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World Leader in Cement Pyroprocess Technology

First successful installation of HURRICLON in preheater

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Please note:
In the following article A TEC GmbH could also be mentioned as A TEC Advances Process Technologies GmbH, PMT; PMT-Zyklontechnik GmbH, Zyklontechnik GmbH
(= company name before 1st June 2005).

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First successful installation of HURRICLON® in preheater

Dr. Franco Colaiacovo, President of COLACEM SPA, Italy & Wolfgang Freimann, PMT-Zyklontechnik GmbH, Austria, describe an upgrading project undertaken in Italy.

The COLACEM Group is one of the largest Italian cement producers. One of its production plants is located in Rassina, a small village in Toscana. The production capacity before modification was approximately 2.300 t/d (max. 2.500 t/d). The preheater system was equipped seen from the kiln to the preheater exhaust gas fan with: calciner including tertiary air duct, one cyclone after calciner, shaft, two cyclones and four cyclones as top stage.

The aim of the project

The aim of COLACEM was to decrease the pressure drop of the preheater tower (in the case of a production of 2.500 t/d approximately 9.000 Pa in front of preheater fan) especially of top stage and 2nd stage, and to equalize the exhaust gas temperature. The temperature difference of the four top stage cyclones was 60°C.

COLACEM was looking for proposals to solve these problems under the preconditions of minimum necessary kiln stop period and minimum amount of new or modified equipment.

PMT-Zyklontechnik's proposal was in principle to enlarge the second stage of the preheater, insert Vortex Finder Vanes; instead of four cyclones, to install two new HURRICLON® cyclones as top stage located between the existing cyclones, and to optimize the kiln feed.

Main work

The work to be performed by PMT-Zyklontechnik included following main points which are illustrated in Figure 1:

- Engineering work, including workshop drawings for Italian local manufacturing of inlet bow to cyclones stage no. 2; enlargement of cyclones stage no. 2 (enlargement of conical part, new cylindrical part, new entrance and new immersion tube); new riser ducts from stage 2 to top stage including new meal feed box and expansion joints; new top stage including new meal pipes, pendulum flaps, expansion joints and meal inlet box in riser duct; and modification of hot gas duct.
- Supply two units Vortex Finder Vanes diameter 2.500 mm for 2nd stage and two units HURRICLON® 3700 CT as top stage
- Supervision of erection and start up

HURRICLON®

International patents have been awarded and numerous installations have been constructed based on the technically superior characteristics of the double immersion tube principle and integrated Vortex Finder Vanes.

Pressure drop and residual dust content are both reduced significantly compared to conventional cyclone separators. Operational use since 1990 has proven the practical application of this new technology.

Pressure drop and energy consumption

Compared to conventional cyclone separators, the level of pressure drop and energy consumption experienced with HURRICLON® is reduced substantially, with simultaneous improvement of total separation efficiency.

Using HURRICLON® it has proven possible to meet the demands for high flow rates and low pressure drop commonly required in practical applications. In many applications the desired level of volume flow can be achieved with a single separator.

In terms of rotary valves, wear linings and steel constructions, this solution represents significant savings and results in a higher level of efficiency due to lower investment costs.

In order to maximize energy savings, Vortex Finder Vanes are employed.

Traditional cyclone separators require up to 100% more pressure drop.

Separation efficiency

In addition to a separation of 98% of particles larger than 5µm to 30µm, depending on the type of cyclone used, a practical separation efficiency has been achieved in large-scale technical applications, which results in wear-free operation for down-stream facility equipment.

The cost-efficiency aspect is reflected in the exceptionally high level of removal and lower costs for

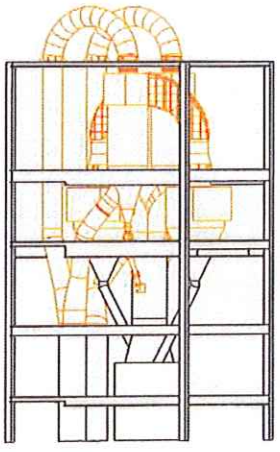
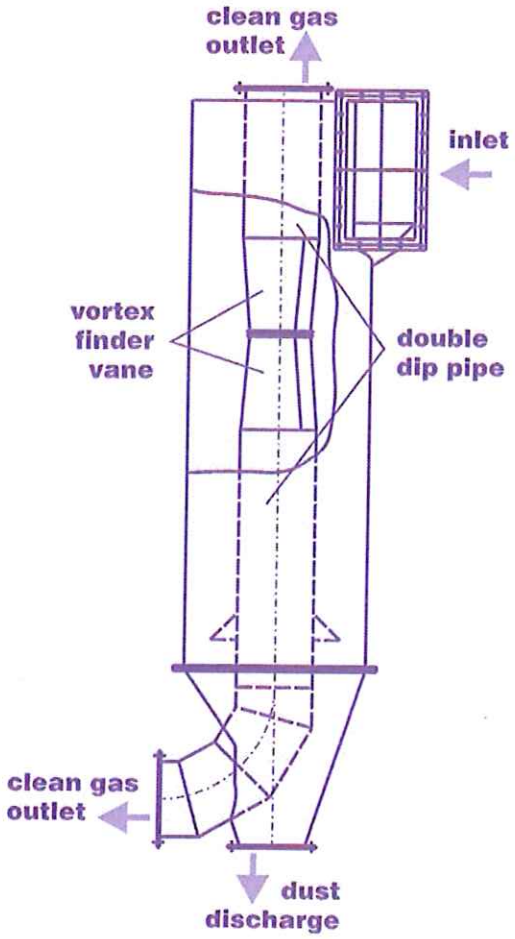


