

Preconco Ltd., Lears, St. Michael, Barbados

The most modern vertical circulation production line for structural and architectural precast concrete in the Caribbean and possibly in the western world

Preconco Ltd., located in Lears, St. Michael, Barbados, had established themselves as the Caribbean's premier manufacturer of precast concrete even before they decided to invest into new hollow core and wet cast production facilities in 2006/2007. After having installed the new equipment and having taken it into operation now completely, their market shares in the Caribbean will continue growing significantly.



Fig. 1: The Preconco plant is located on an eight-acre location in Lears, St. Michael, Barbados

Starting precast in Barbados in early 90s

Barbados is a Caribbean island sized 430 km² with approximately 280,000 inhabitants and with very good educational standards. Tourism has become the most important economic factor, but in principle Barbados is relatively independent since they have their own oil reservoirs and cement production facilities, just to mention two of the most important industries. Residential housing historically followed timber and concrete block construction, as well, before precast concrete was introduced

into the market in the early beginnings of the 90s.

At that time, Preconco Ltd. started their business on an eight-acre location in Barbados, mainly with structural precast, wall and flooring production. Preconco produced all kinds of precast on a large steel bed that was 70m long by 7m wide, and they added an Extruder line for the production of hollow core floor panels later, as well. When the group felt the market needs, they also added a roof tile production line from Vortex Hydra, Italy, to offer to the customers high quality roofing solutions, as well.

The Vortex Hydra plant has a daily capacity of 4,000 roofing tiles per 8-hour shift and it is served by an 1,5 m³ SmartMix mixing plant from ACT, using silica sand for the production, only. Located on the same property as Preconco, this business was initiated as CemTile Inc. in 1995, and it became one of the largest manufacturers of cement roofing solutions in the Eastern Caribbean, especially with their second plant located in Trinidad, serving the other parts of the Caribbean.

Right from the beginning, the philosophy of Preconco was to develop, manufacture and



Fig. 2: A Zenith 940 multilayer concrete block machine is producing either 25,000 pavers or 10,000 concrete blocks per 8-hour shift, served by an ACT SmartMix mixing plant



Fig. 3: Preconco attaches great importance to teamwork



Fig 4: The Spancrete GT 240 slipformer is producing 150,000m³ hollowcore slabs per year on two beds 115m long

complete buildings in shortest time, at the most economical cost, focusing on quality, aesthetic appeal and structural integrity. When they started in 1993 with eight employees, it was the perfectly right time to establish the precast business in the Caribbean. Since then, Preconco specialized in the production of structures for condominiums, hotels, marinas, commercial and industrial buildings as well as residential housings, always having in mind to improve the living standards in the Caribbean.

Responsible for the success story of Preconco is Mark Maloney, Managing Director and shareholder of Preconco from the first day of operation. Grown up in Canada and in the USA he spent most of his time in Barbados, living the Barbadian philosophy of "Pride and Industry". Reinvesting nearly of all the profit into the company was the key to success to separate them from any competition in this business in the Caribbean. In 2004, the group started another business on the Preconco property named



Fig.5: The hollow core slabs are cut to size after curing



Fig. 6: A vertical circulation production plant was the solution Ratec designed for Preconco



Fig. 8: The concrete distributor is served by a forklift currently. Later a flying bucket conveyor system will speed up the delivery of the concrete.

