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CSR Hebel Australia: one of the world's most advanced AAC panel plants

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One of the world's most advanced AAC plant has officially opened its doors in October 2019. Australian listed building materials company, CSR Hebel, is now the proud owner of a second autoclaved aerated concrete (AAC) production facility at its Somersby site, just north of Sydney, Australia. With the opening of this state-of-the-art facility (Fig. 1), CSR Hebel enters into an exciting new manufacturing era and reconfirms Aircrete Europe's leading position as a global leader in AAC panel production technology.

Project Background

CSR Hebel has been producing AAC since 1990, when the first line was commissioned at Somersby, using original Hebel (flat-cake cutting) production technology. Throughout the years, CSR Hebel has evolved into a leading building solutions provider by manufacturing high-quality AAC panels that converted many buildings around the country into fire-proof, sound-proof and attractive constructions. As a result of an increasing demand for sustainable and efficient construction, CSR Hebel recognized the opportunity to expand with a second production facility. For this highly customized turn-key AAC project, CSR Hebel engaged Aircrete Europe to develop a versatile, innovative and high-quality manufacturing facility, specifically designed for AAC panel production.

Fig. 1: Key project team members of CSR Hebel and Aircrete Europe at the official opening ceremony in October 2019 [1]

Fig. 2:
The new facade of the second factory hall, utilizing routed 6-meter AAC wall panels

With CSR Hebel's almost 30 years of AAC production experience and Aircrete Europe's technology and process expertise, a thorough and detailed customized project design phase was started (the so-called Aircrete Phase 1). Phase 1 has been specifically developed by Aircrete Europe as a pre-engineering phase to a project to work-out the expected technical, technological and commercial requirements before actually commencing with the project.

Steve Zebib, COO of CSR Hebel's AAC Building Products division, mentioned: "Our goal is to provide solutions to the building industry, not just products, and to achieve that goal in our new plant, we needed to partner with parties that really understand the production process and are capable of acting like a true technology partner and not just a machine supplier. We selected Aircrete Europe based on their proven panel technology and profound knowledge of AAC systems as well as dynamic engineering capabilities which allowed us to reach our objectives within the set time frame and budget."

The Aircrete approach: Built-to-suit

A targeted built-to-suit approach makes every Aircrete factory unique. The majority of the equipment is manufactured in the Netherlands, where machines are fully assembled, wired and electrically tested before partly dis-assembled and shipped. As a result, minimal installation time on site is required and reduced performance risk during start-up is achieved. Every Aircrete project has an optimized sourcing strategy, implying that procurement of certain, non-core items can be performed locally (e.g. boiler, autoclaves, slurry tanks, etc.), based on Aircrete specifications and quality requirements. This approach optimizes the total investment budget for the client, without compromising performance and quality of the plant and end-product. In the next sections a virtual tour of the CSR Hebel new Aircrete plant is given, highlighting some of the implemented latest innovations.

Fig. 3:
Erection of the new facility with an existing AAC plant in operation at the back [2]

Virtual plant tour of the CSR Hebel factory

In the raw materials area, smart raw materials infeed plays a key role in the new CSR Hebel factory. Under-ground storage hoppers for sand and gypsum allow for direct tipping by delivery trucks without the need for a front-end loader. A High-Angle Conveyor (HAC) is utilized to efficiently convey below-ground raw materials to the ball mill, limiting spillage or dust creation. A high capacity ball mill (24t/hr), automatic steel ball feeding and large slurry tanks (150 m³) allow for a continues, high-volume and versatile production capability. In addition, in order to ensure maximum sustainable production levels, slurry can be produced with a mixture of fresh, stormwater and condensate water to maximize water efficiency on site. Automatic density measurement systems are integrated into slurry pipes and cement and lime are fed into silos before they are pre-weighed in separate weighing vessels prior to mixing, increasing accuracy of batching and allowing extra time for mixing the cycle.

