

# Reflecting

## on a Successful Project

**SHEKHAR JOSHI, INTENSIV-FILTER INDIA AND ASTRID KÖGEL, INTENSIV-FILTER GMBH & CO. KG, REPORT ON THE SUCCESSFUL INSTALLATION OF BAG FILTER TECHNOLOGY AT AMBUJA CEMENTS' NEW PLANT AT RAURI, INDIA.**

**H**imachal Pradesh is a state in the north of India, 2000 m above sea level at the foot of the impressive Himalayan Rohtang Mountains. Two-thirds of the area consists of woodlands, and around 90% of it has been declared a nature protection area. Therefore, the need to offer an environmentally friendly solution without disturbing the ecological balance of the area emerged. Ambuja Cements, one of the biggest Indian cement producers, took this into account when planning the construction of a new plant at Rauri near Darlaghat in Himachal Pradesh in 2006.

In the past, Ambuja Cements has used a reverse air bag filter over electrostatic precipitator (ESP) for kiln/raw mill application, but as air quality regulations continue to tighten in India, stack emissions are becoming an increasingly important factor when choosing a dust collection system. The cement manufacturer decided to consider bag filter technology instead of an ESP for the new plant. Facing a field of strong competitors, Intensiv-Filter India won the contract to

**Table 1. Design data and specifications**

	Dust removal kiln/raw mill
Gas volume n.c.	2.1 million m <sup>3</sup> /h direct 1.44 million m <sup>3</sup> /h compound
Temperature	200 °C direct 160 °C compound
Raw gas dust content	70 g/m <sup>3</sup> direct 100 g/m <sup>3</sup> compound
Residual dust content	< 10 mg/m <sup>3</sup> n.c.
Cleaning mode	Offline
Cleaning pressure	1 – 3.5 bar
Compressed air consumption	< 500 m <sup>3</sup> /h n.c.
Filter surface area	31 795 m <sup>2</sup>
Length of filter bag	8 m
Filter material	P84



Figure 1. Double row filter type IFJCN 80/48-8000 D ECO at the Rauri cement plant, Himachal Pradesh, India.

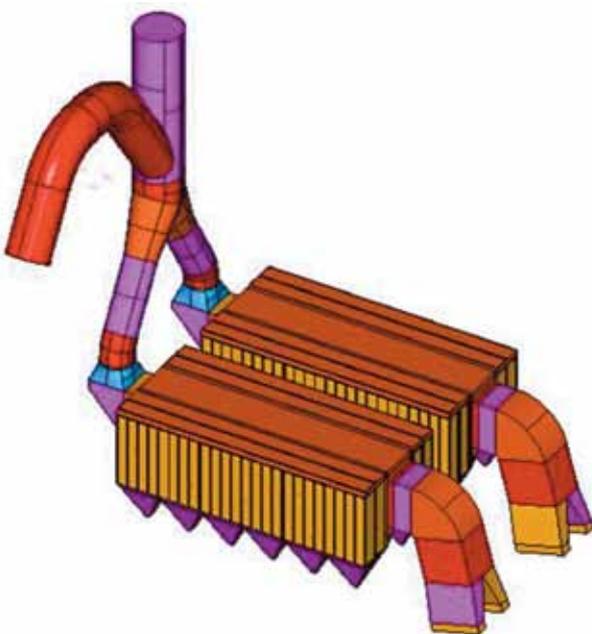


Figure 2. Isometric view.

design, realise and commission the bag filter for kiln/raw mill application at the Rauri plant.

The following criteria were instrumental in the choice of the dust removal technology:

- The dust emission level has to remain consistently very low during all operating conditions.
- The performance and efficiency of the dedusting system should not be affected by unscheduled start/stop of the plant and by changes in fuels and raw meal.
- The capacity increase of the dedusting system should be possible in case of any production capacity increases.
- The low residual dust concentration has to be obtained at low cost.
- Changes in CO concentration should have no influence on emissions and operation.

## Technical solution

The aim was to dedust the rotary kiln and raw mill with a bag filter complying with the maximum dust emission limit of 10 mg/m<sup>3</sup>. The installation and commissioning of the new bag filter were required, as well as a maintenance-friendly filter design and reliable compliance with the specified guaranteed values.

Due to large volumes and space limitations, Intensiv-Filter India proposed and implemented two filters of the type IFJCN 80/48-8000 D ECO. The filters are designed for a gas volume of 2.1 million m<sup>3</sup>/h and a gas temperature of 200 °C. They are arranged in two rows with 12 compartments each. In total, the filter has 7680 bags with a length of 8 m, providing a total filter area of 31 795 m<sup>2</sup>. The filter material used is the P84 so that during raw mill shut down, the gases will be cooled down to 190 – 195 °C and will be filtered for gas temperature at less than 195 °C. For easy maintenance, a penthouse is installed on top of the bag filter and chain conveyors are installed below the bag filter for dust collection.

The filter bags are cleaned by a periodic compressed air pulse at pressures of 1.0 to 3.5 bar, depending on the filter differential pressure. The operation of the filter installation is automatically adjusted to the prevailing conditions by the JetBus Controller<sup>®</sup>, which regulates cleaning pre-pressure and controls the shutoff dampers when necessary.

