Spotlight Issue 1 – 2020
For owners and operators of heat generating plants in the UK and Ireland

SAACKE
Better Life Energy

Meeting tighter NO_x standards for large combustion plants

Plant operators of large combustion plants (⩾ 50 MW) have to make sure that the plant is operated in accordance with Best Available Technique (BAT) standards. Compliance is required by 2021. Find out more on page 4.

What's inside this issue

Hot tips

Tips to improve efficiency and save money

- Repair water, steam and condensate leaks as they will cost you dearly
- Check hotwell temperatures and steam traps regularly, for energy saving and safety
- Check water treatment/TDS blowdown system and optimise
- Reinstate any missing lagging and cladding; install on any exposed surfaces
- Daily, weekly, monthly and annual tests – permanently record in hard bound Boiler-house Log Book with signed and counter-signed records
- Take action when advised of obsolescence, changes in legislation and new design standards
- Use genuine spare parts and ensure manufacturers' O/M instructions are followed

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Brand new Masterclasses for 2020

SAACKE Masterclass

The SAACKE Masterclasses have been running for over a year and are proving to be an attractive and very easy way to learn. These mini training sessions last no longer than 1.5 hours and take place **online**. They involve a live presentation followed by the opportunity to ask questions and are offered to you free of charge. You will even receive a copy of the slides afterwards to support you further!

"The delivery was clear and well structured. The Masterclass wasn't too long so it kept the participants interested."

"Generally find the Masterclasses very useful. Good content especially for newer utilities engineers."

"Good pace, and it's good to receive the slides after the Masterclass."

The full programme for 2020 is as follows:

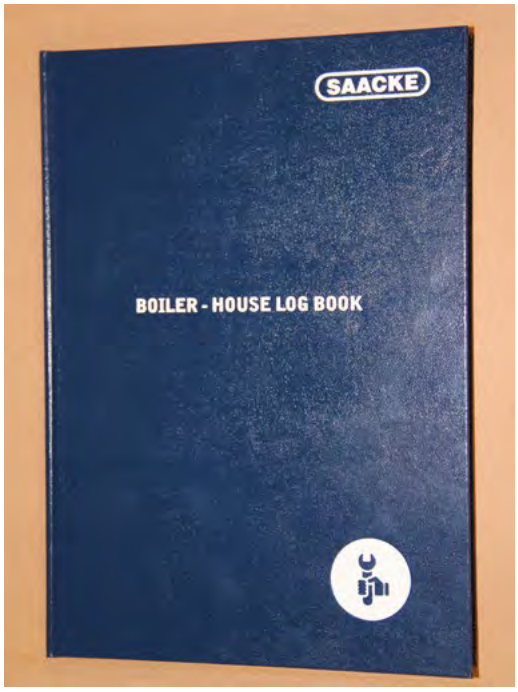
26th March	Best Available Techniques for Industrial Emissions Directive (IED) compliance
30th June	Waste-to-energy
30th October	Hydrogen
8th December	Energy losses

Invitations for each Masterclass are sent out via email by **Susie Bell** around 6 weeks beforehand, so keep an eye on your inbox. These emails include further information about the next Masterclass. If you don't receive the invitations and would like to, please contact Susie via **s.bell@saacke.com**

If you would like to attend, please book in advance and then click the link provided at the specified time. That's it!

Places are limited so if you would like to attend a Masterclass, please book as early as you can! If you have any questions about these events, please do not hesitate to contact Susie.

SAACKE Boiler-house Log Book



Accurate log keeping and retention of records must be viewed as an essential part of any modern boiler-house routine. The need to accurately record daily, weekly, monthly and annual operations is a mandatory requirement. This user-friendly log book aims to make it easy to follow the best practice guides and recommendations laid out in BG01.

