

FREE LIVE WEBINAR – 29th SEPTEMBER 2022

duration: 2 h
Start: 3 pm BST (UK – British summer time)
4 pm CET (Austria)
10 am US-Eastern time

COMBUSTION OPTIMISATION and BOILER CORROSION PROTECTION in Waste to Energy and Biomass to Energy plants



MODERATION (UK)



CCNY (USA) / RESEARCH

SWANA (USA)

TECHNIKGRUPPE (AT) / COMBUSTION



IGS (UK) / CLADDING



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Technical Expert



DAMIR ZIBRAT
Business Development
Manager



COLIN BATEMAN
Technical Advisor
Intergrated Global
Services



Webinar in association with...



Energy from Waste and TECHNIKGRUPPE invite you to a free technical webinar and round table discussion

**COMBUSTION OPTIMISATION AND BOILER CORROSION PROTECTION
IN WASTE TO ENERGY AND BIOMASS TO ENERGY PLANTS**
(the webinar will be recorded for full on demand replay)

Registration Link: <https://bit.ly/3pGOqMs>



www.technikgruppe.com/technology-of-fire

We are very proud to announce that we had hundreds of participants from all continents in the two webinars in November 2020 and October 2021. Thank you to the organisers, guest speakers, TECHNIKGRUPPE staff and many others who supported these events.

Combustion optimisation can have a significant impact on the reliability and profitability of waste incineration and biomass combustion plants. In our next webinar on 29 September 2022, we will present the latest results of combustion optimisation in addition to explaining the operating principles.


We would be pleased to welcome you and your partners at the webinar on 29 September 2022.

Matthias Lukic
CEO, TECHNIKGRUPPE



We would also like to personally invite you to our exhibition stands this year.

2022 EEC/WTERT Bi-Annual Conference
Sustainable Waste Management: The Forefront of Innovation
Preliminary Draft of the Program



October 13th – 14th, 2022
 The Grove School of Engineering,
 275 Convent Ave, New York, NY 10031

www.ccnveec.org

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**



www.keyenergy.it



In this free webinar basic principles of unique methods for combustion optimization on forward moving reciprocating grates will be explained. Practical results will be analysed. Technical experts from Europe and USA will contribute in their presentations and round table discussion to a better understanding of improvement and modernisation in Waste to Energy and Biomass plants.

Participants are kindly invited to visit www.technikgruppe.com/technology-of-fire

If you need additional information please contact Mr. Damir Zibrat damir.zibrat@technikgruppe.com

Target audience:

- **plant managers**
- **operational managers**
- **maintenance managers**
- **performance improvement engineers**
- **plant engineers**
- **supervisors**
- **plant operators**

Key words:

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

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.

