INVITATION KEY ENERGY, RIMINI EXPO CENTRE, ITALY / 8TH - 11TH NOV 2022

TG invites you to the exhibition booth 116 in hall B5 on KEY ENERGY - the RENEWABLE ENERGY EXPO (www.keyenergy.it) Simultaneously to ECOMONDO - the GREEN TECHNOLOGY EXPO





Facts & Figures



Bulgaria Austria

Tunisia

Key Energy is held at the same time as Ecomondo, the circular economy expo.

500 HOURS OF EVENTS

32 CONFERENCE ROOMS 2007 PHISICAL EVENTS with digital extension 800 WEBINARS clump the whole year on the most important, themes about the eccelgical and energy transition 510 MILLION MEDIA CONTACTS IN TOTAL 932,000 90 90 90 SOCIAL 16,300 91 42,000 SOCIAL COMMUNITY

* Data from 2021 show





www.technikgruppe.com/ technology-of-fire

KEY ENERGY, RIMINI, NOV 2022



The control of the combustion process is based on 3 main actions:



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 also very complex. 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 various control algorithms and many arguments how to compare different approaches. In all comparisons two basic factors are used: 1. Which main actions have influence on the quality of the combustion process?

2. Which measured parameters can be accurately compared to determine the combustion quality?

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

- 1. Add fuel into the burning chamber
- 2. Add combustion air (oxygen)
- 3. Mix fuel with combustion air



After more than 25 years of experience in combustion optimization, we can say that forward-moving reciprocating grates are ideally suited to the application of the 3 basic principles for combustion control.



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

20 actuators provide $\,$ 100 000 000 000 000 000 000 possible combinations for fine adjustment // $\,$

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 is very simple \rightarrow see some diagrams of KPI's from a combustion process.

Below are some graphs of real case improvements that have an impact on profitability, reliability and availability. The integration of the WiC leads to significant additional earnings through:



Stabilization and enhancement of steam production



Steam production controlled by DCS

Steam production controlled by WiC (same line)

Primary air

Stabilization of combustion air flow



Primary air controlled by DCS

 4.9 · 104

 4.2 · 104

 3.5 · 104

 2.8 · 104

 2.1 · 104

 1.4 · 104

 7 · 104

 0

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

7 · 10⁴

₹ 5.6·10⁴

Stabilization of flue gas temperature (ceiling temperature)



Ceiling temperature 1000 900 800 [°C] mi 700-VaBrn 600-(J01 T 2v3 500-K.1061 400-HBK100 300-200-100 7 hours

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

How is the WiC connected to existing automation systems?





In most applications the WiC is a bypass or an "add-on" system to the existing combustion control system. It may also be integrated from project start up. The WiC usually comes in a cabinet of 600D x 800W x 2000H mm (24D x 31W x 79H inch) and is placed in the DCS room.

The basic working principle of the WiC is to "listen" to process signals coming from the DCS, calculate appropriate set points for combustion parameters and send them back to the DCS to control the actuators of the combustion system (air dampers, feeder- and grate-hydraulics).

Note:

- WiC does not replace the existing system
- WiC is a bypass/add-on system for exact process set point calculations
- WiC does not interfere with the existing safety system
- With a single switch (software and/or hardware) the operator may define the source of set points, utilizing WiC-set-points or DCS-set-points. This is essential for the operators to gain confidence in a "new combustion philosophy". The operators can, at any time, switch back to their familiar existing system and they can directly compare with the new WiC Combustion Manager.

The installation of WiC takes about 4 weeks. The WiC does not interfere with ongoing operation; there will be no disturbance or plant shut down.

The commissioning of the WiC is finished within 10 minutes. Roughly 30 minutes after commissioning, it is possible to see first benefits of the WiC-system.

Note:

The WiC can also work as an add-on for any 3rd party combustion optimization system the customer might have implemented in the past.



Measuring the benefit of the WiC



After the installation of the WiC, one important question comes up: "What is the benefit of the WiC Combustion Manager?" For answering this question, the following procedures will work as simple and reliable testing methods.

It is necessary to have approximately the same waste quality and then check the KPI's under WiC- and under DCS combustion control.

With one simple switch plant operators can move between the existing system und WiC.



The periods under comparison may be selected according to similar waste conditions.

The commercially most important criteria are:

- stability of steam production
- amount of steam production
- waste throughput
- amount of additive consumption
- stability of flue gas temperature
- stability of primary and secondary air
- O2 concentration
- amount of operator interventions

Some criteria are short term, being relevant for a fast initial assessment of the WiC benefits. Long term benefits can be assessed on the basis of process signals over a period of several months after WiC installation.

The WiC is a fully automated system and provides operation without permanent observation (OWPO). Besides that, WiC is also a great help for operators in case of disturbances.

Note:

For the WiC implementation there is no need for mechanical modifications of the existing combustion system. WiC is an add-on system utilizing the existing equipment.

Stabilization and enhancement of steam production



Steam production controlled by DCS



Steam production controlled by WiC (same line)

What about the financing model for the WiC?

Besides the benefits mentioned above, the WiC provides a considerable additional advantage:

• profits from the beginning of installation WiC offers more than all other systems on the market, also in terms of financing.

After TG's feasibility study, TG can assess the

possibilities and advantages of the WiC for your particular plant. If the outcome of the feasibility study is positive, TG is able to offer the installation and commissioning free of charge:

- no upfront investment
- test installation and commissioning free of charge
- no technical risk, no commercial risk for you



WiC generates additional profits from the beginning of installation

TG has great experience in reliably assessing the advantages of the WiC system on your particular plant.

After commissioning, the customer can immediately measure the short-term benefits of the WiC (financial benefits). At that point the customer can decide freely, without any obligations, whether to go on with a contract for the WiC. The entire risk is on TG. The customer can monthly quit the contract for whatever reason without any further obligations.

If a leasing model with monthly fees is chosen, the fees are in most cases less than the short-term profit enhancement. After a certain time, the customer becomes the owner of the WiC and pays only for the software licence and optional maintenance.

Commercial benefits of the WiC Combustion Manager

Every plant and every incineration line is a unique system. Good result on one line in a particular plant does not automatically mean good result on the other. TG's basic purchasing model provides a Combustion Management System without any commercial and technical risks. The implementation of the WiC is totally financed by TG. Our tested and proven methods provide simple and reliable comparison between "before" and "after" WiC installation. **Finally, only a test run and evaluation will provide a real picture of the system quality.**

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. \rightarrow WiC

Enhancing combustion capacity without mechanical changes





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

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.



Matthias Lukic, technical expert, founder, owner and CEO of Technikgruppe, has more than 25 years of experience in combustion of solid fuels on grates.

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Damir Zibrat, Business Development Manager of Technikgruppe, has more than 25 years of experience in international strategical selling and marketing.

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It will be our great pleasure to welcome you on Technikgruppe's exhibition booth (Hall B5 - booth 116) and personally exchange experiences. WELCOME TO RIMINI



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