The new CSR Hebel factory is capable of producing 300,000 m³ of AAC panels per year. Moreover, the factory is equipped to produce a very wide range of AAC panels (including 50 mm thin cladding panels), accurately profiled and able to execute Just-In-Time (JIT) orders with large variability of products. For that purpose, a unique fully automated mesh production and handling line was designed and installed. The reinforcement area is able to manufacture precision single and caged mesh of the correct configuration just-in-time for manufacturing.

Low carbon footprint

The social and environmental impact of this project should also not go unnoticed. Besides creating extra direct and indirect jobs for the local community, a strong focus on minimizing the carbon footprint has been important as well in this project. An example of this is the zero-water waste, with all water including rain directed by a water management system into an 800,000-litre basin from where it is re-used in the production process [3].

Mould handling is done as per the latest Aircrete Europe standards. As soon as the rising of the green cake is done, moulds are opened automatically and the green cake is lifted out by a grabbing crane and placed onto the cutting machine. After the mould is brushed and a thin oil layer is applied (using micro-oiling spraying technology), the mould is automatically set up in customizable lengths.

Cutting begins with cross cutting of the cake into desired product lengths (performed bottom to top with one inclined oscillating frame). A pusher subsequently pushes the cake through a High-Speed Cutting Frame where oscillating steel wires cut the product to desired thicknesses. A possibility to create a super smooth surface of the panels makes CSR Hebel absolutely unique in the region in Asia. All excess materials from the sides and top of the mould is removed and is re-used back in the production of product.

Fig. 4: New plant produces 100% panels, with 75 mm being the most popular product.

