

Individual solution development – the big advantage offered by PILLARD FEUERUNGEN GmbH

When designing a firing system, Pillard always takes the product and kiln type into consideration. As a result, after 50 years of conducting business, there are not even two fully identical systems with the same configuration in operation. “Each and every system is indeed unique” – emphasizes Manfred Gemmer, head of Research & Development at PILLARD FEUERUNGEN GmbH. “For example, I remember a firing system with three kiln lines constructed in the same way and supplied by the same raw material. In order to achieve the maximum product quality, we had to configure each line separately. This, in some cases, resulted substantial differences in settings.”

Based on this experience, Pillard rotary kiln burners are designed with a maximum level of adjustability that makes efficient adapting to the prevailing production process possible – also once the plant is up and running.

“Given the large multitude of internal and external influences, it takes many years of experience to recognize the requirements of the process and to find the necessary flame setting” – continues Manfred Gemmer. The firing expert joined Pillard 34 years ago. During the initial years, the burners were mostly designed to run on a single fuel at a constant fuel analysis. The design of conveying and injection velocity were primarily based on this analysis. Thus with an adequate dosing accuracy, yielding several flame formations, a sufficiently good product could be made.

By the turn of the millennium, the significance of an optimally adjusted burner had risen rapidly as the cement industry was in the process of replacing primary fuels with secondary fuels. The substitution rate at comparable product quality increased year after year. In 2009, Pillard put several burners, powered by nearly 90% solid alternative fuel, into operational use.

In Manfred Gemmer's opinion, such high substitution rates are not only the result of improvements in burner technology. “For the best possible setting of the



Pic. 1: Manfred Gemmer - during optimization activities

burner an intensive cooperation with the customer is indispensable.”

Rotary kilns in the cement, lime and gypsum industries are highly complex plants where many individual aggregates must be coordinated in order to ensure an optimal production process. Because of this it is essential to keep in mind that the upstream and downstream aggregates of the rotary kiln burners are operated accordingly and also the chemical composition of the raw materials is considered in process optimization.

An example: Both burners from Pillard, the latest generation ROTAFLAM® and the latest leap in development - NOVAFLAM®, are equipped with a number of feed pipes that make flexible combustion of solid, pulverized, coarse, liquid, highly viscous and gaseous fuels possible. Using several secondary fuels at the same time necessitates very specific burner settings, which is suitable for the actual fuel mix. In case the secondary fuels run out or, for technical reasons, can not be used and thus the operator must switch back to primary

fuel, it is necessary to adjust the burner settings in order to prevent damage to the brick lining that could arise as a result of excessive flame temperature.

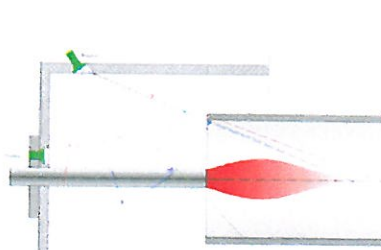
Fact: The heat generated by the fuel and also the heat distribution within the rotary kiln are influenced, in addition to combustion compartment, by the physical and chemical properties of the fuels, their distribution, and to a large extent, by the setting of the burner and the force of injection.

"Therefore when the level of secondary fuel is high and the fuel mixture is not constant, a reproducible documentation of the adjustments is indispensable!" – Manfred Gemmer emphasizes the importance of using conventional measuring equipment, such as gas analysis, shell temperature scanner, and visual observation. The evaluation and documentation of every single primary air quantity and pressure combination is nowadays a must. Given the constantly changing properties of the fuels, an RPM-regulated pneumatic conveying equipment is recommendable.

