



Concrete Plant International

منشأة الإسمنت العالمية

1 | 2021

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NEWS Art meets 3D concrete CONCRETE PRODUCTS Riyadh Kingdom Concrete Products continues with its ambitious plan to expand the production in Al Ahsa, Saudi Arabia CONCRETE PIPES AND MANHOLES On the front lines of pipe plant automation PRECAST CONCRETE ELEMENTS Luxury apartments built with precast concrete in Dubai



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"UPC, or BPC Group in total, has had a very good relationship with Elematic from the beginning, and we run Elematic in all of our five factories throughout the region. I think the level of service and the quality of the machines has stood the test of time – and that's why we continue to choose them," says **Matthew Palmer**, General Manager, United Precast Concrete Dubai.

Read the whole article in this magazine.

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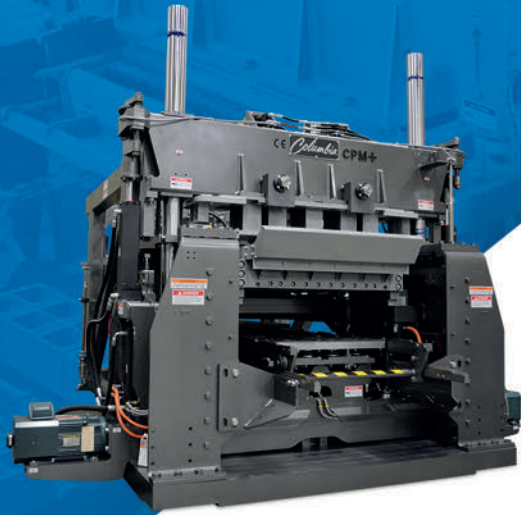


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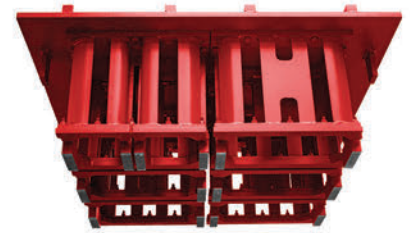


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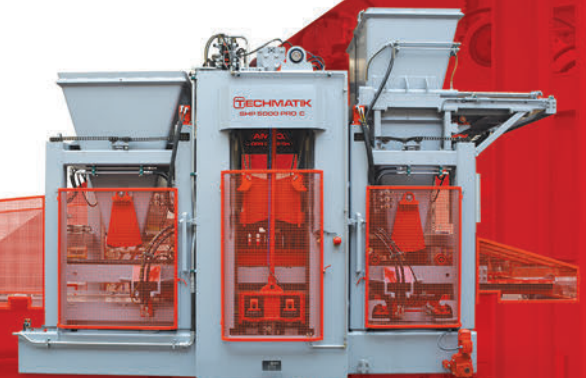
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Luxury apartments built with precast concrete

475 units, 171 villas and 304 town houses, were finished in only 18 months from design to completion. State-of-the-art amenities incorporating community-based facilities made for a lifestyle that transcends even the extraordinary. This vision could come true with the precast concrete method by using sandwich panels in precast concrete walls and hollow-core slabs in floors. A totally precast solution providing the ideal framework for a luxury experience in Dubai.

Grand Views in Meydan provided cost savings during construction, cost savings in long term maintenance and high quality with reduced manpower at site. All this using Building Information Modelling (BIM) to outline the collaborative process for construction with 3D model information and intelligent data behind it, and with precast concrete construction as a business choice. Prefabrication develops competencies and shortens construction time of the building. Initial investment in planning and designing pays for itself in production and construction phase.

With precast a larger area per gross floor area can be utilized for apartments. Column free interior space provides design freedom. Benefits of large open spans comes from flexibility, energy efficiency and shorter building time. Thus, precast is a cost-efficient choice. Precast concrete production can be suited to local conditions and resources. The use of precast concrete lowers total construction costs considerably and gives faster return of investment.

When taking a walk in the Grand Views residential area, it is interesting to reflect how Dubai may continue to attract investors and residents in the future? What are the next efforts to consolidate resilience and set development milestones? Grand Views project certainly supports some possible points, for example citizenship, residency, and long-term competencies in an economically stable living environment. And all this as a totally precast solution.

Congratulations!

الشقق الفاخرة المُشيّدة من الخرسانة الجاهزة

لقد شيّدت 475 وحدة سكنية و171 فيلا و304 منزل بالمدينة في 18 شهرًا فقط بدءًا من التصميم حتى الإنجاز تمامًا. وبُنيت كذلك مرافق راحة حديثة تتضمن منشآت مجتمعية تناسب أسلوب الحياة الذي يتجاوز حتى الأساليب الاستثنائية. ويمكن أن تتحقق هذه الرؤية بفضل طريقة التشييد بالخرسانة الجاهزة باستخدام الألواح العازلة في الجدران الخرسانية سابقة الصب والبلاط مجوف المركز في الأرضيات. ويوفر حل الخرسانة الجاهزة تمامًا إطارًا مثاليًا لتجربة فاخرة في دبي.

قدم مشروع جراند فيوز في منطقة الميدان وفورات في التكاليف أثناء البناء، وفورات في التكاليف في الصيانة طويلة الأجل وجودة عالية رغم تقليص القوى العاملة في الموقع. وتحقق كل ذلك باستخدام تقنية نمذجة معلومات البناء (BIM) لتوضيح العملية التعاونية للبناء باستخدام معلومات النماذج ثلاثية الأبعاد والبيانات الذكية التي وراء ذلك، مع الاعتماد على عملية التشييد والبناء بالخرسانة الجاهزة كخيار عمل. ويعمل التصنيع المسبق للخرسانة على تطوير الكفاءات وتقليل الوقت المستغرق في تشييد المباني. ويؤتي الاستثمار الأولي في التخطيط والتصميم ثماره في مرحلة الإنتاج والبناء.

باستخدام الخرسانة الجاهزة، يمكن استخدام مساحة أكبر لكل إجمالي مساحة أرضية للشقق. وتوفر المساحة الداخلية الخالية من الأعمدة الحرة في التصميم. وتأتي فوائد المساحات المفتوحة الكبيرة من المرونة وكفاءة الطاقة وتقليل الوقت المستغرق في البناء. وبالتالي، فإن الخرسانة الجاهزة تمثل خيارًا فعالًا من حيث التكلفة. ويمكن ملاءمة إنتاج الخرسانة الجاهزة وفقًا للظروف والموارد المحلية. ويقلل استخدام الخرسانة الجاهزة من إجمالي تكاليف البناء بشكل كبير ويوفر عائدًا أسرع للاستثمار.

عند التنزه في منطقة جراند فيوز السكنية، كانت من الأمور المثيرة للاهتمام التفكير في كيفية استمرار دبي في جذب المستثمرين والمقيمين في المستقبل؟ ما الجهود التالية اللازمة لتعزيز المرونة وتحديد معالم التطور والتنمية؟ ويدعم مشروع جراند فيوز بالتأكيد بعض النقاط المحتملة، على سبيل المثال، المواطنة والإقامة والكفاءات طويلة الأجل في بيئة معيشية مستقرة اقتصاديًا. ويتمثل كل ذلك في حل الخرسانة الجاهزة تمامًا.

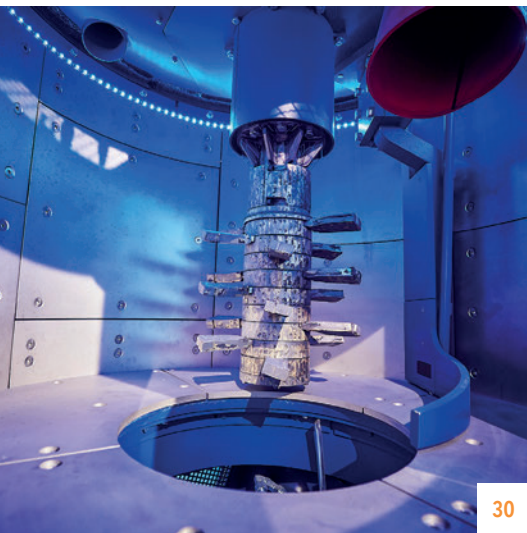
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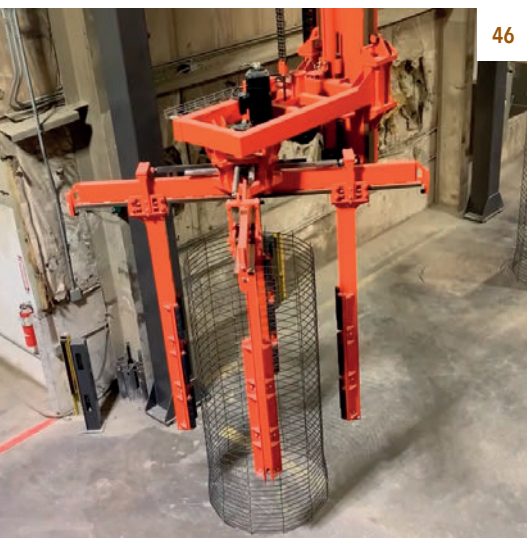
14

SECTIONS

Editorial	3
Imprint	6
Advertiser's List	78



30



46

CONTENTS

NEWS

- Deciduous pavilion
- 8 **Art meets 3D concrete**
- Carve-out successfully completed
- 9 **BASF Construction Chemicals business is now MBCC Group**
- BIM, Digitalization and Industry 4.0
- 10 **Great challenges of the next decade – great chances for the precast concrete industry**
- Obituary
- 13 **Frank Hoffmann deceased**

CONCRETE TECHNOLOGY

- NV Bekaert SA, 8550 Zwevegem, Belgium
- 14 **Simplifying the manufacture of precast elements**
- Maschinenfabrik Gustav Eirich GmbH & Co KG, 74736 Hardheim, Germany
- 18 **Increasing demand for mixers for fibre concretes**
- Xypex Chemical Corporation, V6V 2G9, Richmond BC, Canada
- 20 **Protecting Concrete Structures from Microbial Induced Corrosion**
- Master Builders Solutions, Dubai, U.A.E
- 21 **Fibre Reinforced Geopolymer Concrete as Part of Plant Upgrades**
- BEPETE, 50933 Cologne, Germany
- 24 **Fresh concrete testing for quality control in the precast plant**

CONCRETE PRODUCTS / CAST STONE

- Masa GmbH, 56626 Andernach, Germany
- 30 **Set accents – without compromise: solutions for the production of multi-colored products**
- Kobra Formen GmbH, 08485 Lengenfeld, Germany
- 34 **International architecture projects: Genest Concrete**
- Techno Split, 38050 Ospedaletto, Italy
- 38 **Technologically advanced concrete splitting line**
- Hess Group, 57299 Burbach-Wahlbach, Germany
- 40 **Riyadh Kingdom Concrete Products continues with its ambitious plan to expand the production in Al Ahsa, Saudi Arabia**

CONCRETE PIPES AND MANHOLES

- Afinitas, Clayton, MO 63105 USA
- 46 **On the front lines of pipe plant automation**

PRECAST CONCRETE ELEMENTS

- Elematic, 37801 Akaa, Finland
52 Luxury apartments built with precast concrete in Dubai
- Harsch Bau GmbH & Co KG, 75015 Bretten, Germany
55 Prepared for great things with 72 m beam formwork and 20,000 kN prestressing force
- Construx bv, 8531 Hulste, Belgium
60 Full range of state of the art moulds for precast retaining walls
- Bianchi Casseforme s.r.l., 43045 Fornovo di Taro PR, Italy
64 Prebet "doubles" number of production lines for pre-stressed beams in Romania
- Moldtech S.L, 41500 Alcalá de Guadaira, (Sevilla), Spain
67 Mobile mega plant for road and bridge construction in Romania
- Tecnocom S.p.A., 33100 Udine, Italy
72 Hormipresa counts on beam moulds made in Italy
- Ratec GmbH, 68766 Hockenheim, Germany
74 Third project in a row: further formwork solution for system manufacturer of transformer substations



52



67

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Publishing Company:

ad-media GmbH
 Industriestr. 180 · 50999 Cologne · Germany
 T +49 2236 962390 · F +49 2236 962396
 info@ad-media.de · www.ad-media.de
 www.cpi-worldwide.com



Concrete Plant International



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:
 Grafische Werkstatt Druckerei und Verlag Gebr. Kopp GmbH & Co.KG
 Dieselstraße 2 · 50996 Cologne · Germany

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

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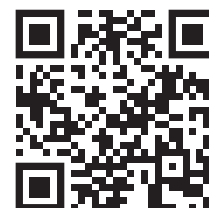
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Art meets 3D concrete

واجهة مبنى ثلاثية الأبعاد مطبوعة على المقر الرئيسي

An unusual sight in the heart of Dubai's financial district: an imposing work of art, which looks like something straight from the future appeared, capturing the attention of curious passers-by. In fact, it is the Deciduous 3D printed pavilion, a sculpture commissioned by Dubai International Financial Center [DIFC]. The concrete elements were fully printed by Besix 3D.

في أبريل 2019، افتتحت شركة Besix 3D استوديو الطباعة الخرسانية ثلاثية الأبعاد في دبي. يجمع هذا الاستوديو بين القدرات الهندسية والإنشائية لشركة Besix البلجيكية مع مورّد كيماويات البناء السويسري Sika ومصمم الطباعة ثلاثية الأبعاد الدولي Witteveen+Bos. وبالنسبة للمبنيين التوسعيين الجديدين التابعين لمكتبهم الرئيسي في دبي، الإمارات العربية المتحدة، فقد قامت شركة Besix 3D مؤخرًا بطباعة ثلاثية الأبعاد للوحات واجهة المبنى.



Deciduous 3D-printed concrete pavilion

Designed by MEAN [Middle East Architecture Network], Deciduous is made exclusively of sustainable materials, including birch, 3D-printed concrete and 3D-printed recycled plastic. Thanks to innovative technologies, the creators were able to push the boundaries of these materials, creating a hybrid blend of both printed concrete and plastic polymer.

In the field of botany, 'deciduous' refers to trees that seasonally shed leaves. The Deciduous pavilion is an invitation to question our relationship with nature while walking through an abstracted botanical form. ■

Besix 3D

In April 2019, Besix 3D opened its 3D concrete printing studio in Dubai. It combines the engineering and construction capabilities of Besix with Swiss construction chemicals supplier Sika and the international 3D printing designer Witteveen+Bos.

Jonas Vandeven, Head of Besix 3D: "Compared to traditional construction methods, 3D printing presents multiple advantages which include a shorter construction time, a safer working environment and higher freedom in shape. It also generates less waste and lower CO2 emissions. For all those reasons, we believe 3D technology is an integral part of the construction sector's future."

About Besix

Besix is a group based in Brussels, Belgium, operating in 25 countries and on 5 continents, primarily in the construction, real estate development and concessions sectors. Iconic projects include Dubai's Burj Khalifa, the world's tallest tower, buildings of the European Parliament in Brussels as well as the Grand Egyptian Museum, on the Giza Pyramid Plateau.

FURTHER INFORMATION



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Carve-out successfully completed

BASF Construction Chemicals business is now MBCC Group

شركة BASF Construction Chemicals التجارية أصبحت الآن مجموعة MBCC

MBCC Group has emerged from the former BASF Construction Chemicals business after its acquisition by Lone Star Funds and started operations as of October 1, 2020. Lone Star is now the new owner of the business. MBCC Group has been carved-out from BASF Group over the past 18 months and has been built as a standalone organization.

انبتقت مجموعة MBCC من شركة BASF Construction Chemicals التجارية السابقة بعد استحواذ شركة Lone Star Funds عليها وبدأت عملياتها اعتباراً من 1 أكتوبر 2020. وشركة Lone Star الآن هي المالك الجديد للشركة. وقد تم اجتراء مجموعة MBCC من مجموعة BASF خلال فترة 18 شهراً الماضية وتم بناؤها كمنظمة قائمة بذاتها.

MBCC Group is one of the leading suppliers of construction chemicals and solutions worldwide and offers innovative and sustainable products and solutions for the construction industry across different sectors, such as buildings, structures, underground construction, new construction, as well as renovation. MBCC Group is amongst the globally leading suppliers of Admixture Systems and amongst leading players in the highly fragmented Construction Systems market.

MBCC Group serves more than 30,000 customers and business partners around the globe. It is consisting of approximately 70 legal entities worldwide and is home to around 7,500 employees and construction experts in over 60 countries. The global and European headquarters are in Mannheim, Germany, with regional headquarters in Beachwood, Ohio, USA (Americas), Dubai, UAE, (Middle East-Russia-Africa), and Singapore (Asia Pacific). MBCC Group's strong main brands Master Builders Solutions®, PCI®, Thermotek®, Wolman®, Colorbiotics® and Watson Bowman Acme® are well established in the markets and are backed by more than 100 years of industry heritage and experience.

Dr. Jochen Fabritius appointed as Chief Executive Officer

The new owner has confirmed Dr. Jochen Fabritius as the new Chief Executive Officer (CEO) of MBCC Group. Fabritius is a civil engineer by training, having spent almost his entire career in the construction sector. He is a highly experienced

expert of the construction industry. In the past years he has been working for Xella, which he joined in 2014, first in the capacity of Chief Operating Officer and then, from 2017 onwards, as CEO. Prior to that, he worked for 15 years at the consulting firm McKinsey & Company.

He said: "I am very happy to join MBCC Group working closely together with a strong global management team to realize MBCC Group's full potential. At this point in time let me take the opportunity to thank all the employees for their hard work and dedication, through a global pandemic, to successfully execute this carve-out while adhering to an ambitious timeline."

FURTHER INFORMATION

MBCC GROUP

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Great challenges of the next decade – great chances for the precast concrete industry

تحديات كبيرة في العقد القادم - فرص كبيرة لصناعة الخرسانة الجاهزة (سابقة الصب)

■ Alejandro López Vidal, Technical Manager ANDECE, Spain

"There's nothing like a challenge to get the best out of yourself". Talking about challenges is talking about the future but applying measures right now. We are currently experiencing an exceptional situation due to the health emergency caused by the expansion of the Covid-19 virus, which is having multiple side effects at all levels. Some of the consequences have a very direct relationship with greater use of digitization, such as increased teleworking, meetings or online events, or an impressive increase in e-commerce. Perhaps when this situation is overcome, the most noteworthy consequences will be that various avenues of digitization that were already previously being introduced, have accelerated their implementation process.

"لا يوجد شيء مثل التحدي لشحن همتك وإخراج أفضل ما لديك". والحديث عن التحديات هو الحديث عن المستقبل ولكن مع تطبيق التدابير الآن. فنحن نشهد حاليًا وضعًا استثنائيًا نتيجة لحالة الطوارئ الصحية الناجمة عن انتشار فيروس كوفيد-19، والذي له آثار جانبية متعددة على جميع المستويات. وبعض العواقب لها علاقة مباشرة للغاية مع زيادة استخدام الرقمنة، مثل زيادة العمل عن بُعد، والاجتماعات عبر الإنترنت، أو زيادة هائلة في التجارة الإلكترونية. ربما عند التغلب على هذا الوضع، ستكون العواقب الأكثر جدارة بالملاحظة هي أن السبل المختلفة للرقمنة التي جرى تقديمها سابقًا، قد عجلت من عملية تنفيذها.

The construction sector is one of the least in which technology has been introduced and is further from this inevitable digital transformation that almost any productive sector has been in place for the last years, especially if we focus it in its execution stage, which is usually carried out in a dynamic environment, with a high level of uncertainty and enormously dependent on the qualification of the available workforce at the site of the work. Against this model of action, the industrialization of construction is based on products and systems manufactured in a factory, offering a higher technical potential of automation as result of much more predictable tasks, with previously defined personnel and machinery, with greater experience effect and which are based on the systematic repetition of instructions, rules and calculations.

In this respect, prefabrication as a variant of industrialized concrete construction, is based on anticipating the factory, a much more controlled, planned and automated environment than the work itself, as many production processes as possible, so it is almost inevitable that the use of digitization will provide an additional impetus to consolidate all the advantages it brings - less waste, durability, optimized sections, less dependence on available on-site workforce, work safety, etc. - and further improve the efficiency in the design, manufacture or logistics of precast elements, as opposed to on-site construction.

Building the construction sectors' digital future: DigiPLACE Project [1]

The construction sector is a key driver for the economy, but it is one of the poorest performers in terms of productivity and innovation. It has yet to embrace digital innovations that could help improve productivity and profitability. The EU-funded DigiPLACE will create a common ecosystem of innovation, standardization and commerce to increase the construction sector's productivity and end products' quality in terms of buildings and infrastructure. It will also investigate what kind of digital transformation will improve productivity and efficiency. The project's results will impact the development and competitiveness of the construction value chain.

BIM and precast concrete

At the core of this technological evolution is found the BIM methodology, which consists in the creation of digital models of the project, whether a building or an infrastructure, through increasingly advanced software that allow to share these models among the different agents involved: architect-



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ture and engineering, builders, developers and suppliers. As we already describe at two previous articles here [2], as it happens in prefabrication, BIM is based on setting an accurate and unequivocal definition of each construction component, ensuring geometric and spatial precision in such a way that errors that are normally emerged during the execution due to deviations or unforeseen events are minimized, which have unpredictable damage and that are especially inherent to the traditional construction being fundamentally conditioned to the good or poor execution of the on-site workforce, but that in the case of precast concrete must be avoided from the early design phase in order to guarantee the correct assembly among the different elements.

Furthermore, the use of BIM coupled with the industrialized construction, brings efficiency to the construction process by allowing to test in the digital model some aspects such as the performance of the design (for example, essential characteristics of the corresponding harmonized standard, or envi-

ronmental impacts coming from the Environmental Product Declarations), the precision of the assembly planning or the quantity of materials required.

Currently the use of the BIM methodology within the prefabrication industry is under continuous development, especially in the case of those companies that participate in all stages of the process (design - manufacturing - logistics - execution) by requiring precise control of each building element, something that in the case of structures or facades made by precast concrete elements is essential. It is also necessary to differentiate between companies of small or medium size, usually with a more localized area of action, with more defined product catalogues, compared to those larger prefabricator companies, where in this case this digital transformation is usually much more evolved, and the investment necessary to undertake it has been conceived as an opportunity for its continuous improvement and to earn competitiveness.

