SINCE 1892
WEHRHAHN

JOURNAL

Economic plants for autoclaved aerated concrete blocks and panels, fibre cement sheets, quicklime and dry mortar

EDITION 2019

TOPICS

Additional feature

Partition walls
with super-smooth surfaces
P. 02

Flow optimisation

How to produce the perfect
homogeneous sheet
P. 04

Architectural beauty

AAC and fibre cement
live in harmony
P. 07

The “all-new” AAC plant generation

minus 30 % factory space
minus 90 % foundation pits
minus 60 % hydraulics

Others talk about perfect AAC production plants and technologies:

We simply build it!

New plant generation launched. Squaring the circle?

The requirements for the “perfect” AAC production plant differ significantly around the globe. Some markets focus on highest possible production capacities for blocks, others prefer medium sized plants for a production mix of blocks and reinforced wall elements. As a consequence Wehrhahn offers a wide variety of well-proven plant concepts to accommodate for all these different market requirements.

Clients ask for lowest possible energy consumption, compact plant design, and utmost flexibility to produce a wide range of highest quality blocks and panels and all this at lowest possible investment figures. Do we seek for a solution to square the circle?

What are the special features of this “all-new” plant generation?

- **Intelligent new electric control modules** facilitate the highly feasible production process including self managing machine control and predictive maintenance tools. The plants reach highest OEE figures and fastest possible cycle times.
- **Minus 30 % space required**
- **Minus 90 % foundation pits.** The factory is now installed on the floor. Unbelievable, but by redesigning equipment this is now standard for new Wehrhahn AAC plants.
- **Minus 60 % hydraulics.** High performance electro-mechanical drives replaced the former hydraulics.

New cutting line

The cutting line is the heart of an AAC production plant; the Wehrhahn cutting technology has always been the benchmark in the industry.

But our teams did not stand still and the result is more than impressive.

The uniform distribution of cutting wires in a very long cutting machine reduces stress applied on the cake during cutting, in particular for very thin blocks and panels where many wires have to pass through the cake. The length of the thickness cutter has almost been doubled. The wires and knives are automatically cleaned to enhance the cutting surface and to prevent material sticking to the wire. The side trimmer (cutting length and profiling) is now equipped with a new “quick-change” cutting system and automatic knife cleaning devices.

Unique intermediate curing

Another important issue is the separation of blocks prior to autoclaving. The new plant uses the proven Wehrhahn green cake separating technology. However, in order to add additional flexibility to the process, a brand-new curing station between cutting and separating has been developed. The curing station allows the cake to harden prior to separating which reduces the risk of unsightly marks on the AAC products and provides more flexibility for the hardness of the cake during cutting which results in a larger cutting window.

Super-smooth surfaces

The Wehrhahn superSMART cutting line remains unchanged and is still used for cutting blocks and thicker panels which usually require tongue and groove. The newly designed super-smooth thickness cutter is added to the well proven cutting line and allows cutting of wall panels with super-smooth surfaces. *For more details see separate article on page 2.*

Mission accomplished!

Coming back to the question in the 2018 Wehrhahn Journal: “Is it the best AAC production plant in the world?” We are sure. And H+H UK, the proud owner of this exceptional new plant, agrees entirely.

Vertically applied AAC wall elements with super-smooth surfaces produced in SMART plants

Add-on for SMART plants: The newly designed super-smooth cutter.

Recently a trend has been observed for thin vertically applied reinforced panels with smooth surfaces. Flat cake cutting technology has been used in some markets, preferably for cutting this special type of reinforced AAC panels. Almost disappeared on the global AAC market due to disadvantages in AAC block cutting and product profiling, this technology is considered to be not flexible enough for the production of blocks and panels within the same plant. What are the drawbacks of flat cake cutting technology? The higher content of binding materials required for the grab handling of the cake. Pofiling is very difficult and not accurate as the cake rests on one side during cutting. Maintenance is continuously needed for the cutting grids with lamellas as they enter the autoclaves.

