

# Willkommen bei Wehrhahn Welcome to Wehrhahn Вас приветствует Wehrhahn 欢迎来到威翰公司

## Wehrhahn since 1892

Outstanding efficiency, reliability under the most challenging conditions, durability and flexibility in application, carbon-neutral and environmentally friendly in production – building materials for tomorrow have to meet tough standards today.

That's why AAC and fibre cement are popular materials for construction projects around the world – and rightly so. As a global market leader, Wehrhahn builds high-performance production plants from which these and other important building materials find their way to a vast range of different construction sites around the world.

The company's headquarters in Delmenhorst have been the hub of its project planning, development and design since 1892. And for us, this long tradition represents an obligation to maintain our top quality performance. Our mission is to develop intelligent solutions to help you achieve long-term success.

Alongside standardised plants, we also develop and produce individual plant concepts which are created with particular attention to the specific requirements and local



**01** The management: Dipl.-Ing. Dr. Klaus E. Bohnemann, Dipl.-Ing. Torsten Dietz, Dipl.-Ing. Armin Berndl. conditions of our clients. Qualified Wehrhahn service teams operate around the world and are on hand to advise and assist our clients at any time.

We are pleased to introduce our company on the following pages and will gladly answer any further questions you may have at any time.

The management

## **Company profile**

**04** A COMPANY WITH TRADITION

## Autoclaved aerated concrete AAC

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# **Contents**

The foundations of a strong company are its key values: team spirit, reliability and sustainability are our top priorities.

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20 EFFICIENT AND COST-EFFECTIVE PRODUCTION

24 FIBRE CEMENT SHEETS - THE PRODUCT

## Made in Germany

Experience gathered over more than a century of producing machines for the manufacture of high-quality building materials for a wide variety of construction applications. At home all over the world and yet with strong roots. Wehrhahn since 1892.

#### 1892 - Industrialisation

In the light of increasing industrialisation and a rapidly growing population, building materials of all kinds are in great demand in Germany at the end of the 19th century. The young engineer Heinrich Wehrhahn from Delmenhorst recognises this trend towards industrial production plants early on and in 1892 he and his brother founded the Gebr. Wehrhahn engineering works.

There is no electricity for industrial production at this time: the first machines developed by Wehrhahn

are powered via transmissions driven by steam engines, watermills or windmills. These include brick production plants, sawmills and grain mills.

#### 1918 – Specialisation

Carl Wehrhahn - the founder's son joins the family firm after completing his engineering studies. Wehrhahn is specialising more and more in sawmills and brick production plants.

#### 1936 – Fibre cement

The new competitively-priced composite material fibre cement conquers the markets. Wehrhahn builds plants for the cost-effective production of fibre cement roofing, flat sheets and fibre cement pipes, thus establishing the global reputation the firm still enjoys to this day as a machine production company.

Quality, service and reliability, coupled with a close relationship to its staff are already central elements of the corporate philosophy at Wehrhahn.

#### 1945 - Post-war period

The post-war and reconstruction period brings many new opportunities. Besides many sawmilling and

fibre cement plants, these include also mobile excavators. At times the company is producing one excavator per day.

#### 1965 - Consolidation

Wehrhahn focuses increasingly on high-quality, turn-key industrial plants, expanding its pool of engineers and technicians and developing its own specialist know-how for fibre cement technology.

#### 1970 – AAC

Increasing energy-awareness creates a demand for well-insulating con-



Starting with low-capacity plants with little automation, Wehrhahn gradually develops fully automated high-performance plants for AAC precision blocks and panels with a daily output of up to 2,000 m<sup>3</sup> -50 to 80 road trains per day enough for 20 to 25 homes. These also include plants for dry mix mortar and special AAC lime.





#### Today – On all continents

Wehrhahn plants are in operation all over the world and internationally leading manufacturers of fibre cement and AAC use Wehrhahn plants and technology.

Starting from the early engineering works of Heinrich Wehrhahn, the company has developed into a global player. More than 150 highly specialised employees design plants and develop technologies according to individual requirements for many high-tech applications in the industry.



