

PRESS RELEASE

Weinsberg, 4 December 2019

Gamuda IBS revolutionizes Malaysia's construction industry

Modern precast architecture is rapidly changing the faces of Asia's megacities. Gamuda IBS is currently setting a highlight in system construction in Malaysia. With the Industrialized Building System (IBS), up to 50-story residential buildings will be possible in the future - in only two thirds of the time to date. The Malaysian construction specialist in Banting is currently expanding its capacities for this purpose.

Malaysia is known for its beaches, rainforests and diverse cultures and people. The capital Kuala Lumpur combines tradition and modernity. Colonial mansions, lively shopping districts like Bukit Bintang and skyscrapers like the famous 451 m high twin towers of the Petronas Towers fascinate every visitor. In order to create new living space for the growing middle classes, to conserve resources such as cement, sand and steel and at the same time to reduce dependence on low-skilled foreign workers, Malaysia is specifically promoting the automated, industrial pre-production of resource-saving precast concrete elements. The goal of Malaysia's state housing ministry is to create more than 200,000 new housing units by 2020 and at the same time increase construction site productivity by 25%. Several government building subsidy programmes have already been initiated, so that CITP 2020 (Construction Industry Transformation Programme).

10,000 residential units per year for mega construction projects

Against this background, the Malaysian construction giant Gamuda IBS expanded its construction portfolio in 2016. "System construction with prefabricated concrete elements is changing the whole of Asia today. We want to be a pioneer in Malaysia," says Tan Ek Khai, General Manager at Gamuda IBS. And they think sustainably and have visions. "From the outset, our goal was to produce more than 10,000 residential units a year for our own construction projects, but also to supply other property developers and real estate developers in Malaysia and throughout Southeast Asia. We have already achieved this goal in 2018, i.e. in less than 2 years". In July 2016, the first plant location opened in Sepang, 200 km northeast of Kuala Lumpur. 3,000 residential units are produced here every year. "A construction system with solid concrete elements, structural concrete parts and facade elements. The Jade Hills residential development project of Gamuda Lands in Kajang with 714 high-quality apartments was handed over to the buyers one year ahead of schedule.

Just under 2 years later, due to the high demand in Banting in the district of Kuala Langat, it was decided to invest in another strategic plant location in Malaysia. "With Malaysia's most modern precast concrete plant, we now not only produce more than twice as much capacity as in Sepang, but also prefabricated bathroom modules and the double walls that are new to Malaysia," explains Tan Ek Khai.

The layout planning process for the plant concept in Banting was carried out by Prilhofer Consulting as an independent consulting firm, parallel to the analysis of the concrete elements to be produced and the required capacities. With the secured data, the developed concept was tested several times using a simulation model and various shift models, taking into account their effects on plant productivity. After all plant and performance requirements had been defined, a specification document was created for each part of the machine technology. Based on this, Gamuda IBS and Prilhofer Consulting issued an invitation to tender for the plant technology, in which the German concrete plant specialist Vollert successfully positioned itself against its competitors. Prilhofer Consulting was also responsible for the implementation planning and project management, in close coordination with the Vollert project team.

Digital IBS, BIM, Qlassic: from the walls to the bathroom module

Industrialized Building System (IBS) is a term used in Malaysia for a building system in which walls and slabs are industrially prefabricated and later installed on the construction site. In 2003, the government approved the Construction Industry Development Board's (CIDB) IBS Strategic Plan and the IBS Roadmap (2003-2010) to increase the efficiency and productivity of the local construction industry. This was followed by the IBS Roadmap (2011-2015) and the already mentioned CIP 2020 (2016-2020). This prompted the Gamuda Group to invest in Malaysia's first digital IBS precast concrete plant in 2016. BIM-based technology makes it possible to produce a variety of walls, slabs or structural concrete elements for modern architectural building systems, whether for residential buildings, schools and universities, hospitals, hotels or mega office complexes. This is done according to the customer's wishes in half the time, first virtually in 3D, then industrially with innovative CAD-CAM robotics and high automation in series production, which enables the exchange and transfer of relevant information regarding drawings, material stocks, inventory and logistics. "This effectively reduces waste to less than 1% while optimizing efficiency and productivity," Tan said, adding that this environmentally friendly method also keeps construction sites safe, clean and well organized. In addition, BIM design details are always accessible to architects, structural engineers or electrical engineers on a digital data

platform. "The new building system is of high quality, affordable for many social strata, durable and environmentally friendly", Tan Ek Khai explains. "Gamuda IBS is well positioned to help the government achieve its 2020 goal."

