VENICE2022

9th INTERNATIONAL SYMPOSIUM ON ENERGY FROM BIOMASS & WASTE
21-23 NOVEMBER / VENICE, ITALY

ENHANCEMENT OF COMBUSTION CAPACITY IN WASTE TO ENERGY AND BIOMASS TO ENERGY PLANTS

Symposium web: www.venicesymposium.it

technikgruppe®
COMBUSTION MANAGEMENT

TECHNIKGRUPPE invites you to the Energy from Biomass and Waste Symposium taking place in Hotel Monaco & Gran Canal, Venice, Italy. Welcome to our stand and workshop:

Enhancement of combustion capacity in waste to energy and biomass to energy plants by implementation of modern optimization systems (theory and case stories)

It will be our great pleasure to exchange experiences during this 3 days international event.

Symposium registration link:
www.venicesymposium.it/en/registration-form

www.technikgruppe.com/technology-of-fire

Technology of fire

The combustion process in Energy from Waste and Biomass plants is very complex, and the demands on control systems in those plants are very sophisticated. There are many theories about the best combustion technologies to use and there are equally many different approaches to find the right solutions.

In most conventional control systems there are lots of implemented control algorithms and many arguments how to compare different approaches.

In all of these discussions there are two basic factors that are used in nearly all comparisons:

1. Which main actions have influence on the quality of the combustion process?
2. Which measured parameters can be accurately compared to estimate the combustion quality?

Simplistically there are 3 main actions which have influence on the combustion process.

1. Adding fuel
2. Adding oxygen (combustion air)
3. Mixing the fuel with oxygen

Key words:

- **technology of fire**
- **combustion optimisation**
- **retrofitting of WtE and BtE plants**
- **forward moving grate**
- **new grate technology**
- **reliability**
- **profitability**

These 3 main actions involve around 30 actuators. But these actuators offer many possible combinations for fine tuning.

If we have 20 actuators and each actuator has 10 possible positions - **how many possible combinations do we get??**

1 actuator provides 10 combinations // 0-1-2-3-4-5-6-7-8-9-
2 actuators provide 100 combinations // 00-01-02-03-04- 96-97-98-99
3 actuators provide 1000 combinations // 000-001-002-003-004-005-006-007 997-998-999
20 actuators provide 100 000 000 000 000 000 000 possible combinations for fine adjustment //
00 000 000 000 000 000 000 ..... 99 999 999 999 999 999 999

The status of the combustion process is changing every few seconds! **That means - every few seconds we need to fine adjust the actuators.** It is clear that the definition of appropriate combination every few seconds is a very complex task.

Whereas the checking of combustion quality itself is very simple → see some diagrams of KPI's from a combustion process.

If you want to talk to our experts, please contact:
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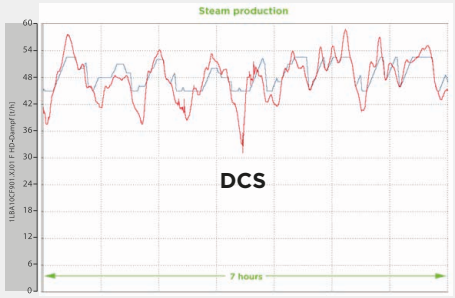
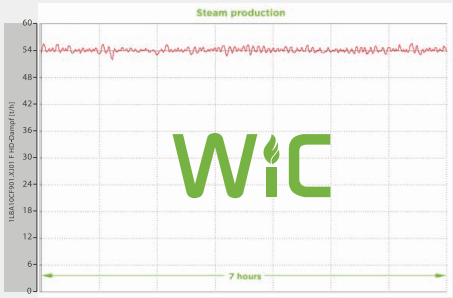
(1) Stabilization and enhancement of steam production



Steam production controlled by DCS

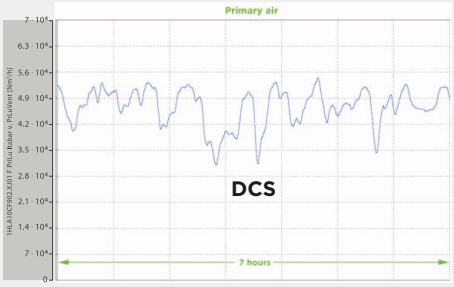


Steam production controlled by WiC (same line)

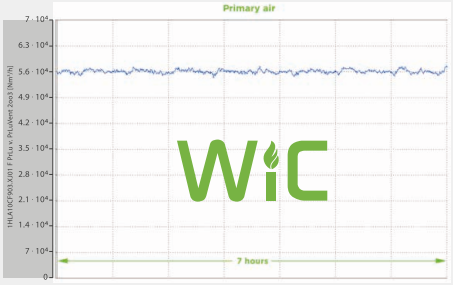
Stabilization of steam flow brings:

- increased steam production
- increased waste throughput
- increased electricity production
- better burn out quality

(2) Stabilization of combustion air flow



Primary air controlled by DCS



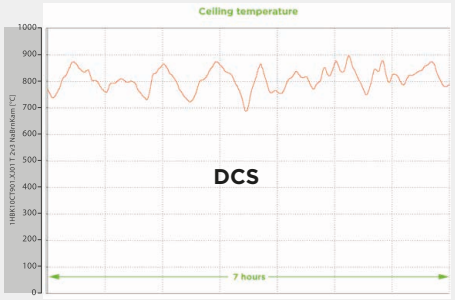
Primary air flow controlled by WiC (same line)

Please NOTE! The higher amount of primary air is related to an increase of waste throughput/steam production