02 Heinrich Wehrhahn 1864-1944.

**03** A family business focussed on sustainability.

**04** Our machine tools have always been an integral part of the company.

# Well qualified and highly motivated

A team of over 150 engineers and technicians in design and planning develop solutions and concepts tailored to your requirements.

INDUSTRIAL PLANTS FOR THE GLOBAL MARKET

# Made in Delmenhorst, Germany.

The success story of Wehrhahn is at the same time the success story of our committed team. They are all highly trained and motivated and every day they advance the company a little bit further with their drive and expertise.

Constantly encouraged by clients who appreciate our top quality standards, reliable service and collaborative attitude.

From Delmenhorst to the world

Production conditions for building materials vary enormously in countries around the world. It is a challenge to guarantee a trouble-free manufacturing process in these various climatic conditions whilst also taking account of the raw ma-

terials available. This is our particular focus.

State-of-the-art manufacture of all plant components at certified prodcution facilities exclusively in Germany and the on-site assembly by professional technicians from the Wehrhahn construction team guarantee optimal production conditions at the highest level.

Wehrhahn machines and plants are pioneering in the international construction sector. It is no coincidence that companies all over the world put their trust in us. More than 100 plants for the production of AAC and over 100 for the production of fibre cement sheets and pipes are in use worldwide.

05 | 06 Our full service covers the development, design and production of all plant parts. For assembly at almost any location on the planet, we will provide professional technicians and engineers to guide the process.





Delmenhorst is an attractive location with an ideal infrastructure and optimal traffic connections to the Hanseatic city of Bremen, whose ports and international airport make the city a major transport hub connecting to the rest of the world.

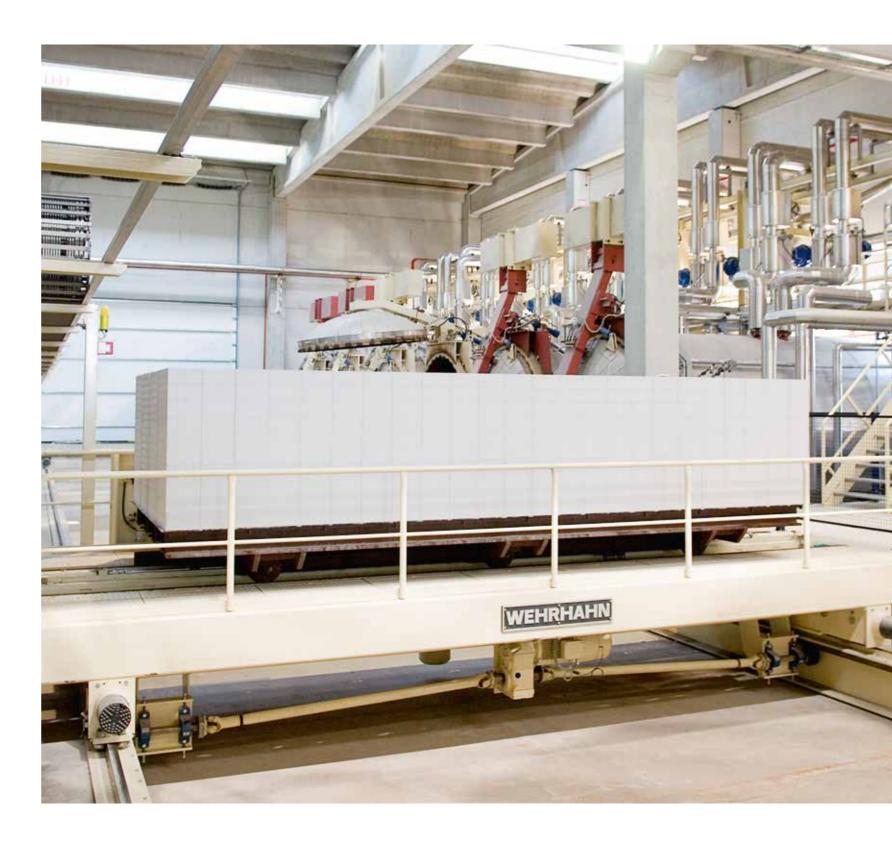
The political and economic conditions in Germany enable us to operate within the context of the social market economy.