From 2019, 7,000 residential units and 16,000 bathroom modules per year will be produced in Banting for mega construction projects throughout Southeast Asia. "With the double wall production, 50-storey residential buildings in IBS construction can be realized – in only two thirds of the time to date. In terms of construction speed, we are unsurpassed because we can produce and install IBS wall and slab elements per week for a residential floor with 84 m² of apartments. Conventional floor-by-floor construction cannot keep up here," describes Tan Ek Kai. "But it's not just about more height and quick construction times, it's just as important to us to have at least as high a sustainable construction quality. Gamuda IBS strives to achieve high quality construction results by having its construction projects certified according to Qlassic, the quality assessment system for building construction managed by the Construction Industry Development Board (CIDB) of Malaysia. Qlassic was developed in response to numerous complaints and building defects that construction quality is a highly subjective matter, as it is sometimes difficult to define and quantify. In 2005, however, CIDB worked with public and private stakeholders to develop the standard for the construction industry, which forms the basis for some basic quality requirements that planners must meet. However, Qlassic's project certification remains voluntary. "The average Qlassic score for residential projects where projects are independently rated ranges between 75 and 76 points (out of 100). "As far as Gamuda is concerned, we want to score a high 80 for every construction project we develop," says Tan. In order to maintain these tight tolerances, we rely on the industrial, dimensionally accurate pre-production of walls, slabs, room modules and façade elements in a planable and controllable factory environment. At the construction site, assembly is only carried out according to precisely specified assembly plans."

Highly automated machine technology ensures maximum plant productivity and a consistently high quality level of the precast concrete parts. The intelligent MES production management system from the automation specialist RIB SAA Software Engineering is used to optimally clock in the walls and slabs in the order planning list on the production side, to manage storage and retrieval sequences as well as curing times and loading processes. State-of-the-art machine technology ensures efficient and highly productive work processes. Precision high-performance robots, turning and transport equipment as well as fully automated clocking of all processes and transport routes ensure an ever-increasing degree

of automation in the precast concrete plant. This is not only important with regard to plant productivity. This also ensures consistently high quality standards and lower concrete and material scrap, thus increasing resource efficiency.

Sophisticated and lean down to the last detail

"From the very beginning of the planning phase, we have dealt very intensively with the requirements of Gamuda IBS and Prilhofer Consulting. In order to produce 7,000 residential units annually, industrial prefabrication requires an intelligent system concept for flexible processes and a high degree of automation with the latest robot technology," explains Steffen Schmitt, Executive Sales Director South East Asia at Vollert. A lot of know-how was brought in into the realization of the concept and the latest machine technology has been integrated. This ensures consistently high quality standards and reduced concrete and material waste, thus increasing resource efficiency.

"Everything was trimmed to the highest system productivity," Steffen Schmitt continues. Several transport lines installed in parallel run through the various work stations such as the reinforcement stations or the concreting area. For flexible adaptation of the processes, work is sometimes carried out simultaneously on several working levels one above the other, as in double-wall production. The VARIO STORE storage and retrieval machine takes the pre-hardened top shell from the curing chamber and transports it at ground level to the VARIO TURN turning device. The finishing of the concrete surface of solid concrete parts by several electric VARIO SMOOTH smoothing machines with wing adjustment and adjustable rotation speeds, which move in longitudinal and transverse direction, takes place on a working level directly above. The exit area from the VARIO CURE curing chamber is also open. Here are two further smoothing stations for finishing the solid walls. Efficient processes also determine the loading technology. The vertical lifting of the solid parts and double walls is carried out by three VARIO TILT high-performance tilting stations. This is done up to a maximum tilting angle of 80°. A hydraulically movable support beam moves against the precast concrete part and prevents it from slipping during the tipping process. Loading takes place directly in transport racks.

