

## **Boiler cleaning processes of Explosion Power GmbH focus on CO<sub>2</sub> reduction due to the increase of boiler efficiency**

Explosion Power GmbH represents a medium-sized Swiss company specializing in the development and manufacture of equipment for cleaning steam boilers in various incineration plants, such as power plants, biomass- and waste incineration plants and wherever the fly ash in the flue gas causes deposits. Thanks to the patented Shock Pulse process, the highest efficiency in cleaning is achieved as a result. Furthermore, thanks to the Shock Pulse process, superheated steam, as consumed by sootblowers for the boiler cleaning process can be omitted. With a saving of this steam, the energy introduced by fuel can be fully converted to energy production, respectively less fuel is required for steam/electricity production and the energy efficiency of the plant is being increased.

A targeted "clean boiler" results in a saving of the consumed fuel and thus leads to a reduction of the flue gas amount. Together with the selection of the appropriate boiler cleaning technology, the boiler efficiency can be optimized, which ultimately leads to a reduction in CO<sub>2</sub> emissions. It can be assumed that the various thermal processes for energy generation and for thermal waste treatment will remain in use for many future years. The energy generation processes will surely be further optimized. The Shock Pulse process forms an integral part of the innovation and clearly leads to CO<sub>2</sub> reduction.

The Shock Pulse Generator (SPG) represents an innovative, and since 2009 proven technology of Explosion Power GmbH for steam boiler cleaning. As with manual blast cleaning methods, the steam boiler is cleaned by pressure waves triggered by an automatically initiated combustion of a mixture of a few grams each of a combustible gas (natural gas or methane) and air. Unlike manual methods, however, in SPGs the ignition of the mixture takes place outside the boiler in a stable, pressure-resistant vessel. The generated shock wave is directed into the boiler through a valve and outlet nozzle, where it vibrates the exhaust gas, boiler tubes, and walls in a way that clears deposits. The triggering of the Shock Pulse is pre-programmed and runs automatically during the plant operation and without any disturbance of the normal combustion process. The entire process of a Shock Pulse takes a few milliseconds.

The following diagram shows the increase in boiler outlet temperatures due to incomplete cleaning of the deposits over the course of the boiler operating time between boiler revisions. Compared are the classical cleaning techniques (red line) with the Shock Pulse process (blue line).

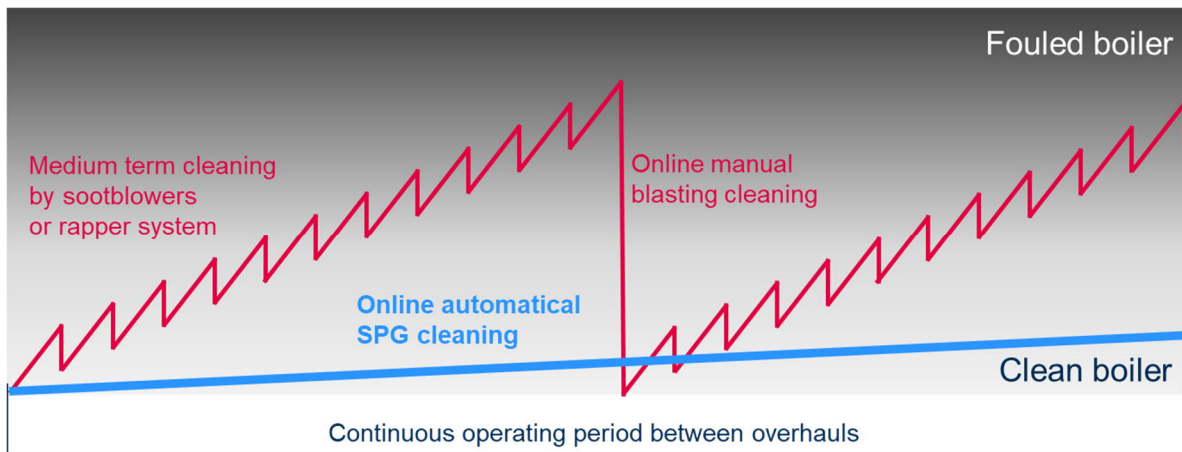


Fig. 1: Illustration of the temperature rise during the boiler operating period in comparison of the classic cleaning techniques with the Shock Pulse process. [Graphic by Explosion Power GmbH]

The Shock Pulse generators are manufactured and assembled in Switzerland from materials that are particularly resistant to pressure and heat. They are CE certified as pressure equipment of the appropriate category. The Shock Pulse Generator technology has been selected by the "Technology Fund" of the Swiss government, Federal Office for the Environment (BAFU), as a supported product for innovative climate protection.