The new concept combines the advantages of tilt cutting and flat cake cutting technology

Customers who wanted to benefit from the many advantages of the Wehrhahn SMART technology implemented the idea to design a solution which does not yet exist on the market. In deep discussions with our customers their requirements for the "most advanced production technology" have been determined. Our team of engineers finally designed a complete new machine which can be added to any Wehrhahn SMART plant.

How does it work?

The Wehrhahn superSMART cutting line remains unchanged and is still used for cutting blocks and thicker panels which usually require tongue and groove.

The newly designed thickness cutter is installed near the second tilting machine. Instead of tilting the cake onto the autoclave grid the cake will be picked up by the cake inserter and is put into the super-smooth thickness cutter.

Growing demand for vertically applied wall panels.

The cake rests on a high precision cutting grid on top of the machine. The cutting grid can be changed depending on the required panel thickness. Cutting is done by two adversely oscillating cutting frames similar to those used in the cross cutter. The cutting frames are installed vertically and move on special linear horizontal guidings through the cake. For every cut, two wires which are installed behind each other, are used. The first wire cuts the thickness and the second one smoothens the surface. The result: a precise and super-smooth panel surface.

The bottom and top cut is automatically removed and returned to the cut offs recycling system.

After cutting, the cake is picked up by the cake inserter and transferred to the standard autoclave grids. Autoclaving and handling of the cakes follow from here the proven SMART technology. Another advantage is that no separating is required because there is no load applied on the cutting joints and consequently sticking between the panels is impossible.

AAC projects around the globe

Stärken's new superSMART plant has already started production. The plant is located in Johor/Malaysia close to the border with Singapore. AAC blocks and panels can be produced in highest quality.

Broco in Indonesia has been a Wehrhahn customer for decades. Currently two PLUS and superSMART plants are in operation. The superSMART has been upgraded to produce high-quality reinforced elements.

Jing Neng Power, a daughter company of Beijing Energy, a large utility supplier, purchased a 600.000 cubic meter superSMART. The plant is currently under installation in China. Start of production is expected later in 2019.

Remote Group in Rwanda is presently installing a Wehrhahn SMART plant. The group is the pioneer for first class AAC blocks in this part of the world.

H+H Celcon U.K. operates in full swing an all new superSMART *(please see page 1)*.

The plant has already reached full capacity in 2018. The project teams of H+H Celcon and Wehrhahn are entirely satisfied with this extraordinary smoothly running project.

Xella shifted a Wehrhahn superSMART plant from Czech Republic to Georgia. The plant is currently under installation with assistance from Wehrhahn.

AAC is gaining more and more market share around the globe.

Trend: Upgrade of existing AAC plants

Tailor made unloading
and packing solution for Xella.

Wehrhahn plants are designed to reach highest Overall Equipment Efficiency (OEE) figures. Some plants have successfully been in operation for more than 20 years.

AAC properties are continuously improved. Lower densities and lower thermal conductivity, new sizes and profiles and specially designed new surfaces enter the global market.

For the purpose of producing all these new materials and to serve the market plants have to be upgraded from time to time.

Especially since the quality of the originally supplied plant is so high and solid, it is often unnecessary to invest in a new plant, but simply to upgrade the existing Wehrhahn equipment.

Here some add-ons:

- single aluminium paste dosing unit
- hard scrap recycling plant
- integration of new intelligent control system modules
- NEW thickness cutter (stress-free cutting of thinner blocks and panels)
- super-smooth cutter for vertical wall elements

Interested in upgrading your plant?
Please contact our team for individual advice. We will analyse the plant and production conditions and recommend cost efficient solutions ensuring that Wehrhahn customers are fit for competition again.

Intelligent fibre cement sheet thickness control – a money saver –

... by mathematical modelling and simulation

State-of-the-art sheet thickness control systems usually include two PI-controllers to regulate the felt speed and to adjust the homogenizer slurry feeding. Determination of suitable controller parameters however can be difficult and time consuming as minimum two gain-parameters and two integrative-time-constants need to be adjusted, to achieve fast controller reaction without significant overshooting.