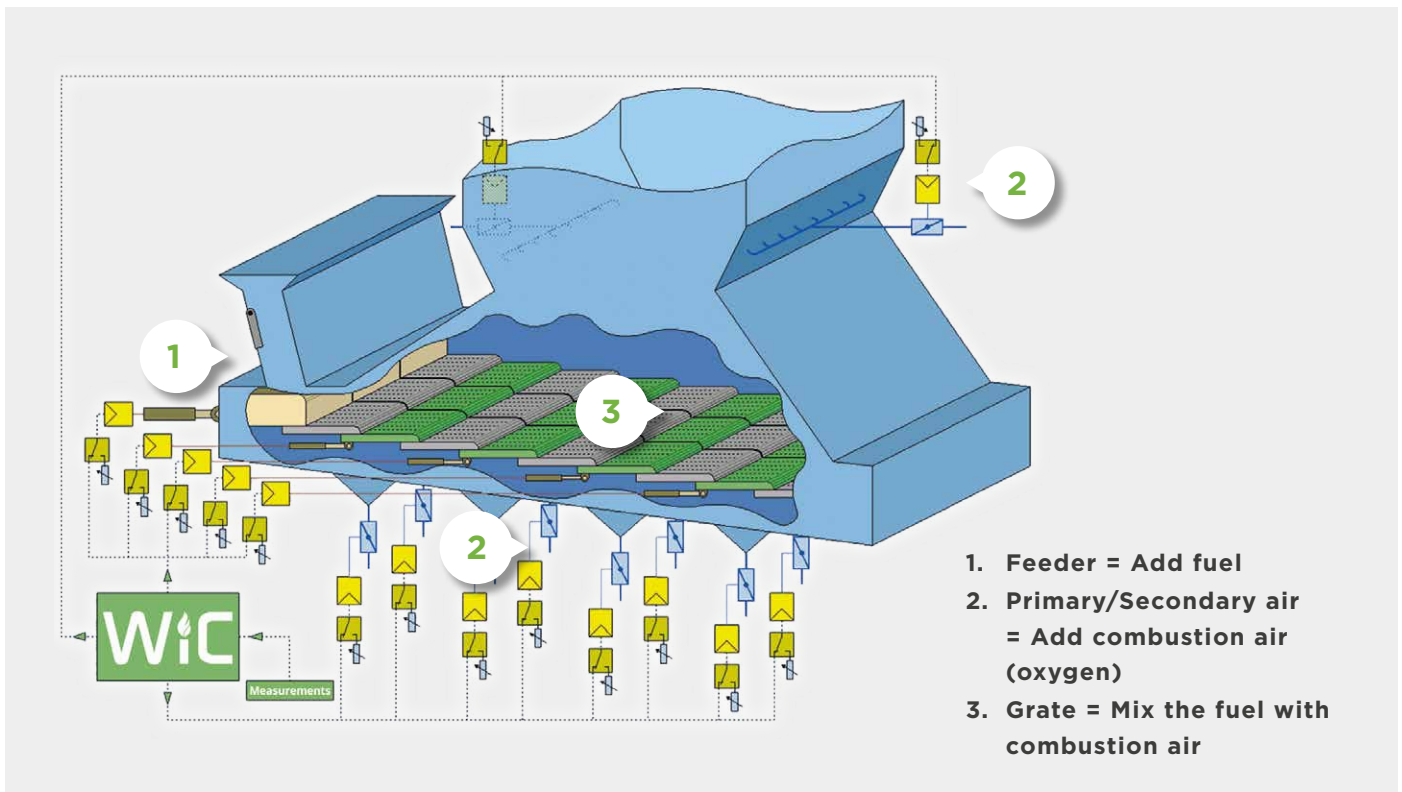
In most conventional control systems there are lots of implemented control algorithms and many arguments how to compare different approaches.

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 used to define and compare the combustion quality?**

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

1. Add fuel
2. Add combustion air
3. Mix the 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??**

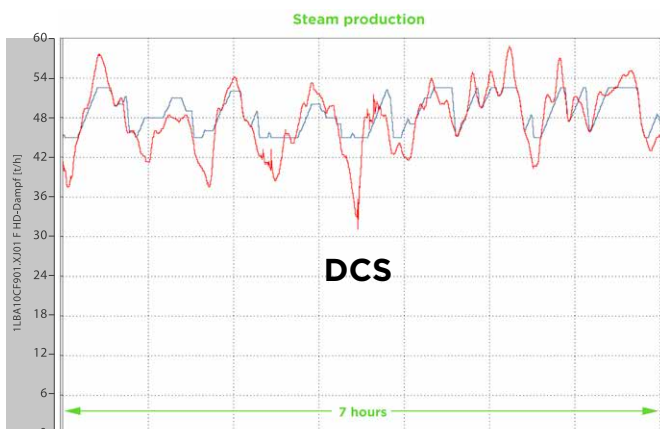
- 1 actuator provides 10 combinations // 0-1-2-3-4-5-6-7-8-9-
- 2 actuators provide 100 combinations // 00-01-02-03-04-96-97-98-99
- 3 actuators provide 1000 combinations // 000-001-002-003-004-005-006-007997-998-999
- 20 actuators provide 100 000 000 000 000 000 000 possible combinations for fine adjustment //**
 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.

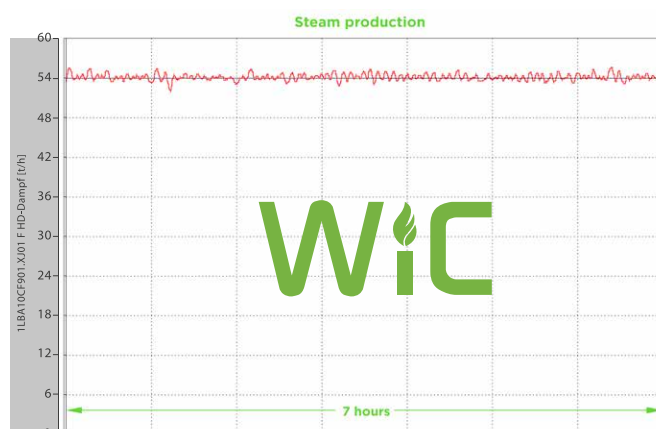
Whereas the checking of combustion quality is very simple → see some diagrams of KPI's from a combustion process.