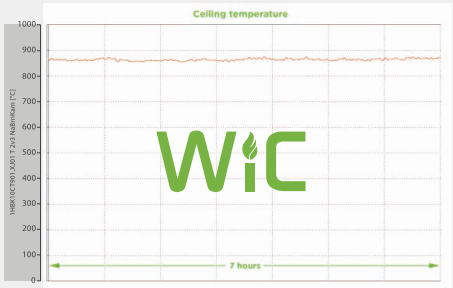
Stabilization of combustion air brings:

- less additives in flue gas cleaning
- less energy and mechanical forces on fans
- less slagging and fouling

(3) Stabilization of flue gas temperature (ceiling temperature)



Ceiling temperature with DCS



Ceiling temperature with WiC (same line)

Please NOTE! The average temperature is, of course higher because of enhancement of waste throughput/ steam production

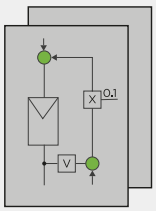
Stabilization of flue gas temperature brings:

- less slagging and fouling
- less wear on refractory
- less corrosion
- less cleaning effort
- lower ceiling temperature
- better heat transfer

What is the difference between conventional controllers and WiC ?

Conventional systems

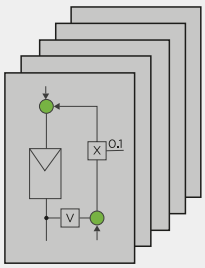
50

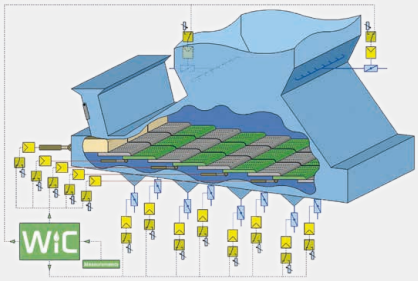


Conventional controllers have about 50 functional diagrams

WiC system

6500

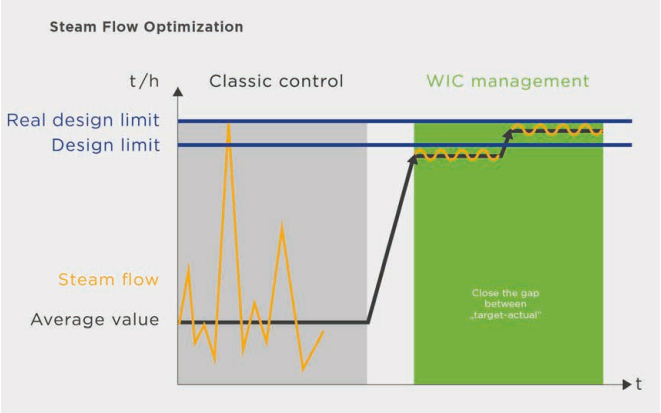




100.000.000.000.000.000.000 possible positions for fine adjustment.

For this complex task the technical experts of TECHNIKGRUPPE have developed a very sophisticated software package with about 6500 functional diagrams.

Enhancement of steam production towards real design limit

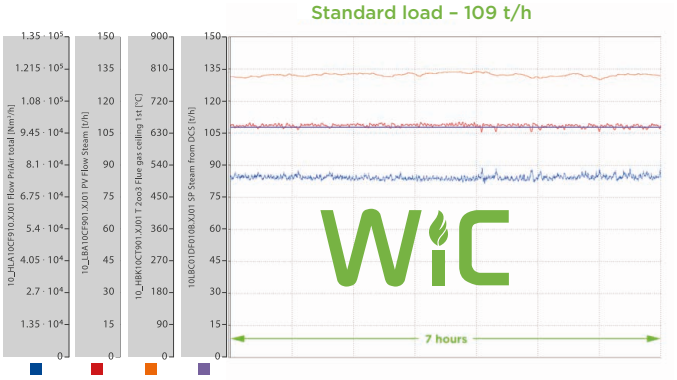


By implementation of classic control, big overshooting of steam production is possible and this is the main reason why the set point (average steam production) is kept below the design limit.

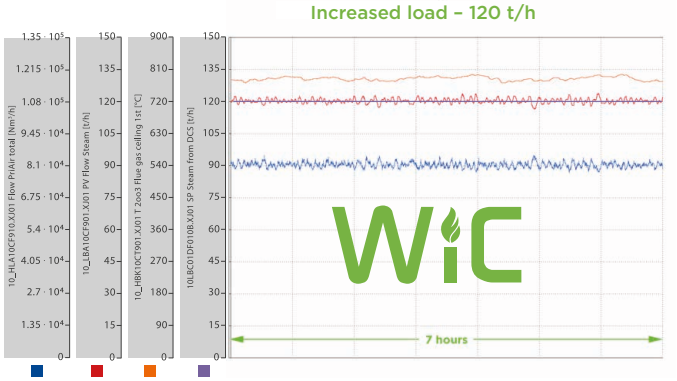
"Classic control" is very likely to produce dangerous overshooting above design limit! Therefore, in most cases, the design limit (MCR) is set **below the real design limit**.

That means, that in most cases the boilers are built with reserves to cover the overshooting due to lack of combustion control quality. These reserves may be utilised by implementing a more reliable and stable combustion control system. → WiC

Enhancing combustion capacity without mechanical changes



After stabilization of steam production, the real capacity could be determined.



This finally led us to a load increase of 10 % from original MCR

It is important to note, that even after increasing steam production from 109 t/h to 120 t/h the steam production is still stable.

It will be a pleasure to exchange experiences on TECHNIKGRUPPE's exhibition booth and workshop.
See you on 21 – 23 November 2022 in Venice, Italy

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