Wehrhahn has been consistently successful in dealing with changing market conditions through continuity, stability and constant innovation - and can therefore look ahead to the future with great optimism.

# AAC

Building for the future with many positive characteristics.

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## SYSTEMATIC HIGH EFFICIENCY

# Production plants with a capacity of 150 to 2,000 $m^3$ /day.

# **Our AAC plants**

Ensuring outstanding levels of productivity and flexibility: zero system waste, highest-precision cutting, low energy requirements (optimum kWh/m<sup>3</sup> values) and minimal consumption of raw materials.

Wehrhahn can supply complete plants or individual machines depending entirely on specific requirements of our clients. We take account of all the relevant factors and conditions, such as production quantities, location, space available, level of investment and much more.

Raw material preparation

is produced by mixing the raw

materials sand or pulverised fuel

ash, cement, anhydrite (gypsum),

lime, water and a small quantity of

Dosing and mixing system

aluminium powder.

Autoclaved aerated concrete (AAC)

ables accurate dosing, weighing and mixing of all raw materials. The mixture is then poured into moulds, where chemical reactions initiate it to rise like a cake.

#### Cutting

After the cake has attained sufficient strength, it is removed from the mould and cut with wires and knives into blocks or panels with precision accuracy.

Hand holds, tongue and groove are cut before the cake is autoclaved in order to avoid milling into the hardened material - a sustainable cost-saving measure and an element of our "zero system waste" concept.

## Wehrhahn's fully automated dosing and mixing plant WECOMIX en-

09 In SMART plants the cakes are autoclaved lying flat.

10 In PLUS plants the cakes are autoclaved upright.



07 A stationary tilting machine and moulds with four hinged walls are the core of our technology.

**08** Our precision cutting machines conform and outperform to the highest standards, ensuring dimensional accuracy for AAC blocks and panels.





#### Autoclaving / Curing

After cutting, the AAC is hardened by autoclaving in a saturated steam atmosphere at a temperature of approx. 180 to 190 °C. Process control and monitoring are done using the automatic Wehrhahn autoclave control system WACO. It is this steam curing that creates the unique crystalline structure and lends AAC its excellent qualities in comparison to building materials which are not steam cured.

#### Sorting and packing

After autoclaving the blocks or panels are packed and are then ready for dispatch to the construction site.



## **SMART** plant systems

Our SMART plants tilt the blocks back into the horizontal position after cutting. This enables "green cake separating" before autoclaving. SMART plants can also produce panels with ultra-smooth surfaces.

## Wehrhahn superSMART

This plant is designed for maximum production capacities (1,100 to 2,000 m<sup>3</sup>/day). It is generally equipped with a green cake separator to separate the cake before autoclaving and to avoid any sticking.

#### Wehrhahn SMART

Designed for smaller capacities (300 to 1,250 m<sup>3</sup>/day) and a growing market. Upgradable to super-SMART.

#### Wehrhahn ecoSMART

The ecoSMART plant is perfect for small markets (200 to 500 m<sup>3</sup>/ day) with lower investment needs. Space requirements: at least 1,800 to 2,200 m<sup>2</sup>.

## **PLUS plant systems**

The PLUS plant is the only AAC plant on the market enabling production of upright autoclaved cakes with zero system waste. This is made possible by our patented bed remover. The PLUS plant stands out for its compact construction and easy handling of the AAC blocks for packing.

#### Wehrhahn PLUS

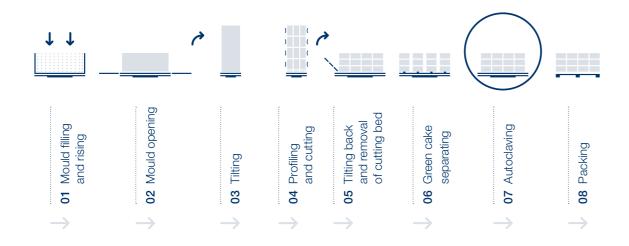
Wehrhahn's most popular plant type with a capacity of 600 to 1,400 m³/day. sized markets. Production quantities

#### Wehrhahn ecoPLUS

The compact plant for mediumhere are between 500 and 950 m<sup>3</sup>/ day. Ideal for investors with a limited spatial capacity.