Industry 4.0

Industry 4.0 not only automates some of the construction activities, improves the communication of the agents involved in it, improves the design of processes and makes decisions based on real data and simulations made from digital models. All this makes the work carried out in on-site construction more difficult to automate and, therefore, that new digital technologies are fundamentally addressed to the industrialization of certain construction processes, achieving greater ef-

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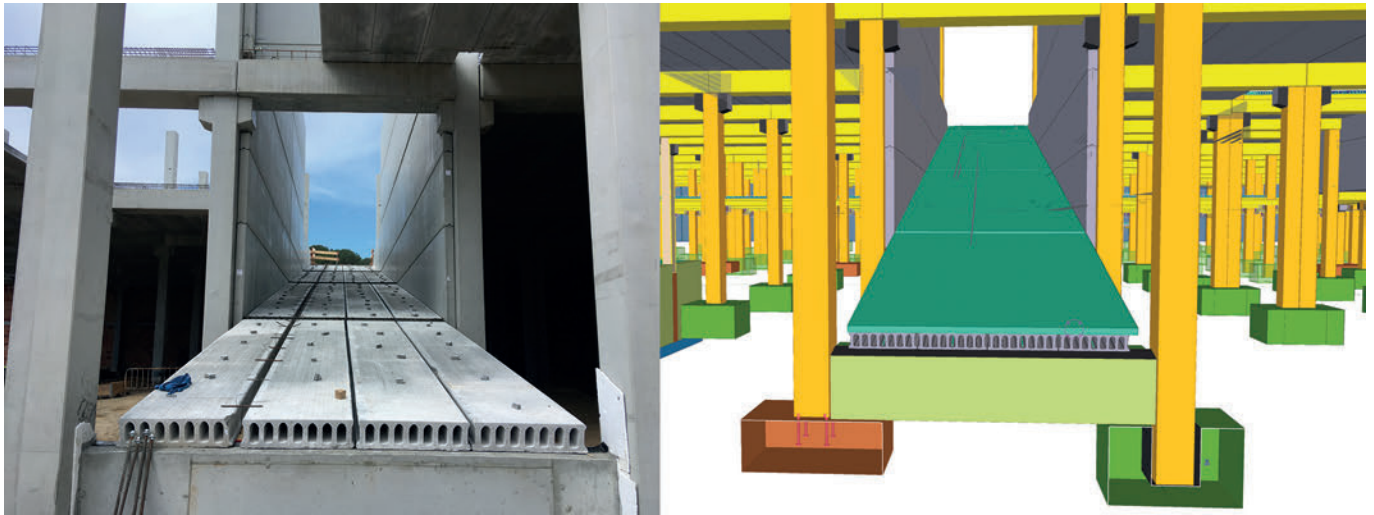


Fig. 1: Precast concrete structure and its BIM model (digital twin) designed with TEKLA software

efficiency and quality, without the finished work losing uniqueness and adaptability to the place where it is located, so we have before us an unprecedented development opportunity:

- Use of embedded sensors that allow to control various parameters during the manufacture of the elements (concrete strength,...) and monitor them during their use stage (detect possible pathologies,...), having precise and continuous control throughout their life cycle.
- Autonomous or collaborative robots, which can help further increase productivity at the factory.
- Increased efficiency, as a technology to help visualize the elements once installed and detect possible failures (geometric deviations).
- 3D printing, both at the manufacturing level of the elements themselves that require complex geometries or have an added value that justifies it, and for the production of limited series of moulds.
- Data acquisition and management software, which link different stages of the process and that allow to further increase the overall efficiency of the process.
- Improved document management through solutions that allow to synthesize to a minimum the issuance of documents, in an industry that increasingly develops constructive solutions on demand and more disparate and versatile products [3].

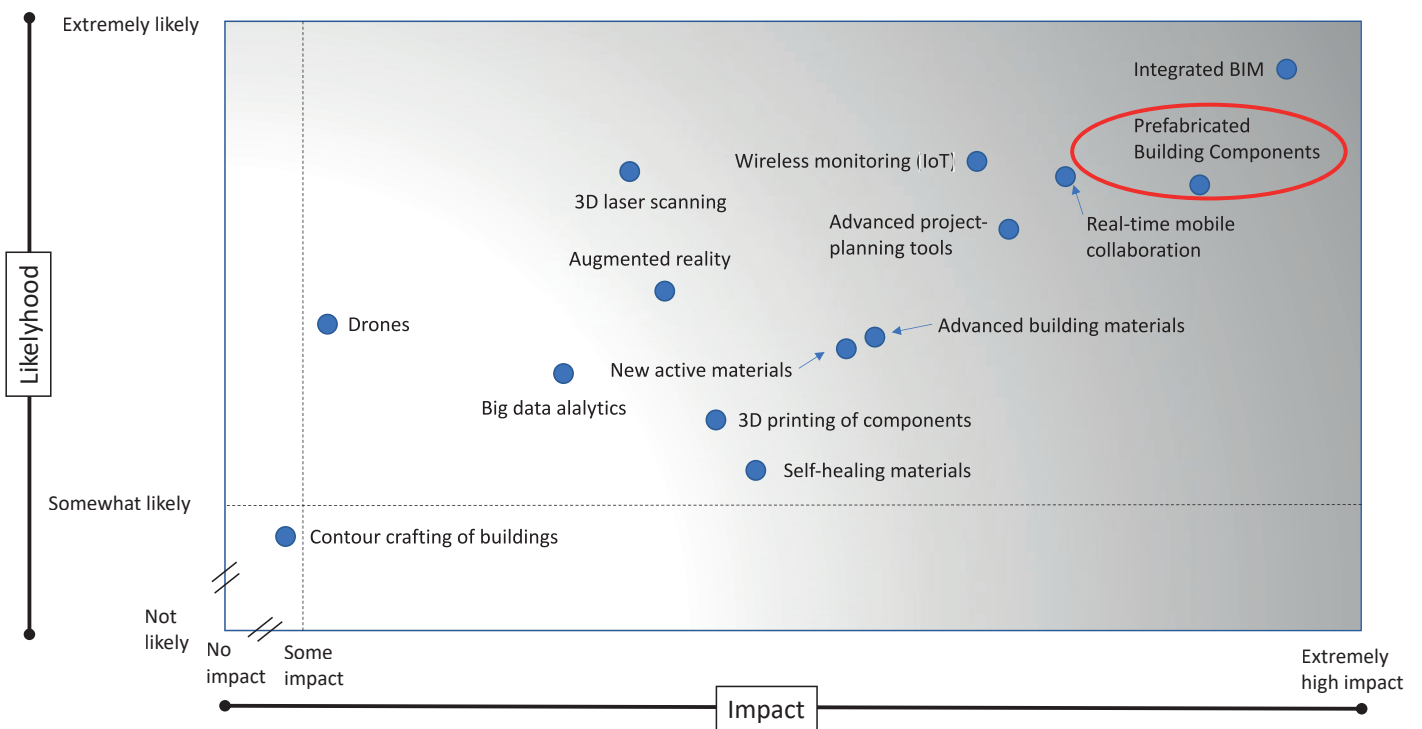


Fig. 2: Matrix linking the impact of new technologies to the likelihood of use of precast concrete components. Figure according to [5]

The case of ANDECE [4]

ANDECE, as association that represents the interests of the Spanish industry of manufacturers of precast concrete elements since 1964, has been decisively committed to adapt as industry to this necessary technological transformation for the last decade, in order to guide its member companies to implement and the maximum profit of these different ways of digitization that the market puts at our disposal, with the maximum aim of improving our competitiveness and presenting us as the best constructive option for the 21st century:

- Digital library of generic BIM objects of precast concrete products developed in ANDECE with one of the main BIM platforms on the market, BIMETICA, recently extended to cover nearly 50 products with a level of development up to LOD200, which aims to be the basis for precast companies to develop their own product catalogues.
- Publication of a particularized BIM guide for precast concrete, including a proposed strategy to be followed by companies, taking into account that can be very different if we refer, for instance, to a company specialized on pavements with a very defined portfolio or it is a company that supplies structure and facade and that has a greater rate of participation in construction projects.
- Organization of technical webinars such as the technological cycle carried out last spring to bring our companies closer to the main companies that are leading this digital transformation.
- Subject of BIM and precast which is one of the most important that are part of the Master of Industrialized Construction in Concrete, the first specific training about precast concrete provided in the Spanish language at a global level [6].

Projection of the future

We want to conclude this article by taking an excerpt from this report of the World Economic Forum [5] that the path that construction takes in the upcoming years and which links that mayor digitalization within construction, inevitably a larger share of industrialized buildings, so that the precast concrete elements increase more as an option to form the different construction systems of buildings, civil engineering works or urban areas: "The industry as a whole should define key areas to work on and should agree on a common perspective. Among others, standard interfaces between prefabricated modules and components will enhance system compatibility, provide economies of scale for suppliers, act as a powerful productivity driver and thus accelerate the industrialization of the sector". ■

- [1] DigiPLACE Project <https://www.digiplaceproject.eu/>
- [2] "To "BIM" or not to "BIM" - The precast concrete industry challenge. Part 1 The background; Part 2 - BIM experiences". A. López. Concrete Plant International, 2017.
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FURTHER INFORMATION



www.andece.org

Obituary

Frank Hoffmann deceased

وفاة فرانك هوفمان

It was with great sadness that the Hess Group announced the unexpected death of its long-time employee Frank Hoffmann. Frank Hoffmann was only 54 years old.

أعلنت مجموعة Hess ببالحق الأسى عن الوفاة غير المتوقعة لموظفها الذي يعمل معها منذ فترة طويلة فرانك هوفمان. كان فرانك هوفمان يبلغ من العمر 54 عامًا فقط.



Frank Hoffmann had been working for the company since 2006, where he distinguished himself through his professional competence, his reliability and his commitment. In the course of his employment, he was known and appreciated by his colleagues as a reliable, trustworthy and sincere employee, colleague and friend. His friendly and engaging manner - combined with his great sense of humour - will be remembered by all.

www.hessgroup.com

Simplifying the manufacture of precast elements

تبسيط عملية تصنيع العناصر الجاهزة (مسبقة الصب)

Thanks to technological progress, structural steel fibre reinforcement today offers a number of advantages and has been successfully employed for over 25 years in the manufacture of precast elements and flooring. This article describes the different types of fibres available on the market and the various applications of these fibres. Furthermore, the article highlights the ways in which the use of fibres can simplify the production of precast concrete elements.

بفضل التقدم التكنولوجي، توفر تقوية الألياف الفولاذية الهيكلية اليوم عددًا من المزايا وقد استُخدمت بنجاح لأكثر من 25 عامًا في تصنيع العناصر والأرضيات الجاهزة. تصف هذه المقالة الأنواع المختلفة من الألياف المتوفرة في السوق والاستخدامات المختلفة لها. علاوة على ذلك، تسلط المقالة الضوء على الطرق التي يمكن من خلالها ببسط استخدام الألياف إنتاج عناصر الخرسانة الجاهزة.

Fibre categories

In the construction sector, one will essentially encounter three types of fibres for a wide range of applications and requirements:

- Glass fibres offer relatively high strengths, but have the disadvantage of being expensive and brittle.
- Plastic fibres are used for two main applications: to counteract the phenomenon of shrinkage, and, in the case of micro-synthetic fibres, to increase concrete fire resistance.
- Steel fibres are the only ones generally recognized to exhibit structural properties [1]

- Steel fibres come along in the most different shapes; the two shapes most commonly used being:
 - Straight fibres (relatively thin, i. e., less than 0.3 mm in diameter)
 - Cranked fibres equipped with hooks of variable shapes at their ends, with lengths ranging from 30 to 60 mm and diameters between 0.5 and 1.1 mm.

Depending on fibre geometry, there can be between 100,000 and even 40 million fibres embedded in 1 m³ of concrete, which would translate into 6 to 480 km of wire; the main objective being the prevention of crack formation.



Dramix steel fibres in fresh concrete



Isla de Arosa: 7,500 m² white non-structural skin, thickness: 10-20 mm



German College of Bilbao: 1,100 m² textured skin and 1,100 m² pure white panelling, thickness: 14-16mm

Steel fibre applications

Dramix Steel fibres essentially serve the same structural functions as rebar, but boast a tensile strength 2 to 4 times higher than the latter because of rolled steel, and are today found in a wide variety of applications.

This can largely be explained by their ease of implementation, which makes these fibres become an alternative in cases of construction elements with reduced thicknesses, complex geometries, or when homogeneous reinforcement is required.

Historically, the first applications of steel fibre reinforced concrete (SFRC) were in the area of industrial flooring, but meanwhile, SFRC has also been used for many years in:

- Drill & blast tunnelling operations
- Segmental linings for tunnelling operations by means of boring machines
- Concrete sewer pipes, manholes
- Water tanks, wastewater tanks
- Substations and telecom rooms
- Basement walls and balconies
- Staircases and street furniture
- Architectural UHFRC
- Off-site construction

SFRC fibres in concrete

The concrete-metal pair of materials has been known and tested for decades. Steel fibres are the only construction material that is insensitive to hygrometric variations (if galvanized, it is even popular when it comes to maritime applications). Steel fibres do not generally creep over time, only in the event of major temperature changes, minimal shrinkage deformation will occur. Since the fibres are added to the con-

crete during the mixing process, their addition cannot be forgotten on the job site or incorrectly introduced the way this may happen when rebar or reinforcing cages are used. Also, the fibres are evenly distributed in the concrete, including in the so-called coating area, which is only relevant anyway when rebar is used at the same time.

On account of isotropic fibre dispersion, enormous advantages over conventional material designs can be achieved.

Benefits of SFRC

When designing the concrete, no special precautions need to be taken. A calculation carried out on the basis of Model Code 2010 (validated by scientists all over the world since 2010) will suffice and is both simple and flexible. If necessary, calculations can readily be based on finite element modelling.

The implementation of Dramix fibre concrete does not present any difficulty whatsoever. However, heightened vigilance is required when moulds display a certain degree of surface roughness or if elements are used with cross-sections of similar sizes as those of the fibres used.

Precasters using Dramix fibres in their facilities will always attempt to ensure a 100% fibre solution without any rebar or mesh. On the other hand, a combination of both reinforcement procedures can very well be chosen to arrive at optimal load resistance values.

Almost no production tool adaptation

A modification of the precaster's concrete recipe when changing to SFRC is only necessary in exceptional cases. Dramix steel fibres are introduced into the production process as soon as possible, either via skip or weighing belt. For this



Greyshield - patented and optimized method to attain shielded rooms

purpose, a dosing unit capable of receiving 1.1 tons of fibres for automatic dosage to the nearest 100 g for about 40 m³ of concrete is recommended.

This flexibility allows precasters to diversify their production and to develop new applications for accessing new markets.

Further innovations

Since there is no need for concrete coatings when using Dramix fibres, reduced concrete structure thicknesses are possible. The unique skins of sandwich panels, for example, can be executed in SFRC with thicknesses ranging from 1.0 to 2.5 cm at very high impact resistances.

These elements can also be used as "lost" moulds, with infinite options in terms of coloration and shape.

Another advantage of SFRC is its ability to partially attenuate the electromagnetic waves frequently used by human beings, namely 100-6,000 MHz.

A patented multi-purpose element containing Dramix fibres will allow for - depending on wall thickness, fibre type used and dosage - a Electro Magnetic Mitigation (EMM) of up to 100 dB (see Greyshield).

Therefore, this component, structural by its very nature, has a special EMM function, which permits the construction of shielded rooms at only about half the cost, i. e., data centres, rooms for sensitive company data, or protection against potentially harmful 5G waves.

As part of a partnership, an innovative French company is relying on Dramix fibres in high dosages (up to 100 kg/m³) to manufacture C70 or C100 concrete in its own mix.



Positioning a modular Cubik Home with Dramix fibre reinforced concrete at its final location



Setting up a 3-module model home in only 6 hours

The properties of this new concrete, produced at an acceptable price, have led to the development of the Cubik Home Concept which allows all precast facilities featuring production tables (fixed or as a carousel system) to become a manufacturer of these types of customized housing modules.

This off-site construction process drastically reduces construction time, cost and environmental impact.

After concreting, the walls with thicknesses of 7 and 5 cm are assembled to form 3D modules that have been pre-equipped in the manufacturer's factory before delivery. This makes it possible to provide customers with high-quality and high-performance turnkey housing in record time.

Thanks to the concrete recipe used and the 12 cm insulating layer already integrated during manufacture, the output modules offer excellent thermal resistance. In addition, these modules provide high resistance to earthquakes up to Level 8 on the Richter scale and to hurricane impacts of Category 4.

[1] fib Model Code 2010: Bulletin Nr. 55, veröffentlicht von FIB (Oktober 2010) Kapitel 5.6 www.fib-international.org/publications/model-codes.html

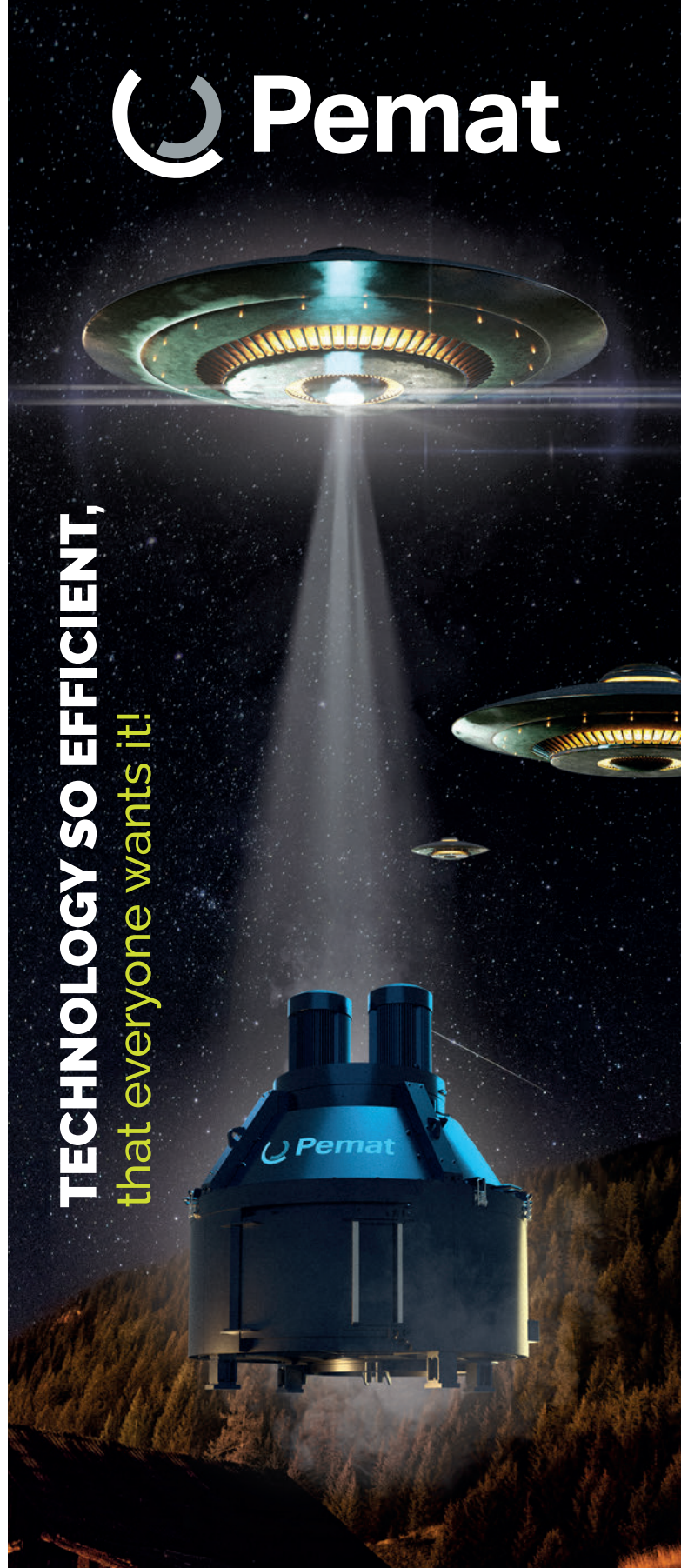
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Increasing demand for mixers for fibre concretes

زيادة الطلب على خلطات خرسانة الألياف

For many applications, fibres are added to concretes, especially to improve the cracking and fracture behavior. The brittleness of the concrete matrix decreases when fibres are added, making the concrete more ductile and better able to resist bending stresses. Depending on the application, steel fibres, glass fibres or synthetic fibres are used, the latter also for fire protection, especially in tunnel construction. If a fire occurs, the fibres burn and leave channels through which water vapour can escape. This prevents the edge layer of the concrete component from chipping off; the steel reinforcement behind it remains protected. It is important that the fibres are homogeneously distributed in the concrete. This places high demands on the mixing technology used to mix the concrete.

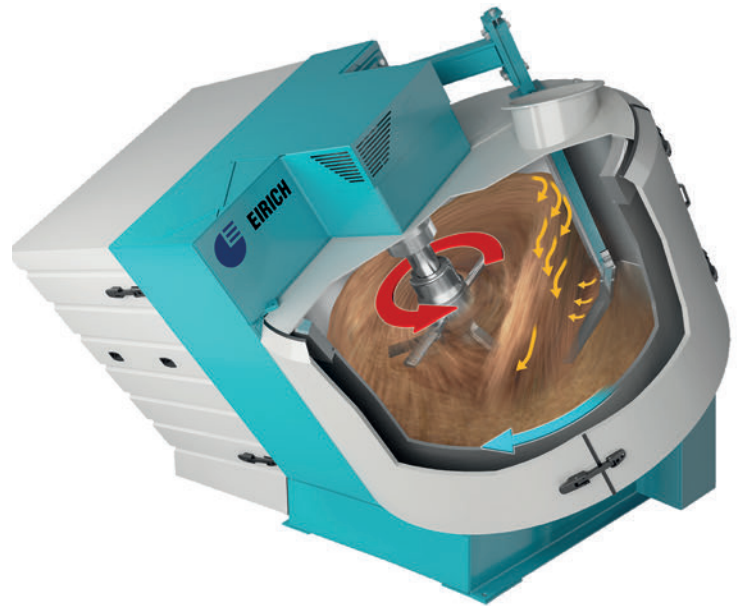
بالنسبة للعديد من الاستخدامات، تُضاف الألياف إلى الخرسانة، خاصة لتحسين طبيعة التكسير والتشقق. تقل هشاشة القالب الخرساني عند إضافة الألياف، ما يجعل الخرسانة أكثر قابلية للسحب والطرق وأكثر قدرة على مقاومة ضغوط الانحناء. واعتمادًا على الاستخدام، تُستخدم الألياف الفولاذية، أو الألياف الزجاجية أو الألياف الاصطناعية، والأخيرة أيضًا للحماية من الحرائق، خاصة في بناء الأنفاق. ففي حالة حدوث حريق، تحترق الألياف وتترك قنوات يمكن لبخار الماء الخروج من خلالها. وهذا يمنع طبقة حافة المكون الخرساني من التقطع؛ فيظل التدعيم الفولاذي (حديد التسليح) خلفه محميًا. من المهم أن يتم توزيع الألياف بشكل متجانس في الخرسانة. فهذا يفرض متطلبات عالية على تقنية الخلط المستخدمة لخلط الخرسانة.

Fibre concrete is a relatively young material; steel fibres were used for the first time around 1970, followed by glass and plastic fibres. When the mixers for concrete were invented, there were no fibre additives yet. Today's mixer designs, mostly almost identical in construction and offered by many manufacturers worldwide, are very similar to the originals more than a hundred years ago: The single-shaft mixer (around 1870), the double-shaft mixer (1888), the ring trough mixer (around 1903) and the planetary mixer (1906). In 1924, the planetary mixer was developed into the Eirich mixer with horizontal mixing vessel, and in 1972 the mixer with inclined mixing vessel was developed further. In contrast to the planetary mixer, the Eirich mixer has a mixing pan rotating around a vertical axis and an eccentrically arranged mixing tool.

The mixers based on inventions from 1870 to 1906 have the characteristic that the mixing tools in the mixing vessel run close to the floor or wall. The mixing tools transport the material to be mixed, even peripheral areas must be covered. Especially to keep friction-related wear within limits, the tool speeds are low, often only 1.5 m/s.

In the Eirich mixer, a rotating container transports the material to be mixed. This material is fed to the mixing tool, called a agitator. In sizes from 1 litre to 3000 litres, only one single agitator tool is required. Only in larger mixers are several agitators installed, e.g. 4 agitators for 12 m³ net capacity.

A characteristic feature of this mixing system is that the agitator only needs two small, non-contact floor cleaning knives



The unique Eirich mixing principle for highest mixing quality.

to keep the bottom of the mixing pan free of deposits. The power dissipation via friction and thus also the wear of the bottom is therefore very low (which is why Eirich mixers do not need ceramic linings). This also allows high tool speeds, with correspondingly high power input. The agitator can run at tool speeds of up to 30 m/s, if required for the task at hand. It goes without saying that added fibres - be it short or long fibres - can be separated and distributed more easily at higher tool speeds, and lump formation - known in techni-

cal jargon as hedgehog - can be prevented. It is possible to work at several different speeds within a batch and thus select the optimum speed and thus the appropriate power input for each processing step of the mixing regime.