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

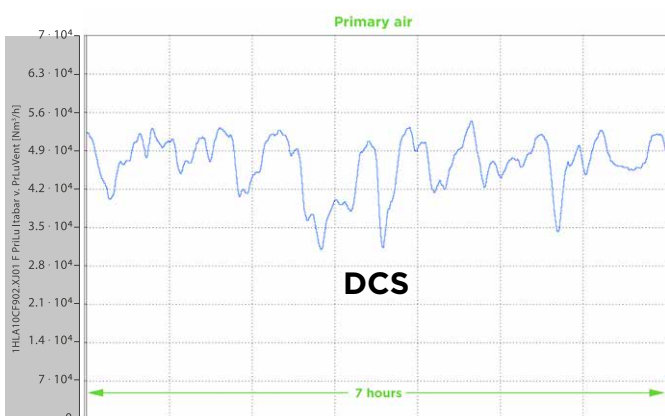


Steam production controlled by DCS (before)

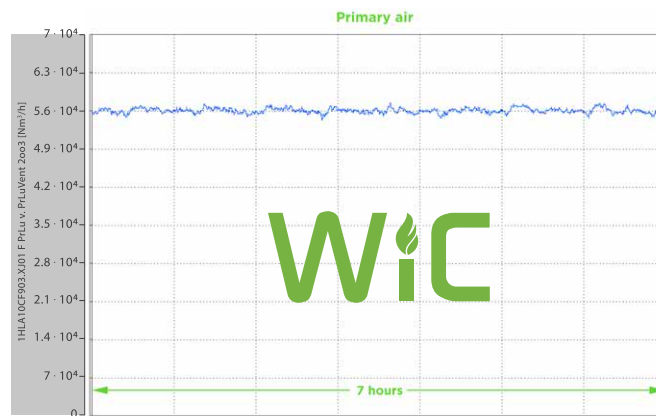


Steam production controlled by WiC (after)

Stabilization of combustion air flow



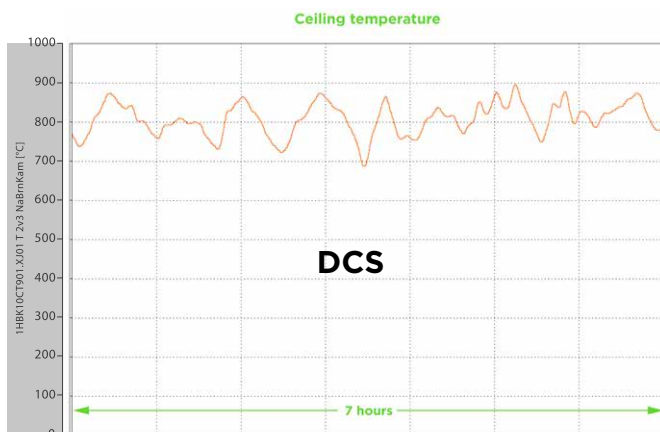
Primary air controlled by DCS (before)



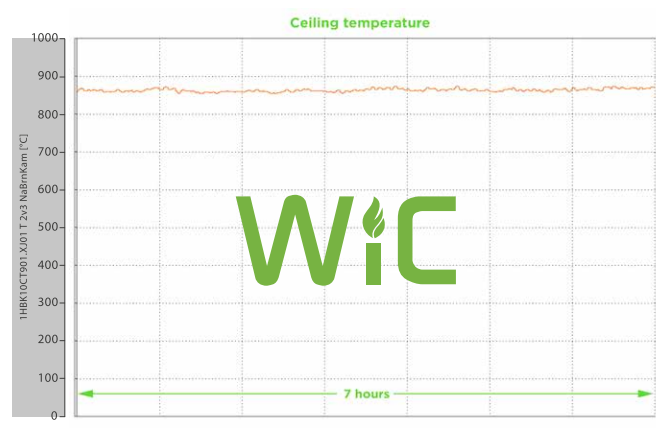
Primary air flow controlled by WiC (after)

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

Stabilization of flue gas temperature (ceiling temperature)



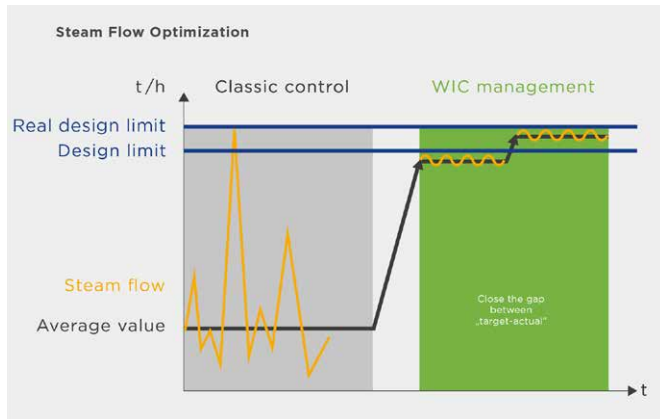
Ceiling temperature with DCS (before)



