



Concrete Plant International

منشأة الإسمنت العالمية

1 | 2022

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Dr.-Ing. Holger Karutz



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Ready for the future!

The entire Middle East is currently still under the sign of EXPO 2020. Three of the themes of this world fair, which deal with the challenges of the present and the future, are in particular: Opportunity, Mobility and Sustainability. The construction industry is predestined to develop solutions for these areas. Hardly any other sector can set decisive accents for these three topics, and this must be seen as a global opportunity for the construction industry that must be seized.

The focus of the construction industry of the future is, of course, on forward-looking systems, and in this respect the precast industry has a great deal to offer. Precast concrete solutions are more than any other construction system able to create added value for builders and owners of buildings.

Next to excellent building physics properties, integrated electrical installations, piping for heating and cooling as well as sound absorbing solutions and more can be considered.

EXPO 2020 has once again shown how important such future-oriented solutions are, and the precast concrete industry is playing a leading role in this!

In this special issue of CPI for the Middle East region, as always, you will find current developments from the precast concrete industry.

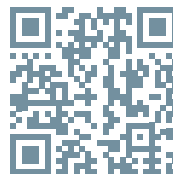
الاستعداد للمستقبل!

لا يزال الشرق الأوسط بأكمله حاليًا تحت شعار معرض إكسبو 2020. وفيما يلي ثلاثة مواضيع من الموضوعات محل النقاش في هذا المعرض العالمي، والتي تتناول تحديات الحاضر والمستقبل، هي على وجه الخصوص: الفرص وقابلية الانتقال والاستدامة. ولقد قدر على قطاع التشييد والبناء مسبقًا تطوير حلول لهذه المجالات. فقلما يمكن لأي قطاع آخر وضع حلول حاسمة لهذه الموضوعات الثلاثة، ويجب أن يُنظر إلى ذلك على أنه فرصة عالمية لقطاع التشييد والبناء يجب اغتنامها.

ينصب تركيز قطاع التشييد والبناء في المستقبل، بالطبع، على الأنظمة التطلعية المستقبلية، وفي هذا الصدد، يوجد أمام قطاع صناعة الخرسانة الجاهزة الكثير ليقدمه. ويمكن لحلول الخرسانة الجاهزة مقارنة بأي نظام إنشاء آخر إنشاء قيمة مضافة للبناء وأصحاب المباني.

بجانب الخصائص الفيزيائية الممتازة للبناء، يمكن التفكير في التريكات الكهربائية المتكاملة وشبكات أنابيب التدفئة والتبريد بالإضافة إلى حلول امتصاص الصوت والمزيد.

لقد أظهر معرض إكسبو 2020 مرة أخرى مدى أهمية مثل هذه الحلول التي تستهدف المستقبل، ويؤدي قطاع صناعة الخرسانة الجاهزة دورًا رائدًا في ذلك! في هذا العدد الخاص من "CPI منشأة الأسمنت العالمية" لمنطقة الشرق الأوسط، ستجد، كما هو الحال دومًا، أن التطورات الحالية تُعزى إلى قطاع صناعة الخرسانة الجاهزة.



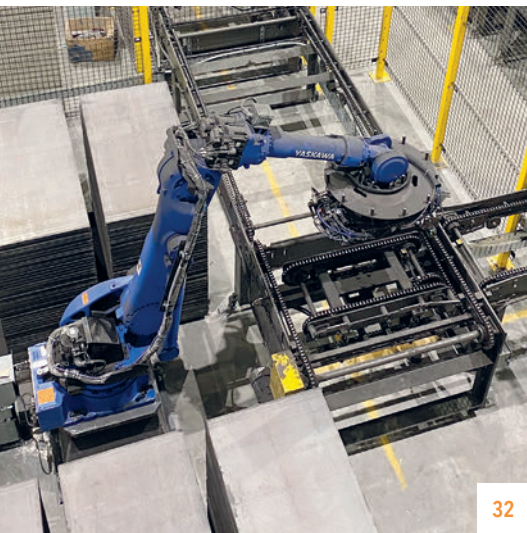
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Place of publication: ISSN:
Cologne, Germany 1862-3662

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Bank connection:
Deutsche Bank, Account no.: 6800080, BIC: 370 700 24
SWIFT CODE: DEUTDEBKOE, IBAN-No.: DE88370700240680008000

Print / Enclosures and supplement delivery:
Kopp Druck und Medienservice GmbH
Dieselstraße 2 · 50996 Cologne · Germany

Postmaster | send address changes to:
CPI - Concrete Plant International, Industriestraße 180, 50999 Cologne, Germany

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ICCX digital 365.

International marketplace for the concrete and precast industry



السوق الدولية لصناعة الخرسانة والخرسانة الجاهزة

In the past year, there have been many attempts to establish digital trade fairs. Most of them were a pure substitute for real presence trade fairs, and thus also built accordingly. Real-looking exhibition booths with various communication options that were intended to encourage interaction. From a technical point of view, the ICCX digital 365. has been the outstanding event, with over 2,500 attendees so far from more than 100 countries around the world. But nevertheless we also have to reflect that in the digital world there are offers that are more and also less accepted. Having offered live days on a quarterly basis, we now have a wealth of experience that has led us to adapt the setup of the ICCX digital 365. from March 2022 and tailor it even more to the needs of visitors and exhibitors.

في العام الماضي، كانت هناك محاولات عديدة لإنشاء معارض تجارية رقمية. كان معظمهم بديلاً مباشراً للمعارض التجارية ذات الحضور الفعلي، وبالتالي تم إنشاؤها أيضاً وفقاً لذلك. أكشاك عرض ذات مظهر حقيقي بخيارات اتصال متنوعة تهدف إلى تشجيع التفاعل. ومن الناحية الفنية، كان معرض ICCX digital 365. هو الحدث الأبرز، حيث حضره أكثر من 2500 مشارك حتى الآن من أكثر من 100 دولة حول العالم. ولكن مع ذلك، يتعين علينا أيضاً أن نعكس أنه في العالم الرقمي توجد عروض أكثر قبولاً وأقل قبولاً أيضاً. وبعد العرض المباشر لعدة أيام الذي أجريناها على أساس ربع سنوي، نتمتع الآن بثروة من الخبرة قادتنا إلى التأقلم مع إعداد معرض ICCX digital 365. اعتباراً من مارس 2022 وتخصيصه بشكل أكبر لاحتياجات الزوار والعارضين.

In the long term, we will see a return to real presence trade fairs, and we must ask ourselves what needs remain for digital platforms.

The interest of visitors to find everything they want in one place is clearly there. But the communication behaviour, on which we had put so much emphasis at the beginning with the ICCX digital 365., has changed fundamentally within one



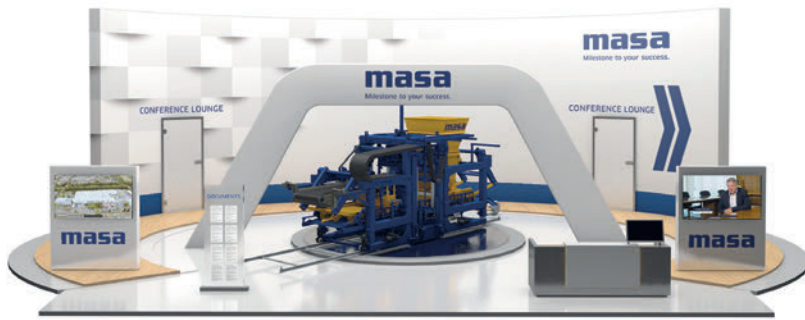
The foyer continues to be the entrance area to the ICCX digital 365. - from here there is direct access to the auditorium and the new exhibitor marketplace. Every month a new lecture is shown on the big screen - and a collection of all previous lectures can be found in the media library in the auditorium, where the lectures are also assigned to the individual categories.



All participants are found in the marketplace and can easily be selected here by name/country/category. There is also a new browse function so that visitors can quickly get a complete overview of all exhibitors.

year. Digital visitors want to find everything, quickly and directly. They want that at any time and in any time zone in the world.

At a presence fair it is different: you go to a place and you have allotted time for your stay. With a digital platform, on the other hand, you come in whenever it's convenient, and then you want to find exactly what you're looking for as quickly as possible.



The individual booths offer visitors numerous opportunities to obtain information.

This results in different scenarios for visitors and exhibitors than the previous notion of what such a platform should look like and how it should be used. And that is exactly what we are now offering with our new ICCX digital 365. based on the experience of the past year.

ICCX digital 365. - Relaunch 2022

The ICCX digital 365. remains the digital marketplace for the international concrete and precast industry, with the fastest possible access and easiest use, around the clock.

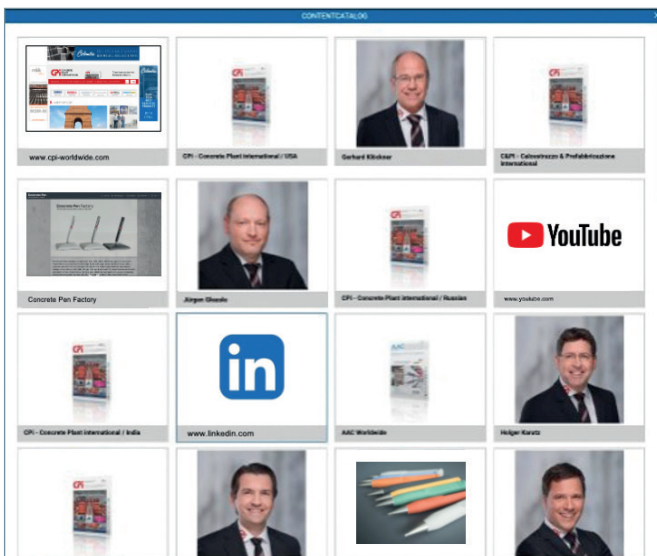
All supplier companies of importance can be found very easily here, sorted into meaningful categories.

A new browse function provides a quick overview of all exhibition booths. Also new is the content catalogue, which is stored at each booth and can be used to call up further information on the exhibitors - including a direct link to the website, which can be viewed in a separate frame within the marketplace.

In this way, interested visitors and customers can actually find exactly what they need in one place in order to keep themselves continuously informed. Contact with exhibitors can be established at any time via contact forms.

A year ago, we argued otherwise. We had placed the focus of the digital trade fair - in comparison with the presence trade fair - on the communication possibilities. Ultimately, however, it has to be said that personal, direct live communication probably ought to be reserved for the presence trade fairs and is better used there. The advantage of the digital world, however, is that all information can be made available at any time in one place, and we are now underlining this advantage with the new ICCX digital 365.

Try it out: www.iccx.digital!



Documents, videos, contact details for representatives and also links to the exhibitor's own website can be integrated in the new content catalogue, which is now included with every exhibition booth

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IFC4precast is recognised as final standard

الإقرار بمعيار IFC4precast كمعيار نهائي

IFC4precast has been officially recognised by buildingSMART International as the "Final Standard". This means that IFC4precast has been released for all software manufacturers and can be increasingly implemented. The achievement of this milestone is the result of several years of hard work and continuous commitment by the participating companies from Germany, Austria, Italy and Finland.

لقد أقر تحالف buildingSMART International معيار IFC4precast رسميًا باعتباره "المعيار النهائي". ويُعني ذلك أنه تم إصدار معيار IFC4precast لجميع مصنعي البرامج ويمكن تنفيذه بشكل متزايد. وتحقيق هذا الإنجاز هو نتيجة لعدة سنوات من العمل الجاد والالتزام المتواصل من قبل الشركات المشاركة من ألمانيا والنمسا وإيطاليا وفنلندا.

With the successful software validation, the internationally consolidated and finally approved standard was confirmed by the bSI Standards Committee Executive. With the finished MVD (Model View Definition, or subset of IFC schema), the added value of manufacturer-neutral data exchange is now also available to the precast concrete industry: CAD, MES and PPS systems can be coordinated even better thanks to the international standard.

Under the umbrella of buildingSMART International, the group was supported and enabled to go through the internationally valid, standardised process step by step to achieve this standard.

What was achieved?

IFC has been used in the construction industry for a long time as a standard exchange format between different planning solutions, but until recently the technical possibility to generate production-relevant information was missing and IFC was used as a collaboration interface. The interfaces currently available on the market between CAD, MES, ERP and PPS systems are reaching their limits in terms of content due to the increasing complexity of the components and further plant automation.

The aim of the project was to create an internationally standardised, uniform interface that is maintained by the industry. This is based on existing interfaces established in the prefabrication process.

In detail, the objectives of the project were:

- Bringing open and interoperable BIM more into the precast sector
- Linking CAD, MES, and PPS systems more closely in order to establish a common data exchange format capable of enabling more domain-specific decision making
- Exchange on the basis of the international IFC4 standard
- Transparent and unambiguous traceability of data on the building model and the building cycle

As part of the work results, the group developed an Information Delivery Manual (IDM) and a Model View Definition (MVD).

The project is supported by the buildingSMART International Community and buildingSMART Germany. Members of the project group are:

- fdu GmbH
- iabi – Institut für angewandte Bauinformatik e.V.
- IDAT GmbH
- Allplan Software Engineering GmbH - Competence Center Allplan Precast
- Progress Software Development GmbH
- RIB SAA Software Engineering GmbH
- Trimble Germany GmbH
- Unitechnik Systems GmbH

The two spokespersons of the project group are Benno Strack (fdu) and Stefan Maier (RIB SAA), who also represent the project group at buildingSMART International.

In the final standardisation phase, the documentation was completed and all necessary IFC information was provided in an IFC schema-compliant manner. A successful software validation was also carried out.

The project group has prepared a video introduction that provides a comprehensive insight into the project and its results. You can find the video presentation here.



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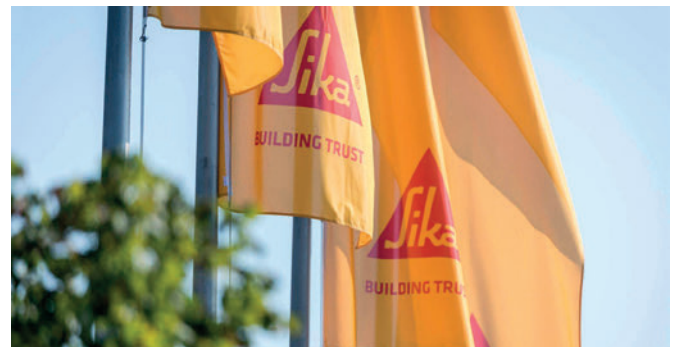
Sika acquires MBCC Group

شركة Sika تستحوذ على مجموعة MBCC

Sika has signed a binding agreement to acquire MBCC Group, the former construction chemicals business of BASF Group (BASF Construction Chemicals), from an affiliate of global private equity firm Lone Star Funds. Headquartered in Mannheim, Germany, MBCC Group is a leading global provider of construction chemicals products and solutions, and includes PCI. The transaction values MBCC Group at 5.5 billion Swiss francs (5.2 billion euros), according to the statement.

وقعت شركة Sika اتفاقية ملزمة للاستحواذ على مجموعة MBCC ، وهي شركة كيماويات البناء السابقة لمجموعة BASF (مجموعة BASF لكيماويات البناء)، وهي من إحدى الشركات التابعة لشركة الأسهم الخاصة العالمية Lone Star Funds. ويوجد المقر الرئيسي لمجموعة MBCC في مانهايم، ألمانيا، وهي شركة عالمية رائدة في مجال توفير منتجات وحلول كيماويات البناء، وتشمل PCI. وتقدر الصفقة مجموعة MBCC بـ 5.5 مليار فرنك سويسري (5.2 مليار يورو)، وفقا للبيان.

The transaction will further accelerate Sika's 2023 growth strategy, it said. Sika is expanding its own product and service offering in the areas of construction chemicals and industrial adhesives through the highly complementary portfolio of MBCC Group. For 2023, the combined company reportedly expects sales of more than 13 billion Swiss francs (12.3 billion euros). Customers would benefit from an expanded and more efficient distribution network in all core markets. "Two sustainability champions are joining forces. Sika is a pioneer for sustainable solutions in the entire construction industry, for MBCC Group sustainability is an equally central pillar of the business," says Thomas Hasler, CEO Sika, about the merger. And Jochen Fabritius, CEO MBCC Group, adds: "Our products and competencies will once again become part of the core business. Together with Sika, we want to open up new and exciting business opportunities." The acquisition is subject to regulatory approvals. Completion of the acquisition is targeted for the second half of 2022.



FURTHER INFORMATION



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Quality control of concrete curing

مراقبة جودة معالجة الخرسانة

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Insufficient curing of concrete causes the concrete surface to dry out prematurely, which leads to a porous structure. Consequently, the concrete surface shows lower strength and lower resistance against long-term physical and chemical attacks from the environment, such as chloride infiltration and carbonation processes. The curing of concrete is not always given the necessary attention at the early age. As part of the project "OptiNB - Optimal Curing for Improved Quality in Construction", suitable processes are being developed to provide evidence of proper concrete curing. For this purpose, non-destructive methods were tested to obtain information about the microstructure resulting from the hydration evolution of the concrete surface. The objectives of this contribution are to discuss and propose innovative solutions for carrying out a successful verification of the efficiency of the applied curing process.

إن المعالجة غير الكافية للخرسانة تؤدي إلى جفاف سطح الخرسانة سريعاً، مما يؤدي إلى عمل بنية مسامية. وبالتالي، يُظهر سطح الخرسانة قوة أقل ومقاومة أقل ضد الهجمات الفيزيائية والكيميائية طويلة المدى من البيئة، مثل عمليات ارتشاح الكلوريد والكربنة. ودوماً ما لا يتم إيلاء الاهتمام اللازم لمعالجة الخرسانة في المراحل الأولى. وكجزء من مشروع - "OptiNB" المعالجة المثلى لتحسين الجودة في البناء"، يتم تطوير عمليات مناسبة لتقديم دليل على المعالجة المناسبة للخرسانة. ولهذا الغرض، تم اختبار الطرق غير المدمرة للحصول على معلومات بخصوص البنية المجهرية الناتجة عن تطور الترطيب لسطح الخرسانة. وتتمثل أهداف هذه المساهمة في مناقشة واقتراح حلول مبتكرة لإجراء تحقق ناجح من كفاءة عملية المعالجة المطبقة.

A decisive but often overlooked factor for the durability of concrete is adequate curing. Curing of concrete includes all measures taken to prevent the concrete from drying out prematurely. If water is lost at an early age, e.g. through evaporation, the concrete hydration is disturbed and generally ends before a satisfactory degree of hydration is reached. High water loss impairs the formation of a dense microstructure in the concrete edge zone and reduces the expected durability of the concrete [2]. The lower the ambient relative humidity and the higher the wind speed, the faster concrete dries out. Also, the difference between the temperature of the hardening concrete and its immediate surroundings plays a role: the drying out of the concrete surface is accelerated when the surface of the concrete is warmer than the surrounding air. The following procedures are suitable for proper curing of concrete:

- leave the formwork in place
- covering the concrete surface with foils
- using water-storing covers with simultaneous protection against evaporation
- maintaining a visible film of water on the concrete surface (e.g. by spraying, flooding)
- use of aftertreatment agents with proven suitability [3]

In many construction projects, these relatively simple procedures are not adequately followed. The consequential damage, however, often only appears decades later. Once built, customers of concrete structures currently have hardly any

possibilities to prove insufficient curing. The task of the "OptiNB - Optimal Curing for Improved Quality in Construction" project was therefore to test and evaluate suitable methods for determining the curing quality of concrete during the construction phase. The aim was to provide a guideline and a recommendation for the investigation and determination of the curing quality of concrete, using non-destructive methods that can be used directly on the construction site.

