

**Environmental Technology**  
Fire length control by SAR

# Fire length control by SAR: Additional parameter for the optimization of combustion processes

Operators of thermal recycling plants face challenges that require further efforts in the area of research and development. Aspects to be considered are the steadily decreasing absolute quality, and the increasing variation in the quality of fuels. A continuously changing market demands practical approaches.

The thermal recycling of domestic and industrial waste and biomass is usually carried out using grate furnaces. When calorific yields are poor, this generally results in burn-out problems due to "excessive fire length". Very high calorific yields also result in damage to the feeder roof and the front wall of the boiler due to thermal overload, caused by "insufficient fire length".

A solution approach should therefore not only include burn-out detection, but also be able to control the fire length on the combustion grate and maintain it within a certain range.

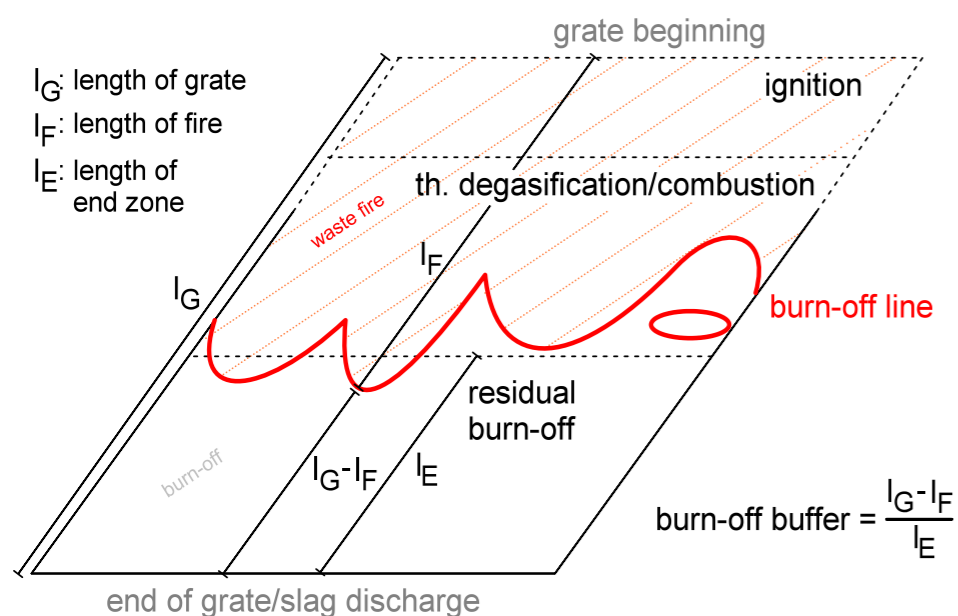
### SAR fire length control

A modern and flexible combustion control system makes it possible for the operator to influence the combustion process. They have access to a greater or lesser amount of control variables for this purpose.

Reliable and reproducible auxiliary variables are essential for a comprehensive combustion control system, but these may not necessarily be available. A possible option is the use of the fire length. But measuring this directly it is not quite so straightforward.

The absolute fire length on the combustion grate can be detected through the development of a reliable system for the automatic detection of the so-called burn-off line, and incorporated as a control variable into the combustion control system.

The combustion control system can now avail of an additional control variable, which has a supportive effect on optimal fire management.



Graphic: Calculation of burn-out reserve

### Current technology standard and motivation

Most plants are not equipped with a dedicated burn-out or fire length control. Operating personnel generally use a video camera to visually monitor the combustion process. Experienced operators can derive characteristic information about the combustion conditions from video recordings and can intervene as required.

A major disadvantage, however, is that operators affect the process in different ways. Their perception of the combustion conditions is subjective and their experience and knowledge of the process differ. There are also plants with automated burn-out detection systems.

SAR's motivation for developing their own fire length detection program came from the experience they were able to gain with current systems on the market, as well as the existing demand for a reliable system in many plants. There are additional benefits for the plant operator, which should not be underestimated. The manual operations required are minimized and the process interventions that are carried out can be reproduced.

In developing the system, great value was placed on ensuring the lowest possible investment costs on the part of the operator. The aim was to avoid a retrofit of cost-intensive sensors. A parallel use of the optical fire room camera, which is already present in most cases, is nearly always possible.

