The construction industry in South America differs greatly from country to country. However, the need for living space – and above all, affordable living space – is present everywhere and is growing. In the stronger economies with correspondingly higher wages, rationalisation measures and efficient production technologies are becoming increasingly important in order to attain the goal of creating affordable living space. The demands on the quality of the elements often increase at the same time. Innovative, practice-proven production technology for the precast sector is therefore growing in importance. Several current projects demonstrate the unique features and special solutions for the Latin American construction sector.

Panama: Technological planning for solid element production

Panama remains one of the region’s fastest growing economies. The drivers of the development in the construction industry are above all the infrastructure projects. However, investments are also being made into residential construction.

Amongst other things, a modern pallet circulation plant for the production of precast concrete elements went into operation last year. Reymann Technik was awarded the planning contract, amongst other things on account of its existing references in Central America (e.g. in Barbados).

The plant mainly produces solid elements for the erection of detached houses with one or two storeys. In addition, it is already set up for a possible extension for the production of double walls. The setup has been consciously planned to be as open and flexible as possible because, like almost all markets in Latin America, there is little standardisation in the market in Panama, meaning that wall thicknesses and other element specifics are subject to strong fluctuations. The goal, therefore, was to enable the customer to produce a large range of products.

The plant is designed for a capacity of 500 m² of solid walls per shift. Special features are the automatic storage and retrieval machine, an automatic concrete distributor, a shuttering robot and the mixing plant. Reymann Technik’s services included the technological and layout planning, and support with the implementation planning and commissioning of the plant. The engineering office thereby acts as an independent adviser and technical contact and thus enables holistic planning to the customer’s advantage.
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Chile: Country’s first automated circulation plant equipped with shuttering

According to the forecasts, the Chilean construction sector has left the bad times behind. Experts estimate growth of 1 to 3 percent in 2018. Trend topics are above all precast construction as well as the use of biomaterials, robot-assisted plants and planning software (source: GTAII). On account of its volume and work intensity, the construction industry is a relevant economic sector in Chile. Also, Chile has one of the highest per capita incomes in South America – a further factor that is forcing the construction industry to invest in efficiency-increasing building and construction methods.

Baumax, a Chilean consortium of various specialists, took a decisive step towards the future in 2017 with the start-up of its automated circulation plant for the manufacture of steel reinforced concrete elements for residential and industrial construction. The production facility is the first automated circulation plant for the manufacture of precast concrete elements in Chile.

Fig. 2a: Shuttering with integrated loop

Fig. 2b: Horizontal grouting groove with wire rope loop boxes

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The product range, which includes simple solid elements (walls, floors) and double walls, can be flexibly adapted and used, for example, for the construction of houses, buildings, schools, hospitals, tanks and swimming pools.

The shuttering solution was developed and supplied by Ratec. The particular challenges for the shuttering concept were firstly to tailor it to suit the automation and secondly to make a suitable proposal for the partly complex details of the construction system developed by the customer.

The use of wire rope loops was foreseen for the connection of the elements. For economic reasons the customer wanted to have an alternative to conventional wire rope loop boxes.

To solve this, Ratec developed robot-compatible shuttering with integrated wire rope loops as well as grouting groove profiles for positioning on the shuttering or pallet, to which single wire rope loop boxes can be individually attached.

In the case of shuttering with integrated wire rope loops, the latter are held in place in the shuttering profile by a PE insert. The PE holder can be pulled out of the shuttering for stripping, subsequently removed from the loop and reused for the next concreting procedure.

In order to implement corner joints in the element, a magnetic grouting groove profile was developed for placement on the pallet or shuttering along with a matched positive-locking magnetic box with integrated loop for setting on the grouting groove profile. These magnetic boxes can also be removed after concreting and reused. Only the wire rope loop remains in the element.

The prerequisite for the implementation of this solution was the static approval for the connection solution described by the competent building authority, which was confirmed in the specific project. The shuttering was virtually refinanced due to the saving of costs using the wire rope loop connections. Usability in other projects is ensured in the case of static approval by the respective regional authorities.

**Peru: Second modular housing project at planning stage**

Like Chile, Peru is one of the countries with a very high demand for affordable and above all earthquake-proof living space. The construction sector is growing here, too, firstly due to government housing building programmes, and secondly driven by a strengthened middle class and attractive credit conditions for house buyers.

The first upcrete modular house production went into operation as early as 2013 in Ica, Peru. This was planned and also erected by Reymann Technik as the general contractor. The modular formwork and upcrete pump technology were developed and installed by Ratec. One of the special features of the plant and the decisive advantage in the use of the upcrete method was the possibility to produce the room modules di-

![Fig. 3: Shuttering with integrated wire rope loops.](image)

![Fig. 4: Construction progress in the “Las Piedras de Buenavista” settlement in Ica, Peru](image)
PRECAST CONCRETE ELEMENTS

directly in the installation position with very high surface quality. This saves rework and accelerates the construction process.

Over the course of the project, a total of 3,600 houses, each with 3 rooms, 70 m² of living space on two floors and a patio and garden of their own will be built on an area of 1,000,000 m² in the “Las Piedras de Buena Vista” settlement. 1,300 houses have already been built. Demand is still very high for the owner-occupied houses, which are quite affordable at around 25,000 USD.

The plant is currently producing up to three houses per day, each consisting of three room modules, six partition and privacy walls, stairs, balcony and two roofs.

The construction of further settlements in Ica, such as “Las Viñas” and “Jardines del Edén” has already begun in parallel. Other house types are being built here from room modules, which are likewise manufactured in the existing modular formwork in the plant in Ica.

Motivated by the success of the first project of its type, the developers are planning a follow-up project in the north of the country. It is already certain that Ratec and Reymann Technik will once again design and erect the production facility. The modular formwork required for this, which have to be adapted to the revised architectural designs, are already under development.

The new plant will be designed to produce two houses per day with three modules each or three houses per day with two modules each in the first step. In a further step the capacity will be extended to four houses with three modules or six houses with four modules. Commissioning is planned for 2020.

“We have further customers in almost all Latin American countries, who have chosen magnetic shuttering technology from Ratec”, explains Jürgen Deppe, head of Ratec SLU in Spain, who is responsible for the Latin American customers.

"The Latin American market for precast concrete elements will continue to grow strongly in the coming years. However, poor standardisation and a lack of infrastructure in many places for the transport of large precast concrete elements make it a very demanding market in which custom solutions stand to the fore. Ratec and Reymann Technik are very well prepared for these requirements as both a developer and supplier of system solutions."

FURTHER INFORMATION

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Fig. 5: Further house types for follow-up settlements being created in the plant in Ica
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