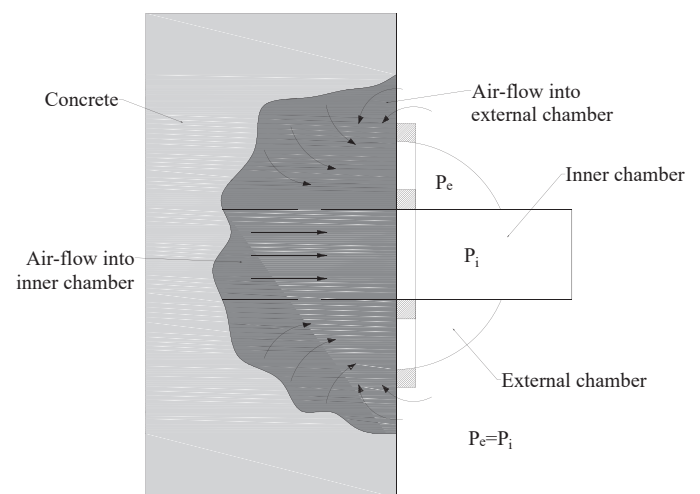


Fig. 1: Vacuum cell, pressure regulation and air flow into its two concentric chambers



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■ Clémence Bos, Dipl.-Ing. Dr. techn.: Research assistant on cement and concrete at Smart Minerals GmbH in Vienna, is an expert in micromechanics of heterogeneous materials and durability and long-term performance of concrete.



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The most suitable investigated methods are presented for evaluating the curing quality of concrete. This includes gas permeability testing, hyperspectral imaging and electrical resistivity measurements.

The performance of concrete structures and durability strongly depends on the permeability of the concrete pore system. The current knowledge of suitable test methods and correlations between the individual transport parameters justifies the extensive use of gas permeability measurements to characterize the transport properties of concrete. Although not directly related to the degradation in performance, the gas permeability correlates closely with the diffusion coefficient of gases (e.g. CO₂ in the carbonation process), the diffusion of aggressive ions in the liquid phase, the rate of water uptake and the permeability for water or solutions. Therefore, this single parameter can characterize the permeability of concrete in a variety of different cases, covering different corrosion and deterioration mechanisms [4].

The gas permeability coefficient of a concrete surface depends on many factors, including:

- concrete mix proportions, including the presence of chemical admixtures and additional cementitious materials;
- the composition and physical properties of the cement and aggregates;

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- curing quality;
- degree of hydration or age;
- presence of microcracks;
- presence of surface treatments;
- moisture level at the time of the test [4].

The gas permeability coefficient is therefore a relevant durability indicator for the tested concrete [5]. A procedure for investigating the air permeability coefficient is specified in the Swiss standard SIA 262/1: 2019 [6], according to the totally non-destructive "Torrent method". The gas permeability coefficient of hardened concrete (kT) is measured by creating a vacuum in a double-chamber cell that adheres to the surface of the element to be tested and in measuring the flow rate of the incoming gas under controlled, non-steady conditions, see Fig. 1. The test method was originally developed to measure kT [10⁻¹⁶ m²] in situ on the building structure, although it is also widely used in the laboratory.

A promising sensor-based method is hyperspectral imaging. The basic principle of hyperspectral analysis is to record a large number of closely spaced wavelengths. Hyperspectral cameras record the reflection ratio of electromagnetic radiation in higher wavelengths than visible light. The reflection is recorded in a certain wavelength range with small intervals. These intervals are called the spectral resolution. A reflectance-wavelength graph can be created, which is representing the spectral signature. Spectral signatures contain information about the characteristic properties of the recorded materials.

In previous studies, the spectral properties of concrete were determined depending on the concrete strength [7], water-to-cement ratio [8] and under the influence of carbonation [9], chloride penetration [10], cracks on the surface [11], etc. The electrical resistivity of concrete is influenced by factors such as the type of cement, the water-to-cement-ratio, the degree of hydration, the moisture content and the curing quality [12]. More precisely, the measured electrical resistivity varies with the pore solution, the connectivity of the pores, and the porosity of the interface between aggregate and cement stone. The resistivity decreases with increasing temperatures [13]. In general, it is assumed that a concrete is more durable the higher its electrical resistivity (tighter and more tortuous pore structure).

The electrical resistivity of concrete can be measured using a Wenner probe [14]. The measurement is made by applying four electrodes on a line on the concrete surface. An alternating voltage is applied to the two outer electrodes. The current is transported by ions in the pore fluid. Then the potential difference established between the two inner electrodes is measured. The calculated resistivity depends on the distances between the electrodes and on the geometry of the element tested [15-16]. The instrument used for this investigation was the Resipod from Proceq.

Methodology

The aim of the investigations was to determine the suitability of different methods for the quality assessment of concrete

based on the curing carried out. The measurement methods were applied in the laboratory under controlled environmental conditions on samples with different curing conditions. The results were evaluated for informative value and suitability for determining the curing quality. The tests and results of the most promising methods are discussed below [17].

Sample preparation

As part of the investigations, three different aftertreatments on concrete samples were compared; the specimens were cast with a mixture with the following characteristics: w/c = 0,48; cement content = 258kg/m³; 28-day cube strength = 28,3-33,8MPa (depending on curing type). Table 1 summarizes the storage conditions in a climatic chamber for the various curing conditions, depending on the age of the sample. The three types of curing conditions C1, C2, C3 are characterized as "good" (C1), "no" (C2) and "bad" (C3).

The samples for electrical resistivity and gas permeability measurements had a size of 15/15/15 cm and those for hyperspectral measurements 10/10/10 cm.

Results and evaluation

Gas permeability

The gas permeability measurements were carried out using a PermeATORR device, from Materials Advanced Services.

Concrete samples subjected to the three different aftertreatments specified in Table 1 (C1, C2 and C3), but with varying aftertreatment duration of 1, 4 and 7 days, were examined at the age of 3, 7 respectively 10 days. Also, as one requirement

Table 1: Curing types for the laboratory tests, see [15]

Samples	Storage	Temperature [°C]	Relative Humidity [%]
Curing conditions first day			
C1	surface protected with foil	20	60
C2	surface not protected	20	60
C3	surface not protected	30	40
Curing conditions until day 7*			
C1	In foil	20	60
C2	Without foil	20	60
C3	Without foil	30	40
Curing conditions from day 7			
C1, C2 & C3	Without foil	20	60

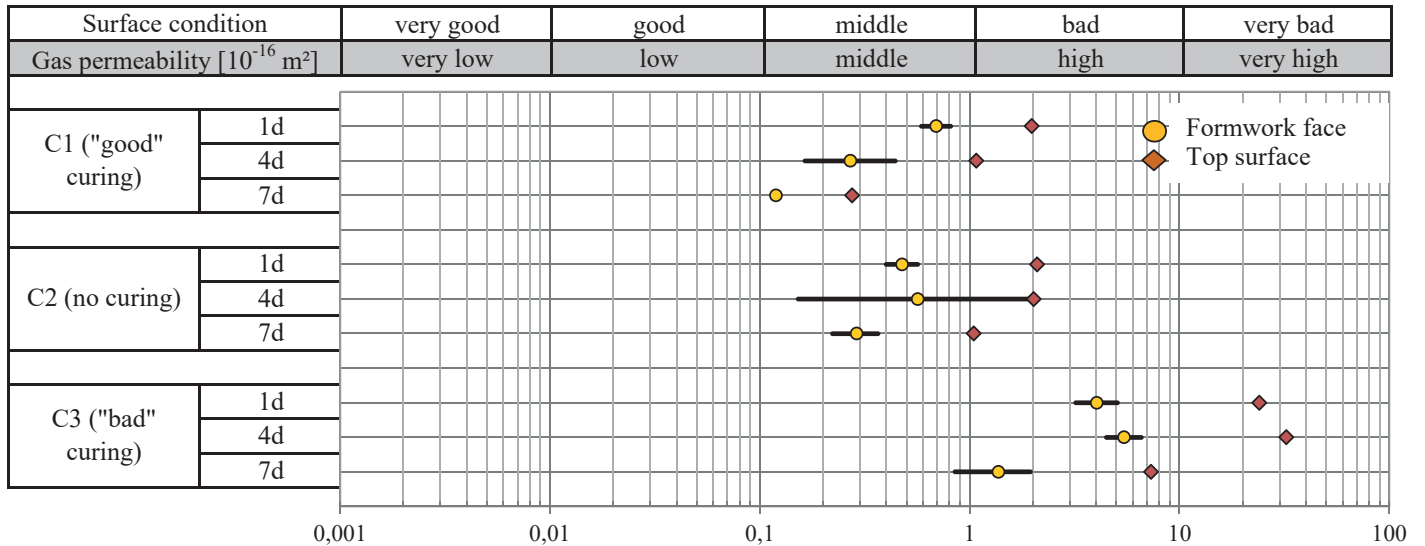
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for gas permeability measurements is a dry sample, the samples for this investigation were dried for three days at 50 °C prior to the measurements.

Figure 2 shows the results of the coefficient of air-permeability (kT) measurements. The influence of the aftertreatment

is clearly recognizable; the aftertreatments C1 and C2 are in the middle range with regard to the surface condition. The samples with poor aftertreatment C3 are in the poor to very poor range. The results of the measurements from the top of the samples are consistently worse than the values obtained on the side faces.

Fig. 2: Gas permeability kT [10⁻¹⁶ m²] of the test samples depending on the quality of the aftertreatment.



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The positive effect of extending the “good” curing conditions C1 from 1 up to 7 days can be seen in Figure 2, resulting in a 10-fold reduction of kT , both for the formwork and top surfaces of the specimen. Invariably, for all curing conditions, the permeability of the top surface of the cubes was significantly higher than that of the formwork faces. The specimens with “bad” curing C3 showed substantially higher permeability than C2 and, especially, than C1.

The gas permeability allows to make specific statements about the condition of the concrete surface and thus about the quality of the aftertreatment.

This method is well suited for assessing the curing condition. It can also be used on the construction site and delivers reliable results. However, it must be ensured that the concrete surfaces to be tested are sufficiently dry for an examination, reason why Swiss standard SIA 262/1: 2019 (5) prescribes the use of an impedance-based non-destructive technique for measuring the surface moisture to be tested. Therefore, this method is not suitable for young concrete on-site where no pre-conditioning can be done (recommended test ages: 28 - 120 days).

Electrical resistivity

The electrical resistivity of concrete was determined on the top surface (upper side) of the samples and on the four sides that were protected by the formwork. Measurements took place immediately after the formwork was removed at the age of one day and at regular intervals during the first four weeks. The influence of the aftertreatment on the samples was investigated. Figure 3 summarizes the development of the relative electrical resistivity referred to the concrete of one day of age. Due to high water losses from day 0 for curing C3, the relative electrical resistivity of these samples was also estimated relative to the concreting day (day 0).

The influence of the aftercare can be seen very clearly. The increase in electrical resistivity in all samples with increasing concrete age occurs due to the drying out of the concrete surface.

The samples with no curing (C2) show higher resistivity than the samples with good aftertreatment (C1). The resistivity of samples C3 (bad curing conditions) is the highest and increases the most.

The samples with aftertreatment C2 and C3 show higher electrical resistivity increase on the top surfaces than on the side faces, as the former were not protected from drying out until the first day.

Figure 3 shows that the electrical resistivity for the different curing conditions was significantly different. The problem with this technique is that, contrary to air-permeability, the concrete with increasingly worse curings (C2 and C3, compared with C1) look increasingly better in quality (higher electrical resistivity). In this respect, a concrete of poor intrinsic quality (high w/c ratio), badly cured may be judged of having similar or even better durability than a well-cured concrete of high intrinsic quality (low w/c ratio). The process for operational readiness is still being checked with reference samples and thus for the possibility of use in practice.

Hyperspectral imaging

The hyperspectral analyses were carried out on concrete samples with different curing conditions (C1, C2 and C3). The results of the samples were then compared and analysed. The investigations took place on days 1, 2, 4, 7, 9, 11, 15, 21, and 28 after concreting, so that the development of the reflection intensity within the measured wavelength range during the development of the strength of the concrete could be observed.

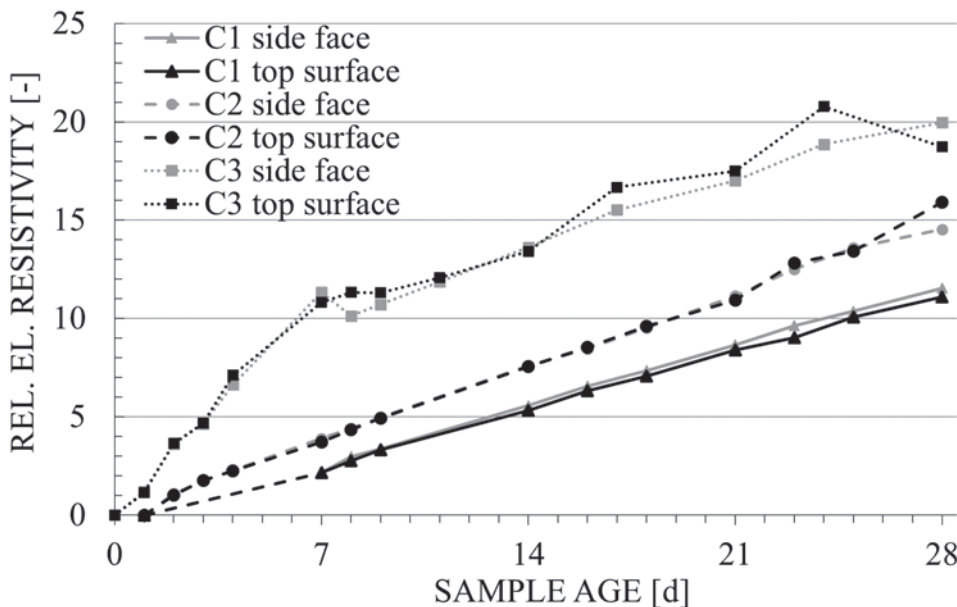


Fig. 3: Relative increase of the electrical resistivity of the test samples for various aftertreatments and sample sides compared to the concrete age of one day.



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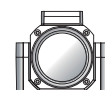
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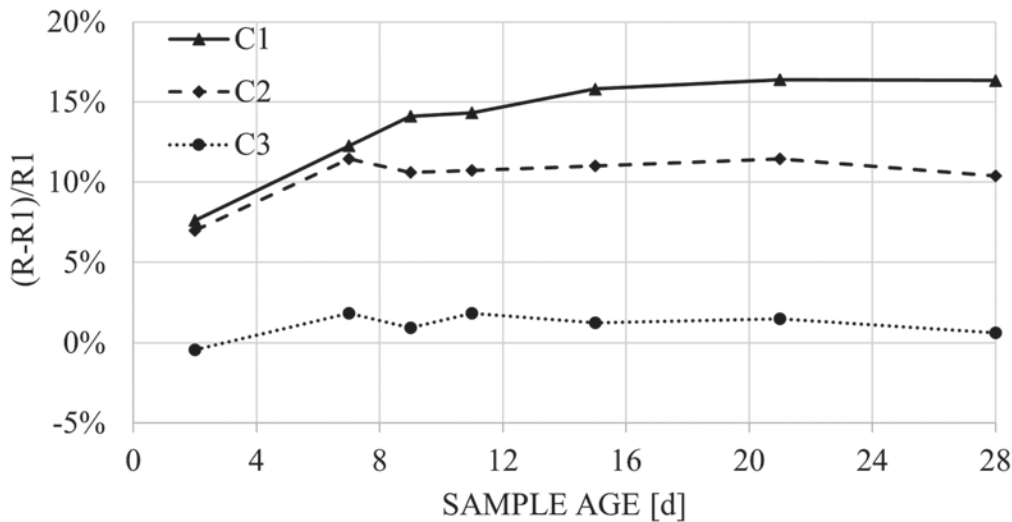


Fig. 4: Relative increase in the reflectance of the test samples for various aftertreatments compared to the concrete age of one day [18]

The measuring system consisted of a Xenics NIR (near infrared) camera, a Specim N17E spectrograph that operated in the wavelength range between 900 and 1700 nm, lighting made of halogen lamps and a support table operated by a step motor.

Spectral signatures taken from the same sample on different days after concreting showed that the reflectance increased with the hydration days (see Fig. 4). In addition, the curing conditions influence the rate of increase in average reflectance. The sample with the best curing conditions (C1) had the highest rate of increase.

Figure 4 shows the slope of the average reflection of all examined samples of the test series per type of aftertreatment (four samples per type). The tested samples with aftertreatment C1 show the strongest increase in reflection in the first 7 days after concreting and increases even further up to the age of 15 days. The values remain more or less constant up to the 27th day. Without special aftertreatment (C2), the reflection also increases up to the 7th day, but the slope is less pronounced than with C1. From the 7th day onwards, there is hardly any increase. The reflection of the samples with curing conditions C3 shows only a slight increase and remains relatively constant. The reflection curve of the C3 samples differs significantly from the other two with aftertreatments C1 and C2.

The hyperspectral recordings prove to be a reliable method to accurately determine the quality of curing with a very high degree of probability. The method is easy to use, but the evaluations are complex. They require an appropriate evaluation software as well as appropriate expertise in statistical analysis. For a reliable determination of the aftertreatment quality, reference samples are necessary in order to be able to classify the results correctly. Environmental influences such as humidity, temperature and incidence of light are reflected in the results of the hyperspectral recordings. The incidence

of light in particular is a major influencing factor. This makes it difficult to compare laboratory results with in-situ results. It is therefore essential to make a comparison with a reference sample that is recorded under the same conditions.

Conclusions

The evaluated methods for determining the curing quality of concrete showed that there is a clear connection between the curing condition and the surface quality of concrete.

Since concrete structures are usually exposed to numerous environmental influences, which have a major influence on the measured values, no general statements can be made regarding the quality of the aftertreatment based on the on-field measurement results of the gas permeability, hyperspectral analysis and electrical resistance. However, a corresponding statement on the quality of the concrete surface area could be made by comparing the results with reference samples cured in the laboratory. The comparison of the results with previously measured structures could increase the reliability of the evaluations.

The non-destructive investigation of the curing quality of concrete is proved to be a promising and reliable alternative to conventional, often destructive and more complex measurements.

Acknowledgements

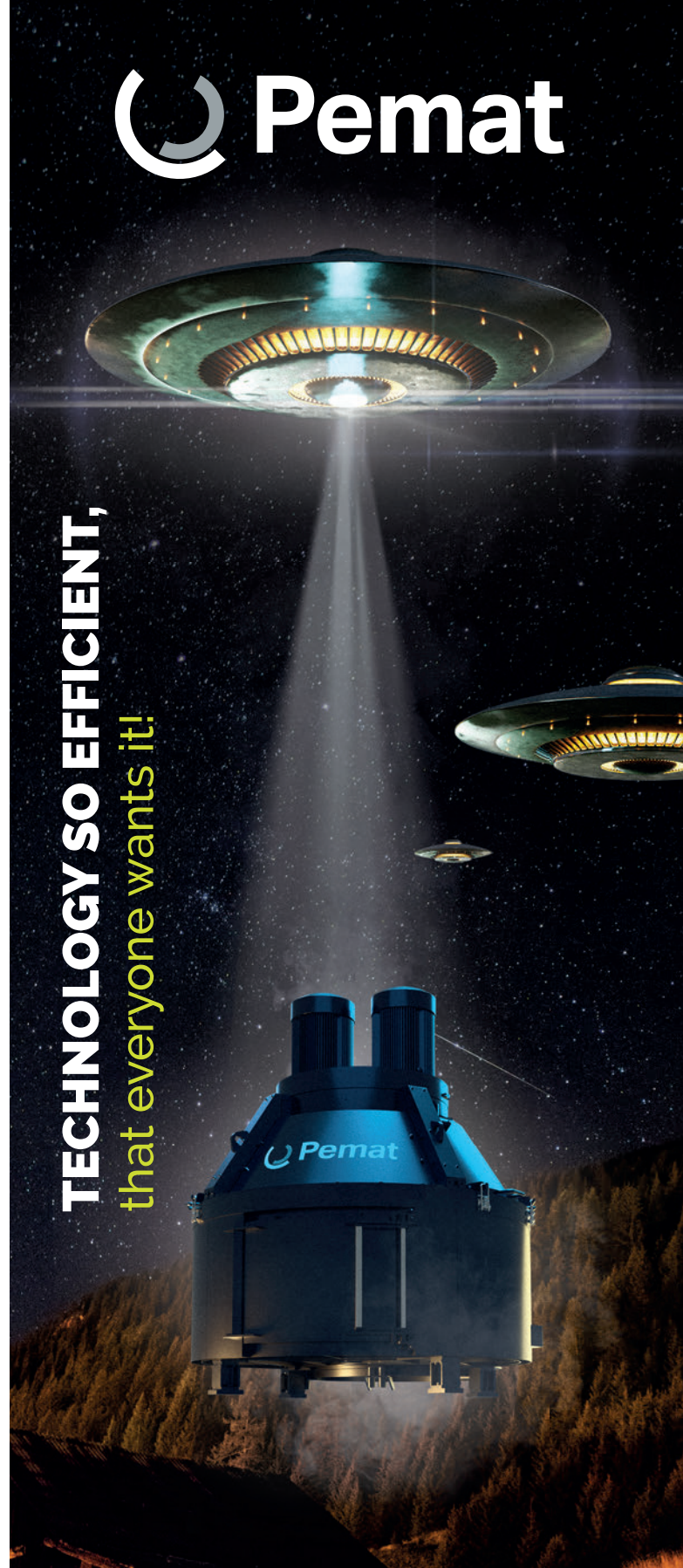
The authors would like to express their gratitude to BMK, ÖBB, Asfinag and FFG for facilitating and supporting the project.

