

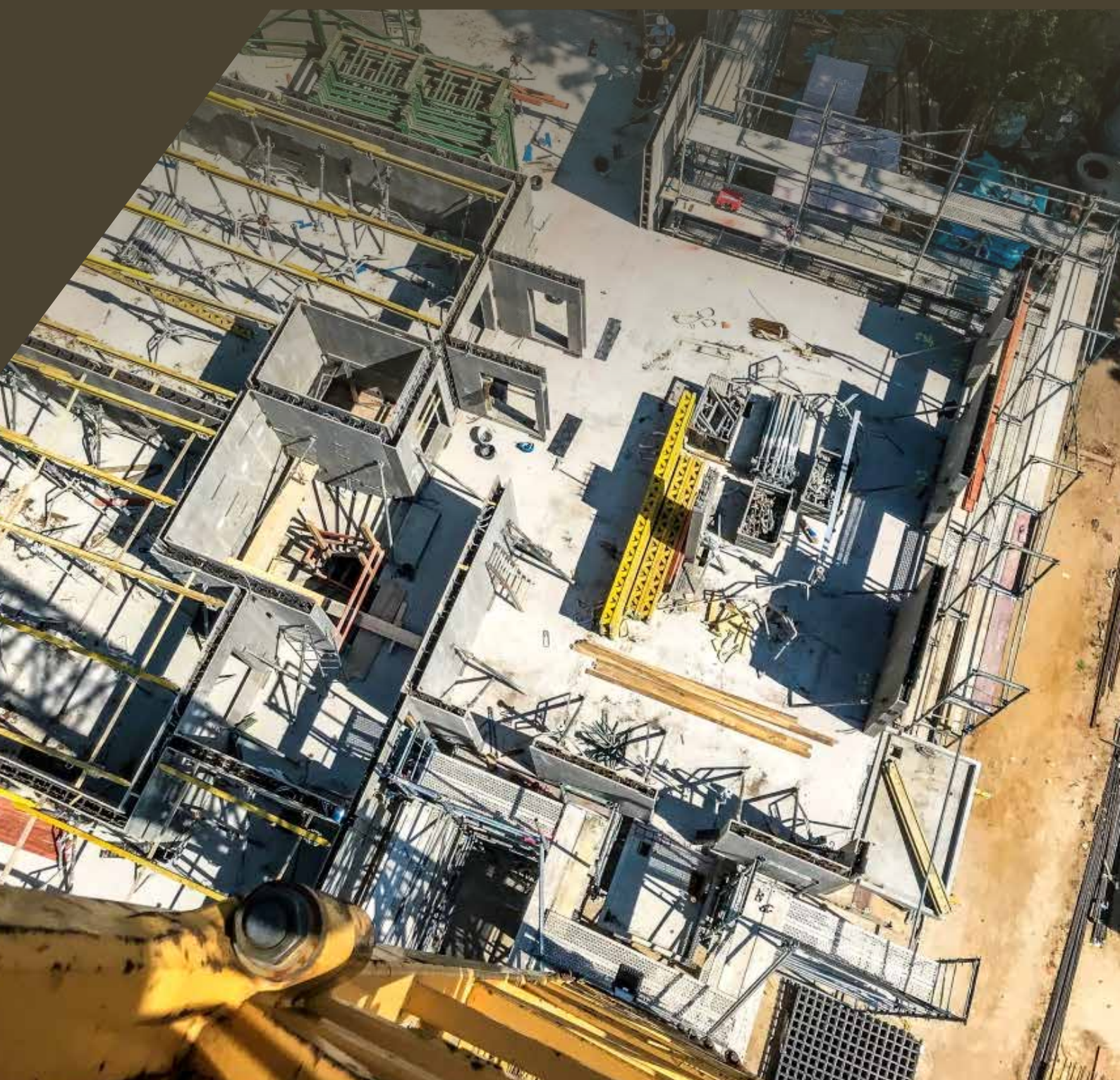
The background image shows a large industrial facility, likely a manufacturing plant for construction equipment. It features complex green metal frameworks, conveyor systems, and various mechanical components. A worker is visible in the distance on a platform. The lighting is bright, coming from large windows in the background.