In addition to intelligent processes, automation at Gamuda IBS plays a decisive role in plant productivity. Robotics and industry 4.0 are the buzzwords here. With the SMART SET line, Vollert shows what is possible here today. The SMART SET shuttering robot is a multifunctional robot of the latest generation that combines innovative technology with precision and high performance values at travel speed and acceleration. Depending on the

wall or slab type, the 70 to 200 mm high shuttering profiles are positioned on the two parallel SMART SET robot lines under CAD/CAM control and the contours for built-in parts and reinforcement components are preplotted. The robot lines have separate safety areas so that work can continue in a robot area even in the event of malfunctions. "Thanks to robot technology and automated processes, we can move 7-8 circulating pallets through this work area every hour," explains Steffen Schmitt. For the demoulding process, modern 3D laser and camera systems scan the surface of the circulating pallet and register the type and position of the profiles before two SMART SET robots remove them. SMART STORE magazing robots take over the intermediate storage of the stop-off profiles in the storage magazines after stripping or transferring them to the feed section for the next shuttering process.

The reinforcement mats and the lattice girders are then inserted via a fully automatic AWM reinforcement system. Installation parts such as sockets and window frames are set manually. A workstation system provides all the necessary special parts in a particularly ergonomic manner and also has a tool transport trolley that can be moved sideways. This takes place on 3 parallel transport lines. Depending on the construction project and the degree of utilisation, preparatory work for the element slabs or top and bottom formwork of the double walls can be carried out simultaneously. Downtimes or waiting times are minimized and plant productivity significantly increased. For the exact positioning of the built-in parts, reinforcement supplementation and quality control, a total of 9 laser projectors are installed at the manual workstation stations.

The specially designed bucket conveyor system supplies the concreting process from a central mixing plant. The planning specification of an online signal exchange between concrete distributor and bucket conveyor with variable transfer positions guarantees short travel distances of the concrete distributor to the concrete transfer and maximum available effective concreting time. A fully automatic SMART CAST concrete spreader moves across a bridge chassis between the three concreting stations. A total of ten discharge augers ensure exact distributing of the concrete. Compaction of the concrete by means of a combined VARIO COMPACT² shaker/vibrator station per concreting line ensures an optimum upper shell of the solid concrete parts in exposed concrete quality, as well as compaction of the more heavily reinforced load-bearing shell in double walls. A fourth shaking station is installed in the area of the turning device. The low-frequency shaking movement is generated by four unbalance drives and the concrete is compacted as a result. Depending on the dead weight

of the concrete element, the unbalances are synchronised in different ways. This enables an optimum circular shaking movement with low noise emission.

Visionary invests in Malaysia's future

"Gamuda IBS will change the building system and architecture in Malaysia," says Steffen Schmitt. Currently, 664 residential units are under construction in Gamuda Gardens in Sg Buloh and other affordable housing projects for Selangor State Development Corp (PKNS) in the Cyber Valley and Worldwide Holdings Bhd in Puncak Alam. Gamuda IBS also uses the new building system for its own residential projects Gamuda Gardens and Gamuda Cove. A number of city villas, terraced houses and exclusive bungalows are currently being built there.

About Vollert Anlagenbau GmbH

With more than 370 built precast concrete plants, Vollert Anlagenbau GmbH has become worldwide one of the leaders in technology and innovation in the precast concrete industry since 1925. Vollert always offers its customers state-of-the-art technology, from simple start-up concepts to highly automated multifunctional plants and systems for large and structural concrete elements or prestressed concrete sleepers for tracks and rail networks.

The specialists provide manufacturers of construction materials, construction companies, and property developers with advice on the latest developments in precast concrete manufacturing technology and devise customized, turn-key plant and machine concepts, ranging from high-performance tilting stations and battery moulds for stationary production to automated circulation systems and special formwork, for example, for columns, beams, and prefabricated staircases.

Vollert's plant and machine solutions are deployed in more than 80 countries around the world and in Asia and South America the company's own subsidiaries strengthen in addition the sales activities. Vollert employs more than 300 people at its company headquarters in Weinsberg. **www.vollert.de**

Press contact

Frank Brost

Senior Marketing Manager

Vollert Anlagenbau GmbH
Stadtseestr. 12
74189 Weinsberg/Germany
Phone: +49 7134 52 355
Fax: +49 7134 52 203
E-mail: frank.brost@vollert.de



Image 1

Depending on the wall or slab type, the 70 to 200 mm high shuttering profiles are positioned on two parallel SMART SET robot lines controlled by CAD/CAM.