The content of this article was summarized from the *fib* Conference Paper "Optimal Curing of Concrete" [1].

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Artic puts another concrete block line into operation

شركة آرتك تقوم بتشغيل خط إنتاج كتل خرسانية آخر

■ Mark Küppers, CPI worldwide, Germany

Arabian Tile Co. (Artic) is a part of Al Aggad Investment Company (AICO) and was founded in 1975. With more than 45 years' experience, today Artic is one of the leading manufacturers of concrete products and building materials in the Gulf region. The company has four factories in Riyadh, Jeddah, Al-Kharj and Dammam, all at strategically favourable locations in Saudi Arabia. All in all, the four factories feature a total of 17 production lines. Some of them were supplied by the Hess Group, a company from the Topwerk Group. After commissioning the first Hess line in 2003, another one followed in 2011 and then the third in 2015. The fourth line, a Hess RH 1500-4 concrete block machine, was recently put into operation as a key component. Not only does this make Artic one of the Hess Group's first customers in Saudi Arabia, but also one of the most loyal.

الشركة العربية للبلاط (آرتك) هي جزء من شركة العقاد للاستثمار (AICO) وتأسست في عام 1975. وبفضل ما تتمتع به من خبرة تزيد عن 45 عامًا، تمثل حاليًا واحدة من الشركات المصنعة الرائدة للمنتجات الخرسانية ومواد البناء في منطقة الخليج. وتمتلك أربعة مصانع في الرياض وجدة والخرج والدمام، وجميعها في مواقع مواتية استراتيجيًا في المملكة العربية السعودية. إجمالاً، تتميز المصانع الأربعة بإجمالي 17 خط إنتاج. تم توفير بعضها من قبل Hess Group، وهي شركة من شركات Topwerk Group وبعد تشغيل أول خط وفرته Hess في عام 2003، تبعه خط آخر في 2011 ثم الخط الثالث في 2015. وتم تشغيل الخط الرابع، وهو عبارة عن آلة تصنيع كتلة خرسانية Hess RH 1500-4، مؤخرًا كمكون رئيسي. وهذا كله لا يجعله واحدة من أوائل عملاء Hess Group في المملكة العربية السعودية فحسب، بل أيضًا من أكثر العملاء ولاءً.

By its own account, Artic was the first company to manufacture terrazzo tiles in Saudi Arabia in 1975 and in 1982 it was also the first company to produce glass-fibre reinforced concrete in the Gulf region. Artic also built one of the first modern plants in the Middle East for the automated production of concrete stairs. It can therefore be said that Artic has always

been one of the pioneers when it comes to introducing many new products for the construction sector in Saudi Arabia. Since 1995 the company has also been very successful in the production of interlocking pavers, which enjoy a very high demand. Artic has dozens of showrooms and a solid wholesale network that covers Saudi Arabia and other GCC countries.

Artic is a part of Al Aggad Investment Company (AICO) and was founded in 1975.





Bird's-eye view of the new production hall

Artic's main objective: building trust

"We make every effort to create a mutually beneficial and transparent relationship with our customers. We ensure a professional environment with high efficiency, which helps to achieve the company's objectives"

Quality and always meets the quality standards

Artic places great emphasis on quality and always meets the quality standards by only using high-quality raw materials. The company is certified according to ISO 9001:2015, 14001-2015 and 45001-2018 and is the only manufacturer in the Kingdom of Saudi Arabia to be a full member of GRCA International, The Glass-fibre Reinforced Concrete Association.

Safety comes first - without compromises

Arabian Tile Co. (ARTIC) regards health and safety as a key company value and is committed to creating totally safe working conditions. "Our commitment to safety and long-term health contributes to us being the first choice as an employer; our company only employs those who support our vision and are prepared to change. There are no compromises when it comes to safety".

Turnkey concrete block line from the Hess Group

Artic's main argument for opting for the Hess Group again was the experience with the previous Hess machines and the excellent working relationship between both parties. The services provided by the Hess Group are not only limited to a good after-sales service, but also include regular inspection

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Two planetary mixers were selected for the concrete production: the large SX3750 for the core concrete and the smaller SX750 for the facing concrete.

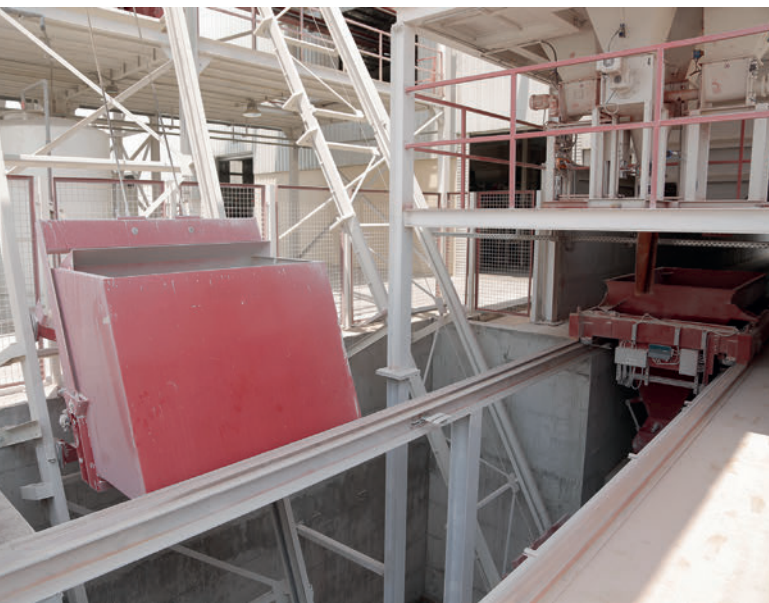
visits to the customer's relevant production facilities - with the aim of analysing and improving the efficiency of the machines. The service team in Dubai is made up of engineers with many years of professional experience as responsible works/production managers at similar production sites in the region. This makes it possible to look and understand from the same point of view as the customer.

For Artic it is important to have a competent and reliable partner by its side, who can support it in its development work with all the necessary knowledge and technical solutions. Hess offers system solutions from a single source and knows the needs of the customers.

Consequently, the Hess Group has once again supplied the core components for the project, from the mixing plant through to the cubing system. The result is high-performance concrete block production, which is able to impress with both the output quantity and the high quality of the products.

Concrete Mixing Plant

For the respective concrete mix design, Artic can rely on aggregates from eight silos on the new line. The aggregates are dosed directly from the silos arranged in a row into the weighing bin, which moves up under the silos. This then



The aggregates are dosed directly from the eight silos arranged in a row. Bucket elevators are responsible for feeding the mixers.

transfers the aggregates to one of the two skip hoists lifting buckets, which feed the core and face mix mixer at the mixer level.

Two planetary mixers were selected for the concrete production: the large SX3750 for the core concrete and the smaller SX750 for the facing concrete. The Topwerk mixers, are particularly suitable for the manufacture of earth-moist concrete, as are needed e.g. for the production of paving stones, kerb stones, hollow blocks and slabs, but also for pipes, manholes and precast elements. The planetary mixers are characterised by their high level of mixing intensity and have been reliably used by many customers worldwide for many years. The mixing quality has a decisive influence on the quality of the products, the Topwerk mixers assure homogeneous mixes in the shortest possible mixing time.

The cement is dosed through a speed-controlled screw and slowly added to enable a good blend. Adding the cement directly to the mixing material also reduces the cement dust deposits in the upper area of the mixer trough. There is thus much less soiling during mixing and the cleaning time and costs are reduced.

Multimat RH 1500-4 - developed for the high-performance market sector

At the heart of the new production line is the concrete block machine, the Multimat RH 1500-4. This has been developed as a particularly powerful machine for the high-performance market sector. Despite short cycle times the machine is characterised by a soft movement process. This is achieved through special control technology and hydraulics. The intelligent interaction of these components thereby guarantees the reliable and very productive manufacturing of concrete elements. Production on the new line at Artic is done on 1,400 x 1,100 x 14 mm steel production boards.



At the heart of the new production line is the Multimat RH 1500-4 concrete block machine.

The machine is also characterised by a solid steel machine frame, which ensures that the vibrating force is very well directed into the product. Thanks to the high precision of the control system, even at high speeds a very accurate motion is achieved, which is of critical importance for filling, compaction and the product quality. In addition, setting the parameters on the display panel is particularly simple and user-friendly.

Like all concrete block machines produced by the Hess Group, the new plant at Artic is also equipped with an operating console. The height and screen angle can be adjusted fully in line with the operator's needs. A clearly designed touch panel enables all the concrete block machine's functions to be fully monitored. The operating concept thus allows even inexperienced personnel to quickly become familiar with the control system. Furthermore, the automatic change of mould can be directly monitored at the machine using a mobile panel, which makes the mould change even faster.

Fully automatic handling system and curing chamber

The freshly made concrete products are transported on the steel production boards via a V-belt conveyor to the elevator. In subsequent upgrades, an ejection station and a double washing plant are expected to be added on the wet side.

The elevator with 20 levels and a max. load capacity of 14 t collects the production boards and, depending on the product height, deposits one at every level or only every second level. The finger car then takes the production boards out of the elevator and puts these into the curing rack with 12 chambers and a changeover chamber. Altogether, the curing rack with 18 positions per chamber has room for 4,680 production boards.

The cured products are then taken back out of the rack by the finger car and transferred to the lowerator.



The double bucket conveyor transfers the core and facing concrete into the concrete block machine's corresponding storage silos.



Production is done on 1,400 x 1,100 x 14 mm steel production boards.



Like all concrete block machines produced by the Hess Group, the new unit at Artic is also equipped with an operating console.

Servo 700 cuber

Using the lowerator, the production boards with the cured products are separated onto the latch conveyor on the dry side and conveyed to the Hess Servo 700 cuber. The movements of the cuber, which is equipped with a hydraulic clamp, are fully electrically servo driven. The fast cycle times of the cuber when stacking the products, keeps up with the fast cycle times of the concrete block machine.

The bundles of blocks are stacked on the 28-m long slat conveyor, the length of the slat conveyor allows enough time for the forklifts to handle the ready products in the storage area,

without affecting the production efficiency. The empty steel production boards on the latch conveyor, are conveyed in cycles further along the latch conveyor and are cleaned as they pass through the subsequent board scraper and brush, thereby preparing them to be used again, after it is turned over by the turning device at the cross conveyor.

The special production board buffering system for very high plant efficiency is a remarkable added value in the plant, if the dry side releases more steel production boards than are needed on the wet side, a magnetic stacking device arranged in front of the board silo takes the production boards from the cross conveyor.



Servo 700 cubing system



The packets of blocks are formed on the 28-m long slat conveyor arranged in parallel and then transported outdoors in cycles.

New markets with even higher performance

Artic is the region's leading company in the floor covering systems sector (paving stones and slabs). The new production line, which has been installed in Dammam, thus stands for Artic's expansion in the eastern region of the country.

The eastern region offers good sales opportunities, especially as the production capacities are lower compared to the

region in and around Riyadh and the western provinces like Jeddah or Makkah. The region also provides the opportunity to export to the neighbouring countries like Qatar and Bahrain, which at a distance of approx. 200 km each lie within the delivery range.

It remains to be seen what the concrete block experts from Saudi Arabia will plan next, as standing still does not appear to be in the management's vocabulary. ■



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Cross conveyor with board turnover device and board buffer conveyor; in the background the magnetic stacking device

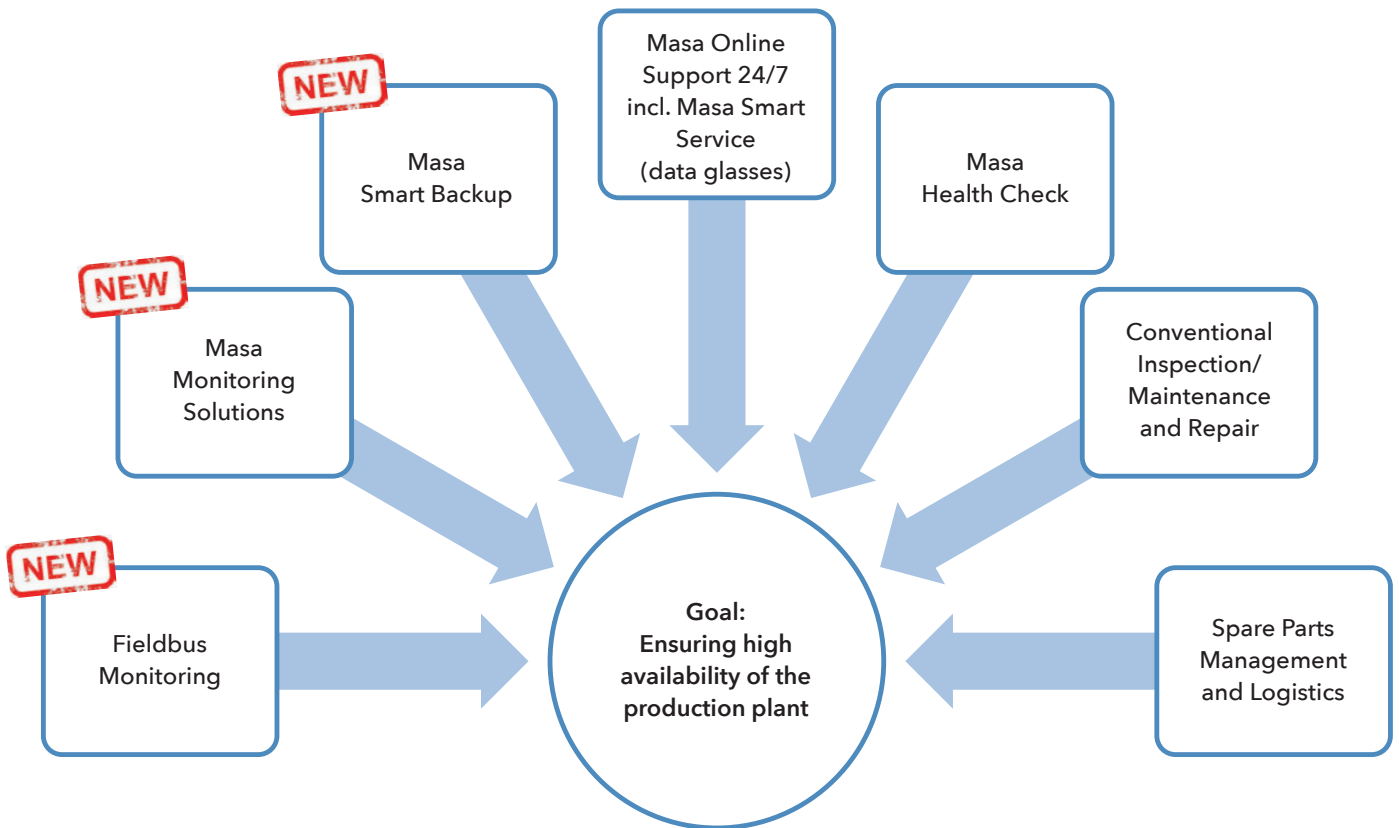


Future-oriented maintenance – digitally supported

صيانة تركز على المستقبل بدعم رقمي

Machines and production plants for manufacturing concrete blocks and pavers have developed enormously in recent decades, both in terms of their complexity and their technology. Understanding the current status of individual components or assemblies is becoming an increasingly challenging task in modern plants, as more automated processes means more potential sources of problems. Many components are subject to wear and can cause defects. PC's, PLC's, and other electronic components are particularly affected by aging and wear. This can be exacerbated by unfavorable surrounding conditions, often found in a plant environment.

تطورت آلات ومصانع إنتاج الكتل والأرصفة الخرسانية بدرجة مبهرة في العقود الأخيرة سواء من حيث تعقيدها أو تطورها التكنولوجي. أصبح فهم الوضع الحالي للمكونات الفردية أو التركيبات مهمة متزايدة الصعوبة في المصانع الحديثة، حيث أن زيادة العمليات المؤتمتة تعني زيادة مصادر المشكلات المحتملة. العديد من المكونات عرضة للتلف ويمكن أن تسبب عيوبًا. تتأثر الحواسيب الشخصية وأجهزة التحكم المنطقية القابلة للبرمجة والمكونات الإلكترونية الأخرى بشكل خاص بعوامل مرور الزمن والتلف الناتج عن الاستخدام. يمكن أن تؤدي الظروف المحيطة غير المواتية، والتي غالبًا ما توجد في البيئات النباتية، إلى تفاقم هذا التأثير السلبي.



Portfolio Masa Service

With growing competitive pressures for superior quality products and high outputs, the focus of concrete block producers is also in ensuring the highest possible plant up time. Appropriate maintenance management becomes one of the most important factors, because it has a direct influence on the functionality of equipment within the production plant. It helps to ensure consistent and repeatable production of quality products, maintaining the safety standards of the equipment for those who operate it, extending the service life of the machines, and minimizing downtime and costs. The level of knowledge and experience of the operating personnel of the production plant is a factor that should not be underestimated. However, it is precisely in this area that deficits are becoming increasingly apparent, as the search for suitable operating personnel is becoming more and more difficult in today's competitive labor market. To compensate for this development, Masa relies on a mix of different services and tools that can actively support the plant operator's maintenance management.

Digital and on-site strategies for maintenance

Preventive and predictive maintenance strategies are playing an increasingly important role in achieving maintenance goals in modern concrete block production plants. Instead of carrying out maintenance reactively after damage occurred, it can be done preventively or proactively.

Digital strategies

With digital backup and monitoring solutions, Masa offers several tools to quickly diagnose the causes of actual failures, as well as predictive detection of potential failures.

Masa Smart Backup

For example, one of the possible causes of failure in industrial computers is the failure of hard disks. To reduce the associated loss of data, Masa is integrating so-called NAS (Network Attached Storage) systems into production plants. The system, named Smart Backup, is a backup station equipped with four NAS hard drives. The desired data redundancy is achieved by backing up all relevant plant data on two pairs of hard disks each. In the event of a hard disk failure, the data can be restored from the other hard disks. The backup includes the recipes and product data acquisition database of the production plant as well as all control programs required for automation. The coordination and execution of the fully automatic backups are handled by the Masa Smart Backup System, which is always active in the background. Restoring the data in this way can easily be done online by Masa technicians.

Masa Monitoring Solutions

Masa Monitoring Solutions (MoSo) relies on Masa Online Support to monitor the status of the plant computers and the online connection via the RED router (Remote Ethernet Device).