# VST BUILDING TECHNOLOGIES AG

The Future of Construction

Technology Transfer





# VST - the building technology of the future

The innovative, patented VST technology satisfies the highest quality requirements and offers significantly shorter construction times compared to conventional building methods, with no restrictions on the client's

creative freedom. At the same time, the total costs of a construction project are significantly lower. The key to this unique optimization is the prefabrication of all VST components in the VST manufacturing plant.

## Industrialization of construction in response to the shortage of skilled workers

Prefab or offsite building systems are becoming increasingly popular. One of the driving forces behind this development is the shortage of qualified personnel on most markets: It is becoming increasingly difficult to find competent people to work on construction sites. VST is a pioneer in the industrialization of building processes. All VST components, such as walls, slabs, columns, beams, stairs, etc., are made in the

VST manufacturing plant and transported to the respective construction site just-in-time. The concreting process then takes place on site. Compared to other construction methods with prefabricated components, such as precast concrete elements, VST elements are much lighter, which is why the transport capacity and hence the delivery radius of the plant (up to approx. 2.000 km) are so much greater.

# The VST system

The next generation of  
formwork technology



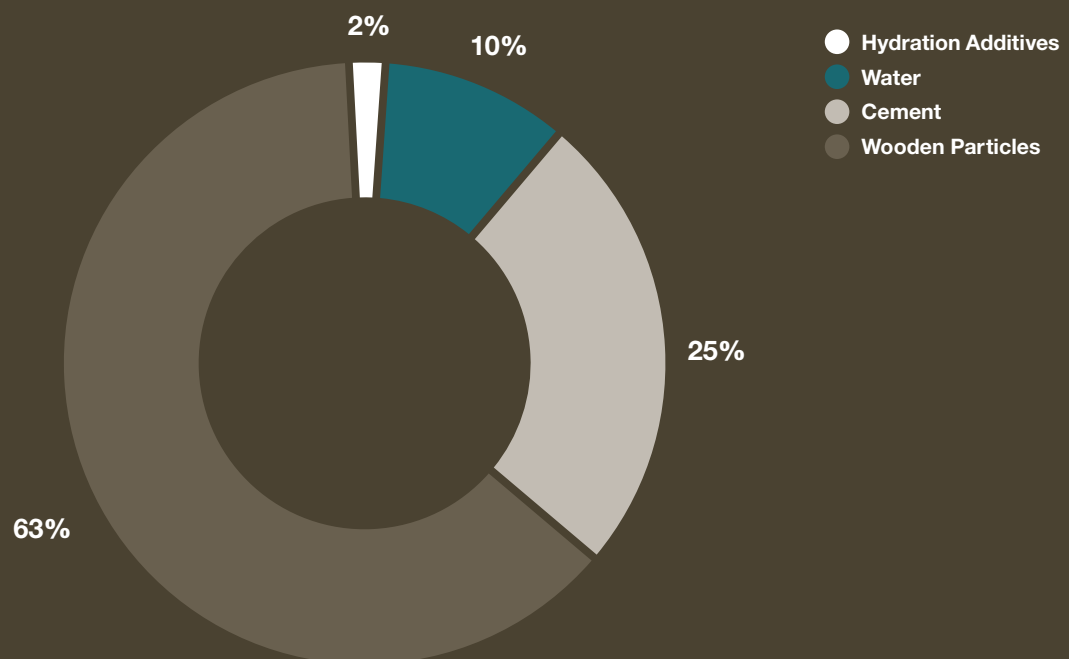
The VST system is based on the principle of composite formwork. The formwork is not removed but incorporated into the concrete core and thus becomes part of the building. The formwork removal procedure is therefore rendered obsolete, which shortens the construction time, avoids construction site waste, and increases safety on site.