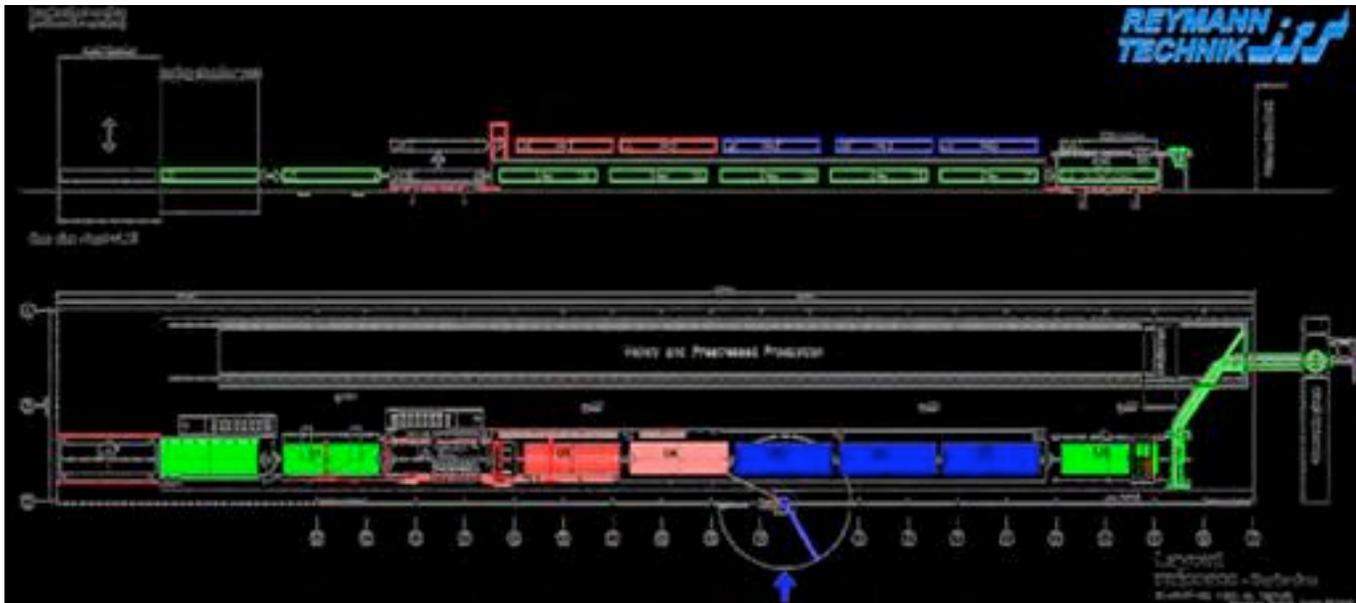


Fig.7: Layout of the Preconco plant. From autumn 2008, a flying bucket conveyor will be added to the plant to serve both the concrete distributor of the circulation plant and the Spancrete plant, as well.

“Creative Paving Solutions Inc” when they purchased a new Zenith 940 multilayer concrete block machine that was put into the same hall like the roofing tile machine, so it can be served by the ACT SmartMix, as well. When producing pavers with this machine, they can manufacture 25,000 pavers per 8-hour shift, and the daily concrete block production capacity is 10,000 blocks per 8-hour shift. For the Zenith machine, Creative Paving is using so called “mixed quarter” (0-6 mm) aggregates and silica sand. If they produce colored pavers, they are using Caemlink synthetic iron oxide delivered from China, and they are coloring the whole stone, not face concrete only.

10m USD investments to become one of the most modern precast plants in the western hemisphere

Since a couple of years, Preconco is already a member of the National Precast Concrete Association NPCA and the Precast/Prestressed Concrete Institute PCI. When they purchased a new hollowcore line from US based manufacturer Spancrete in 2006, they became also a member of the Spancrete Manufacturers Association SMA, as the only Spancrete producer in Barbados.

John Pinto, Preconco Plant Manager, said: „Since I started at Preconco in 2001, I was always convinced by the straight-forward strategy of this company. But it’s not only

strategy – it’s also fun, and a challenge, to work with up-to-date equipment and people who are always thinking on the cutting edge.”

In total, Preconco spent around 10m USD in the last 4 years for modern equipment to improve the precast facilities. “I eat, sleep and breathe precast” says Maloney, whose passion is car racing. “Speeding up the production of high quality precast is exactly what we were looking for. My vision is to see the precast industry become the industry of choice for any type of building throughout the world and to see people accept change as a way of life as our intention is to become more efficient and effective at what we do daily”

Operations Manager, Chandran Valappil who joined the company in 2005 after being in the steel industry for 25 years, said: “from the day I visited the facilities and got a feel for what was going on and what was the intention of the company, I immediately made up my mind to join the dynamic team and to see the company grow from strength to strength is heartening”.

Hollow core production plant

The Spancrete plant was put in 2006 into the production hall where they were producing precast on the 70m steel bed, as well. Due to restrictions of the location of the factory, everything had to be put inside the existing 160x25m hall. On two 115m beds of

2,4m width each Preconco is producing with the GT 240 Spancrete Slipformer 150,000 m² hollow core products per year. The average production speed is 2,5m/min, and their product range is from 100-250mm thickness for the slabs.

Bed preparation is taken care of with a Multifunction trolley from Spancrete that is able to clean and oil the beds, as well as laying the prestressing strands onto the beds. A single strand prestressing machine from Paul, Germany, is used for the prestressing operations.

Depending on the needs, Preconco is able to produce 1,2m or 2,4m width floor slabs. For 1,2m slabs, they are using clamps for handling procedures, and for 2,4m slabs, they are using hooks that are cast into the slabs by filling the holes with concrete. Additionally, shear reinforcement is used when they are producing 2,4m width slabs to reduce cracking during handling of the slabs. For curing purposes, standard blankets are being used. In CPI 1-2007, an article about the new Spancrete plant was published already, earlier.