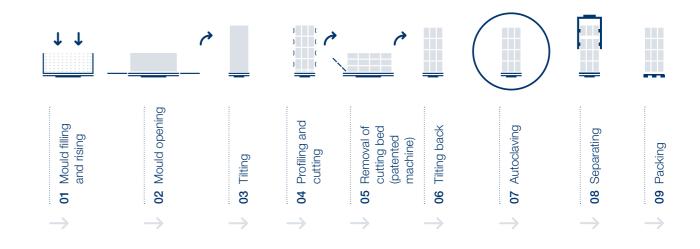
## SMART plant system

Simplified diagram of the production process



PLUS plant system

Simplified diagram of the production process



#### PLANT TYPES AND COMPONENTS 13

SUSTAINABILITY

Environmentally friendly and cost-effective construction is playing an increasingly important role worldwide.

# AAC – the product

AAC is a high-quality, versatile building material which can be produced as blocks, megablocks or panels. It has proven reliability in all climate zones. In many countries around the world it is the eco-friendly wall building material of choice today and for the future.

AAC is also known as gas concrete and by the brand names Ytong<sup>®</sup>, Hebel<sup>®</sup>, H+H<sup>®</sup> and Porit<sup>®</sup>. It is used in practically every sector of the building industry. In both residential and commercial building projects, and even large prestigious building complexes and industrial projects.

AAC is suitable for building walls of all kinds, e.g. external and internal walls (load-bearing and non-load bearing), infill panels or blocks between concrete or steel columns, separating walls, fireproof walls and single or double shell exterior walls. For the restoration or conversion of older buildings, even half-timbered buildings, AAC is often the first choice due to its low weight and its extraordinarily convenient handling.

#### Summary of characteristics:

 very good eco-balance because its production uses natural and to a large extent regional raw materials. AAC is not poisonous, neither in production nor in further processing. AAC products are recyclable.

 excellent insulation properties due to its low bulk density and unique cellular structure. Perfect heat insulation and excellent fire





protection as well as substantial compressive strength coupled with a comparatively low density are its outstanding characteristics. AAC is also used very successfully in areas with seismic activity.

- low weight and very easy handling.
   AAC can be further processed quickly and easily using simple tools – even on site at the construction location.
- very cost-effective due to precise dimensions enabling rational application. Thanks to its low weight, AAC can be produced in large units, thus saving application time.



**11** AAC as a universal building material for private and commercial buildings of all styles.

**12** Wall panels of 6 m length for commercial construction.

**13** AAC enables rapid and simple construction.

A VARIETY OF POSITIVE FEATURES

Insulation. Fire protection. Noise protection. Structural load-bearing capacity. Recyclable building materials.





## APPLICATION 17



**14 © Bundesverband Porenbeton** Commercial application with 6 m long horizontal wall panels.

**15 © Bundesverband Porenbeton** Today's architectural style with AAC blocks and panels.

**16** AAC in buildings with the highest standards of technology.

# Fibre cement

Unique versatility.

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FIBRE CEMENT 19

## EXCELLENT PERFORMANCE

# Productivity and flexibility.

fibre cement sheets.

#### Raw Material preparation

Our fibre cement plants

After the sand is ground and the cellulose prepared, the sand and cellulose slurry are stored in silos.

#### Dosing and mixing system

Fully automated mixing of raw materials in the Wehrhahn dosing and mixing plant WECOMIX ensures consistent quality. After further dilution the slurry is fed into the sheeting machine.

#### The sheeting machine

Rotating sieve cylinders in the 2 to 6 tubs of the sheeting machine filter the solids out of the fibre cement mixture. The sieve cylinders transfer thin material layers onto the felt. The layers are dewatered and then accumulated at the forming roller until the required sheet thickness is reached and the sheet is cut off.

Sheet thickness measuring system

The automatic sheet thickness control system guarantees minimal thickness variation within the production series. The consequent savings on raw materials and waste reduction improve the cost-effectiveness

#### Cutting / Pressing

of the plant.