Ceiling temperature with WiC (after)

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

Enhancement of steam production towards real design limit

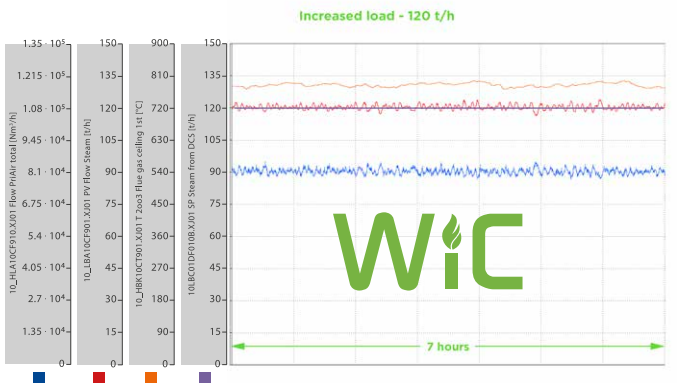
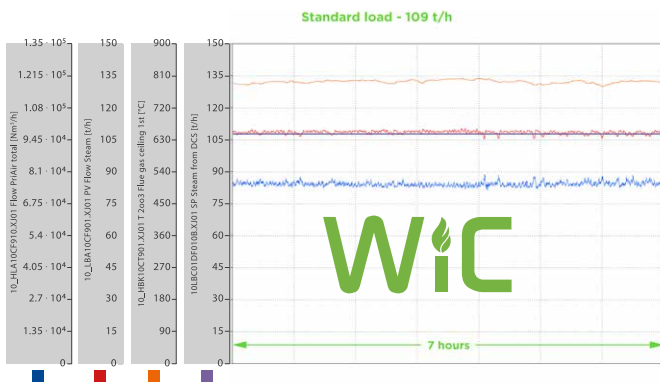


By implementation of classic control, big overshooting of steam production is possible and this is the main reason why the set point (average steam production) is kept below the design limit.

“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



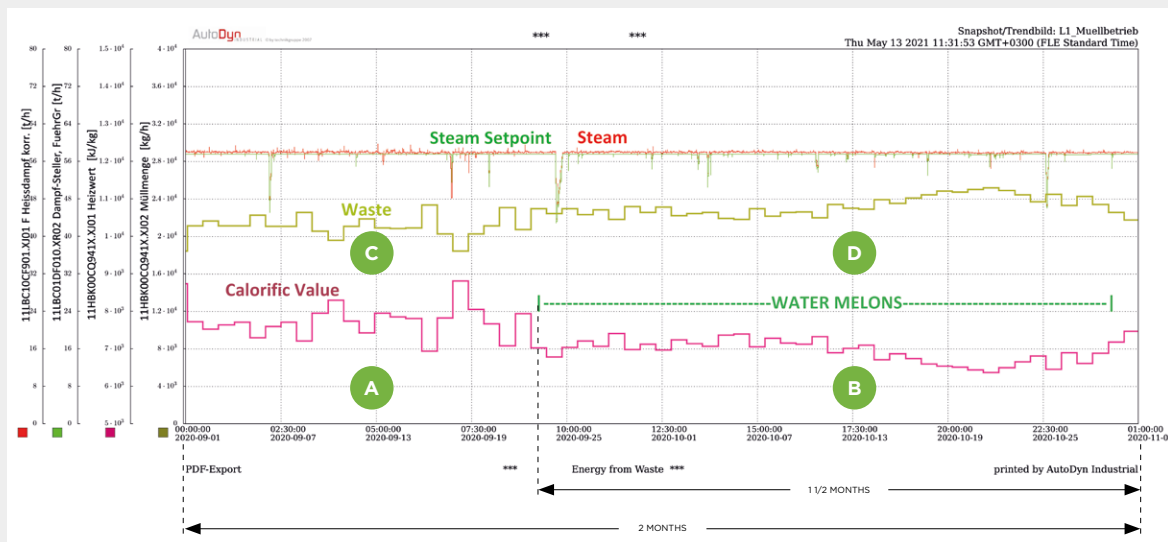
After stabilization of steam production, the real capacity could be determined.

