### COMBUSTION BAY ONE

**advanced combustion management**

<table>
<thead>
<tr>
<th>less fuel consumption</th>
<th>more flexibility</th>
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<tbody>
<tr>
<td>less pollutant emissions</td>
<td>more safety</td>
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- **Propulsion**
- **Power**
- **R&D, Education**

[www.CBOne.at](http://www.CBOne.at)
An engineering company for advanced combustion management

Company profile

Combustion Bay One (CBOne) is an Austrian company with extensive knowledge of advanced combustion processes.

CBOne systems optimise industrial combustion processes in thermal machinery, with focus on power and propulsion gas turbines.

The main benefits of the CBOne technology are improvements in energy efficiency at increased production rates, combined with emission reductions.

The beginning

It was on a winter’s day in Graz (Austria), in 2011, when Dr. Fabrice Giuliani decided to take the next step in combustion research. After 15 years of fundamental combustion research at

- the VKI (Von Karman Institute for Fluid Dynamics, Belgium),
- the ONERA (French Aerospace Laboratory, Toulouse, France),
- the DLR (German Aerospace Centre, Cologne, Germany)
- and finally the Graz University of Technology, Austria

he realised that the time had come to take his research from the laboratory to industry. As a spin-off of the Combustion Division he directed from 2004 to 2011 (Institute for Thermal Turbomachinery and Machine Dynamics, at the Graz University of Technology) – Combustion Bay One was born.

Our mission

Renewable energy systems are becoming more and more important – and this is good news. However, combustion of conventional fuel remains the dominant source of energy; in 2014, almost 13,000 Mtoe primary energy was consumed worldwide – or 17 Terawatts – 80 % of it supplied by conventional fuels. Saving 1 % would be equivalent to the power generated by approximately 50 nuclear power plants. Thus, the impact of saving just one percent of the worldwide primary energy demand by increasing the efficiency of combustion would be tremendous. Combustion technology is believed to have achieved maturity – a domain where everything has already been seen and tried out. The truth is: there is still room for improvement.

This is the mission of Combustion Bay One. By improving combustion technologies for industry, we help to reduce emissions and energy costs. Moreover, we are convinced that halting climate change is also in our hands!

Our expertise

Engineering  Pulsation  Education
Combustion Bay One is a specialist in the management and the optimisation of combustion processes. Potential fields of application for our know-how are stationary gas turbines and thermal turbomachines. Software and hardware technologies developed by CBOne are applied to perform a comprehensive analysis of incinerators and allow us to respond to our customer-specific demands on an individual basis.

**Fields of application**

- Industrial burners
- Industrial gas turbines
- Aeroengines
- Power plants
- Research facilities

**Services**

- Expertise, counselling
- Technical audit on industrial combustion systems
- Research and development in combustion
- Speciality in understanding / managing combustion instabilities
- Testing innovative combustor configurations

**Your benefits**

- Expansion of the operational range in your plant
- Emission reduction

- Improvement in fuel economy
- Recommendations on process control in view of the reduction of maintenance costs

**Pulsation**

By pulsation we understand thermoacoustics, where flame and sound interact. Most of the time this is not desired – we are talking here about combustion instabilities. If, on the other hand, this process is desired and thus controlled, we are talking about pulse combustion. Both aspects are specialities of CBOne.

Instabilities in flames cause frequent changes in pressure in the combustor and result in a disturbing combustion noise, a lack of process control and a risk to the integrity of the system. On the other side, if the pulsation of the flame is controlled in a refined way, the effect of pulsating the flame can be advantageous.

With pulsed combustion, it is possible to push the lean blow out limit further, balance an instable flame or operate a burner with low caloric value fuels.

**Tangible benefits of pulsed combustion**

| REDUCE emissions |
| INCREASE efficiency |
| STABILISE the flame |
| PUSH burner limitations |
The CBOne SIREN is our product designed especially for your Plug&Play pulsed combustion. Conceived to generate near-sine sound at a precisely tuned frequency and amplitude under heavy flow conditions, it operates in the 0-2000 Hz range, with amplitudes achieving up to 130 dB SPL. The model Siren 3G is ideal for laboratory and test bench use, with up to 20 bar backpressure and up to 10 bar combustor pressure. It can operate with preheated air of up to 750K. An 80 bar industrial version is currently under development.

Education

CBOne has not forgotten that its origins are in the lecture halls and in the laboratories of European universities and research centres. Members of the CBOne team are teaching students at the University of Applied Sciences FH Joanneum and the Graz University of Technology. We also offer company-specific training that brings our experience and expertise directly to your company.

CBOne Education training sessions boost research and development in your company and help you to achieve competitive advantages.

Fields of application

- Gas turbine combustion
- Measurement techniques in combustion, signal processing and actuation
- Low emission burner designs
- Fuel types
- Combustion monitoring
- Workshops & test rig applications
- Environment

Tangible benefits

Expertise in combustion management, extending the range of application for your technologies. We can help you, and make recommendations where and how the potential of your products and services can be improved.

Renowned Partner Organisations and Companies who work with us
The Innovation Wheel at CBOOne

The journey from an invention to an innovation is both long and fascinating. Thanks to our extensive experience in research, we are familiar with every single step in detail. Furthermore, our academic role means that we benefit from a unique technical platform for experimental research. The following graph illustrates how we bring our research to highly developed industries:

Our team

Dr. Fabrice Giuliani
CEO and founder of CBOne
Education: ESSTIN Nancy, University of Strathclyde Glasgow, Von Karman Institute for fluid dynamics Brussels, SUPAERO Toulouse
Activities at CBOOne: Direction and global management, project supervision, education, representation

Dipl.-Ing. Gerhard Kraft
Research Engineer
Education: Master's programme in Mechanical Engineering at the Graz University of Technology and the University of Cagliari (Italy); majors in Environmental Management Technology and Business Economics
Activities at CBOOne: Project development, Project management and Education

Dipl.-Ing. Markus Stütz
Engineering Adviser
Education: Master's programme in Mechanical Engineering at the Graz University of Technology; majors in Energy Technology and Production Science
Activities at CBOOne: Design of the siren and peripherals, machine controls and combustion monitoring equipment

Lukas Pfefferkorn, BSc.
Research Assistant
Education: Bachelor's programme in Aviation at the University of Applied Sciences FH Joanneum Graz
Activities at CBOOne: Mechatronics, siren controls

Georg Mader, MSc.
Environmental Economist
Education: Master's programme in Environmental System Sciences with a focus on Economics at the University of Graz and Örebro University (Sweden)
Activities at CBOOne: Business development, market research, distribution and marketing
Questions? Challenges? Contact us!

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Dpt. Initiative,
Opportunities & Prospects
CBOne / OP
Same as previous

www.CBOne.at

Lectures
Chemistry and Fuels, MAV-08-05 (15 hours), Gerhard Kraft at FH Joanneum
Gas Turbine Combustion, LV319.004 (30 hours), UE319.005 (15 hours), Fabrice Giuliani at TU Graz

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