONS

Problem: poor water quality in spray chambers and loop

Solution: remove excessive Oil (<5 ppm) and TSS (<10 ppm) to minimize caster nozzle plugging and ultimately casting rejects

COLD MILLS - RINSING

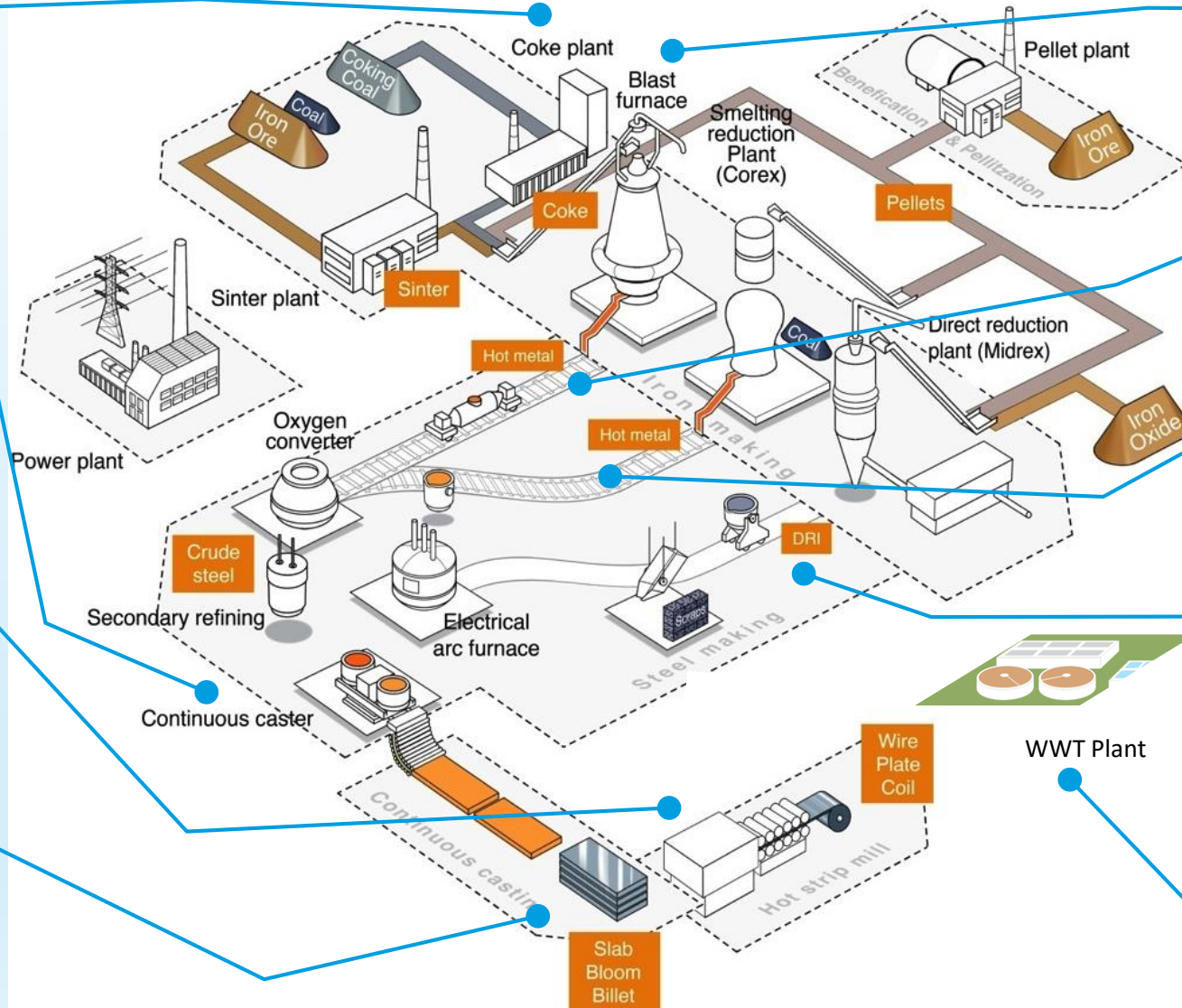
Problem: salt stains in pickling and finishing

Solution: reduce fouling and depositions

COLD MILLS - WASTEWATER HANDLING

Problem: ineffective oils and metals removal

Solution: enhance oils removal and metals elimination



COKE PLANT – BY PRODUCT PROCESSING

Problem: poor tar quality and quantity

Solution: feed custom tar treatment emulsion breakers and separation aids

HOT MILL - DESCALING

Problem: poor descale water quality

Solution: improve removal of solids and oils

HOT MILL – REHEAT FURNACE

Problem: high maintenance costs

Solution: replace city water for surface/recycled water for cooling

DIRECT REDUCTION IRON (DRI)

Problem: inability to control gas temperature in the gas scrubber and gas cooling

Solution: better pretreatment to control TSS in the loop

WASTEWATER TREATMENT PLANT

Problem: ineffective removal of oils, solids, organics and metals to meet discharge limits or RO feed quality

Solution: use membrane pretreatment to achieve high and constant water quality

akvoFloat™ Technology Benchmarking

A novel flotation-filtration process water technology for the removal of **hard-to-treat contaminants (oils, metals, solids, organics and inorganics)**, in the most challenging operating conditions (high T, pH, TDS, ..)

- Coagulation / Flocculation
- Precipitation / Emulsion Splitting
- Gravity Separation / Sedimentation
- Flotation (DAF/IGF/IAF)
- MMF/GAC



- Polymeric Membranes (UF/MF)
- Tubular Ceramic (UF/MF)
- EAF (Entraped Air Filtration)



akvoFloat™ Flotation-filtration process



Conventional Technology Advanced Technologies akvoFloat™

Operational Limits	n/a	Polymeric: pH =6-7, Temp up to 30 °C Ceramic: pH =2-13, Temp up to 70 °C	pH =2-13, Temp up to 70 °C
Influent Quality Limits	low	Polymeric: < 20 ppm Oil Ceramic: < 300 ppm Oil	< 100.000 ppm Oil
Influent Quality Variability	regular	medium	high (integrated pretreatment)
Removal Efficiency	low-high - 60-90% Oil (tech dependent) - low removal of emulsions	high > 90% oil > 99% TSS	very high > 95% oil > 99% TSS
Recovery Rate	< 60-80%	80-85% (cross-flow)	95%
CAPEX	medium	Polymeric: high Ceramic: very high	medium
OPEX (chem+energy)	0,2 – 0,3 €/m ³	0,15 – 0,25 €/m ³	0,05 – 0,08 €/m ³
Footprint	very high	high	low
Payback time	> 5 years	1,5-3 years	< 1,5 years

akvoFloat™ Technology Validation



“The scrubber water contains small coal-tar and other organic particles (1-250 micron) that cause scaling in pipes and trays of the adsorption/desorption tower. akvola delivered the perfect solution: a significant removal of particles down to 10 micron was achieved and the scaling in the pipes is reduced drastically. The operation of the plant has suffered no downtime since its commissioning.”

ThyssenKrupp / HKM Coke Plant Manager



SIEMENS

SCHAEFFLER



VIESSMANN



ŠKODA

DAIMLER