

# TEAMING UP



Peter Collins,  
W. L. Gore & Associates UK Ltd, and  
Steve Kearsy and Daniel Roberts,  
Breedon Group, present the results  
of a filter bag upgrade at Breedon's  
Hope cement works.

**B**reedon Group's Hope cement works in Derbyshire is the UK's biggest cement plant. With ambitions to also be a worldwide leader in optimised performance, efficiency, and sustainability, the company is undertaking a systematic programme of upgrades to ensure that its equipment uses the best available techniques.

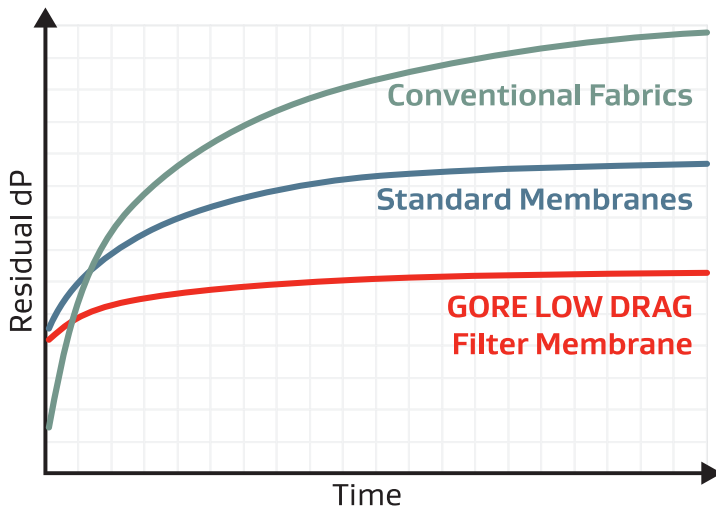


## New filter bag technology

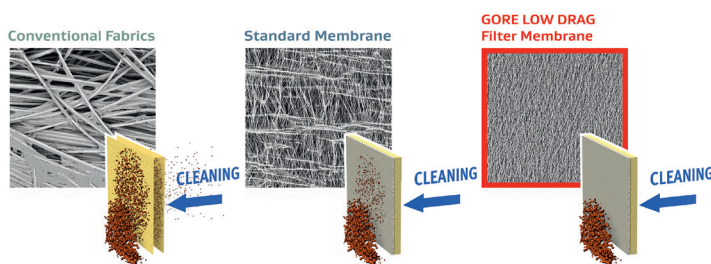
In 2018, W. L. Gore & Associates approached Steve Kearsey, Senior Process Engineer at Breedon Group, to introduce the concept of low resistance membrane technology, and to determine if GORE® LOW DRAG™ filter bags could help Breedon Cement to improve on the performance of existing filter media. Interested, Kearsey pulled together a small but focused team, representing all functions of the Hope works. Gore presented the concept of its



Breedon Cement. Photo credit: Sam Devito.



Comparison of filter media seasoning over time.



GORE LOW DRAG FILTER membrane comparison.

LOW DRAG filter membranes and explained results seen from other demonstration sites located in Canada and Mexico.

Gore and Breedon worked closely to determine the operating parameters required for the completion of a detailed financial analysis, which would reveal the total cost of ownership of the Breedon kiln bag filter. This analysis showed that the filter bags would save money over the life of the bags and provide an acceptable payback period. It would form the basis for the justification of capital investment for the Breedon team.

## Increasing airflow

The decision was made to invest in the low resistance product and to replace the kiln two bag filter ahead of the planned schedule. The initial driver in this decision was to reduce pressure drop, saving electrical fan energy and achieving greater overall process efficiency, combined with a long-term plan to 'future proof' the filter for the remainder of the plant's life.

An order for a full suite of 3024 new GORE LOW DRAG filter bags was placed in 4Q18. This was a relatively quick decision that reflects as much the agility of the team at Hope, as it does the potential of the solution. The bags arrived on site on 24 December 2018 in time for the planned shutdown in January.

"We were reasonably happy with the filter bags that we had in place, but we knew that this area of the plant would become a bottleneck moving forward," explained Kearsey. "We knew that at some point in time we would need more air flow in order to future proof the plant for the remainder of its life."

Daniel Roberts, Engineering Reliability Manager at Breedon Group, said: "Following on from our meeting with Gore, we were convinced that by partnering with them and using the company's filter bag technology, we could reduce our operating differential pressure, which in turn would save us a significant amount of electrical energy, making the payback on investment attractive."

## Reducing filter resistance

GORE LOW DRAG filter bags incorporate a new class of membranes. One of the problems

with traditional filter bags is that, as they age, their resistance to airflow increases and filters get seasoned and blinded over time, which ultimately reduces performance and results in change out.

However, the low resistance filter bag is a true surface filter. The membrane structure is completely new and the composition is suited to applications such as carbon black, steel, and cement manufacture, where the particulate matter is especially fine. Dust stays on the surface of the filter, instead of finding its way into the membrane fibrils, thus increasing cleaning efficiency.