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.

Combustion of low calorific waste

The incineration of waste with low calorific value is generally a very complex process. Due to the great experience and expertise in the field of combustion technology, very complex calculations and very powerful processors, the WiC-Combustion Manager can optimally carry out the incineration of low calorific waste. The following is an example of trends for an optimized incineration of low calorific waste.



- A** Calorific value normal waste average 7,5 MJ/kg
- B** Calorific value with watermelons average 6,5 MJ/kg
- C** waste throughput with normal waste average 21 t/h
- D** waste throughput with watermelons average 24 t/h

Often old grates are beset by problems with excessive wear, poor reliability or simply poor combustion performance. Considerable savings could be realized if the grate were changed to a well designed forward moving grate. Technikgruppe's technical experts have the experience of assessing grate performance and can determine the viability of changing the grate.

The diagram illustrates the transition from traditional grate designs to a modern forward-moving grate. On the left, three cross-sectional views of different grate types are shown, with blue arrows pointing towards a central image of a modern forward-moving grate. To the right of the grate image is a plus sign followed by a photograph of a control cabinet filled with electronic components, representing the WiC combustion manager.

Two line graphs compare steam production over a 7-hour period. The top graph, labeled 'WiC', shows a steady, flat line for steam production, indicating consistent performance. The bottom graph, labeled 'DCS', shows a highly fluctuating line for steam production, indicating significant cyclic variations. The y-axis for both graphs is labeled 'tUBA(CEP50) X100 T (HG-Dampf) (t/h)' and ranges from 0 to 60. A green double-headed arrow at the bottom of the DCS graph indicates the 7-hour duration.

less cyclic = more steam

A photograph showing a large pile of waste being processed by a mechanical grate in an incinerator. The grate is a complex metal structure with multiple levels, designed to move and burn waste efficiently.

more waste burnt

Simply changing the type of grate can have considerable positive effect on combustion quality and profitability. However, much greater saving will be realized if the change were also to include Technikgruppe's WiC combustion manager.

For additional information about WiC please download materials on www.technikgruppe.com or contact Technikgruppe directly.

ABOUT Technikgruppe

... is an Austrian engineering company with 40 employees having international experience and worldwide engagement. Due to its long experience in Energy-from-Waste and Biomass Technikgruppe also acts as an independent consultant for technical and commercial issues.

Please contact us for any question. We are happy to exchange our experience.

Matthias Lukic, C.E.O

Every combustion line is unique and is a complex technical system. Every combustion line should be individually adjusted to optimize its operation. Our tailor-made automation systems use extremely powerful control processors and extremely fast software to individually optimize each grate system to deliver a state-of-the-art combustion system that optimizes the combustion of waste to deliver:

- enhanced profitability
- enhanced reliability
- enhanced availability

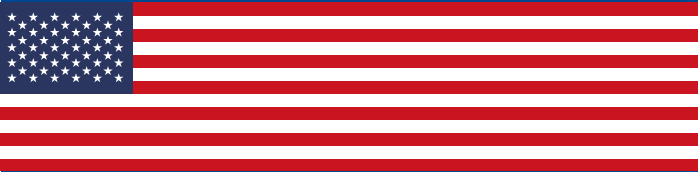
Matthias Lukic, technical expert, founder, owner and CEO of Technikgruppe, has more than 25 years of experience in combustion of solid fuels on grates.

matthias.lukic@technikgruppe.com
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Damir Zibrat, Business Development Manager of Technikgruppe, has more than 25 years of experience in international strategic selling and marketing.

damir.zibrat@technikgruppe.com



ABOUT SWANA

The Solid Waste Association of North America (SWANA) is an organization of more than 10,000 public and private sector professionals committed to advancing from solid waste management to resource management through their shared emphasis on education, advocacy and research.

For more than 60 years, SWANA has been the leading association in the solid waste management field. SWANA serves industry professionals through technical conferences, certifications, publications and a large offering of technical training courses.

Jeremy K. O'Brien is a solid waste research engineer and consultant who has over 40 years of experience in the industry.