## Building in timber or reinforced concrete? A combination of both!

Deciding between resource-saving and fast timber construction on the one hand and solid and weather-resistant reinforced concrete construction on the other is often not easy. VST combines the advantages of both these construction methods. The VST elements are manufactured from 24 mm thick cement-bonded particle boards, which are made

from approx. 70% wood and approx. 30% cement. VST buildings have advantages of timber construction, such as a pleasant indoor climate and excellent moisture balance, as well as advantages of reinforced concrete construction. These include very good sound insulation, heat storage and excellent fire protection properties.

### Composition of cement-bonded particle boards



# Benefits of VST at a glance



## **Industrialization of the construction processes**

High degree of industrial  
prefabrication



## **Short construction time**

Reduction by up to 50%



## **Greater creative freedom**

Custom-made  
for the client

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**Green Technology**

Passive-house appropriate components – fulfillment of the most modern requirements for energy efficiency

**Very good sound insulation**

(up to  $R_w$  62dB)

**High fire protection**

Surface of the particle boards and concrete core are not flammable A2-s1, d0

**Monolithic construction**

Resilient seismic safety

**Termite free and mold resistant**

due to high pH

**Local production**

Boost your local economy

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# Products

## VST wall



The VST wall consists of two, approximately 24 mm thick cement-bonded particle boards that are connected to each other by special spacers. If required, reinforcement, empty electrical piping as well as heating and sanitary piping can already be integrated into the VST walls. The walls are manufactured according to the individual production plan. All openings and break-throughs (e.g. for doors, windows, empty electrical piping, etc.) are cut out in the factory. The thickness of the wall is variable depending on the structural requirements. On the construction site, the cavity between the two particle boards is filled with concrete. This connects the concrete core permanently with the particle boards. VST walls are generally used as load-bearing walls.

## VST slab



The VST slab consists of a cement-bonded particle board to which steel hat profiles are fastened and form the basic reinforcement. As with the VST walls, openings and breakthroughs are cut out in the manufacturing plant, and slab edge formwork can be mounted in the factory. The additional reinforcement

is applied on the construction site and the concrete poured. The VST slab can be easily connected to thermal separation elements. The thickness of the concrete slab can be freely selected according to static requirements.

# Products

## VST beam and column



VST beams and columns are individually manufactured in the plant and fully reinforced, so that only the concrete has to be poured on the construction site. The support columns can be connected to the VST shear head, which avoids the risk of shearing.

## VST stairs



VST stairs can be assembled quickly and easily on site. The stairs can already be used in early construction phases, meaning that the use of ladders can be dispensed with to a certain extent. This reduces the risk of accidents on the construction site. The reinforcement is installed into the stairs in the plant. VST stairs can be combined with a variety of acoustic separation solutions.

# VST manufacturing plants

## Manual double line



VST wall elements are manufactured on the manual double line. Up to 180.000 m<sup>2</sup> of VST walls can be manufactured per year on a manual double line.

At the heart of the manual double line is the universal saw with automatic feed system and vacuum manipulator. The saw is positioned in the center of both production lines and cuts the cement-bonded particles boards to the necessary size. Openings (e.g. for windows or doors) are also cut out.

After the cuts are made, the specially developed steel spacer profiles are screwed onto the particle boards in the screwing station. The spacer profiles are fastened in place by galvanized countersunk screws without the screws penetrating the surface of the elements from the inside. This preserves the ready-to-paint surface of the VST elements.

After the spacer profiles have been screwed in place, the elements arrive in the press. The reinforcement meshes are installed before the pressing procedure. In addition, the empty electrical pipework (incl. electrical sockets) as well as the heating and sanitary pipework are installed in the elements. After all the components have been installed, the two element halves are pressed against each other, with the spacer profiles being permanently connected to each other by means of a click system.