Wehrhahn uses mathematical modelling of the involved process components and software controllers. Based on mass balances, this method can describe the entire process of slurry feeding, mixing, vat feeding and layer generation up to the forming roller. PI-controller models can link the layer thickness signal with the slurry feeding characteristics and the felt speed. The resulting set of equations image the complete control path and the thickness control system.

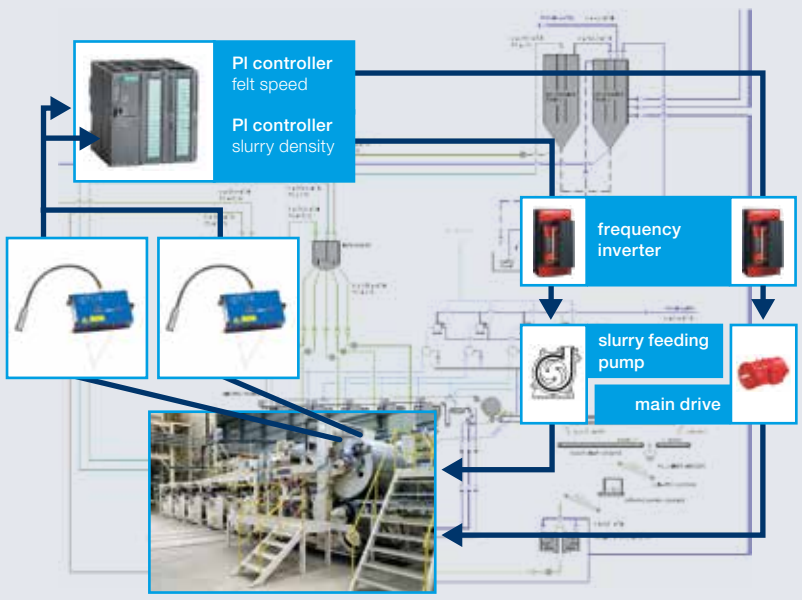
Time-discrete computer simulation allows the calculation and graphical display of the system performance on different controller parameter settings. Optimised parameters can be determined offline before operating the real sheet production. This shortens commissioning time and saves tons of raw materials due to plant operation on low thickness tolerances over years of production.

In addition, the mathematical equations can be implemented into the machine PLC control to calculate a real-time felt speed compensation for deviations in slurry feeding. Wehrhahn implemented this felt speed correction as a feed-forward pilot speed control to further increase the sheet thickness performance.

This add-on to the conventional sheet thickness control allows:

- faster changes in felt speed and machine capacity on a minimum of sheet thickness deviation during the adjustment phase
- minimisation of changes in sheet thickness in case of homogenizer slurry feeding deviations due to e.g. changes in pump performance or flocculants feeding
- faster return to the setpoint felt speed after necessary controller actions

Fast responding sheet thickness control system.



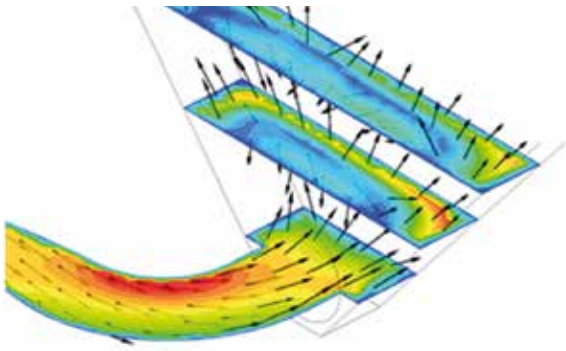
Intelligent sheet thickness control saves raw materials and stabilises production.

Upgrade fibre cement production by vat inlet flow optimisation

Vat inlet flow optimisation

The slurry flow conditions inside the vats of fibre cement board machines are not well researched. Exploration and optimisation on basis of trials on small scale models are difficult as the transferability of test results to the real machine is questionable due to the particular viscosity characteristics of the fibre containing multi-phase slurry and similarity laws to be applied.

The application of Computational Fluid Dynamics (CFD) analyses offers interesting optimisation possibilities as results are generated fast so that different equipment design options can be computed within short time.



CFD Analysis is used to optimise the fish-tail design (tub in-feed).