Vertical circulation production plant

When Preconco decided for an additional investment to increase their precast productivity, they visited several circulation plants in Europe. Impressed from speed and quality of this production process, Preconco still had to work with the constraints given by their production hall. The goal was to dou-



Fig. 9: The pallets are transported through a tunnel to the other end of the production line for curing. A rack feeder puts in the pallets into the curing chamber

ble the productivity for solid wall panels from 75,000 m³ to 150,000 m³ per year within the same space, with less people and a better quality.

Since 2002, US based Ratec LLC were already supplying Preconco with magnets and shuttering systems for the precast production on the 70m steel bed, so they were very familiar with the boundary conditions given at Preconco. When Ratec were asked about a possible solution for a new plant, their proposal finally developed by Reymann Technik was to design a circulating production plant for 24 production pallets sized 13x4m that would circle vertically, not horizontally, as usual. This design is unique for the western hemisphere and considering that there are only very few operating circulation production plants in this part of the world, it was quite a challenge for all parties concerned.

Maloney was totally convinced by this proposal: "The concept with the vertical carousel plant is easy to follow - and to evaluate: There is no bypass, just a straight production line. Every pallet has to be in time to guarantee a proper production. This concept has to be understood by the people, but once they do, they like it a lot!"

Fig. 7 shows the layout of the new plant that was completely designed, commissioned and taken into operation from Ratec LLC, cooperating with their German sister company Reymann Technik including their well-known German machinery supplier network.

Nearly exactly following the planned schedule, the plant was taken into operation within only two weeks after delivery. Since Preconco kept some possibilities to produce precast conventionally, they nearly did not have any production breaks during the erection and commissioning phase of the new plant.

Production process

After being poured with the concrete distributor and vibrated on the ground floor, the production pallets are passing through a tunnel of about 80 m length before they are put by the rack feeder into the curing chamber rack that is designed to hold 15 pallets. Due to the Caribbean weather conditions, after a very short curing time of 4 hours only, the pallets are taken out of the rack again to be delivered to the tilting station. The tilting station U1 is designed to enable other pallets to bypass this station during the demoulding process. The hardened ele-



Fig. 10: The tilting station U1 is designed to enable other pallets to bypass this station during the demoulding process. Mark Maloney MD Preconco (left) and Mathias Reymann, President Ratec, are convinced that the circulation process for precast production is an optimal solution for a production of modern precast concrete walls.

ments are manipulated by crane and put directly onto specially designed transport racks. On these racks, the elements are brought to the building sites just in time.

After demoulding the pallets, they are lifted to the second story of the plant, around 1,2m high. Pallets underpass the control room before they are cleaned automatically, likewise the moulds that were taken away at the demoulding station are cleaned.

At the following stations U3/U4, steel moulds are placed after oiling the pallets with a sprayed vegetable release agent. To fix the moulds, Preconco continued to use established Ratec magnet technology.

For the handling of the moulds special cranes are used that enable the worker to place the moulds without heavy movements exactly onto the lines that are prescribed by a laser system that is mounted below the

ceiling of the hall. A second laser system positioned above U5 station marks the positioning of the reinforcement and of inserts, so it is very easy and fast to equip the pallets with everything that is needed.

The reinforcement is processed in another hall next to the production hall. Preconco is using two rebar straightening and shear lines from KRB, so they can make use of coil material to be very efficient. For all diameters 8/10/12/16 mm, coil material is being used. For bigger diameters, Preconco are using standard rebar steel. After being prefabricated, a special crane brings in the reinforcement from outside and puts it directly onto the production pallets at U5/U6. Preconco are using special plastic spacers that they designed themselves up to their needs and that are produced by Universal Building Products.

After a final quality control at U7, the pallets are lowered onto the vibration station before being poured with concrete again. The concrete distributor allows storage of 4m² of concrete, and it is using snakes for the exact placement of the concrete above the moulds.

The concrete itself is produced with a 2m³ twinshaft mixer supplied by Elematic that was installed already in 2000. Preconco is using CEM I 42,5 cement, domestic limestone 10/12 mm and silica sand. As admixture, they are using BASF superplasticisers for the wet cast operation. The mixing and batching plant with an outdoor storage of aggregates and a collecting belt conveyor is being used for both wet cast and dry cast operations, and currently the concrete is brought either with a forklift or with a Tuckerbilt concrete transport vehicle to the Spancrete machine and to the concrete distribution. From autumn 2008, an automa-

ted flying bucket conveyor system will be used for the concrete delivery from the mixing plant to the production machines.