In addition: Each mixing process is superimposed by a segregation process, essentially caused by centrifugal forces, especially when the components of the mixed material have different densities and grain sizes - as is the case with concrete. Investigations on concrete mixers were carried out as early as 1980, with the result that it is not possible to mix for an arbitrary length of time because the mixing quality then decreases again. This is also the reason why concrete standards do not specify that concrete should be mixed "well", but only until the mixture appears uniform. It is therefore often not possible to achieve the optimum mix quality.

With the Eirich mixer, on the other hand, complete mixing is achieved during a single rotation of the container. The product, which is locally segregated by the agitator during the throwing process, is back-mixed by the permanent circulation movement, so the mixer mixes without segregation. This means that the product can subsequently be mixed for as long as the respective task requires it.

Many manufacturers of precast concrete elements today use the mixing technology from Eirich. It should be noted that the term "concrete" is also used for fibre concrete when the max-

imum grain size is less than 4 mm. Such fibre concretes are particularly demanding in terms of mixing technology. The glass fibre concrete panels for the façade of the Johannesburg Stadium, which was built for the 2010 World Cup, were also produced using Eirich mixing technology. The design of the façade was to be reminiscent of a traditional African drinking vessel. The 40,000 glass fibre concrete panels in various African colours were supplied by the Austrian company Rieder Smart Elements with production facilities in Kolbermoor, near Rosenheim, Upper Bavaria, Germany.

Eirich has recently been receiving a number of enquiries from precast manufacturers who want to produce high-quality and uniform (fibre) concrete. In addition to mixing technology, fully automatic fibre dosing for small and large quantities is also of interest, for which Eirich can offer proven solutions. ■

FURTHER INFORMATION



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Xypex Chemical Corporation, V6V 2G9, Richmond BC, Canada

Protecting Concrete Structures from Microbial Induced Corrosion

حماية الهياكل الخرسانية من التآكل الناجم عن الميكروبات

The South Lathrop Commons Centre Sewage Pump Station is a pre-cast structure made of eight separate elements. The elements consist of a precast slab, 6 large "box culvert" shaped sections that are stacked to create the chamber itself and a roof. The joints are sealed with flexible waterstop materials and the gaps filled with Xypex Megamix II with BioSan to protect the gaskets. This structure is to service a new large warehousing complex.

محطة ضخ مياه الصرف الصحي بمركز South Lathrop Commons عبارة عن هيكل جاهز مسبق الصب مصنوع من ثمانية عناصر منفصلة. تتكون العناصر من بلاطة جاهزة مسبقة الصب، و6 أقسام كبيرة على شكل "قناة مربعة الشكل" مجمعة لإنشاء الحجرة والسقف. تُغلق الوصلات بمواد مانعة لتسرب المياه مرنة ويتم ملء الفجوات باستخدام Xypex Megamix II مع BioSan لحماية الحشيات. يعمل هذا الهيكل على خدمة مجمع تخزين كبير جديد.

In order to protect the concrete structure from microbial induced corrosion and to achieve water tightness Xypex Bio-San C500 was added to the concrete mix at the Jensen Precast's plant at the time of batching. The Bio-San C500 contains antimicrobial crystalline technology which both kills the acid-producing microbes which proliferate in sewage structures as well as providing watertight, chemically resistant concrete with crack-healing properties.

Jensen Precast reported no operational or other issues in regards to mixing, casting or curing of the concrete containing Xypex Bio-San C500. The use of Xypex Bio-San C500 is expected to significantly extend the life as well as greatly reduce any long term maintenance of this important new piece of infrastructure. ■

Project: South Lathrop Commons Center Sewage Pump Station

Completion Date: October 2018

Owner: City of Lathrop, California

Engineers: PACE Advanced Engineering

Precast Manufacturer: Jensen Precast, Lockeford, CA

Contractors: Conco West Inc., Manteca, CA

Products: Xypex BioSan C500,

Project Type: Sewage Pump/Lift Station

FURTHER INFORMATION



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The use of Xypex Bio-San C500 is expected to significantly extend the life as well as greatly reduce any long term maintenance of concrete structures.

Fibre Reinforced Geopolymer Concrete as Part of Plant Upgrades

استخدام خرسانة الجيوبوليمر المدعمة بالألياف كجزء من عمليات تطوير المصنع

■ Warren Mc Kenzie, Technical Manager, Master Builders Solutions, Dubai, U.A.E

Evolution, as described by Charles Darwin is the ability to adapt, compete and ultimately flourish in an ever-changing world. Civil engineering, more specifically concrete technology is no different in the science and our understanding of this complex system is continuously evolving. Conventional concrete technology has been based on and around the use of Ordinary Portland Cement (OPC) since the mid to late 19th century when Joseph Aspdin obtained a patent for a material produced by burning chalk with clay in a lime kiln. Despite the numerous uses and benefits of OPC based concrete, there are growing concerns over the environmental impact and the energy consumption required to produce the material, as well as, the depletion of quarried resources. As industrial requirements advance, all avenues of cutting-edge developments must be pursued in order to stay ahead of the evolution curve. One of these developments is the use of high OPC replacement levels with PFA and GGBS in concrete. A recent example is the replacement of 100% OPC with fly ash (PFA), ground-granulated blastfurnace slag (GGBS) and micro silica (MS) etc., and their activation with high alkali solution(s). This process is affectionately referred to/identified as geopolymer concrete or alkali-activated material (AAM). Going forward the term geopolymer will be used as it is preferred by most researchers in the industry.

التطور، كما وصفه تشارلز داروين، يمثل القدرة على التكيف، والمنافسة والازدهار في نهاية المطاف في عالم دائم التغير. ولا يختلف مجال الهندسة المدنية، وبشكل أكثر تحديداً تكنولوجيا الخرسانة في العلوم حيث يتطور فهنا لهذا النظام المعقد باستمرار. تعتمد تكنولوجيا الخرسانة التقليدية على استخدام الإسمنت البورتلاندي العادي (OPC) وتدور حوله منذ منتصف القرن العشرين وحتى أواخره وذلك عندما حصل جوزيف أسبين على براءة اختراع لمادة منتجة عن طريق حرق الطباشير مع الطين في فرن الكلس (الجير). وعلى الرغم من الاستخدامات والفوائد العديدة للخرسانة التي تعتمد تركيبها الأساسية على الإسمنت البورتلاندي العادي، إلا أن هناك مخاوف متزايدة بشأن الأثر البيئي واستهلاك الطاقة المطلوب لإنتاج هذه المواد، بالإضافة إلى استنفاد موارد المحاجر. ومع زيادة المتطلبات الصناعية، يجب مواصلة جميع سبل التطوير المتقدمة من أجل البقاء في صدارة منحنى التطور. ويتمثل أحد هذه التطويرات في استخدام مستويات عالية من بدائل الإسمنت البورتلاندي العادي مثل رماد الوقود المسحوق (PFA) وخبث الفرن العالي المحبب المطحون في الخرسانة. ومن الأمثلة الحديثة على ذلك استبدال الأئمة البورتلاندي العادي تماماً بالرماد المتطاير (PFA)، وخبث الفرن العالي المحبب المطحون (GGBS) والسيليكا الدقيقة (MS) وما إلى ذلك، وتنشيطها بمحلول (محاليل) قلوي عالٍ. يُشار إلى هذه العملية وتُعرف بكياسة على أنها خرسانة جيوبوليمر أو مادة منشطة بالقلويات (AAM). ومن الآن فصاعداً، سيُستخدم مصطلح جيوبوليمر كما يفضله معظم الباحثين في الصناعة.

Geopolymer concrete provides a sustainable, environmentally friendly alternative to OPC based concrete by reducing CO₂ emission by up to 45% while remaining economically competitive. These reductions are often looked at only as operational CO₂ (oCO₂) and not as the embodied carbon dioxide (eCO₂), which can be defined as the emissions derived from the construction and disposal phase in terms of the element's life cycle. The next progression step in the evolution of concrete technology is a truly revolutionary material, Fibre Reinforced Geopolymer Concrete (FRGC).

Master Builders Solutions have established themselves as leaders and innovators within the construction industry, with their vision to build sustainable performance and a passion for innovation by making the impossible possible by taking a pro-active approach in driving the industry forward with the latest technologies. So much so, they will be using FRGC slabs as part of the construction and upgrade of their plant situated in Dubai Investment Park, Dubai. More than 30 m³ of 40 MPa FRGC will be used throughout the plant as Master

Builders Solutions continues to serve its customers with the latest and most comprehensive solutions in the Gulf region. The FRGC uses GGBS as its primary binder source in combination with MasterFiber MAC 2200CB, the high alkaline activator MasterCrete AC 500 and Master Builders Solutions patented superplasticizer MasterCrete 1000 to provide water reduction, slump retention and improved rheology. It should be noted that factors effecting the strength development of geopolymer with GGBS as the primary source of binder are: the type and dosage of alkaline activator, the means of adding said activator, the type and fineness of binder, ratio of SiO₂/Na₂O, curing temperatures and water/binder ratio.



Fig. 1: A series of reactions in the activation process of GGBS

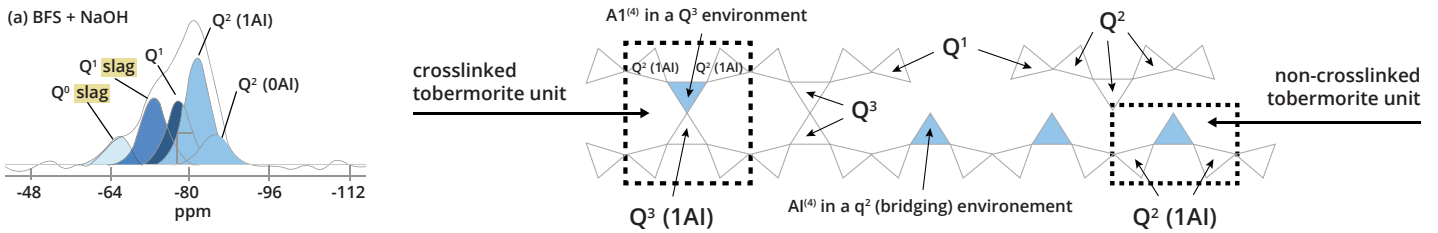


Fig. 2: C-A-S-H formation based on NaOH

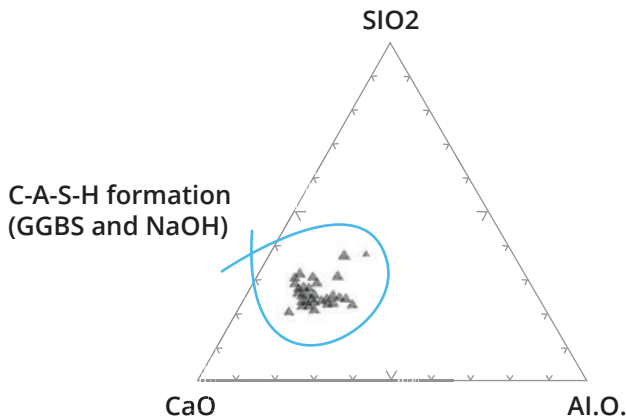


Fig. 3: C-A-S-H formation

The reaction of GGBS based geopolymer is different from that of PFA. The GGBS latent hydraulic component is the development of calcium silicate hydrate (C-S-H) gel along with aluminium results in formation of a calcium silicate hydrate with aluminium gel (C-A-S-H). The C-A-S-H gel presents in a similar formation to that formed by OPC based concretes, C-S-H. The C-A-S-H formed through alkali activation has a Ca/Si ratio below 1.5 where OPC based concretes have a Ca/Si ratio of approximately 2.0.

The high calcium content along with the low aluminium content of GGBS changes the mechanism of alkali activation compared to PFA, where the cation (R^+) acts as a catalyst in the initial phases of hydration via cationic exchange with the Ca^{2+} ions during the early stages of hydration and strength development as per Figure 1.

They are then combined into the structure forming zeolite-like phases. The hydration process is affected by the sodium content and the Ca/Si ratio and begins with the destruction of the slag bonds Ca-O, Mg-O, Si-O-Si, Al-O-Al and Al-O-Si before a Si-Al layer is formed of the binder prior to the formation of the hydration products as per Figure 2.

The nature and composition of products formed during the activation of GGBS remain controversial however, most research conclude and accept the following assertions:

- The main hydration product is a composition of calcium silicate hydrate with aluminium (C-A-S-H gel) with a Ca/Si ratio less than 1.5;
- The structure and composition of the C-A-S-H gel is dependent on the type and amount of activator used.

The presence of aluminium results in a gel forming long linear chains, as well as, the possible existence of sporadic inter-chain Si-O-Al bonds consequently forming two-dimensional cross-linked structures becoming a C-A-S-H gel shown in Figure 3. Depending on the type of activators used, being either silicate or hydroxide based, will have a direct effect on the degree of silicate species condensation in the gel structure. Typically, sodium silicate-based activators present with highly condensed structures while GGBS mixes using sodium hydroxide activators result in tetrahedral aluminium bridging in position of the silicate chains.

Multiple studies have shown particle packing principles (PPP), also known as particle packing models (PPMs), which take into account particle shape, size and distribution to improve the performance of concrete by reducing porosity and is an essential step in the mix design phase as illustrated in Figure

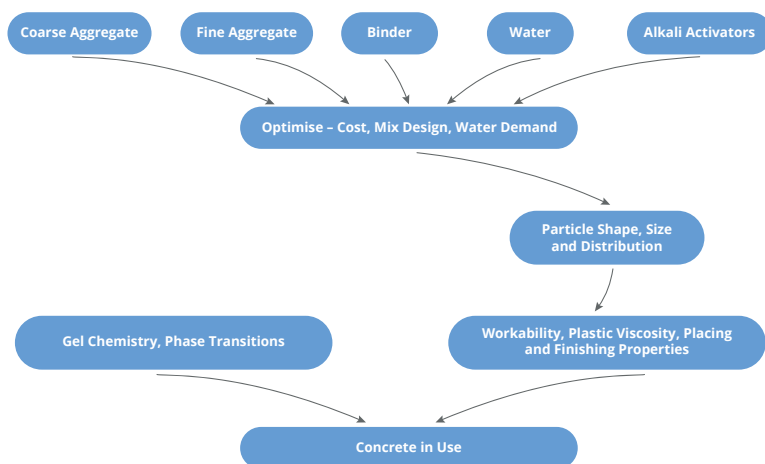


Fig. 4: Geopolymer concrete mix diagram

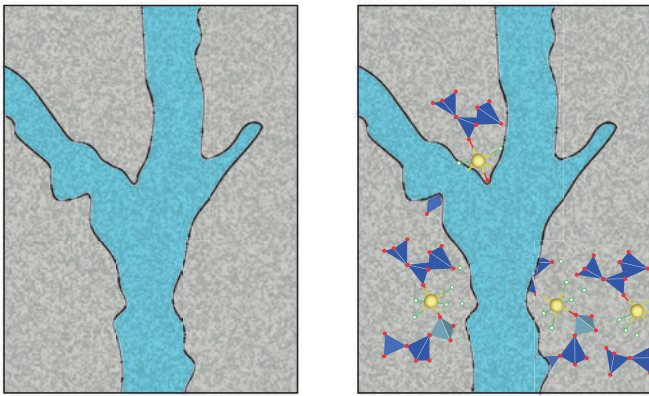


Fig. 5: The saturated capillaries resulting in polymerization around the capillaries

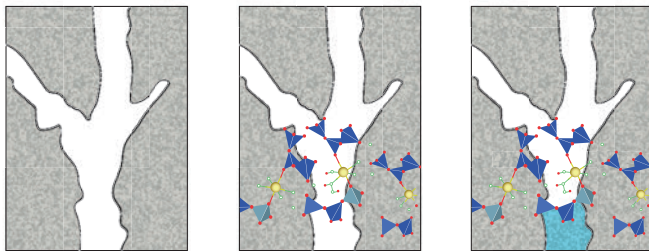


Fig. 6: C-A-S-H gel allowed to polymerize through the empty capillaries

4. PPP can be applied to most concretes, however, there are a few notable differences between conventional concrete and geopolymer. For one the free water from the activator(s) needs to be considered when addressing the W/B ratios.

If one were to consider the mix design contained 400 kg of binder with 150 l of mixing water and 30 l of activator (50% concentration) the W/B could be recorded erroneously as 0.38 where the “true” W/B ratio of would be 0.42.

Curing of conventional concrete has been described as “the maintenance of appropriate moisture and temperature conditions to permit the continuation of the hydration or pozzolanic reaction”. However, the “hydration” phase of geopolymer concrete is more of a polymerization phase than an actual hydration phase as is the case in conventional concrete where CSH is formed. It is thought that geopolymer concrete produced with a basic GGBS will have a minimal calcium content and could therefore be considered as self-curing, where no water curing is required, providing further advancements in concrete technology. It is thought that curing of FRGC in water results in the capillaries remaining saturated, consequential the polymerization takes place around the capillaries, while air cured FRGC allows for the C-A-S-H gel to polymerize through the empty capillaries thereby improving the overall durability of the concrete, as per figures 5 and 6 respectively.

The workability of the concrete was recorded by measuring the slump-flow/spread of the FRGC using an inverted slump cone. The results of which are reported in Table 1 along with compressive strengths. The result demonstrates that FRGC

Table 1: Workability and compressive strength

Workability by Slump (mm)	Initial	650 mm
	30 min	630 mm
	60 min	620 mm
	90 min	600 mm
	120 min	560 mm
Fresh Wet Density (kg/m³)	2,495	
Air Content (%)	1.60	
Average Compressive Strength (N/mm²)		
1 Day (24 Hours)	11.9	
3 Days	23.0	
7 Days	32.6	
28 Days	48.8	

can be successfully produced and retains excellent workability properties for up to 2 hours.

Compressive strength cubes were prepared using 100 mm cubes and air cured at 23°C prior to testing at 1, 3, 7 and 28 days. The results show a continuous near linear strength development over the 28-day period.

Conclusion

The results obtained during the production of FRGC show that it is possible to produce stable geopolymer concrete using conventional methods. The unique property of air curing FRGC reduces the complexities of curing on site while producing a denser matrix thus improving properties such as compressive strength and water absorptions.

Further trails shall be conducted to evaluate how the improved matrix effects durability properties such as chloride ingress and carbonation resistance.

Master Builders Solutions remain committed to the advancing of concrete technology by driving innovations such as FRGC in partnership with key stakeholders within the industry and government authorities. ■

FURTHER INFORMATION



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Fresh concrete testing for quality control in the precast plant

اختبار الخرسانة الخالصة لمراقبة الجودة في مصنع الخرسانة الجاهزة

In many precast concrete plants worldwide, BRECON is known as a competent partner in the field of vibration technology for concrete compaction, conveying technology and other applications. Brecon took over the vibration technology product sector from Robert Bosch GmbH, Stuttgart in 1995. After ten years of „Brecon licensed by Bosch“, the product sector became entirely the responsibility of Brecon GmbH. Since then the company has produced both vibration motors and the matching control technology itself. After 25 years with a focus on vibration technology, Brecon developed a complementary portfolio for the materials testing product area under the brand name BEPETE (BetonPrüfTechnik). In the following, it is shown which test methods according to the standard are necessary for monitoring the quality of fresh concrete in the precast concrete plant and which equipment is used for this purpose.

في العديد من مصانع الخرسانة الجاهزة في جميع أنحاء العالم، تُعرف شركة BRECON بأنها شريك مختص في مجال تكنولوجيا الاهتزاز لضغط الخرسانة، وتكنولوجيا النقل والاستخدامات الأخرى. وقد تولت Brecon قطاع منتجات تكنولوجيا الاهتزاز من شركة Robert Bosch GmbH، في شتوتغارت في عام 1995. وبعد عشر سنوات من "ترخيص Brecon من قبل Bosch"، أصبح قطاع المنتجات مسؤولة شركة Brecon GmbH بالكامل. ومنذ ذلك الحين، والشركة تقوم بإنتاج كل من محركات الاهتزاز وتقنية التحكم المتوافقة معها بنفسها. وبعد 25 عامًا من التركيز على تكنولوجيا الاهتزاز، طورت شركة Brecon مجموعة تكميلية لمجال اختبار المواد المنتج تحت الاسم التجاري (BEPETE (BetonPrüfTechnik). وفيما يلي، تُوضح طرق الاختبار وفقًا للمعيار اللازم لمراقبة جودة الخرسانة الخالصة في مصنع الخرسانة الجاهزة والمعدات المستخدمة لهذا الغرض.

The Bepete product range also includes the testing equipment required for fresh concrete. Bepete, together with Brecon, focuses on synergy, optimisation and innovation in concrete compaction and concrete testing.

Definition of fresh concrete

As long as the ready-mixed concrete can be processed and compacted, it is called fresh concrete. It must be composed in such a way that it can be processed and fully compacted using the methods of transport, installation and compaction. The decisive factor is that the hardened concrete has the required hardened concrete properties. This already clearly shows the synergy between Brecon and Bepete.

Fresh concrete temperature



Insertable thermometer 200 mm, 300 mm and 120 mm (from left to right)

Low temperatures retard the hardening of concrete, high temperatures accelerate it. The setting of the fresh concrete is also influenced by the temperature. The concrete temperature must therefore be observed during concreting at extremely cold or warm ambient temperatures. As a rule, the installation temperature should not exceed +30 °C and not fall below +5 °C.

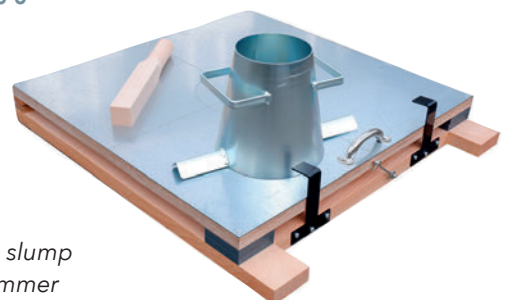
Consistency classes according to

DIN EN 206-1 and DIN 1045-2

The description of the consistency of fresh concrete is based on the classification into consistency classes. Common test methods for determining the consistency class are the three methods described below. A fourth test method according to Vébé is not used in Germany.

Determination of the fresh concrete consistency via the slump

DIN EN 12350-5



Slump cone, slump table and rammer



SLIM2 Quick Release Vibrator

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up to 25% lighter than its competitors

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* BRECON Außenrüttler mit SL Charakteristik(Synchronlauf) erreichen exakt die von der Frequenzsteuerung vorgegebene Drehzahl, z.B. 6000rpm bei 100Hz elektrischer Frequenz. Die Angaben sind bezogen auf Außenrüttler, die die gleichen Charakteristik aufweisen wie BRECON SL-Rüttler. BRECON SL-Rüttler sind in der Geschwindigkeit regelbar. Die SLIM2 Schnellspanhalterung ist auch für BRECON Hochfrequenz und BRECON Normalfrequenz Rüttler einsetzbar.

This test determines the consistency of fresh concrete by measuring the slump.

The fresh concrete can be assigned to the following consistency classes by means of the slump:

- F1 - stiff
- F2 - plastic
- F3 - soft
- F4 - very soft
- F5 - flowable
- F6 - very flowable

For ≤ 34 cm and > 63 cm, measuring the slump using the method according to EN 12350-5 is not suitable.

The test is also not suitable for testing self-compacting concretes and foam concretes.

Determining the fresh concrete consistency using the degree of compactibility (Walz)

DIN EN 12350-4



Compacting container acc. to Walz EN 12350-4

The test procedure records the change in volume by compacting a fresh concrete loosely filled into a container and is shown as degree of compactibility c . The fresh concrete can be assigned to the following consistency classes using the degree of compactibility c :

- C0 - very stiff
- C1 - stiff
- C2 - plastic
- C3 - soft

A degree of compactibility < 1.04 or > 1.46 is not a valid measurement.