# VST manufacturing plants

## Slab and special element production

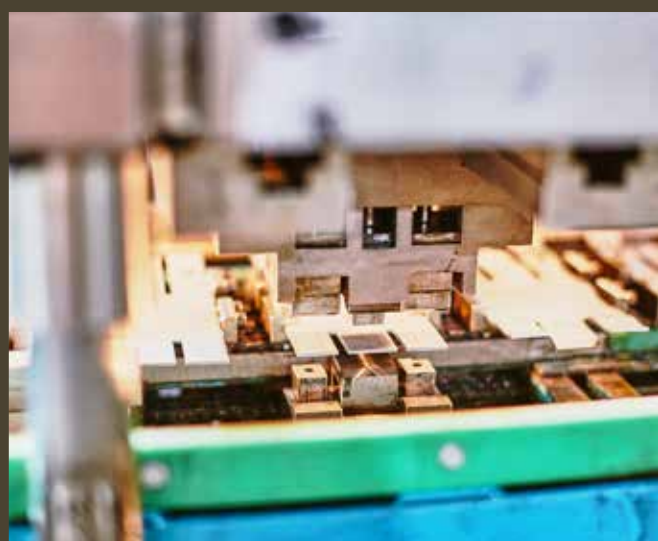


Slabs are produced by first cutting the cement-bonded particle boards to the necessary size with a universal beam saw. The hat profiles are screwed onto the cement-bonded particle board from above with galvanized countersunk screws at 40 cm distance without the screws penetrating the surface of the elements from the inside. In addition to the VST slabs, the VST columns and beams are produced in this station.

## VST metal fabrication



All spacers, steel components and reinforcement elements required for production and transport are manufactured or machined in the VST metal fabrication. The VST plant requires only the necessary raw material for production, such as rolled steel and reinforcing steel. The punching machine produces the spacers profiles from slotted strip material, whereby different punching heads enable the production of different sizes of spacer. This allows the thickness of the VST walls to vary as required to suit the static requirements. The bending machine processes the rolled steel that is needed for the corner reinforcements and the shear heads.



# VST manufacturing plants

## Automated production line



The cement-bonded particles boards are picked up by the handling robot and placed on the conveyor system. The boards are fed automatically through an edge processing machine, where the groove and tongue are milled on both long edges of the board as it passes through, after which glue is applied. The individual boards are pulled together and pressed to form an “infinite” board.

After the standard board elements have been pressed, the “infinite” board is immediately cut to the required length of the wall element. The boards are individually cut to size with a water jet saw.

Two screwing robots with grabbing and placing devices especially suited for the spacers simultaneously screw the spacer profiles onto the boards. The screwing robots are automatically supplied with the spacer profiles and the screws.

*\* Building Information Modeling*

The boards with the spacer profiles screwed in place are positioned vertically and fitted with all components (reinforcement, empty pipework, sanitary and heating pipework, etc.). The two halves of the wall are then pressed together.

The finished walls are guided by a ceiling crane into the finishing station, where the final inspection and any necessary rework is carried out.

The automated production line is controlled by specially developed software. The plans for the elements to be produced are first created with a BIM\*-based planning program. Next, they are sent to the manufacturing plant's controlling computer, which automatically manufactures the elements on the automated line according to the plan specifications.