The book has a day per page layout followed by a weekly summary page. It covers up to 7 boilers (unlike other log books) over a period of 1 year and currently costs £78.00/€98.00 including VAT, carriage and packing. To order yours, please contact our Spares team on **+44 (0) 23 92 333907** or via **ukspares@saacke.com**

SAACKE Customer Service Solutions

As a solution provider for the entire life cycle of your plant, you may notice that we have renamed our 'Aftersales' department. It is now known as Customer Service Solutions and is headed up by **Adam Hartin**, Customer Service Solutions Manager. Adam can be contacted on **+44 (0) 23 92 333829** or via **a.hartin@saacke.com** We are committed to providing our customers with solutions at every stage, in particular within this department with a focus on service, retrofit and spare parts. We have the know-how, so please get in touch to find out how we can help you!

Is hydrogen really zero carbon?

Hydrogen is the most abundant element in the universe. Is hydrogen really zero carbon? Technically yes, but it rarely occurs naturally as a gas. It is almost always combined with other elements.

The world now understands hydrogen's potential as a resource for vehicles, heating, electricity generation, industrial processes and energy storage – including the fact that hydrogen could do those things with little or no emissions. The need to reduce our emissions and achieve climate goals grows more urgent by the day.

In the combustion and energy systems industry, we are aware that there are advantages and disadvantages of hydrogen. One advantage is no CO_2 emission by combustion. A disadvantage is a higher flame temperature and therefore a higher NO_x emission, approximately factor 2.5 – 3 higher, but this can be reduced to natural gas level by Flue Gas Recirculation (FGR).

Most of the hydrogen produced today is so-called 'grey hydrogen' which is obtained from fossil fuel, and is therefore not carbon neutral. Zero-emission 'green hydrogen' produced from renewable sources through water electrolysis makes up less than 5% of global hydrogen production, and it is still considered too costly. Some further details of the processes:

Thermal processes – Thermal processes for hydrogen production typically involve steam reforming, a high-temperature process in which steam reacts with a hydrocarbon fuel to produce hydrogen. Many hydrocarbon fuels can be reformed to produce hydrogen, including natural gas, diesel, renewable liquid fuels, gasified coal or gasified biomass. Today, about 95% of all hydrogen is produced from steam reforming of natural gas.

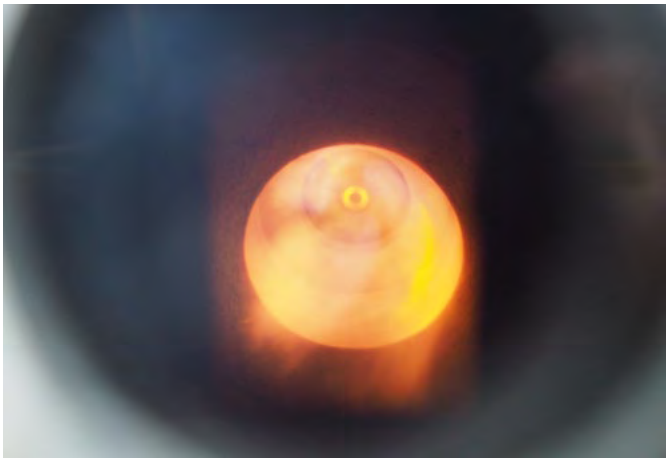
Electrolytic processes – Water can be separated into oxygen and hydrogen through a process called electrolysis. Electrolytic processes take place in an electrolyser, which functions much like a fuel cell in reverse – instead of using the energy of a hydrogen molecule like a fuel cell does, an electrolyser creates hydrogen from water molecules.

Solar-driven processes – Solar-driven processes use light as the agent for hydrogen production. There are a few solar-driven processes, including photobiological, photoelectrochemical and solar thermochemical.

Photobiological processes use the natural photosynthetic activity of bacteria and green algae to produce hydrogen. Photoelectrochemical processes use specialised semiconductors to separate water into hydrogen and oxygen. Solar thermochemical hydrogen production uses concentrated solar power to drive water splitting reactions often along with other species such as metal oxides.

