Siempelkamp

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World record at the foundry: The world's largest casting made of cast iron with spheroidal graphite **World premiere:** Assembly of the cooling structure for the world's first Core Catcher **Future market:** Transformer board presses **Record-holding steel cord conveyor belt press:** Grand opening at Fenner Dunlop **Front-end technology:** Hombak expands the Siempelkamp product range

bulletin

The Siempelkamp Magazine

PEOPLE | MARKETS | MACHINES

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Dr.-Ing. Hans W. Fechner
Chairman of the Executive Board
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Dear Readers:

In times of the financial crisis our success is based on meeting swift changes with the foresightedness to provide our customers with solutions that secure them competitive advantages.

The articles in this Bulletin are proof of this flexibility. We welcome Hombak, providing customers in the wood-based products industry with a number of products for the front-end area, to the Siempelkamp Group of companies. CMC Texpan has become more integrated into the technology, production, and innovation pool of the Group including new products in the area of wood processing. Further areas were opened up with our involvement in the fields of biomass power plants and transformer board presses.

At the same time, a few records demonstrate how our products and technologies maintain the pole position in their markets. In July, Siempelkamp Foundry poured the largest casting ever made of cast iron with spheroidal graphite. In the same month, we celebrated together with our customer Fenner Dunlop the start-up of a new facility for the production of steel cord conveyor belts in Kwinana Beach, Western Australia. Here, the world's largest press for steel cord conveyor belts, which was manufactured by Siempelkamp, was installed! Also a record-breaking project, by Siempelkamp Nukleartechnik, involved a reactor vessel sealing lid for the nuclear power plant Brokdorf, which helps save the customer time during inspections.

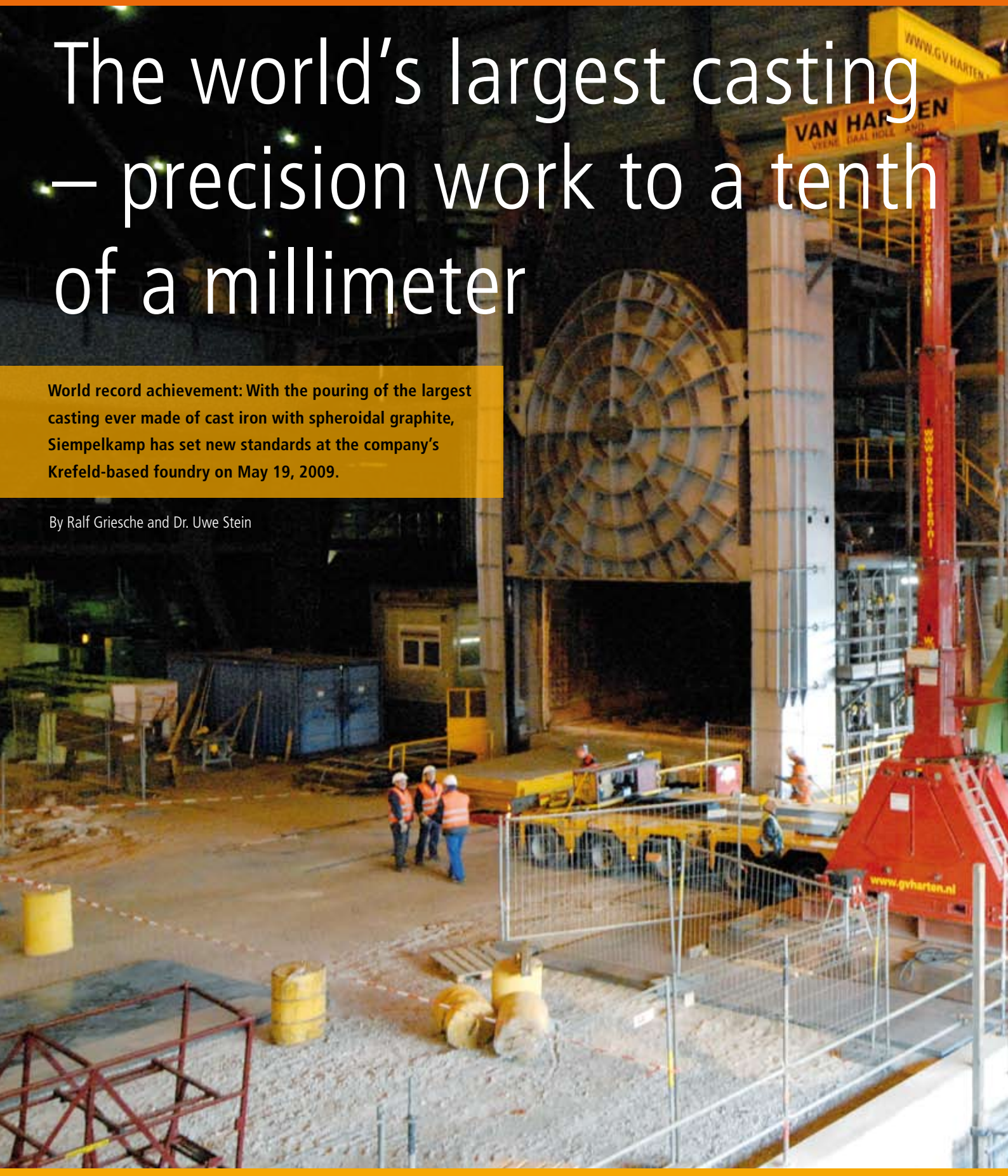
The conclusion: Siempelkamp stays flexible and on the ball when it comes to providing our customers with concepts that are customized to their needs. With this in mind, we are looking forward to the year 2010.

We wish you and us continued close cooperation, constructive dialogues, and a successful and busy 2010!

With kind regards and best wishes from Krefeld,

Dr.-Ing. Hans W. Fechner

The world's largest casting – precision work to a tenth of a millimeter



World record achievement: With the pouring of the largest casting ever made of cast iron with spheroidal graphite, Siempelkamp has set new standards at the company's Krefeld-based foundry on May 19, 2009.

By Ralf Griesche and Dr. Uwe Stein

Lower bolster for the press at the building site

Design process

3D image

Calculation according to …

Camera crews are not a daily occurrence at Siempelkamp Foundry. If, at the same time, the board of directors of one of the largest heavy plate manufacturers and the president of the German Foundry Association are present something spectacular must about to be happening. On May 19, 2009 Siempelkamp poured the world's heaviest casting made of spheroidal graphite cast iron, that is, the upper bolster for a straightening press with a raw casting weight of 252 t (278 US tons).

Twelve months prior to the pouring, the Dillinger Hüttenwerke AG had ordered from Siempelkamp a new straightening press for heavy plates to meet the increasing demand for thicker high-strength plates. The press manufactures steel plates with dimensions that have to meet high demands.

Heavy plates are manufactured with a thickness of up to 300 mm. In part they are supplied with very smooth surfaces.

The press plunger not only has to apply enormous forces, it also needs to be highly precise. It has to be operated with a precision of a tenth of a millimeter.

The plates made in Dillingen are high-tech products made of high-strength steel. Though hardly noticeable in everyday life, they are omnipresent. Examples include supporting parts of bridge constructions, extension arms of mobile cranes, and hulls.

Founded in 1685, Dillinger Hütte is Germany's oldest cooperation with a long-standing tradition in Europe. Superlatives are on the daily agenda in Dillingen. The company from the Saarland region supplied the plates for the world's largest offshore wind farm 'Horns Rev' which is located in the Eastern North Sea off the coast of Denmark and the world's highest bridge. The bridge with a height of 345 m (377 yards) leads over the Tarn River in South France. Also the world's most efficient digger, which can accommodate 42 cubic meters of oil sand with just one shovel filling, consists mostly of heavy plate made in Dillingen. The requirements of the machinery at Dillinger Hütte are extraordinary: Presses for plates with a weight of up to 60 t (66 US tons) are not produced in serial production, they cannot be bought from a catalogue. There are only a few manufacturers that have the experience in making presses of this size. One of them is Siempelkamp.

Early on in the planning process for the new press, representatives of Dillinger Hütte contacted Siempelkamp. Both companies have had business relations for years. The company in Dillingen has been operating two Siempelkamp flanging presses with press capacities of 22.5 and 25 MN. Dr.-Ing. Hans W. Fechner, chairman of the Executive Board of the Siempelkamp Group, notes: "Dillinger Hütte would not have contacted us if they had not been satisfied with the other two presses."

Up-to-date heavy-duty steel – a challenge for plant engineering

The new press is designed for plates made of high-strength materials with a tensile strength of up to 1,200 N/mm². These steels are so robust that a rod with a diameter of a single strand of spaghetti could carry a load of 120 kg (265 pound). The press will straighten plates with a thickness ranging from 50 to 300 mm (2 to 12 in), a width of up to 5,200 mm (205 in) and a length of up to 19,000 mm (748 in).

Even for Siempelkamp these are not common day-to-day requirements. However, our engineers make use of the experience of many previous comparable projects. Also, they benefit from a combination that is unique in the industry. Their co-workers at the

… the Finite Element Method

Siempelkamp Foundry work on the same premises and are readily available if something needs clarification.

The design engineering and construction of large presses require other methods than those used for repetition parts: Before a new machine, which was produced in serial production, is introduced to the market, the manufacturers will test prototypes and initial batches thoroughly. Many details are optimized in this way before serial production starts. For large presses this is completely different. In their performance class every machine is unique. This means that from the day it is put into operation the prototype has to work reliably, efficiently, and precisely day in and day out for many decades.

A unique combination: engineering and foundry under one roof

Based on the customer's requirements the Siempelkamp engineers examined the feasibility of different options and developed the macro-structure of the press. This is a creative process during which the different manufacturing processes such as welding and casting are put to the test. At the end the result is a high-tech machine, however, in the beginning of each project the design engineers still use a pencil to put ideas and concepts down on paper.

Building "to the point"

Cast iron with spheroidal graphite offers a large creative freedom for the design. It allows thin but nevertheless rugged structures (e.g., in the center of a casting) as well as massive structures for highly-stressed areas. Changes in sections can be streamlined to lower stress concentrations.