Wehrhahn offers a full range of cutting equipment, e.g. cutting press, guillotine, circular knife and water jet cutter. All Wehrhahn stack and single sheet presses for corrugated or flat sheets ensure the excellent quality of the final products.

## Autoclaving CCA

Over several hours, the sheets are cured in autoclaves in a saturated steam atmosphere. Process control

```
17 Cellulose fibre processing plants.
```

18 Efficient, fully automated sheet production plants.





## For the industrial production of air cured and steam cured (autoclaved)

and monitoring are done using the automatic Wehrhahn autoclave control system WACO. Similarities to the production of AAC have enabled Wehrhahn to accumulate comprehensive expertise in autoclave technology which is put at the disposal of our clients.

#### Alternative: Air curing

The sheets are stacked and stored at ambient temperature until they are cured.

## **Colouring plants**

Many fibre cement sheets on the market have a surface coating or are thoroughly colour pigmented. Wehrhahn supplies colouring plants tailored to the relevant product and the climatic conditions in the client's country.

# Fibre cement plants to suit all requirements

Wehrhahn supplies both individual machines and complete plants together with production know-how.

DOUBLING YOUR PROFITS

# Our considerable experience and highest quality standards.

Together with our clients, we create production plants specifically tailored to individual needs and local conditions.

Each plant has a modular design, enabling expansion with market demands. Plant components can always be added - e.g. a press section or a fully automated conveyor system – without changing the existing machines.

Plant types For the production of fibre cement sheets, two technologies have proved suitable:

#### CC = Cellulose Cement Sheets

CC sheets are produced from cement and fillers. A mixture of virgin cellulose and PVA or PAN fibres serve as fibre reinforcement. The plant capacities range from 2 to 20 t/h.

#### CCA = Cellulose Cement Autoclaved Sheets

CCA sheets are made from cement, finely ground silica sand and additives. Fibre reinforcement is by virgin cellu-

19 Fast electromechanical stacker robots.

**20** Stack or single sheet presses for compressed sheets.



Which technology for which product?

## CC sheets for:

```
Roofing
(corrugated or flat sheets)
Façades
Fencing
```

lose and up to some extent waste paper for sheets applied internally. Capacity: 2 to 20 t/h.

#### Compressed sheets

CC and CCA sheets can be compressed in a stack or single sheet press. This increases the bulk density, frost resistance and flexural strength.

#### CCA sheets for:

Lap sidings (e.g. home wall cladding)

Façades

Fencing

Dry walls and ceilings

# Fibre cement sheets

Ideal characteristics which come into their own in particularly challenging climate conditions: fibre cement is heat-resistant and frost-proof, non-combustible and resistant to termite infestation.

DISCOVER CREATIVITY

Utmost versatility in terms of creative scope and potential applications.

Building standards are becoming ever more stringent: architects and developers want high-quality materials, investors are building with a strict eye on economic considerations and extreme weather conditions require appropriate building materials.

Fibre cement takes account of all these demands. They have proved itself in building construction and are prized as a flexible and yet economic building material. Production and material composition are subject to

strict ecological building regulations. Fibre cement is deemed completely safe. Fibre cement sheets are used all around the world in residential, public, commercial and industrial construction and often in the agricultural sector.

 Façades and fences: Available in a range of colours and formats.

Fibre cement in plank form with a surface wood pattern is a particularly popular choice. Fibre cement façades are an alternative to traditional render. They can also be





installed in winter when rendering is no longer possible.

- · Internal applications: Fibre cement sheets provide excellent fire protection characteristics, are suitable for use in wet rooms and have an impressively high level of stability in comparison to gypsum boards.
- Roofing: Fibre cement sheets have been used for decades in roofing. The sheets are corrugated or produced in the form of small slates. Available in various formats and colours.



21 © Cembrit Slates for roofing or beautiful façade application.

22 © Cembrit Fibre cement façades withstand even the most challenging weather conditions.

23 © Cembrit As an architectural design element, fibre cement shows unsurpassed versatility.



Moisture resistant, frostproof, eco-friendly, affordable and flexible. Excellent fire protection.