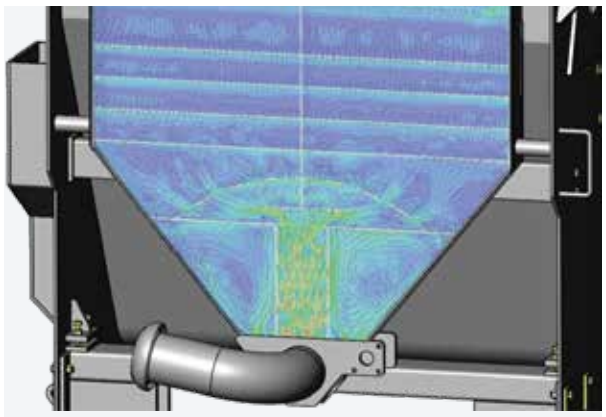
Flow speed homogenisation over the production width of the vats

The slurry preparation is typically located at the side of the board machine. Consequently at least one pipe elbow is required before the board machine to lead the flow into the production direction. Resulting unequal flow conditions over the machine width need to be compensated. Furthermore it is necessary to achieve equal flow speeds when the slurry is distributed from one or several individual feeding points to the entire production width.

Best possible slurry mixing on the way from homogenizer to sieves

Fresh slurry and backwater are merged at the homogenizer and sediment slurry from the cone tanks is added. There three slurries show different solids content and solids composition. Effective mixing is required to achieve even solids distribution over the production width. Additionally flocculants are added and need to be distributed without affecting the polymer molecules.

Wehrhahn is currently studying possible detail modifications of the vat design to exploit the potential of the CFD method and provide the optimisations mentioned above.



Static mixer and internal built-in components provide homogenous slurry velocity and distribution of solids.

Achievements will be:

- **lowest possible layer thickness variations**
- **best possible flocculants efficiency**
- **minimal thickness tolerances from sheet to sheet**
- **ideal layer homogeneity**

Fibre cement projects around the globe

Sri Lanka

Wehrhahn supplied a state-of-the-art fibre cement plant for the production of autoclaved flat sheets to El Toro. The plant has come with a large number of newly designed features and started production in 2017. It is the first plant for autoclaved fibre cement sheets in the region. El Toro ordered another plant for corrugated roofing sheets, even before the new Wehrhahn plant for flat autoclaved sheets had started operation. The plant features several innovations in the sheeting machine and cutting plant sections. Plant installation is scheduled within 2019/2020.

This project is another milestone for El Toro as it will be the first plant for non-asbestos corrugated roofing sheets in their region. With these two new plants El Toro is recognised the market and technology leader in Sri Lanka. Wehrhahn and El Toro are planning to cooperate closely in more new projects to come.

China

ESSE from Beijing received two high capacity Wehrhahn flat sheet production lines for air cured fibre cement boards. The plant will be installed and commissioned shortly. Intention is to use a newly developed cement which offers many advantages in comparison to standard Portland cement. Start of production is envisaged during 2019.

Russia

Kazbek from Chechnya ordered a plant for the combined production of flat and corrugated sheets. The flat sheets will be autoclaved whilst corrugated sheets are produced using air-curing technology. Wehrhahn supplies a finishing plant together with the sheet production line to enhance the fibre cement sheet quality which will generate higher sales prices for Kazbek.

Latest fibre cement plant generation successful in operation.

How to make your AAC plant smart

The new feature of WH-EnMS – Wehrhahn Energy Management System – is called “Load Peak Monitoring System”.

Intelligent modules of the Wehrhahn Industry 4.0 system

In state of the art production plants, many product data, machine data, parameters and measuring data come together. The collected data, sorted with care and reasonably connected, contain a huge value which results in experienced ideas for improvement and innovations. In many plant control systems the data end up unused in different departments, locations or registers, so that the actual coherence is unrecognised and therefore unused. The new inhouse developed uniform Wehrhahn database automatically collects all data in real time and transforms them in a customised flexible sensible correlation. The new created findings and insights will be the base for precise decisions ensuring an optimal production process.

