Avermann Maschinenfabrik GmbH & Co. KG, 49078 Osnabrueck, Germany

Third pallet circulation system for double walls delivered to SEAC in the south of France

Various precasters in France are increasingly pressing forward with the utilisation of double wall elements. SEAC, a company with headquarters in Toulouse, has played a major role in the introduction and propagation of this construction system. This third double wall manufacturing facility means that SEAC has come much closer to achieving its aim of establishing a production basis capable of covering the entire south of France. The plant at St. Jean d´Illac has also raised technical capabilities to a new level aided by computers and robots.

New production hall at St. Jean d´Illac

Thomas Strach, Avermann Maschinenfabrik GmbH & Co. KG, Germany

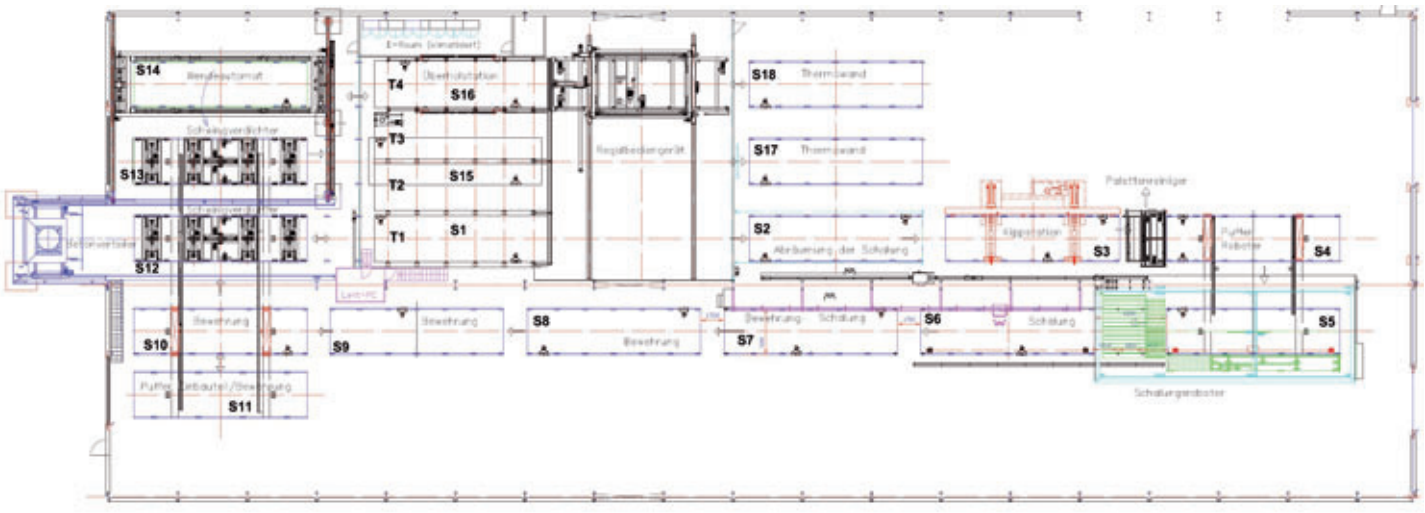
SEAC 1962 was founded by Pierre Guiraud in 1962. The company has known continuous expansion up to the present time due to its constant, professional work. Today, under the leadership of his sons, Jacques and Laurent Guiraud, a total of 20 sites manufacturing the most varied of precast products have come into being in France. Thanks to this development, SEAC will also in future have a cutting edge role to play on the French market.

After installing circulation systems in Pamiers 2003 and in Saint Martin de Crau 2006, SEAC decided to follow on at the beginning of 2008 by tackling the construction of a new double wall production facility near Bordeaux. The planning criteria for the new precast facility were generated by Reymann Technik, as with the two other facilities already completed. Many of the customer's suggestions and ideas were able to be elaborated and implemented during the tendering process. A bidding consortium composed of two companies, Avermann and SAA Engineering, was able to offer specific customised solutions at this stage. This meant that, in the end, Avermann was awarded the contract.

Once the other tasks had been assigned, any coordination work necessary was carried out under the oversight of Reymann Technik. Concurrent with the construction of the new production hall, work commenced on a new mixing plant with concrete recycling and all other outdoor storage facilities. With its length of 94 m and a total width of 34 m, the hall is precisely tailor-made to the factory design chosen. The impeccable time scheduling enabled assembly to begin on the circulation system on time in November 2008. The plant is principally planned for manufacturing double walls but can, if required, also produce element floors.

The curing chamber area is made up of four racks built up on a steel platform with a passage making it possible to travel underneath the same. Storage capacity in the totally insulated curing chamber is set up for 39 pallets. With a pallet size of 12.50 x 3.30 m, approximately 400-450 m² of double walls are feasible in one shift - generating a yearly production performance of some 110,000 m² in single-shift operations.

