

ADVANCED BURNER CONTROL (ABC)

APPLICATIONS

The design intent is to have accurate SRU tail gas quality control in order to optimize sulfur recovery. ABC provides that. It is clearly superior over conventional SRU control and has always been Jacobs Comprimo®'s control system of choice for the EUROCLAUS®/SUPERCLAUS® process with over 200 licenses worldwide.

ABC handles changes to SRU feed gas variables such as flow rate, pressure, temperature and composition, provided these changes are relatively small. Bigger changes need correction by tail gas quality control, which is slow by nature due to the location of the tail gas analyzer at the back of the SRU. Typically ABC is to be applied when major changes to one or more SRU feed gas variables, and especially the composition, are not expected.

DESCRIPTION

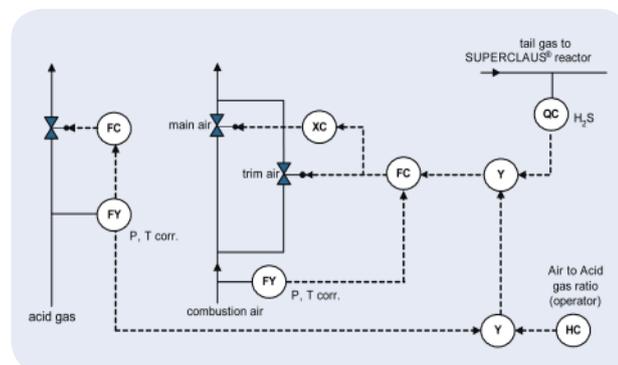
Combustion air to SRU main burner is continuously adjusted to correct for changes in SRU feed gas flow rate, pressure, temperature and composition. ABC copes with these aspects as follows (refer the scheme):

- » feed gas flow rate changes are controlled by feed-forward ratio
- » feed gas pressure changes are controlled by SRU feed gas header pressure control, while feed gas flow rate is compensated for pressure fluctuations
- » feed gas temperature changes are controlled by process units upstream SRU, while feed gas flow rate is compensated for temperature fluctuations
- » feed gas composition changes are controlled by tail gas quality control.

ABC controls the main and trim air valves simultaneously, which provides a direct and accurate response. The total air flow controller manipulates the small and accurate trim air valve. The trim valve position controller monitors the trim valve position and acts on the main air valve to keep the trim air valve within operating range.

ABC uses only a common air flow transmitter, thereby reducing cost while improving control robustness and providing a more accurate combustion air flow measurement.

A change in SRU feed gas composition actually requires a change in air to feed gas ratio control, which is manually set by the operator. However, in case the manual air to feed gas ratio deviates from actual then tail gas quality control within ABC effectively adjusts the air to feed gas ratio in order to provide the correct combustion air demand. The modified air to feed gas ratio then remains valid as long as the SRU feed gas composition does not change again, meaning that subsequent SRU feed flow changes are directly processed with the modified air to feed gas ratio. This way continued corrections by tail gas quality control, and thus sub-optimal operation leading to reduced Sulfur Recovery Efficiency (SRE), can be avoided.



ADVANCED BURNER CONTROL PLUS (ABC+)

APPLICATION

The design intent is to have accurate SRU tail gas quality control, while changes to especially the SRU feed gas composition may be relatively big. ABC+ features all successful elements ABC already has while adding SRU feed gas composition control via:

- » SRU feed gas flow compensation based on SRU feed gas mole weight
- » Actual air to feed gas ratio control based on continuous on-line SRU feed gas analysis.

DESCRIPTION

ABC+ brings added value by means of SRU feed gas composition control based on analytical hardware for each SRU feed gas as well as a common ABC+ PLC for control and safeguarding of the extra hardware scope. This revolutionary development calculates the actual air to feed gas ratio to timely control the combustion air requirement at rapidly changing SRU feed gas composition thus maintaining stable tail gas quality control. This directly benefits all sulfur recovery processes taking place within any type of SRU and thus leading to optimum SRE at all times.

ABC+ uses proprietary Jacobs Comprimo® algorithms in the ABC+ PLC, providing the air to feed gas ratio and feed gas mole weight as outputs to be used in DCS according to the control scheme below.



IMPLEMENTING ABC+ OR UPGRADING ABC TO ABC+

There can be multiple reasons why changes occur to amine acid gas (AAG) and/or sour water stripper acid gas (SWAG) feed gas flows, just a few examples:

- » Instabilities in Amine Regeneration Unit (ARU) like foaming, pressure swings or overhead temperature control
- » Instabilities in Sour Water Stripper Unit (SWSU) hydrocarbon breakthrough or overhead temperature control
- » Upsets/trip/start-up of process units further upstream in the refinery or in a gas plant
- » Crude oil changes in refineries
- » Upset/trip/start-up of compressor stations, which can be located very remotely from the gas plants
- » Pigging of gas supply process lines
- » Quickly changing ambient conditions like sudden heavy rain.

In such cases the SRE can easily drop below mandatory limits imposed by the local authorities due to insufficient control robustness. Direct effects in the SRU are heavily swinging H_2S , SO_2 concentration at the tail gas analyzer thus reducing SRE. ABC+ can prevent this!

ABC+ brings following benefits to an SRU:

- » Increased daily, monthly, etc. average SRE, less SO_2 stack emissions
- » Improved SUPERCLAUS® oxidation stage on-line performance
- » On-line SRE and CO_2 emissions reporting
- » Less exposure of SUPERCLAUS® catalyst to high H_2S
- » Less risk of soothing 1st Claus catalyst
- » SRU can run on higher average capacity
- » Smoother SRU start-up.

REFERENCES

Currently two amine acid gas (AAG) ABC+ systems and one sour water stripper acid gas (SWAG) ABC+ system are running. A third AAG and second SWAG system are in commissioning phase. Three AAG and three SWAG ABC+ systems are under design.

ABC+ also provides additional benefits for process units directly upstream or downstream the SRU.

Key in this revolutionary design is the high demand on ABC+ analytical hardware availability, reliability and accuracy. To provide a generic and fit for purpose solution to clients globally with such high quality Jacobs Comprimo® has partnered with Analytical Solutions and Products (ASaP, Amsterdam) to jointly engineer, design and provide the complete ABC+ hardware scope. Apart from overall project coordination support, hardware and software, other support such as Factory Acceptance Tests (FAT) support, integrated FAT support, and start-up support can be delivered as well.

Jacobs Comprimo® Sulfur Solutions, a member of Jacobs Engineering Group Inc.

For any information:
 Mr. Frank Scheel
 Tel: +31 71 582 7366
 E-mail: frank.scheel@jacobs.com
 Mr. Dennis Koscielnuk
 Tel: +1 403 692 2950
 E-mail: dennis.koscielnuk@jacobs.com
 www.jacobs.com/comprimo