Two points play a decisive role here. Especially in case of a machine or plant malfunction, a stable online connection to Masa Online Support is essential. "Surprises" such as a missing online connection leads to unnecessary delays. Therefore, regular monitoring of the connection to the RED router is extremely important.

On the other hand, monitoring the actual status of the plant computers is helpful in detecting any exceeding limit val-

Maintenance

According to the standards DIN EN 13306 and DIN 31051 (listed in the German Set of Standards), maintenance is the combination of all technical and administrative measures as well as management measures during the life cycle of an object to maintain or restore it to a functional state so that it can fulfill the required function.

While DIN 31051 structures maintenance into the four basic measures "maintenance", "inspection", "repair" and "improvement", DIN EN 13306 divides maintenance into the two categories "preventive maintenance" and "corrective maintenance".

Maintenance

- Save the state of the plant
- Activities: e.g. readjustment, lubrication, cleaning, refilling

Inspection

- Detect and evaluate the wear
- Activities: e.g. planning, measuring, testing, diagnosing

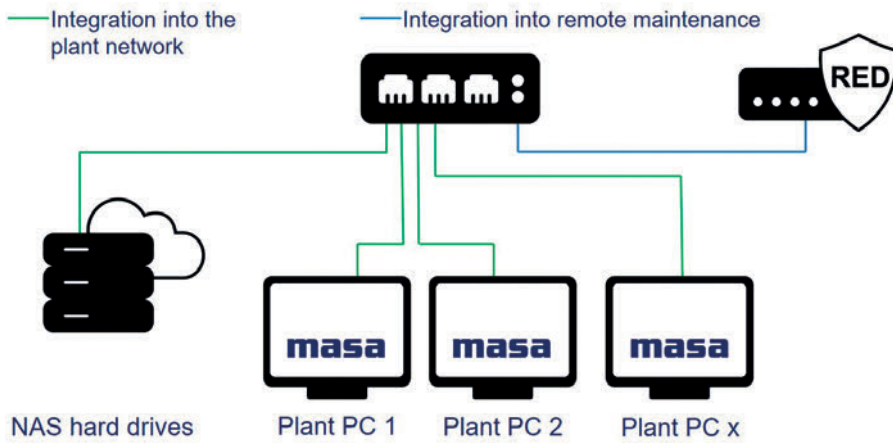
Repair

- Restore the functional status
- Activities: e.g. replacement, mending, repair, functional test

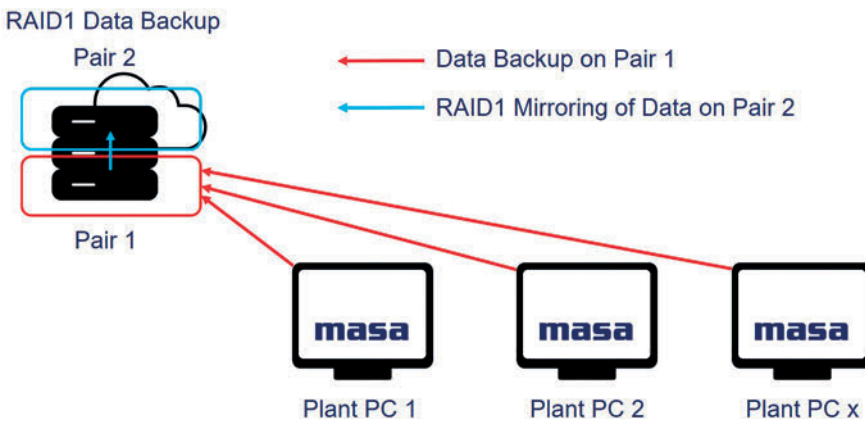
Improvement

- Increase functional reliability
- Activities: e.g. analyzing, designing, extending, substituting components

Four basic maintenance measures according to DIN 31051



*Masa Smart Backup:
Integration into the
Online Support*



*Masa Smart Backup:
RAID Mirroring*

ues at an early stage. Relevant values such as temperature, storage capacity, accessibility or fan speed are analyzed at defined intervals. If the defined limit values are exceeded, a maintenance stop can be scheduled promptly. This significantly reduces the risk of unplanned downtime. The actual status of the plant computers is displayed in a three-stage system.

Fieldbus Monitoring

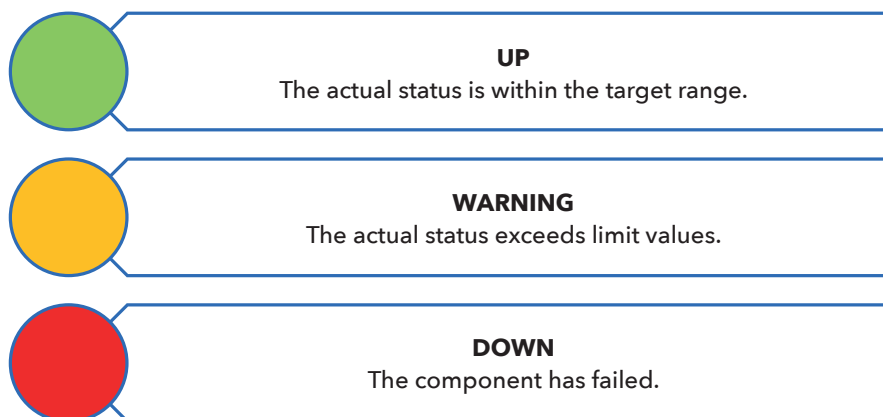
Field bus systems such as Profibus or Profinet form the basis for the operation of modern plants. Communication and data exchange between the individual bus participants is the prerequisite for trouble-free plant operation. However, components such as connectors, cables, or the interface modules (IM) are also subject to aging or wear. By monitoring the com-

munication protocols and the line physics, a direct indication of weak points in the system can be displayed. Modules can then be replaced before a failure occurs. Since troubleshooting in the fieldbus is known to be very time-consuming, such diagnosis and monitoring is extremely helpful. Masa has been working intensively on the topic of fieldbus monitoring for several months and is currently examining the possibilities for integration into future and existing plants.

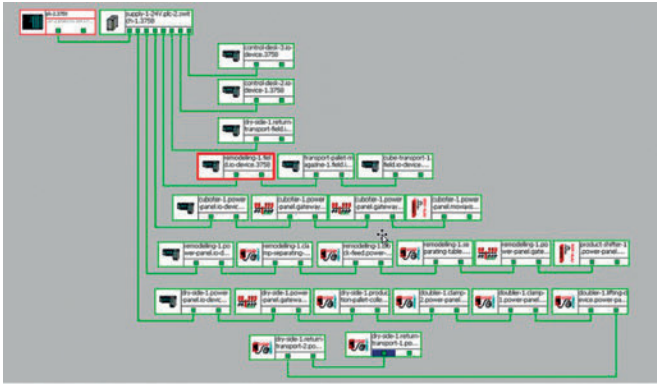
In general, cloud-based applications are also quite conceivable for Masa.

Masa Online Support 24/7

Masa has been offering reliable 24/7 online support for several years. Using suitable remote maintenance hardware and



*The actual status of the plant
computers is displayed in a
three-stage system.*



Bus topology

software, requests can be responded to quickly and efficiently. Several possible communication channels ensure the Masa online support remains accessible.

In the event of a malfunction, the Masa support team can perform diagnoses and "first aid" measures around the clock much faster and easier. Downtime is reduced and the need for on-site visits by Masa service technicians is not required as often. In addition, updates and function expansions on the production plant can be carried out conveniently and quickly (within Masa office hours).

The customer-specific documentation of each Masa Online Support action carried out is made in a comprehensive database and ensures constant traceability of the measures. Plant operators can view the documented fault and fault clearance histories at any time. This enables them to draw conclusions

for faster fault diagnosis and elimination, or to research possible triggers of recurring faults.

Masa Smart Service

The live connection of the Masa Smart Service can be used to supplement the Masa Online Support (additional customer requirements are required, e.g., fast and stable internet connection via landline or UTMS, W-LAN coverage around the plant). By means of a voice-controlled head-up display with camera (data glasses), a connection is established between the customer's technician and the Masa online support staff. Certified with IP66 protection class (dust and waterproof), the data goggles are shockproof up to a 2 m drop and are attached to a conventional hard hat. The hands-free function and voice control of the data goggles can be used even in extraneous noise of up to 95 dB. A live stream with Masa Online Support is established via a Masa service app. The Masa Online Support employee can now visually accompany and guide the person on site and thus actively support maintenance work or troubleshooting. Here, functions such as sending hints/markers to the display, sending documents to the display (screensharing), or taking photos in HD quality are helpful features of the data glasses. A session ID is assigned for verification during login and for documentation and tracking. Each session can be recorded if desired.

Communication and first aid via Masa Smart Service offers considerable advantages: Firstly, visual control of machine functions is possible, as well as simplified support in the event of process-related problems. In the event of mechanical, hydraulic, or electrical malfunctions, guided troubleshooting support can be provided. Important information from circuit or hydraulic diagrams can be projected onto the head-up display.



Digitally supported by means of Masa Smart Service

On-site maintenance strategies

As always, the second focus of Masa's services and tools to support maintenance management is on machine and component-related measures. The conventional inspections, maintenance, and repairs carried out on site can be extended by the Masa Health Check. For the replacement of components, the Masa Spare Parts Service team is also available to provide advice.

Conventional Inspection, Maintenance and Repair

Masa provides expert support for the inspection of a production plant. The actual status of the plant is recorded, documented, and assessed. The functioning of the entire plant as well as all plant components, settings, and values are checked. Components are examined for signs of wear (visual inspection), then the degree of wear is evaluated. Maintenance work should delay and minimize the progress of wear, and in the best case can even prevent it. The target status is to be restored.

Masa provides maintenance plans as part of the plant documentation, which contain various work steps for the maintenance of the respective assemblies.

The maintenance plans specify, for example:

- Cleaning work
- Maintenance work
- Checking of settings
- Recording of measured values
- Inspection, exact adjustment, replacement of plant components
- Checking of filling levels
- Lubrication and troubleshooting plans

Regular inspections and maintenance have a positive effect on the wear and tear of machines and plants. Nevertheless, even when used as intended, wear-related damage can occur that requires immediate repair. Defective parts or entire assemblies must be repaired or replaced. For maintenance work in production plants with an upcoming "winter repair" Masa keeps a trained service team ready. The service depart-

ment will be pleased to answer any inquiries and to schedule a visit.

Masa Health Check

As part of a preventive maintenance and repair measure, the machine inspection "Masa Health Check" can be booked. Experienced Masa technicians then take over the inspection and objectively and reliably check the status of the block making machine, taking into account a defined and detailed checklist. For each Health Check, Masa prepares a report that includes an action plan as well as spare parts and adjustment recommendations. Provided that this action plan is adhered to by the plant operator, the Masa Health Check is a possible instrument to keep the machine productivity and availability at a consistently high level.

With regard to plant productivity, the Masa Health Check pursues the following goals:

- Less unplanned downtime
- Shorter repair times of the machine
- Lower impact of downtime on the production process

Depending on the actual compliance with the recommendations, the service life of the machine can be extended. The planning of (recommended) actions such as checking, adjusting, replacement of wear and spare parts is simplified.

However, the sole definition and execution of inspections and maintenance tasks is not sufficient for the realization of the above-mentioned goals. Rather, a smooth replacement supply is also of great importance. By means of the report generated from the Masa Health Check, Masa prepares a recommendation for preventive stocking of wear and spare parts. The plant operator can check their existing stock and, if necessary, supplement it as required when thinking of planned maintenance work required in the future.

Spare Parts and Spare Parts Logistics

Even short downtimes in a production plant cost time and money. The availability of original spare parts, which are optimally matched to Masa machines and plants, and efficient



Masa Health Check: Inspection mold bearing



Masa Health Check: Checking the general status of the hydraulic system



Masa spare parts stocks worldwide

spare parts logistics have a positive effect on plant productivity. For this reason, Masa incorporates decades of experience and know-how into the development and production of Masa original spare parts.

Masa's spare parts service focuses on another comprehensive service: Competent technicians in the spare parts sales department assist in identifying the right spare part and always advise on the purchase individually matched to the respective plant components. Each order request is subjected to a technical check by Masa specialists before dispatch. Once the order has been approved, Masa original spare parts are then professionally packed and delivered. Masa works exclusively with worldwide operating freight companies in order to guarantee a smooth delivery.

A well thought-out spare parts and shipping logistics system allows spare parts requests to be accepted and processed without delay and Masa original spare parts to be shipped as quickly as possible. The close cooperation between Masa locations worldwide as well as the on-site support of customers have proven their value. With two Masa locations in Germany and Masa subsidiaries in the United Arab Emirates, USA and China, short delivery routes for wear and spare parts can be realized.

Location	Capacity (number of different part numbers per location)
Masa GmbH DE - Porta Westfalica	> 7,500 Part no.
Masa GmbH DE - Andernach	> 5,500 Part no.
Masa-USA, LLC. USA - Green Bay	> 2,500 Part no.
Masa Middle East FZCO VAE - Dubai	> 1,500 Part no.
Masa-Tianjin Building Material Machinery Co., Ltd. CN - Tianjin	Spare parts on request



Read here an interview with the Masa expert Markus Feix about a comforting solution against data loss.



<http://masa-group.com/en/news/news/>

If country-specific, longer import times are to be expected, Masa additionally recommends stocking the most important wear and spare parts in order to avoid longer downtimes in a production plant. The selection and compilation of a reasonable, individual spare parts package can be done in coordination with the Masa service staff.



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Stowell Concrete Commissions State-Of-The-Art Concrete Products Plant in Somerset, UK

مصنع Stowell Concrete Commissions الحديث للمنتجات الخرسانية في سومرست، المملكة المتحدة

Situated on the edge of Yatton, right in the heart of stunning North Somerset, in the South West of the United Kingdom, Stowell Concrete is an outstanding, fully independent, family-run business specializing in the manufacture of an extensive range of quality concrete products. With over 60 years of hands-on experience, delivering across the UK, they have carved out a leading position in the industry and continue to grow. Stowell Concrete has earned a very proud and well-deserved reputation for dependable, dedicated service with a careful and uncompromising focus on quality.

توجد شركة Stowell Concrete عند حافة قرية "ياتون"، في قلب منطقة "شمال سومرست" الرائعة، في جنوب غرب المملكة المتحدة، وهي شركة متميزة ومستقلة تمامًا تديرها عائلة ما ومتخصصة في تصنيع مجموعة واسعة من منتجات الخرسانة عالية الجودة. وبفضل تمتعها بما يزيد عن 60 عامًا من الخبرة العملية، في جميع أنحاء المملكة المتحدة، فقد حققت مكانة رائدة في هذا القطاع ومستمرة في النمو. ولقد اكتسبت الشركة كذلك سمعة تدعو إلى الشعور بالفخر الشديد ومستحقة فيما يتعلق بتقديم خدمات متفانية يمكن الاعتماد عليها مع التركيز الدقيق والذي لا هوادة فيه على الجودة.

A Brief History of Stowell Concrete

Roger Stowell, who was born in 1939, began what became Stowell Concrete in September 1959, in a field behind the family farmhouse in the village of Kenn, near Clevedon. He was the youngest of four children, unlikely to inherit the farm, so he explored agricultural contracting. He also bought a small block machine with a capacity of five blocks to use when the business was quiet.

Concrete blocks took off, Roger continued investing in his block making equipment rather than his agricultural equipment and when he was confident in his ability at block making, he bought his first land at Yatton in 1968 and moved the block production there. He installed hydraulic wet presses to produce commercial slabs in the yard at Kenn.

The Holcombe yard was purchased from receivers in 1979 to expand hydraulic wet pressing further, adding kerbs, edgings, channels and T-beams to the product range. The former owners, Bristol Stone and Concrete, had specialised in bespoke concrete products, where Stowell Concrete has always made standard products for stock.

Land adjoining the Yatton works was purchased at every opportunity so that a total of 30 acres is now under their ownership and this has allowed Stowell Concrete to expand the yard five more times over the years. The small Kenn operation, including the head office, was incorporated into the Yatton yard in June 1996.



Vince Stowell (Managing Director of Stowell Concrete), with his eldest daughter Beth during the installation of their new Columbia CPM+60 plant.



*Plant mixer station
by Concrete Batching
Systems, Ireland.*

In January 1997, Roger died suddenly after developing a heart condition. With the help of a long term and loyal workforce, Margaret and her eldest son Vince, who had been working in the business full time from the age of 17, were able to continue. Vince was promptly appointed as Managing Director.

A small block yard was purchased in Weston-Super-Mare from a competitor in 2001, and 2 years later, an opportunity came up to lease land within Callow Rock Quarry, one of the quarries that still supplies Stowell Concrete with aggregate, so the block production was moved from Weston-Super-Mare.

The Beginnings of a Long-Term Partnership with Columbia

Early in 2019 Vince's daughter Beth, the eldest of the 3rd Stowell Concrete generation, accompanied her father with senior engineer, Dave Devine and Columbia's UK sales representative, Stephen Wilson, on a fact-finding trip around North America to look at Columbia production plant versatility, meet the Columbia team and see block machines being made at factory HQ in Vancouver WA.

A Columbia CPM+60 block machine was chosen and soon on order along with all associated batching and mixing plant with handling equipment. Despite the challenges of the COVID-19 pandemic, construction kept on track, and the plant is now up and running, finally utilising all of the available Yatton land.

An Ultra-Modern 'State-Of-The-Art' Cpm+60 Concrete Products Plant

Stowell Concrete opted for two independent sets of 4 x 40 cubic metre aggregate storage bins with feed to the bins from

ground shovel dump hoppers and incline belts to a rotary conveyor. The driver selects a bin from a remote control in the shovel cab, to feed the aggregates to the bins which have high/low-level light indicators. Designed and constructed by Concrete Batching Systems Ltd in Ireland and using weighing and control automation by another Irish firm, Pneutrol International Ltd, each concrete batch is metered onto a weigh belt and conveyed to any one of three dry aggregate holding hoppers over the relative mixers.

The moisture quality check of material feeding the Columbia CPM+60 uses the latest Hydronix moisture system with real-time microwave moisture measurement sensors at the exit of all eight aggregate bins and in each mixer to sense moisture variation and compensate accordingly. With concrete cored brick, concrete coloured tumbled walling and coloured concrete block paving in mind, a Würschum 4 "big bag" colour pigment dosing system was fitted. This allows pigment to be blended and blown to any one of the three Teka mixers, supplied by Conspare with a full set of concrete dosing hoppers and metering belts, delivering an extensive range of colour permutations along the feed belt to Columbia machine's feed drawer. Three vertical cement silos were also erected local to the mixer station to convey cementitious materials to three independent weigh vessels above each mixer, to complete the batching and mixing scope.

At the very heart of the new Stowell Concrete plant, the Columbia CPM+60 machine has a flat steel production pallet size of 1400x700x15mm, chosen primarily due to the unique Columbia Vibration Technology (CVT) that provides controlled mould vibration, accurately guided in a completely vertical motion. The CVT results in longer mould life, uniform distribution of aggregates, reduced cement usage, precise product heights and product versatility. Columbia's patented



Twin cassette fully automatic mould change inside a generous CDS sound room with 2.5 tonne overhead crane and targeted dust extraction.

CVT combines over 80 years of innovative engineering and field-proven capability to enable high quality and a comprehensive range of products. The CPM+60 is an easy to operate machine with user-friendly HMI/Compact Logix control and machine adjustments made from the HMI and full menu screens for quick machine set up. In changing from product to product (including any mould change requiring a height change), the machine makes the change automatically. Product change-over is recipe driven with a push-button control and tool-less agitator and strike-off plate removal.

The machine also features forced oil lubrication, a laser probe to control the feed drawer material level, full isolation between rear feed drawer section and machine centre section vibration, hydraulic linear agitation, remote valve stand, electronic product height control, product reject control and automatic mass control.