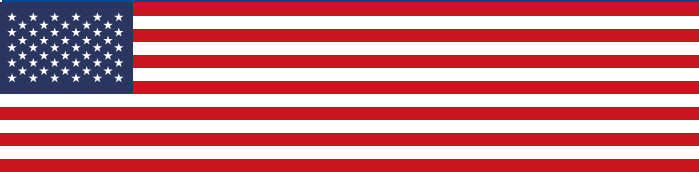
Since 1999, he has served as the Director of Applied Research for the Solid Waste Association of North America (SWANA) – an organization of more than 10,000 public and private sector professionals committed to advancing from solid waste management to resource management through their shared emphasis on education, advocacy and research. From 1989-1999, Mr. O'Brien was employed by HDR, Inc. – a global architectural, engineering and consulting firm with over 10,000 employees in 200 offices through the world. Mr. O'Brien received an M.S. degree from Duke University in Urban and Environmental Engineering in 1977 and obtained his Professional Engineering license in 1984.

www.swana.org



David Biderman, SWANA's Executive Director and CEO, will be speaking in person at the Energy from waste Conference being conducted at the City College of New York on October 12-14, 2022!

You don't want to miss this!



ABOUT ACE

Applied Control Engineering (ACE) is proud to be selected as the US partner for Technikgruppe, a leader in deriving energy from waste and biomass sources. For more than 25 years ACE has been providing solutions in the energy industry and we are excited about the prospects and benefits that waste and biomass energy plants will bring to the sector.



Our experience and partnerships with various DCS and PLC manufacturers mean that ACE can seamlessly integrate these systems with your existing plants. Our expertise with reporting, metrics and data analytics means that your plant and operation managers and engineers will have the information that they need to run these systems efficiently.

Shawn Coughlan is an owner at Applied Control Engineering, Inc. (ACE) where he has been employed for the last sixteen years. He earned his Professional Engineering License early in his career and has continued his professional development within the controls industry by learning new systems and earning several certifications.

His 37-year career has seen him involved in control system projects in the power, chemical, refinery and pharmaceutical industries. He has worked all levels of projects from programmer to project manager.

<https://www.ace-net.com>

2021 System Integrator of the Year

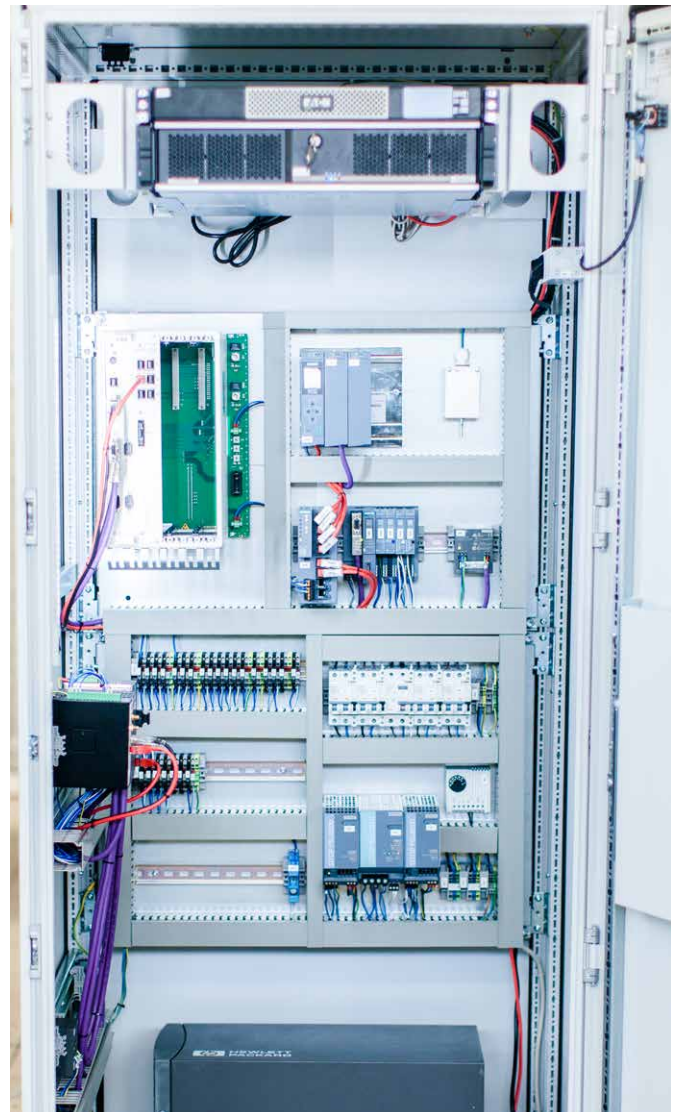


ACE has over 100 employees and offices across the USA. ACE provides PLC/DCS installation, training and technical support for the WIC.