More strength for less money

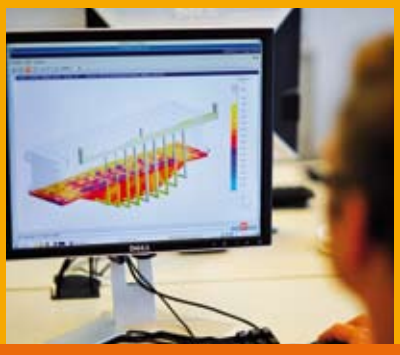
Compared to steel, structural elements with the same strength can be produced at about 10% less of the cost. Contrary to cast steel, the melt of spheroidal graphite cast iron is characterized by the self-feeding behavior. Due to this fact, the dreaded shrinkage cavities known from cast steel will be avoided. This is a large advantage especially for component parts that are highly stressed in certain areas.

Because castings made of cast iron with spheroidal graphite are near-net-shape when removed from the mold, the time needed for the mechanical machining is reduced.

A safe investment

Furthermore, cast iron with spheroidal graphite is notably economic. Because no heat treatment is necessary, cast iron with spheroidal graphite cuts down on one entire production step and saves energy. For weights of up to 300 t (331 US tons) this makes for considerable cost savings.

Last, but not least because of the high fracture toughness and fatigue strength as well as the good damping characteristics, cast iron with spheroidal graphite has an extremely long life cycle.



Simulation of the production process at the foundry

Casting pit

Inserting the molded parts

Lifting of the finished part

In the fettling shop

Casting after machining

To ensure that the prototype meets all required specifications and functions faultlessly from the start, the engineers revert to a proven instrument, that is, the close cooperation with the casters from the beginning on. The designing of the new Siempelkamp press for Dillingen was a repetitive process in which engineers of different fields took part. A continuous dialogue between design engineering, engineering, foundry and production departments as well as the close cooperation with the customer, made sure that the optimal solution was found. This solution is a press with a capacity of up to 65 MN (6,500 t = 7,165 US tons) which incorporates large structural parts made of spheroidal graphite cast iron.

The first design was a 3D model which was presented to the customer. Together with the customer, the requirements were then defined in detail.

During engineering, the model is tested under simulated working conditions with static and dynamic stresses. The Siempelkamp engineers model statics and dynamics according to the finite element method. During this process multi-body contact systems are used to determine the interdependencies of the different components. Afterwards, the engineers determine the process kinematics, for example for movable plungers, as well as the thermodynamics. In another process step, the model is evaluated in the forming simulation. After a few optimizations the structure of the press was defined and the forces, the power requirements, and the dimensions of the components were known.

The continuous dialogue with the Foundry

In the next step, the design engineers discussed the design with their colleagues in the foundry. What is the best pouring position? How are the casting cores arranged? Where will the cooling and degassing ducts be placed? Finally, the geometry of the mold determines how the molten iron flows into the mold, disperses, and cools.

Thereupon, the casters simulated the production process from the pouring to the solidification, to the calculation of the internal stresses in the finished casting. The result: After several improvements the prototype, with a functional and casting-suitable design which is optimized in regard to quality and costs, existed on screen.

Spectacular: 270 t (297 US tons) of molten iron poured in only 90 seconds

Large structural components made of cast iron with spheroidal graphite are cast in Siempelkamp's own foundry. The Foundry, which is one of the largest hand-molding foundries in the world, specializes in castings made of cast iron with spheroidal graphite. Each year the Foundry pours approx. 70,000 t (77,162 US tons) of molten iron; castings with weights of more than 200 t (220 US tons) are the daily routine. Next to components for large presses, the Foundry also produces structural parts for large wind power plants, housings for turbines, and engine blocks for ship diesel engines.

270 t (297 US tons) casting – a world record

Stefan Mettler, Managing Director of Siempelkamp Foundry, attaches importance to the fact that not only the size of the castings matters: "Even for casting thick-walled components our casters have specific metallurgic know-how. This allows setting the optimal conditions for the solidification process during crystallization of the matrix and the graphite nodules. Only a few foundries worldwide possess this specific knowledge."

Starting with the construction drawings, the Siempelkamp casters made a wooden model of the upper bolster. Within two weeks the casting cores made of molding sand bonded with resin were formed around the model and were then together with the wooden model inserted into the mold.

On May 19 the time had come: Within only 90 seconds 270 t (297 US tons) of molten iron were poured into a mold with a length of approx. 10 m (33 ft) and a width of 3.2 m (10.5 ft).

Just as the rest of the audience, Stefan Mettler, Technical Managing Director of the Foundry, could feel the tension during the casting process: "The well-prepared and careful work of all employees in the forefront provides us with the security that we can handle projects of this dimension. Nevertheless, it is time and again exciting to be part of such a casting process."

This time we have outperformed our own world record from 1998. Stefan Mettler is proud of his team: "Regarding the technology, this project was a tremendous challenge. The entire amount of molten iron had to be available in five pouring ladles at the same time with exactly identical properties and the same temperature of 1,350°C (2,462°F). This was a logistical masterstroke if one considers that the four melting furnaces and two holding furnaces of the Siempelkamp Foundry 'only' have a total capacity of approx. 150 t (165 US tons)."

After the casting process, the iron required approx. four weeks to cool down to a temperature of approx. 300°C (572°F). During this period the bolster was covered with sand. Nobody knew whether the casting succeeded and whether it was free of errors. Not until the bolster was removed from the mold the Siempelkamp specialists could find out that the casting was a success. The result:

For machining on the portal milling machine

Siempelkamp had successfully cast the largest casting made of spheroidal graphite cast iron!

After lifting the bolster out of its mold, it was transported from the molding bay to the fettling shop where it cooled down to room temperature. Here, the fettlers then removed sand and burrs from the bolster with heavy-duty grinding machines.

A power drill with 100,000 Watt

The next stop of the bolster on its journey through the Krefeld factory was at one of the world's largest portal milling machines. This machine was put into operation by Siempelkamp in 2008 in particular for the mechanical machining of exceptionally large parts. The machine which has a milling capacity of 100 kW machines parts with a mounting length of up to 22,500 mm (74 ft), a width of up to 7,000 mm (23 ft), and a height of up to 6,000 mm (20 ft).

Inside this machine the upper bolster for Dillingen with a final length of 9,783 mm and a height of 3,300 mm looked almost small. The final weight of the upper bolster amounted to approx. 220 t (242 US tons).

With the new portal machining center Siempelkamp is the only company worldwide which is not only capable of pouring castings of such size but also of machining them. When machining, Siempelkamp achieves a tolerance of 0.1 mm for the parallelism and 0.1 mm for the evenness of the surfaces. For workpieces of this dimension, this is very hard to match.

Dr.-Ing. Hans Fechner, chairman of the Executive Board of the Siempelkamp Group, is convinced that the company is on the right track: "Our investment in new equipment for the machining of unusually large parts at the Krefeld factory is paying off. We are now able to produce very large presses from one source. The engineering design, the foundry, and the mechanical machining are in close proximity to one another on the same premises. This makes the communication between these areas easy and prevents interface problems right from the start."

Too large for a transport on the Autobahn

On October 5, 2009 the finished upper bolster left for Saarland, Germany. First, it was transported on a heavy-duty vehicle to the Krefeld port. From there it went via a ship on the rivers Rhein, Mosel, and Saar directly to the factory port of Dillinger Hüttenwerke. Over the next few weeks many other cargo trucks from Krefeld will arrive there. The Siempelkamp scope of supply also includes the loading and unloading tables as well as supporting equipment for the manipulating, lifting, lowering, and transversing of the plates. The entire hydraulic and electronic control for the straightening press was also designed and built by Siempelkamp.

Transport by land and water

At the time of the editorial deadline of this Bulletin the press was still being installed. Wolfgang Schultes, Site Manager for Siempelkamp at Dillingen, is pleased with the impressive interim result: "The installation of the press proceeds outstandingly which is also due to the close cooperation with our partners at Dillinger Hütte."

Precisely on schedule

The start-up of the press is scheduled for spring 2010. Siempelkamp straightening specialists are supporting the commencement of production.

Dr. Fechner of Siempelkamp is convinced that the press will meet the high requirements regarding press precision: "With the new equipment, our customer can make heavy plates which are precision-straightened and of which the surface evenness surpasses the tolerance class S of DIN EN 10029."

The experience of many decades from many previous projects has demonstrated that Siempelkamp is on the right track. With up-to-date design methods, an intensive cooperation between design engineers and casters, as well as precise mechanical machining, Siempelkamp provides the assurance that extraordinary large presses will meet the customer-specific specifications at first go and operate efficiently for decades.

While the Siempelkamp Foundry has started working on other castings, the making of the upper bolster will always be a special memory. With it, Siempelkamp has produced what is currently the world's largest casting made of spheroidal graphite cast iron. This achievement sets new standards for the foundry industry and, one more time, this standard was set by the Siempelkamp Group.

Delivery of the lower bolster to the construction site

Olkiluoto, Finland:

The assembly of the cooling structure for the world's first Core Catcher has been completed successfully

Minus 17°C and a freezing wind from the frozen Gulf of Finland make one realize quickly that a hat, a scarf and gloves do have their uses. Under such climatic conditions, a premiere took place on Finland's west coast. Under the supervision of Siempelkamp Nukleartechnik (SNT), a team of assemblers completed the installation of the cooling structure for the first Core Catcher inside the EPR™ reactor on Olkiluoto Island.

By Norbert Dyllong

Construction site of EPR reactor in Finland

In December 2007 SNT had successfully applied for this assembly order with Areva NP GmbH after the planning, production and supply of these reactor components was already in SNT's hands. Siempelkamp has significantly taken part in the development of the Core Catcher through research work in the area of nuclear safety since 1994.

Since January 2008, after Siempelkamp had commissioned an installation company with this project, the planning work as well as the procurement of the necessary hardware (e.g., transport means, special tools, etc.) were running at full speed. Each task and transport route was planned in detail. The schedule of 17 weeks of one-shift operation was tight.

After all, SNT was not the only supplier to the consortium, consisting of Areva and Siemens, responsible for the building of the EPR™ reactor. Approximately 1,700 subsuppliers worldwide were commissioned. Just at the construction site the number of employees grew to 3,500 this year. The completion date of the world's largest reactor is advanced by around the clock work. Many nationalities are present. Though the official project language is English, also spoken are German, French as well as Polish. Speaking the Finnish language is difficult for the foreign workers. Luckily, a surprising number of Finns speak German.

At the end, the schedule became so tight that Areva decided to switch over to two-shift assembly. With it, 11 weeks remained for the installation of 849 cooling elements made of cast iron with spheroidal graphite and with a weight ranging from 365 to 1,750 kg.

