



SERVICE PROFILE

Accelerated Nitrogen Cool Downs

Accelerated Nitrogen Cool Downs (ACD)

The high temperature vessels used by the energy industry often take days or even weeks to cool down to manageable temperatures for work to be done. By implementing an engineered accelerated nitrogen cool down program, the time required from the initial shutdown to starting work can be greatly reduced from days to hours, depending on the size and temperature of the vessel being cooled. The vessel is also left completely inert and oxygen free.

The nitrogen gas accelerated cool down relies on the transfer of heat from the hot vessel into the gas, which is then vented to

the incinerator or flare. Depending on the system composition, nitrogen can be used for accelerated cool downs in either a gaseous or liquid phase ranging from -196°C to +400°C.

The heat loss during a cool down can be determined using the following principle:

$$Q = m \cdot c \cdot (\Delta T)$$

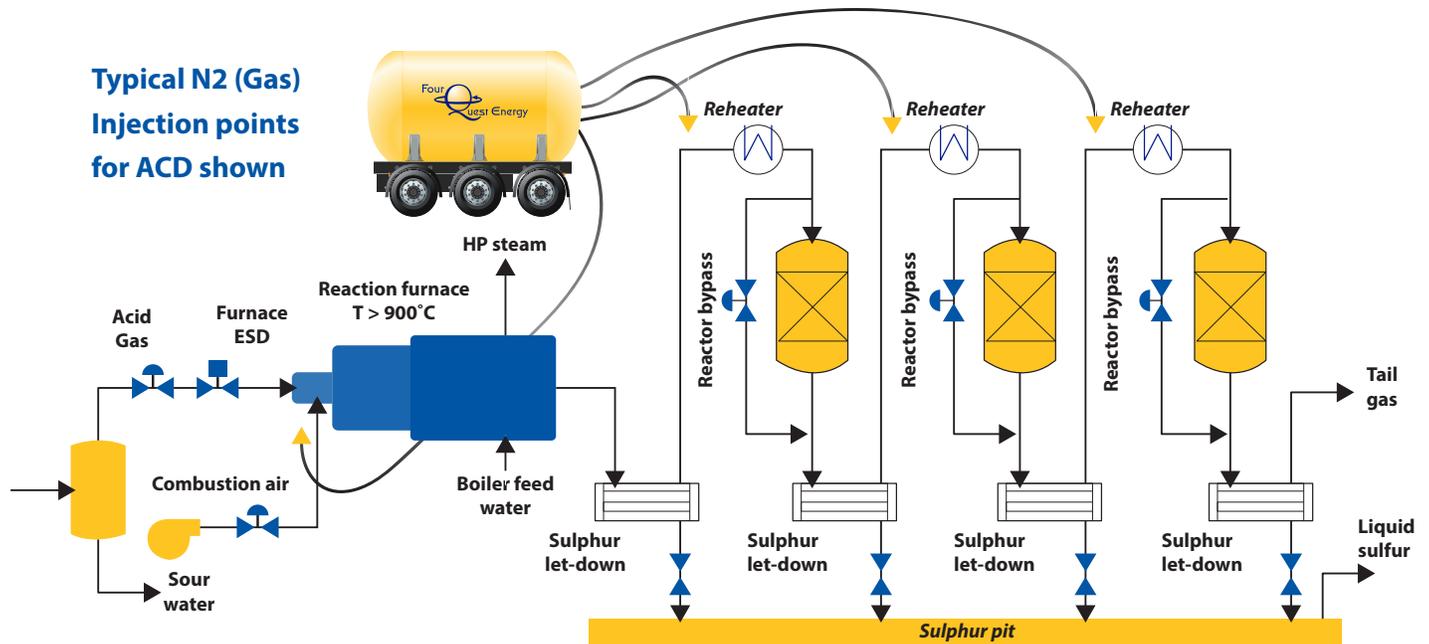
Where: Q = heat loss
 m = mass of object to be cooled
 c = specific heat capacity
 ΔT = change in temperature (final-initial)



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Typical N2 (Gas) Injection points for ACD shown



Sulphur Recovery Unit (SRU) Shutdowns

Bringing a sulphur recovery unit plant down for maintenance is a highly technical undertaking. Not having proper planning and precautions in place can cause significant damage to both the process system and the expensive catalyst contained in the system. Nitrogen can be combined with steam and used to moderate the process of bringing the plant down thereby providing a high level of safety through each phase.

Having the ability to provide high rate nitrogen on-site and ready to pump before beginning the shutdown can greatly reduce and even eliminate any thermal runaways when conducting heat soaks /sulphur burnouts in sulphur recovery units; this is a major safety optimization.

Nitrogen Accelerated Cool Downs

Virtually any reaction vessel operating at extremely high temperatures can benefit from the thermally engineered

accelerated cool down service provided by FourQuest Energy. Proper engineering design optimizes the accelerated cool down portion of the plant shutdown process, allowing our clients to better plan and execute shutdown activities over and above the time savings provided by the ACD. Put simply, shutdown time is significantly reduced so that work can start sooner and reduce the overall shutdown duration.

The proven engineering techniques FourQuest Energy uses to model the cool downs often require a reduced amount of nitrogen product and allow our engineers to more accurately determine the equipment required. Our customized procedures have been proven to safely and efficiently reduce the time required for cool downs on process reactors including hydro-crackers, hydro-treaters, catalyst beds, and reaction furnaces without causing any adverse effects to thermally sensitive material. With continuous on-site monitoring of the system and its response, our engineers and technicians can adapt and respond with changes to the process in real world conditions.



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