Biological processes – Biological processes use microbes such as bacteria and microalgae and can produce hydrogen through biological reactions. In microbial biomass conversion, the microbes break down organic matter like biomass or wastewater to produce hydrogen, while in photobiological processes the microbes use sunlight as the energy source.

For the UK, the government set out in the Climate Change Act to cut carbon by 80% but has since pledged to decarbonise the UK 100% and to be net zero carbon by 2050.



Above: *A hydrogen flame*

SAACKE

There are a whole range of chemical processes where hydrogen is a by-product and can either be flared off or used thermally. If it is used as a fuel, for example steam generation, a large amount of natural gas is saved and less CO_2 is emitted. SAACKE systems have been essentially doing this since the 1980's.

SAACKE offers the following solutions for economical utilisation of special gases: The TF-DDZG steam pressure atomiser series and the SSB-LCG swirl burner series. Their proven technology reliably utilises even difficult gases with very low pump pressure, for a positive effect on both the budget and the environment.

For further details on hydrogen firing equipment, please contact our sales department via **uksales@saacke.com**

Compliance with BAT standards by 2021

NO_x levels below 30mg are possible for large combustion plants (⩾ 50 MW)

The specifications in the European Union's 2017 leaflet mean a significant reduction in NO_x levels for large combustion plants (⩾ 50 MW). The exact values will be transposed into national law by 2021, although the mandatory limit values have not yet been definitively set. The European Union's 'Best Available Technique' (BAT) reference document on this subject includes the emission levels listed in the below table as the state of the art.

The table shows that gas-fired existing and new plants are affected by a reduction in permissible NO_x emissions. The operators of former heavy and fuel oil boilers will therefore face considerable challenges despite a conversion to natural gas, as the sometimes very high combustion chamber heat load of existing plants already makes it difficult to comply with the legal limit levels.

In general, two different technical approaches to reducing NO_x emissions are known and in use: (1) Primary measures which are based on a modified combustion management system (low-NO_x technology) and (2) secondary measures which are downstream of the combustion system (flue gas cleaning). As a rule, secondary measures are associated with high investment costs and additional operating costs, and so many plant operators prefer to use low-NO_x combustion systems, which are associated with significantly lower costs. Although existing plants with low-NO_x technology can currently still be operated sufficiently safely below the legal limits, the BAT values in the table underline that the NO_x requirements for large combustion plants will increase in the near future.

Achievable NO_x emissions according to the European Union's BAT reference document:

Firing capacity [MW]	NO_x-Emissions as average daily value at 3% O_2 [mg/Nm³]			
	Existing plants		New plants (from 2014)	
	Heavy oil and fuel oil	Natural gas	Heavy oil and fuel oil	Natural gas
<100	210-330	85-110	100-215	30-85
⩾ 100	85-110		85-100	

Even now, emission limits in some countries are much stricter than in Europe. China in particular should be mentioned here, with demanding NO_x emissions below 30 mg/m³ for gas-fired new and existing plants in the Beijing area. The current low-NO_x technology is reaching its limits here. The typical primary measures for NO_x reduction, such as increased recirculation of exhaust gas or high excess air, lead to rising operating costs of the blowers and efficiency losses due to increased exhaust gas losses (see ordinance BImSchV of the Federal Emission Control Act in Germany) and in some cases even to unstable operation of the combustion plant. Only the most advanced technology and the coordinated combination of various primary measures can reliably map these low NO_x emissions over the entire output range.

For more than 80 years, SAACKE GmbH based in Bremen, Germany has been continuously developing new and more efficient combustion technologies in the combustion sector in order to reliably and safely meet the constantly increasing requirements resulting from falling emission limits. Already today, a large number of SAACKE GmbH firing systems are equipped with the so-called Ultra-Low-NO_x technology, which can also safely fall below the strict emission limits in China. Even heat generators with up to 60% higher combustion chamber heat load (compared to conventional heat generators) can be operated safely below the legal limits with this technology. Figure 1 shows an example of this: Here the exhaust emissions achieved over the output range for a large combustion plant in China with a highly loaded furnace are listed.