Figure 1 Sketch illustrating work to be performed by PMT-Zyklontechnik



A new state-of-the-art in cyclone separators

down-stream equipment components, especially because the maximum particle is restricted to particle sizes that are classified as wear-free.

HURRICLON® cyclone separators have been used successfully for many years in the cement, lime, plaster, wood, foundry and sugar industries as well as in metal powder separation applications.

Take a moment to look over our list of references and information on other possibilities for using HURRICLON® to increase your separation efficiency, save energy or optimise overall investment and operational costs.

Vortex Finder Vanes

A number of installations since 1992 in the wood, cement, lime and plaster industries and the patents awarded confirm the energy savings which can be achieved by installing Vortex Finder Vanes.

Existing and new cyclones can be fitted with Vortex Finder Vanes. This addition allows a reduction of 30% of the pressure drop of conventional cyclone separators, thereby helping to save precious energy.

For example this represents energy savings of some 140.000 kWh per year for a volume flow of 100.000 m_/h, pressure drop reduction of 5 mbar and 7.000 operational hours annually.

The Vortex Finder Vanes are almost as simple as the immersion tube itself. This ensures problem-free operation and economical use in large-scale technical applications.

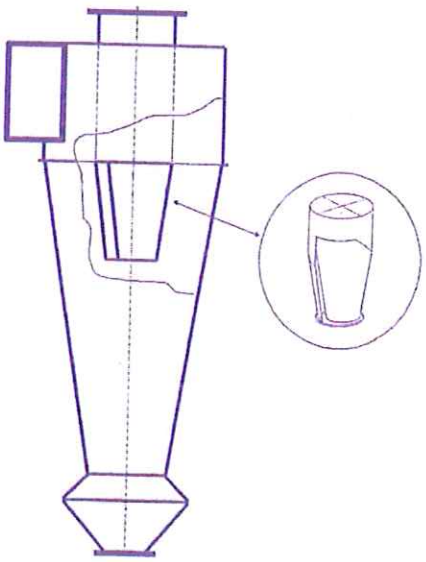
The sizes installed range from a diameter of 3.600 mm to 150 mm, for operating temperatures up to 650°C.

Simple installation and low downtime guarantee the efficiency of Vortex Finder

Commissioning

By middle of June 1999 the erection including refractory lining, was successfully completed after a kiln shutdown of 3 weeks and the kiln could be restarted. After approximately 3 days, a capacity of 2.500 t/d could be realized with a pressure drop reduction of 2.800 Pa. The picture overleaf shows

Vortex Finder Vanes for Cyclone Separators



Operating results

Kiln feed:.....170–175 t/h

Preheater fan:
Speed:.....700 rpm
Power:.....850 kW
Pressure drop in front of preheater fan:.....6.200 Pa
Oxygen content:.....4%
Preheater Tower:
Pressure drop of stage 1:.....600 Pa
Temperature after stage1:.....320°C
Pressure drop of stage 2:.....1000 Pa
Temperature after stage2:.....530°C
Secondary and Tertiary air temperature:.....1030°C
Total fuel input:.....78.120.000 kcal/h
Kiln feed:.....175 t/h
Chemical clinker factor:.....1,54
Clinker production:.....2500 t/d
Heat consumption:.....750 kcal/kg clinker

the modified upper part of the preheater in Rassina.

Conclusion

The power consumption of the preheater fan could be decreased by 350 kW which is approximately 2.800.000 kWh per year.

The heat consumption could be decreased by 20 kcal/kg clinker with the new optimized location of feed and lower velocity in the riser duct.

The limitations of preheater modifications are in most cases due to the structure of the existing preheater building: firstly the limitation in space, and secondly the limitation in load. By using HURRICLON® both preconditions can be fulfilled because of double gas throughput of HURRICLON® compared to conventional cyclones. The double gas throughput can be realized because of two immersion tubes. With this new technology we have an absolutely new perspective for preheater upgrading projects. ■