Over time automation systems become obsolete, spare parts become expensive and difficult to obtain and most importantly hardware and software technology advances. In traditional Process Control Systems and especially in older systems plants must “live” with many problems such as:

- unstable steam production
- large swings in steam production
- periods of significantly reduced steam production
- oscillations in primary air supply
- oscillations in secondary air supply
- oscillations in flue gas temperature
- poor waste combustion - large amount of total organic carbon TOC
- slagging and fouling of the combustor
- significant increases in consumption of chemicals for flue gas cleaning
- large quantity of fly ash produced
- more reliance on operator intervention in the control room
- more stress in control room because of alarms caused by process variability

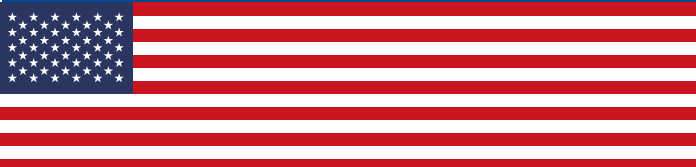
By retrofitting the latest state-of-the-art combustion control technology many of these problems will simply disappear.



Our technical experts can assess your plant and using our many years of combustion expertise we can advise:

- how the control system can be upgraded, if fundamental changes are required or whether a combustion optimization system can be added
- identify where the problems are in the combustion control system
- identify if mechanical changes are required and how this will improve the system response
- outline the benefits of replacing the grate with a grate using a different control method





ABOUT CCNY

Marco J. Castaldi, - Ph.D.; Professor;
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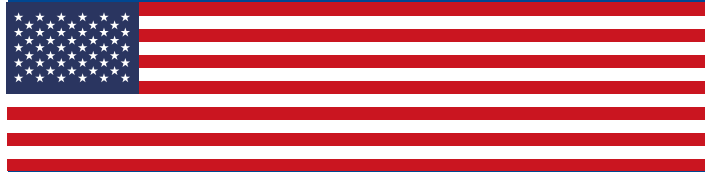
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(<http://ccnyeec.org>)
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Dr. Castaldi is the Director of the Waste-to-Energy Research and Technology Council (WERT) in the United States, an international organization that supports several students and post doctoral researchers; also, his group is recognized by the American Society of Mechanical Engineers as the foremost research group on chemical kinetics of converting wastes to energy. Dr. Castaldi's research will lead to the development of advanced waste-to-energy processes and in particular the high-efficiency recovery of energy from biomass processes using catalysis. Understanding the fundamental reaction sequences and their associated kinetic parameters is the sure way to provide the requisite capability to explore and develop new technologies while improving existing ones for converting "waste" resources into renewable energy. Currently Dr. Castaldi has established the Earth Engineering Center at City College, City University of New York. The goal of EEC|CCNY is to bring to bear rigorous engineering solutions that enable responsible use of energy and materials for the advancement of society. Through industry collaborations and research sponsorship EEC|CCNY develops novel solutions to some of the world's most pressing problems. EEC|CCNY routinely engages students with industry professionals enabling a holistic approach to creative realistic, forward-looking applications. The reach of EEC|CCNY is international in scope with many projects connecting international students and companies with a global presence.

Marco Castaldi was born in New York City and received his B.S. ChE (Magna cum Laude) from Manhattan College. His Ph.D. is in Chemical Engineering from UCLA and he has minors in Advanced Theoretical Physics and Astrophysics. Prior to joining CCNY he was Associate Professor at Columbia University's Earth & Environmental Engineering Department. Professor Castaldi has approximately 90 peer-reviewed research articles, 40 peer-reviewed conference papers, 2 textbooks, 3 book chapters and 11 patents in the fields of catalysis, combustion and gasification. Prior to his academic career Professor Castaldi worked as Manager of Fuel Processor Component Development for Precision Combustion Inc. in New Haven, CT. Professor Castaldi is Past Chair of the Materials and Energy Recovery Division of ASME, Past Chair of the Research and New Technology Council of AIChE and recent Past-Chair of the North American Catalysis Society's New York Metropolitan Section. He is a consultant to several companies including WasteManagement and AECOM.



2022 EEC/WTERT Bi-Annual Conference

Sustainable Waste Management: The Forefront of Innovation

Preliminary Draft of the Program



October 13th – 14th, 2022

**The Grove School of Engineering,
275 Convent Ave, New York, NY 10031**

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www.ccnyeec.org



Snehesh S. Ail is the Associate Director of the Earth Engineering Center at The City College of New York. He manages the applied research programs at EEC|CCNY sponsored by operating companies and industry consortia in the field of sustainable waste management and conversion. His research focuses on waste valorization, waste management (data-oriented reuse strategies), catalysis, and combustion diagnostics.