Although the current emission regulations in Europe for existing plants are still far away from these 'extreme' limit values by our standards, the current BAT reference

document clearly shows the direction of the future targets of the European Union, especially for gas-fired new plants. And: The BREF (BAT reference document) is to be transposed into national law as early as 2021 (13th BImSchV in Germany).

The requirements that large combustion plants are expected to meet are a challenge - but they can already be solved today through new technologies and individual assessment.

Author: **Dr. Ing. Christopher Rosebrock**, Development & Process Engineer, SAACKE GmbH

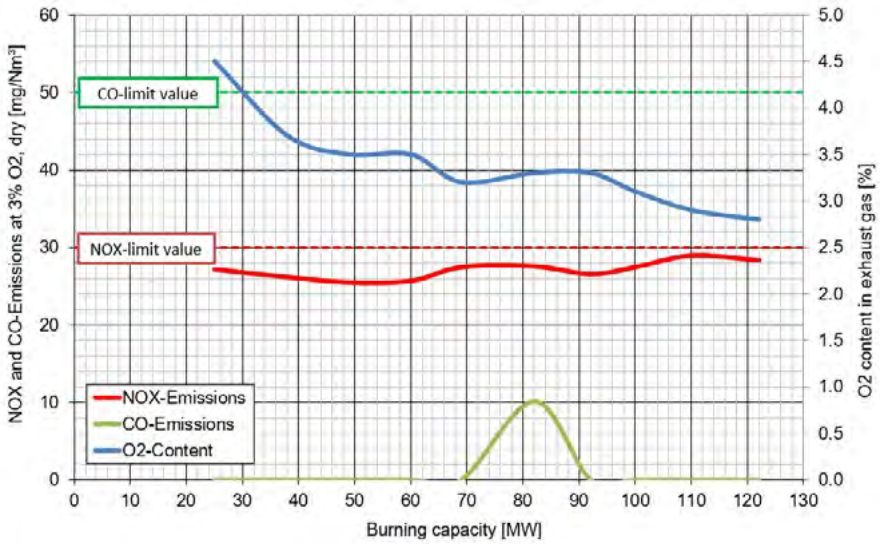


Figure 1 Exhaust emissions achieved for a high-load large combustion plant in China

LCP: **L**arge **C**ombustion **P**lants

BAT: **B**est **A**vailable **T**echniques

BREF: **B**est Available Technique **Ref**erence Document

Best Available Techniques (BAT) – short and simple

What is the LCP BREF?

It is a document with about 1000 pages created by the European Union.

What is the content?

It defines the state of the art technology reducing the environmental impact of emissions by large combustion plants.

Who does it apply to?

Large combustion plants with a thermal capacity over 50 MW.

Why is it so important?

The document contains a list of BAT conclusions which define the state of the art technique and the achievable emission limits, providing a basis for new approval conditions.

What are the consequences for the plant operator?

Plant operators have to make sure that the plant is operated in accordance with BAT standards corresponding to the state of the art technique.

When were the BAT conclusions released?

On 31st July 2017.

When will the stricter limits become effective?

From 31st July 2021 plants will have to comply with the new emission limits.

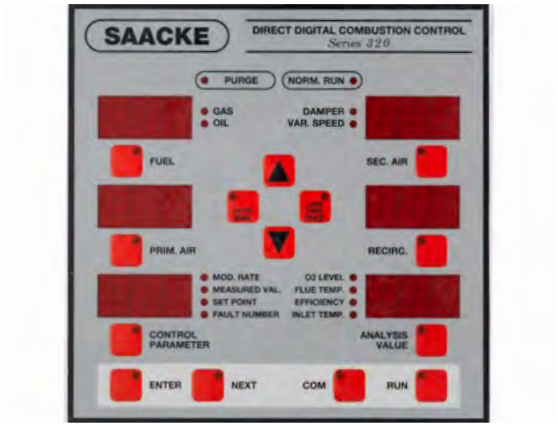
What does the plant operator have to do?