Vince Stowell was meticulous in his plant design to include a generous sound room with separate hydraulic pump room around the CPM+60 machine. The sound room is separate from a dual-level, air-conditioned operator control room raised at first floor to 2.5 metres from the factory floor and again to a second floor at 5 metres. The operators have a fantastic view of the machine from side and front through deep panes of full height acoustic glass. An automatic dust extraction facility is included in the sound room to target the natural dust plume generated during tamping and vibration. The sound room and operator control room were designed and supplied by CDS Group.

“We believe our machine operators are the most important part of the potential 24-hour factory shift operation. We aim to raise our working conditions to the very best possible standard by minimising noise and increasing machine visibility and light to a maximum. We have also eliminated manual handling during mould changes, including easy feed drawer agitator changes by overhead crane.” explained Vince Stowell.

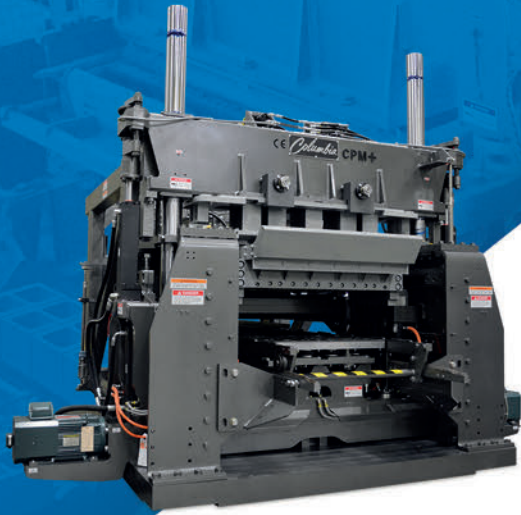
The 4 tonne, Automatic Mould Change facility, was purchased with dual cassettes which run on a floor supported overhead monorail system. The first of the two cassettes is used to extract the mould from the machine while the second cassette offers a new mould. A mould change is very simply done from a menu-driven touch panel for different products and heights, and a complete mould change is performed in less than 4 minutes for products that are the same height.

Designed into the new factory building there is a dedicated mould workshop for the rebuild of genuine Columbia moulds, fully fitted out with a 3.5 tonne overhead crane, a precision machined surface table and a specialist mould alignment fixture to allow off-line alignment of mould shoes with die cavities. Moulds are routinely inspected, oiled and stored after use and overhauled in the new workshop.

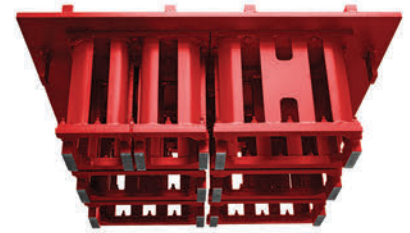
After a brush and air blast to remove debris from the fresh product, as part of a stringent quality control policy, Stowell Concrete has installed a pallet and product weight and height check facility on the green side of the plant. Every

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Product handling equipment
Molds for any machine



Concrete production lines
Product refinement stations
Block making machines
Concrete mixing plants
Planetary mixers
Molds



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Columbia 18 tonne PTS with turntable, green side stacker, 2 x buffers, 2 x dry side unstackers + CDS chamber racking system for 7,000 pallet capacity.

pallet of product is checked on the run for mass and height before entering the curing chamber, and a visible alarm is wired back to the control room to alert of out-of-tolerance.

The green product is gently conveyed along smooth urethane belt conveyors to a stacker where two pallets of product per shelf are elevated to 18 shelves high and a maximum combined pallet and product payload of 18 tonnes. The load is then collected by the PTS up-car and brought onto the lo-car for turntable rotation and transport to the correct location in the fully automatic curing chamber sequence. The precise, galvanised mild steel curing chamber holds 7,000 production pallets and was supplied by CDS Group with production pallets supplied by Clarkes of Stillington. DIN standard S30 lo-car and up-car rails were carefully mitred and then staggered to ensure a smooth and gentle transition of the car wheels throughout the curing chamber.

A single atmosphere, fully temperature and humidity controlled chamber with all-round air circulation was designed and built by CDS Group, to ensure completely even curing conditions and no colour variation of those products that contain pigment. The main factory building was constructed by Rose Engineering, to an exacting standard. Local firms were used where possible with GAR contracted to complete the shed and yard foundations and Wesco Systems supplying the electrics for the site.

The carefully regulated single atmosphere environment in the curing chamber allows for 24-hour operation of the plant. Products can exit the chamber on two separate dry side lines, an outer line for routine fast cycle production and a second



Twin dry side pallet return, lift blade push-offs, brush, grinding and pallet turn-over to robotic buffer accumulation of 510 pallets.



Vacuum product cubing robot with Columbia slave pallet strapping and hooding circuit.

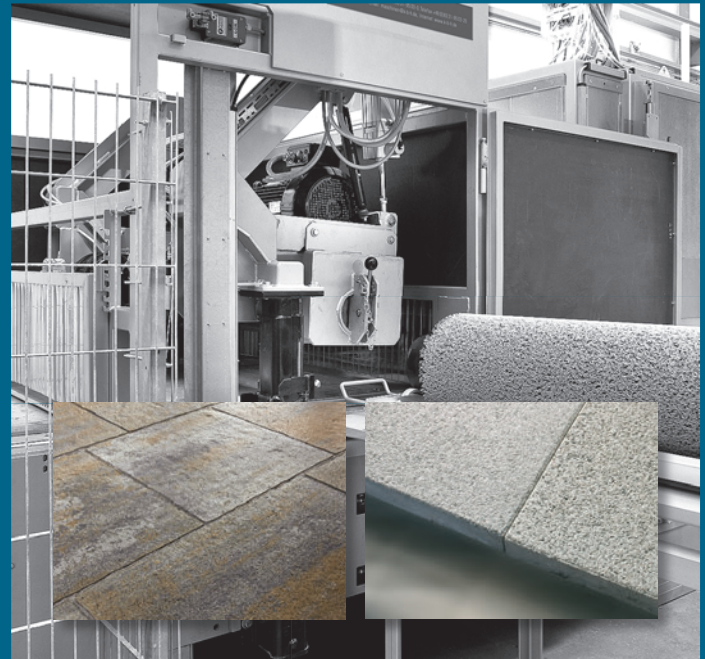
inner line for slower cure / slower cycle aged products. Not yet installed, an in-line, two-way split and "true tumble" secondary processing line is currently on order with Columbia and will be integrated into their production in autumn 2021 to increase the Stowell product range further.

Upon exiting the curing chamber on the outer dry side conveyor line, the product is removed from the production pallet by a dual set of lift-blade push-off machines.

The empty pallet is then conveyed to brushing to remove any fine debris before being turned over to even out the vibration through the production pallet on the next machine cycle.

To facilitate a degree of independent operation between the plant's dry and green sides, a robotic pallet accumulation buffer is included on the dry side, immediately after the pallet turnover. If the CPM+60 is calling for a pallet, it is conveyed straight to the block machine. However, if it is not called for, the pallet is automatically lifted by the robot vacuum to a storage buffer until the machine signals it. Similarly, if the plant's cubing side is stopped (perhaps for changes of strap), the block machine can continue by consuming the buffer stock via the vacuum robot. The steel pallet is finally coated with oil before re-entry to the block machine.

Product is pushed from the production pallet and travels along powered midget roll conveyors to a robotic cubing system with two-row forming in-feed lines. A Yaskawa MPL



CURLING SYSTEM

“nice haptics” Special abrasives brush – value enhancing

- Cleans, smoothens the product surface and creates a shiny finish
- Accommodates variation of product heights - either way front to back, left to right or even diagonally over the product layer
- Integration to the KBH Dancing Weights System possible – alternatively Stand Alone System
- Modular design allows accommodation of many different layer sizes and different product layer travel speeds – we design to plant specifications

**When installed at the KBH Dancing Weights System
3 modes of operation are possible:**

- Distressing and Curling
- Distressing only – curling brush raised
- Curling only – dancing weights raised



The first of two sets of horizontal and vertical OMS strapping machines.

robotic arm with vacuum end effector and dedicated foam surface pick pan is used to lift from both pick points and place each tier of product in the final cube.

Each cube of product is built onto a specialist metal slave pallet, designed to allow vertical straps to be threaded through the metal pallet on the underside of the cube in two directions. The conveyor loop system contains approximately 30 slave pallets which circulate continuously and can work with or without a wooden transport pallet as required and depending on customer preference. The full cubing slave circuit consists of two vertical and two horizontal OMS strappers; an OMS stretch plastic film hooding machine and two gantry style wood pallet dispensers.

The foundation and building infrastructure are already in place for a second phase CPM+60 plant and another Columbia 18 tonne PTS system.

"We would like to extend our sincere thanks to the entire Stowell team for investing in a long-term partnership with Columbia and for their support throughout the Phase 1 project. We wish the business continued rapid growth with their exciting new product range, and we very much look forward to Phase 2 and the installation of our splitting and ageing equipment in 2021," said Kevin Brown, Columbia Machine Division President. ■



A cube of voided UK concrete coursing brick (with horizontal and two side vertical strapping) leaves the Stowell strapping line on a slave strapping pallet.

FURTHER INFORMATION



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The perfect time to expand into more automation



الوقت المثالي للتوسع إلى الاعتماد على المزيد من التشغيل الآلي

From its origins as a fledgling concrete business located in a humble shed in Spartanburg, South Carolina, USA, Tindall Corporation has evolved into a national powerhouse prestressed/precast company with leading edge technology and a large footprint in the manufactured concrete products industry. Learn why this point in Tindall's long history was the right time to expand into more automation with the Afinitas Prima solution.

لقد تطورت شركة Tindall ، منذ نشأتها كشركة ناشئة في قطاع تصنيع الخرسانة في مكان متواضع في مدينة سبارتانبرغ، ولاية كارولينا الجنوبية، الولايات المتحدة الأمريكية، إلى شركة وطنية قوية في مجال صناعة الخرسانة المسلحة / الجاهزة تعتمد على التكنولوجيا فائقة التقدم ولها بصمة كبيرة في صناعة المنتجات الخرسانية المصنعة. تعرّف على السبب وراء أن هذه النقطة في تاريخ شركة Tindall الطويل كانت هي الوقت المناسب للتوسع في الاعتماد على المزيد من التشغيل الآلي باستخدام حل Afinitas Prima.

While the company's founding dates to 1932 in the throes of the Great Depression, its emergence really began in 1963 when the Lowndes family purchased the small business, expanded into precast concrete utility pipes and then into prestressed products - and never looked back.

Now, Tindall has 1,500 employees spread across six facilities that serve the Southeast, including two in Spartanburg, and locations in Petersburg, Va., Connelly, Ga., Moss Point, Miss., and San Antonio, Texas.

"I would say we're a leader in the industry, especially in engineered solutions," said Joel Sheets, vice president and general manager of the Tindall Utility Division. The prestress side of Tindall is now the majority of the business, with commercial construction, parking structures, schools, institutional buildings, wall panels, warehouses and all types of above-ground construction.

But the roots are in utility products, which are still an important part of the company.

"We come from a traditional utilities background - manholes, vaults, boxes - and we still do that today," Sheets said. "But then over the years we have grown into a specialized infrastructure solutions provider. It really could be anything - detention systems, three-sided bottomless, arches, flat-tops. It's about providing engineered solutions, so now we've added stair and elevator towers and specialized trenches and tunnels. We're really a solutions provider."

Outgrowing Shared Space

Tindall's seemingly infinite capabilities have led to continuing growth, and the company was getting landlocked at its Spartanburg facility. The prestress and utility divisions were quickly outgrowing their shared space, Sheets said.



Joel Sheets, Vice President and General Manager of the Tindall Utility Division



The Prima process line brings the forms to the worker saving steps and reducing the labor input per piece.



Each form contains an RFID tag that incorporates pertinent information like location, processing times, concrete mix, vibrator settings, among others.

At the same time, Afinitas was refining its Prima Wetcast Automation System. HawkeyePedershaab introduced Prima to the industry in 2015 and continued to enhance the system as other well-known legacy brands like BFS, New Hampton Metal Fabrication and Spillman Company joined the Afinitas family. Prima had established itself as a premier automation system for the precast industry, and now Tindall was looking for an automation solution.

“The timing was really a great thing,” Sheets said, “Prestress had just added a new proprietary product line and the Utility Division was on the move. So, it really drove the decision where one division had to split off from our shared location.”

In an era where labor shortages are severe and persistent, dynamic companies like Tindall still need to find a way to meet growing demand. The goal was to increase Tindall’s capacity and capability without increasing labor by the same amount, Sheets said.

“We had been investigating automation so we could better utilize our workforce and have the ability to make more with the folks that we have,” Sheets said. “Automation was going to be a key part of our move to a new location. So, we evaluated systems, and because Afinitas had so many companies rolled under one umbrella, it made the most sense to us.”

In addition to the Prima system, Afinitas added into the lineup its new Prima Base, a monolithic manhole base casting system that works in tandem with the Prima production line and makes it easy to create customized inverts for manholes. Prima Base sealed the deal for Tindall.

“That might have been one of the biggest deciding factors driving us toward a total Afinitas package,” Sheets said. “And the timing was just right because the division was growing, we had the opportunity to move to a brand-new plant, and we built it around the Afinitas Prima system.”



Jason Banwart, Afinitas Director of Technical Sales: “One of the principals of lean manufacturing is creating a flow, and that’s what you are doing with Prima.”

Tracking Metrics, Improving Safety

Prima is relatively new to the precast concrete industry, but the concept has been around since Henry Ford invented the assembly line in 1913. While Prima’s operating system is many times more complex than the original Ford line, the idea of moving the product down an assembly line is at the heart of Prima. The big difference between the original assembly line and Prima is the vast amount of information that Prima collects along the production loop as it tracks metrics, providing data for planning, training and efficiency improvements.

The automated production line benefits the employees “in many, many ways,” Sheets said. “Probably the chief one is from a safety and work task scenario.” Prima eliminates the need for forklift trucks in the production area and eliminates overhead transport of products and concrete buckets, enhancing safety.

The Prima system consists of a production loop where the forms automatically circulate through specialized workstations. When a task is completed, the station is reported “ready” and the molds move to the next position. “The people are far more stationary,” Sheets said. “The forms are coming to you. And so, if your task is always to set up a form, that’s what you are exclusively doing, and you’re getting really good at it. This gives you the opportunity to be an expert at what you’re doing as opposed to having a roving crew moving from form to form to form. Your tools are always right there with you, so you’re not having to go around looking for tools. That’s a benefit to the company and the employee.”

Jason Banwart, Afinitas Director of Technical Sales, said that the principles of Prima are based on lean manufacturing, which is geared to increasing worker productivity, improving efficiency and reducing waste.

“One of the principles of lean manufacturing is creating a flow, and that’s what you’re doing with Prima,” Banwart said.

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Prima doesn't need to stop to reconfigure for a new product. You can run different sizes all together down the same line with the same operators.

"You're not bringing the tools and material to each mold. You're bringing the mold to the people. It drastically reduces the labor input per piece, because of that assembly line efficiency. Each worker is doing a certain task at a certain station all day long, and that system is hitting cycle time all day long, so it really drives efficiency and drives down the labor content in every piece."

Which means that the Prima system meets the core objective of Tindall's new automation push - increasing the output rate of products without increasing labor. Not only that, the Prima system enables Tindall to cure much larger products than it could using its previous kiln that limited the size of the products they could cure.

The Tindall configuration is the largest Prima system Afinitas has designed to date, Banwart said. It includes an inventory area with 130 spots for product. The factory has four bays - one running the length of the building for the inventory; a second bay that houses the actual Prima loop assembly line; a third bay for rebar and a fourth bay for extra-large forms that will not fit into the Prima system.

Multiple Products on the Same Line

The beauty of Prima is that the line doesn't need to stop to reconfigure for a new product. It runs seamlessly, and for Tindall that means any combination of 4, 5 and 6-foot diameter manhole bases, risers, and cones, many sizes of storm boxes and a variety of other products.

"We'll have 110 to 120 forms in the Prima system just to start," Sheets said. "You can run them all together down the same line and the same operators will be able to efficiently cast each one."

This variability is accomplished through RFID tags on each mold, Banwart said.

"The RFID tag contains information about the product. When it comes to the fill station, Prima reads the tag and knows which mold is there. It knows that we need this much concrete at this volume. It knows the estimated time needed at each station. So, all the data for that one product is contained with the RFID tag."

In addition to the operators at each workstation, Prima has a main operator on an elevated platform who can control the entire production line as well as the fill station.

The basic production jobs are still the same," Banwart said. "You still have to pull open the mold. You still have to clean it after it's stripped and place the reinforcement back in. But everything you need to accomplish that is right at your fingertips."

While every greenfield construction project comes with a myriad of challenges, Tindall came into the year-long project with a comfort level, because of its history with the individual Afinitas brands, Sheets said. Banwart concurred.



The Afinitas Prima Base system, powered by BFS software and milling technology.



The Prima process line at the new Tindall plant in Spartanburg, SC.

"It was probably the most organized pre-sale meeting I've ever been a part of," Banwart said. "They had the building contractor, the batch plant supplier, the aggregate heating supplier and the whole Afinitas team in one meeting talking about the details."

"It was really a great project for Afinitas," he added, "because we had four of our companies all coming together to produce this system. We had BFS with the Prima Base, Hawkeye-Pedershaab with the Prima system and the forms supplied out of our New Hampton and Spillman facilities."

For Tindall Corp. and Sheets, beyond the production gains just seeing the looks on the faces of his production team was worth the hard work of commissioning a new plant. "Just standing here, you're in a brand new, clean, bright factory. A lot of consideration was placed into the worker experience," he said.

"It is also satisfying for the Afinitas group, which has been working to bring together its legacy companies coming together as one company and producing a world-class system," Banwart said.

"That's a world-class system for a world-class company, and it happened at the perfect time."

Benefits of the Prima System

- Ease labor issues - up to 50% labor reduction over traditional wetcast plants.
- Increase profitability and throughput - track productivity down to the piece.
- Improve plant conditions - attract and retain better employees with a clean and comfortable work environment.

- Position your company as a leader - win more business with automated processes that increase output and shorten lead times. ■

FURTHER INFORMATION



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Philippines precast concrete pioneer Megawide celebrates 10 years of innovating for affordable housing market

تحتفل شركة Pioneer Megawide الفلبينية للخرسانة الجاهزة بمرور 10 سنوات على ابتكارها لتوفير سوق إسكان ميسور التكلفة

The Indian Economic Times defines affordable housing as follows: Affordable housing refers to housing units that are affordable by that section of society whose income is below the median household income. Though different countries have different definitions for affordable housing, but it is largely the same, i.e. affordable housing should address the housing needs of the lower- or middle-income households. Affordable housing becomes a key issue especially in developing nations where most of the population isn't able to buy houses at the market price.

تُعرّف صحيفة ذا إيكونوميك تايمز التي تصدر باللغة الهندية الإسكان ميسور التكلفة على النحو التالي: يُشير الإسكان ميسور التكلفة إلى الوحدات السكنية التي يمكن لقسم المجتمع الذي يقل دخل أفرادها عن متوسط دخل الأسرة تحمل تكاليفها. ورغم أن تعريف الإسكان ميسور التكلفة يختلف من دولة إلى أخرى، إلا أنه يكون متماثلاً إلى حد كبير، أي أن الإسكان ميسور التكلفة يجب أن يلبي احتياجات الإسكان للأسر ذات الدخل المنخفض أو المتوسط. ويمثل الإسكان الميسور قضية رئيسية خاصة في الدول النامية التي لا يستطيع معظم السكان فيها شراء منازل بسعر السوق.

With this in mind, an increasing importance of this issue should be considered worldwide. The housing prices are rising in a matter pay scales cannot hold on to, so more and more people will be needing affordable living space. The UN estimates that by 2030, three billion people will need affordable housing in cities. Many building developers and the majority of the building industry are searching for good methods to implement this in their business plans and develop good solutions to benefit the population and the companies.