Determination of the fresh concrete consistency using the slump

DIN EN 12350-2

This test is mainly suitable for concretes in the medium consistency range.

This method involves measuring the slump to within 10 mm of a concrete sample previously produced in a frustum with a bottom internal diameter of 200 mm, a top internal diameter of 100 mm and a height of 300 mm.



Slump cone EN 12350-2

The slump is classified into the following consistency classes:

- S1 - stiff
- S2 - plastic
- S3 - soft
- S4 - very soft
- S5 - flowable

J-ring test

DIN EN 12350-12



J-ring to determine the flowability

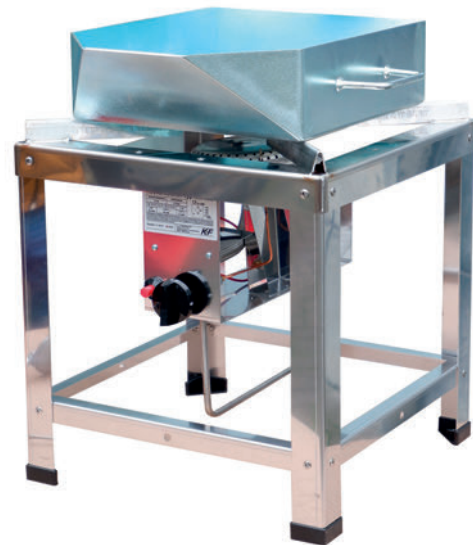
The standard describes the measurement of the flowability of self-compacting concrete (maximum aggregate size $D \leq 40$ mm) with impediments due to reinforcement and constrictions. The J-ring test is an alternative to the L-box test according to EN 12350-10.

The test is carried out in the same way as the slump-flow test, but additionally with obstruction by a J-ring with wide (59 mm) or narrow (41 mm) bar spacing. The latter simulates clogging reinforcement.

The slump-flow SFJ [mm] in case of obstruction, the tendency to block PJ [mm] and the slump speed t_{500J} are measured with an accuracy of 0.5 s. In addition, the concrete is tested for possible segregation. The blocking tendency is determined by measuring the relative height differences of the concrete surface inside (Δh_0) and outside (Δh_{x1} , Δh_{x2} , Δh_{y1} , Δh_{y2}) the J-ring with an accuracy of within 1 mm.



Air entrainment meter, EN 12350-7, GOST 10181



Drying unit for fresh concrete and drying pan

Since, depending on the reinforcement, a J-ring with 12 wide bars or 16 narrow bars is to be used, two J-rings are defined in the standard. Recently, there are J-rings which, due to their modular design, cover both variants in one device and can be dismantled. This reduces the space required in the laboratory.

Determination of the air void content in %

DIN EN 12350-7:2019

This procedure applies to fresh concrete with normal aggregates and a maximum diameter of 63 mm. A pressure compensation is carried out between a container filled with concrete and a chamber filled with compressed air. The pressure drop resulting from the air voids can be read off the manometer of the air entrainment meter as the air content of the concrete in %.

Determination of the fresh concrete bulk density

DIN EN 12350-6

To determine the bulk density, the fresh concrete is compacted and weighed in a rigid and watertight container (container volume ≥ 5 l).

The smallest dimension of the container must be at least four times the maximum nominal size of the aggregate in the concrete, but it must not be smaller than 150 mm.

Self-compacting concrete is to be filled into the container in one work step without mechanical or manual compaction.

The ratio between the mass of the concrete sample m [kg] and the container volume V [m³] results in the fresh concrete gross density D and must be specified with an accuracy of 10 kg/m³.

The value obtained is used for checking the nominal bulk density according to recipe specifications of the concrete composition.



Bepete offers a wide portfolio of different moulds made of plastic, cast iron and polystyrene for the production of test specimens.

Determination of the water content in fresh concrete not standardised (acc. to the withdrawn DIN 1048-1)

The so-called kiln drying test is a method for determining the water content in fresh concrete. The test is carried out to calculate the actual water/cement ratio.

On a fresh concrete sample, the loss of mass is determined in the kiln drying process by very fast and complete drying. The water content is then calculated from the loss in mass.



Mobile vibrating table with foot switch 3,000 rpm

Production and storage of test specimens

DIN EN 12390-1 and -2

Concrete specimens with the dimensions specified in the standard must be produced and stored under specified conditions.

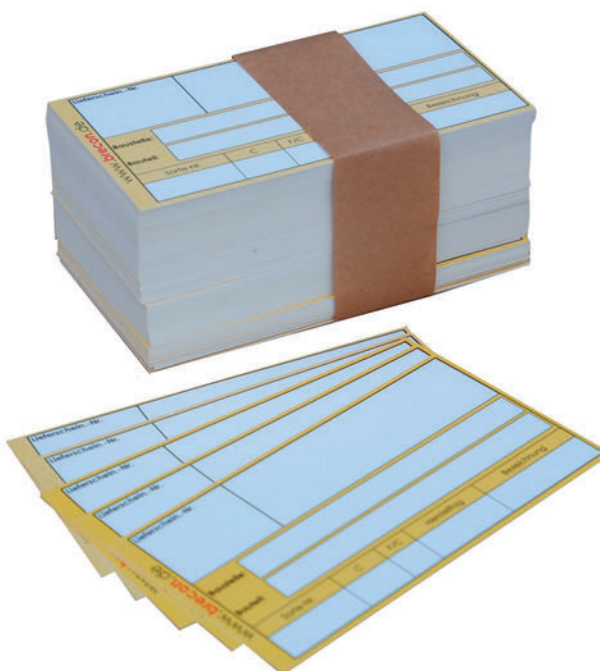
To determine the compressive strength, cubes with an edge length of 150 mm or cylinders with a diameter of 150 mm and a height of 300 mm must be produced.

The test moulds must be coated with a release agent before being filled with concrete. Depending on the consistency of the concrete, filling is carried out in one or more layers.

Each layer is usually compacted with a vibrating table. No excessive slurry may settle on the concrete surface. The test specimens must be marked, e.g. with cube labels.

After 24 hours, the samples must be stripped and stored under water at 20 ± 2 °C or alternatively in a humidity chamber at 20 ± 2 °C and a relative humidity of ≥ 95 % until the seventh day. This storage usually takes place in so-called climate boxes, in which the temperature is kept constant by a heating device with control.

After the seventh day, the samples are removed from the water and stored in air at 20 ± 2 °C until the test, normally on day 28. ■



Cube labels for marking test specimens



Plastic concrete sample curing tank

Air entrainment meter to determine the air void content in fresh concrete

DIN EN 12350-7:2019

Available models:

Air entrainment meter 5L

Technical data:

Content: approx. 5.2 litres

Weight: approx. 7.9 kg

Standard: EN 12350-7:2019;

GOST 10181



Air entrainment meter 8L

Technical data:

Content: approx. 8.2 litres

Weight: approx. 8.3 kg

Standard: EN 12350-7:2019, ASTM

C231; GOST 10181



Properties:

- consistent further development according to the latest version of the standard EN 12390-7:2019
- simple operation due to a clear device structure
- very easy to maintain due to optimisation of the design of the assemblies
- durable due to a robust construction
- significantly lower weight compared to comparable products

FURTHER INFORMATION

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Set accents – without compromise: solutions for the production of multi-colored products

ضبط علامات الشكل المميّزة - دون المساومة: حلول لإنتاج منتجات متعددة الألوان

A distinguished and unique color blend contributes significantly to the character of concrete blocks. Masa multi-color systems are a tool for manufacturing these products and adding them into your product portfolio. The systems range from Easy compact solutions, to Premium versions with sophisticated technology to feed the block machine with complex color blends repeatedly and assuredly. Specialty mixers and auxiliary equipment for the block making machine are also available to further accentuate the look of the finished products.

يساهم مزيج الألوان المميّز والفريد بشكل كبير في نوعية الكتل الخرسانية. وتعد أنظمة Masa متعددة الألوان أداة لتصنيع هذه المنتجات وإضافتها إلى مجموعة منتجاتك. تتراوح الأنظمة بدءًا من الحلول المُدمجة السهلة، وحتى الإصدارات المتميّزة ذات التقنية المتطورة لتغذية آلة تصنيع الكتل باستخدام مزيج ألوان معقد بشكل متكرر ومضمون. كما تتوفر أيضًا خلطات متخصصة ومعدات مساعدة لآلة تصنيع الكتل لإبراز مظهر المنتجات النهائية.

Multi-color system Easy

The multi-color system Easy is the compact version of a Masa coloring system. The device is mounted directly on the machine silo of the block making machine. The operation of this device is almost identical in both the main mix and the face mix concrete filling units.

The concrete is deposited in several layers on the closed slide with the weight continuously being monitored via load cells. This can be called upon at any time via the visualization. The slide then opens gradually causing the concrete to fall in a randomized manner creating the color blend.

Control and visualization

The control of the multi-color system Easy is directly integrated into the recipe management system of the products. Here the opening width of the slide can be defined for all five positions and the delay time between the individual movements of the slide can be set. These two parameters have a significant influence on the final appearance of the multi-colored product. All processes are displayed in the visualization of the block making machine using the latest generation of visualization Live Motion.



Hydraulic version for the block making machines of the XL series



Electric version for the L-series block making machines



The patented Masa Multi-color system Premium

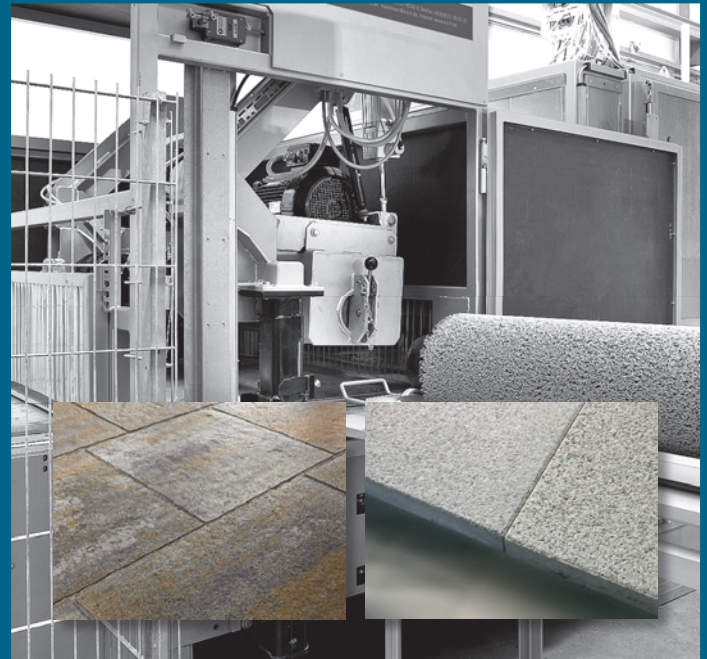
Multi-color system Premium

The patented premium system accurately coordinates blends to enable the replication of highly varied color combinations repeatedly and assuredly. It can be used for blending the colors of both the main mix and face mix concrete. The system essentially consists of two assemblies: the silo unit with a swiveling dosing belt and the collection belt.

Silo unit with swiveling dosing belt

As a standard, the multi-color system is equipped with three silos for products with three different colors.

Stainless steel silos with a water volume of 2250 l in the main mix version and 580 l in the face mix version are used. Each silo includes a flap for easy access during cleaning processes. For constant monitoring of the filling level, the silos are hung on a frame above the collecting belt on four load cells for main mix concrete and three load cells for face mix concrete. Below the silo is an 800 mm (main mix concrete) or 650 mm (face mix concrete) wide dosing belt, which is mounted on a swiveling device. This allows the dosing belt to pivot up to 30 ° from the center axis to the right and to the left.



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“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

Baustoffwerke

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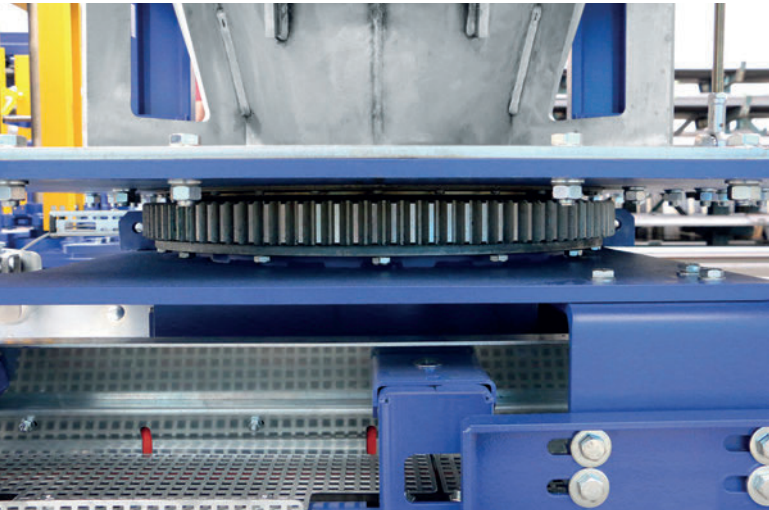
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Swiveling drive

Optionally, the drives can be equipped with frequency converters so that the speed of both the belt and the swiveling drive can be adjusted.

Collecting Belt

The colored concrete can be deposited in up to five different positions on the 1400 mm wide collecting belt. The collecting belt is equipped with a frequency converter to adjust the speed of the moving belt. This combination enables the precise placement of concrete onto the belt and more importantly uniform placement of the concrete into the machine silo.

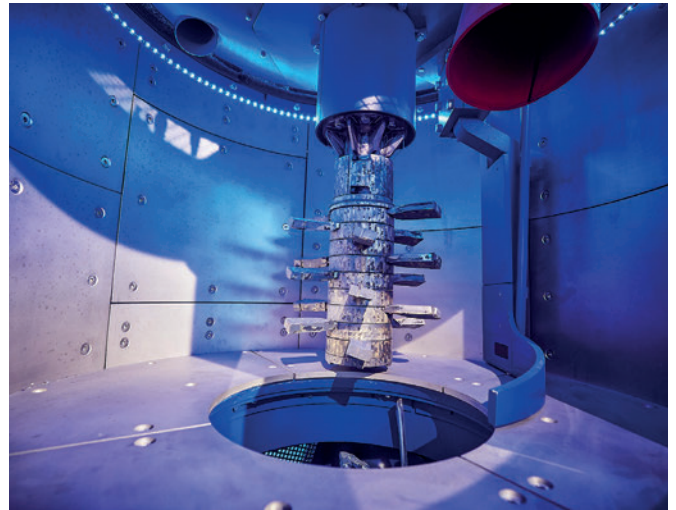
Alternative variations

Alternatively, the Premium Multi-Color-System can be implemented with movable belts. With a combination of both variations, concrete can be fed independently to both the base mix and face mix by means of a flying bucket conveyor or a conveyor belt.

Control and visualization

The premium system is assigned a separate page in the Masa visualization program. A significant advantage is the use of the current Live Motion generation, which considerably simplifies the monitoring of equipment; particularly for components that cannot be seen from the control panel or the control cabin. In addition, some functions enable the user to intervene in the production process partially.

The control of the system is integrated into the recipe management section of the products. Up to 10 sequences can be defined for each product. One sequence is the depositing of the concrete from each swiveling belt onto the collection belt.



S 350/500 in the interior view of the probe for moisture measurement (in the side scraper).

Each sequence consists of three options per silo:

- **Positioning of the concrete onto the collecting belt:**
Up to five positions can be selected here. Pivoting between different positions is also possible.
- **Delay time:**
The delay time indicates whether the dosing starts immediately with the start of the sequence or whether a delay between the start of the sequence and the start of the dosing should occur. With a delay, superimposing concrete on the collecting belt is possible.
- **Amount of concrete to be dosed:**
The amount of concrete to be dosed is specified. The determined weight factor (kg/s) determines the running time of the dosing belt.

Supplementary equipment to produce high-quality multi-colored products

Face mix concrete mixer S 350/500

The Masa concrete mixer portfolio has different concepts for the production of main mix and face mix concrete. While the models of the PH series are designed for the volume requirements of main mix concrete production, the S 350/500 face mix concrete mixer is ideal for particularly small batches of high-quality concrete. A highly wear-resistant agitator in combination with a counter-rotating mixing trough is used as mixing tool. The mixing trough is inclined by 20° so that the mixing process is separated from the transport of the mix. This prevents cement and color balling and achieves excellent homogenization of colored concrete with fine aggregates and small batches. With the face mix concrete mixer, an output between approximately 120 l and 350 l can be achieved per mixing cycle.



Filling box feeding via dosing belt.



Face mix filling box with hydraulic bottom plate.

The mixing process is supported by the Masa water dosing system Aquados, which uses a probe to determine the humidity content of the mix after the aggregates have been filled into the concrete mixer (or after the dry mixing time). By comparing the set water/cement ratio with the measured humidity, the amount of water can be calculated and precisely dosed. The radar technology penetrates a large volume of material and compensates for unequal humidity distributions at an early stage of the mixing process. The method enables precise measurements at low to high water content as well as different material densities and grain sizes. The probe getting covered in concrete, the conductivity of the material, and the local prevailing temperature has little effect on the ability of for the system to accurately produce highly homogenized concrete. In combination with the Masa plant control software a recipe-based calibration of the water curve is carried out. This enables correct humidity measurement even with different material compositions. The use of a Bluetooth probe is also available as an option.

Auxiliary equipment for block making machine

By incorporating special equipment into the block making machine, the production of excellent multi-colored products can be cleared at an early stage. For example, the use of a dosing belt to feed the filling boxes instead of the standard dosing flap ensures a more even and controlled filling of the main mix or face mix filling boxes. Furthermore, the face mix filling box can be equipped with a driven bottom plate. This makes it possible to fill the mold only in the backwards move-

ment of the filling box, which prevent overfilling of the mold. It also limits the superimposition of the concrete, which leads to more distinguished and contrasting colors in multi-colored applications and increases the reproducibility of the products surface.

Various solutions and components

Masa offers various solutions and components for the successful production of colored concrete products. These options can be incorporated upfront when planning and realizing a new plant or integrated into an existing production system to expand and modernize the plants capabilities. Depending on the customer-specific requirements, and after checking the feasibility of a retrofit, the product range can be expanded to include multi-colored products at a later date.



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Watch the Masa Multi-Color System in a video.



International architecture projects: Genest Concrete

المشاريع المعمارية الدولية: شركة Genest Concrete

■ Holger Eckelt and Stefanie Schaarschmidt, Kobra Formen GmbH, Germany

It all started in 2006 with a trip to Germany. Chris Genest, Managing Partner of Genest Concrete, was impressed by the way European buildings are constructed from concrete blocks, which is completely different from the steel and timber constructions of the New England style. The family company Genest Concrete, headquartered in Sanford, Maine/USA, was founded in 1927 and is currently in its fourth generation, being managed by brothers Chris and Matt. It is one of the leading manufacturers of concrete blocks in New England and manufactures numerous products for both the public and private sectors.

بدأ كل شيء في عام 2006 برحلة إلى ألمانيا. أعجب كريس جينست، الشريك الإداري في Genest Concrete، بطريقة تشييد المباني الأوروبية من الكتل الخرسانية، والتي تختلف تمامًا عن الإنشاءات الفولاذية والخشبية على طراز نيو إنجلاند. تأسست الشركة العائلية Genest Concrete، والتي يقع مقرها في سانفورد، مين/الولايات المتحدة الأمريكية، في عام 1927 وهي حاليًا في جيلها الرابع، ويتولى إدارتها الإخوان كريس ومات. تعد الشركة إحدى الشركات الرائدة في تصنيع الكتل الخرسانية في نيو إنجلاند وتقوم بتصنيع العديد من المنتجات لكل من القطاعين العام والخاص.

Back in Sanford, Chris Genest started to develop a hollow block for house construction based on the German model, which combines numerous advantages over traditional timber construction and is a novelty for the region.

An energy-efficient stone system with thermal insulation which, unlike wood, does not require any subsequent treatment, does not deform, is far less susceptible to fire, cannot rot or be damaged by insects and is clearly more wind-resistant than any wooden construction. In addition, a pleasant room climate is created which ensures a constant temperature regardless of the season.

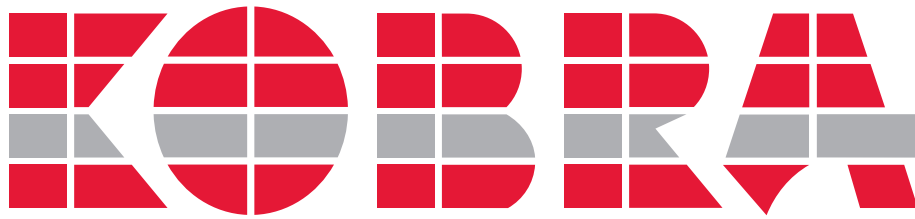
After four years of research and development, the first Comfort Block™ comes onto the market in 2010 as a patented product. The air chambers of the 4, 8 or 16 inch hollow block (CB-4, CB-8 or CB-16) are filled with an insert of expanded polystyrene, which guarantees a high level of thermal insulation. The block also has cross channels for the integration of cables and spaces for the installation of switch boxes. The system is modular and can be adapted to individual conditions.

The development and design of the first concrete block molds for Tiger block production plants is carried out in close cooperation with Kobra Molds LLC. Block molds for the US



Comfort Block™





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In 1996, KOBRA had patented the »Dynamic™« vibrating mould insert. The decoupling principle enables free and, at the same time, defined vibration behaviour. Vibration energy is transferred directly and effectively into the insert and results in improved force transfer in the concrete and an optimum side finish on the block. A milestone in mould technology, of which many thousands are in use worldwide.

market are developed by Kobra engineers and manufactured directly in Hudson/Wisconsin.

The manufacturing process of the Comfort Block guarantees high dimensional stability of the stones, which can be installed precisely and easily. All that is needed is concrete adhesive, which reduces the amount of dirt accumulation during the construction phase and increases the speed of construction. After setting, the blocks are plastered inside and outside. Chris Genest emphasises that all materials used in the construction process are chosen with ecological considerations in mind to create a healthy environment free of chemicals and toxins.

Since the launch of the Comfort Block, building projects have been completed in the Maine area with renowned architects. Chris Genest even built his own house with Comfort Blocks. "For me, the Comfort Block System is a growth factor for commercial and residential construction. For a small company, we're pretty proud of the brand that we believe will shape the industry. The Comfort Block is the first stone system of its kind in the United States."

A model house is currently being built in Arundel, Maine, to give both business and private customers an impression of the many advantages of the Comfort Block.

The entire outdoor area will also be designed with other products from Genest Concrete. The Sebago™ paving stone system, developed in cooperation with Kobra USA and Germany, has been supplementing the Genest portfolio since 2020. The Stone & Design department at Kobra's headquarters in Lengenfeld develops the system in close cooperation with Genest and adapts formats and surfaces according to customer specifications.

It is based on an existing product and consists of a wild pattern in which individual stones are systematically interchangeable



Kobra concrete block mold Basicline 2™ for Sebago Stone™

able to avoid continuous joints during laying and to generate a varied view. The embossed surface in a slate look is available in different colour variations. The stone is characterised by high stability and weather resistance due to the aggregates selected for the core concrete. In order to achieve a homogeneous surface and a natural colour gradient, Genest uses Kobra concrete block molds with features adapted to the product to increase the stone quality.

The construction of Kobra molds depends on the stone systems to be produced and the individual conditions in the concrete block factory. There is a suitable technology for each



*Sebago Stone™ -
Laying*

Basicline2™

The mold bottom of the Basicline2 comprises a precisely machined mold insert made of block material with all-round cavities shaped to hold the flange assemblies including rails. Unnecessary welded joints in and on the mold insert are prevented through this design.