A check on the plant needs to be carried out in order to find out whether it complies with future requirements by BAT standards. In the case modernising is required, the planning needs to be completed as soon as possible, this in order to initiate the implementation in good time.

What are the solutions SAACKE provides for BAT plant modernisations?

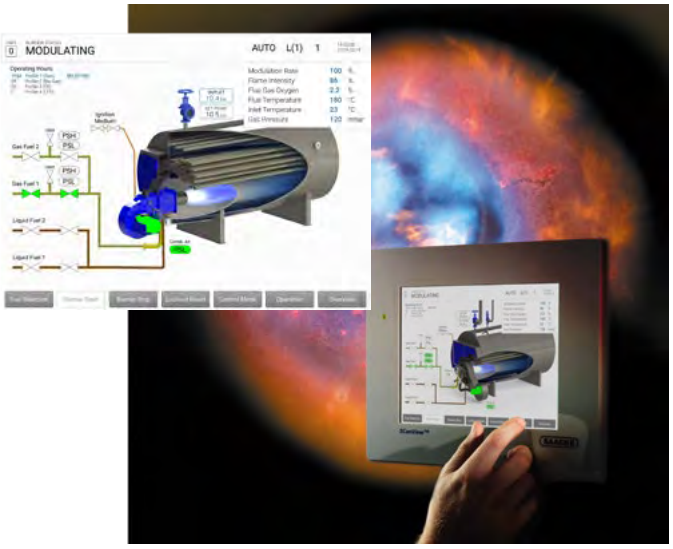
With SAACKE technology, future required BAT limits are achievable. Modern burner technology is already in operation with proven excellent performance. Please contact us for more information on how we can help you.

DDCC320 controller – end of life reminder



The DDCC320 combustion control system and its variants DDCC3000 and DDCC3900 were manufactured and sold for over 20 years. However, as communicated previously, we reached the point in the product life a few years ago that components were becoming scarce or no longer available and therefore we introduced an end of life schedule back in 2017. As foreseen, we are now at the point in 2020 that it is extremely difficult to source components to cover repairs.

If this is something that you still need to address, an upgrade path is available in the SAACKE SCanView Burner Management System. The modern SCanView product, which is designed and manufactured in the UK, meets current accreditation requirements as well as being technologically advanced, enhancing the safety of your plant.



If you would like to consider the modernisation and upgrade path for your equipment or have any questions on the above, please contact **Adam Hartin**, Customer Service Solutions Manager via **+44 (0) 23 92 333829** or **a.hartin@saacke.com**

TEMINOX GL low NO_x burner – even lower NO_x emissions being achieved

The TEMINOX GL comes in mono or duoblock design for industrial heat and steam generation. It is available as a natural gas, light oil or dual fuel burner. Thanks to the low residual oxygen content in the exhaust gas, it achieves extraordinary efficiency even when the highest emission requirements are called for. For gas operation, the NO_x emissions range from as low as **25 – 100 mg/Nm³** and for oil operation from **120 – 200 mg/Nm³**. Please contact us to find out more.

Dangerous Substances and Explosive Atmosphere Regulations (DSEAR) Risk Assessment

The Combustion Engineering Association (CEA) recommend that every boiler-house has a DSEAR Risk Assessment. The Health and Safety Executive Dangerous Substances and Explosive Atmosphere Regulation 5 specifically refers to risk assessment.

SAACKE now offer this Risk Assessment as part of our training and risk assessment portfolio. For more information, please contact **Martin Seller**, Training Officer via **+44 (0) 23 92 333833** or **m.seller@saacke.com**

New Regional Service Manager in the Southern area

We are delighted to announce that **Daniel Adams** (pictured left) has taken over as Regional Service Manager in the Southern region. Congratulations, Daniel!