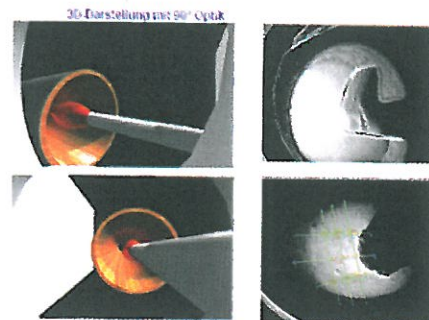
During the last few years, an objective examination has proven thermography helpful in obtaining a flame formation that, using the previously mentioned means, is not possible. Changes in flame formation and heat distribution can be discerned. Thus a targeted response to varying fuel combination can be made by re-adjusting the burner. The thermal imaging camera is ideally mounted on the side of the kiln hood in order to best monitor the radix and the first meter of the flame as well as the heat distribution in the surrounding furnace.

In some cases the cameras are mounted at the front end of the kiln hood to allow for an early analysis of clinker. This, however, only allows the monitoring of an axial flow and is suitable only to a limited extent in flame evaluation.

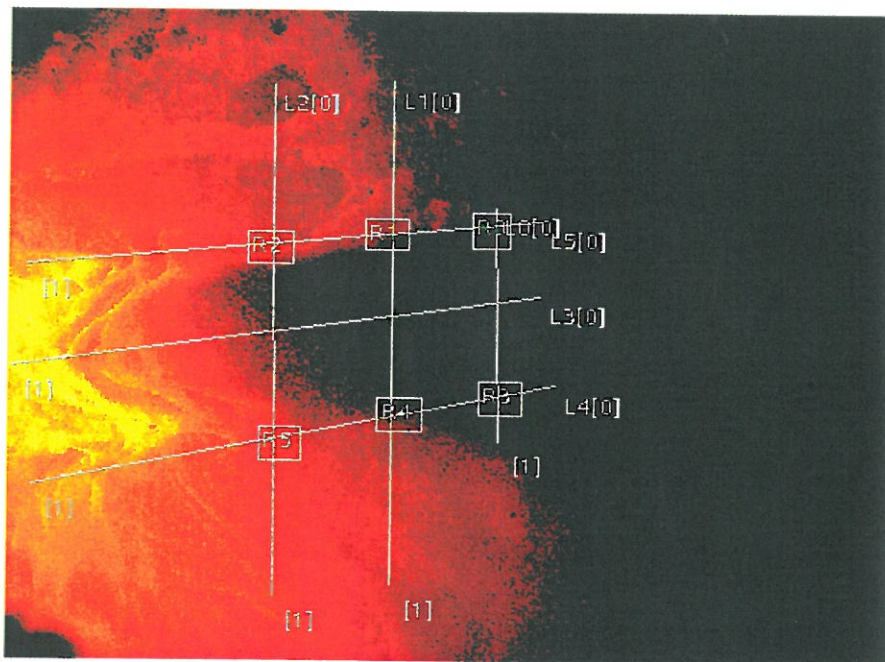
Till now, Pillard is the only manufacturer that utilizes a portable thermography system to analyse the thermal proper-



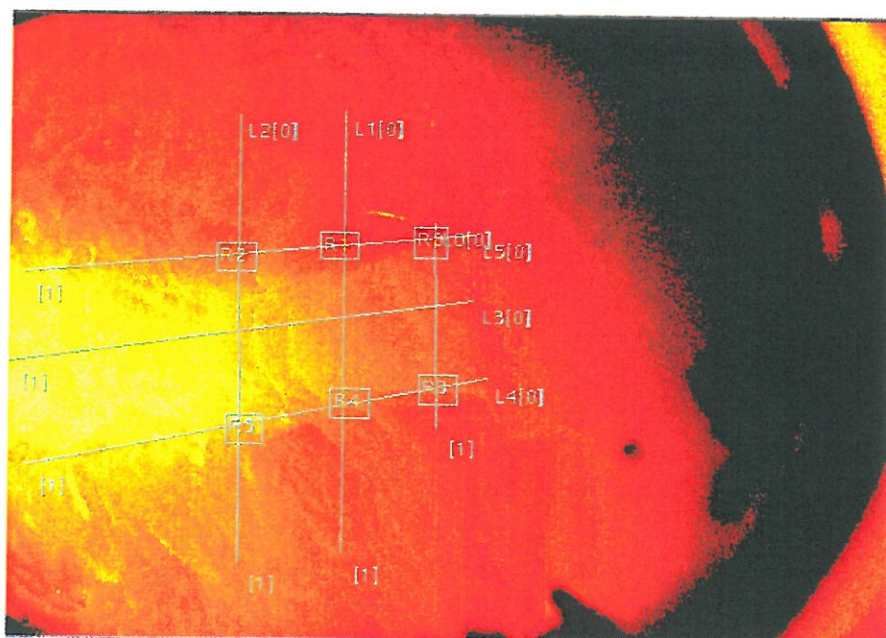
Pic. 2: Advantage of the thermal imaging camera - mounted on the side of the kiln hood.