Packed seaworthy inside 240 wooden crates, the cooling elements had to be transported from the storage location to the 'basement' of the reactor building where they were unpacked and installed. This area below the reactor pressure vessel is called the spreading area. The spreading area is the area of the plant that would contain, cool, and stabilize the melted core in the extremely improbable case of a nuclear meltdown. The Core Catcher plays a significant part in the further improved safety concept of the EPR™ design.

The assembly location inside the plant was sort of a blessing for the assembly personnel. Though 14°C is no optimal working temperature, compared to the reactor building, which had no roof at that time, the assembly location was dry and it did not require any spikes to make frozen transport roads accessible. Furthermore, Siempelkamp worked alone in this area so that there were no interferences with other assembly teams.

Apart from a number of unforeseeable technical challenges, which are normal for first-time installations, the forecast assembly period proved to be realistic. Although the assembly could not be carried out chronologically because certain work processes had to be brought forward, it became clear that detailed planning is worth its weight in gold. To find solutions for unforeseeable technical tasks on site is the daily bread of the site managers. Once again, these managers have proven their competence in solving problems. By means of a fairly simple and quick process, the solutions for such problems were submitted to and approved by the customer. The cooperation with the safety officers, for example regarding the issuing of welding

Installation of the last of 849 cooling elements – a milestone

Welding on of supports for the wall elements

Installation of the 578 Core Catcher floor elements

Logistical masterstroke – the transport of elements weighing up to 800 kg (0.9 US tons) in a tight space

tasks, took place very effectively. Last but not least the good communication and close cooperation with the customer resulted in a successful implementation of the project.

Siempelkamp, the supplier of components around the reactor

Next to the supplied and installed cooling structure of the Core Catcher for the Olkiluoto reactor, the nuclear companies of the Siempelkamp Group received orders for different small stud tensioners and for 23 crane systems for weights ranging from 500 kg to 160 t.

During the production of the Core Catcher cooling elements for the EPR™ reactor in Finland, the Siempelkamp Group received an order in January 2008 for the delivery of the cooling structure for the second Core Catcher – this time for a new reactor in Northern France which is part of the Flamanville 3 project. Orders for the delivery of stud tensioning machines as well as lifting beam assemblies for reactor closure heads and internals followed.

About the EPR™ reactor

- The EPR™ reactor is the world's first reactor of Generation III+ under construction with a unit output of approx. 1600 MW_e
- Building projects are currently in progress in Finland, France, and China
- The construction started in Finland in 2005, with operations forecast to begin in 2012

The spreading room with the installed cooling structure of the Core Catcher

Siempelkamp receives 'Areva Top Supplier' award

Areva, expert for energy management, is pleased with Siempelkamp's professional and innovative range of services. The award of 'Areva Top Supplier' was given to two nuclear companies of the Siempelkamp Group on July 1, 2009.

Anne Lauvergeon, chair woman of the board of management of Areva, is handing over the seal of quality 'Areva Top Supplier' to Michael Szukala

Michael Szukala, Managing Director of G. Siempelkamp GmbH & Co. KG and Siempelkamp Nukleartechnik GmbH, accepted the seal of quality as a representative for 141 sub-suppliers from Germany. The award was presented by Anne Lauvergeon, chairwoman of the board of Areva.

Two awards demonstrate that Siempelkamp has adjusted strategically to market requirements and has become an internationally accepted supplier of components around the reactor. "With our engineering know-how, our innovative strategies, and our production capacities we would like to be the long-term partner of Areva in its worldwide efforts to build solutions for carbon-free power generation," says Michael Szukala during the award ceremony in Berlin.

What is a Core Catcher?

The Core Catcher is used to supplement the primary safety systems of the EPR™ reactors which are responsible for reliable prevention and control of nuclear accidents. In the extremely improbable case that all these safety systems fail and the reactor core is melting, the Core Catcher ensures the integrity of the containment by long-term stabilization and cooling of the molten core before it can even reach the foundation. Thus, the containment will remain as the ultimate safety barrier. The Core Catcher is a complex structure consisting of numerous individual cooling elements which are made of cast iron with spheroidal graphite. After the assembly has been completed, the inside of the structure is backed with concrete.

CMC Texpan is expanding and is becoming more integrated into the Siempelkamp Group

Oscillating screen

In plant engineering, being able to receive complete plants from one source has always been better than receiving plant components from many different providers. The more components a manufacturer can offer for a plant, the less interfaces have to be dealt with when it comes to complex projects in the wood-based materials industry. This results in considerable advantages for the customer. In this respect, as a supplier, Siempelkamp is becoming more complete. A recent example: For more than 25 years Siempelkamp Maschinen- und Anlagenbau GmbH & Co. KG and CMC Texpan S.r.l. in Colzate (Italy) have been shareholding companies. In November 2009 this relationship was modified to the effect that Siempelkamp now holds 70% of the majority stake. Advantage number one: The Italian company now is even more integrated into the technology, production, and innovation pool of the Siempelkamp Group. Advantage number two: CMC Texpan is expanding its product range. For the customer this opens up new products in the area of wood processing such as the storage, dosing, cleaning, screening, and the glue application of chips, flakes, and fibers.

By Ralf Griesche

Since 1980 CMC has been a competent and reliable partner to Siempelkamp. The shared activities are characterized by expert knowledge and extensive experience with many different machines and equipment which include almost all areas of the wood-based products industry.

"This make-up is an extremely important advantage. All Siempelkamp Group companies work closely with their partners. CMC is no exception in this regard. CMC provides extensive knowledge of the entire production process which optimally fits into our Group," says Dr.-Ing. Hans W. Fechner, Managing Director Siempelkamp Maschinen- und Anlagenbau GmbH. Dr. Dario Zoppetti, Managing Director CMC Texpan, adds: "Furthermore, as part of the Siempelkamp Group, our operating radius makes it possible to accurately assess the needs of our markets. Consequently, we concentrate on the production of new machines in order to meet the constantly changing market demands. Close dialogue with our Group partners is again an important pace maker in this respect."

CMC Texpan has recently added several innovations to its range of products. Furthermore, the company, based in Colzate, has upgraded the production of well-proven machinery which was formerly marketed by Texpan. Until 1997 CMC Texpan operated as an independent company. Important innovations can be found in the areas of storage, dosing, cleaning, screening as well as glue blending.

Storage: the right solution for every material

CMC Texpan offers a large selection of bins and silos for the storage and dosing of both dry and wet materials (e.g., chips and particles). These silos can be installed in all production areas. According to the type of material processed, an appropriate discharge and dosing system is installed.

CMC Texpan equips concrete silos for the storage of chips with hydraulic moving floor extracting systems. Cylindrical steel silos are suited for both dry and wet materials: Extraction takes place by means of hydraulic sliding scrapers, rotary systems, and extracting dosing worm screws. Usually, only the extraction system for the silo is supplied, while the concrete or steel construction of the silo is carried out on site according to CMC design data.

Silo

Dosing bin

Chip Cleaner

Dosing

CMC dosing bins and scales are designed to deliver a constant and precisely metered flow of mainly dry but also wet materials to the machines installed after them (generally blending systems). They are equipped with a leveling system which, by means of rotary combs, creates a mat with uniform height inside the bin. The electronic weighing devices are highly precise. These scales control material dosing and make sure the preset material throughput is maintained, which will minimize glue consumption. In this respect, this technology scores high in the area of resource efficiency.

Cleaning

CMC has resumed the production of chip cleaners which were marketed by Texpan in the 1990s. The last generation of these machines has been updated with technical and technological solutions.

These machines are designed to remove any possible pollutants or materials (e.g., stones and minerals, sand, metals, glass, rubber, plastics, high density wood chips and so on) unsuitable for production from the material stream (especially from relatively dry recycled material). These cleaning machines play a significant role within the technological process for the production of particles, flakes or fibers from wood chips.

Their principle of operation is based on densimetric separation. This separation takes place in an oscillating tank and is

Gravimetric separator

supported by a strong pulsating air flow which provides for further cleaning.

"High efficiency removal of contaminants is fundamental not only to prevent wear and damages to downstream machinery, but also to ensure a long-life cycle for the entire production line," says Dr. Dario Zoppetti.

Screening and grading

The latest screening and grading technology by CMC is also state of the art. The correct separation of chips and particles will have a positive influence on material yield and resin consumption. It represents a key factor for good board quality. In this respect, classification of the chips and particles is a matter of great importance within the production process. CMC now offers machines for this field of application.

Gravimetric separators carry out a classification of wet and dry particles according to their weight, size, and thickness. Heavy pollutants are reliably removed. The separators' principle of operation is based on a wind chamber with an air flow. The particles are separated in the air flow according to their weight. The degree of separation can be easily adjusted to achieve the desired selection.

Depending on the quantity of screening decks located inside the screening box, oscillating screening machines are designed to screen material in up to four fractions. The use of screens with different mesh sizes with a reliably high material throughput enables the precise definition of the particle size to be classified.

Roller screens are particularly suitable to process wet material. CMC has already been implementing roller screening systems in mat forming lines for many years.

The high technology required by such applications has resulted in the construction of high performance roller screens. These screens efficiently screen wet chips, sawdust and shavings without contaminating them.

Gluing systems: a CMC core competency

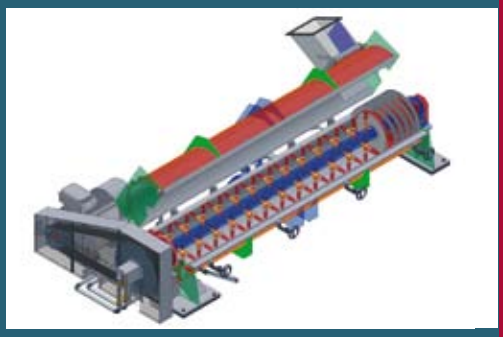
Glue blending is undoubtedly an extremely important part of the production process of wood-based boards. "The correct, constant, and accurate dosing and mixing of particles, glue, and additives is the precondition in achieving a board with good mechanical properties," says Dr. Dario Zoppetti. A state-of-the-art glue blending system can provide customers with considerable savings.