## APPLICATION 27







**24** Fibre cement flat sheets add colour and facilitate insulation underneath the sheets.

**25 © Cembrit | 26** Sidings applied for new or traditional architectural taste.

## TAKING ON YOUR CHALLENGES

# A wide variety of production plants for the building materials industry.

# Dry mix mortar and lime

Wehrhahn creates complete building material production systems with variable add-on components, such as dry mix mortar production plants, lime kilns or lime milling plants.

#### Lime plants

Burnt lime is a raw material which is not available in every region. Wehrhahn supplies efficient lime kilns and milling plants specifically for the production of lime for AAC.

#### Dry mix mortar production plants

Dry mix mortar has proven itself in construction applications all over the world as a reliable cement, plaster and floor finish. Many AAC producers deliver it together with AAC. Particularly interesting to investors: Combined dry mix mortar and AAC

plants. Here, too, we offer expertise and service for international production applications.

#### Special projects

We offer processes an for the production and innovative building mat at laboratory level and over pilot systems to la plants.

#### For instance:

- · presses for lightweigh materials
- filter presses for gypsu





#### DRY MIX MORTAR AND LIME 29

- filter presses for calcium silicate boards

Engineering as a service for

• and much more

id machines	successful implementation
application of	of your projects
erials, starting extending arge-scale	A team of highly qualified engineers provides top-quality service for your engineering needs: our core com- petences are in the fields of design, planning and implementation.
nt insulation	Our service covers all aspects of mechanical and electrical engineering.
um fibre boards	Just ask us.



27 Bulk loading of dry mix mortar.

28 Efficient lime kilns for production of hard and soft burnt lime.

29 Storage silos for various types of lime.

## The perfect run of events ...

Every individual part of a production plant is a link in a long chain of actions and reactions. The key is perfect flow.

Wehrhahn technicians, IT specialists and automation engineers use their decades of experience to build control cabinets, connect machines and program PLC and PC controls conforming to the highest standards of functionality, safety and efficiency. Wehrhahn offers electric and automation solutions not only for Wehrhahn plants, but also for all kind of production processes in a wide range of industrial branches.

#### **Electric engineering**

Efficient engineering for effective and rapid installation from an ePLAN certified engineer.

#### Manufacture

Control cabinet manufacture for individual requirements worldwide. • all Wehrhahn control cabinets are manufactured, pre-assembled and tested in the over 700 m<sup>2</sup>
Wehrhahn workshop
reliable function ensured by use of high-quality components

 automatic assembly workstation for a fast "just in time" manufacturing

# Pre-wiring of machines to decentralized control cabinets:

- "Machine for the socket"
  Wherever possible the electric equipment like motor starters and PLC inputs/outputs are integrated and prewired in the machine.
  25% saving on installation time through prior cabling of all sensors, motors and valves
- up to 6,000 m less cable and 800 less contact points to be set on site
  machines are tested with control
- cabinets and programs before they get to the clients which means faster and simpler start-up on site

## Automation

Wehrhahn Automation is recommended by SIEMENS as one of just a few CERTIFIED SIEMENS SOLUTION PARTNERS.

A team of well trained and experienced automation engineers designs and programs for global requirements.

- PC and PLC programming in a logical methodical structure
  precise and time-optimised motion
- controls for motor and hydraulic movements • visualisation with all relevant
- machine and process parameters allows adjustment without programming knowledge
- program and process simulation not only to test programs in different circumstances but also to analyse the best process run

# 30

#### WECOMIX

The Wehrhahn intelligent, economic dosing and mixing control system for all mixing processes of various industries. It includes benefits like flexible dosing sequence, automatic dosing optimisation, individual report design etc.

#### WACO

The precise Wehrhahn autoclave control system for autoclave processes of various industries.

 automatic curve correction in case of disturbances

control of different valve types like electrically or pneumatically operated
adjustment of all sensor and pro-

cess parameters on the visualisation

## WH-EnMS

By using the Wehrhahn Energy Management System nearly every

**30** We test all control cabinets thoroughly before they get to the client.

#### AUTOMATION 31



production process can be optimised for energy saving. But which action has the most potential?