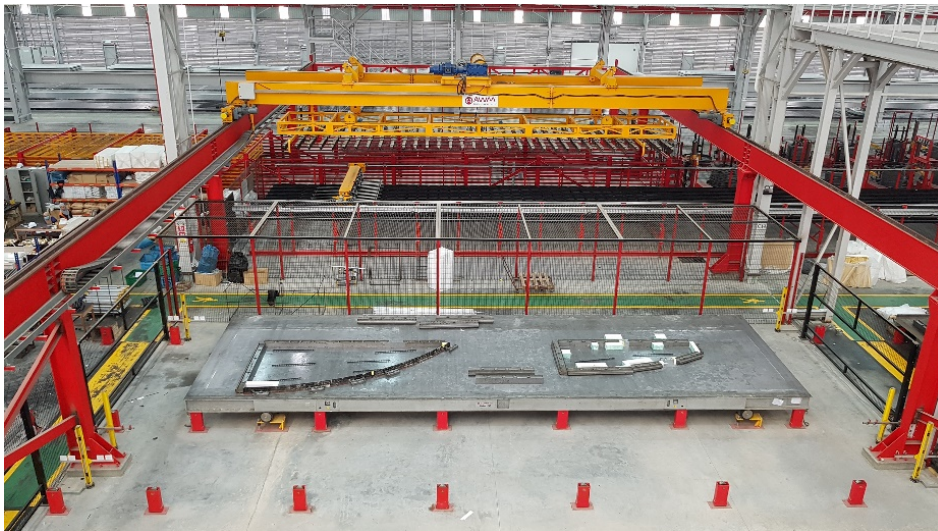


Image 2

Reinforcing mats and lattice girders are inserted via a fully automatic AWM reinforcement system.



Image 3

9 laser projectors are installed at the manual work stations for the insertion of the built-in parts, reinforcement supplementation and quality control.



Image 4

The planning specification of an online signal exchange between concrete spreader and bucket conveyor with variable transfer positions guarantees short travel distances of the concrete spreader to the concrete transfer.



Image 5

A Vario STORE storage and retrieval machine takes over the efficient storage and retrieval of the semi-finished concrete elements for the curing process.

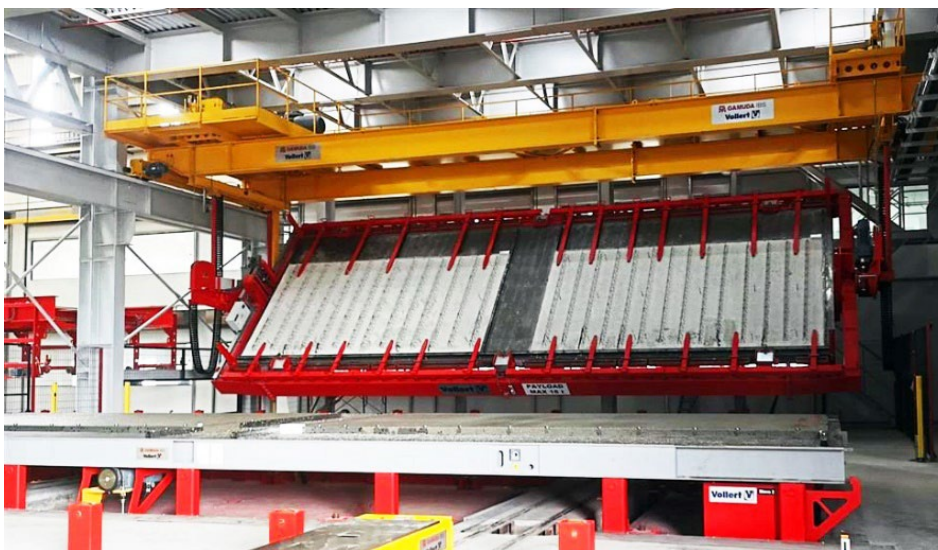


Image 6

Double walls, novel for Malaysia, are also manufactured in Banting.



Image 7

The exit area from the VARIO CURE curing chamber is open. Here there are two further smoothing stations for finishing the solid walls.



Image 8

After the fully automatic, robot-controlled demoulding process, the precast concrete parts are moved to the loading process.



Image 9 (Source: Gamuda IBS)

The MES production system of the automation specialist RIB SAA Software Engineering controls all processes and manages the loading procedures.



Image 10

Precast concrete parts ready for transport to the numerous construction sites of the Gamuda Group.



Image 11 (Source: Gamuda IBS)

The goal of Malaysia's state housing ministry is to create more than 200,000 new housing units by 2020.