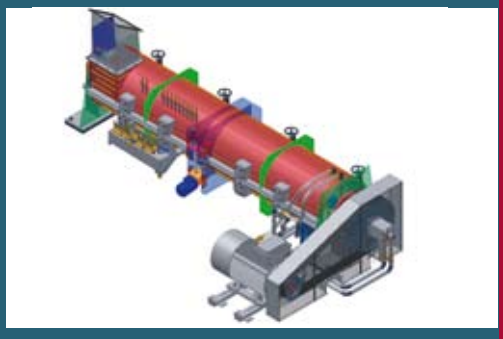
Siempelkamp is responsible for the development of the glue systems and works closely together with CMC Texpan. These glue kitchens are equipped with the latest flow meters and have been tested in Siempelkamp's laboratory. The centerpiece of the system is new software that provides a number of ways to save glue.

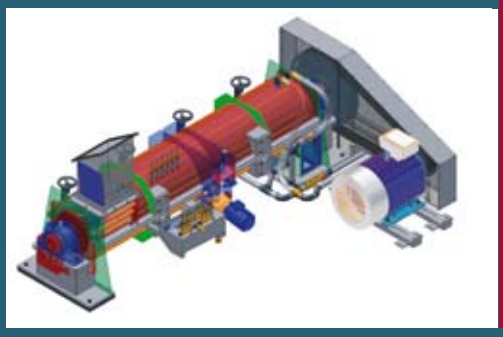
Combined with the CMC dosing bins with scales (for a precise dispensing of particles to be mixed with glue), the use of the glue system leads to high board quality.

CMC also offers glue blenders designed to obtain a uniform, homogeneous flow of glued particles to be fed into the forming station.

"Our customers need an integrated concept starting with the wood-yard and ending with the packing of the finished boards. With CMC Texpan, Siempelkamp has added a manufacturer of state-of-the-art machines covering a broad range in wood processing," concludes Dr. Hans Fechner, chairman of the Executive Board of the Siempelkamp Group.







Different types of glue blenders

Testing of a complete gluing system for an MDF line

Cut-to-size technology designed by SHS:

Custom-made innovations

By Ralf Zimmer

Whether for standard sizes or pre-cut parts, large quantities or small lot sizes, thick OSB or thin MDF, a high-quality cut-to-size line can meet any challenge – no matter how specific and diverse the line and the materials are. In this respect, Siempelkamp Handling Systeme GmbH (SHS) stands for precision work!

Top: Huquian, China, longitudinal saw with alignment and book feeder
Bottom left: Diagonal saw, saw beam with drive, saw aggregate
Bottom center: Norbord USA, Longitudinal saw with feeding table and cross-cut saw
Bottom right: Norbord USA, Outfeed side of the cross-cut saw

Within the Siempelkamp Group, SHS is the specialist for everything that is necessary to process board-type materials after leaving the press. The scope of supply includes cooling and stacking, sanding and cut-to-size lines, high-stack, high bay, and crane storage systems as well as packing lines. SHS also supplies lines for the production of sandwich elements and light-weight panels.

This portfolio meets a constantly changing market. Line capacities are steadily increasing and press speeds or high volume outputs are setting a fast pace. The demands on the cutting quality and reliability of a line as well as environment and safety engineering are also rising. Furthermore, because plant operators are making plant efficiency a top priority, reducing overall costs and cutting waste has become an important performance feature. SHS meets these demands with continuous development of its cut-to-size technology.

New design for diagonal saws: precision work with up to four saws

The diagonal saw system at the press outfeed has been completely redesigned and can now be equipped with up to four saws. The Chinese wood-based products manufacturer Anhui Huquian is operating this new system. At production speeds of 2,000 mm/second (6.6 ft), boards are cut to their final length of 2,440 mm (8 ft). "To perform this process precisely and in finish cut quality, the saws are hung via dust-protected guides from robust and low-vibration saw beams. The suction hoods adjust to the respective board thickness via an electric motor, and thus guarantee a clean operation. Due to the quick experimental flap, short

Left: Stacking and packing line
Bottom: Duratex 77-m cut-to-size system and cooling and stacking line

experimental boards can be cut at high production speeds without unnecessary cutting waste," says Ralf Zimmer, Manager Sales for Wood-based Material Technology at SHS.

The board clipper is best suited for thin board manufacturing lines. During this process the cut is performed with rotating knives which are mounted spirally on two shafts. The advantages include long knife life, little need for suction, and high speed.

Innovations from two-pass-saws to cross-cut saws

SHS has further fine-tuned the concept for two-pass-saw systems. Now higher capacities with improved quality and less cutting waste can be achieved.

With longitudinal saws, books instead of single boards can now, for the first time, be trimmed and cut. Prior to this process, boards are stacked to books and centered. A feeder then feeds the books into the saw. Thus, the required cutting precision can be guaranteed at a significantly higher capacity.

An innovation in the area of cross trimming and dividing saws is that the board feeder has been replaced with a chain feeder. Each chain is equipped with two cams which will feed single boards or books of boards to the saw. Ralf Zimmer: "The advantage is that the empty trip of the feeder is omitted. The time savings are transformed into additional output." In order to improve cutting precision, the chain feeders are synchronized via an electronic shaft before each cut. Thus, a new adjustment after maintenance work, as done with mechanical systems, is omitted.

Another innovation by SHS involves the suction hoods. They can now be adjusted to board and book thickness via an electric motor, and therefore they operate cleaner and more efficiently.

Due to the performance increase the new cross-cut saw can now cut single thin boards instead of packs of boards. This makes the stacking of individually trimmed boards according to A, B or C quality possible. Depending on the requirements, trimming widths in the single-digit millimeter range are run. One advantage for the customer is that the cutting waste is significantly reduced especially when compared to book saws.

Field example Agudos: high-performance cut-to-size saw with mega capacity

Another performance highlight made by SHS is used with the world's longest continuous press. Duratex ordered for its Agudos location an MDF line with a record size 9' x 77 m ContiRoll® press from Siempelkamp.

For this record line SHS supplied a high-performance cut-to-size saw with a capacity of up to 2,800 m³ of board per day. This daily output requires a cutting height of 260 mm (0.9 ft), which is carried out by two 75 kW saw motors. In order to further increase the performance, SHS incorporated a flexible book feeding unit. Cover boards are fed synchronously and without time losses. The goal of the project was to process the available board capacity at high speeds. All processes from the loading to the stacking were optimized resulting in a line speed increase by another 10 to 15%.

This enormous capacity is handled via two packing lines with fully-automated dunnage placing devices which are downstream of the cut-to-size line.

Innovations resulting from dialogue with our customers

These examples demonstrate that the development of the SHS cut-to-size systems is ongoing. When searching for optimization potentials, the company relies heavily on the dialogue with its customers. "Many of the above described innovations have been developed together with and as a result of customer suggestions. These innovations are already in use and have proven themselves in the field. In order to fully use this technical advance, upstream and downstream line components including the loader and unloader systems as well as stacking system are also further improved in regard to their performance and flexibility," notes Ralf Zimmer.

Transformer board presses made by Siempelkamp:

Exciting projects in a future market

In the last few years Siempelkamp has repeatedly supplied presses for the production of transformer boards. In Europe and China these presses manufacture pressboard used as insulating material. What outstanding characteristics does the market demand from such presses? How are insulating material and transformers used effectively? This report reveals the details.

By Dr. Jochem Berns

Complete plant during assembly




Assembly of a multi-daylight press

Siempelkamp multi-daylight presses have for decades found their place in different industries. The entire spectrum of wood-based materials can be processed on these presses with a wide range of board sizes possible. Presses with up to 30 daylights manufacture panels according to the wet process including insulating material for high-voltage transformers consisting of pure cellulose pulp.

It takes ambitious technology to process pure cellulose pulp because its manufacturing process is highly specific. "If you want to succeed in this market, you have to ensure a consistently high quality. It is important to guarantee that the material is free of metal and other contaminants. The market puts high demands on the consistency of the product, for example, the thickness tolerance. Transformer boards require high mechanical strength because they have to withstand high stresses during the production and operation of the high-voltage transformers," explains Dr. Jochem Berns who is in charge of project planning and technology at Siempelkamp.

Siempelkamp is currently demonstrating its competence in regard to transformer board presses with several projects. Transformer board, also called pressboard, is almost always made of cellulose pulp with a high degree of chemical purity on a paperboard machine and then hot-pressed. The characteristics of this product include high density, consistent thickness, surface smoothness, high mechanical strength, flexibility, ageing resistance, and, of course, excellent electrical insulating properties. Unbleached Nordic softwood kraft pulp is especially well-suited as raw material for electrical applications. The DIN standard (IEC DIN EN 60641) strictly defines the criteria for hot-pressed pressboard which are indispensable due to the high demands that are put on the product (see box).

Transformer board technology by Siempelkamp: consistent precision

An outstanding characteristic of the new Siempelkamp press lines is the mechanical precision of the quality-defining components. The thickness accuracy, the smoothness and the parallelism of the hotplatens are impressive. For a press with a length of 6.6 m (21.6 ft) and a width of 3.56 m (11.7 ft), the tolerance of the parallelism is 0.8 mm at the most! This limitation is an indispensable requirement in order to produce transformer boards with close thickness tolerances!

The hotplatens of the press are equipped with additional drainage channels that will drain off water and steam. Siempelkamp's specific experience of more than 125 years with drilled hotplatens is applied here.

A comprehensive hydraulic system applies the necessary pressure of 37 kg/cm² to the product – this is done with a total press capacity

Transformer board – the following is required by the DIN standard

- Production exclusively from fibers of plant origin
- High degree of chemical purity
- Free of contaminants and glue
- No metallic, organic or inorganic particles!
- High degree of polymerization
- Preferred nominal thickness, for pressboard 0.8 to 8.0 mm

Assembly of press and loader and unloader unit

Mat on the transfer belt

of 77,500 kN which corresponds to a weight of approx. 7.8 million kg. A simultaneous closing device is guaranteeing simultaneous mat contact and densification of all sheets, independent from the daylight. The necessary process temperatures ranging from 120 to 160°C are achieved via a hot water heating system. The indispensable high stability of the process parameters is guaranteed by using the latest sensor technology and intelligent control systems. The control and drive technology is up to date and ensures the overall success of the concept: latest technology (Siemens S7, SIMODRIVE Motion) controls the loading of the sheets, the pressing process and the transfer of the boards to the subsequent machines.

The equipment is controlled by means of a database recipe system which stores the set parameters for each thickness and product type. Thus, 100% repeatability is guaranteed! Furthermore, plant data needed for analysis and documentation purposes are archived in a process data trending system.

The high technical standard of the entire equipment ensures our customers a consistent and excellent product quality!

The process: cellulose pulp becomes insulating material!