The EG10 series and SPGr™ series models include several sizes, which are individually selected by the design engineers of Explosion Power GmbH for the respective application and boiler dimensions.

Currently, more than 800 such Shock Pulse Generators are successfully in operation for various applications in over 20 countries worldwide. This has enabled operators to significantly improve continuous boiler operation and increase profitability.

For many plants, due to SPGs a prolonged continuous operating condition has made it possible to increase the annual operating hours by eliminating intermediate cleaning, or even the entire maintenance shutdowns. This means that the gray energy originally spent on the construction of the complete plant can be used for greater energy production, which is more ecological. The same applies to the gray energy saving for superheater bundles if they only must be replaced after a longer period of operation due to the gentle SPG cleaning.

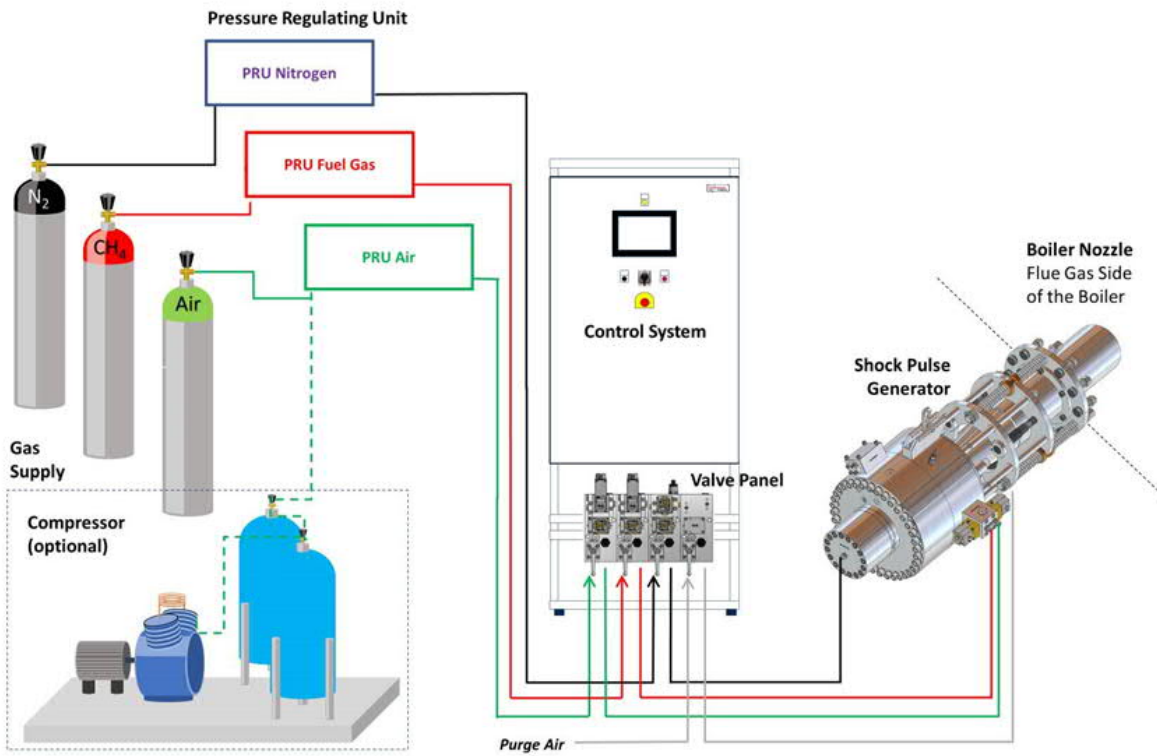


Fig. 2: Flow diagram of the Shock Pulse Generator SPGr [Graphic by Explosion Power GmbH]

