



## Process and Environmental Technology

Advanced combustion control system SAR-ACC



Focus Netherlands

## Combustion Control System SAR-ACC

The "SAR-ACC" advanced combustion control system designed by SAR was released to the market over 20 years ago, and is currently operating successfully in more than 150 incineration lines worldwide.

This pool of diverse tasks allows our clients to benefit from an extensive wealth of experience in either optimising their combustion processes or developing new systems.

The SAR-ACC is continuously undergoing further enhancement, through both the latest research and development discoveries and the incorporation of experience that can only be gained in practice.

The control concept is designed to be transparent and comprehensible - a philosophy that characterises all of our designs.

## Attero Moerdijk (NL)

The Attero waste-to-energy plant located in Moerdijk featuring four incineration lines has a total annual throughput of about 1 million t/a. The operating company was searching for possible ways to enhance the operation of their system to be even more efficient.

Following the meetings between Attero and SAR, an inspection of the combustion process and the combustion control was requested. This was an important prerequisite for assessing the system technology and the operation of the incineration line on site and thus being able to submit sustainable optimisation suggestions.

The optimisation potential presented convinced those responsible to place an order for the delivery and commissioning of the combustion control system SAR-ACC.

### A holistic approach

SAR does not just replace the existing control structure or expand it with additional functionalities. We consider the functional unit as a whole. This also includes the process engineering design, sensors/actuators, hydraulics and process control technology.

Attero focused on topics such as stable steam production with the lowest possible fluctuation range, avoiding CO peaks and reducing manual intervention.

Another requirement was a combustion control system with a transparent structure and comprehensible mode of operation.



Fig. 1: mobile control panel

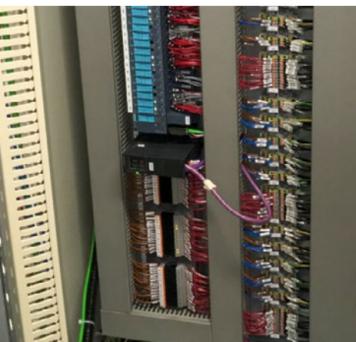


Fig. 2: modified hydraulic control cabinet

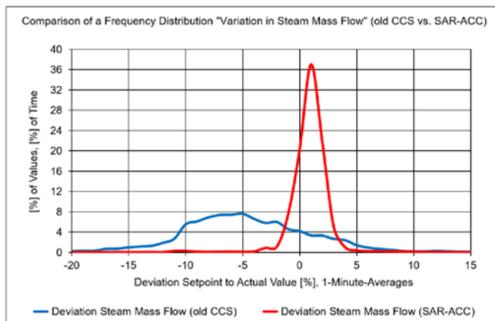


Fig. 3

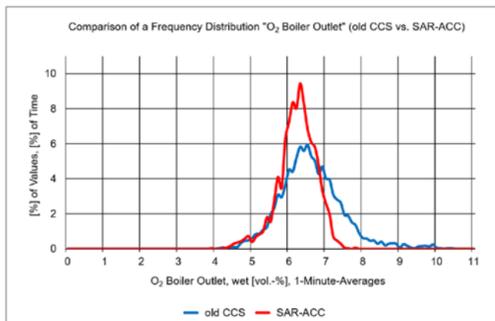


Fig. 4

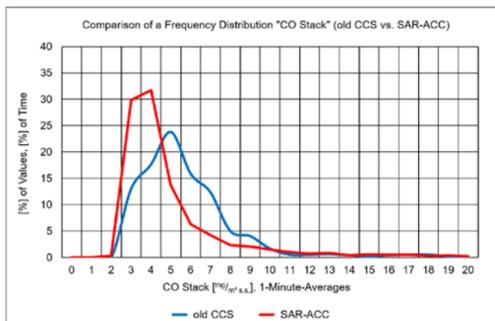


Fig. 5

### Special control of the grate system hydraulics

One special feature was the hydraulic control of the fuel feed and combustion grate in incineration line 4. It was accommodated in a separate control cabinet and designed as a proprietary system ("black box").

The components installed were not standardised industrial components, which made it almost impossible to keep a spare parts stock. As a result, the highest possible availability was not provided in this area.

From SAR's point of view, the only sensible solution was to replace the existing system with standardised industrial components. The result is maximum flexibility in the control of the grate and allocation via the combustion control, and at the same time increased system availability.