Optimill carbo 68 plus™

With Optimill carbo 68 plus, a hardness of 68 HRC is achieved in the insert and on the wear plates, as well as an all-round hardness depth of 1.2 mm, which make the concrete block mold tool particularly wear resistant. Bolted wear plates improve the reparability of the mold and extend its service life.

Facts & advantages:

- Maximum mold accuracy due to internal Kobra quality standard
- Special cavity geometry for uninterrupted hardness development
- Hardness quality up to 68 HRC, hardness depth up to 1.2 mm
- Multiple insert changes possible in old frame
- Replaceable bolted wear plates

Hotshoe™

With Hotshoe, which consists of heatable tamper shoes and an integrated temperature control device, verifiably higher surface qualities can be achieved on the concrete block. The drying of the facing concrete prevents the tamper shoes from adhering to the concrete and helps with the texture of the block surface. In this sense, Hotshoe is also a demolding aid. The control compares the target temperature with the actual value measured on the heating element and if necessary, reheats. The target value to be set depends on the respective mold, the water ratio in the concrete mix and the ambient temperature. As a result, the water-cement content matched to the product can be used without limitation due to surface problems, since adhesion to the tamper shoes is prevented. Higher surface qualities and a refined finished surface appearance are achieved.

Facts & advantages:

- Verifiably higher surface quality on the concrete block, fewer rejects
- The temperature range with the Kobra control device can be controlled for customer-specific and individual product needs
- Prevents the adhesion of moist, fine facing concrete through controlled setting
- Shorter cycle times for products requiring intensive cleaning

type of product, which has been adapted to the specific requirements of the production process.

The Sebago block system is produced with Basicline 2™, which consists of a precisely machined mold insert made of block material with all-round cavities shaped to hold the flange assemblies including rails. Unnecessary welded joints in and on the mold insert are prevented through this design. In addition, the steel is specially hardened so that the mold is particularly wear-resistant with a hardness quality of 68 HRC and an all-round hardness depth of 1.2 mm.

The even surface of the Sebago paver is achieved by using the Hotshoe™ feature, which consists of heatable tamper shoes and an integrated temperature control device. The drying of the facing concrete prevents the tamper shoes from sticking to the concrete and helps to structure the stone surface.

By building the model house and designing the site exclusively with its own products, Genest offers architects, building contractors and potential homeowners the opportunity to see the company's wide range of products for themselves. There is even the option of using the property for several days. In this sense, Genest is going down presentation paths that go far beyond previous advertising measures, allowing the advantages of concrete blocks in room and area design to speak for themselves. ■



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FURTHER INFORMATION

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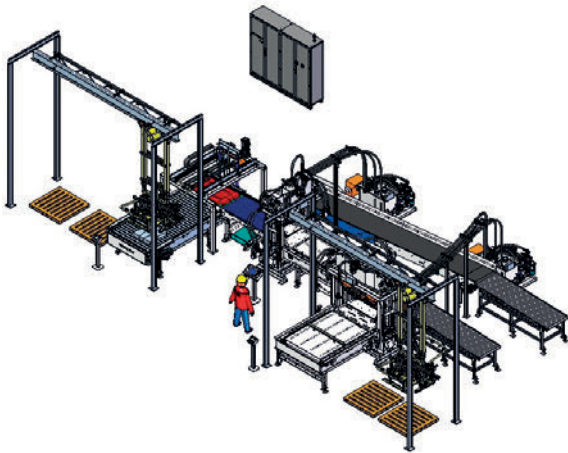
Techno Split, 38050 Ospedaletto, Italy

Technologically advanced concrete splitting line

خط تقسيم الخرسانة المتقدم تكنولوجياً

Techno Split is an Italian company specialised in the design and production of plants for splitting concrete blocks, known and appreciated especially in Europe for the high quality of its products. The most important customer of Techno Split, one of the leading manufacturers of concrete products in Europe, is always on the lookout for the best technical solutions for his investments. This customer did not hesitate to contact Techno Split, when he was looking for a new splitting line that should be installed at the customer's facility.

Techno Split هي شركة إيطالية متخصصة في تصميم وإنتاج محطات تقسيم الكتل الخرسانية، المعروفة والتي تحظى بالإشادة خاصة في أوروبا للجودة العالية لمنتجاتها. هذا ويبحث أهم عميل لشركة Techno Split، وهي إحدى الشركات المصنعة الرائدة لمنتجات الخرسانة في أوروبا، دائماً عن أفضل الحلول التقنية لاستثماراته. لم يتردد هذا العميل في الاتصال بشركة Techno Split، عندما كان يبحث عن خط تقسيم جديد يجب تثبيته في منشأة العميل.



Overview of the concrete splitting line



The first splitting machine with pusher bar conveyor



The second machine



Quality control area



Unloading conveyor at the end of the concrete splitting line

As envisaged by the pre-sales consultancy service offered by Techno Split, a visit was made to the customer's facility to determine the production line best suited to the customer's needs. After the order was finalized, Techno Split began to design the system, focusing not only on the fundamental points that have created the company's success: robustness, reliability of the components, production performance and safety, but also on a number of important innovations that can optimise and facilitate the adjustment of the splitting machines.

Configuration of the splitting machines

The splitting line consists of two machines: the first is the TS 136/40 model with a splitting force of 120 tons, the second is the TS 80/40 model with a splitting force of 90 tons. The first splitting blade is 1,360 mm long and the second 800 mm. Both machines have a vertical passage of 400 mm and are equipped with side blades that allow them to obtain a better finished product.

Both splitting machines are equipped with the following features:

- A sensor that controls the blade penetration during the splitting phase,
- A system that facilitates the locking and unlocking of the blade tools,
- A gear motor (replacing the manual handwheel) that motorises and optimises the adjustment of the height of the side blades,
- A proportional valve with variable flow rate was fitted on the hydraulic control unit of each machine, as well as the oil cooling and heating system with weekly operation programming.

Precise positioning thanks to pusher bar conveyor

All the conveyors that feed the splitters are equipped with servomotor-controlled pusher bars that ensure precise and reliable positioning of the concrete block under the blades and save both time and valuable space.

A quality control zone has been installed at the outlet of the second splitting machine. If a block has to be rejected, it is evacuated from the working area. The blocks that have passed the control will continue into an area where a vertical pusher will compact the row and push it onto a conveyor used as an unloading area.

Both loading and unloading operations of the line are carried out by vertical grippers that Techno Split has recently designed and built. ■

FURTHER INFORMATION



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Riyadh Kingdom Concrete Products continues with its ambitious plan to expand the production in Al Ahsa, Saudi Arabia

شركة رياض المملكة للمنتجات الخرسانية تواصل خطتها الطموحة لتوسيع إنتاجها في محافظة الأحساء، بالمملكة العربية السعودية

Zoman Mohammed Al Hajri & Partners Contracting Co. (known as Al Zoman Contracting Co.) is a general contracting company specializing in turnkey civil, mechanical & electrical projects, ranging from road & bridges construction to infrastructure & street lighting. The company is classified as First in Road Construction/Earthworks and Second in Electrical, with an annual work capacity of over 350 million riyals and over 1,000 employees. The sister company Riyadh Kingdom for Trading & Contracting LLC operates plants for the production and supply of ready-mix concrete and all other cement products, ranging from paving stones, curb stone and concrete blocks. Riyadh Kingdom Concrete Products planned to expand and approached their long-standing partner Hess Group, for support. The partnership between the two companies has now existed close to a decade.

تعد شركة زومان محمد الهاجري وشركاه للمقاولات (المعروفة باسم شركة الزومان للمقاولات) شركة مقاولات عامة متخصصة في المشاريع المتكاملة المدنية والميكانيكية والكهربائية، والتي تتراوح بدءاً من إنشاء الطرق والجسور وحتى البنية التحتية وإنارة الشوارع. تصنف الشركة على أنها الأولى في إنشاء الطرق/أعمال الحفر والثانية في مجال الكهرباء، بطاقة عمل سنوية تزيد عن 350 مليون ريال وأكثر من 1000 موظف. وتقوم الشركة الشقيقة، رياض المملكة للتجارة والمقاولات ذ.م.م، بتشغيل مصانع لإنتاج وتوريد الخرسانة الجاهزة وجميع منتجات الإسمنت الأخرى، بدءاً من أحجار الرصف، وحجر الرصيف والكتل الخرسانية. وخططت شركة رياض المملكة للمنتجات الخرسانية للتوسع والتواصل مع شريكها طويل الأمد شركة Hess Group للحصول على الدعم. وهذه الشراكة بين الشركتين موجودة الآن منذ ما يقرب من عقد من الزمان.

Misfer Al Zoman, Managing Director of Riyadh Kingdom Concrete Products contacted Hess in November 2010 regarding the expansion of production capacity. The customer received an order for delivery of 140,000 m² of paving stones and was optimistic about further demand. This has been taken as a signal to expand production capacity. In August 2011 Hess

received the order for the delivery of a fully automatic plant based on the machine RH1500-3 and the concrete mixing plant. The plant was the first fully automatic Hess RH1500-3 Plant including mixing plant from Hess in the Eastern Region of Saudi Arabia (Al Khobar Industrial Area), Dammam and the first fully automated plant of the customer. In a very short



Production site of Riyadh Kingdom Concrete Products Al Ahsa

time, the customer could see the advantages such as a wider range of concrete products, continuous product quality and savings in the number of personnel for the operation, compared to mobile or semi-automatic production plants. The new production facility could maintain 85 % to 90 % efficiency in the concrete product production and got great quality reputation for their products in the eastern province of the Kingdom of Saudi Arabia.

Therefore, the company now decided to invest in another RH 1500-3: „After nine years’ experience with plants of Hess Group, we have seen trustful advanced technology, reliable aftersales support and spare parts availability. We are looking forward for further expansions in the future together“, said Mr. Misfer Al Zoman. The Plant is installed in the Al Ahsa Area, approx. 150 km away from Dammam.

Market penetration in Saudi Arabia

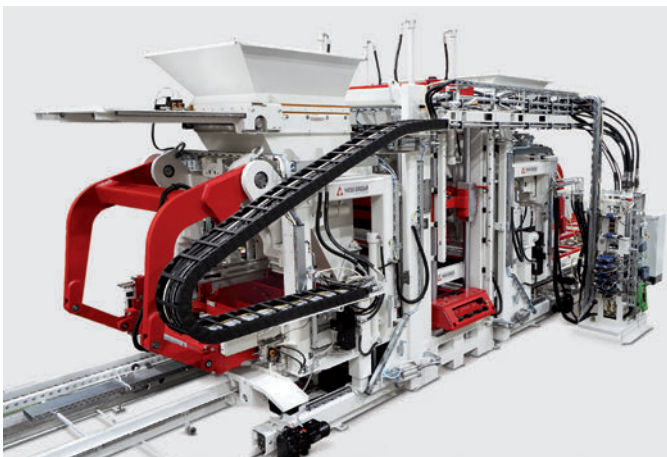
The market in the Middle East, especially in Saudi Arabia, is very dynamic and is constantly developing. Therefore, business success depends heavily on how quickly and well you can respond to market and product developments. The modular equipped plants from Hess Group offer significant advantages here.



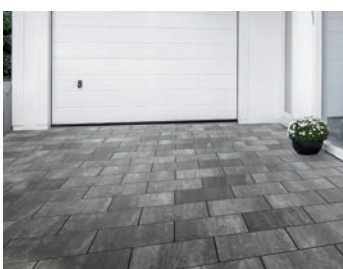
Block machine RH 1500-3 with double flying bucket



A member of **TOPWERK**



RH 2000-4 MVA –
high **PRECISION** *in*
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HESS GROUP is a worldwide leading supplier of high performance concrete block machines, dosing and mixing systems as well as the associated packaging and conveying technology.

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We put concrete into shape.

In addition to technical aspects, close and partnership-based cooperation with the customer, experience with local conditions and the willingness to support the customer in all aspects of his business are factors for the market success and consequently a decision criterion of the customer.

Trust, empathy and loyalty are values that customers from the region appreciate.

Hess Group has built up a large network, maintains constant contact with its customers and is known for its remarkably good and flexible machines and plants.

The complete package

One of the key arguments for Riyadh Kingdom Concrete Products was the local availability and know-how of Hess engineers and experts, experience with local conditions such as climate, personnel, raw materials and product development and the attitude of being at the customer's side at all times. That includes listening carefully with a deep understanding of the practical production conditions on site. Even if there are no obstacles, engineers from the Topwerk Middle East office, visit the plants after commissioning regularly and provide technical support and advice. The goal is to make sure the customer's production plants runs smoothly always.

On the technical side, Hess Group provides machines which allow products from 25 mm to 500 mm, depending on the model chosen. The customer has the possibility to produce a wide range of products from thin to high concrete products in highest quality. By now, customers know that they turn to Hess Group if they want to plan flexibly in the future.

Hess RH 1500-3

The technology has proven itself under difficult local climate conditions up to and over 50°C which are normal conditions in the Middle East during summer time.

The RH1500-3 machine is the state of the art technology with 1400x1100 mm pallet size, amplitude controlled vibration (Variotronic) and is equipped with unique oil bath vibration table, which provides permanent lubrication of bearings for very high compaction in short cycle times. The production could reach a steady rate of 5500 square meters of 60 mm height rectangular pavers in 20 hours daily production time. The mentioned compaction technology in the RH 1500-3 allows a production of 25 seconds cycle time for curbstones including face mix with 25 cm height. In addition, the advanced filling system with laser sensors in the filler boxes and machine hoppers assure sustainable quality in every cycle. This enables a precise control when filling the mould. As a result, 6 curbstones of a total length of 6 linear meters have a very high density and reach a very high strength, which is comparable to the known wet press products, also produced mainly in the Middle East.



Finger car, 14to capacity



Cuber Servo 700 with walking beam conveyor and stone cube frame conveyor

CONCRETE PRODUCTS & CAST STONE

To secure the cycle time of the machine throughout the output of the plant, a servo-controlled handling system is required. At the wet side, Hess installed V- belt conveyors, one of the fastest and smoothest possibilities to handle a production board with fresh concrete products.

The 14 to capacity elevator, finger cart and lowerator with 20 storeys, are connected to the big chamber curing room with 4180 pallets active capacity.

This plant setup has been chosen by the customer in the first plant already, to ensure the production without stops in the production flow.

From the lowerator a walking beam conveyor transports the cured products on the production boards to the Hess Cuber Servo 700. The cuber is fully electric servo controlled in the movements. Attached to the cuber is the hydraulic clamping device. The cuber will ensure the fastest cycle time to cube the products, as well to keep up with the high speed of the concrete block machine.

Efficiency is the biggest task for a concrete block making plant; therefore, customers are asking for short cycle times. But what counts at the end is the number of high-quality products, going out of the plant and a very limited wastage in production. Therefore, the wet and dry side of the plant have to be harmonized in terms of cycle time setup, depending on the different products produced on the wet and dry side. With a Hess concrete block machine a realistic wastage of less than 2 % is possible, through easy operating of the plant with the Hess advanced control systems. The Hess Training Academy is also a key point and a special offer from Hess, where the customers' operators are well trained in concrete technology, efficient operating of the equipment and about



Karajan visualisation and control system

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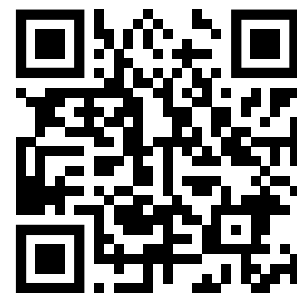


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Mixing plant control

the maintenance and troubleshooting of the plant. The Hess Training Academy will be held by Hess engineers wherever there is demand worldwide.

Coming back to the efficiency, the advanced handling system of the Hess plant has a buffer system, to ensure that both sides, wet and dry side, are never stopped in their production. The system will supply the wet side with production pallets, if there is a waiting time on the dry side or take out pallets of the system in case the wet side is stopped. Even if there are products with different cycle times on wet and dry side produced, the intelligent buffer system increases the capacity of the plant, by taking in or out production pallets in very short cycle time.

The block plant is operated by the Hess control system Karajan. This is the meaning of a stand alone touch screen monitor, from which the complete process of the production of the concrete products is controlled.

The mixing plant was also delivered by Hess Group: The hoppers are installed on a low ramp and filled with aggregates by wheel loader. The aggregates are collected by a double aggregate weigh batcher, moving on rails and weighing the requested aggregate very precisely. Through a 4-hopper powder pigment dosing system, the concrete products can be coloured in any possible colour feature requested by the customers clients. The pigments are dosed into the aggregate weigh batcher and embedded in the aggregates; the aggregate weigh batcher moves then to the skip hoists of the mixers.

The customer chose a higher capacity coarse-mix mixer of 3750l due to a high demand of kerbstone production. The face mix mixer 750l was installed on the same mixing plat-

form. The mixed concrete is transported to the block machine via double flying bucket. This prevents contamination of face and core concrete, beginning with the dosing of the grain sizes.

The control of the mixing plant is placed inside the control cabin, where the operator can control the complete mixing process. Receipts are stored in the system for all individual products. A transfer of the complete relevant production data from batching, mixing, pressing, curing, until cubing can be collected from the Hess control system and even transferred to a customer's ERP system.

A very special feature included in all new plants of Hess is the Hess statistics system. This system enables the plant manager or owner to review all relevant production information of his plant on his mobile device - anywhere in the world.

Even customers with older plants, installed this system in their controls, to be able to check what the plant is producing, in real time, from far away.

Commissioning during Corona crisis

Hess Group is worldwide in permanent contact with its customers and that is no different during the Corona crisis. Nevertheless, the installation of the new RH1500-3 was special: Usually Hess Group get engineers from Germany for commissioning a new plant. But due to the Covid-19 lockdown, the commissioning was done remotely. Just as this works perfectly for trouble shooting, for the first time a complete commission was carried out, by Topwerk Middle East engineers. The PLC software of the complete plant was sent to the Topwerk Middle East engineers from their German colleagues. With the online support of the German engineers, Topwerk

Middle East engineers put the plant into operation, which was constantly connected to the PLC's in the plant as well as to the visualisation systems, through internet. Thanks to the adapted work processes the commission took almost the same time as normal.

Future Prospects

Saudi Arabia has a young and growing population. This leads to demand for housing and infrastructure. The Kingdom aims to create more jobs for Saudi Arabians (Saudization) and more prosperity. With the Vision of 2030 (Project worth \$500 billion Dollars) a master plan was presented. As part of Vision 2030, mega projects such as NEOM are planned or already under progress. This and several other projects require huge amounts of building materials.

Hess Group has continuous business in Saudi Arabia as well in other countries in the Middle East and implements the lessons learned.



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On the front lines of pipe plant automation

في طليعة قطاع أتمتة مصانع الأنابيب

With a difficult labor market, Bill Washabaugh Jr., who leads USA company Northern Concrete Pipe, understands that automation is key to making their family business, employees, and the concrete pipe industry thrive. For that reason, when it came time to upgrade his Grand Rapids, Michigan, plant, he reached out to Afinitas company HawkeyePedershaab to assist with setting his plans for technology innovation and increased automation in motion.

في ظل سوق عمل صعب، يدرك بيل واشابو جونيور، الذي يقود شركة Northern Concrete Pipe في الولايات المتحدة، أن الأتمتة تعد عاملاً رئيسياً لجعل شركته العائلية، وموظفيه، وصناعة الأنابيب الخرسانية تزدهر. ولهذا السبب، فإنه عندما حان الوقت لتطوير مصنعه في غراند رابيدز، بولاية ميشيغان، تواصل مع شركة HawkeyePedershaab التابعة لشركة Afinitas لمساعدته في وضع خطته للابتكار التكنولوجي وزيادة دعم التحول إلى الأتمتة.

Interstate 96 connects the major cities of Michigan, from Grand Rapids in the west, through Lansing in the central part of the state, to Detroit in the east. It's a lifeline of sorts through the state, so it makes perfect sense that Northern Concrete Pipe would locate three of its five plants in close proximity to I-96. With those three sites, plus the original Bay City location 100 miles north, and a plant just over the border in Sylvania, Ohio, Northern has a solid reach throughout the region as it powers into its seventh decade of manufacturing pipe and other critical infrastructure products such as manholes, box culverts and three-sided bridges. Founded in 1958 by the Washabaugh family, the company is now in its third generation of family ownership, with Bill Washabaugh, Jr., at the helm.

Those deep Michigan roots may help explain why Bill Washabaugh takes seriously his ongoing commitment to the family business, the concrete pipe industry, and Northern's employees. And it is also behind the company's multi-year plan to upgrade each of its plants with the latest automation - not only to produce higher volumes of state-of-the-art pipe, but to keep up with demand in an era of deep shortages in the labor force.

"We're blessed to have absolutely incredible people working here. The problem is, we can't find enough good help," Washabaugh said. "We've been running shorthanded in all of our plants for four or five years. We're able to do that because of the exceptional staff that we have, but it's not fair to them to force them to work their tails off. So, anything we buy - it's not eliminating jobs - it's just replacing people that we can't find."

A challenge

That kind of thinking put Northern Concrete Pipe on the front lines of automation, and it led them to challenge Hawkeye-



Newly installed HawkeyePedershaab Mastermatic XT150 at Northern Concrete Pipe's Grand Rapids, MI, plant.

Pedershaab, an Afinitas company, to collaborate on developing new technology to further automate their plants when it was time for an upgrade. Afinitas is a global family of infrastructure equipment and services companies that serves the manufactured concrete products industry. The focus of Afinitas is to provide the machinery and technical expertise to further the evolution of the industry. The partnership between Northern Concrete Pipe and HawkeyePedershaab to upgrade Northern's Grand Rapids plant is a case in point.

Northern Concrete Pipe purchased the plant in 2012 toward the end of the Great Recession, and it came with a mid-1970s-era Transmatic pipe machine, which is the forerunner of the



The Mastermatic XT150 is a self-stripping machine and does not require an overhead crane.

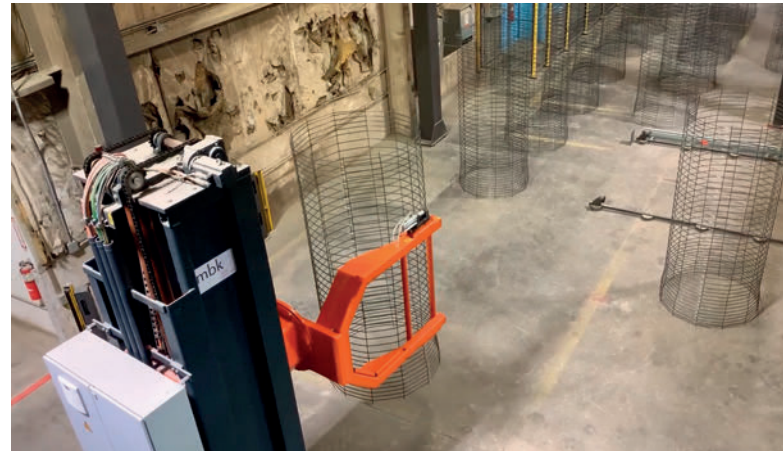
Mastermatic line of products that HawkeyePedershaab now manufactures. Consider the age of that equipment. When the Transmatic was installed in Grand Rapids, the inhabitant of the White House was Gerald Ford, a Michigan man and Grand Rapids resident himself. Let's just say the equipment was well seasoned when Northern took over the operation.

The plant also came with some key people, who were integral in working with the Afinitas team to design the new plant, according to Washabaugh. Charlie LaMange, plant manager, and Ben Stokes, maintenance manager, knew the Transmatic equipment inside and out. They were responsible for keeping it running, even though the technology might be generously described as antique. The machinery was holding up, although replacement parts sometimes had to be custom-fabricated and might take months to acquire. LaMange and Stokes and their crew found ways to keep it running.