Daniel previously worked for 5½ years as a Senior Service Engineer in the region. He is supported by the Regional Office Administrator, **Wendy Scott**. Daniel's appointment follows the departure of John Heneghan. Daniel can be contacted via **d.adams@saacke.com** and Wendy via **w.scott@saacke.com** The telephone number for the Southern office is **+44 (0) 1293 853953**.

Thank you to all our customers in the region for your patience during this transition phase.

Another successful apprenticeship

Congratulations to **George Albery** who has completed his NVQ Level 3 Apprenticeship in Electrical and Electronic Engineering for which he was awarded a double distinction. George is now employed as a 'Trainee Electrical Designer' in Havant and is studying a BTEC Level 4 (HNC) in Electrical and Electronic Engineering. Well done, George!

Let's get social

We invite you to follow us on LinkedIn, the world's largest professional network, for our latest news and information: linkedin.com/company/saacke-combustion-services-ltd We look forward to seeing you there!

New office in the Northern area

Our Northern office has recently moved to a new location. Regional Service Manager, **Jim Nee** (pictured below) and Regional Office Administrator, **Jo-Ann Szysz** are now based in Preston.

The office telephone number remains the same: **+44 (0) 161 877 5113**. As before, Jim can be contacted via **j.nee@saacke.com** and Jo-Ann via **j.szysz@saacke.com**

Global Marketing Meeting 2019

The 2019 Global Marketing Meeting took place at the end of August in the UK. The venue was the SAACKE UK office building in Havant, Hampshire. As well as regular conference calls, the team meet up once a year to keep up-to-date and share ideas. It makes a real difference to working relationships. Next stop for 2020 – France!

Above: *Members of the Global Marketing team together with SAACKE UK General Manager, Phil Kemp: (L-R) Margit Hendricks (Germany), Phil Kemp (UK), Elisabeth Andrade (France), Susie Bell (UK), Maggie Zhang (China), Florence Schuster (France) and Lukas Schad (Germany).*

Welcome

We are pleased to welcome:

Benn Taylor
Service Engineer, North

Jack Whitfield
Trainee Electrical Designer, Havant

Congratulations

Karl Heather (Electrical Designer, Havant) who has achieved his BTEC Level 5 (HND) in Electrical and Electronic Engineering with Distinction.

Andrei Sisu (Service Engineer, Midlands) who has achieved his BTEC Level 3 in Electrical and Electronic Engineering with a Double Distinction.

Danny Foy (Service Engineer, North) who has achieved his BTEC Level 3 in Electrical and Electronic Engineering with a Distinction and a Merit.

Aleksandr Attemann (Trainee Electrical and Mechanical Design Engineer, Havant) who has achieved his BTEC Level 4 (HNC) in Mechanical Engineering with Distinction.

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UK team snippets

Congratulations also go to:

Alister Linford (Spare Parts Co-Ordinator, Havant) who has recently celebrated 25 years with SAACKE UK companies.

Above: *Alister (left) is presented with his award by General Manager, Phil Kemp*

David Haynes (Service Engineer, North) and his partner Gillian on the birth of their daughter Florence Jean born on 22nd September 2019.

Lauritz Hillmann from near Bremen, Germany joined the team in Havant on an internship from the summer of 2019 until Christmas, with the aim of improving his English – something that he definitely achieved! Lauritz assisted in the Sales department during his time in the UK. His hobbies include playing the drums and so he was grateful for the opportunity to do that at a local pub several times during his stay!

Keith Tester (Lead Stores/Spare Parts Technician, Havant) and **Andrea Leggett** (Personnel Officer, Havant) (pictured below) have a real passion for photography outside of work and have both been Licentiates of the Royal Photographic Society since 2013. They love to photograph seascapes, with Keith currently being keen on producing black and white images and Andrea enjoying experimenting with long exposures. Andrea also photographs flowers in their studio and then uses those images to create beautiful textile designs for fashion and decor. Amazing! **www.kandaimages.co.uk**

Above: *One of Keith's pieces of work*