Before the raw material reaches the Siempelkamp transformer board press, a few prior processes have to be completed. First, the bales or sheets made of unbleached softwood kraft pulp are dissolved in a pulper with water. Next, with a special refiner the fibers are then reduced to the desired size. The fiber suspension

is cleaned of foreign bodies and undiluted cellulose clots. The next step includes the sheet forming in a paperboard machine. Following this process is Siempelkamp know-how:

Lengthwise and cross trimmers inside the loading device provide for smooth and clean sheet edges. The wet sheets are simultaneously introduced to the multi-daylight press by means of the loading device. Under high initial pressure mechanical dewatering takes place. Up to 2500 l (660 gallons) of water are removed from the charge. While the product continues to be under pressure, further dewatering takes place via evaporation. The required heat

Loader device in front of the press

An exciting product – transformers

A transformer is a device that converts high voltages into low voltages and vice versa. We all use transformers, for example, the charger for our cell phone. The charger converts the voltage from the main supply into the suitable voltage for our mobile phone.

In the large scale, transformers have even more power and range, for example, when electrical energy from the manufacturer (power plant) is supplied to the consumer.

Because power plants are primarily built close to energy sources such as water or coal, the distances to the consumer can be very far.

Electrical power cannot be transported as it is produced by the generator because large generators have a capacity of approx. 150,000 kW. If this current was transmitted with a voltage of 220 V, an enormous amperage of 700,000 A in the current line would be the result. In order to process amperages of this size, the lines would have to be several meters thick, which is not feasible. Furthermore, a large part of the electrical energy would be transformed into heat and would be lost.

If electrical energy has to be transported over long distances it is only possible by increasing the voltage and lowering the amperage. This is where transformers come into play. Generator transformers are connected to power plant generators. They convert the voltage produced by the generators up by 220,000 V or 380,000 V.

The electrical current is transported as such in high-voltage power lines. For the use in private households this high voltage is being lowered to a voltage of 230 V or 400 V step by step. This is done by distribution transformers. The current of this voltage is finally transported to household outlets where our mobile phone can receive its charge …

View of the loader device

is furnished via the hotplatens. By means of an unloader device the sheets arrive at the finishing line including stacking, storing and order picking systems.

"The actual pressing process can take anywhere from 15 minutes to four hours depending on the product thickness and type," explains Dr. Jochem Berns. By request, Siempelkamp integrates a special feature into the loader device. This feature allows the removal of wet sheets in order to form the sheets into special products afterwards.

"High precision sheet forming in the paperboard machine is a necessary prerequisite for high-quality transformer boards. The material tolerances in and crosswise to production direction after sheet forming have to be very small. Siempelkamp's high precision hotplatens meet the required tolerances for the finished product and the high production requirements," says Dr. Jochem Berns.

Transformer board presses for China and Turkey

After the installation of a line in China last year, Siempelkamp currently supplies three transformer board presses of the same design to customers in China and Turkey. Enpay in Izmit ordered a 12-daylight press with 3.2 x 6.4 m hotplaten for the production of transformer boards made of high-quality pressboard. Founded in 1978, the Turkish company is regarded as the pacemaker in the transformer industry. More than 90% of Enpay's production including transformer components, transformer windings, and transformer tanks are supplied to 50 countries worldwide. The first board was pressed on the new press in June 2009. On the press Enpay produces insulating material for transformer components and high-voltage transformers for high voltage power lines, which are in high demand by all large international power producers. With quick implementation including several customer-specific requirements and quick ramp-up, Siempelkamp is a reliable and strong support for its customer in Izmit.

Two more Siempelkamp transformer board presses are supplied to Shun Power in Anshan, Liaoning province, China.

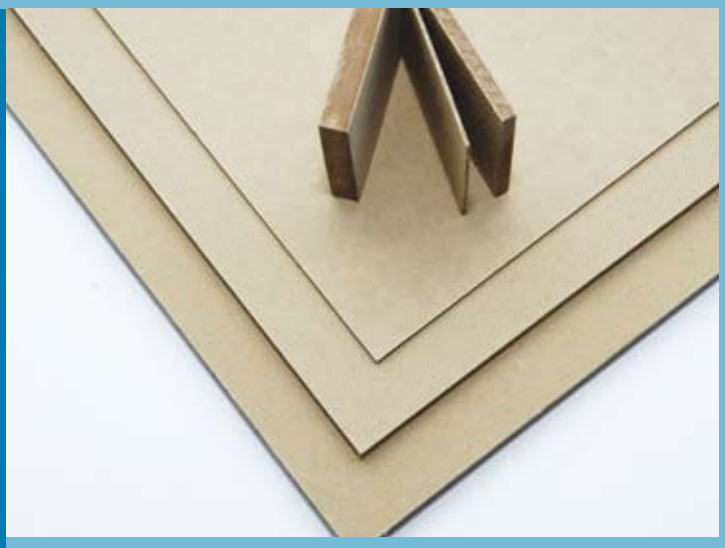
The first line is currently being assembled; the first board on this press is forecast for spring 2010. At that point in time, the assembly for the second line is to start.

Shun Power has been producing transformer boards for several years. The new lines will enable the company to manufacture

Unloader device for finished boards

boards with a size of 6,300 x 3,200 mm and a thickness of up to 8 mm which are suitable for transformers in high-voltage areas.

With its outstanding product thickness tolerances of +/– < 0.1 mm, Siempelkamp has opened up a trendsetting field of activity. "In the future we can provide our customers not only with the core components including the press and loader and unloader devices, but also the project planning and other plant components such as the control integration so that Siempelkamp know-how can be effectively used in other areas," says Dr. Jochem Berns looking ahead. Energy providers worldwide represent important customers. Next to European countries which are expanding their capacities, demand from China, North and South America and Africa (Sahara) can be expected.



Different thicknesses of transformer boards

Siempelkamp Tensioning Systems:

Up-to-date stud tensioning machine for the nuclear power plant Bugey in France

By Roland Lang and Panagiotis Polizoidis

April 2007: Siempelkamp Tensioning Systems GmbH (at that time still operating under the name of Wenutec GmbH) and the company's French subsidiary Siempelkamp MSDG S.A.R.L. recorded a new project. The French energy provider Electricité de France (EDF) ordered from STS a 'Machine de serrage et desserrage de goujons (MSDG)' which is French for an 'up-to-date stud tensioning machine'. These machines feature a high degree of automation and are used in nuclear power plants for the opening and closing of reactor vessels.

EDF's nuclear power plant in Bugey

The location of the new stud tensioning machine is the Bugey nuclear power plant. The coordinates of the location, which are 45°47' north and 5°16' east, take us to the French Département Ain, close to the commune of Saint-Vulbas on the Rhône River. Here, EDF operates, with blocks 2 through 5, four of a total of 59 nuclear power plants in France since the late 1970s. With an installed gross output of 3,700 MW this location is one of the larger ones in the country. The four pressurized water reactors, supplying on average 25 billion kWh, cover approximately 40% of the power requirement of the Rhône-Alpes region.

To limit the radiation exposure of the personnel and the down time of the reactor, the installation time for stud tensioners has to be kept as short as possible. With this in mind our technology has to ensure absolute safety and reliability. At the same time, our operational personnel are required to be highly qualified and well-experienced with the use of stud tensioning machines.

Key technical data illustrate that the concurrence of tonnage and precision make the highest demands:

Reactor vessel:

• **Outer diameter of the reactor vessel cover**	4,674 mm (15 ft)
• **Number of studs for the reactor vessel**	58

Stud tensioning machine:

• **Stud tensioner type**	Segmented support ring, sandwich design with stud turning devices
• **Stud tensioner dimensions (without storage stand)**	Ø 6,220 mm x 2,945 mm (20 ft x 10 ft)
• **Weight (without reactor vessel studs)**	approx. 38,500 kg (42 US tons)
• **Tensioning technology**	Drawbar with two tensioning cylinders; simultaneous tensioning of all 58 reactor vessel studs
Tensioning force of each reactor vessel stud	
• **Designed for**	6,310 KN
• **Normal operation**	4,782 KN
• **Tensioning force difference between the reactor vessel studs**	+/– 2%

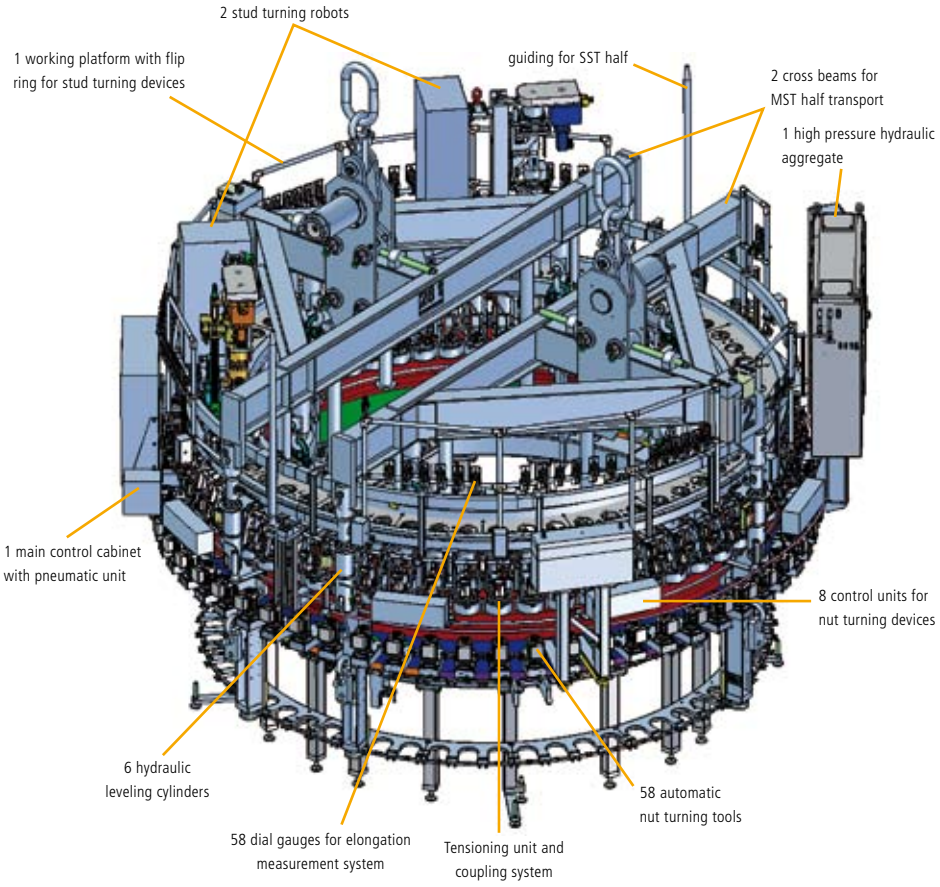
Start-up of the stud tensioning machine inside the storeroom of the Bugey nuclear power plant