Funded and supported by the government - Affordable housing in the Philippines

Like the industry, many governments are conscious about the need for affordable housing and make considerable efforts to support their citizens. In the Philippines, the issue is covered by the Home Development Mutual Fund (HDMF), or more popularly known as the "Pag-IBIG" government fund. The biggest backlog is for the lower income residents and overseas workers with Filipino citizenship.

Within the five categories covered by this fund, leading Philippine infrastructure and engineering innovator Megawide Construction Corporation, focuses on the two most economic ones for their projects and is showcasing how prefabricated precast concrete elements are creating mutual benefits.

- **Socialized housing**
With a unit size of 18-24m² and a sales price of approximately 520.000 Peso (9.000 Euro).

- **Economic housing**
With a unit size of 42-48m² and a sales price of approx. 2 million Peso (34.000 Euro).

There also exist different configurations of the housing types within those categories like row houses (town houses), duplex houses, single attached, etc.

Markus Hennig, Executive Vice President - Business Units at Megawide Construction Corporation shared some insights on the current affordable housing projects at the Philippines and shows, based on the company's success model, that large-scale affordable housing projects with limited margins and precast elements



can and should be a part of the future planning of builders all around the globe. Megawide is the contractor for one of the biggest housing projects in the Philippines, a country where affordable housing is also hugely anticipated and supported by the government.

Markus Hennig, Executive Vice President - Business Units at Megawide



In producing precast concrete elements in factories, the time building on-site is significantly reduced and the quality of the walls and slabs is consistently high.



The automated machinery from Progress Group helps to reduce the physical labor and increases speed and safety at the same time.

Building affordable houses with state-of-the-art central factories and satellite precast factories

For over 10 years, Megawide is building high-rise and mid-rise projects with prefabricated precast elements and believes that this method of building will define the future of affordable housing.

Megawide is currently building six projects with prefabricated precast elements, totalling around 12.000 units. Two additional projects will start 2021 for 6.000 units. For these projects the company is either the EPC Contractor (Engineering, Procurement and Construction) or the Precaster only.

Two of the new projects will be the first for horizontal housing developments and will be delivered as turnkey. All the ongoing ones are located in the provinces of Luzon and one turnkey project will start in Mactan Island in Cebu.

The projects in the Manila metropolitan area are covered by the centralized factory in Taytay, Rizal. For the other projects, the prefabricated precast elements are produced in a satellite factory on-site, which keeps it more cost-effective. Logistics costs are too high to deliver from centralized factories to all the locations of housing developments in the provinces.

But this does not mean that the satellite factories are any less productive. In those facilities the machines are equipped with modern technology, and provided, among others, by one

of the biggest precast machinery developers in the world, the Progress Group. With this innovative technology the elements can be produced with less manpower and within a short period of time. The precast slabs and walls, as well as the already prefabricated bathroom units, can be installed quickly on-site, thanks to the short building time with this method and a committed schedule.

But still, many people of the industry are unsure if this way of building can also be profitable for the company. The answer is yes, this business can be commercially successful. More and more builders are counting on the method's faster construction process and high-quality standardization, as well as on-time delivery to clients. That is why precast elements are preferred over other building methods many times, and keeping in mind, additional opportunities will rise post Covid.

Markus Hennig, Executive Vice President - Business Units at Megawide states: "Our precast system, from engineering to production and installation, as well as high technical know-how for less costs, are the keys. One of our clients was searching for an entire year to find an alternative supplier but could not find anyone who could supply the quality for the price we offered. We are fast in setting up a factory, ramping it up quickly, and performing as per agreed schedule to complete enough units per month.", and adds: "Yes, with precast the costs are higher. But with a conventional method, nobody can complete as many units per month and year as we do with precast."



In these units, as per Philippine custom, often the whole family is living in one flat together - with an average Filipino family size of two adults and at least three children.



Megawide is planning to add two projects every year, as they see an increasing need in the future.



The precast elements used are 100 mm wide solid walls all around both floors as per minimum code requirement. The 120 mm solid slabs are provided as one piece.

Town houses in Tanza

One of Megawide's projects with a focus on town houses is located in Tanza, at Cavite, Luzon. On 28 ha for 2800 units, the main client's design is 42 m² per unit. Every developer has its own design, but most of the economic houses are planned as town houses with 42 to 48 m². The ones with 50-65m² are single attached or duplex units with a higher sales price. Two to three units are installed per day, resulting in 60 to 70 units per month, which can be finalized with precast elements. The goal is to complete 600 plus units per year per location with one production facility and one installation team and crane.

Adding to the town houses built with precast elements, affordable housing projects also include infrastructures as town halls, basketball courts, and other community areas. Sometimes even the streets are built by the developer.

The main customer for those buildings are overseas workers and, as per the funding guidelines, they can buy this house for an amortization of 3000PHP/month (52 Euro). 1.8 M Philippine peso (31.000 Euro) is the approximate sales price, which of course, varies in different regions.

Multi-storey buildings for those who work in the metropolitan area of Manila

Another of Megawide's projects is a 14-storey mid-rise affordable housing built with 90% precast - shear walls, half slabs, external and internal walls, stairs, and prefabricated bathroom units.

The pre-Covid plan was to create 23 buildings with 900 units each, all within five years of building time. Now, the schedule for the construction finalization has expanded. Still, with this big floor area Megawide is able to construct one floor within 10 days. Most of the buyers are singles or couples working



14-storey mid-rise affordable housing built with 90% precast

in the metropolitan area of Manila who don't want to travel much to their homes in the provinces. One to two people with max. two kids are going to live in the 24 m² single bedroom-only flats, with only a few bigger double condos.

The wall versions vary between shear walls or gravity walls, depending on which floor it is. The higher you get, the thinner the walls are going to be. For affordable housing, the external and inner solid walls are produced 100 mm thick. The prefabricated bathroom unit (PBU) is 80 mm thick with at least two sides. Megawide is the first company in the Philippines to work with PBUs. The PBU's can be made with a special 3D mould system and installed on-site as one already finished bathroom unit, which saves time, manpower, and provides a better quality. The fundamentals are conventionally made without precast elements. The infrastructure will be planned with the developer and Megawide will deliver the turnkey part.

The prefabricated bathroom units (PBU) are being delivered as a finished unit ready to be installed at the construction site with less manpower needed.



The back log is the same, but Covid changed the working habits, and with that, the demand for one's own home and its location. The trend is said to switch from living close to the city, to more likely living in provincial areas, as working remotely is getting very common in all businesses. Building with precast elements made in satellite factories is flexible and can work with this change of habits perfectly, without losing any time and at a much better financial benefit than thought.

Building with precast elements is more cost intense than other methods, but due to the highly increased production and building speed, it is still lucrative and gives the real estate developer a higher level of commitment and safety regarding the delivery time. It makes sure they don't lose buyers due to much higher finalization time than anticipated.

"With the precast elements, we can provide a new edge and opportunity with making available a much higher quality than conventional construction to the developers. This leads to a higher price that they can sell the units, and of course, this creates and develops trust to the developer's brand as they work with our well-known brand.", confirms Mr. Hennig. ■



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The PBU's are made in a fully automated mould system from Progress Group. They can be filled from above or through the side by a pump system.

FURTHER INFORMATION



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Modular architecture and construction industrialization

الهندسة المعمارية المعيارية والتحول الصناعي في قطاع التشييد والبناء

Several years ago, Moldtech has introduced to the market a new generation of 3D hydraulic moulds which are used for the construction of prison cells and residential buildings. Prefabricated prefinished volumetric Construction (PPVC) is a construction method by which independent three-dimensional modules are fabricated, completed with internal finishes, installations, and accessories in an industrial factory, and are transported and installed on the final site, where they are structurally connected to each other and to the general building facilities.

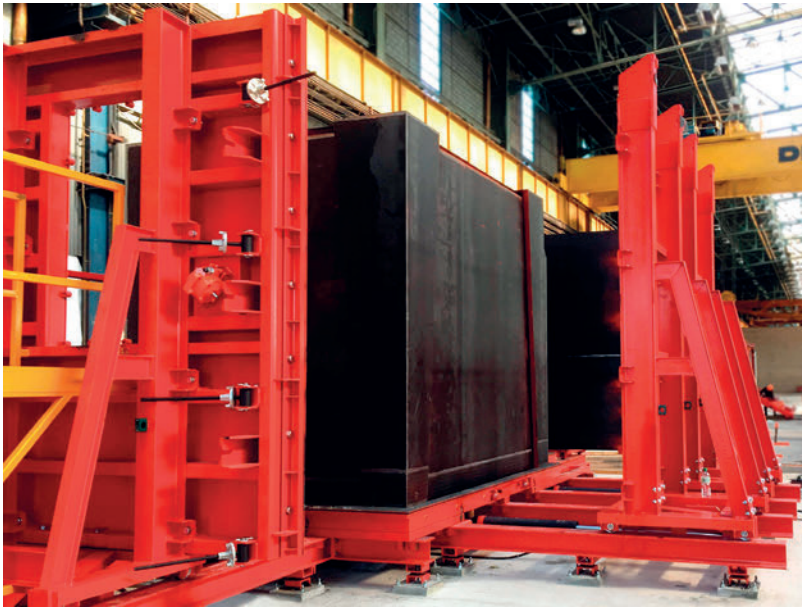
منذ عدة سنوات، قدمت شركة Moldtech إلى السوق جيلاً جديداً من القوالب الهيدروليكية ثلاثية الأبعاد التي تُستخدم لبناء زنازات السجون والمباني السكنية. البناء الحجمي مُسبق التصنيع والتجهيز (PPVC) هو طريقة بناء يتم من خلالها تصنيع الوحدات المستقلة ثلاثية الأبعاد، وإكمالها بالتشطيبات الداخلية والتركيبات والملحقات في المصنع، ويتم نقلها وتركيبها في الموقع النهائي، حيثما يتم توصيلها هيكلياً ببعضها البعض وبالمرافق العامة للمبنى.

There are many reasons why this modular architecture system is booming, some of the most important are:

- **Better Construction Environment**
As the bulk of the installation activities and manpower are moved off-site, it minimizes dust and noise pollution and improves site safety.
- **Improved Productivity**
PPVC can improve productivity by up to 40% in terms of manpower and time savings, depending on the complexity of the projects.
- **Improved Quality Control**
Off-site fabrication in a controlled factory environment can produce higher quality end products.



General view of the mould



Mould with shrinkable inner core

Due to the significant experience in various projects both in Asia, as well as in the Middle East, Europe and South America, Moldtech has been selected by one of the most important construction companies in Europe to be the supplier of the three-dimensional prison cell prefabrication system which will be used in the production of prison modules for various projects and with a variety of dimensions.

The PPVC moulds allow the client to precast the walls and the top slab of the prison cells, which once lifted from the mould are moved to a finishing table where the lower slab is incorporated which allows the module to be closed on its 6 sides and to pass to finishes and installations. This working system avoids the “turning” of the three-dimensional cells part.



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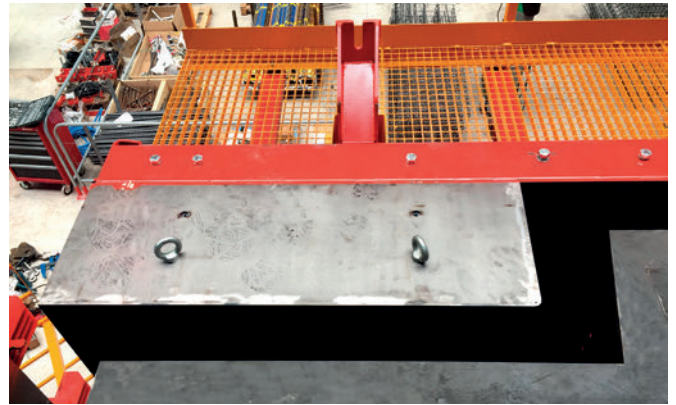
Window shutter

One of the big challenges of this project was that the prison cell production system had to adapt to various projects, and therefore had to allow a change in dimensions in the length and width of the cells, in addition to allowing changes of symmetry on its sides. This three-dimensional mould, with a hydraulic shrinkable inner mould, was designed as a machine adaptable to various configurations, both in size and shape. This working model allowed the customer to reduce the investment and to be able to cope with different jobs with the same PPVC cell production system.

Once the three-dimensional concrete modules have been removed from the mould, the finishes are carried out, the in-



Casted element



Shutter to create recess in the corner



Demoulding of casted element

stallations (water taps, lights etc.), are incorporated and the furniture is installed, in a fully industrialized production line, where operators and technicians perform repetitive and controlled tasks like in a car factory assembly line, that makes it possible to check the quality of each step of the process and to obtain prison cells of a very high level of quality.

Moldtech also worked on the installation, commissioning, and training of the client's staff, in addition to assisting the client in the processes of adjusting dimensions to adapt to new projects. With this project, Moldtech reaffirms itself as one of the world technological leaders in prefabricated modular construction PPVC and takes a new step in the development of industrialized construction. ■

FURTHER INFORMATION



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Hydraulic tilting tables to produce wall panels

المنضدات القلابة التي يمكن إمالتها هيدروليكيًا لإنتاج ألواح الجدران

Using a tilting table is one of the best ways to produce prefabricated concrete wall panels. The rigid structure, the faultless finish of the top facing and the wide variety of possible features guarantee a concrete product that copes with the highest standards and suits the customers' requirements. In order to demould wall panels without damaging the edges, the panels need to be tilted before they are removed off the table. By doing so they can also be stored vertically. The use of a hydraulic tilting table is a very appropriate way to tilt the panels.

إن استخدام المنضدة القلابة التي يمكن إمالتها يمثل طريقة من أفضل الطرق المُستخدمة لإنتاج ألواح الجدران الخرسانية الجاهزة. ويضمن الهيكل الصلب والتشطيب الخالي من العيوب للواجهة العلوية ومجموعة الميزات الواسعة الممكنة توفير منتجًا خرسانيًا يتوافق مع أعلى المعايير وبلانم متطلبات العملاء. ولضمان فك ألواح الجدران دون إتلاف الحواف، يجب إمالة الألواح قبل إزالتها عن المنضدة. ومن خلال القيام بذلك، يمكن أيضًا تخزينها عموديًا. كما يُعد استخدام المنضدة القلابة التي يمكن إمالتها هيدروليكيًا طريقة مناسبة للغاية لإمالة الألواح.

The design

A Construx tilting table consists of a rigid top pallet which is fixed onto a tilting base frame. The surface of the table has an 8mm or a 10mm steel sheeting which consists of 1 single steel plate only, without any welds or joints. The plates Construx uses are manufactured on special demand and fit for table form use. The type of steel is S355JR which gives an extra durable surface. The manufacturing of the plates is done according to the OFL-S standard which is a special procedure to obtain extra flat surfaces, fit for the use in fair-faced concrete applications. The steel sheets can be up to 16m x 4,5m in 1 single piece. Larger sizes are possible if needed; in those cases, the table will be manufactured in parts and the individual sections will be connected, welded and grinded in the precast facility. Due to a large permanent stock of those large plates, Construx is able to supply on short demand.

In order to obtain maximum quality, the surface of the tilting table is stripped, shot blasted and polished on an automated grinder, until a flawless finish and the required smoothness is reached. The grinding is done with grains 26 and 80 and at the end the surface is polished with "Scotch-Brite".

The top structure is subdivided into a top pallet and a tilting frame, with vibration absorbers fitted in between both, this gives the table a very smooth and equal vibration pattern with no loss of energy in the frame or in the ground.

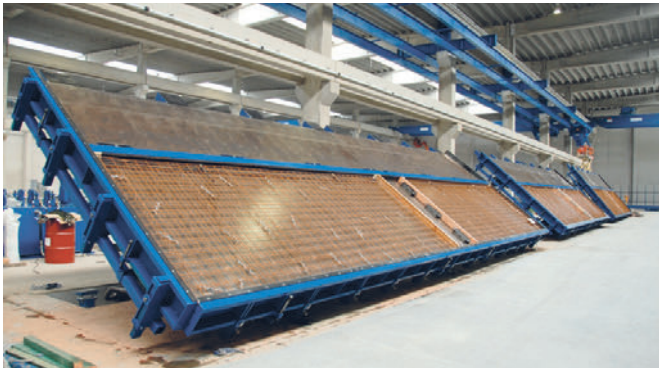
The frame is connected with hinges onto stable and fixed ground beams. These ground beams are equipped with floor supports and accommodate the cylinders. Each of these floor supports has also a rubber shock absorber. There is no requirement for any special foundation for the table, a normal concrete slab is sufficient. The customer doesn't need to dig



Overview of precast production facility with tilting tables



Fully equipped hydraulic tilting table



Tilting tables with fully prepared side-forms and reinforcement



Tilting tables with LED displays for frequency controlled vibration

holes underneath the table to accommodate the hydraulic rams because by using multi-stroke cylinders there is no need for recesses in the floor, the rams fit perfectly in between the table and the factory slab. The height of the surface of the table is approximately 780mm, which is a good ergonomic height. When in upright position, at a tilting angle of 80°, the bottom side of the table comes very close to the factory floor due to the positioning of the hinges, therefore no space in height is lost due to the tilting.

The tilting is done by means of telescopic cylinders; these cylinders are driven by a hydraulic aggregate with separate pumps for each individual cylinder (or group of cylinders) in order to synchronize perfectly the stroke of all cylinders. The overall tilting capacity depends on the customers' requirements, which is most of the time somewhere between 600kg/m² and 1000kg/m². The hydraulic group is placed under the table, so it is completely out of the way. The tilting of one or more tables can be controlled from the centrally located electrical cabinet or by means of a wireless remote control. When using the remote, the required table needs to be selected with a safety key.

Wide range of special features

If the customer is not going to use self-compacting concrete, the table can be equipped with vibrators, operating at either normal or high frequency. In the latter case, a frequency converter will be used to adapt the vibration energy according to the shape and the sizes of the elements sitting on the table. The vibrators come with a motor protection switchbox and a separate control cabinet, so all motors can be controlled individually or simultaneously. When using a variable electronic frequency inverter for a large number of tilting tables, Construx can supply extra-large 3-digit LED displays. Per table, the operator can choose to either run all the vibrators at the same time or the left half or the right half separately. The top LED display indicates the location of the table (2 first digits: row and position) and the configuration of the activated vibrators (last digit: none, left, right, all). The bottom LED display indicates the chosen frequency (0Hz to 200Hz). The complete electric and electronic installation is done with vibration-proof cables and according to IP65 standard specifications.

The sides of the table can be equipped with fixed, detachable, tiltable or adjustable side-forms. These adjustable forms are easy to use and can be fixed at any height. The most common range is 200mm: from 100mm to 300mm, continuously variable. The forms are bolted to the table and sit on the bottom long side and on both short sides of the table. A 90° angle can easily be adjusted, and the height can rapidly be adapted. A rubber joint is incorporated between table and side-forms. The top of the side-forms can have an incorporated timber profile to be able to fix chamfers or box-outs and a detachable trapezoidal machined chamfer for tongue and groove connecting panels. The bottom side-forms are divided in 2 individually adjustable parts, to be able to pour wall panels with 2 different thicknesses on the same table and at the same time. In order to speed up the production process, the short side-forms can be opened and closed with hydraulic rams. These hydraulic rams keep the side-forms in place so no extra fixation is required.

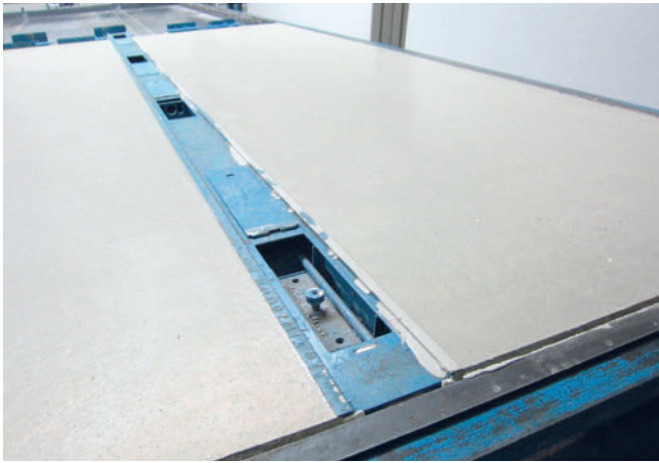
As an option, the tables can be insulated and equipped with heating pipes underneath the top part of the table. The insulation plates can also be fixed on the factory floor or onto a steel casing around the table. The heating pipes sit right underneath the top part, through the lateral profiles. All tubes are interconnected and the positions of inlet and outlet are determined after consulting the customer.