# VST manufacturing plant packages

## Compact



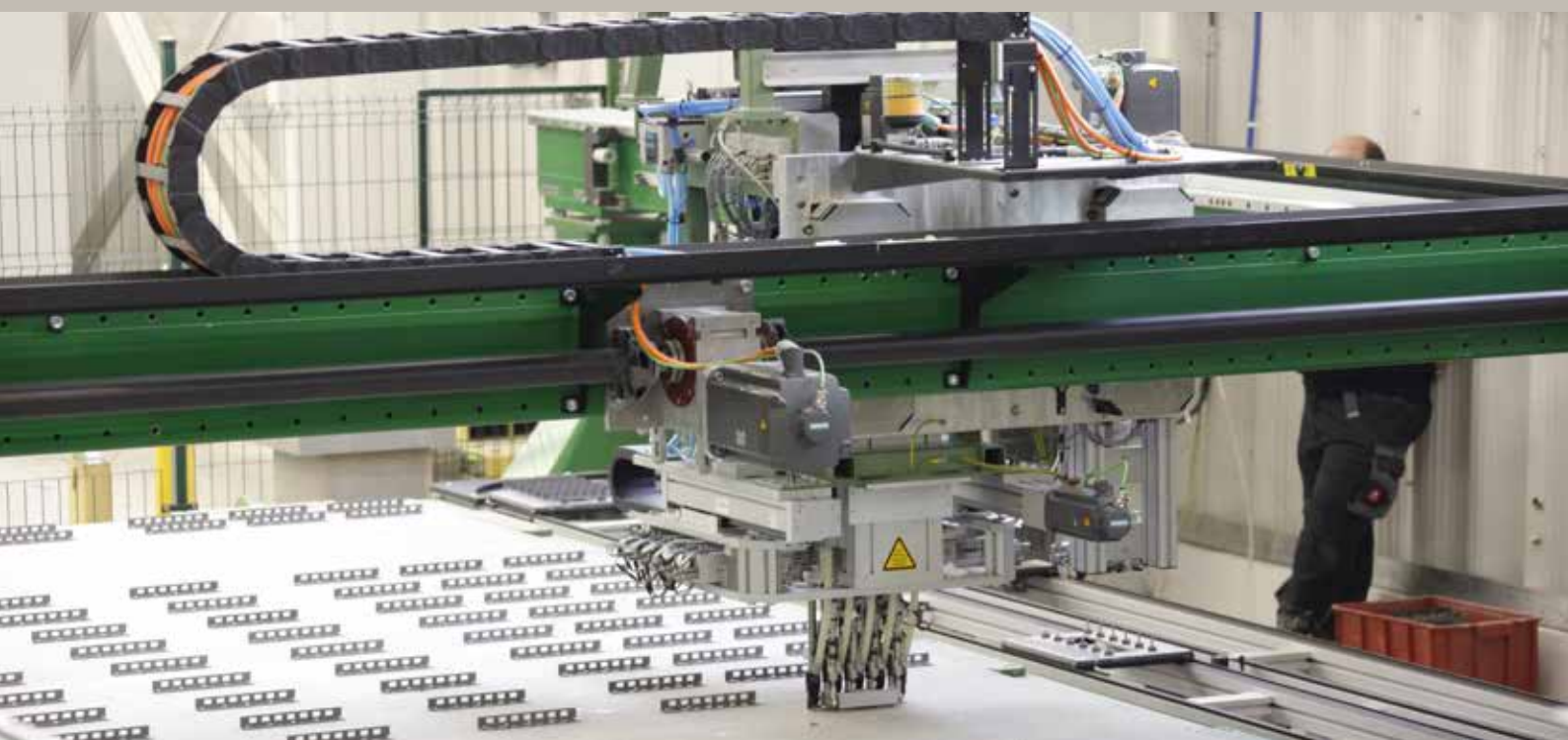
The manufacturing plant package Compact consists of a manual double line for the production of VST walls, a slab and special element production line and a metal fabrication. All VST products can be produced with the manufacturing plant package Compact. The manufacturing plant package Compact can be planned for easy expansion at a later date. This package is suitable for an annual project volume of up to 130.000 m<sup>2</sup> gross floor area.

## Select



Compared to the Compact package, the manufacturing plant package Select has a second manual double line for the production of VST walls, which doubles the production capacity of VST walls. The package therefore consists of two manual double lines, a slab and special element production line and a metal fabrication. This package is suitable for an annual project volume of up to 250.000 m<sup>2</sup> gross floor area.

## Premium



The manufacturing plant package Premium consists of an automated production line for VST walls, a manual double line (also for wall production), a slab and special element production line and a metal fabrication. Due to the partial automation, the manufacturing plant package Premium offers maximum production capacity for relatively low personnel requirements. This package is suitable for an annual project volume of up to 340.000 m<sup>2</sup> gross floor area.