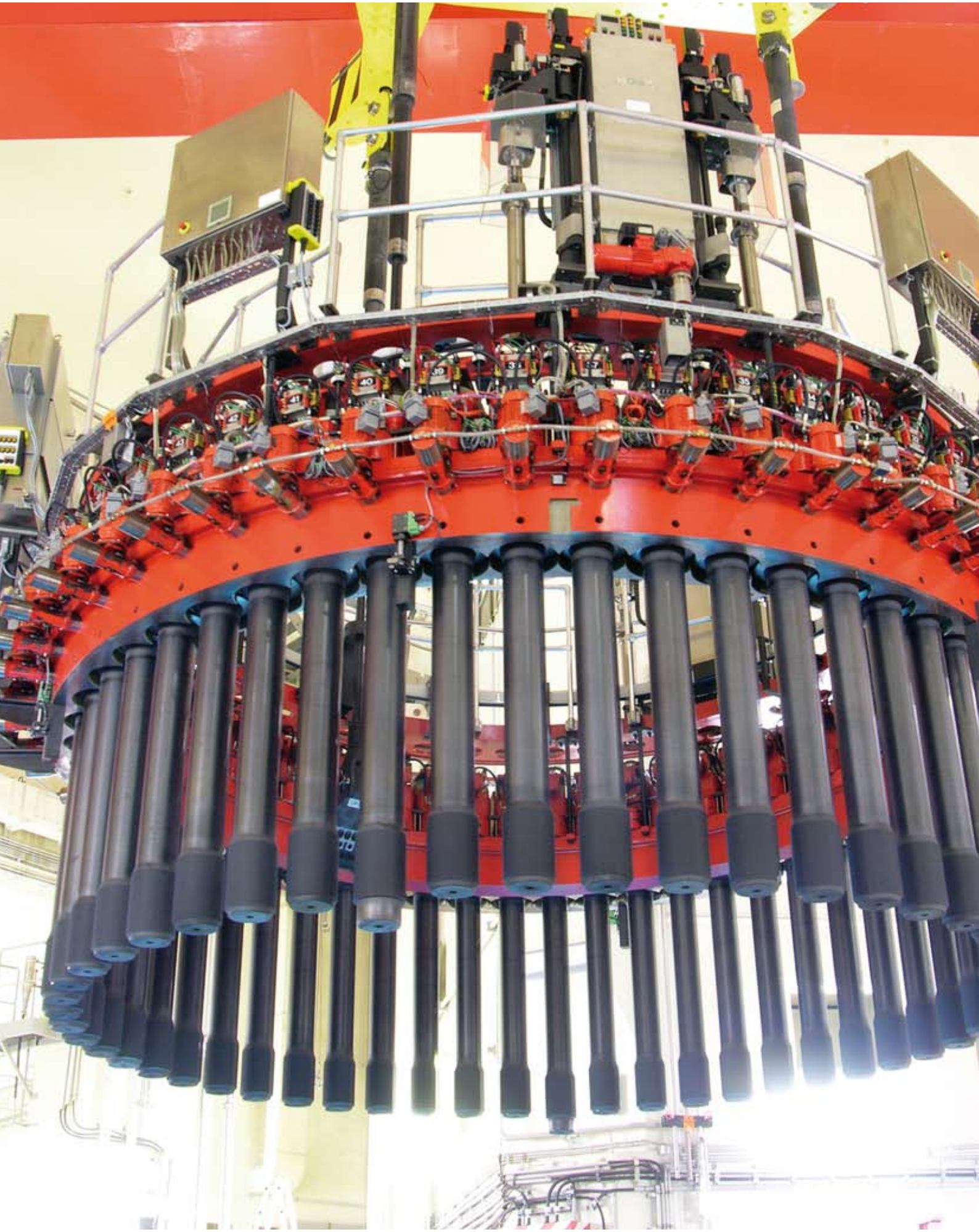
Experience plus creativity equals customer-specific solutions

First of all, regarding the design and construction of the new stud tensioner, a major obstacle had to be overcome. The maximum crane capacity and the total weight of the machine with 58 reactor vessel studs (each stud weighing 360 kg) did not match. Here, the experience and creativity of the engineering department were required in order to present the customer with a custom-fit solution.

The support ring with the assembled tensioning units has to withstand a pressure of up to 2,000 bar and is therefore made of high-strength material. With a weight of almost 10,000 kg (11 US tons) it is one of the heaviest components. That is why our engineers started here and came up with a sandwich design for this component. Our concept included a three-layer design:

- A top layer of ring-rolled heat treatable steel (30CrNiMo8)
- A core layer of a ring-rolled aluminum alloy AlZnMgCu1,5
- A bottom layer consisting of several segments made of higher strength fine grained steel





Transport of the reactor vessel studs with a machine by Siempelkamp Tensioning Systems

The result:

Compared to the standard design this specific solution resulted in a total weight reduction of 2,380 kg (2.6 US tons). The connection of the two ring halves of the upper and the four ring halves of the core layer with the segments of the bottom layer is guaranteed by 56 high-strength studs.

In the beginning, we had to convince our French customer of the use of weight-reducing aluminum. Final uncertainties were removed by using strain gauges within the scope of the acceptance test for the first time – which was a subsequent requirement on the part of EDF.

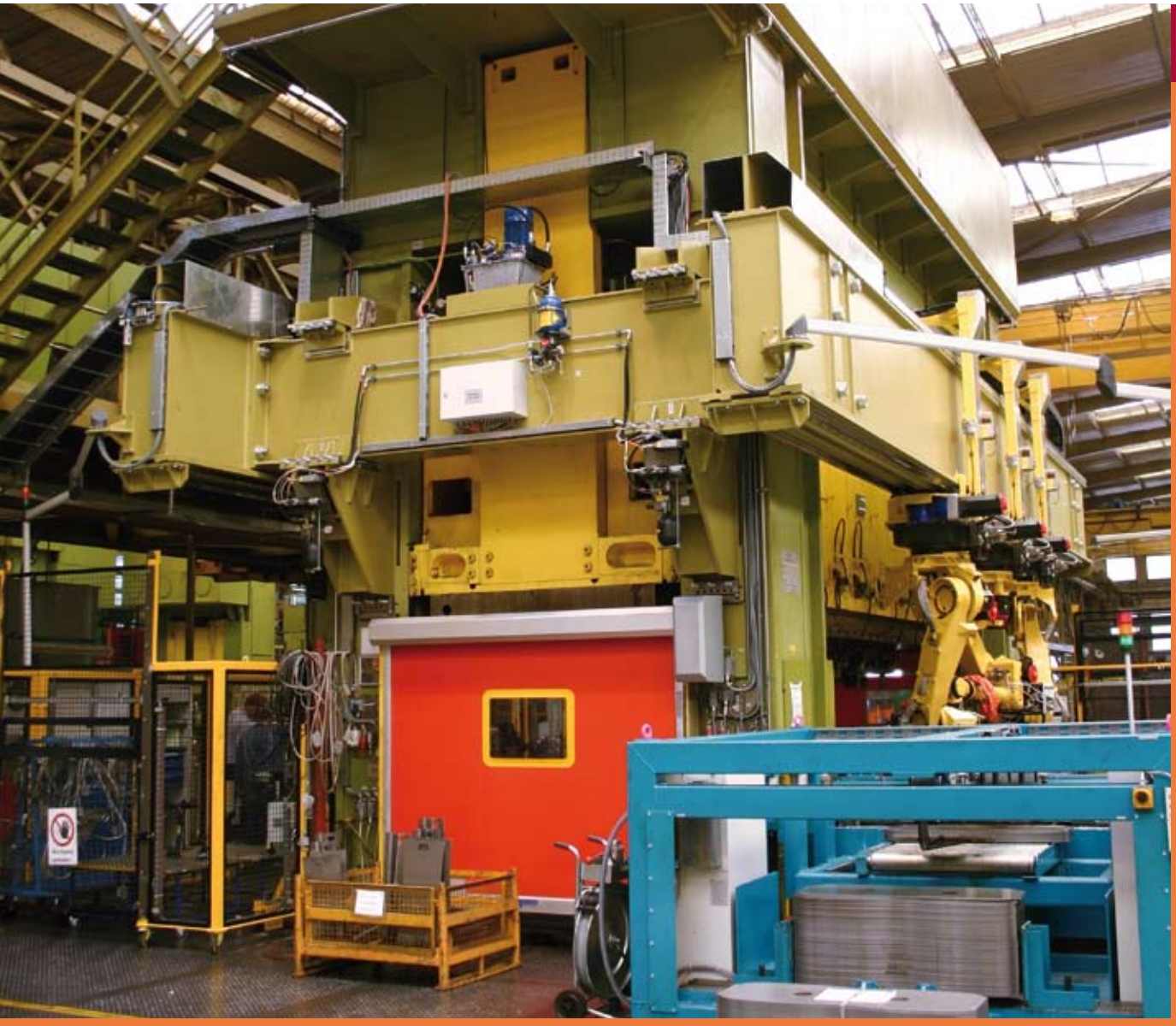
We had a long way to go until the successful acceptance test by the customer: A technical study, which we compiled over a period of several months, along with close dialogue with our French customer, smoothed the way for the implementation of a challenging project. Next to finding a solution to reducing the weight for the support ring, another highlight was the transport of the tensioning machine from its storage location into the reactor building. Limited access in connection with the strict regulations for transporting components which are radioactively contaminated put strong demands on our constructing engineers. Their work was supported by simulation software provided by our customer UTO/EDF – here, once again, our good relationship paid off.

Tested – and approved good and safe!

December 2008: The assembled unit was ready for the acceptance testing. Set up in a closed-off area, the stud tensioning machine was put under test pressure. For our start-up specialists this was a stressful phase because production defects and assembly errors would show themselves mercilessly within only a few minutes.

After two and half days of intense testing of the hardware and on paper, the customer signed the certificate of acceptance. The functionality of the aluminum ring was successfully demonstrated, the tests with strain gauges had shown no abnormalities. The packing of the machine components and the transport to Bugey were then only a mere formality.