With the SAR-ACC, the operator acquires a comprehensive tool and thus creates ideal conditions for effective system operation. Without replacing the hydraulic control, the SAR-ACC would not have been able to exploit its full potential.

### Practical implementation

SAR designed a commissioning concept, which was then customized for Attero. The control modification of the grate hydraulics was carried out before the SAR-ACC was put into operation in order to avoid double optimisation processes.

The SAR-ACC was then commissioned with the new control of the grate hydraulics - and thus under ideal conditions.

Figures 3-5 show excerpts from the encountered initial situation ("old CCS") compared to the current operating mode ("SAR-ACC"). The period used for comparison was approx. 7 days in each case.

SAR developed innovative concepts for on-site operation of the hydraulic drives. Figure 1 shows, for example, a mobile panel that allows safe and convenient on-site operation.

For the control of the grate hydraulics, state-of-the-art and proven control technology was used, which fits seamlessly into existing systems and facilities (see figure 2). The decision to fall back on standardised industrial components was deliberate. For the maintenance personnel, this simplifies troubleshooting and keeping spare parts in stock.

## HVC Alkmaar (NL)



The HVC waste-to-energy plant located in Alkmaar also features four incineration lines with a total annual throughput of about 700,000 t/a. Similar to the Moerdijk plant, SAR came across the special hydraulic control ("black box") of the fuel feed and the combustion grate during the previously commissioned plant assessment.

The holistic approach with regard to the system technology practised by SAR has once again proven to be the key to success. Besides selective additions to the sensors, a modification or upgrade of the grate hydraulics control was considered necessary.

### Practical implementation

The modification of the control technology of the grate hydraulics was implemented as part of a scheduled shut-down of the incineration line. After the overhaul had been completed, the system was initially started up with the "existing CCS", the previous feeding operation and operation of the grate was adopted.

In a second step, parallel to ongoing system operation, the SAR-ACC was connected to the process control system via signal exchange.

After consultation between HVC and SAR, the SAR-ACC was then activated step by step. Commissioning and optimisation could now be carried out successfully under ideal conditions up to the final test run.

Figures 6-8 show excerpts from the encountered initial situation ("old CCS") compared to the current operating mode ("SAR-ACC").

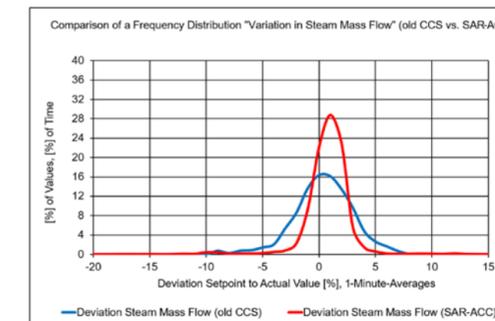


Fig. 6

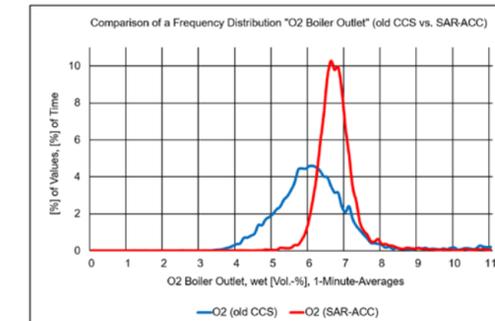


Fig. 7

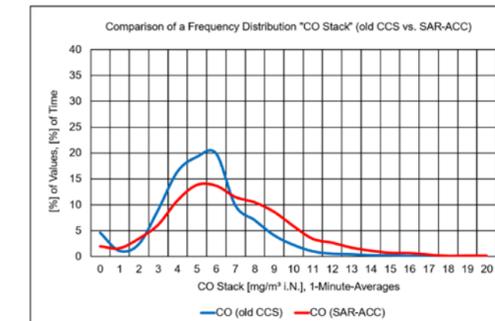


Fig. 8



## GENERAL CONCLUSION

The scopes of the Attero waste-to-energy plants in Moerdijk and HVC in Alkmaar were very similar.

In principle, this does not make any significant difference to the expectations of other operating companies of thermal incineration plants. The overlap of requirements is of major importance. The measures required to achieve this make the difference (as the topic of grate hydraulics in this case).

Once again it has been shown that it is not enough to simply upgrade or replace the control concepts, but that a holistic view will be essential if optimisation goals are to be achieved reliably and sustainably.

### Combustion plant operation with efficient energy release

After the test run to verify the guaranteed properties was completed, the results could be presented to clients and system operators. The results have exceeded the set goals.