# VST manufacturing plant packages

## Overview of manufacturing plant packages

	Compact	Select	Premium
Manual double line (Wall production)	✓	✓✓	✓
Automated line	–	–	✓
Slab production	✓	✓	✓
Metal fabrication including reinforcement preparation	✓	✓	✓
Special element production	✓	✓	✓
Max. production capacity Walls	180.000 m <sup>2</sup>	360.000 m <sup>2</sup>	480.000 m <sup>2</sup>
Max. production capacity Slabs	130.000 m <sup>2</sup>	250.000 m <sup>2</sup>	340.000 m <sup>2</sup>
Minimum size of site	10.000 m <sup>2</sup>	15.000 m <sup>2</sup>	22.000 m <sup>2</sup>
Minimum size of production hall	5.000 m <sup>2</sup>	8.000 m <sup>2</sup>	15.000 m <sup>2</sup>
Time from contract signing to commissioning	12 months	12 months	18 months



# Technology Transfer

VST offers the delivery and assembly of the manufacturing plant packages mentioned above. The production hall in which the VST manufacturing plant is to be installed should be made available by the client. The technology transfer also includes a training program in the areas of Production, Engineering and Assembly. The training takes place in parallel with the

delivery and the setup of the VST manufacturing plant. A one-time license authorizes the client to manufacture and distribute the VST system within a defined region. The technology transfer enables the client to independently manufacture and distribute and build with the VST system.



## Training program

All information needed for the planning, production and assembly of the VST system will be passed to the customers or their employees during the training program. The customers will be given comprehensive training materials so that they have access to all relevant information at all times after the training is over.

The training is arranged into the following areas:

**Planning and Engineering:** The customer learns about planning the supporting structure coordinated to the use of the VST system and about planning the VST elements for production.

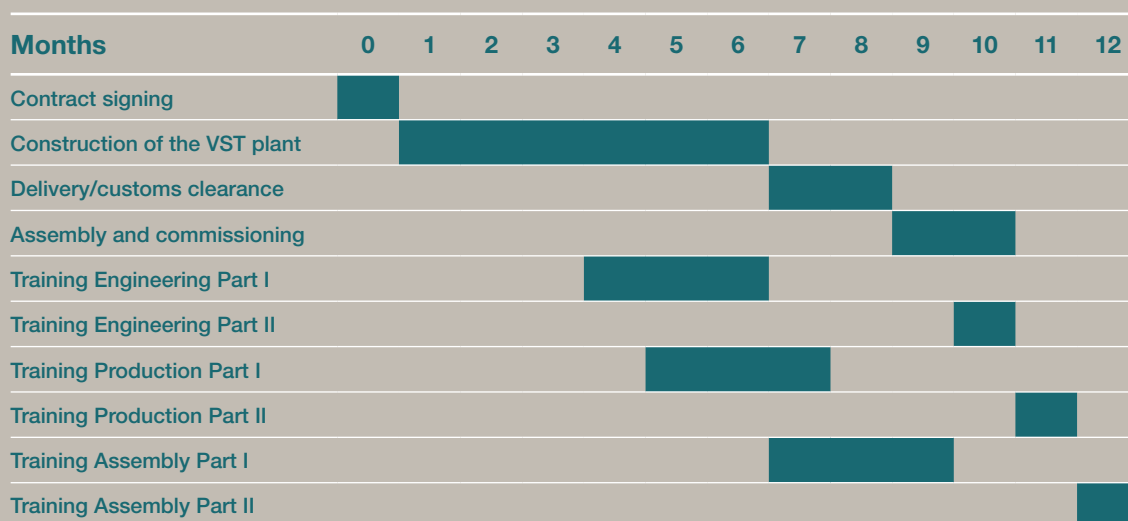
**Industrial Production:** This training area deals with the entire production process of all VST elements in the VST manufacturing plant. The customer will also be informed of measures for optimizing the efficiency of the manufacturing plant.

**Assembly:** The final topic area deals with the assembly of the VST system on the construction site. Information about the necessary materials and tools is also provided.

