CREATING A PRE-ASSEMBLED MONSTER OF A BAG FILTER

GIULIAMARIA MERIGGI, REDECAM GROUP, ITALY, OUTLINES THE COMPANY'S SEARCH FOR INNOVATIVE SOLUTIONS AT ITS BRAZILIAN CLIENTS' CEMENT PLANTS.

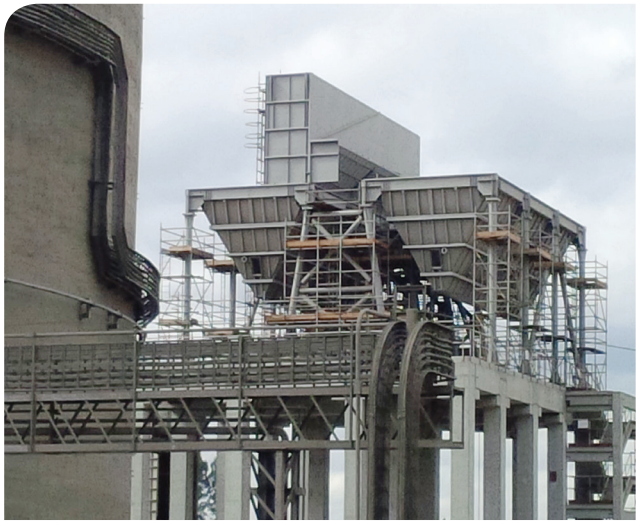
Over the past few years, Redecam Group has expanded its number of contracts in Brazil, during which time it has created an interesting precedent in terms of product offering. In 2014, Redecam commissioned a project that marked the first time they supplied and transported a heavy duty bag filter (baghouse) pre-assembled in a mere 14 parts, leaving the crew to put together what looked like a giant Rubik's Cube on site. What's more, most parts for these recent projects, including the Rubik's Cube bag filter, were manufactured in Brazil creating jobs, contributing to the local economy, reducing costs for their customers and making the pre-assembled monster of a bag filter a success. It proved to be a worthwhile challenge and put Redecam on the path to find a number of local Brazilian suppliers to perform precise work on a very large quantity of enormous pieces of equipment. It also created a new product offering.

Bag Filter in 14 parts

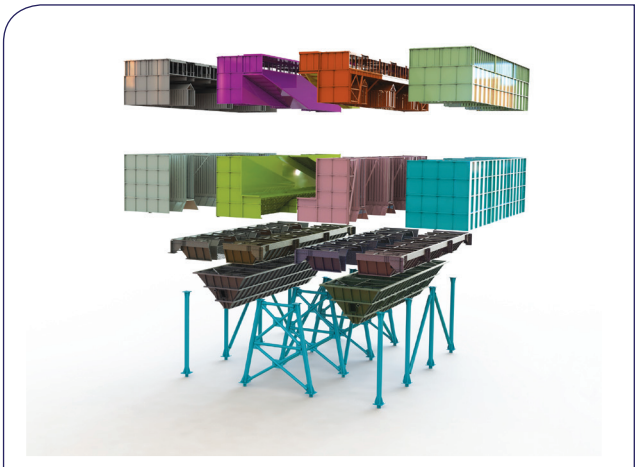
In 2013, Redecam was contracted to find solutions for a new – and fifth – mill line at one of its Brazilian clients' cement plants. The project was commissioned in 2014. Redecam provided a large bag filter, a cyclone and dedusting filters for this project.

The innovation came in the form of a large DPM-Model Bag Filter, suitable for high flow rates (above 1.5 million m3/h or 883 000 ACFM) and high

All 14 modules were pre-assembled with tailor-made lifting lugs installed in-factory for easy installation.



Installation took about half the time and much less space on site.



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inlet dust burden applications (up to 1000 g/Nm^3 or 0.44 gr/ft^3). Redecam's large DPM-Models are standard with a big central hopper, but this one was completely re-designed without one. The client had already defined their layout, leaving a limited footprint for a baghouse and the idea was to try to reduce weight. Weight reduction is a common goal in the pursuit of baghouse perfection, although the ideal often proves challenging due to custom part thicknesses or specific standards imposed by the client.

The big challenge was providing a modular solution. Although Redecam is used to pre-assembling equipment, it usually means splitting a part simply to make it fit into a container. Producing and transporting a baghouse in 14 parts may not sound that difficult, but the list of challenges was impressive:

1. The baghouse was non-compartmented, meaning there were no walls inside to form perform straightforward 'cuts' to create a module. Engineers had to re-think every part. They had to innovate a way to allow each module to be lifted and transported despite not having walls to hold the structure. They succeeded in creating what looked like a giant Rubik's Cube: 16 m long x 16 m wide and almost 15 m tall, divided into 14 pieces weighing a total of 230 t.
   - Every big lateral compartment was 16 m long x almost 5 m wide x 5 m tall.
   - The central compartments were 16 m x 3 m x 5 m.
   - The hoppers were nearly 16 m x 16 m x 15 m.
2. The project was developed in 3D Cad-Cam Software and executed with CNC machines to avoid mistakes on the final assembly. The modules being so large, some usual procedures were impossible, such as pre-assembling the entire bag filter in the workshop. A large crane would have been needed in the workshop twenty-four seven. It meant the calculations, 3D design and CNC cuts had to be exact, with no room for error.
3. Once the modules were assembled, they needed to be sandblasted and painted. It required the team to find an extremely large paint cabin, which they did.
4. Transporting this monster of a baghouse by road offered another challenge. The 14 modules needed to be brought 450 km from the workshop to the site in record time. "I drove the entire trip myself to ensure the trucks wouldn't face a dead end," laughs Redecam's Brazil Country Manager Felipe Abraham. "We even measured every bridge clearance and every potential obstacle to be sure the trucks had clearance." A specific route was chosen because it was quiet, not because it was smooth. "At times the trucks were rolling at a mere 30 km/h in a procession with two police cars. We certainly did not need a speedway to go that slowly!"
5. The team was on a very tight timeline, roughly 120 days to get all equipment designed and produced, which is much tighter than usual. The Rubik's Cube was only possible because of the engineering team's innovation and hard work, how

