

A CLEAR VIEW EVEN IN A ROUGH ENVIRONMENT

FILLING LEVEL CONTROL OF WOOD FUELS

High performance light barriers are robust and reliable solutions for filling level control even under harsh conditions. Experiences of a manufacturer of warm air heaters, which are automatically fed with wood residues.

Eisenwerke Winnweiler Krämer KG (EWI-THERM) is a family-owned metalworking business that employs around 25 people and manufactures space heaters and hot-air heaters for joineries, carpentry stores and woodworking businesses (see box). "With our solutions, wood residues can be recycled and the company building can be heated at the same time. Compared to conventional hot water heating systems, our hot air heating in particular is an economical alternative," says Michael Krämer, who is responsible for sales and development at EWI-THERM.



The combination of transmitter, receiver and amplifier offers a wide range of applications for high performance light barriers under harsh environmental conditions. The portfolio of solutions from ipf electronic enables more than 5,400 combinations. (Image: ipf electronic)

AUTOMATIC FEEDING WITH SILO DISCHARGE

The products are manufactured with enormous craftsmanship, with each hot air heater designed according to customer requirements. "From an output of around 50kW, it is also worthwhile to automatically feed the hot-air heating system with wood fuel by means of a silo discharge. To control these conveyors, the level of the fuel in the furnace's combustion chamber must be continuously monitored," says Krämer.

FILLING LEVEL CONTROL WITH ROTATING PADDLE DETECTOR

In the past, this was done with a rotary paddle level detector, whereby a rotary paddle (rotating paddle) continuously driven by a motor was connected by a wire rope through a pipe to a limit switch located immediately behind the upper part of the filling shaft. The rotation of the paddle, which was positioned at the height of the maximum filling level required in each case, stopped as soon as it came into contact with the refilled fuel. If the level fell below the movement radius of the paddle, it started to rotate again, causing the the paddle began to rotate again, triggering the limit switch via the wire rope and and the silo discharge was activated for refilling the fuel.

REPEATED ERRORS AND ALSO FAILURES

However, after a certain time, soot and tar settled in the tube between the rotary blade or paddle and the limit switch due to the flue gases rising from the furnace. This made the wire rope increasingly sluggish until finally the paddle stopped. "The detector therefore signaled a sufficient level even if the fuel in the firebox had already fallen below the target quantity. Such a fault could only be rectified after extensive cleaning of the pipe. In addition, the high heat in the combustion chamber affected the electronics of the rotating paddle drive, so that the motor sometimes failed and had to be replaced," says Michael Krämer, describing some of the complications that could arise with the filling level control system.

IDEAL FOR HIGH REQUIREMENTS

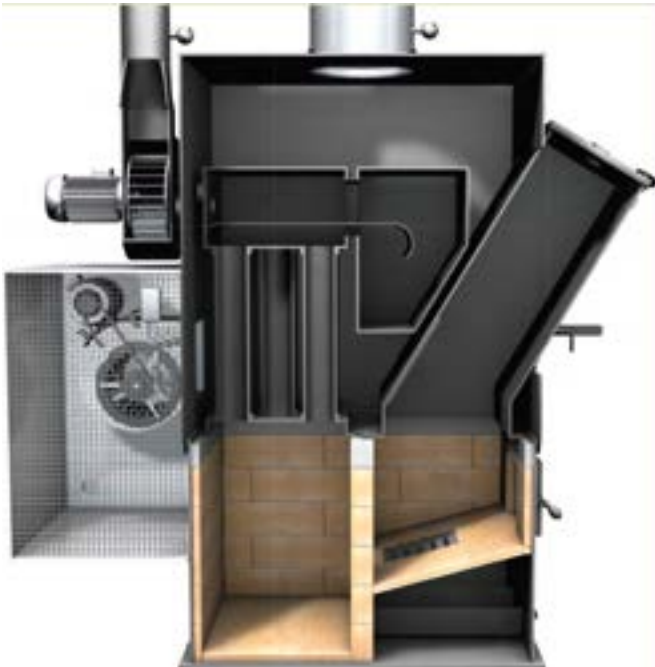
During a visit by an application specialist from ipf electronic, Michael Krämer addressed the problems. After a thorough examination of all possible solutions, the application specialist recommended a high performance light barrier.

High performance light barriers from ipf electronic consist as system solutions of transmitter, receiver and amplifier, including multiplex amplifiers for connecting several light barriers. This combination of devices, together with extremely short-wave infrared light as the transmission signal, predestines high performance light barriers for use in very harsh environmental conditions. Depending on the selection of transmitter, receiver and amplifier, the systems achieve ranges of up to 70 meters. Nevertheless, they are mostly used with shorter working distances. The power reserves available due to the high transmitting power can then be used for efficient contamination compensation.