With the filter membrane successfully capturing product, which is then removed with a quick and easy cleaning cycle, airflow through the filter bag is increased and filter resistance is reduced. This has the following benefits:

- ▶ Fan energy savings – reduced filter resistance enables the baghouse to operate with lower pressure drop, which means the fan motor can operate at lower rotational speed. This is obviously a cost benefit, as well as an environmental one.
- ▶ Increased throughput capability – with increased airflow through the filter bags, production increases are possible without having to increase the size of the baghouse.
- ▶ Better burning of alternative fuels – alternative fuels often require greater volumes of airflow for optimised combustion.
- ▶ Fewer bags needed – for those plants that cannot make use of the increased airflow, the number of filter bags in the baghouse could be reduced.
- ▶ Alternatively, by operating the same number of bags, with the same airflow and the same differential pressure, longer bag life can be achieved.

Overall, there are a variety of benefits to reducing filter resistance, all of which can have an impact on operating and maintenance costs.

“The technology sounded impressive and we were excited to have the opportunity to be the first cement plant to implement it in the whole of Europe, the Middle East, and Africa,” said Roberts.

### Preparing for a trial

“For the trial to be effective, we knew we had to start from a level playing field,” added Roberts. “To ensure that both Breedon and Gore would get the best results possible,

### About the Hope plant

Originally opened in 1929, the Hope plant has been through a number of ownership changes in recent years, before joining the Breedon Group in 2016. Located in Derbyshire, the plant is situated in an area of outstanding natural beauty, which comes with obvious benefits, as well as challenges.

Like many cement plants around the world, the Hope cement plant is under pressure to run more efficiently. While it does not have the global resources of a multinational cement manufacturer, it does have a reputation for innovation – and a wealth of expertise. Both these attributes were an important component in the success of the new filter bag project.

we decided to invest in upgrading our cleaning system, installing new solenoids and diaphragms in the baghouse to make sure everything was performing 100%. At the end of the day, it was not worth running the demonstration if we were not going to get accurate data from it.”

Breedon Cement worked with Gore’s installation partner, Filtration Medic, on these initial works before installing the new filter bags. Breedon also provided Gore with historical data for the sake of comparison. This cooperative framework was instrumental in ensuring the success of the project.

### Installation and commissioning

Switching the filters was a straightforward process. Gore visited the plant in advance, measured up, and carried out test fits to make sure the new filter bags would be just right. Filtration Medic and Gore installed the bags during the January 2019 maintenance outage and the plant was started at the end of January.

“Startup was simple and we actually noticed a difference right away,” said Roberts. “Of course, you have to run these things for a while before you get a real idea of long-term performance, but we were immediately impressed with the results.”

Since January, Gore and Breedon have worked together to analyse the operating data and compare against historic trends. Incremental changes to reduce differential pressure (DP) were made over a three month period, while also considering the effects of reduced DP on expected bag life and cleaning performance. The plant has been running under these optimised conditions ever since. Performance is monitored on a monthly basis and will be for a prolonged period while Breedon and Gore test to see how the results stand up over time.

### Results

The initial results from the trial have been positive. Breedon has achieved record performance levels, including the following:

- ▶ More than 30% lower DP than before.
- ▶ Approximately 35% lower pulse pressure than previously.
- ▶ 25% fewer pulses than before.

In addition, fan energy consumption is down by more than 10%, equating to significant energy savings of greater than 10% over the five year life expectancy of the bags. Lower operating costs and increased bag life were a benefit, but the plant is most pleased with its improved environmental performance.

“The increased efficiency of the filter bags benefits local air quality, as well as the plant’s overall environmental footprint,” explained Roberts. “As a manufacturer in a national park, this is incredibly important to our ethos and to our relationship with the local community. We look forward to seeing how things progress over the next several months.”

An additional advantage of the new filter bags is the ability to increase air flow as and when it is needed, meaning the plant has the capacity to increase production without needing to make further changes to its bag filter. The idea is that the plant will be future ready.

## **A successful collaboration**

The success of the project at Breedon would not have been possible without the teamwork achieved both at the plant and with Gore. As a relatively small team, Breedon has the ability to include the right people in discussions from the get-go. For this project, its team had the knowledge and enthusiasm to make decisions quickly, meaning the plant was able to reap the benefits of changing filter bags quickly, too.

The relationship with Gore was also important, since the project involved mutual trust and high levels of cooperation. Gore understood Breedon’s main drivers and was able to provide a solution that delivered on those needs – as well as generating other benefits. ■

## **About the authors**

Peter Collins is Field Sales Associate at W. L. Gore & Associates UK Ltd.

Daniel Roberts is Engineering Reliability Manager at Breedon Group.

Stephen Kearsey is Senior Process Engineer at Breedon Cement.