they developed the project, the local workshop hired for the job and because the project was nearly completely supplied locally (only specialised components like Redecam's proprietary Bi-Jet Bag Cleaning System and other such components were brought in from Redecam's own workshop in Italy). "This modular system wouldn't have been possible if we had tried to ship it from abroad," admitted Abraham.

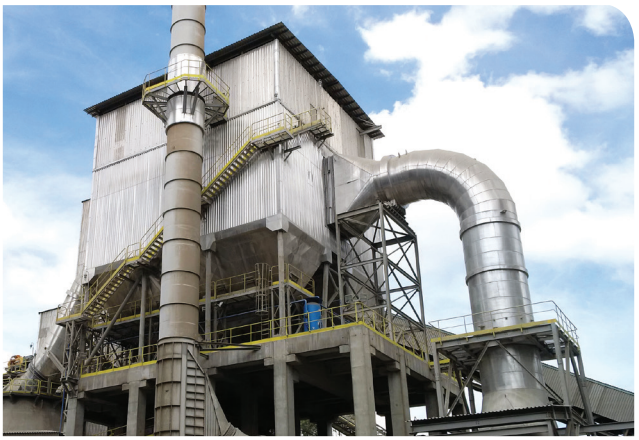
The big goal: Savings for the client

Both the client and the installation company saved on numerous fronts due to the modular approach:

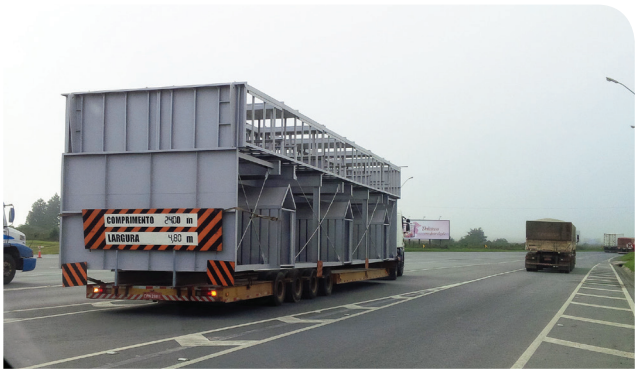
- Money. They saved money on welding, pre-assembling on the ground (most modules were dropped-off trucks directly to their final positions) and repainting.
- Space. The customer also saved space on site as field pre-assembly was eliminated. Usually, an empty space as big as two baghouses placed side-by-side (sometimes even larger) is needed to pre-assemble the modules on site. In many cases, the client must have a solid concrete base poured to support the baghouse's pre-assembly 'table,' which is as big as the filter itself.
- Time. The Redecam team developed a precise logistics and delivery schedule. Some parts arrived on site earlier than others in order to avoid a rush once the last pieces were ready. The erection of the bag filter began once half the modules had arrived. "The result was superb," commented Abraham. "Our client saved a lot of time, compared to the normal installation process. I'd say we cut installation time by more than half."
- Safety. Bigger pieces are usually not appreciated by the ground crew. The on site installation team usually views them as heavy and difficult to manoeuvre. It was crucial that the contractor already have his cargo weight and rigging plan done. Every part arrived with its own custom-designed lifting lug pre-assembled on the part in the workshop. Redecam ensured each lifting lug was properly designed for the weight, shape and size of the piece it was to fit upon and oversaw the manufacturing process and its installation. When on-site installation began, a large crane was needed only for a short time and the process was quite fast and safe. In effect, safety was augmented doing installation this way. Erecting this equipment the 'traditional' way means handling numerous pieces and creating lugs on site that are not as perfectly adjusted.

The modular concept worked so well that Redecam re-created it on a smaller scale for five SP-Model Nuisance Filters (each customised for its use and space) and a cyclone for this customer. Some dedusting filters were supplied in one large piece, others were divided into three main 'modules': the structure, the hopper, and the casing and plenum together.

"Our Lego-type concept really worked so well that we closed another Brazilian contract for a leading cement manufacturer with the same concept of supply," said Abraham. In this second Rubik's Cube contract, the baghouse was smaller but it was designed based on its 'bigger brother's' concept.



The Modular Filter saved the clients money, space and time while increasing on site safety.



The 14 modules needed to be brought 450 km from the local workshop to the site in record time.

"In this second contract, the company also saved quite a lot on installation costs. The company that did the erection was the same company that manufactured the smaller Rubik's Cube, so they knew exactly what needed to be done on site – almost nothing, really," continued Abraham.

Conclusion

That project was a first and a learning experience for many at Redecam and amongst their subcontractors. "Despite the challenges, I offer this solution now anytime I can," stated Abraham. "It is true that the Rubik's Cube concept is not one that can be used for all projects and plants. But when it can be done, the savings in terms of money, space, time and safety make it a winning solution."

"We now have Brazilian subcontractors with experience manufacturing this type of concept for us as well, making us confident about closing more similar deals in this country," he concluded.

Redecam has since created its 'Modular Filters' as a general concept that they have begun offering to customers all over the globe.