"The overall machine was in pretty good shape," LaMange said, "but we had problems with the print card system that was the operating system for that unit. Each specific card has a function," he added. "It's technically digital, but we couldn't add on any functions. It's not like today's machines where you can program in something else. Overall, that machine functioned very well. It wasn't the problem - it was the operating system."

With their deep knowledge of the equipment, LaMange and Stokes were integral members of the team creating the new vision for the plant. It centered around replacing the classic Transmatic with the HawkeyePedershaab Mastermatic XT150, a fully automated rising core compaction pipe machine. The Mastermatic is a self-stripping machine so it doesn't require an overhead crane to demold the product.

HawkeyePedershaab's patented rising core feeds concrete into the mold at a 45% faster rate than conventional fixed-core vibration machines and demolds it 40% faster. But that was just the start. In addition to increased production capacity, Washabaugh and his team were looking at even more



mbk robot handling of cage to the cage manipulator. The entire cage handling process is automated.

automation in the process, and they set out a vision for the HawkeyePedershaab design team.

Automation & collaboration

"We asked them to do things they hadn't done before," Washabaugh said. The company had recently replaced three older mbk cage welding machines with a new mbk system. The goal was to seamlessly integrate the movement of the cages going into the HawkeyePedershaab system with the mbk system. It required programming the U.S.-based HawkeyePedershaab operating system with the German-based mbk. Afinitas is the exclusive representative of mbk in North America.

Jason Banwart, HawkeyePedershaab Director of Technical Sales, said his team was up for the challenge. "Northern came to us and said, 'we want a system where we don't have to touch the cage from the time it gets made until it is cast into the piece.' That was kind of their big request, and our initial concept to them was basically delivering the cage on a conveyer just in time, where it gets cast into the piece," Banwart said. "But they wanted to have some flexibility to have a



Pallet cart delivering the pallet and cage to the Mastermatic machine.



The automatic cage handling system saves labor and reduces safety risks from manually moving and lifting cages.



Offbearing device removing the pipe and placing it for transport to the kiln.

buffer zone, where if something paused in the machine production the mbk could keep running and producing cages. Or, if the mbk had to shut down, the machine could keep running and pull cages from that buffer zone. It was kind of that two-pronged request that drove the automation that we developed."

When it came to envisioning groundbreaking new technology for their plant, Washabaugh's long relationship with HawkeyePedershaab and their faith in their Grand Rapids managers gave them a level of confidence to push the envelope.

"We knew they could do it," Washabaugh said. "It was just a lot of meetings. Sitting down with their engineering staff and their installation staff and their salespeople. Because our people knew that machine as good as anybody. They knew it inside and out. We made a list of 'here's what we want,' and started going through each step, solving issues with each one, coordinating timing and finally coming to an agreement," he added.

"We absolutely wanted something better than what we had," LaMange said. "The overall style of the machine is the same as the Transmatic, but we were also looking at the additional function of reducing our spacer usage by having cage positioners. We wanted something to be able to take cages directly from the mbk and place them all the way through the Mastermatic to pipe production, and have it come out the other side.

Health & safety benefits

"The idea was to have it all automated," LaMange added. With a shortage of available labor, the goal was to reduce the manual workload for plant personnel and increase output. Increased automation also brings added health and safety benefits.

"Before we were manually moving cages and lifting cages, so you have a reduction in the possibility of injury," LaMange said. "This was all pre-pandemic so it wasn't an issue then, but it has made a big difference right now." Maintaining a workforce has been even more challenging for manufacturers during the pandemic.

"It's not without its hiccups on occasion, but working with HawkeyePedershaab, we're a good tag team," LaMange said. "Their programmers are able to go in and adjust things to our preferences." Instead of trying to find a print card for the old Transmatic, the programmers can remotely log in and make adjustments. "They're able to see how our machine is functioning on the other end," LaMange said. "They'll take our suggestions and make it work with their programs."

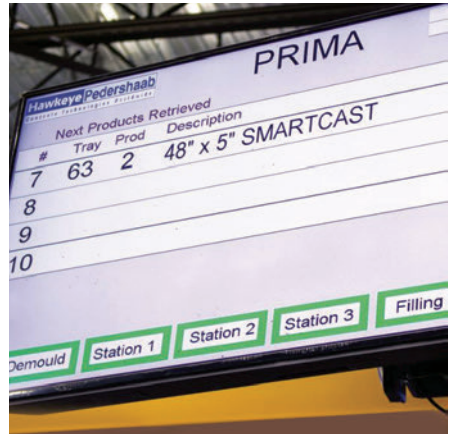
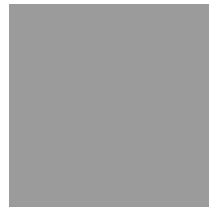


Latest control technology minimizes the amount of labor needed to operate the machine and allows technicians to log in remotely to make any adjustments needed.

HawkeyePedershaab

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Afinitas is a global, comprehensive and customer-oriented infrastructure equipment and services platform that brings together the expertise of HawkeyePedershaab, BFS, New Hampton Metal Fabrication, CAM Products and Spillman.

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The result of the new configuration is a pipe operation that can run with one operator to monitor all the processes and one off-bearing operator to make sure the cages keep moving in and the pipe keeps moving out.

"To me, the exciting part about this whole project was the collaboration between Afinitas and mbk and Northern," Banwart said. "We needed to be able to communicate with the mbk machine so we would know when they produce a cage and where they place it, and then our robot comes in and moves it to the buffer zone. Throughout the whole process we had a series of meetings with the Northern team where we would throw out a concept, they would come back with feedback, and we would go through another iteration and present it. This was definitely a request that pushed our limits and took our automation to the next level," he added.

If it's quality you want, there's nothing better than the pipes that emerge from the Mastermatic, Washabaugh said. "We knew we were going to make a step up in quality, and these pipes are just absolutely as good as you can make drycast concrete pipe. The compaction is consistent and uniform. We've had no quality issues whatsoever, and our daily output is not restricted by all the automation."

It's a cliché, LaMange said, but the difference in the operation at the Grand Rapids plant has been "night and day. It's just much smoother," he added. "You have far less physical labor. It's making a difference in our output. The guys are not having to work nearly as hard. You know, the old adage, 'work smarter not harder.' They're doing more now with their minds, controlling these machines and setting up programs versus having to do the physical labor of lifting cages and placing spacers."

Working smarter

With no end in sight to the labor shortage, the "work smarter" trend is something that Afinitas is seeing throughout the industry, said Derek Von Cannon, Afinitas Vice President of Sales for the Americas. It is one of the hallmarks of the company, which was formed from five iconic industry brands – HawkeyePedershaab, BFS, CAM Products, New Hampton Metal Fab and Spillman Co.

"As we put Afinitas together, we want to be a cutting-edge, value-added resource for our customers, where we sit down with them, and it's not like we're selling them on our products," Von Cannon said. "It's that we're analyzing as a partner. We're putting together a partnership with each one of our customers that's going to give them the best of what they want. It's the partnership and the value, and how, with our partners, we're going to take the industry to the next level."

For Bill Washabaugh, it all goes back to people. Northern Concrete Pipe is planning to replicate the success of this project with bigger and better upgrades at its plants in Clarkston (near Detroit) and Charlotte (near Lansing).

"I can't emphasize enough how important it was for our key people – our plant manager and our maintenance manager

– to be involved," Washabaugh said. "Their involvement with the design staff from HawkeyePedershaab is what made the project turn out as well as it did. Our two guys and their key people. We have a long history with Hawkeye, so we knew what they could do." ■

FURTHER INFORMATION



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Luxury apartments built with precast concrete in Dubai

الشقق الفاخرة المُشيّدة من الخرسانة الجاهزة في دبي

■ Curt Lindroth, Elematic, Finland

Grand Views in Meydan in Dubai is a residential experience beyond the ordinary. The state-of-the-art amenities incorporating community-based facilities make for a lifestyle that transcends even the extraordinary. Project vision came true with precast concrete method by using sandwich panels in precast concrete walls, and hollow-core slabs in floors. Total 475 units, 171 villas and 304 town houses, were finished in 18 months only from design to completion.

تمثل منطقة جراند فيوز السكنية في منطقة الميدان في دبي تجربة سكنية استثنائية. فقد بُنيت بها مرافق راحة حديثة تتضمن منشآت مجتمعية تناسب أسلوب الحياة الذي يتجاوز حتى الأساليب الاستثنائية. ويمكن أن تتحقق رؤية المشروع بفضل طريقة التشييد بالخرسانة الجاهزة باستخدام الألواح العازلة في الجدران الخرسانية سابقة الصب والبلاط مجوف المركز في الأرضيات. وشُيّدت كذلك 475 وحدة سكنية إجمالاً و 171 فيلا و 304 منزل بالمدينة في 18 شهرًا فقط بدءًا من التصميم حتى الإنجاز تمامًا.

How can acceptable housing units be built within a reasonable time frame, with a limited budget and at the same time provide a solid foundation for living and prosperity for the future homeowners and tenants? The question comes down to the choice of building method and building materials.

Why precast concrete construction was chosen for Grand Views?

- To save time and fasten the building process
 - o 171 villas and 304 town houses in 18 months from design to completion
 - o up to 1 villa and 2 townhouses per day

Grand Views in Meydan in Dubai is a residential experience beyond the ordinary.





■ Curt Lindroth, Area Sales Director, Elematic Oyj
 curt.lindroth@elematic.com

- Cost savings during construction
 - optimal use of raw materials
 - less finishing
- Cost savings in long term maintenance
 - durability
 - energy consumption
 - thermal comfort
- High quality
 - well known design principles
 - sound insulation
 - fire resistance
- To reduce manpower at site

BIM optimizes the construction process

Building Information Modelling (BIM) is used to outline the collaborative process for construction with 3D model information and intelligent data behind it. The work is transparent, and it is possible to monitor the project from design phase to the actual project. Model based process enhances collaboration and makes it possible to control the expenses. The process enables efficient creation and transfer of information.

Precast concrete optimizes materials, production, and quality

Precast concrete construction is a business choice. Prefabrication develops competencies and shortens construction time

of the building. Initial investment in planning and designing pays for itself in production and construction phase. With precast a larger area per gross floor area can be utilized for apartments. Column free interior space provides design freedom. Benefits of large open spans comes from flexibility, energy efficiency and shorter building time.

Precast is a cost-efficient choice. Precast concrete production can be suited to local conditions and resources. The use of precast concrete lowers total construction costs considerably and gives faster return of investment.

Sandwich wall panels insulate heat in the Grand Views

Sandwich wall panels is a dominating façade type in precast concrete buildings. The sandwich panels consist of two layers of concrete and a layer of rigid insulation between them. The outer layer can have several looks and patterns. In Grand Views, the façades are made using grey concrete and painted. Cooling is a major issue in the United Arab Emirates, where more about 50 percent of all produced energy is used to cool buildings. Government of Dubai requires a maximum U-value of 0.57 W/m²K watts per square meter and per Kelvin. This means big savings in cooling system investments in comparison with traditional building methods without insulation.

Sandwich wall elements have a special insulation layer that can dramatically reduce the energy consumption of a building. Choosing sandwich panels will lead to savings in the long run. The required thermal insulation will result in a payback period of 6 years in the United Arab Emirates thanks to the building’s lower operational costs.

Why and where to use hollow-core slabs?

The hollow-core slabs in Grand Views were automatically manufactured by extruder with high level of compaction. It made possible to achieve long floor span and low self-weight.

Total 475 units, 171 villas and 304 town houses, were finished in 18 months only from design to completion.



With precast a larger area per gross floor area can be utilized for apartments. Column free interior space provides design freedom.



Iranna S. Dongritot, Senior Projects Manager, United Precast Concrete Dubai, and Curt Lindroth, Area Sales Director, Elematic, discussing the ways in which precast concrete promoted fast completion of the project.

Benefits of hollow-core slabs

- reduced deflections
- fire rating
- sound insulation

When taking a walk in the Grand Views residential area, it is interesting to reflect how Dubai may continue to attract investors and residents in the future? What are the next efforts to consolidate resilience and set development milestones? Grand Views project certainly supports some possible points, for example citizenship, residency, and long-term competencies in an economically stable living environment. ■

FURTHER INFORMATION



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Prepared for great things with 72 m beam formwork and 20,000 kN prestressing force

مُجهز للأشياء الرائعة باستخدام قوالب صب عوارض 72 م وقوة إجهاد مُسبق تبلغ 20000 كيلو نيوتن

■ Mark Küppers, CPI worldwide, Germany

As a family-run construction company, Harsch has been assisting its customers with their construction projects for over 100 years. The experience in turnkey construction with fixed price and guaranteed completion date has made the group of companies what it is today: a reliable partner when it comes to industrial and commercial buildings as well as the production and assembly of precast concrete elements. With two precast concrete plants, Harsch can optimally plan production and logistics according to the customers' needs. The plant in Gondelsheim was recently extensively modernised. In addition to a spacious new production hall, the company invested in a 72 m hydraulic beam formwork system from Howal, among other things. The associated prestressing line equipment for up to 20,000 kN prestressing force was supplied by the Paul company.

تساعد شركة Harsch، بصفتها شركة إنشاءات تديرها العائلة، عملاتها في مشاريع البناء الخاصة بهم لأكثر من 100 عام. لقد جعلت الخبرة في مجال الإنشاءات المتكاملة بسعر ثابت وتاريخ إنجاز مضمون مجموعة الشركات على ما هي عليه اليوم: شريك موثوق عندما يتعلق الأمر بالمباني الصناعية والتجارية وكذلك إنتاج وتجميع عناصر الخرسانة الجاهزة. تمتلك شركة Harsch مصنعين للخرسانة الجاهزة، ومن ثم يمكنها التخطيط الأمثل للإنتاج والخدمات اللوجستية وفقًا لاحتياجات العملاء. وقد تم تحديث المصنع الكائن في مدينة Gondelsheim مؤخرًا على نطاق واسع. استثمرت الشركة في نظام صب الخرسانة الهيدروليكي بطول 72 مترًا من هوال، من بين أمور أخرى، بالإضافة إلى قاعة الإنتاج الجديدة الفسيحة. وقد قامت شركة Paul بتوفير معدات خط الإجهاد المسبق المرتبطة بقوة إجهاد مُسبق تصل إلى 20000 كيلو نيوتن.

The Harsch group develops individual special designs for its customers. This not only fulfils design requirements, but also shortens construction times and thus saves costs. Harsch takes over the planning up to the complete project development. The team of experts is available to its clients from the first draft to completion and beyond. The production of precast concrete elements, civil engineering, underground construction and road construction as well as the areas of supply and pipeline construction, ready-mixed concrete production, demolition and building materials recycling round off the extensive range of services.

As one of the largest medium-sized companies in the region, Harsch employs 500 motivated people.

Precast concrete elements are on the rise

The production of precast concrete elements has been gaining in importance at Harsch for several years. In the two precast plants in Gondelsheim and Lischma in Laupheim, precast concrete elements are produced under controlled conditions, independent of weather and other environmental influences. The precast concrete elements are mainly produced for customers and projects in the entire southern German region. Both precast concrete plants together offer over 30,000 m²



The new production hall with roofed-over outdoor area in Gondelsheim.

of production space and 20,000 m² of storage space, 5,500 m² of which is roofed over. This provides optimal storage conditions for the high-quality fair-faced concrete precast elements. Harsch manufactures up to 20,000 m² of fair-faced concrete façades per year.



72.00 m Howal Hystanplus type 220 beam formwork

The plants are certified and quality-controlled according to EN standards. The production and transport of components up to 100 t and walls up to 25.00 x 4.00 m are possible. The direct connection of both plants to federal roads has a favourable effect.

The annual production capacity is around 100,000 t. The precast elements are produced not only for the company's numerous own projects, but also on behalf of customers for third-party projects, using modern plant technology such as

the new hydraulic beam formwork from Howal and the prestressing equipment from Paul.

Hystanplus hydraulic beam formwork

Howal's 72.00 m Hystanplus Type 220 beam formwork, with a maximum crown or useful height of 2.20 m, can be divided into four 18.00 m sections. These can be moved individually or coupled together.

The base frame is equipped with vibration dampers and support bearings for external vibrators. The total width of the formwork when open is approx. 3.00 m, plus the working scaffold. Both side shields are hydraulically retractable (stroke on one side 1000 mm, on the other side 200 mm).

On each of the transfer tables there are telescopic stand lances that serve to suspend the top and bottom chord inserts. The top chord inserts are adjustable in height and inclination segment by segment by means of the telescopic lances. On the top chord inserts, there are transversely movable longitudinal shutter holders for wood covering by the customer for different top chord widths (max. top chord width 80 cm). The bottom chord inserts can be shifted by the thickness of the formwork skin by means of spacer plates, which enables fast conversion to T-cross-sections.

With the Hystanplus hydraulic beam formwork, parallel-chord I or T-beams or also gable roof beams with a maximum crown height of 2.20 m can be produced. The maximum top chord

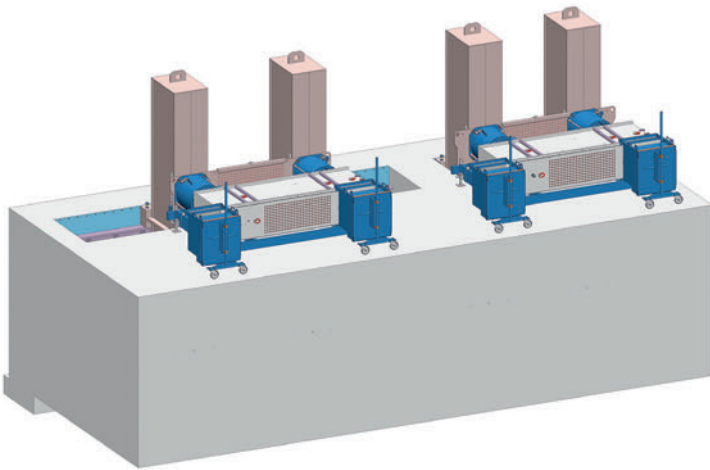
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Harsch is prepared for great things with robust prestressing line equipment for the production of particularly heavy components and a prestressing force of up to 20,000 kN.



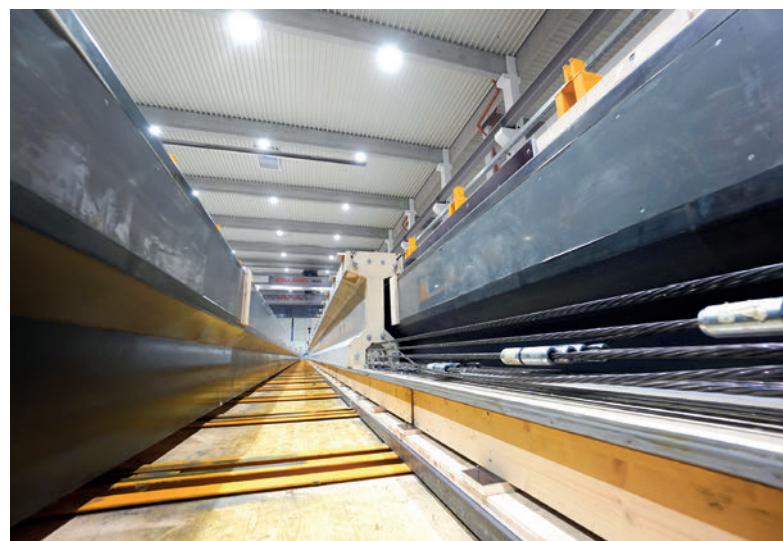
width is 800 mm, the standard bottom chord width is 400 mm (with a web thickness of 150 mm). Otherwise, the web thickness can be selected variably. The beam formwork can also be used to produce rectangular cross-sections up to a width of approx. 1200 mm.

Prestressing line equipment from Paul

Harsch is prepared for great things with robust prestressing line equipment for the production of particularly heavy components and a prestressing force of up to 20,000 kN. With a hole pattern of 50 mm with 12 x 30 holes in the transverse anchor plate, large forces can be clamped with equally large flexibility in the clamping pattern.

High quality with low wear on the formwork is ensured by the double-sided tension release, which also minimises slippage in the formwork.

The release unit presented at the bauma 2019 can extend the cylinders by a factor of 2.5 faster without load, which is particularly noticeable with the very large cylinders of almost 60 litres. The new development with two-stage delivery rate shows its full potential with this oil volume: the extension at low pressure (up to 50 bar) takes place at 16.5 l/min. During the actual release, the short stroke to remove the support shell, with 4.2 l/min at high pressure (up to 450 bar).



Howal's 72.00 m Hystanplus Type 220 beam formwork, with a maximum crown or useful height of 2.20 m, can be divided into four 18.00 m sections.



With the Hystanplus hydraulic beam formwork, parallel-chord I or T-beams or also gable roof beams with a maximum crown height of 2.20 m can be produced.

The protective boxes on castors suspended from the transverse anchor plate make work easier and provide additional protection for the employees. They can be pushed to the side for the installation of the strands and anchorages or for prestressing. They are then placed behind the strands again and play their part in protecting against the consequences of any prestressing steel breakage.

However, so that not only the big demands are covered, the line can be converted by means of relocatable and bolted abutment anchor posts. Then precast elements can be produced and prestressed on two smaller lines with twice the capacity instead of on one 20,000 kN line.

Technical data:

- Prestressing force: 20,000 kN
- Support length: 2,650 mm
- Transverse anchor plates with 12 rows of 30 holes in 50 mm grid
- Guards movable on both sides, easy access for prestressing
- 4 detensioning cylinders each with 10,000 kN; diameter 710 mm, weight 2,135 kg, oil volume 59.6 l each.



The Primus tandem tilting table can be decoupled if necessary so that two individual tables can then be used.

Primus tandem tilting table

Howal's entire scope of supply for the new production hall in the Gondelsheim plant included a Primus tandem tilting table, 4.5 m x 26 m, in addition to the hydraulic beam formwork. This can be decoupled if required, so that two individual tables can then be used. Primus tilt tables are characterised by homogeneous compaction. This is achieved by the design with a very torsion-resistant central tube and cantilever arms that taper outwards. ■

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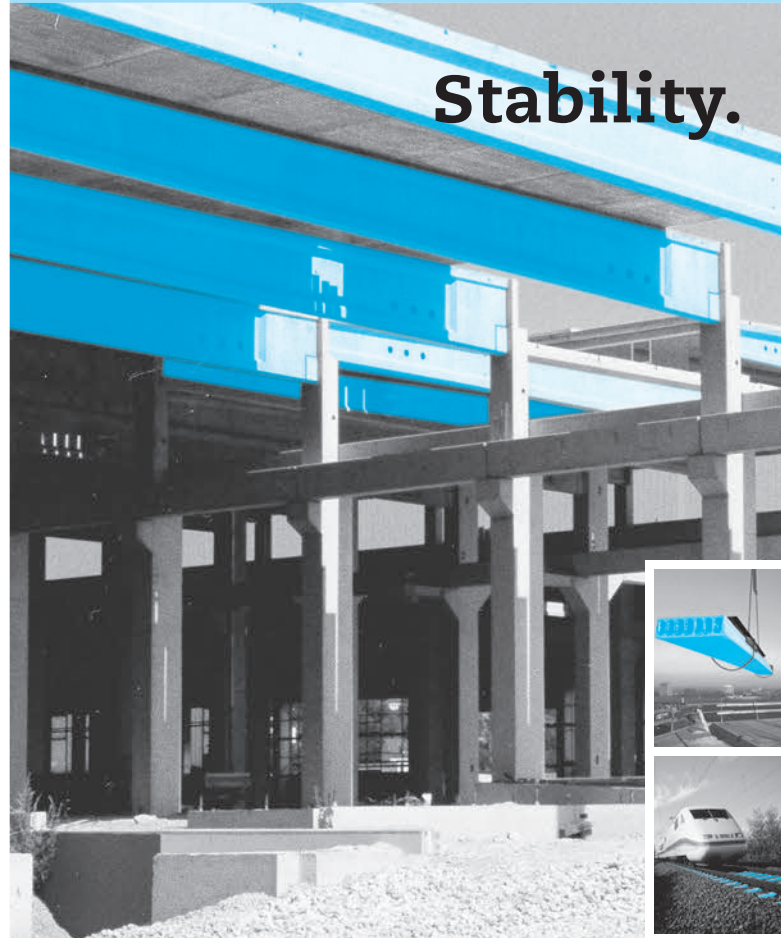
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Full range of state of the art moulds for precast retaining walls

مجموعة كاملة من أحدث القوالب للجدران الساندة الجاهزة

Construx is one of Europe's leading mould manufacturers and has developed over time a vast portfolio of moulds that suit precast manufacturers' needs. In close collaboration with the customer Construx tries to find the most appropriate mould which is in accordance with all technical specifications, which fits the customers' budget and which copes with the dimensions and numbers of precast elements the customer wants to cast. For companies supplying precast elements for agricultural use, Construx conceived over the years a full range of state of the art retaining wall moulds. The precast retaining wall units are ideal for forming both retaining and containing structures, not only in agricultural, but also in commercial, residential, industrial and waste developments.