FIBER OPTICS TO PROTECT THE ELECTRONICS

For the application at EWI-THERM, an **OS126120** transmitter, an **OE126020** receiver, an **LS102911** fiber optic set and an **OV620810** single-channel amplifier with switching and analog outputs were selected.

For filling level control between the combustion chamber and the charging shaft of the automatically charged furnace, the light barrier had to be placed laterally, in contrast to the rotating paddle level detector. Since both the transmitter and receiver can withstand a maximum operating temperature of +60°C, metal-clad fiber optic glass fibers are additionally used here. They are designed for a temperature range up to a maximum of +300°C, which is sufficient for the planned interrogation position.



Insight into a warm air heating system from EWI-THERM: The fiber optics for the transmitter and receiver are positioned in the area between the filling shaft (right) and the combustion chamber below at the level of the gray concrete base. (Image: EWI-THERM)

"There are now two small, opposing holes there for the fiber optics of the one-way barrier. The interrogation point or this environment is thermally uncritical for the optical fibers, although very high temperatures sometimes prevail in the plant, e.g. up to +1,200°C in the secondary combustion chamber directly next to the furnace.

The light emission of the glass fiber optic is curved, which makes the installation easier. The transmitter and receiver, on the other hand, are installed in an area whose ambient temperatures are unproblematic for the integrated electronics," explains Krämer.



The receiver of the light barrier, connected to a fiber optic protected with a metal sheath, is installed in an area of the furnace whose ambient temperatures are unproblematic for the electronics. (Image: ipf electronic)

📌 Sustainable solutions for carpentry and woodworking companies

As early as 1961, the first "hot air furnaces" were developed and laid the foundation for the "EWI-THERM" company. The family business based in Winnweiler (Rhineland-Palatinate), about 20 kilometers north of Kaiserslautern, is now managed by Hans-Jürgen Krämer in the 3rd generation. As the 4th generation, sons Timo and Michael Krämer bring fresh ideas to the company, which specializes in space heaters and warm air heaters. The range is supplemented by accessories, from silo dischargers and hot water heating modules to stainless steel chimneys and flue gas dust collectors.

www.ewi-therm.de

OPTIMUM FUEL SUPPLY AT ALL TIMES

The high performance light barrier is to monitor the filling level of the burning material in the upper area of the furnace. For this purpose, a basic power must first be determined for the amplifier. The goal here is to achieve a setting where no signal change occurs due to normal contamination conditions within the light barrier. Michael Krämer specifies: "At the beginning, fuel is filled into the combustion chamber for the ignition phase. Based on the temperature measured in there, the furnace control recognizes whether the fuel has been successfully ignited. Subsequently, as much fuel material is refilled until the light barrier is interrupted and the amplifier no longer switches, which corresponds to the maximum filling level. If this drops below the determined setpoint during the combustion process, the light barrier is released and a switching output is set, signaling the silo outlet carrier to refill fuel until the light barrier is interrupted again."



For filling level control, the light barrier had to be placed laterally, in contrast to the rotating paddle level detector, so that the fiber optic can detect the combustion chamber through a hole, as shown here. (Image: ipf electronic)



Detail view of the light guide for the receiver in curved design. The light guide head is located at some distance from the hole to the combustion chamber. (Image: ipf electronic)

ALARM OUTPUT SIGNALS CONTROL LIMITS

In addition to the switching output, the amplifier has an analog output that can be used to precisely align the transmitter and receiver using the 0-10V measurement output, even at greater distances. The **OV620810** compensates for contamination occurring within the light barrier by regulating the power of the transmitter depending on the contamination. In addition, an alarm output is automatically activated before the amplifier should reach its control limits due to increasing contamination. "We do not currently use this feature, but would like to include it in the future for our warm air heaters with silo discharge. For the solutions already in operation, we still recommend customers to clean the fiber optics when the furnace needs to be cleaned anyway and, for example, the ash residues need to be removed, which is usually necessary once a week. With the test input on the amplifier, our customers can also check at any time whether the light barrier is working properly or needs to be cleaned," says Krämer.

EASIER FOR ALL

For about three years now, EWI-THERM's hot-air heating systems with silo discharge have been equipped with ipf electronic's high performance light barriers for filling level control, with consistently positive experiences so far, as Michael Krämer confirms: "The robust system is a real alternative to the previous solution and always works reliably without failures. And it has also become easier for our customers, as cleaning the light barrier involves far less effort."