Meanwhile, our equipment, which was brought online in September 2009, has passed the practical test. It will open and close the reactor vessel at our customer's disposal for many years.



Vibration-free in any situation:

New handling system for Hörmann side member press

By Derek Clark

Strothmann recently installed and started up the handling system for a 3,000 t side member press at Hörmann Automotive. The Siempelkamp company had designed and implemented the robot-based automation system as well as the frame attachment for the large automobile sub-supplier. Next to the assembly, the scope of supply also included the integration of the control system, the programming including visualization, as well as a dry run at the Strothmann factory in Schloß Holte-Stukenbrock.

Side view of the new side member press with overhead robots

Hörmann Automotive produces side members for trucks from high-strength materials through to QStE 500 TM and in materials up to 10 mm thick. The plant in Gustavsburg sits on an area of 28,615 m². The side members for light, medium, and heavy trucks can be supplied as straight or bent designs. The production is equipped with two large presses, a blanking press and a forming press, with a pressing capacity of up to 50,000 kN, as well as a modern profiling system for the rolling out of side members.

The challenge is in the frame attachment

In 2007 Hörmann Automotive made high demands on the flexibility of the handling system for the company's 3,000 t side member press. A new automation system was to bring the Siempelkamp press from the 1980s up to speed again and make it possible to produce other parts such as tank supports. To maximize flexibility, standard robots should carry out the handling processes. The basic concept was simple: Three overhead articulated-arm robots on each side of the press would handle the entire pressroom auto-

Key data for the side member press

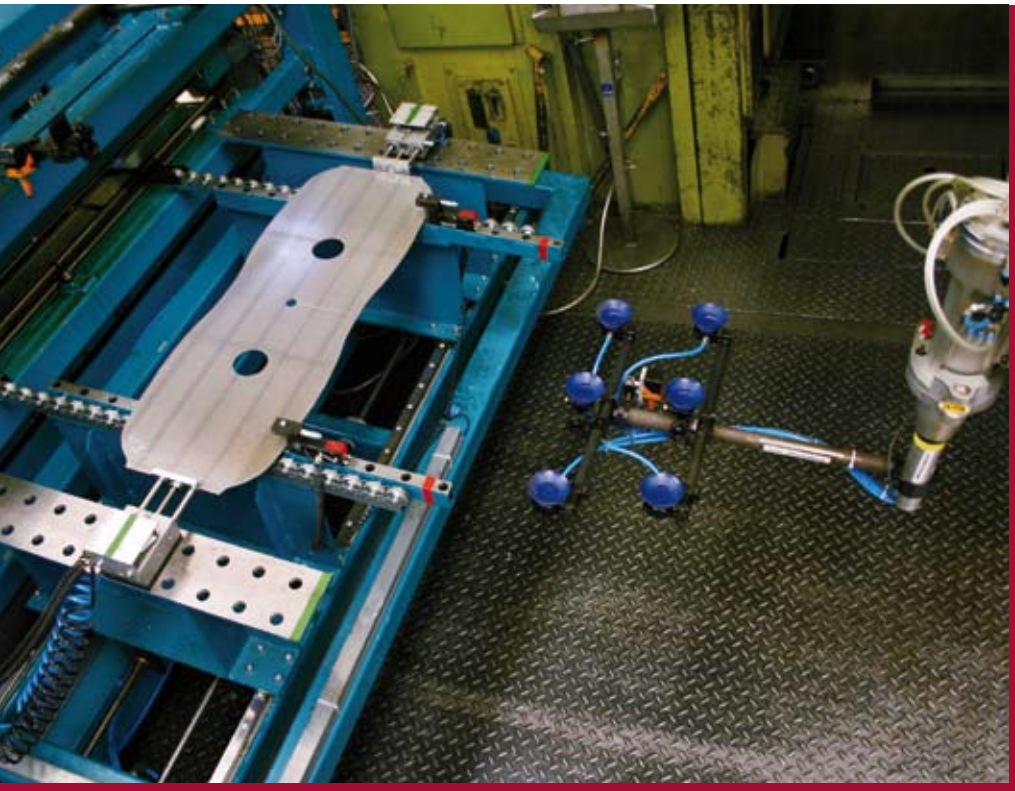
Press capacity: 30,000 kN
Material grade blanks: QStE 380 – QStE 500
Cutting width: 350 x 8,000 mm (13.8 in x 26 ft)
Blank thickness: 4.0 – 10.0 mm
Six overhead robots for workpiece transfer

Company background of Hörmann Automotive Components GmbH

Hörmann Automotive Components is the only supplier of pressed and profiled manufacturing technology with complete cataphoretic dip priming (KTL) and topcoat systems in Europe. The company is based in Gustavsburg in the State of Hesse, Germany, and specializes in the production of high-quality bodies, chassis and add-on parts for truck and car manufacture. Approximately 900 employees carry out made-to-measure work in shaping, joint technology and the coating of parts. The company's scope of supply also includes the planning, engineering, and manufacturing of cutting, bending and drawing tools for the forming of blanks. Furthermore, it includes the zinc phosphatisation, cataphoretic dip priming (KTL) and topcoat systems of blank surfaces. By constructing its own tools, the company can supply products at short notice including demanding, customer-specific items.
A total of 6,500 employees of the Hörmann Holding processed around 138,000 t (152,119 US tons) of steel in 2008 and generated a sales volume of 750 million Euro.

The suspended frame attachment with three robots on each side of the side member press

Control for articulated robots



The gripper of the articulated robot places a blank into the press

Press line conveyor

mation as well as the automation for areas in front, adjoining and behind the pressroom. The advantage of using overhead robots is that the pressroom remains freely accessible. However, the following had to be considered: Since the robots are mechanically connected to the press, each vibration of the press is fully transferred to the robots whereby the life of the automation solution is reduced. After several other automation providers failed in solving this problem, the Strothmann team presented an optimal concept for this task.

The principle of the suspended robots

For the Strothmann engineers it was clear that the press and the robots had to be detached from one another in order to isolate shocks and vibrations. A simple separation of the press from the robots by using floor supports for the robots could not be the solution because in this case vibrations would be transmitted via the floor to the robots.

The solution of the Strothmann engineers incorporates a hydraulically suspended mounting frame at the press. Measurement systems on the press and in the frame support detect vibrations and provide the values for the adjustment of the hydraulic cylinders which are connected to the press on one side and to the frame on the other side. They cancel the vibration of the press punch so that they are not transmitted into the frame. By means of real-time control software in the control system, the frame is stabilized so that the robots seem suspended in air.

This concept convinced the staff at Hörmann Automotive. The system was tested at the Strothmann plant without the press. The hydraulic systems were started up with simulation software. After a successful test run, the start-up of the system at Hörmann in Gustavsburg went smoothly.

"This type of automation concept makes the press very flexible," explains Derek Clark, Sales Manager at Strothmann. "Workpieces with different dimensions can be processed. Even if the process steps are different from one workpiece to the next, the six feeder robots provide for time savings."

If the press is used as a transfer press with different production stations, the first robot removes a blank from the destacker and puts it in the first station of the press. The robot on the opposite

Press line Strothmann

side then puts the blank in the second station. From there the robot positioned diagonally opposite transports the blank from station two to station three. The last robot removes the finished blank and puts it on the transfer belt. Thus, up to six stations or process steps, respectively, can be carried out individually and automatically in the press by the handling system. This is possible because the robots take over all functions such as the turning over and turning of the workpieces between the production stations.

When processing large-size workpieces the robots work synchronously. Together they grip and transport the workpiece through the press. "Our equipment is able to transport bulky components such as side members without problems through the press. Such flexibility can hardly be beaten," says Clark.

Automation standards

The entire press and the robots are controlled by a parent Siemens S7-control system. The individual robots are each controlled by a stand-alone control system. The robot controls are linked with the Siemens control system and are coordinated by it. By individually programming the robots on their control panels, operators can put them into teaching mode to process new workpieces. The parent control system will then select individual programs and synchronize the robots by allowing them to be cleared at the programmed stops. This control is equipped with a visualization system which administrates not only the programming for new workpieces but also the entire operation and fault indication. The entire press can be easily monitored from this central point. Another advantage: The control panels of the individual robot controls are easily accessible so that each robot can be operated individually and quickly in the case of a critical contingency. By integrating safety functions in the automation solution, the robots can be operated in set-up mode directly inside the danger zone.

"With the Strothmann solution we have doubled productivity for the plant," says Bernd Güntzel, Manager Pressroom at Hörmann. "It is also fun to watch the robots on the job. We can see how flexible Strothmann automation has made the press."

Grand opening in Kwinana Beach, Australia:

Fenner Dunlop inaugurates a conveyor belt press

A big day for the Siempelkamp project E 0166: On July 2, 2009 Fenner Dunlop Australia started up a new facility for the production of steel cord conveyor belts in Kwinana Beach, Western Australia. Here the world's largest press for steel cord conveyor belts has been installed!

By Steffen Aumüller

On July 2, 2009 Mark Abrahams (CEO Fenner PLC) and David Landgren (Executive Director Fenner Belting) turned the record-holding production line over to start operation: Numerous customers, suppliers, and dignitaries including Deputy Prime Minister Western Australia Julia Gillard were guests when the 70-million Dollar manufacturing facility south of Perth was inaugurated.

The grand opening started the final phase of a project that began in October 2007: Back then, Fenner Dunlop, a global player in the production of conveyor belts for the mining and large scale industries, decided to order from Siempelkamp the largest manufacturing line for conveyor belts ever produced.

The project planning, production and delivery for this project had to be completed in 2008: The scope of supply included the cable creel, the cable clamping and tensioning device, the compactor lorry with pre-press, the inspection lorry, the vulcanizing press with clamping and plug device, the pull-roll stand and the winder.

Compactor lorry

Vulcanizing press: 3,200 mm x 18,480 mm; 156 cylinders; 25,000 t

a record-holding steel cord
s made by Siempelkamp

Furthermore, Siempelkamp supplied a movable winder which allows the press to also vulcanize textile conveyor belts.

Three firsts

The equipment that was completely manufactured and assembled by Siempelkamp includes a creel which was the first ever designed for 520 cables. Each of these cable reels is equipped with its own frequency-controlled drive in order to adjust the required braking torques to the diameters of the cables during the winding-off process. This creel allows production with 260 cables while the other 260 cables are prepared for the next product. Thus, quick product changes become possible!