The graphs presented (see fig. 3-8) clearly show that the steam mass flow during operation with the SAR-ACC are much closer to the range of the setpoint value than was possible for a comparable period with the existing CCS. This factor allows the operating company to increase their performance. The setpoint value can be raised without the risk of exceeding the maximum load of the boiler.

Periods in which the amount of steam is not produced, that should have been produced according to the setpoint value, have been minimised. Investing in a new combustion control system is often linked to the question of amortisation. This can be easily calculated by analysing the negative deviation from the setpoint value within the reference period. For both projects, the time to value was well below 12 months.

The smooth operation generates a constant flue gas volume flow, which has a positive effect on the downstream flue gas cleaning. As a result, it works more efficiently and saves reducing agents while complying with all emission limits at the same time. In addition, the ID-fan is less energy-intensive. A consistently high burnout quality helps to avoid having to dispose of the resulting clinker and to be able to market it.

### Long-term effects

Since completion of the project, both systems and the incineration lines have already been overhauled multiple times so that statements can also be made with regard to long-term system behaviour. Mechanical and thermal wear due to rust, caking on boiler walls or the consumption of additives for flue gas cleaning purposes carry major weight here. Our goal is to support the client long term after the project has been completed, allowing us to respond immediately to any negative developments.

### CLEAR BENEFITS PROVIDED BY SAR-ACC

- minor steam volume fluctuations
- efficient and even energy release
- constant flue gas volume flow
- positive effect on the system components downstream from the combustion process
- high level of operating conformity
- clearly laid out control display
- acceptance through understanding
- minimisation of improper interventions

The investment usually pays for itself within a year.

Such experiences and the associated exchange with the operating company help to further develop the SAR-ACC in a practical manner. After-sales service is one of our top priorities!

All arguments listed so far are so-called "hard facts". Their current states can be verified by means of numbers, are unambiguous and thus provide security. However, for a project to be successful, it also requires a variety of "soft facts".

Take the operating conformity of the SAR-ACC as an example. The existing shortage of skilled personnel makes no exception when it comes to thermal incineration plants. Tools that are self-explanatory and comprehensible which can be operated easily, almost intuitively, help to minimise improper interventions by inexperienced personnel. These arguments speak in favour of using the SAR-ACC in all incineration lines of the two power plants. The full benefit of the "soft facts" is exploited only then.

Due to the uniform control concept, the operating company can deploy their operating personnel to any line. Findings and experiences in the specific control behaviour of the SAR-ACC can be equally applied to all incineration lines.

Necessary post-optimisations or adjustments to changing fuel properties (e.g. sewage sludge co-incineration, shift in the ratio of household and commercial waste) can be carried out in parallel by the operating company and/or SAR on all incineration lines.

SAR Elektronic GmbH is an owner-managed, medium-sized company, founded in 1985 in Dingolfing, Lower Bavaria. Due to the constant growth, the establishment of first branches followed in Germany, as well as others in Europe and beyond. At the beginning of 2019, a sales office was opened in the Netherlands as a contact point for local clients.

Today, the SAR Group has over 700 employees providing future-oriented automation solutions from a single source, for both the industrial manufacturing and the process and environmental technology sector.

Whether as a general or sub-contractor - with SAR you can rely on the excellence, experience and flexibility of a medium-sized company with flat hierarchies. Our actions are based on in-depth experience and sound expertise. We offer our clients sustainable solutions that do not neglect either ecological or economic aspects.

### Process and Environmental Technology scope of supply and services

From design to implementation, maintenance and training, you receive all services in the disciplines of process automation, electrical and process control technology, and instrumentation and control technology.

We automate systems for thermal waste treatment (waste-to-energy plants, hazardous waste incineration plants, etc.) with combined power and heat generation. In addition, we provide you with automation solutions for substitute fuel, biomass and industrial power plants as well as the specific exhaust air and flue gas purification thereof. Our know-how in petrol chemistry is also in great demand.

Further reference projects can be called up at

[www.sar.biz](http://www.sar.biz)

Our core competencies in the area of combustion technology are compiled at

[www.combustioncontrol.biz](http://www.combustioncontrol.biz)

Among other things, lectures from various conferences and trade fairs are available here.

Detailed information regarding the Premium Plant Library PPL can be found at

[www.ppl.biz](http://www.ppl.biz)

Ask for our reference lists!

Also feel free to contact our customers to find out more about the work and quality of SAR.

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