Pic. 3 & 4: Thermal imaging camera mounted on the side (top) and at the front end (bottom) of the kiln hood



Pic. 5: Flame before optimization



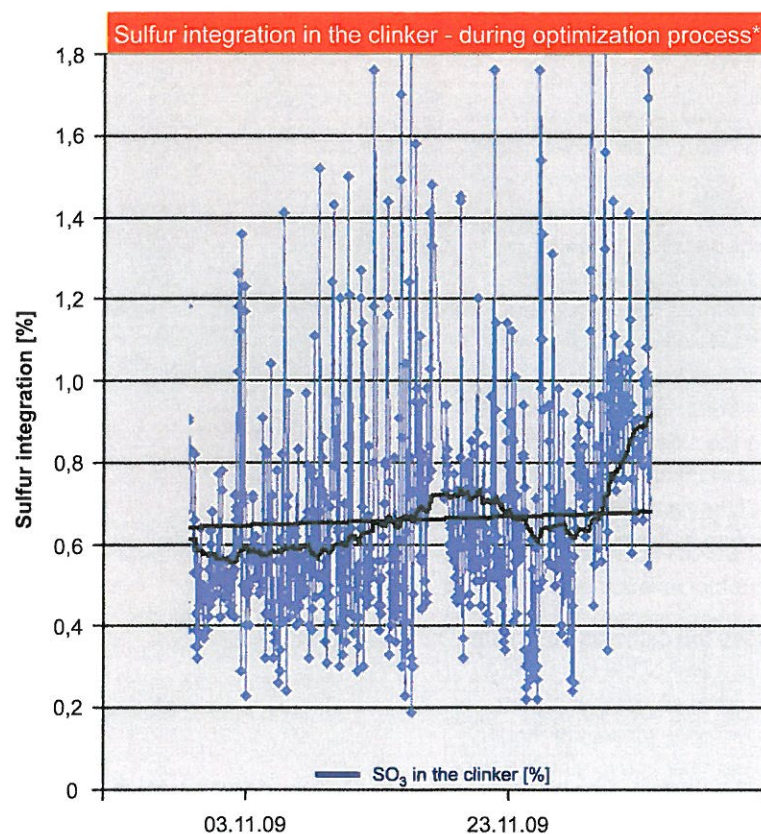
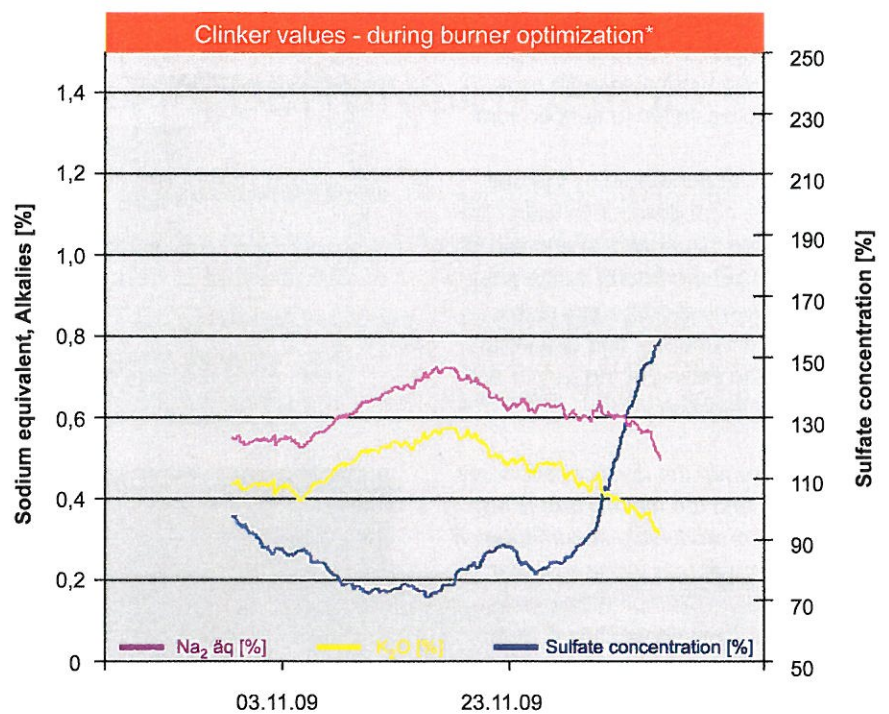
Pic. 6: Flame after optimization