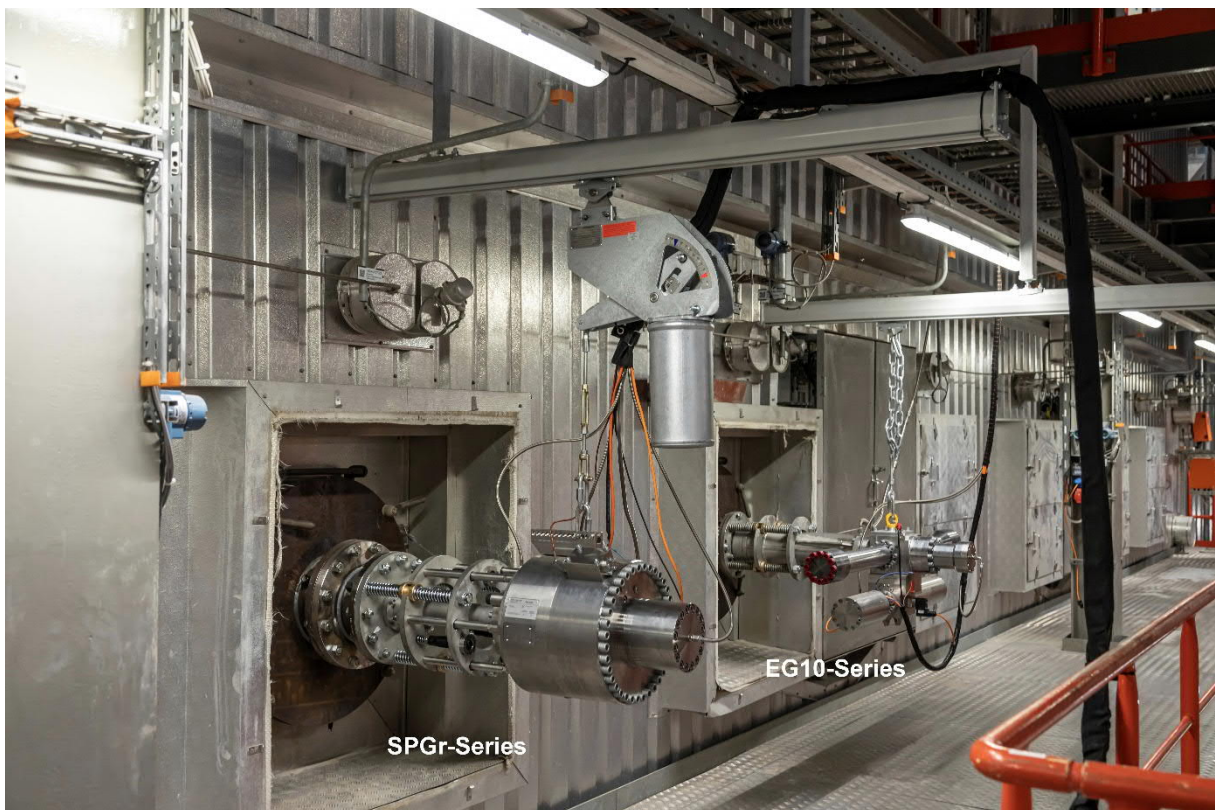
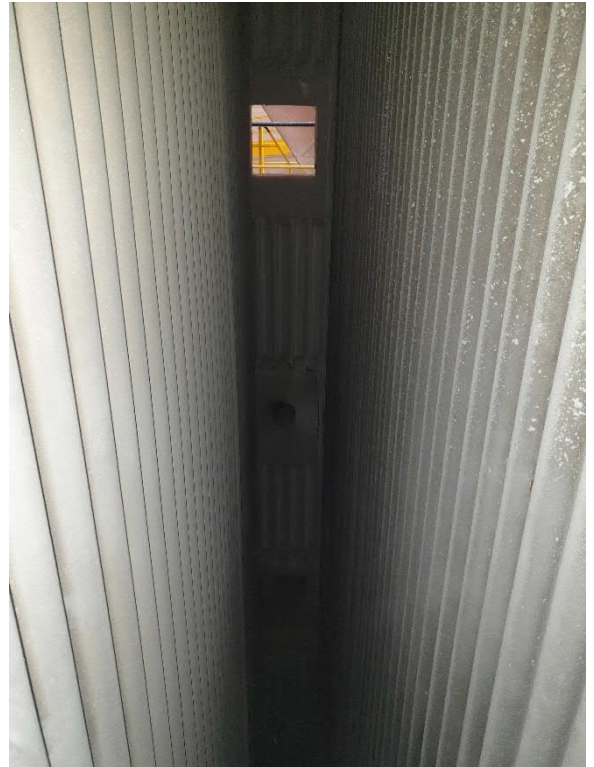


Fig 3: SPG of the two marketed series in a waste incineration plant. [Photo by Explosion Power GmbH]



*Fig. 4: Difference in the surfaces shape of boiler bundles:*

- *Deposits formed before installation of SPG (left) and*
- *Actual and thus permanent operating condition during cleaning with SPG with 2-h pulse frequency (right) [Photo by KVA Buchs]*