Side-forms, magnets and extensions

In order to use the table at its full width, Construx supplies individual and detachable extensions along the length of the table, which can be used as a support for the side-forms and their magnets if the side forms need to sit at the edge of the table. This means that a 4m wide table can be used to cast 4m wide elements.

Construx also supplies a wide range of removable full steel or open side-forms, brackets and magnets, to be used on top of the tilting table. All these items are designed and produced in-house. The side-forms serve as a shutter for the sides of the wall panels that are not closed by the adjustable side-forms of the table. The double-sided full steel side-forms are always made to measure, with a flat surface on both sides or one flat side and another side with a special profiling for tongue

PRECAST CONCRETE ELEMENTS



Double sided side-forms with incorporated removable 2000kg box-magnets

of groove, according to the customers' wall panel detailing. The open side-forms and brackets mainly serve as shutter for door and window openings. These open side-forms and brackets can accommodate cut to measure plywood plates. The plywood is screwed or nailed directly against the open side-forms or brackets. All the side forms and brackets are held in place by means of strong box-magnets. The box-magnets are removable, interchangeable and independent from the side-forms, so the customer only requires a limited number of magnets. When they are sitting in the full steel side-forms, the magnets are protected by means of a protection cover, so no concrete can get into the forms.

Shaping the future of concrete

Having a large permanent stock of big size, OFL-S quality steel plates and having a large capacity to produce top quality hydraulic tilting tables, Construx always complies with the short lead time and with the customers' requirements to obtain a complete package of hydraulic tilting tables and all relevant accessories. As being one of Europe's leading tilting table manufacturers, Construx supplies flexible and versatile solutions to manufacture precast concrete wall panels. It is an absolutely economical way of producing precast concrete wall elements.

Construx is an engineering-driven manufacturing company relying on the commitment, creativity and experience of its employees. Their aim is to establish a partnership, rather than to be a supplier, in providing turnkey solutions for precast and on-site formwork issues.

FURTHER INFORMATION



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Battery Mould for very high productivity and quality in precast plants

قالب بطارية لتوفير إنتاجية وجودة عاليتين للغاية في مصانع الخرسانة الجاهزة

The worldwide trend of prefabrication in construction industry is gaining momentum increasingly, and the reasons for this approach are being recognized more and more. Industrialized or modularized construction provides time and cost savings and an ensured quality, due to efficient production in an off-site and controlled environment. This fact is even more critical in mass housing projects which are nowadays much needed for most of the countries in the world to address their excessive need for affordable housing.

إن الاتجاه العالمي للتصنيع الجاهز في قطاع التشييد والبناء يكتسب زخمًا متزايدًا، ويزداد الإقرار والتسليم بأسباب هذا النهج أكثر فأكثر. وتعمل أعمال البناء المتقدمة صناعيًا أو المعياريّة على توفير الوقت والتكلفة وجودة مضمونة، وذلك بفضل الإنتاج الفعال في بيئة خارج الموقع وخاضعة للرقابة. وتحظى هذه الحقيقة بأهمية أكثر في مشاريع الإسكان الجماعي التي تحتاج إليها معظم بلدان العالم بشدة في الوقت الحاضر بهدف التعامل مع حاجتها المفرطة للسكن الميسور التكلفة.

The modularization of building components can be carried out in different levels; from individual studs and blocks, over wall and slab panels, up to finished room cells. For prefabrication of large panels, there are different methods, and accordingly various equipment with pros and cons in each case. With successful experience in design and manufacturing of both horizontal and vertical precast equipment, B.T. innovation GmbH has introduced the Butterfly Battery Mould®, as

a solution to combine the advantages of horizontal preparation and vertical casting of precast elements. The Butterfly Formwork® as a double shuttering platform provides an easy and accurate preparation of inbuilt parts (anchors, door and window openings, utilities, etc.) and reinforcement on a working station. It then flies into the battery mould and functions as an integral part to enable the simultaneous production of several panels vertically.



Modular off-site production in the precast plant enables short construction times due to high degree of prefabrication



Patented Butterfly Battery Mould combines the advantages of horizontal preparation and vertical production



Butterfly Formwork in unfolded position - Horizontal preparation



Insertion of a Butterfly Formwork into the Butterfly Battery Mould

for faster
construction

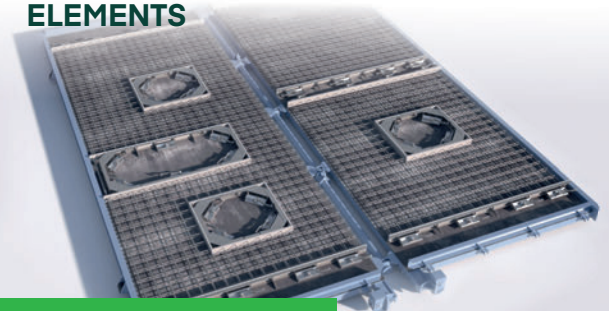


B.T. INNOVATION GMBH

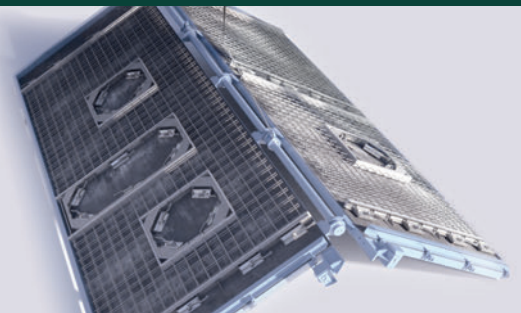
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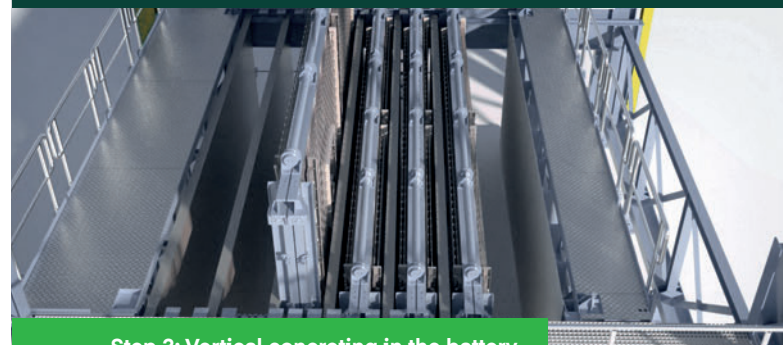
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Step 1: Horizontal preparation



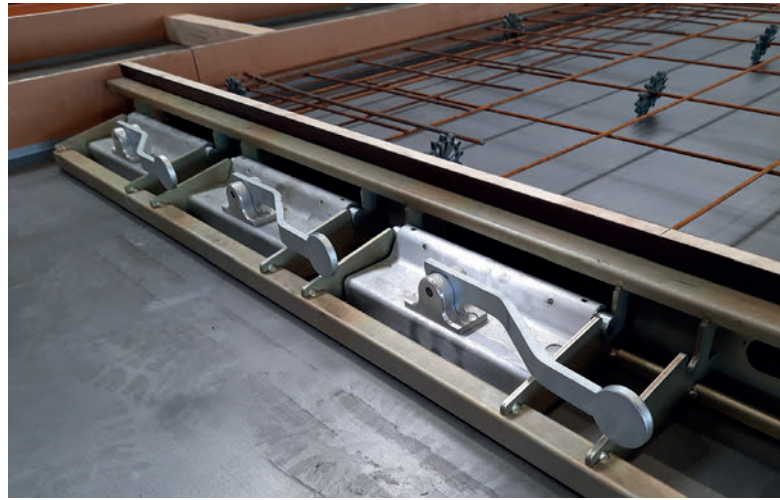
Step 2: Folding up the formwork



Step 3: Vertical concreting in the battery



Smooth folding up the formwork with special hydraulic equipment



Shuttering formwork MultiForm with MagFly magnets

To form the elements on the butterfly surface, BT innovation provides reinforced and tailored shuttering solutions. The well-known and trusted MultiForm profiles and MagFly® magnets of BT innovation are shaped and positioned optimally to bear the significant hydraulic pressure of fresh concrete at a height of up to 4m.

Horizontal preparation on the butterflies makes it possible to use laser projectors to mark up the positions of in-built items, openings, and shuttering profiles. Furthermore, control systems using customized handling software contribute to a well-planned and safe working process in the precast plant.

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*Butterfly Battery
Mould with
MagFly magnets*



Control point for unfolding and folding station and laser projectors



All five sides and the edges and surfaces of the recesses are absolutely smooth.

Butterfly Battery Mould system is now being used in Europe and Africa, in different levels of automation and complexity. End products are high quality panels with extremely smooth surfaces on all sides which are either directly installed in buildings on site, or are structural components of precast room modules in factory. B.T. innovation GmbH as a technology provider in precast industry focuses on the individual requirements of the clients and develops a tailored and customized solutions with regard to targeted budget, capacity, size, or scope of delivery. ■



Watch in this video:
Butterfly Battery Mould® sets new standard
for precast elements in modular construction



FURTHER INFORMATION



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Innovation 4.0 and safety

الابتكار 4.0 والسلامة

The two companies Bianchi Casseforme and Brigade Elettronica share a good partnership, which was born from the intuition of the company founders and their willingness to innovate. Brigade Elettronica introduced the first acoustic reversing alarm in Europe just over 45 years ago; over the years, the company has specialised in vehicle safety and consolidated its position in this sector. Bianchi Casseforme built the first metal formwork in Italy in the early 1960s, which then replaced wooden formwork, and in the 1980s the company developed "Speedy" after Mario Bianchi saw a prototype of the machine in the USA. A versatile, economical and above all fast and reliable concrete spreader with 3 to 4 m³.

تتشارك الشركتان Bianchi Casseforme و Brigade Elettronica في شراكة جيدة، نشأت من حدس مؤسسي الشركة وطبيعتهم واستعدادهم للابتكار. فقد استحدثت شركة Brigade Elettronica أول إنذار صوتي للرجوع للخلف في أوروبا وذلك منذ ما يزيد عن 45 عامًا بقليل؛ ولقد تخصصت الشركة، على مر السنوات، في مجال سلامة المركبات وعززت مكانتها في هذا القطاع. وشيدت شركة Bianchi Casseforme أول قوالب صب معدنية في إيطاليا في أوائل الستينيات، والتي حلت فيما بعد محل القوالب الخشبية، وفي الثمانينيات طورت الشركة آلة "سبيدي" بعد أن رأى ماريو بيانتيشي نموذجًا أوليًا للآلة في الولايات المتحدة الأمريكية. وهي آلة موزعة للخرسانة متعددة الاستخدامات واقتصادية وفوق ذلك كله سريعة وموثوق بها بسعة 3 إلى 4 متر مكعب.

This machine was the turning point for the company, which already had great success in the precast concrete industry. So, in the 1990s the company entered the European market, focusing on Spain and from 2008, the world market. It's export share today represents almost 65% of total turnover.

The business activities are aimed at the precast concrete market and include formwork for concrete elements for industry, trade, construction and residential construction, concrete distribution systems, complete plants and circulation systems for automated production, magnetic systems, prestressing systems

and vibrator systems as well as accessories for lifting and attaching.

Today, almost sixty years after its foundation and with the third generation of owners already working in the company, Bianchi Casseforme continues to follow the path set by its founder, relying on its innovative and forward-looking technologies, such as the new Speedy electric concrete spreader, which is currently in the development phase. The current version of the concrete spreader is powered by a diesel engine; but the electric model, soon to be launched, is certainly an



To guarantee maximum vehicle safety, Bianchi Casseforme relies on Brigade Elettronica, the market leader in vehicle safety systems.



Front camera

optimal choice, also to comply with increasingly stringent emission regulations, especially in cases where work has to be carried out in completely closed environments, as often happens in Italy and in Europe. There are therefore no restrictions on the use of this new machine and it is approved for all countries. A new challenge for the Bianchi Casseforme company, which has many years of experience and exclusive know-how, with a production of ten to 20 machines per year and a park of more than 400 machines installed worldwide.

Technology and safety

To guarantee maximum vehicle safety, Bianchi Casseforme relies on Brigade Elettronica, the market leader in vehicle safety systems. Bianchi Casseforme has installed Brigade Elettronica safety systems in almost all the machines built. These include the Backsense® radar sensors and the Backeye®360 system with cameras and screen. Backsense® works with a modulated continuous wave radar (FMCW), which guarantees precise and immediate detection. The radar sensors' radius of action can be configured to a width between 2 m and 10 m and a distance between 3 m and 30 m, depending on the vehicle, and customised detection zones are possible to exclude fixed objects or body parts. Backsense® is characterised by its extremely robust design and features a five-level display

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Backeye®360 is a camera system with 360° vision all around the vehicle that uses appropriate software to process the images from the four ultra-wide-angle cameras into a single image, combine them and display them in real time on the monitor in the driver's cab.

with easy-to-read indication and corresponding acoustic alarms. This device is assembled by Bianchi Casseforme to meet heavy duty requirements and it allows the processing of 130 m³ of concrete per day in efficient and safe conditions.

Backeye®360, on the other hand, is a camera system with 360° all-round vision around the vehicle that uses appropriate software to process and combine the images from the four ultra-wide-angle cameras into a single image that is displayed in real time on the monitor in the driver's cab. In addition, Backeye®360 offers the possibility to activate specific views with different triggers and the screen can be split to display the whole vehicle and a specific area at the same time. A system that eliminates blind spots and protects people. Bianchi Casseforme was able to install this system easily on the Speedy concrete spreader because the cameras are mounted on top of the vehicle and rotate together with the moving part of the machine. The monitor installed in the driver's cab is the more durable 7-inch waterproof model.

Industrie 4.0 Ready

The real innovation, not only in terms of safety, is the connection of Backeye®360 to the MDR mobile DVR in the Wi-Fi and 4G version, which meets some of the criteria required to make the machines compatible for Industry 4.0 applications. The MDR not only records and stores the camera shots, but also allows the machine to be connected to the server in the company and monitored in real time. Its functions include geolocation, sending data about alarms on the machine and live displaying work phases with the possibility of intervening when faults occur. These features have attracted the interest of Bianchi Casseforme's customers. Bianchi Casseforme has thus confirmed its willingness to innovate and has taken an in-depth look at the Industry 4.0 directive in order to provide customers with advice on the choice of the most suitable devices for them - from Brigade Elettronica, of course. ■

The real innovation is the connection of Backeye®360 with the MDR mobile DVR in the Wi-Fi and 4G version, which meets some of the criteria required to make the machines suitable for Industry 4.0 applications.





Side camera



Backsense

FURTHER INFORMATION



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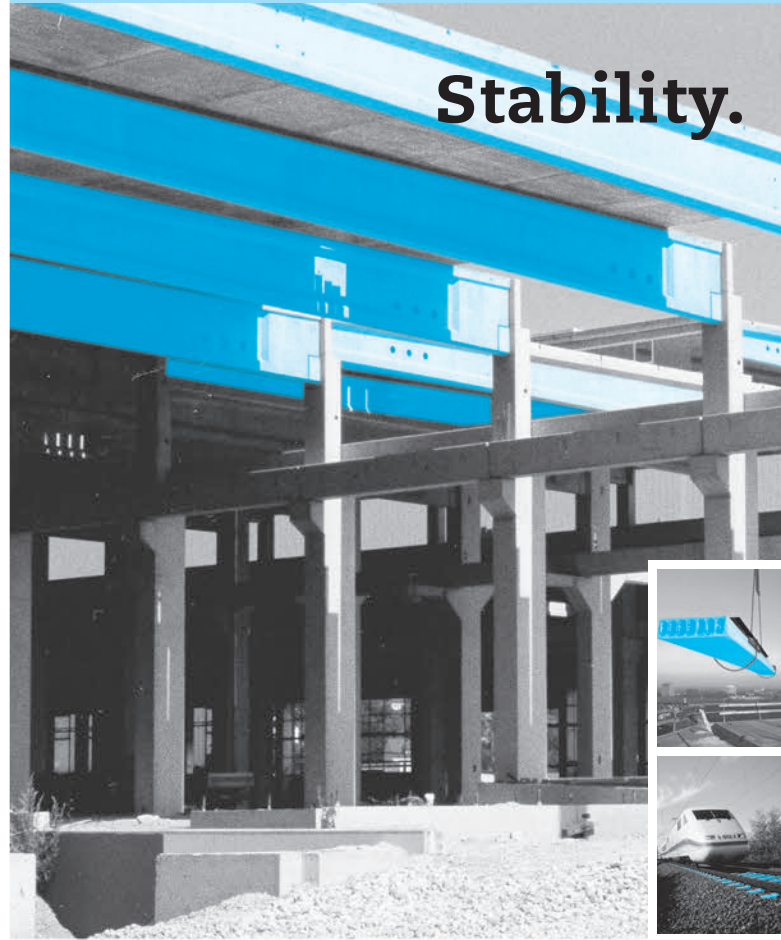
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On the road to success: Schneider Betonfertigteilewerk GmbH invests in new circulation plant at Philippsburg site

على طريق النجاح: شركة Schneider Betonfertigteilewerk GmbH تستثمر في مصنع تدوير جديد في موقع فيليبسبورغ

Schneider looks back on almost 60 years of history, which began in the late 1960s in Philippsburg, Baden-Württemberg. Today, the product portfolio includes a wide range of precast concrete elements, in addition to the main products of lattice girder slabs and double walls, as well as solid walls, thermal walls, special parts and room modules. Schneider Betonfertigteile GmbH recently invested in a new multifunctional plant for the production of lattice girder slabs and double walls, thus laying the foundation for capacity expansion. Reymann Technik was commissioned with the planning of the plant and accompanied the new construction as a project management partner.

تسترجع شركة Schneider تاريخها الذي يقرب من 60 عامًا، والذي بدأ في أواخر الستينيات في فيليبسبورغ، بادن فورتمبيرغ. وفي الوقت الحالي، تشمل مجموعة المنتجات على مجموعة واسعة من العناصر الخرسانية الجاهزة، بالإضافة إلى المنتجات الرئيسية لألواح العوارض الشبكية والجدران المزدوجة، بالإضافة إلى الجدران الصلبة والجدران الحرارية والأجزاء الخاصة ووحدات الغرف. واستثمرت شركة Schneider Betonfertigteile GmbH مؤخرًا في مصنع جديد متعدد الاستخدامات لإنتاج ألواح العوارض الشبكية والجدران المزدوجة، مما وضع الأساس لتوسيع السعة. وتم تكليف شركة Reymann Technik بتخطيط المصنع بالإضافة إلى البناء الجديد كشريك في إدارة المشروع.

The production at the Philippsburg site consists of a total of three production halls with different equipment, in which the entire product mix is manufactured. Prior to the investment decision, production capacities for the main products, lattice girder slabs and double walls, including the thermal wall, were operating at the limits of their capacity throughout the year with very high utilisation. Lattice girder slabs, which used to take up most of the concrete volume, were mainly produced on a pallet circulation plant dating from 1990, while more elaborate slabs were produced in the old Hall 1. The existing double wall production on stationary folding pallets in Hall 3 only allowed a limited daily capacity and limited order sizes. In order to be able to exploit existing growth potential, this production area was to be expanded.

study analysed existing production possibilities and identified opportunities to expand the capacity of the main products. In addition, other objectives were considered in the study, such as:

- Rationalisation of production processes
- Optimisation of personnel deployment
- Optimisation of the use of materials and material logistics
- Extension and optimisation of the product dimensions
- Possibility of production in shift operation
- Improving occupational safety

Reymann Technik was founded in 1974 by Wolfgang Reymann in Hockenheim. As a planning and engineering office for precast concrete plants, Reymann Technik acts independently of machine suppliers and can thus plan and implement the optimum plant solution for its customers in terms of economy, logistics, process technology and quality.