system to analyse the thermal properties of flames; a very helpful tool both for the customers and Pillard itself with which a faster and more effective optimization of the flame is possible.

The combination of flexible products that, owing to decades of experience, can be adapted perfectly to the prevailing process, an intensive exchange of ideas with the customers as well as an objective recording, analysis and documentation of all modification settings and results therefrom ensure a maximum amount of possibilities in optimization.

Manfred Gemmer substantiates the enormous potentials that are inherent in Pillard's "Individual Solution Development" with a specific example: „At Holcim AG's plant in Höver, we improved an extensive range of process parameters. Based on intensive analyses and wide-ranging discussions with the customer, first we modified the burner tip. Thereafter, we optimized the burner settings, which was partly made possible as a result of using a mobile thermal imaging system. With this system we monitored changes in flame formation and heat distribution in real time and made the fine tuning adjustments. I think the results speak for themselves: We increased the sulfate concentration from 80 % to > 100 % and the sulfur integration in the clinker from 0.6 % to 0.8 %; at the same time, we made it possible to reduce the quantity of lime hydrate and the SO_3 content of the hot meal went down by about 1 %. Temperature levels in the heat exchanger dropped by about 20° C, accretion slowed down and old tires could be fed into the burner continuously. Subsequent observation by Holcim indicated a stable accretion in the kiln.

Such results are not accidental. Manfred Gemmer's opinion is validated by yet another practical example: At the Portlandzementwerk Wittekind – Hugo Miebach & Söhne KG, we reached a 15 % increase in clinker production. Furthermore, our customer subsequently experienced a significantly more stable kiln operation. In this case too,



*Fig. 7 & 8: Measurement data during optimization - [Reference: Holcim (Deutschland) AG]

we reached our target in two stages. First we installed a rotary kiln – the latest generation at that time. Thereafter, we optimized the burner settings, while paying attention to the customer's specific production process. It is worth mentioning that all this was possible in spite of a certain alternative fuel that is very uncommon in Germany.

Conclusion: Demand for efficiency, quality and cost effectiveness of complicated production processes is constantly on the rise with an ever increasing consideration of the environmental impact. Nowadays, manufacturers of industrial firing systems have to deliver far more than just a flawless product for standard application.

By following the concept of Individual Solution Development, a concept that has been proven times and times again, PILLARD FEUERUNGEN GmbH is staying abreast of the changes in a convincing manner.



Pic. 9: Thermal imaging camera - mounted on the side of the kiln hood