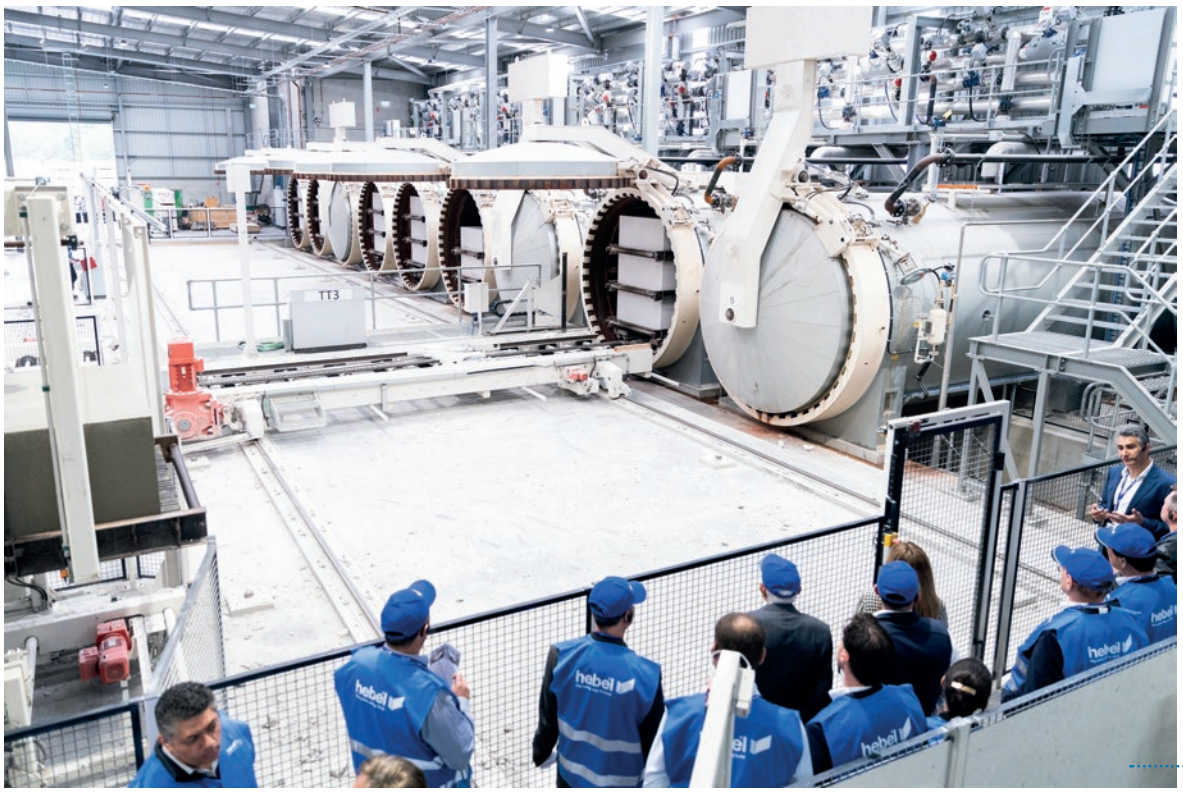

Fig. 5: Fully-automated autoclaving section of the new plant [5].

Versatility is key for CSR Hebel plant

To ensure optimized efficiency and minimal waste levels, the new factory of CSR Hebel is equipped with an automatic mould shortening option to be able to cast every mould at the exact desired length [4].

For the horizontal autoclaving process, cakes are stacked 3 layers high for maximum autoclave space utilization. Steam is re-used between autoclaves, and waste energy is recovered from vent steam and boiler exhaust gases to improve energy efficiency of the curing process. Condensate produced during autoclaving can be re-used in slurry production and pouring, maximizing water efficiency.

In the unloading area, white cakes are de-stacked and placed onto the packing line automatically and stacking pins are removed automatically. In the after-treatment sawing area, white milling and sawing creates customized profiles and patterns on the finished products. In order to achieve maximum profiling accuracy and quality, tongue and groove profiling is also performed at the white stage. All the dust and residue occurring in this area is recycled back in the process, resulting in the highest levels of operating efficiency with bare minimum waste levels.

The high-level automation and innovation of the new CSR Hebel plant is performed on the back of a very sophisticated control system that flawlessly integrates all production areas (regardless of equipment supplier) into one single plant control platform. The latest generation of plant automation allows for more efficient use of raw materials, improved safety, reduced shutdown times, full and JIT order customization and consistently faster cycle times.

Fig. 6: Each panel in a pack undergoes quality control

Australian market frontrunner of global trends: AAC panels are the future

New residential estates, retirement facilities, modern versions of terraced housing and commercial developments are among the types of projects that have fueled the demand for Hebel to expand its capacity. "The demand for Hebel building systems in medium-density living and detached living continues to increase" says Steve Zebib. "There is growing recognition of it as an innovative material that allows builders to build faster and more efficiently." AAC panels are large format reinforced elements which are easy and quick to install. Product portfolio of the new line includes horizontal and vertical wall panels, story-high partition panels, floor panels and thin cladding panels, with a focus on 50-75 mm thicknesses. For that purpose, the latest generation of flat-cake Aircrete Super Smooth cutting line was installed to perfectly address the requirement. [6]

Your technology partner

Developing and building the CSR Hebel Aircrete factory was an excellent example of teamwork between all stakeholders involved in the project, including key civil and other third-party suppliers. A unique collaboration between CSR Hebel and Aircrete Europe created the principal engineering team to design and transform CSR Hebel's requirements into new and innovative AAC production solutions to be equipped for the construction challenges and opportunities of tomorrow. Aircrete Europe is very proud to have worked together with CSR Hebel to develop one of the most advanced AAC plants in the world.

CSR Limited

CSR Hebel, a subsidiary of CSR Limited, a major stock-listed, building materials group, is a manufacturer and integrated solution provider of AAC building systems. The company is specialized in the production of AAC panels and panel building applications, ranging from wall, floor and cladding systems. Read more about CSR Hebel solutions on the company´s official website.

References

[1] Image resource: CSR Hebel website
[2] Image resource: Crossmuller website
[3] CSR Hebel website
[4] "Adjustable moulds for flexible and efficient panel production with zero waste", AAC Worldwide, 4 | 2019
[5] Image resource: CSR Hebel
[6] CSR Hebel website

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Fig. 7: Ready AAC panels buffering on the line while at the back AAC walls provide structure to the hall.