Efficiency through preparation

To optimize the productivity of a circulation pallet production plant, special design software is essential that is able to lead through the whole process. Preconco decided at BAUMA 2007 to cooperate with the German software company IDAT. Their software system that is based on AutoCAD can be used to design complete buildings even in 3D and it facilitates an automated production plant perfectly.

IDAT adopted their software to the individual needs of Preconco and taught the engineers of Preconco to perfection even before the new circulation plant was taken into operation.

Starting with building drawings, the IDAT software now takes care completely about the optimal precast element size, the drawings for moulds, the reinforcement, placement of inserts etc. All these data are given to the laser system that marks the position on the steel pallet in the production plant. Preconco is using the software in the meantime for the production planning of all precast operations: hollow core slabs, wall panels and conventional precast like stairs, columns and beams.

Even the assembly of the elements on the transport racks for the trucks – and for the transport by boat, because Preconco is shipping 20% of their production capacity to other islands into the Caribbean – is taken into account by the software. Therefore, the amount of precast elements being stored in the stockyard could be reduced significantly.



Fig. 11: A cleaning station with brushes is cleaning the pallets



Fig. 12: Ratec magnets are used for moulding process that takes place on the upper level of the circulation plant.



Fig. 13: A special lifting equipment enables the worker to position also heavy moulds easily

Development of precast projects from A-Z

With their own fleet of vehicles and cranes and their own installation teams Preconco does not only produce precast elements but they also develop complete projects up to the sales activities of complete homes. Since Preconco started their operation in 1993, they completed projects with a total of more than 10,000 condominiums and a variety of hotels, marinas, stadia and prisons. The turnover of the company's production facilities reaches 50m USD per year, and the development department gives additional turnover of 25m USD per year.

In total, around 200 people are working for Preconco today.

Since Preconco was very much involved into the development of affordable housing and middle-income housing, the group started another precast business in 2007, named "Caribbean Homes". In this precast plant specially designed for a certain number of given house types, they are producing 1,5 homes per day. With this producti-

on capacity, they are currently developing a housing project with 700 homes in Barbados that are sold starting from 40,000 USD only.

Caribbean Homes will be exporting these kind of affordable and middle-income homes also to other islands in the Caribbean, following the idea of improving the living standards for the people in this area. Including their own installation teams



Fig. 15: The mixing plant from Elematic is serving both the dry cast and the wet cast operation



Fig. 14: KRB straightening and shear lines are used for the rebar processing. After preparing the reinforcement in the other hall, it is brought to the pallets by crane from outside

Fig. 16: Special delivery racks are used for transporting the wall panels

of Caribbean Homes, more than 350 people are working for that company. Besides marketing precast concrete and precast projects to engineers, architects and developers, Maloney is currently establishing a precast concrete association for the Caribbean, bundling the knowledge and the marketing activities for precast concrete.

Mathias Reymann, President of Ratec LLC, is talking about his demanding Barbadian cus-

tomers with pride: "Preconco Ltd. is an excellent collection of open-minded, responsible people. All of them; the engineering department, operation and plant management, understood the difference between conventional precast production site and a fully automated, CAD operated carousel line, and they are earning the advantage out of this today. Our family-owned business in Germany proved for long being able to design capacity- and profit-oriented precast

plants all over the world, and we are proud having Preconco satisfied being our first customer for a complete plant in the US. With our US based Ratec LLC, we are looking forward to successfully continue presenting the concept of automated precast production in The States."

Living in precast concrete houses that are resistant to hurricanes, termites and earthquake is a huge improvement compared to



Fig. 17: The office of Caribbean Homes gives an example of the superior quality of the product



Fig. 18: One of their current projects is including the turn-key delivery of 700 affordable homes, starting at 40,000 USD sales price in the Caribbean

wooden homes that are still dominating the Caribbean and huge parts of the US. Preconco Ltd. with their new production plants is already groundbreaking and continuing to establish their position as the leading precaster in the Caribbean, having already more than 70% of the precast market share in that region.

The new Preconco plant is absolutely comparable to modern European precast plants and it is fulfilling all international production standards. ■

FURTHER INFORMATION



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Fig. 19: The range of products Preconco delivers to the Caribbean includes affordable, middle-income and luxury homes, condominiums, hotels and many more. High quality precast concrete is always providing the structural system.