The JetBus Controller<sup>®</sup> is used as an intelligent cleaning control unit within the Intensiv-Filter system. The modular structure of the system means that the controller can be flexibly configured and can be easily changed or extended at a later date. The filter can be operated either in online or offline mode. The controller regulates the cleaning pre-pressure and controls the pneumatically-activated clean gas dampers. The controller is linked to higher level systems via standard coupling modules, which switch between the controller and the existing process control system.

In addition to its uses in standard solutions, the JetBus Controller<sup>®</sup> is particularly suitable for the following:

- For energy reasons.
- For filtering installations with varying strains.
- For creating a defined filter cake.
- If using sensitive filter media.

The benefits of the system are:

- Ideal adjustment of cleaning to meet the operating conditions in the dust removal installation.

- Flexible parameterisation of the system functions.
- More precise monitoring and direct assessment of the cleaning system.
- Saving and processing operating results.
- More precise error analysis and identification of error sources.

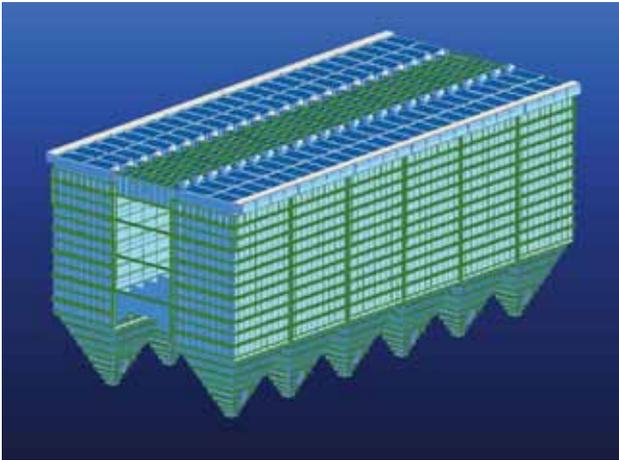


Figure 3. 3D CAD drawing of the bag filter at the Rauri plant.

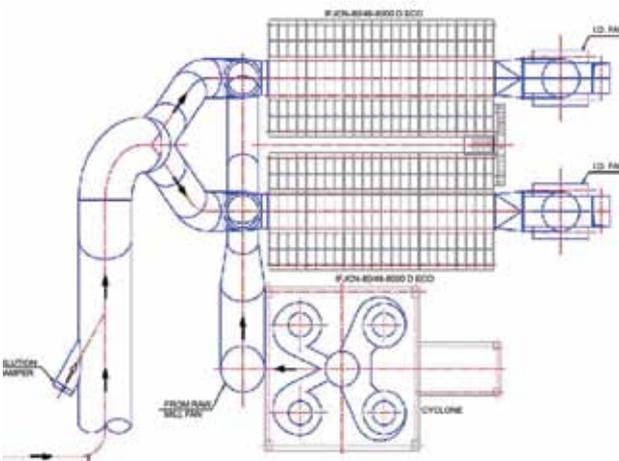


Figure 4. Design layout of the double row filter at the Rauri plant.



Figure 5. Assembly.

- Optimising and reducing compressed air consumption.
- Longer filter media service life.
- Optimising and homogenising of dust discharge.
- Reducing overall energy costs.

As shown in Figure 4, the dust laden gas from the preheater travels either to the raw mill or to the baghouse after dilution. The exhaust gas from the raw mill is passed through the bag filter after a set of cyclones and the raw mill fan. Therefore, the bag filter receives the dust laden gas either directly from the preheater or from the roller mill. Two ID fans exhaust the clean gas from the bag filter. The process filter data and the technical specifications are given in Table 1.

## Assembly and commissioning

In general, good communication between contractor and principal is extremely important for the smooth assembly of a filtering installation. The regular control of the assembly progress and the regular consultations between production and the filter supplier prevent misunderstandings, delays and unnecessary costs on both sides. To guarantee a flawless function of all filter components, specialists should carry out the commissioning of the filter plant. Training the plant operating staff in filter operation and maintenance reduces downtime and could even eliminate small irregularities. This understanding of assembly and commissioning characterises Intensiv-Filter India. The company not only provided the optimum technical solution, but also completed the project as promised.

The kiln was lit in December 2009 and produced the first clinker by January 2010, in spite of difficult terrain, weather conditions, and space constraints. This is emphasised by Sunil Duggal, Joint President of Ambuja Cements Ltd: “The dust removal of the rotary kiln contributes to Ambuja’s scope of environmental engagement. This is possible due to Intensiv-Filter India’s co-operation and support. The entire Rauri team enjoyed working with the company and setting high standards throughout the duration of the project.”

## Summary

Increased productivity, optimised flexibility, improved efficiency and, above all, the newest technological achievements in dust removal were essential on account of the sustainability promise of Ambuja Cements at its Rauri cement plant. On the basis of the specific customer conditions, Intensiv-Filter India designed the dust removal and gas cleaning systems for the plant. The filtering installation represents a complex waste gas treatment plant that required process engineering solutions to be implemented. This is proven by the constant performance of the bag filter, which has now been operating for a year. In order to design the gas cleaning installations and to implement this optimum solution within the remit specified by Ambuja Cements, it was essential to know each procedure in detail and to specify the framework parameters in consultation with the operator. It is only possible to plan the gas cleaning installation for a specific requirement if all the circumstances that are relevant to measuring, operating methods and selecting materials are known. This is particularly true when providing a technical warranty. Plant concepts from Intensiv-Filter India are far more than simply dust collectors. This is proven at Rauri. 🌐