تعد Construx إحدى الشركات المُصنعة الرائدة للقوالب في أوروبا وقد طورت بمرور الوقت مجموعة واسعة من القوالب التي تناسب احتياجات الشركات المُصنعة للقوالب الجاهزة. وبالتعاون الوثيق مع العميل، تحاول Construx العثور على القوالب الأنسب والتي تتوافق مع جميع المواصفات الفنية، والتي تناسب ميزانية العملاء وتتوافق مع أبعاد وأعداد العناصر الجاهزة التي يريد العميل صيها. بالنسبة للشركات التي تورد عناصر جاهزة مسبقة الصب للاستخدام الزراعي، فقد ابتكرت شركة Construx على مر السنين مجموعة كاملة من أحدث قوالب الجدران الساندة. وتعتبر وحدات الجدران الساندة الجاهزة مثالية لتشكيل كل من الهياكل الساندة والمحتوية، ليس فقط في مجال الزراعة، ولكن أيضًا في مشاريع التطوير التجارية، والسكنية، والصناعية والنفايات.

Retaining wall units are an ideal product where the speed of installation is important. They offer a fast and cost-effective solution for constructing retaining developments. Typical shapes are L, U, T and A. In this article we focus on the L-shaped retaining walls which is the most common type. These elements can have several features: straight or tapered

walls, straight sides or sides with tongue and groove, chamfers where needed, etc. There are three ways of manufacturing retaining walls: side-cast, cast 90° turned (bottom leg cast vertical) or cast upside-down.

Different retaining wall mould types: advantages and disadvantages

Side-cast

Typical one element, one mould combination. With these moulds it is difficult to combine multiple elements in one mould. It is also not easy to apply tongue and groove in these moulds. The mould itself is very straightforward and can be low-cost and easily equipped with chamfers all around. This mould is typically applied for short elements of 1 m or 1,5 m in length. Where multiple moulds are required, they can be quite space-consuming compared to the other mould types. The major advantage is that they can be transported as they are cast, so no turning is needed.

Cast 90° turned (bottom leg cast vertical)

A typical mould for this type of casting looks like a table with a fixed vertical side. A second vertical side is used as a counter form. There is always easy access to the mould and to the concrete. The biggest disadvantage of these moulds is that self-compacting concrete cannot be used and that casting



Fig. 1: Precast retaining wall elements

PRECAST CONCRETE ELEMENTS

with regular concrete must be carried out with great care. One inside face of the retaining wall has no fair-faced finish. If the edges of the retaining walls can be made tapered, an easy and quick demoulding of multiple elements is possible.

Cast upside-down

These are typical multiple-element moulds. All surfaces are fair-faced except from the base, which is never apparent. Chamfers can be applied in almost all edges and tongue and groove or other side features can easily be implemented. Between demoulding and putting the elements in the stockyard, a turning operation must be applied. There are several solutions possible to do so (mechanical or vacuum lifting combined with a turning device ...) or as a high-end solution the complete mould can be turned and demoulded in one single action. The length of the elements can easily be adapted, and simple solutions can be found to adjust the height.

Typical mould combinations

Depending on the different types of elements needed and the frequency they must be cast, or depending on the flexibility in production, Construx can make the moulds multi-purpose. Moulds which can make all types of elements do not exist, although, Construx is the ideal partner to come close to such a combined solution. Depending on the type of mould and the shape of the elements, following combinations are suitable:

- Variation in length of the elements
- Variation in height of the elements
- Variation in thickness of the walls

To make the mould suitable for these variations, it may be necessary to have extra accessories such as stop-ends, height adjusters, different bases, etc., to complete the basic mould setup. Even in combination with a fully automated mould, this remains a suitable solution.



Fig. 2: Series of different types of retaining wall moulds



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Fig. 3: Manually movable and adjustable retaining wall mould

Possible mould automation

A basic mould setup consists of a fully mechanically closed and secured mould:

- All bolts are round threaded so they cannot be worn down by the concrete
- If the use of bolts is to be avoided, a fast-securing mechanical clamping system is appropriate
- To go all the way, Construx provides solutions where all closing and securing is fully hydraulic

Most customers want to have the crane-time brought back to a minimum for opening and closing the moulds:

- If the locking and securing is done hydraulically, opening and closing the mould is a fast and easy job
- Side-forms can be made hingeable or can be mounted on wheels

- If on wheels, the side-forms can be rolled backwards manually
- When required, the moving of the side-forms can be executed hydraulically
- An intermediate solution is the use of a chain-drive with gearbox
- Stop-ends can be moved by hand, by crane or by using a mechanical push-pull system
- In a fully automated setup, these stop-ends can be moved hydraulically or they be made hydraulically shrinkable

Some customers may want extra automated processes in order to speed up the demoulding of the retaining wall elements. Construx can provide a multiple fully hydraulic mould, that can be turned by means of a turning device, so after turning and opening the mould all concrete parts will sit on a carrier or on a pallet. It only takes a minute to unlock and demould the complete setup and the mould will immediately be ready for the next pour.

The “mother of all retaining wall moulds”

Construx recently supplied a fully hydraulic quadruple mould for manufacturing 2 m long L- or inverted T-shaped retaining walls. The height can be set at 3,740 mm or 4,240 mm and the length of both foot and heel is steplessly adjustable. The mould is designed as a cross with four individual moulds (one in each quarter) and incorporated working platforms, with an access ladder, in the middle and on the entire perimeter of the mould. Each individual mould has a fixed part (panel and side-form connected), one articulating and movable panel and one articulating side-form. Each articulating and movable panel is connected to its twin mould articulating and movable panel, and each articulating side-form is connected to its twin mould articulating side-form.



Fig. 4: Fully hydraulic mould with stainless steel sheeting

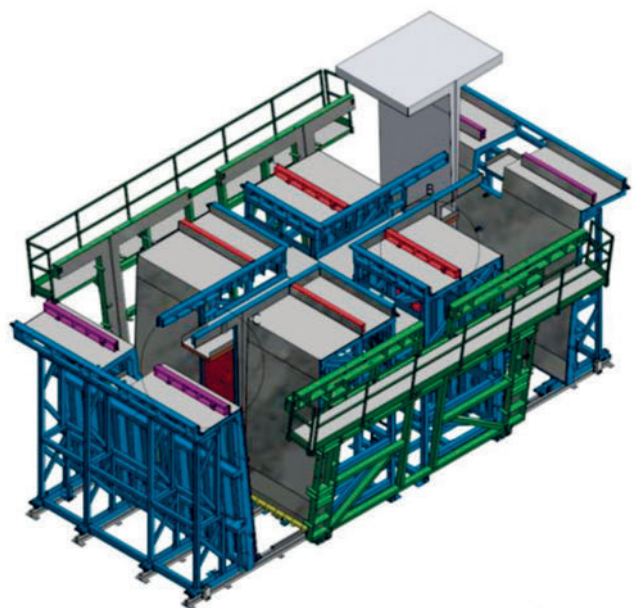


Fig. 5: Design of a fully hydraulic quadruple mould



Fig. 6: Fully hydraulic quadruple mould with stainless steel sheeting

All movements are fully hydraulic:

- Opening and closing the articulating outside panels
- Moving the articulating outside panels back and front
- Locking and securing the articulating and movable outside panels with wedges
- Opening and closing the articulating side-forms
- Locking and securing the articulating side-forms with wedges

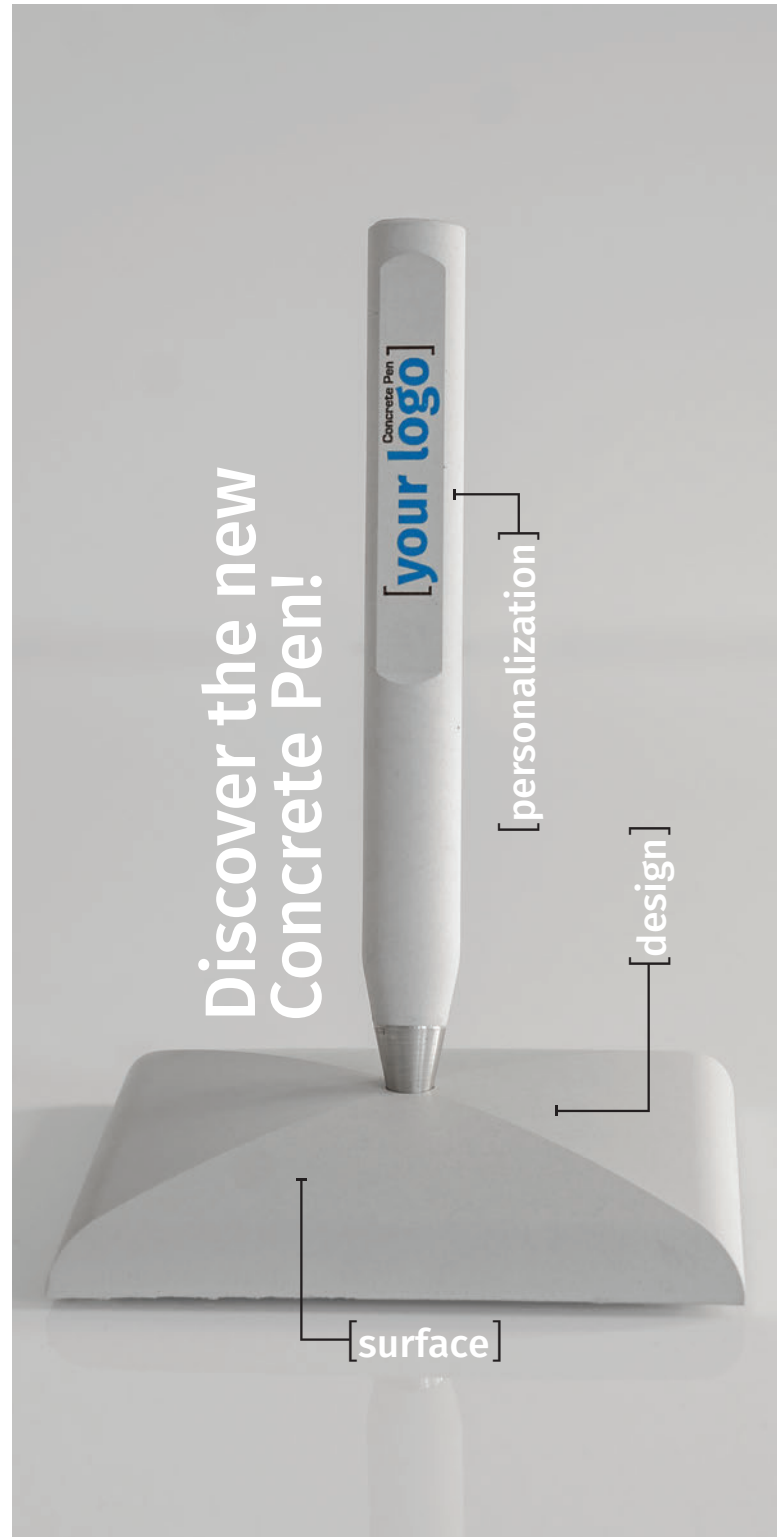
The wall as well as the foot and the heel are tapered, the sides have a groove/groove finish, all corners have triangular chamfers, and the top of the element has a 20 mm rounding. The complete mould is sheeted with stainless steel providing a perfectly smooth and fair-faced finish of the precast elements and an easy cleaning of the mould. A perfectly fitting insert serves to reduce the height from 4,240 mm to 3,740 mm and the position of all stop-ends, for foot and heel, can be steplessly adjusted. Its robustness, versatility, adjustability and its top stainless steel finish, make this mould so to speak the “mother of all retaining wall moulds”.

Construx meets the requirements of every customer individually, in order to obtain a multifunctional and flexible solution to manufacture their retaining wall elements. The outcome of achieving such an objective is always a satisfied customer.

FURTHER INFORMATION



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Prebet "doubles" number of production lines for pre-stressed beams in Romania

شركة Prebet تضاعف عدد خطوط إنتاج العوارض سابقة الإجهاد في رومانيا

After having entrusted Bianchi Casseforme s.r.l. for the first time in 2016 with the supply of a production line for pre-stressed concrete beams, Prebet, the Romanian manufacturer of "I" beams for viaducts and bridges as well as of other precast concrete elements, decided to partner with the leading Italian manufacturer of plant equipment once more in 2020 - this time for the supply of a second prestressing line for 82 m long beams.

بعد تكليف شركة Bianchi Casseforme s.r.l. لأول مرة في عام 2016 بتوفير خط إنتاج للعوارض الخرسانية سابقة الإجهاد، قررت شركة Prebet، الشركة الرومانية المصنعة للعوارض "I" للكباري والجسور بالإضافة إلى عناصر الخرسانة الجاهزة الأخرى، الشراكة مع الشركة الإيطالية الرائدة المصنعة لمعدات المصانع مرة أخرى في عام 2020 - هذه المرة لتزويد خط الإجهاد السابق الثاني لعوارض بطول 82 مترًا.

S.C. PREBET AIUD S.A. is a leading manufacturer of a complete range of reinforced concrete and prefabricated concrete elements for viaducts, railways, and culverts, located in Romania. The use of state-of-the-art technologies and equipment allows the company to meet the highest quality standards.

The company started off in 1904 as a manufacturer of wooden elements for the railway sector - in fact the current precast plant was built on the site of the former production facility for wooden sleepers. Between 1904 and 1950 no major changes or investments in the plant or its production capacity were made. In 1951 the company, which was then part of the State Department of Railways and Transport of Romania, took over the production of wooden sleepers, telecommunication/telegraph poles and poles for power lines. In 1973 it acquired

and began to use equipment and technology for the in-line production of concrete sleepers as well as prestressed pre-fabricated concrete elements, like e.g. roof beams and walkways.

Today, the plant produces prefabricated concrete elements, covering the demand for concrete sleepers for railway sub-structures in the cities of Cluj, Timisoara, Brasov, Lasi and in parts of Galati, as well as for structural elements for the construction of highways for "The Highway National Administration and The Bridges and Roads District Administration." The main objective of the company is to produce and market pre-stressed sleepers for railway construction as well as structural precast concrete elements. The private capital company S.C. Prebet is based in Aiud, a city located about 70 km south of Cluj.



View of the fixed abutment



Preparation for the first pouring process



Closed mould



Side mould lifted and demoulded first concrete element

Second prestressing line for the manufacture of beams

During the second half of 2016 S.C. Prebet Aiud S.A. decided to invest in new technology for the production of bridge beams and “I” viaducts, of three varying height levels, from 1.4 to 1.8 m and with varying lengths between 24 and 40 m. The partner chosen for the realization of the entire project

was Bianchi Casseforme s.r.l., an Italian family-run company, active since 1964 and today all over the world with a wide range of services and products for precast concrete producers.

In June 2020 Prebet Aiud decided to double its production of beams. Again, the Romanian company chose Bianchi Casseforme s.r.l. as its partner for the realization of the new line for the manufacture of pre-stressed beams, this time with a man-

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First element lifted from mould



Lifting of the side mould

ual chassis, 700 ton stressing heads and I-beam side moulds. Bianchi's head office is located in Italy, in Fornovo di Taro (Parma), with four branches in France (Bianchi France S.a.r.l), Spain (Bianchi Casseforme Iberica S.L.), India (Bianchi Casseforme India Pvt. Ltd.), and Brazil (Bianchi Formas and Tecnologia para Pré-Moldados Ltda.).

Bianchi Casseforme follows a Certified Quality Management System in accordance with UNI EN ISO 9001:2008 and is represented in Romania by Gabor Concrete.

Thanks to the experience and know-how acquired through the decades of the company's history, Bianchi Casseforme is the ideal partner for the creation of production solutions tailored to the needs of each individual customer. Creating modern, highly customized, and flexible technological solutions to guarantee economic efficiency and ease of use in an evolving market, respecting the particular needs of its customers, is the challenge that accompanies the company every day.

Bianchi Casseforme also supplied all necessary equipment for this new prestressing line.

The pre-compression line rests on a manual base frame with a length of 82 m, consisting of transverse steel beams with anti-vibration pads, special articulated removable blocking devices to close the side moulds during casting operations, placed on the frame and finned pipes for accelerated curing. The soffit provided is designed to produce elements 45 to 48 cm wide and it is complete with PVC gasket and 15 x 15 mm steel chamfer. The steel plate, that is in contact with the concrete, is 6 mm thick, it is reinforced by a frame consisting of other bent steel sheets and structural profiles.

Modular side moulds with a maximum length of 82 m

The "I" prestressed beam is obtained with the help of a pair of modular side moulds with a maximum length of 82 m each. Again, each modular side mould consists of several elements: six elements with a length of 12 m each and one element with a length of 10 m. The "I" beams have a height of 95 cm. Manual hydraulic pumps allow for the movement of the side

moulds when removal is required. The Italian manufacturer of machinery also supplied the vibration plant which consists of 34 electric vibrators Bianchi type VFC 2000 0-100 Hz 42 V, with a power of 1,700 W, a maximum centrifugal force of 2,000 kg, and with voltage converter (input frequency 400V-50Hz output 42V 0-100Hz). 164 m of modular inserts were also supplied to increase the height of the side moulds and thus be able to produce elements with a maximum height of 105 cm. The stressing abutments have a capacity of 700 tonnes, with their centre of gravity located about 75 cm above ground level. They consist of two sets of columns placed into holes in the existing production floor, two sets of predrilled cross beams to support the strands as well as two relaxation cylinders with a capacity of 50 tonnes and 400 mm of travel plus two relaxation cylinders with a capacity of 350 tonnes and 400 mm of travel. Also supplied were a hydraulic mechanism for the removal of the collars on the relaxation cylinders and the complete hydraulic system to control cylinders, including valves and oil pipes. ■

FURTHER INFORMATION



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Mobile mega plant for road and bridge construction in Romania

مصنع ضخم متنقل لتشييد الطرق والجسور في رومانيا

One of the top priorities of the European Union is the improve the road infrastructure within its borders so all member states will be connected by high capacity highways which comply with the most demanding safety norms. Within this context Romania is one of the beneficiaries of new roads amongst which a new ring road around the city of Bacau in eastern Romania. The work is being carried out by the company Spedition UMB while the client is the National Company for the Administration of Road Infrastructure (CNAIR).

من أهم أولويات الاتحاد الأوروبي تحسين البنية التحتية للطرق داخل حدوده بحيث يتم ربط جميع الدول الأعضاء بالطرق السريعة عالية السعة التي تتوافق مع معايير السلامة الأكثر تطلبًا. ضمن هذا السياق، تعد رومانيا أحد المستفيدين من الطرق الجديدة من بينها الطريق الدائري الجديد حول مدينة باكو في شرق رومانيا. يتم تنفيذ العمل من قبل شركة Spedition UMB بينما العميل هو الشركة الوطنية لإدارة البنية التحتية للطرق (CNAIR).

UMB is a family enterprise led by Mr. Umbrescu and is a leading construction company. This well consolidated company has an exceptional capacity as far as human and production equipment is concerned. This allows the company to embark in large construction projects amongst which are 30km of the Transylvanian highway between Nadaselu and Zimbor, the last 2 segments of the highway between Craiova and Pitesti and the upgrading of the road in the county of Vrancea.



The founder of the companies Technostrade and UMB, Mr. Doriel Umbaescu and the executive director of Moldtech, Mr. Angels Cejudo, after signing of the contract

Project scope

Upon conclusion of the contract UMB demanded maximum quality and very short delivery times which supposed an unprecedented challenge to the Moldtech production and installation teams in the area of engineering and project management.

meaningful illustration of the mere size of the project was the fact that within a short time span a total of 120 truckloads of material had to be transported from the Moldtech factory in Spain to the client's premises in Romania.

For a correct project definition, Moldtech, in close collaboration with its local agent First Technology carried a detailed

The equipment concerns a mobile plant with capacity to manufacture large span bridges using 4 hydraulic moulds, each with a length of 125 meters, as well as additional equipment for the production of the so-called bridge superstructure.



study of all the project requirements. This study included all the required precast element be produced but also aspects local the local climate, the labor force skills level and most particularly the need to produce at different locations. This last factor supposed an important advantage for UMB taking into account the high transport costs of large span elements in Romania.

With regards to the design of the moulds it was foreseen to make a modular system and self-stressing system. This way the costs of civil works to install the 1500 TN pre-stressing heads could be minimized. Furthermore, the hydraulics incorporated into the mould allow to carry out the opening and closing movement quickly contributing to an efficient operation of the mould.

Bridge construction for the Bacau ring road



Transport of a bridge girder



Mould with hydraulic opening



Height adjustment of the mould



Tilting table for the production of sound walls

The final result was an innovative proposal in which, probably for the first time in the history of precast in Romania, a mobile plant was constructed with the exceptional capacity of a daily pour of 1.100 m³.

Once the production phase in Bacau area was completed all the equipment was moved to Craiova for the second phase which involved 400 pre-stressed bridge girders and the additional elements like deck slabs, parapets, diaphragm etc...