In a first step, Reymann Technik GmbH was commissioned to carry out a feasibility and investment study. The feasibility



The new production hall and mixing plant



Shuttering logistics with three robots



Shuttering robot and patented centimetre shuttering



Automatic laying of reinforcement with double insertion robot



Ready for concreting

The study focused on an economic expansion of the lattice girder slabs and double wall production on a new pallet circulation plant that was as flexible as possible and the associated planning. The bases for such analyses are existing key figures for the plant, on the basis of which recommendations are made regarding the product mix, capacity planning and target key figures. Due to the large number of projects which have been realised by Reymann Technik worldwide over the last almost 50 years, extensive experience and benchmarks are available, which entail planning security and reliability for customers.

The existing building fabric of the three production halls and the equipment at the Philippsburg site had remained unchanged for about 20 years. The existing old Hall 1 also has a very low ceiling, with only very limited production capacity and no usable crane capacity. After careful consideration of all available options, the decision was made to demolish this existing hall and to build a new production hall on the same site, which would be suitable for the installation of a modern pallet circulation plant. Accommodating the new plant on the existing site while taking into account the existing buildings was one of the challenges in this project.

At the same time, existing production was to continue without major restrictions during the demolition and reconstruction

of Hall 1. The fact that the former Hall 1 accounted for a rather small proportion of production capacity at the time and that the main part of production could continue to run in Halls 2 and 3 without restrictions had a favourable effect here.

The size of the new hall was based on the possibilities of the site, the requirements of an efficient circulation plant and the equipment needed for this. At the same time, the location on the site, distances to the boundary and to the neighbouring hall, logistical requirements and future expansion possibilities had to be taken into account. The new hall was realised with a length of about 84 m, a width of 36 m and an interior height of 11 m. The construction of the hall was planned and realised by the orbau Group. The hall columns, walls and ceilings for the required platforms were produced and supplied by the precast plant itself, with the outer walls manufactured as insulated sandwich walls with Schöck Isolink.

High degree of automation according to the current state of the art

The plant equipment corresponds to the latest state of the art in lattice girder slabs and double wall production. Ebawe Anlagentechnik GmbH and progress Maschinen & Automation

AG, both subsidiaries of the Progress Group, were awarded the contract for the supply of the equipment for the circulation plant. Particularly noteworthy are the completely automatic shuttering logistics with shuttering, storage and de-shuttering robots, as well as automatic shuttering transport and cleaning. The integrated automation of the shuttering logistics contributes significantly to the reduction of manual errors and damage to the shuttering material.

In the area of reinforcement, a space-saving solution was installed with automatic round steel processing and lattice girder cutting. The round steel is automatically drawn from the coil, straightened, cut and bent and supplied to the insertion robot on a chain magazine, as are the cut-to-size lattice girders. The chain magazines for the reinforcing bars and the lattice girders were planned in such a way that a maximised number of reinforcing bars and lattice girders can be provided in order to avoid or minimise robot waiting times during automatic laying.

The prepared reinforcing bars and lattice girders are placed on the pallet in the prepared shuttering by a double laying robot. A fully automatic steel processing system including automatic mesh or lattice girder welding equipment was also discussed, but rejected for the time being due to space constraints and economic considerations.

The pallets can be moved semi-automatically via up to eight circulation stations, from lifting and deshuttering to manual shuttering extension, in order to minimise the manual effort required for pallet transport in inching mode.

The ebos software package from Progress Software Development GmbH is used for overall control. It keeps an eye on the entire circulation plant for work preparation, production and process analysis and can display all the details of the pallet assignments and each element to the employees in the plant on large screens based on the CAD data. With the display on screens at the manual workstations, the amount of paper is reduced and more information is available in better quality.

The shuttering system used is RT U60Pro shutters supplied by Ratec in the centimetre shuttering grid developed and patented by the Progress Group (Infinity Line® Notch-Free shuttering system). This ensures length-optimised use of the shuttering, minimises the need for manual polystyrene extensions and optimises the quality of the panel edges.

For manual finishing, shuttering extension and installation of built-in components, the pallets pass through two manual workstations after automatic reinforcement. An alternative station is available for more complex pallets and special parts. The manual work is supported by a laser projection system over two pallet stations. At the same time an additional quality control is made possible.

For the production of double walls and thermal walls, a decision had to be made as to which equipment should be used for turning the 1st shell. In principle, there are two possibilities for turning here: by means of a suction turning frame or by means of a pallet turning device.

As Schneider has traditionally had good experience with glass fibre spacers (Schöck Isolink) in the production of thermal walls, turning with a pallet turning device was favoured and planned for the new production plant. This means that the element accuracy automatically set on the pallet by the shuttering robot can be optimally used and errors in positioning the 1st shell can be ruled out.

On-demand concrete supply

Analysis of the site's existing concrete supply and its performance indicators resulted in the decision to build a new mixing plant immediately next to the new circulation plant. As a long-standing partner of Schneider Betonfertigteilewerk GmbH, Wiggert & Co. GmbH was awarded the contract for the supply and installation of the new mixing plant. It is designed in such a way that the other two production halls can also be connected to the new mixing plant via a new bucket conveyor at a later date. Due to the construction of the new



Concreting and compaction station



Automatic concrete discharge

PRECAST CONCRETE ELEMENTS



Pallet transport to the storage and retrieval machine

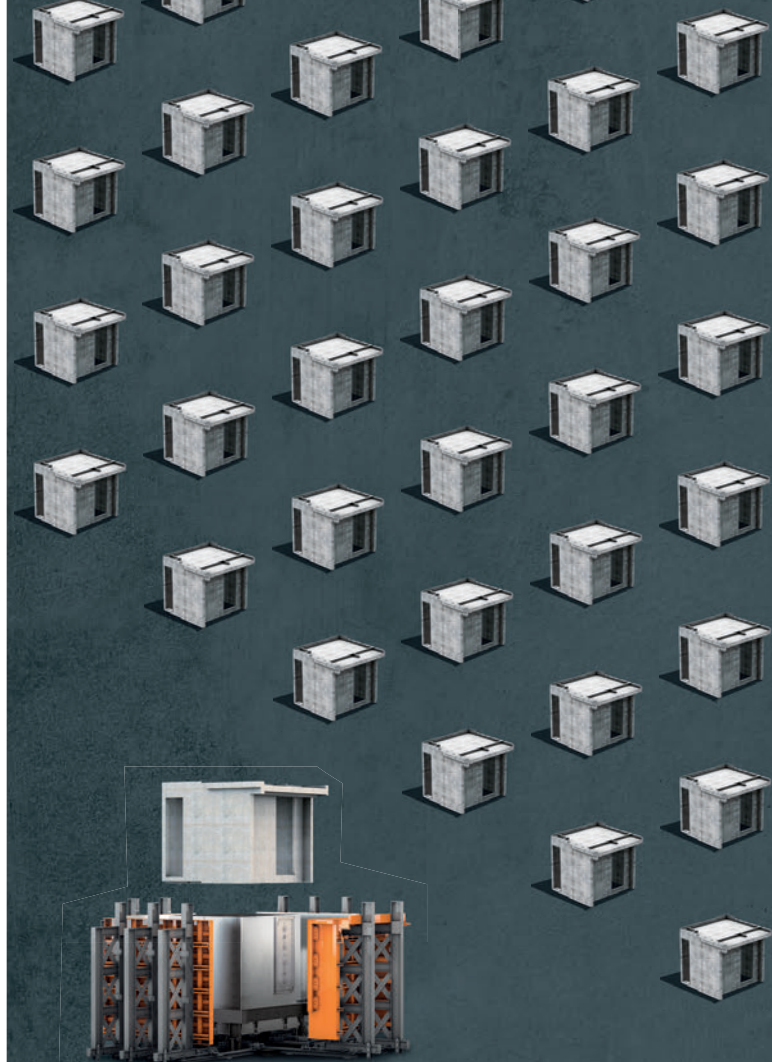
mixing plant, it was possible to place it in the immediate vicinity of the main consumer of the new circulation plant with a concrete transfer from the mixer via a pre-silo directly into the concrete spreader.

At the same time, a fresh concrete recycling plant was implemented to recycle water and solids from fresh concrete residues and the wash water from the mixing plant and concrete distributor in order to produce in a resource-saving and sustainable manner.

All other machine equipment of the planned circulation plant, such as automatic concrete spreader, various compaction stations, automatic storage and retrieval machine and curing chamber are also precisely adapted and coordinated to special parameters and requirements of the customer and its products.



Automatic storage and retrieval machine



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Turning device and clamping of the 1st shell for the double wall



Turning of the double wall

For the run-off logistics of the finished element stacks and wall transport racks, a run-off truck with longitudinal and transverse travel is available, which allows a large number of stacking positions in the hall and in front of the hall. The aim is to be able to produce around the clock without having to clear the stacking areas with a fork-lift truck during the night.

Powerful with high flexibility

With the investment in a modern pallet circulation plant, Schneider has created flexible production possibilities for a variable ratio of double wall and lattice girder slabs with scope for special and solid elements. The plant is initially optimised for a mixed production as well as for 100% production of double walls and thus offers additional possibilities of added value.

The plant offers the possibility to produce further products such as solid walls in the circulation plant. The quality, which increases with the plant and is free of fluctuations, increases

customer satisfaction and reduces unnecessary reworking. Compared to the previously existing production facilities, occupational safety has been significantly improved. Overall, the production site has been significantly upgraded and a solid foundation laid for future growth.

All-round carefree package through holistic planning and advice

Reymann Technik acts as a planning partner with a comprehensive service profile. Depending on the needs and wishes of the customer, this also includes the preparation of all documents and the coordination of approval procedures, the preparation of tender documents, vendor comparisons, awarding process and the supervision of the complete realisation up to the commissioning.

“We always go one step further in our consulting and planning services than machine suppliers usually do and support our customers in all related areas,” explains Andreas Gewis, head of the Reymann Technik planning department.



Vertical lifting of the double walls at the tilting station



Screen support for employees

"If the project has to be presented to the authorities or the local council, we also take on such tasks as overall planners for our customers."

The coordination of the individual suppliers and service providers on the part of the Reymann Technik project management ensures that the individual plant components and the planned environment are perfectly matched. In addition to the plant equipment, the engineers also plan platforms, as well as storage and supply logistics.

Another special feature of Reymann Technik's planning work are the performance indicators contractually agreed with suppliers, which are checked during acceptance of the installed equipment. Coordinated sample pallets are used to check the defined parameters during commissioning and to ensure that the plant performance in terms of machinery corresponds to the target values, so that the customers are on the safe side.

Robert Ohliger, Managing Director at Schneider, is extremely satisfied with what has been jointly achieved: "With the planned and implemented automated plant we will gradually achieve very good productivity. At the same time, we can improve flexibility and product quality for our customers. With the flexible plant, we can respond more quickly to our customers' needs and new challenges and help them implement shorter construction times and optimum quality."

Intelligent planning, an implementation that is independent of the company's own machine range and a supplier team that works well together form the foundation for the smooth realisation of such a project. The constantly evolving technical standard of equipment for precast concrete plants holds enormous potential in terms of efficiency and production output. Coupled with intelligent planning and an all-round view in the interests of the customer, plant solutions with a guarantee of success can be created. ■

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Concrete batching plant sets a standard for dust free operation in Malaysia

مصنع خلط الخرسانة يضع معيارًا للتشغيل الخالي من الغبار في ماليزيا

While the concrete industry continues to boost global infrastructure development, populations across the globe are also looking for greater sustainability and environmental care from the world around them. In the construction equipment segment, Lintec & Linnhoff has remained a pioneer in driving improved sustainability in construction materials supply, with a number of innovative designs aimed at boosting productivity while simultaneously limiting adverse environmental impact.

بينما تستمر صناعة الخرسانة في تعزيز تطوير البنية التحتية العالمية، يبحث السكان في جميع أنحاء العالم أيضًا عن مزيد من الاستدامة والرعاية البيئية من العالم من حولهم. وفي قطاع معدات التشييد والبناء، ظلت شركة Lintec & Linnhoff رائدة في قيادة تحسين الاستدامة في توريد مواد التشييد والبناء، بفضل عدد من التصاميم المبتكرة التي استهدفت تعزيز الإنتاجية مع الحد في الوقت نفسه من الآثار البيئية السلبية.

One example in Kuala Lumpur, Malaysia, saw a Eurotec MZP200 ready mix concrete batching plant installed within an enclosed warehouse in the Chan Sow Lin district as part of a sustainability drive in 2014. It was a design idea that proved so successful, other companies in the country adopted the design, leading to significant improvements in local air quality.

“Seven years ago, this was the only plant in Malaysia with the enclosed design, but it quickly caught the attention of the local construction industry who were all impressed with the reductions in noise and dust emission levels it delivered,” said R. Sakthi, CEO at Lintec & Linnhoff Concrete Pte Ltd. “This greatly improved air quality and helped the Malaysian industry take another step towards more sustainable infrastructure development.”

Similar to the other readymix concrete plants in the MZ series, the Eurotec MZP200 features a modularised structure for easy and quick installation and maintenance. The project in Chan Sow Lin was completed inside an almost totally enclosed warehouse, with the plant’s six aggregate bins, multiple tall cement silos, centre-discharge conveying system and static

aggregate ground-feeding conveying system all assembled within the giant structure. This way dust and cement are contained within the compound, rather than polluting the external environment and nearby residential areas.



R. Sakthi, Chief Executive Officer, Lintec & Linnhoff Concrete Pte Ltd.

“This project showed that it is entirely possible for concrete batching plants and local residents to co-exist peacefully, as long as proper attention in detail is paid to the environmental impact,” concluded R. Sakthi. “Now the enclosed Ready Mix Concrete plant has become popular and other jobsites have started adopting it to reduce pollution. This is one early design innovation we are rightly proud of, but we have lots more coming in the future too!”



Eurotec MZP200 ready mix concrete batching plant installed within an enclosed warehouse



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The enclosed warehouse reduces noise and dust emissions

Production volume up; audible volume down

The cement batch plants worked for 10 hours per day, producing up to 4.5m³ per batch or up to 200 m³/hour of ready-mix concrete for construction and infrastructure projects in Kuala Lumpur and the Klang Valley. Despite this, the Eurotec MZP200 concrete batch plant was notable for the reduced noise and dust.

By March 2015, the plant achieved another milestone when it was awarded SIRIM QAS International Sdn Bhd’s ISO 14001:2004 certification in the Manufacturing of Ready Mix Concrete category.

“Our engineering detail allows the MZ batching plant model to fully reclaim returned concrete by separating the sand, aggregates and water, and then recycle them back into the batching process,” said R. Sakthi.

The combination of an enclosed warehouse for the concrete plant, plus an operational capacity to fully reclaim returned concrete is a perfect design for urban locations. Increasingly

in Asia there is greater attention being paid to delivering better air quality, with the Asian Development Bank even launching a Clean Air for Livable Cities series to support the initiative. At the same time, demand for greener construction continues to rise, and interestingly this is being supported by end users, with recent research showing that most Asia-Pacific companies would pay higher rent to lease a building with stronger green credentials.

As this trend continues, contractors will increasingly look for innovative designs and advanced technology in their mission of producing good quality concrete that can help them deliver more sustainability-certified buildings.

Customisable design to suit local needs

With an extensive range of customisation options to suit the requirements of any major project, the Eurotec MZ series can be designed with one mixer and two discharge chutes to reduce the waiting time of mixer trucks, thereby increasing productivity and reducing fuel use. The energy consumption – along with wear and maintenance costs – of the batch plant is also reduced via the use of computer-controlled twin-shaft mixers that ensure high accuracy. Operating at high torque, their three-dimensional mixing motions generate a higher consistency of concrete. ■

FURTHER INFORMATION



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The Eurotec MZP200 concrete plant features a modularised structure for easy and quick installation and maintenance.

Schwing GmbH, 44653 Herne, Germany

Endurance athlete: new truck-mounted concrete pump for demanding, large-scale concreting operations

قدرة تحمل عالية: مضخة خرسانية جديدة مُثَبَّتة على شاحنة لعمليات صب الخرسانة واسعة النطاق التي تتطلب عناية فائقة

High-quality, sturdy machines are required where large quantities have to be pumped over long periods of time. Precisely this characteristic distinguishes the new truck-mounted concrete pump from the German quality manufacturer Schwing. The high pump output at a low engine speed and the well-known sturdiness of the Rock concrete valve ensure low operating and maintenance costs as well as a long service life. Due to the low space requirement for the outriggers of the truck-mounted concrete pump and the very short setup time, the new S56 SXF is the ideal equipment for exacting large building sites where time is tight.

يلزم توافر آلات عالية الجودة ومتينة عندما يلزم ضخ كميات كبيرة على مدى فترات زمنية طويلة. وهذه الخاصية هي بالضبط ما يميز مضخة الخرسانة الجديدة المثبتة على الشاحنة التي وفرتها شركة Schwing الألمانية التي تهتم بالجودة. ويضمن الخرج العالي للمضخة عند سرعة المحرك المنخفضة والمتانة المعروفة للصلام الخرساني الصخري تكبد تكاليف تشغيل وصيانة منخفضة بالإضافة إلى إطالة عمر خدمة الآلات. ونظرًا لأن أذرع الامتداد والركائز الخاصة بمضخة الخرسانة المثبتة على الشاحنة لا تتطلب مساحات كبيرة وتستغرق وقتًا قليلًا للغاية لإعدادها، فإن مضخة S56 SXF الجديدة تمثل المعدة المثالية لمواقع البناء الكبيرة المخصص وقتًا ضيقًا لإنشائها.

Boom

The kinematics of the 5-section boom of the S 56 SXF with overhead roll folding makes extremely short setup times possible, thus offering maximum flexibility for every building site.

Pump kit

The outriggers from Schwing enable the use of a long-stroke pump kit P2525 with 2.50 metre-long pumping cylinders.

The advantages are even smoother operation and a considerably reduced stroke rate.

Open hydraulic system

Efficient conversion of the engine power into pumping power with little loss: the S 56 SXF with its open hydraulic system impresses in this discipline. Thus, the usual practical concrete output can be realised with a fuel-saving engine speed of just over 1,000 rpm.



The S 56 SXF shows its strengths especially where large quantities of concrete have to be pumped constantly over lengthy periods of time. The truck-mounted concrete pump has a vertical reach of 55.2 m, a concrete output of 162 m³/h and a maximum pressure on concrete of 85 bar.

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SXF outriggers

The S 56 SXF dispenses with multi-telescopic outriggers, because the SXF outriggers developed by Schwing combine the tried-and-tested single-part SX outriggers with a foldable outrigger leg. The advantages compared to multi-telescopic outriggers are reduced maintenance, increased stability and smoother pumping. The protected piston rod ensures optimum protection against damage.

Concrete valve

The low level of wear of the Rock concrete valve and its optimum geometry for a low-friction concrete flow guarantee low service and operating costs as well as a long service life. And thanks to its excellent cleanability, the S 56 SXF is ready for the next assignment in next to no time.

Supply control

The water box can be filled and emptied and the water pump, agitator, spray hose, high-pressure cleaner and compressor can all be controlled via the standardised supply control. This is standard for all Schwing truck-mounted concrete pumps for greater clarity and ease of operation.

Remote control SC 30

Thanks to the ergonomic design and low weight of the SC 30, the operator can concentrate on the job in hand for extended periods almost without fatigue. The powerful batteries guarantee an operating time of at least 8 hours.

Vector control

The machine operator can inspect machine data, operating conditions and settings on S 56 SXF, changing various parameters, all through the intuitive VECTOR control. The integrated diagnostic system ensures safe operation and also reminds the operator when maintenance is necessary. ■

FURTHER INFORMATION



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