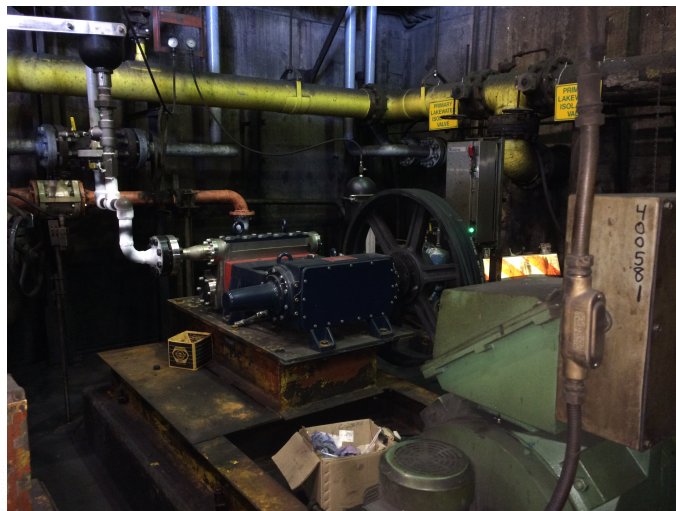


Application story



Pressure Injection 2

Location	Indiana, USA (Installation: From January 2017)	Hydra-Cell model	Q155EDSGHFEHA x 3
Type of application	Pressure Injection of Ammonia Liquor	Flow rate	595 l/min (187 gpm)
Liquid	Ammonia Liquor Wastewater Stream with Dissolved Ammonia	Pressure	Discharge 48 bar (696 psi) / Suction 3.5 bar (51 psi)

Application details One of the simplest and most frequently used methods of removing ammonia from coke oven gas is to absorb it in water. Aqueous absorption liquor is fed into ammonia washer vessel in a counter-current flow of the coke oven gas leading to ammonia solution of high concentration. Typical concentration of 5 g/l to 8 g/l.

Ammonia (NH₃) is a by-product produced during the production of coke from coking coal in the coke ovens. It is a constituent of the coke oven gas (COG) leaving the coke ovens, with a typical concentration in raw COG of 6 grams per normal cubic meters (g/N cum). The solubility of NH₃ in water leads to its presence in the flushing liquor of coke oven battery (COB) with a typical concentration of 5 grams per litre (g/l) to 6 g/l of total NH₃. Therefore, due to the net production of flushing liquor in the COB, also sometimes being referred to as excess flushing liquor, there arises a liquid stream as well as a gas stream from which NH₃ is required to be removed. The quantity of excess liquor is around 12 % of the dry coal throughput, which depends on the coal moisture content.

Removal of NH₃ from the gas stream is a universal feature of a coke oven and by-product plant. This is because NH₃, in the presence of the other COG contaminants hydrogen cyanide (HCN), hydrogen sulphide (H₂S), oxygen (O₂), and water, is extremely corrosive to pipelines made of carbon steel. Also, when ammonia is uncontrollably burnt in any combustion chamber, it forms nitrogen oxides (NO_x) which causes air pollution. Hence, removal of NH₃ from COG and liquid stream is required to be also done due to environmental reasons.

Treatment of excess flushing liquor - In some places, excess flushing liquor can be disposed of without prior treatment, using deep well injection. A once widespread practice is to use the excess flushing liquor for quenching the hot coke, although for environmental reasons this practice is no longer acceptable. In the absence of such simple disposal methods, the remaining alternatives are the removal of the majority of NH₃ from the liquor by distillation. This steel mill has a concession from the local government (EPA) to inject this Ammonia Liquor deep into the ground.

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The previously installed Bethlehem B-200 plunger pumps had huge issues with leaking packing, requiring frequent packing maintenance. As the packing was contaminated with Ammonia there was also a significant disposal cost.
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The pumps had to be replaced daily manually to pump their feed tanks along with the need to dispose of this waste oil once discharged into the sites drain system. From daily attendance and expensive monthly packing replacement for these aging pumps.
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