The Wehrhahn EnMS

WH-PCI System:

measures and saves the energy consumption of each machine
shows the energy consumption of a section on the visualisation
gives energy reports for certifications
includes energy saving actions like automatic interval, switch off or energy-recovery systems

Wehrhahn Product Control and Information System does not only collect product data over the entire process to guarantee constant high quality but also includes automatic adjustment to optimise machine parameters on product change or environment circumstances.

 $\cdot$  storage of product data into

- SQL database
- · export to csv-file
- data evaluation software with helpful tools like "search" or "filters"
- data exchange to ERP systems (Enterprise-Resource-Planning)

#### Wehrhahn safety concept:

Wehrhahn safety concepts are designed in collaboration with the German association. We design safety concepts which do not interfere with production.

#### Wehrhahn global service:

- · development of individual concepts
- modernisation or migration
- training in hardware and software (in German, Russian and English)
- world-wide technical support by remote control via modem, internet, telephone and e-mail or by specialists on site

INDIVIDUAL AND CREATIVE

# Client-specific plant development and service.

# Wehrhahn technical service

As a global market leader in the design and manufacture of highly efficient building material production plants, Wehrhahn meets the highest standards of reliability, quality and cost-effectiveness.

Our headquarters in Delmenhorst are home to our machine design, plant development and administration sectors.

Either personally or by remote maintenance on request.

#### Wehrhahn remote maintenance

After manufacture, every Wehrhahn machine undergoes function testing before the plant – pre-assembled as far as possible – is shipped to the client.

#### Installation and servicing

Installation, commissioning and startup of the plants at their final destination is overseen by our highly qualified engineers and programmers. The scope of support provided depends on the requirements in each case and ranges from a few service inspections to complete installation. Even after commissioning and startup we are always on hand to help.

After production commences, the plant can be monitored via Internet. Personal on-site support by our specialists is of course also available at any time.

#### The major advantages of Wehrhahn remote maintenance are:

- simple installation of modifications parameter transfer possible in both directions
- Wehrhahn engineers can intervene during normal operation
- · no travel costs.

Wehrhahn training courses Your staff is trained by professionals

**31** Training courses at Wehrhahn: the perfect preparation for your staff.

32 Our professionals provide on-site support.





who teach the basic expertise necessary to ensure trouble-free operation of your plant.

#### **Client-specific plant** design and service

We deliver solutions for success: as well as construction projects from scratch, we also develop innovative concepts for the upgrading of existing plants.

An experienced team of engineers and technicians provides support with both mechanical and electronic aspects from initial design to successful implementation. Detailed advanced planning ensures the trouble-free and timely start-up of your plant.

# Benefit from our expertise

Wehrhahn is a global presence – and therefore never far away. Satisfied clients in all parts of the world rely on our fast and expert service every single day.

## DEVELOPMENT ON PRINCIPLE

Practical innovations through close client collaboration and constant exchange with research and training partners.

Research and development The continuous new and further development of our machines, plants and production processes requires a high level of qualification and the advanced education of our engineers.

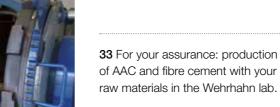
This constant innovation results in successful and exclusive Wehrhahn products. These include the "zero system waste" technology as well as patented individual machines.

We maintain close contact with our clients, research institutes and universities. This lively exchange of information and experience also

flows into the further development of our technology.

The Wehrhahn laboratory We undertake detailed laboratory testing of regionally available raw materials. These form the basis for improving formulas and ensure the smooth running of production processes.

- Testing of raw materials (XRF & XRD) Production of AAC and fibre
- cement in pilot runs
- Autoclaving possibilities Testing of compressive and flexural
- strength, shrinkage and other quality parameters.



**34** A simple sketch can reveal so much. Personal contact is still a central focus at Wehrhahn.





Data found in the lab deliver real values which can be transferred to original dimensions.

#### Technology and the environment

The resources of this unique planet are finite, and we have a huge responsibility to future generations. The use of ecological building materials is therefore becoming increasingly important.

Present us with a challenge and benefit from our expertise – acquired over years of experience in various sectors under a wide range of conditions in all climate zones of the world.

AT YOUR DISPOSAL

# We will be happy to provide you with further information on request.

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