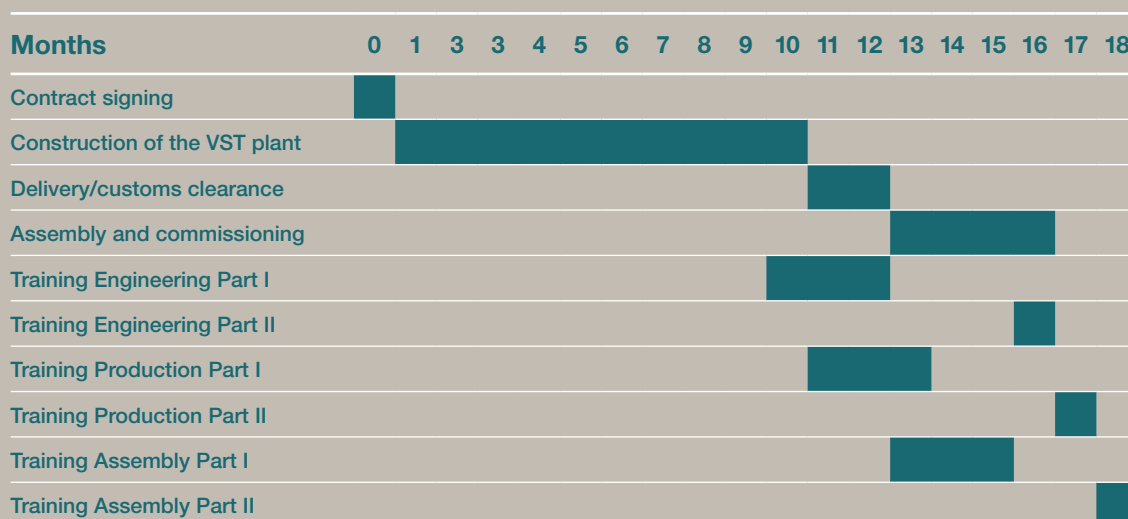
The training in each topic area (Planning and Engineering, Industrial Production, and Assembly) is broken down into two parts, with the first part of the training taking place on the premises of VST in Europe or on a VST construction site in Europe. The second part

of the training takes place in the offices of the customers, in the new VST manufacturing plant, or on the first VST construction site of the customer in their country.

*Timetable of the training program for the manufacturing plant packages Compact and Select*



### Timetable of the training program for the manufacturing plant package Premium



# Raw materials



**The following raw materials are needed for production:**

- Cement-bonded particle boards\* approximately 24 mm thick
- Reinforcing steel and meshes
- Hot-rolled steel

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*\* Cement-bonded particle boards are manufactured amongst others in Canada, Germany, the Czech Republic, Portugal, Turkey, Belarus, Japan, India, Russia and China and delivered worldwide.*

# Production hall



Depending on which manufacturing plant package the customer requires, a site with a minimum area of 10.000 m<sup>2</sup> - 22.000 m<sup>2</sup> will be needed. The production hall must – again depending on the selected manufacturing plant package – have a minimum

area of between 5.000m<sup>2</sup> - 15.000m<sup>2</sup>. The precise arrangement of the rooms and machines - and thus the shape and layout of the production hall - is flexible. VST supports customers with creating the optimum layout of the production hall.

## Other requirements

- The concrete floor must be at least 200 mm thick, apart from beneath two presses, where the concrete must be at least 550 mm thick.
- Depending on the manufacturing plant package, between 8 and 15 ceiling cranes with a lift capacity of 1 to 5 metric tons each will be required.
- The height between floor and crane hook must be at least 6 m (in case the trucks need to be loaded in the hall).
- The halls must have a compressed air distribution rate of 120 m<sup>3</sup>/h at a pressure of 8 bar.
- The installed power output of the machines supplied by VST is approx. 220 kW.

# Transport to construction site



The VST elements are transported from the production plant to the construction site in standard trucks. The VST elements are loaded in the production plant by crane and unloaded by crane again on the construction site. Up to 190 m<sup>2</sup> of walls or up to 490 m<sup>2</sup> of slabs can be delivered in a standard truck. The elements can be transported upright to a maximum height of 2,90 m, otherwise they will be transported lying flat.





## CONTACT

You are interested in investing in a VST manufacturing plant?  
We look forward to hearing from you.

We would be pleased to organize tours of VST manufacturing  
plants and VST construction sites for interested customers.

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