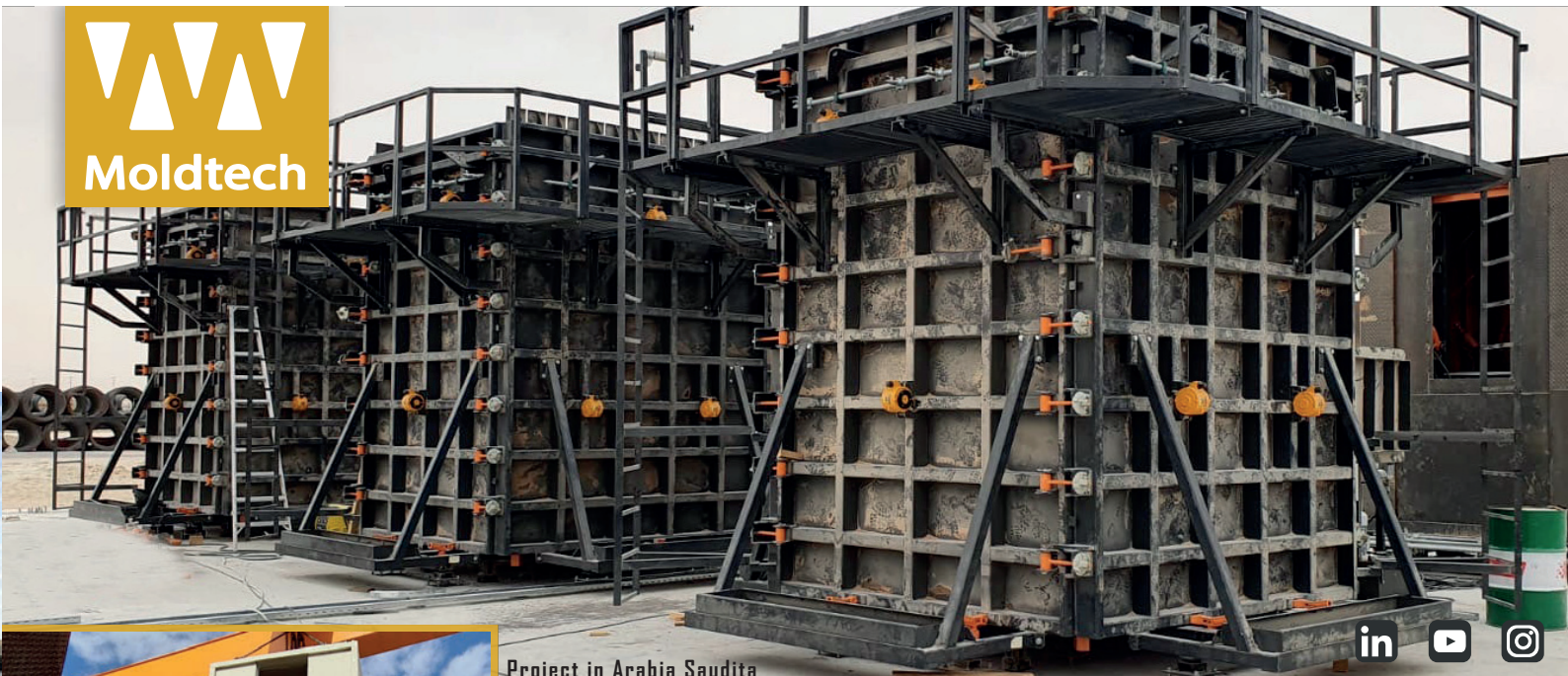
Technical characteristics

For the construction of the highway bridges a wide variety of precast elements are required. Moldtech supplied equipment for the manufacturing of:

- **Prestressed bridge girders**
Ranging in heights from 1 meter up to 2.4 meters height and with a total pre-stress force of a minimum of 400 MT and a maximum of 1500 MT. These "I" type girders have a width of 700mm at the bottom and can have a width up to 1200mm at the top.
- **Pre-cast deck slabs**
Typically, pre-stressed half-slabs of a width of 2.4 meters which are supported by the girders and are completed by pouring a fresh layer of concrete on top.

- **Diaphragms**
So-called secondary structural elements which provide the connection between the different bridge segments. The pre-casted diaphragm is placed transversally between the bridge segments. This element has a shuttering function when in a second phase concrete is poured to make a union between the pre-slabs and bridge girders, at the same time establishing a joint between 2 bridge segments.
- **Sound walls**
Panels installed alongside the highway in order to reduce the acoustic impact on the environment.
- **Parapets**
Safety elements
- **Box culverts**
Used for creating the necessary infrastructure for water evacuation; the sizes of these box culverts are calculated in accordance to the predicted water volume.

The first part of supply consisted of setting up 4 casting beds with a length of 125 meters each for the production of bridge girders. These are moulds with a hydraulic opening and closing system and where the mould sides are made up of insertable sections allowing the casting of different girder



Project in Arabia Saudita



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MT20 dry cast box culvert machine

heights, in this case up to 2.4 meters. In order to keep the amount of civil works for the installation of the bed to a minimum it was chosen to use a self-stressing mould where the pre-stress forces are absorbed by stressing beams running parallel on both sides of the casting bed. The whole stressing equipment was designed to withstand a stressing force up to 1500 Tn. The so-called active stressing head incorporates the corresponding slackening cylinders to de-tension the strands before cutting them.

The supply also included other accessories such as tension jacks, strand pushing machine, hydraulic tension and de-tensioning units etc..

Despite the weather conditions associated to Romanian winter, it was decided that the equipment would be placed out in the open air so all the moulds had to be prepared for this challenge. Moldtech therefore designed a special containerized boiler system which design includes a 2x800 kW per hour water heater capable of delivering hot water to the casting beds which were equipped with a closed circuit of finned hot water pipes. Another common feature of the moulds was a vibration system to assure an optimum compacting of the concrete.



Boiler equipment with capacity of 2 x 800kW per hour in containers



Active self-stressing head for 1500 Tn of pre-stress

For a swift process of filling the moulds Moldtech supplied several Giraffe concrete transport and distribution vehicles with a capacity of 4m³ and which can pour directly into the different moulds including the 2.2 meters high girder mould.

For the production of the deck slabs Moldtech supplied 2 self-stressing fixed tables of 2.4 x 30 meters and pre-tress force up to 200 Tn. The typical deck slab has a thickness of 50mm which once placed in its final position at site is completed by pouring a compression layer of fresh concrete on top thereby making wet joints between the slabs and the girders.

With regards to the diaphragm moulds the Moldtech technical team had to face the challenge to provide a versatile solution which had to be effective for a girder range starting with a height of 600mm up to a height of 2200mm so the client could make all diaphragm sizes using the same equipment. Moldtech delivered a total of 8 mechanical moulds.

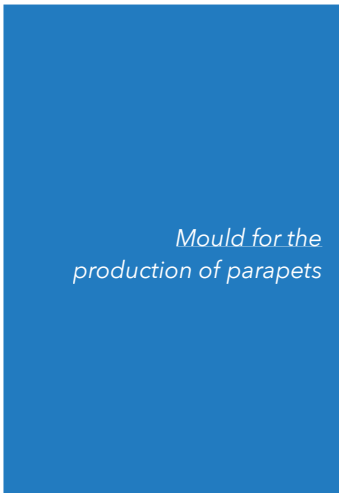
The sound walls had a special "toothed profile" in order to maximize its function for noise reduction so Moldtech had to incorporate this profile into the surface of the tilting table on which the panels were casted. To comply with the production



Pouring of the concrete into the mould using Giraffe vehicle



Fixed table for the production of half slabs



Mould for the production of parapets

requirements Moldtech supplied a total of 2 tilting tables with size of 2.5 x 48 meters with its corresponding collapsible top shutter to facilitate a smooth panel release.

The parapets were produced in 8 mechanical moulds each with a length of 12.5 meters custom built in accordance to the specifications of the Romanian road authority.

Lastly the supply included one of the well-known MT 20 dry cast box culvert machines which Moldtech has been selling since more than 10 years. This dry cast machine makes it possible to produce 10 box culverts in one shift thanks to its vibro-pressing system. As the mould has a modular set-up it can produce a wide variety of box culverts dimensions in this case ranging from 1.5 x 1.5 to 3 x 4 meters with a length of 2 meters. The equipment also features an electric vibration system where frequency and duration are controlled from a frequency converter placed on a trolley.

The MT20 does not require any special foundation or anchoring arrangement so can easily be moved from one building site to the next. To complete the scope of supply Moldtech also delivered a 90° turner so the casted box culvert could be turned safely and quickly.

With this mega project Moldtech strengthens its position as a manufacturer of equipment for precast bridge elements. Thanks to the technical knowledge, its qualified workforce and the narrow collaboration with its client, Moldtech was

able to complete this project in a short time meeting its requirements and in a short time span. ■

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Hormipresa counts on beam moulds made in Italy

شركة Hormipresa تعتمد على قوالب الحوامل المُصنَّعة في إيطاليا

Hormipresa is a leading company when it comes to industrially prefabricating precast concrete elements for residential and industrial construction work. The company, founded in 1972 with its headquarters in Tarragona, can supply its customers in Spain and France with a wide range of high-class products. It has become specialised over the course of time mainly in manufacturing beams, pillars and walls. Its prefabricated buildings possess numerous certifications of quality. Including subsidiaries in different regions of Spain, the company has a total of more than 150 specialised technical employees.

تعد Hormipresa شركة رائدة عندما يتعلق الأمر بعناصر الخرسانة الجاهزة الصناعية لأعمال البناء السكنية والصناعية. يُمكن للشركة، التي تأسست عام 1972 ويقع مقرها في تاراغونا، تزويد عملائها في إسبانيا وفرنسا بمجموعة واسعة من المنتجات عالية الجودة. وقد أصبحت الشركة متخصصة على مدار الوقت بشكل رئيسي في تصنيع الكمرات، والأعمدة والجدران. وتمتلك مبانيها الجاهزة العديد من شهادات الجودة. وتمتلك الشركة ما مجموعه أكثر من 150 موظفًا تقنيًا متخصصًا بما في ذلك الموظفين في الشركات التابعة لها في مناطق مختلفة من إسبانيا.



The automated, highly flexible mould for manufacturing beams was designed especially for Hormipresa



Removing a concreted beam from the variable mould with individually adjustable sections



The company produces beams with a total length of up to 63 m

Hormipresa recently once again decided on working together with Tecnom, its partner of many years, in expanding the production facility in Tarragona. Tecnom, a Progress Group company, specialises in systems for prefabrication in the precast concrete element industry and has more than forty years' experience in designing and manufacturing moulds.

The Hormipresa production site in Catalonia is set up primarily for manufacturing elements for large prefabricated industrial buildings. The company was aiming to invest in a highly flexible, automated system, with which beams of varying sizes could be manufactured. In this specific case, it involved a mould of impressive size with individually adjustable sections along a total length of 63 m. This special mould provides an ideal solution to satisfy the demanding requirements of a leading company like Hormipresa. It will permit the company to continue producing precast concrete elements for numerous industrial and residential buildings in the best possible way in the future as well.

"Many of our systems have been developed by Tecnom," notes Ramon Mullerat, purchasing manager at Hormipresa. "For us, Tecnom, with its experience and expertise, embodies our vision of industrial reality." The driving factor behind the decision for investment was the need to maintain

competitiveness in a market demanding increasingly more rapid production times. "We have limited production areas but have to manufacture large quantities of different sized products in order to keep up with our competitors. They often have several production sites and a great number of machines available," emphasises Ramon Mullerat. Tecnom technology provides a fitting solution in this case: an automatic mould, in which beams can be manufactured very rapidly in different sections, thereby generating optimum production times.

Hormipresa products offer very great load-bearing capacities coupled with impressive span widths. The company is satisfied with the current market situation and is ready to face future challenges. "Based on current orders, we are working at 75% of our potential in this year but the signs are good that we can reach 100% in the near future. An important building block in this process is the positive cooperation with our reliable partner, Tecnom. They are supporting Hormipresa with their experience in constructing individually customised machines to create the most efficient production processes possible." The high number of incoming orders and ongoing customer satisfaction underscore the good sense behind this investment and are the basis for a continued successful partnership. ■



View of the Hormipresa company premises in Tarragona

FURTHER INFORMATION



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Third project in a row: further formwork solution for system manufacturer of transformer substations

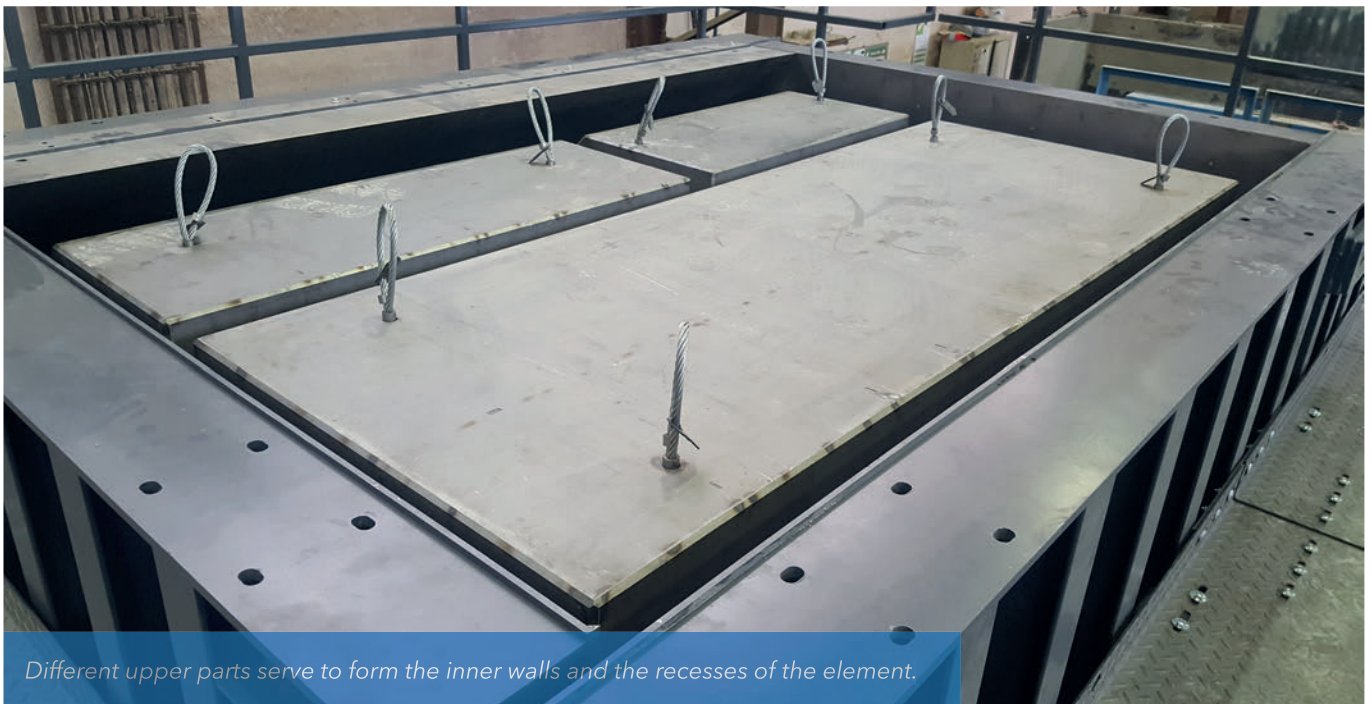
المشروع الثالث على التوالي: حل صب خرسانة إضافي لمُصنّع أنظمة محطات المحولات الفرعية

The trend towards electric mobility holds further growth potential for the precast concrete sector. The necessary expansion of the grid infrastructure results in an increasing demand for transformers to convert the supplied medium voltage into low voltage that can be used by end consumers and industry. In Germany, a significant proportion of transformer stations, unless installed in buildings, is realized as a precast concrete station. For a variant of these transformer stations, the non-accessible compact substation, RATEC developed a formwork solution initiated by customer requirements several years ago.

يحقّق الاتجاه نحو الحركة الكهربائية مزيدًا من فرص النمو لقطاع الخرسانة الجاهزة. ويؤدي التوسع الضروري في البنية التحتية للشبكة إلى زيادة الطلب على المحولات لتحويل الجهد المتوسط المزود إلى جهد منخفض يمكن للمستهلكين النهائيين استخدامه ويمكن استخدامه في مجال الصناعة. ففي ألمانيا، يتم تحقيق نسبة كبيرة من محطات المحولات، ما لم تكن مركبة في المباني، كمحطة خرسانية جاهزة. بالنسبة لمجموعة متنوعة من محطات المحولات هذه، المحطة الفرعية المدمجة التي لا يمكن الوصول إليها، فقد طورت RATEC حل صب خرسانة بدأته بناء على متطلبات العملاء منذ عدة سنوات.

In 2018, Ratec delivered the newly developed formwork for the first time to a plant of German utility and transformer station producer Scheidt GmbH & Co. KG. The following year, Ratec was awarded a follow-up contract to supply another site with its formwork. Finally, a third formwork has been installed in the summer of 2020.

„We are delighted that we have been able to build on the two previous successful projects,” says Joerg Reymann, Managing Director of Ratec GmbH. After 2018 and 2019, this is the third collaboration between Scheidt and the Hockenheim-based formwork specialist: With this project, it has been possible to roll out Ratec’s highly variable formwork solution for the construction of transformer stations at all Scheidt locations throughout Germany.



Different upper parts serve to form the inner walls and the recesses of the element.

Highly variable formwork for a wide range of station types

The customer's initial objective was to modernize its existing production and replace the old formwork, and in that course increase flexibility and accelerate set-up times of the formwork.

Therefore, the design of the new formwork had to be extremely variable and allow the customer to produce two transformer station sizes with a single formwork while at the same time also covering different design variations. Ratec developed the requested formwork in modular design, which can cover a large number of the different design variations for two types of stations.

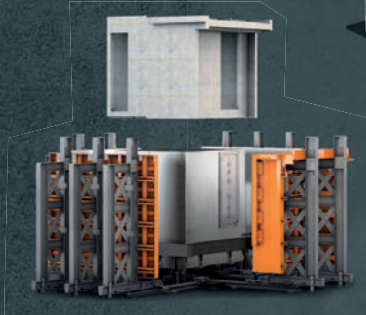
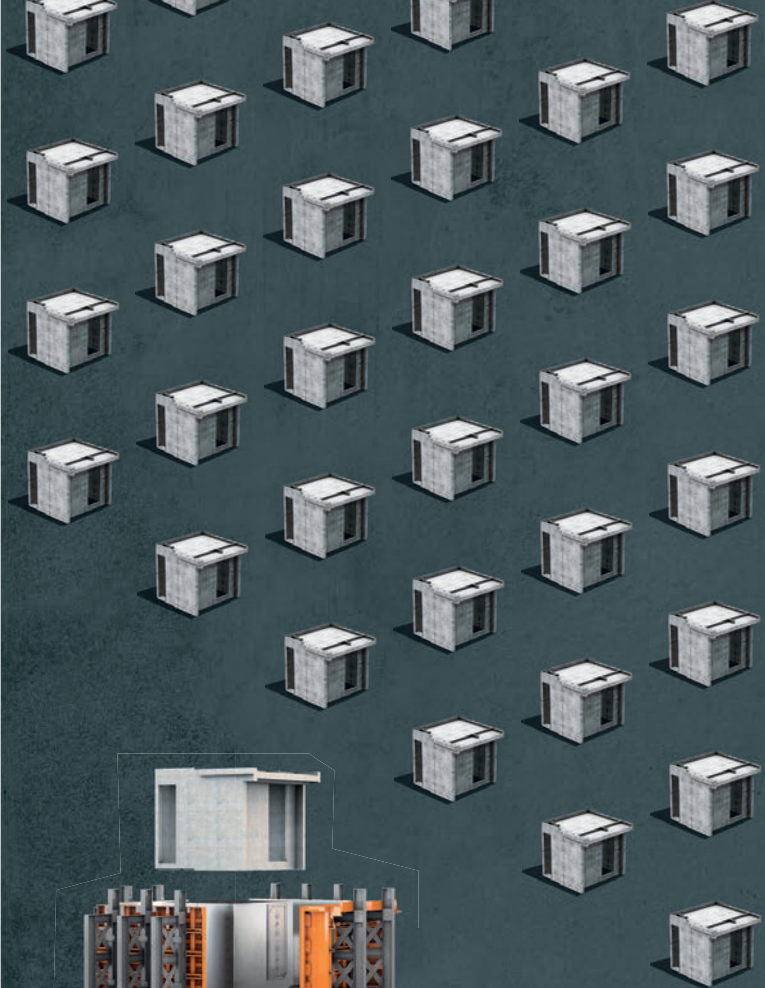
Project 1

The first installed formwork is designed for the production of transformer stations measuring 2.4 x 2.1 x 2.3 m (L x W x H) and 2.9 x 2.1 x 2.3 m (L x W x H). To change between the two element lengths, the formwork core can be converted from one to the other length.

This variation also had to be provided for in the design of the base frame and the outer panels of the formwork. The outer panels are moved manually and are securely closed by corner bracing.



Assembled formwork for transformer substations on site



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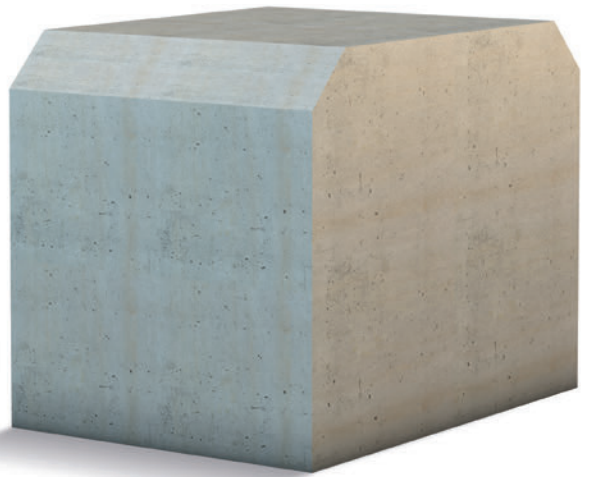


Interchangeable insert for the core to form the inner walls of a station

The various interior workings of the stations are achieved with the help of interchangeable attachments which are securely held in place on top of the core by a hydraulic tensioning device.

More than 23 different attachments make it possible for the customer to realize its broad program of up to 14 differing variations. For openings in one or more of the elements' side walls, Ratec also provided the according steel frames, that are attached on the outer panels and held by high-performance magnets.

Previously the conversion from one variation to another took up to a half working day, now the change from one attachment to the other within one station size is completed in significantly less time. At the same time, it is no longer necessary for an employee to enter the core in order to fix attachments from inside, as the upper parts are tensioned by hydraulic mechanism from outside.



Example of two different shapes of the possible concrete elements

Projects 2 and 3

In the two subsequent projects, the installed moulds are largely identical and differ from the first project's solution mainly in their size, and in the concept and design of the attachments.

The length of the formwork can again be varied, now between 3.10 m and 3.60 m, the height between 2.59 m and 2.84 m. The width of the formwork is 2.41 m. The change of length is performed again by utilising an intermediate piece which is inserted between or removed from the two halves of the core.

The height can be changed by using a special frame that serves as the bottom formwork for the lower elements. In contrast to the first project, fewer upper attachments are needed for the different station variants. Only the inner walls



Example of a finished substation

of the substations vary and are produced by different inserts for the core which are tailored to the respective geometry.

The customer has a total of 2 x 3 interchangeable inserts available for his variants, which are placed by crane and then hydraulically tensioned. This reduces the time and effort required for changing inserts. With the two lengths, two heights and the inserts, this formwork type covers a total of twelve different station variants.

Easy handling, short set-up times, versatile application possibilities

For demoulding, the inner core is designed with a draft angle, which means that the walls are formed slightly conically. To support the demoulding process, the bottom formwork is raised hydraulically by about 10 cm before the element is lifted. Overall, the bottom formwork has more than 60 tons of lifting force that is transferred over four cylinders.

Each formwork is also equipped with a vibrating unit for the use of normal or exposed aggregate concrete, that provides 14 kN vibrating force.

As the formwork can cover different lengths, heights, and shape variations, it is suitable for all common station types that Scheidt manufactures on behalf of its customers. Another advantage is the easy handling and very short set-up times: Changing the attachments for another station type usually takes less than 20 minutes. The versatile applications also speed up processes in the plant.

“For about 2.5 years we have been working together with Ratec in the field of formwork construction, and we are entirely happy”, comments Georgine Scheidt, Managing Director of Scheidt GmbH & Co. KG. „We are excellently accompanied from the first idea, over first plans to the start of production. In this way further development is simply a pleasure. We are looking forward to many further projects”.

The follow-up orders demonstrate that Ratec’s solutions prove their value in practical use and simplify production processes over the long term. Throughout the past projects, Ratec has thus further expanded its expertise in this specialist area and rounded out its portfolio. This is supported by a growing demand and new projects, that are currently in progress or planning. ■

FURTHER INFORMATION



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