He completed his PhD in the Combustion Gasification and Propulsion Laboratory at the Indian Institute of Science, Bangalore, and previously obtained a BE in Chemical Engineering from Manipal University.

ABOUT IGS

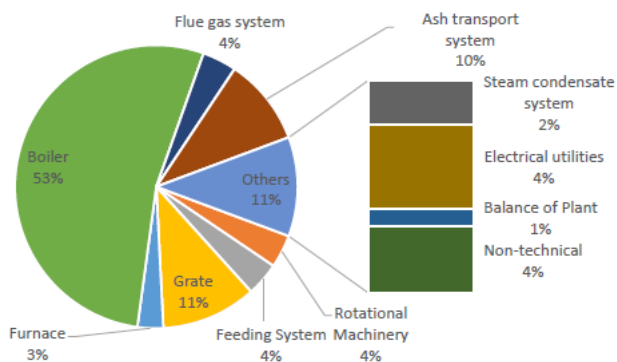


Colin Bateman
technical adviser
IGS - Intergrated Gobal Services

Integrated Global Services, Inc. (IGS) is an international provider of surface protection solutions headquartered in Virginia, USA. We run operational hubs, subsidiaries, and sales offices around the world to serve our global clients. We have over 35 years of experience helping customers solve metal wastage and reliability problems in mission-critical equipment and are an industry leader in the development and application of solutions to corrosion and erosion problems in challenging operating environments.

Colin graduated in 1996 with a Masters degree in Mechanical Engineering from Newcastle University and has 20+ years of experience in developing and specifying protective barrier solutions for mission critical assets. Working in the Energy Sector, he currently supports asset owners in Europe and the Middle East, helping them to manage and mitigate their erosion and corrosion challenges through the utilization of robust surface protection technologies, developing preventative maintenance programs.

Root cause unplanned outage



info@integratedglobal.com
<https://integratedglobal.com/contact-us>



Boiler reliability has become one of the main challenges with the advent of efficiency advances in Waste to Energy industry.

To ensure the highest percentage of operating availability, a solid preventive maintenance is required.

Unplanned outages, on the other hand, lead to unfortunate consequences

1. Emergency work. The line is stopped, conditions, to complete the repair under time constraints are unfavorable. Oftentimes, this extra work can occur in the middle of the night, on a weekend or during a holiday period, adding unnecessary stress for the operation and maintenance teams.

2. Financial losses. Several days are required to remedy the problem, leading to sizeable production losses.



Mitigating Corrosion/Erosion in Waste to Energy and Biomass Boilers



Refractory effectively protects the waterwalls but, due to its low heat transfer, even the latest generation materials reduce heat transfer significantly.



Alloy 625 performs exceptionally well at temperatures up to 400°C/752°F. Above this temperature, the lifetime is reduced by half with every 10°C/50°F increase



Corroded weld overlay

No corrosion on area fitted with IGS 5000 Series cladding

Material	W/m ² K
Mono Tile	~16
Mortar	6-8
Carbon steel	~50

Thermal Spray Evolution: High Velocity Thermal Spray (HVTS) Alloy Cladding

In the early 2000s, a handful of engineers and material scientists have successfully developed a solution to improve the quality of the cladding applied with Thermal Spray (TS). The aim was to keep the benefit of TS technology, including the low heat input to the substrate and high production rates, while avoiding permeability, stress and distortion. The key improvement to achieve the breakthrough technology are as follows.

Creating an Impermeable Barrier /Bond Strength /Quality Assurance and Control

Boiler waterwalls near the moving grate are protected by the refractory. The typical height of the refractory is 1.5 - 2 metres. HVTS is used above that area for corrosion protection of the second pass and the roof area within the boiler.



Marina Silva
International Marketing Manager
marina.silva@integratedglobal.com



Download the White Paper here:
<https://bit.ly/3Jmdz8k>

REVIEW:

TECHNIKGRUPPE is permanently present on various Waste-to-Energy events in Europe and the USA. Our technical experts with professional support of sales and promotion experts are our strongest ambassadors in that field. Personal discussions on our presentations or our exhibition booth provide an excellent platform for exchange of experiences. Many photos from TECHNIKGRUPPE exhibition became „famous“ in our professional networks (see below).



TECHNIKGRUPPE at NAWTEC 2019 in Virginia.



TECHNIKGRUPPE at the Energy from Waste Conference 2020 in London.

SAVE THE DATE:

KEY ENERGY
Rimini (IT)
8-11 November 2022

www.keyenergy.it

ENERGY FROM WASTE
London (UK)
15-16 March 2023

www.efwconference.com



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