### Operating principles

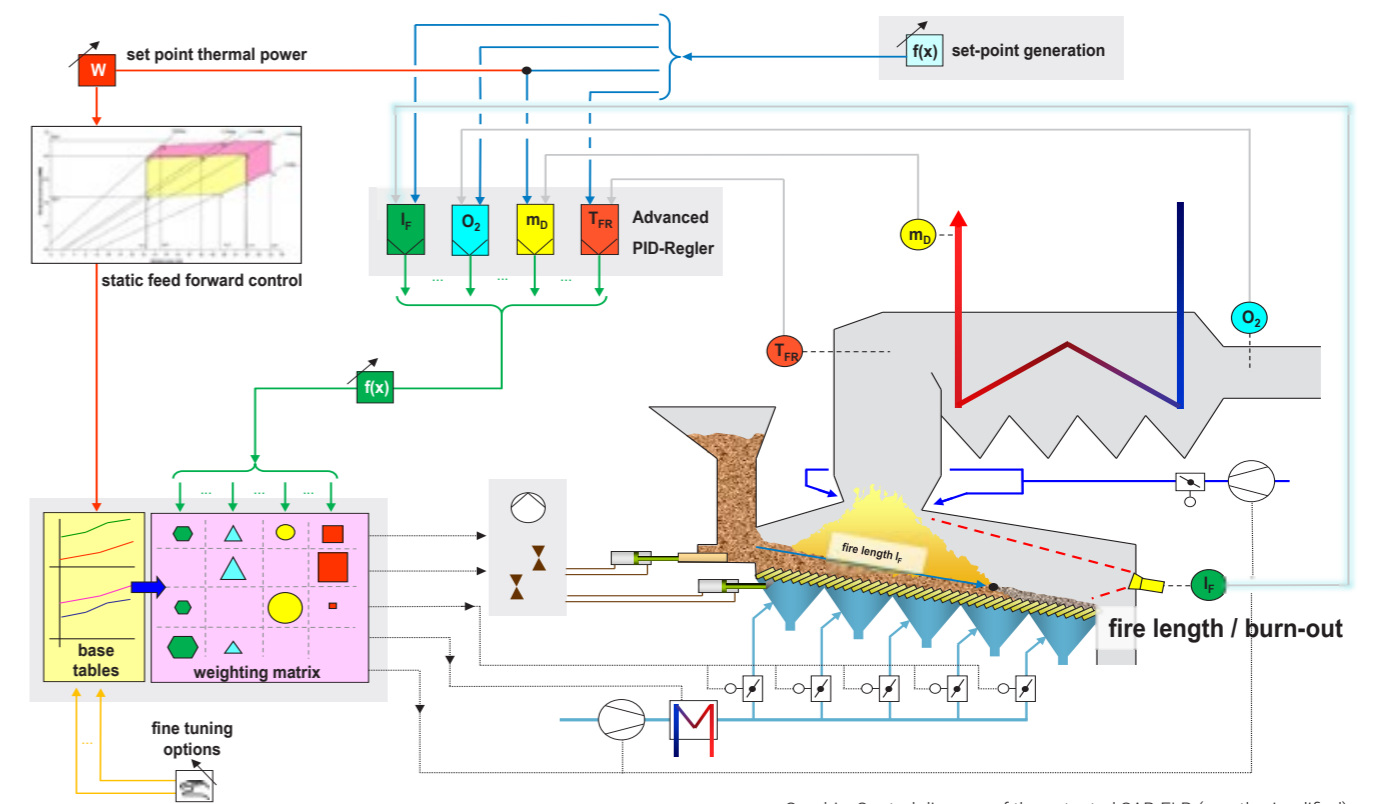
The SAR fire length control intelligently detects the so-called burn-out line, which lies in the transition zone between visible signs of flames (due to combustible material) and already burned fuel. The absolute fire length can be derived from the burn-out line detected, by calibrating the digital image on the combustion grate.

This process takes into account so-called hot spots in the burn-out area and also permanently monitors the image quality, which can deteriorate spontaneously due to smoke billowing from the slag discharge.

### SAR-FLR combustion control system with SAR fire length control

The "fire length control" add-on is the ideal way to expand the SAR combustion control system (SAR-FLR). This provides the operator with competent support for both systems from a single source, as well as real added value by expanding the system with a new control variable.

The expansion of the patented SAR-FLR with the "fire length" control circuit results in the following control diagram (used as an example and greatly simplified):



Graphic: Control diagram of the patented SAR-FLR (greatly simplified)



## KEY ASPECTS OF THE SAR FIRE LENGTH CONTROL

- Optical detection of burn-out line or fire length
- User friendly and lean image processing system
- Easy connection to existing camera systems (analogue and digital)
- Transparent structure
- Standardized interfaces
- Stand alone system or integration into a combustion control system
- Special cases are covered (e.g. 2 combustion chamber cameras)

### 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 RDF, 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 SAR's work and quality.

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