The curing chamber is fed by an electro-hydraulic storage and retrieval unit which has been set up at an optimum 12 minute cycle time as with all other circulation system components. The Avermann storage and retrieval unit possesses other impressive features like



Layout

Plant overview

Storage and retrieval unit plus curing chamber

ground-level operations without the need for a pit as well as height-optimised storage technology. These design measures put Avermann in a position to be able to store two pallets more in each rack at similar hall heights than is generally the case with other systems. The pallets bearing the hardened double walls are stripped of their formwork directly behind the plant feeding the curing chamber. The built-in magnets in the Ratec shuttering elements are released and are immediately transported by conveyor to be cleaned. The walls are lifted at the following tilting bay. According to customer preferences, this lifting can be carried out vertically with a crane or horizontally with a vacuum crossbeam. Further transportation to the directly adjacent storage area takes place manually with a crane. The finished product is prearranged there for transport.

Empty pallets are transported through a pallet cleaner to an intermediate storage bay in front of the formwork area. This is

Plant overview – formwork stripping area with tilting bay

Avermann formwork robots

located within the automated section and when a formwork bay is signalled as "free", the pallet is placed automatically under the Avermann formwork robot by means of a transverse transporting device. The robot's layout within this formwork and component storage area is very economical in terms of space in order to shorten the distances travelled and to minimise travelling time. The formwork robot performs all shuttering work permitted by the raster plus the plotting of all elements whose shuttering is not generated automatically. After their combined cleaning and oiling, the formwork components, themselves, are identified and conveyed to active repositories on the front side of the pallet. The management of this active repository system is integrated in the SAA robot control unit and permits all 30 formwork compartments to be accessed freely and directly. All formwork components, inasmuch as they are both available and needed in this active repository system, are employed on the pallet currently being shut-

Active formwork repository

Passive stacking areas for Pro-Boxes

Feed belt for Pro-Boxes

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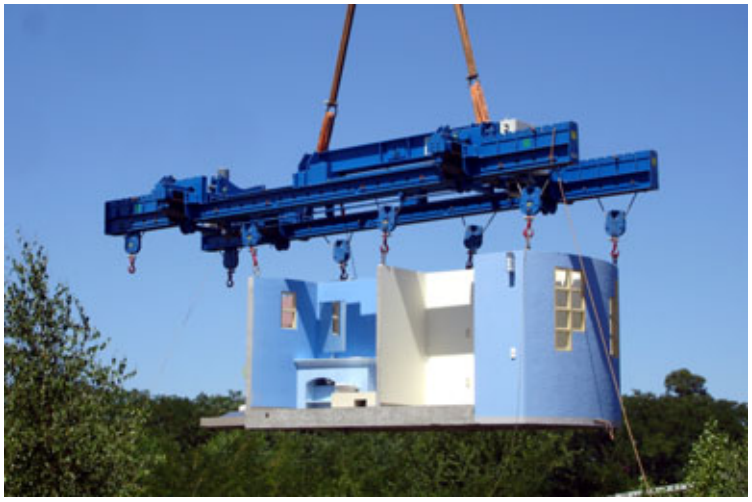

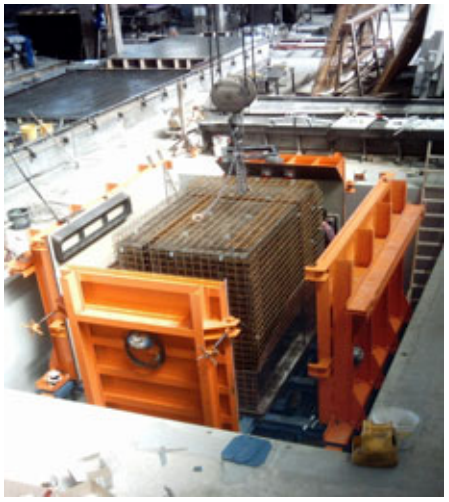

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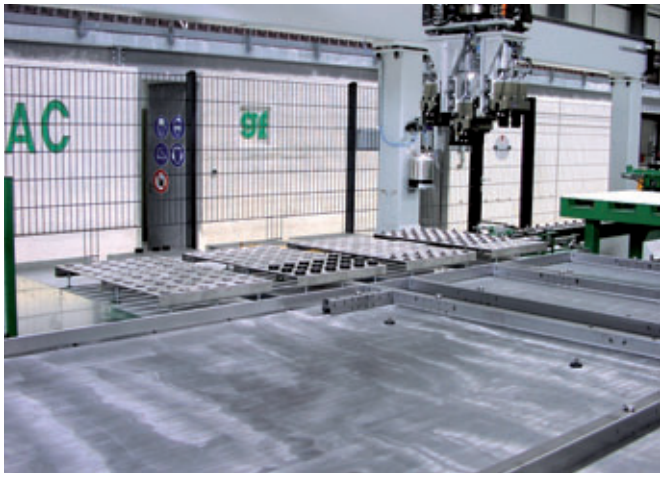

Passive storage containers for round magnets

Manual formwork bays with work station system

Steel processing unit

tered. Those formwork elements that are not on hand are taken by the robot from the passive repository that is located on the pallet's longer side.