Examples:

· **Self-managing machine control (PCI-System)**

A machine control automatically adjusting machine parameters to product specifications and production conditions based on product data from the PCI-System, energy data from WH-EnMS to operate the plant in a most gentle and effective way, which guarantees an long plant life.

· **Predictive maintenance (WH-EnMS)**

The energy consumption value in kWh/m³ of a single machine in correlation to the type of product as well as machine parameters (e.g. speeds) will become the benchmark data. Any increased value indicates the need for maintenance.

· **Service interval application (SIA)**

Service interval indicators with color change signals from green to red inform the operator and service personnel about the actual maintenance status ‘everything in order’. Fault and warning messages will be stored and evaluated in transparent trend diagrams.

· **Automatic cycle time monitoring**

The minimum cycle time of each machine is continuously monitored and recorded in a daily chart. If a single machine is not in line with the specified cycle time anymore, the system will give alarm.

Process optimisation by means of WH-EnMS

WH-EnMS

It started 2011 as an energy management system which measures the energy consumption of each single machine in a second by second sampling rate. The WH-EnMS considers the whole energy requirement of the company, including electric power and gas consumption under view of key performance indicators (KPIs) as well as energy performance indicators (EnPIs) from all single production lines, storage rooms, office buildings, etc. It helps to run the production on the most effective state and reduces energy consumption.

Today the automatic report system of the WH-EnMS does not only create energy reports, but also includes load peak monitoring system, reports raw material consumption, production time, maintenance requirements and transfers productivity reports to a local merchandise management system.

WH-EnMS ensures to...

- produce in an energy-efficient way
- reduce operation and long-term cost
- optimise and ensure a constant product quality
- control the productivity
- secure enduring and eco-friendly production

Data analysis – new service by Wehrhahn

A modern production plant typically provides a large number of measured values, plant data, production data and machine data, which reflects the condition and efficiency of the production plant or helps to make the best decision for optimisation. A huge amount of data input requires a systematic analysis and processing of the information. Many plant managers feel overloaded by the comprehensive amount of data and wide data diversity and therefore they do not have the chance to profitably use the data provided. Wehrhahn offers a detailed inhouse analysis service of all production data.

Based on the experience gained from a large number of successfully realised production plants, Wehrhahn carries out a systematic data analysis (bench marking) and points out improvement potentials. As an equipment supplier with its own design and automation department, Wehrhahn is in a position to define measures with high potential and to implement them.

After data analysis, Wehrhahn is able to program an automatic monitoring of specific data analyses into the plant control system that provides data evaluations in real time. Experience has shown, that even in a well-organised AAC plant, savings of more than € 50,000 per year are possible by fully exploited data analysis.

Target of data analysis service:

- identify and evaluate improvement potentials
- ensure sustainable, reliable and efficient production
- increase overall equipment effectiveness – OEE
- minimise production costs

Wehrhahn Support – powerful, useful and feasible

Improvement of customer skills in how to operate production lines is the main part of our work

It is the aim to optimise the complete range of business with a strong focus on production costs while, at the same time, taking account of the current and future needs of customers by applying Wehrhahn technical know-how.

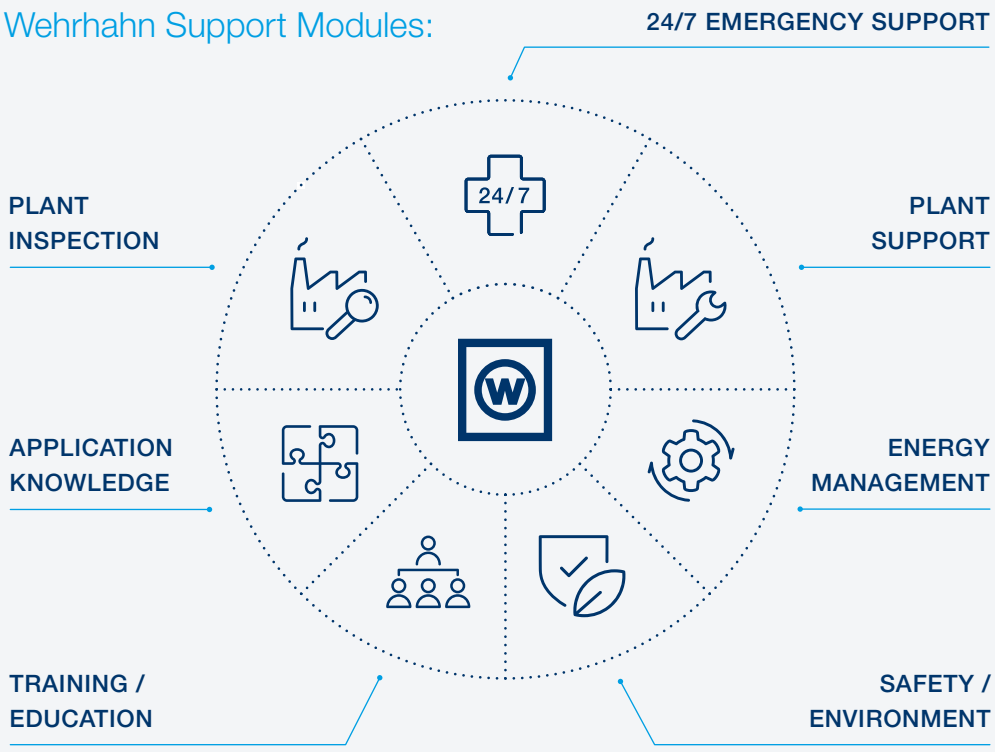
What sets Wehrhahn apart?

With over 200 plants supplied to clients worldwide we have an in-depth knowledge of our customers' business and know their "weak points". Two things are always in short supply: time and money. For a product successful on the market, both factors must be used to reach the best result. We are dedicated to increase profitability by identifying bottlenecks or lack of understanding. We give expert support in making products sustainable, superior and feasible. Together with customers an integral concept is developed to optimise production costs, production processes and technology.

Well established methods and processes, experienced engineers, complemented by intelligent Wehrhahn software solutions, are an asset for our clients.

The successful Wehrhahn Support story will continue – do you want to be part of it?

Please contact: **support@wehrhahn.de**



Expert report: Klaus Boderke

"The Wehrhahn Support"

Klaus Boderke heading for his next AAC plant support ...

The Wehrhahn Senior Manager Support Mr. Klaus Boderke shares his experiences with us:

"I start my first day of support in an AAC production plant. The entire team ist present: many new faces, names, the kick-off meeting.

What are the tasks?
Where are the main problems?
What are the expectations?

Then the first tour through the plant, I try to absorb all the impressions – status and condition of the plant, skills of the production team. My work starts from raw material evaluation and preparation up to quality of the finished products. The first sreening provides ideas how to optimise the entire production process. I'm looking forward to jointly work with the team of plant operators and their management.

After some days we get familiar with each other. The staff members of the plant answer all my questions important to identify the hot spots and bottle necks in the plant. Where are lacks of knowledge and where should we start to improve? In comprehensive training lessons the process know-how and correct procedures are presented and explained. The training helps to easier accept necessary adjustments in the plant – I like to convince by explanation and understanding, this is the only way to arrange sustainable changes.

The final result: better knowledge, better understanding of the AAC production process and measurable improvements: For example: 21 % reduction of energy consumption for the boiler or 12 % savings in recipe cost; 16 % waste rate reduction or 15 % increase of production.

And, what I like best: smiling faces and warm words about the good results. I found new friends. I am part of the plants' family.

I leave the plant convinced and satisfied that things are going better now. I love this job!"

AAC and fibre cement live in harmony

Architects love fibre cement sheets, elegantly finished with a wide range of colours or even unpainted, but coloured through with added pigments.

AAC panels

1. Easy installation
2. Speedy construction
3. Economic advantages

AAC panels are ideal for universal use!

An impression of the various global applications:

Non-structural thin panels for no-crane installation with only light reinforcement for transportation can be handled by one or two men.

Vertical walls
Mostly 100 mm (4 in) floor high as external and internal walls commonly used in cost-sensitive countries with moderate climates.