Restacking the formwork from the active to the passive repository only then takes place if the transverse transport at the end is occupied and no other means of transporting the formwork is possible. Unnecessary movements by the robot gantry can be avoided this way – time can be saved and wear minimised. Several special solutions were put into effect in this domain of robot and repositories.

For example, the Standard Pro-Boxes (SPB 450) from Ratec move on a separate transport line into the automated section. At the end of this line, segregation takes place and the robot can remove two Pro-Boxes at a time to be used in the formwork. Unneeded Standard Pro-Boxes are stored by the robot in a flat stacking area.

Being able to relocate the round magnets with the robot gripper without having to change head or tool is one other particular feature with the system. The round magnets are arranged in two tray-type storage containers that can be operated and loaded from the outside without stopping the workflow.

SAA has devised an optimum system that has already become well-known for shuttering and locking formwork. The spacing between the shuttering elements is minimised when setting up the formwork and the magnets are subsequently activated. This means that the greatest accuracy and highest quality can already be attained at the formwork stage.
Once the automatic formwork processes have been completed, the pallet travels out of the automated section. Supplementary shuttering work is carried out at both of the following manual formwork bays. A work station system with a travelling tool trolley is at the operator's disposal here. Power connections, hot glue gun and a shuttering oil spraying device are immediately accessible as are the electrical fixtures to be inserted or Styrofoam from the shelving.

From there, the path continues on to three standard reinforcement bays and a working bay for special components set up outside the circulation line. Parallel to this latter line, a Filzmoser steel and lattice girder processing plant has been situated by the hall's wall. The rods and lattice girders requested via the master computer then only have a short way to travel before being inserted directly into the pallets.

After a short quality check, the pallets, with both formwork and reinforcing completed, are transported sideways to the concreting and compacting bay. The bridge-design concrete spreader is filled directly under the mixer. A weight measuring device allows for the exact amount required and avoids unnecessary concrete residues. The concrete spreader is operated manually but has been prepared for automatic operations.
SEAC's high demands on quality for the manufactured element surfaces are transposed into reality with their Avermann vibratory compaction systems in the best possible way. The vibratory compactor in the concreting bay is responsible for the element floors and first shells produced for the double walls; the neighbouring vibratory compaction system is employed for compacting the double wall elements. The element floors and first shells are transferred under the rack directly in front of the concreting and compacting bay to their storage space. On the way, the floors pass through a lowered roughening rake in order to prepare the surface for bonding later with the in-situ concrete. Completed double walls travel to the curing chamber from the neighbouring vibratory compactor on their own track.

The master computer is responsible for assigning those first shells of the double walls that are hardened and ready for a third production line. The passageway under the rack has been designed as an lifting bay where "overtaking" can take place to avoid creating bottlenecks. The first shell pallets, now empty on their return journey, can be placed into intermediate storage at this lifting bay so as not to impede the progress of the next first shells.
Once the tilting table machine has been supplied, the empty pallet can proceed on its way to be cleaned. The tilting table machine handles the pallets on this third production line. Once both pallet

Concrete spreader

Vibratory compactor and concreting bay with concrete spreader

and elements have been clamped in place, the tilting bay is ready to lower the first shells into the freshly concreted second shell thereby producing a new double wall.
The storage and retrieval unit comes into play once again at the end of the production sequence. The freshly concreted double wall elements are placed in storage for curing; hardened walls are transported to the formwork stripping area or first shells to the tilting table.

The master computer plus the control unit for the circulation system and robots were delivered and commissioned by SAA in their entirety. The Leit2000 master system controls both the plant's logistics as well as data transfer to the central office in Toulouse. Individual production processes are set down in varying process plans and are incorporated on the pallet at the robotic formwork bay. These process plans define the production flow in stages and prescribe the different routes of the pallets within the production lines. The user-friendly master system enables the operations manager to intervene in the process at any time or to carry out alterations e.g. to the drying time. Plans for new wall types, such as an insulated double wall, can also be issued by the production manager.

It is perhaps worth mentioning that a complete set of production documents with evaluations, tables and statistics is available at any given moment. CAD data for the machines' control units is prepared

and transmitted automatically. Extracts with element contours plus the inserted position of any components and reinforcing are simultaneously printed out on individual sheets for the manual work. These accompany the pallet on its entire journey and contribute to the smooth process flow with its accompanying assurance of quality. One point that should not be underestimated is the comprehensive remote maintenance of the control system. Any errors occurring can be diagnosed and remedied via the internet.

Thanks to very close cooperation with the customer and SAA Engineering, Avermann was able to carry out this project without a hitch, successfully and on time. SEAC has also once again underscored its success as a company and can confront the market in an extremely competitive way.

Overview - compaction bay and tilting table machine

Plant overview – robots / tilting bay / curing chamber

FURTHER INFORMATION

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