These panels are highly suitable for fast building of standardised homes.

Structural load-bearing “crane” panels are quite popular as **lintels** in different lengths to cover openings like doors, windows and are a must in extremely cold climates.

Wall panels of any thickness as vertical walls for home buildings, schools, hotels/motels, hospitals (mostly light reinforcement).

Horizontal panels for industrial and commercial buildings where good in-house climate and fire protection are a must.

Vertical panels are highly suitable for fast building of standardised homes.

Fibre cement sheets

Few building materials offer such a combination of architectural scope and strong technical specification as convincing as fibre cement cladding and roofing.

Fibre cement combines strength, easy handling and stylish versatile colour options. It gains its impressive strength in a special manufacturing process. Thin layers of fibre cement are laminated and compressed under high pressure followed by air curing or autoclaving. A major advantage of fibre cement is its ability to resist all kinds of weather conditions: frost and thaw, heat, hale or rain. Inside buildings fibre cement is applied as backer boards in wet areas or for dry walls in heavy duty applications where fire resistance and strength are the dominant requirements.

A global trend is noticed towards apartment houses in downtown areas preparing the ground for an increasing demand for cladding materials. Here fibre cement sheets show their unsurpassed quality.

Latest news? Social media, website, exhibitions...

Our sales team is available:
face to face, by phone or by e-mail.

Internet, social media and trade fairs

From Europe to Africa, from the Arab world to Russia and Asia, but also to America – no trade fair is too far away for Wehrhahn. Interested parties from all over the world have the possibility to inform themselves personally about the innovative machines for the production of building materials.

The trade fairs at which we are represented are published on our website and posted on LinkedIn.

www.wehrhahn.de

Our website is available in 6 languages (German, English, Russian, Chinese, French, Spanish) offering many information for download.

To get an idea of the Wehrhahn plant systems and technology the Wehrhahn Youtube Channel provides a wide range of videos.

Wehrhahn covers the full program for Russia

New plants for AAC, fibre cement, dry mortar and lime

The opening of the first plant in the industrial “Technopark” for integrated production of home building materials is a major step for the developing construction industry in the Northern Caucasus area of Russia. The lime kiln is producing 100 tons of burnt lime per day. Wehrhahn was chosen as supplier for this big project, as only Wehrhahn is capable, due to the versatile manufacturing program, to supply all four included types of plants as a whole in this “Technopark”: AAC, fibre cement, dry mortar and quicklime plants.

Whilst lime and mortar production facilities in the Caucasus are now ready to produce, AAC and fibre cement production are being installed.

Because of large needs in this area many building materials will soon be available:

- quicklime for AAC production
- hydrated lime for dry mix mortar production
- crushed limestone powder and granulate for dry mix, fibre cement and many other applications
- dry mix products for all types of mortars and adhesives
- AAC blocks and panels for the home envelope (walls, floors, roofing)
- fibre cement flat sheets for facades, partitions, prefab walls
- fibre cement corrugated sheets for roofing
- paint coating plants to upgrade fibre cement sheets and to provide architectural beauty

The latest “lime burning and processing plant” was inaugurated in the Caucasus.

From Delmenhorst to the world

125 years of Wehrhahn history

Luck is often involved, when a family business has been existing for more than 125 years. A number of factors form the basis for long-lasting success. The key are above all the diligent and creative people identifying with the company. But also economic conditions, passion and flexibility throughout the time and always the right feeling for the customers’ requirements ensure the company’s reputation. This prompted us to tell the unique Wehrhahn story from 1892 until today and to write down the company chronicles published in a book.

Whilst right from the beginning the product range has always focused on the construction and building material industry, Wehrhahn plants today are a symbol of reliability and efficiency throughout the world.

This will be our challenge and motivation for the future: Our aim: “We want to be the best at what we do!”

JOURNAL

SINCE 1892 WEHRHAHN

Wehrhahn GmbH
Muehlenstrasse 15
27753 Delmenhorst
Germany

Tel. +49 4221 12 71 0
Fax +49 4221 12 71 80
mail@wehrhahn.de
www.wehrhahn.de