Another first: For the first time Siempelkamp introduced a cable clamping and tensioning device for up to 260 cables which can tighten each cable with a force of up to 3,900 N. Following, the tightened cables are aligned and positioned to one another according to their height and their distance to each other. The result is a cable carpet on which the compactor lorry applies the green rubber from top and bottom which is then compressed inside the pre-press. The green conveyor belt resulting from this production step is then transferred into the vulcanizing press.

The centerpiece of this production line, the vulcanizing press, is the largest of its kind. It features a production width of 3,200 mm (10.5 ft) and a length of 18,480 mm (60.6 ft). With a total press capacity of 25,000 t (27,558 US tons), this is the strongest hot press in the rubber and plastics industry. Compared to presses of

Press infeed with 6 cylinders arranged along the width direction

2-story creel for 520 cables

From the creel to the infeed of the cable tensioning system

Pull-roll stand

Hot press

the past which used only a few cylinders to generate pressure, this press has a total of 156 cylinders (6 x 26 arrangement), which provide for an excellent pressure distribution inside the press.

First No. 3: Following the press is the first winder with a width of 3,200 mm and a capacity of 70 t (77 US tons), which enables Fenner Dunlop to provide significantly longer belts to the market. In long conveyors this makes for significantly less connections than before which is a competitive advantage that cannot be ignored!

Top quality for the world market leader

Because Fenner Dunlop relies on world market-leading technology in order to further expand its own reputation as a world market leader, the company decided to invest in Siempelkamp equipment. It is the third press on which Fenner Dunlop started manufacturing. The big player in the field of conveyor belts will produce steel-reinforced conveyor belts with a width of up to 3.2 m (10.5 ft) and a thickness of up to 50 mm (1.9 in) with the equipment.

With the opening of this greenfield plant, Fenner Dunlop has demonstrated its trust in the Australian market and its potential. "It will be a great advantage for our Australian customers to have the most modern technically advanced steel cord plant in the World, coupled with our value-added service technicians not only in their time zone, but also in Western Australia's, close at their doorstep," says David Landgren.

Infeed of the steel cord tensioning device

Outfeed cable tensioning system with comb unit and return rollers

Upper winder at the compactor lorry

Pre-press with lower winder at the compactor lorry

Mining resources

Our entire life is based on resources such as ores like iron, copper, tin, zinc, and nickel as well as coal, phosphate, salt, etc. These resources are primarily found and extracted in remote locations. The further processing usually takes place far away from the place of discovery. This brings up the question how massive amounts of extracted resources can be economically transported.

In the middle of the last century this question was answered in Germany with the development of a conveyor belt for large-scale applications.

Conveyor belts – ingenious journey and destination at the same time

Conveyor belts are brilliant inventions because they represent the journey and the transport container at the same time. Rubber plays a central role for conveyor belts. The actual conveyor belt consists of this material as well as either one or more fabric plies or high-strength steel cables. In the middle of the last century especially the steel cable-reinforced conveyor belts have been further developed to be highly rigid and reliable in Germany.

Numerous achievements can be found in different applications: belts widths up to 3,200 mm, conveyor capacities up to 30,000 t/h (33,069 US tons), conveyor lengths up to 17 km (10.6 miles), drive capacities up to 12 MW and conveyor speeds up to 7 m/s (7.6 yards/s).

Conveyor belts play a primary role in brown coal mining. In North-Rhine Westphalia, the extraction of brown coal has a 300-year long tradition. Today, brown coal has an enormous economic importance in this region of western Germany. At three mining sites in North Rhine Westphalia a total of 2,000,000 t/day (2,204,623 US tons) of mine spoils and coal are transported mainly by conveyor belts. This happens for a good reason. Belt conveyors are reliable transport systems which operate economically and efficiently as well as environmental-friendly because of their low energy consumption.

Especially against the background of discussions about climate and energy efficiency, the conveyor belt has gained new importance. On many continents the material transport from mines is carried out with mining trucks. These have a total weight of approx. 700 t (772 US tons), drive at speeds of 60 km/h (37 miles/h) and consume, depending on the topology, 800 to 2,000 l/h (211 to 528 gallons/h). The empty weight of the truck of up to 250 t (276 US tons) has to be hauled during each transport as well. For some time, the concept of "In-Pit Crushing and Conveying" (IPCC) has been discussed within the mining industry. This concept is dedicated to the use of mobile crushing machines and the increased use of conveyor belts starting directly in the mine. This new direction aims at reducing or even avoiding the complex transport by means of mining trucks.

From woodyard to finished flakes and chips:

Hombak expands the Siempelkamp product range with front-end technology

By Ralf Griesche

Effective June 2009, a new company belongs to the Siempelkamp Maschinen- und Anlagenbau GmbH & Co. KG. The Hombak Maschinen- und Anlagenbau GmbH based in Bad Kreuznach, Germany, has enriched the product range of the Group with products for the front-end area which are used in the production of wood-based boards. The company's program has been well established on the market. What is important for our customers is that now even more services are readily available from one source. The Siempelkamp portfolio moves towards completing itself!

Wood shaving mill

With this acquisition Siempelkamp is setting another milestone towards complete plants for the wood-based products industry. The company can supply complete production lines from the woodyard to finished laminated furniture boards – all from one source. Thanks to Hombak, Siempelkamp can now offer machines for material crushing and shredding, material grading and screening, as well as conveyor systems and bunker installations.

Aerial picture of Hombak

Hombak, founded in 1924, started out with the development and production of joinery machines. In 1956 the company supplied the first flakers to a thriving particleboard industry. Hombak consistently expanded in this area by developing individual machines to complete lines for the flake, strand, and chip processing.

46 employees generated a sales volume of approx. 6 million Euros in 2008. The company's experience of many decades guarantees high quality for flaking processes as well as for the production of wood chips: The portfolio includes drum flakers for pre-cut timber, universal drum flakers, drum chippers, rest wood shredders, and butt end equalizers. For the reduction of recycling wood of all kind, Hombak developed the hammer mill: The processed material can be used for further processing or for boiler fuel. Wood shaving mills have recently been added to the product range. They process logs of up to 3 m (9.8 ft) in length.

A feature of the reduction technology by Hombak: "Our knife clamping system as well as the improved feeding of wood optimize the production of chips. Our customers profit from high efficiency, high-quality chips and last but not least low wear costs," explains Heinz Richterich, Managing Director of Hombak Maschinen- und Anlagenbau GmbH.

Debarker

Chipper

Separation technology: exact and gentle

In the area of separation technology, Hombak's screening equipment provide for a gentle handling of the material to be screened as well as for efficient separation into the required fractions. Gyratory screens, drum screens, and disc graders kill two birds with one stone: they provide a high degree of separation as well as gentle screening. According to the requirement, different screening techniques are used or combined with one another. New procedures allow the screening of the incoming material into homogeneous fractions according to their size and weight.

In the area of conveyor belts Hombak focuses on custom-fit designs according to customer requirements. Custom-made conveyor systems which are tailored to the customer are core elements of each Hombak line. They guarantee low maintenance and trouble-free production. "We create an optimal layout which is backed by three quality factors. The first factor includes an exact analysis of the line capacity, the second the integration of existing machines provided by the customer, and the third a fine-tuned cooperation with the end-customer," says Heinz Richterich.

With regard to gentle processes, Hombak's bunker installations focus on the gentle handling of the incoming material. Exact dosing allows consistent material feed to downstream aggregates. The Hombak metering bins guarantee the safe discharge of extremely long strands which tend to plug. An exact dosage is achieved by using a frequency-controlled discharging transport belt and spiked rollers.

Left: Largest flaker
Right: Universal drum flaker

Left: Knife-ring flaker
Right: Rotor

Metering bin

In-house developments with consistency

No matter which Hombak product, all machines are developed and continuously optimized at the Bad Kreuznach location. The manufacture is based on a high quality standard of which the foundation is skilled personnel and quick and qualified service. Concerning customer proximity Hombak is in line with the demands of the Siempelkamp Group! More than 5,000 delivered machines and over 3,000 customers worldwide are the solid 'dowry' that the Bad Kreuznach-based specialist for wood reduction technology brings into the Siempelkamp family.

Hombak will continue to market its products and services under the Hombak name. The completion of the manufacturing program will take priority in the near future. Next to the environmental and recycling industries, Hombak will focus on OSB production and OSB handling. With the additional know-how and support of the Siempelkamp Group, Hombak will continue to fine-tune existing machines and develop new machines for the front-end area.

Hombak highlights:
Range of applications and customer benefits

	Range of applications	Supply material	Customer benefits
Universal drum flaker	discontinuous flaking of different types of wood with a drum flaker	logs of random lengths, cores, slabs, and edgings	• during flaking the logs are kept in place with weights • excellently suited for the production of flakes with very narrow thickness tolerances and very low percentage of fines and splinters
Drum chipper	continuous production of wood chips	logs, residual wood, and wood wastes	• large drum diameter, screening surface equipped with additional cutter bars –> high quality chips • high degree of operational reliability due to toothed draw-in rollers with surface armoring –> long service life • the counter knives are designed for multi-lateral use and can be reground
Drum and gyratory screens	grading and screening of green and dry material	Drum screen: strands, chips, flakes, sawdust, extremely long flakes (OSB and wafers) Gyratory screen: chips, flakes, bark, peat and compost as well as sawdust	Drum screen: • precise grading as well as gentle screening due to large drum surface and special lining • considerably reduced idle times due to easily replaceable screen linings in frames Gyratory screen: • maintenance-free, rubber-spring universal joints • fast and easy replacement of the screen frame –> long service life • almost self-cleaning and vibration-free mode of operation
Metering bins	intermediate storage of strands, wafers, and similar materials both green and dry	strands, extremely long chips, especially OSB	• safe discharge of extremely long strands which tend to plug • exact dosage by means of the frequency-controlled discharging transport belt and spiked rollers
Hammer mills	reduction of recycling wood of all kind (used for further processing or for boiler fuel)	pallets, crates, boxes, scrap wood, wood residues, construction timber waste, bushes, branches, packing materials, roofing cardboard, etc.	• top of machine housing can be opened hydraulically for easy change of the hammers, screens and counter knives
Rotor Debarkers	debarking of logs with a length of up to 6 m and wood with a diameter ranging from 50 to 600 mm	logs	• simple, robust construction • high operational reliability • variable agitator speed • simple operation
Knife-ring flakers	production of core and surface layer chips for the particleboard industry	chips	• easy knife-ring replacement • excellent chip quality • high wear protection
OSB strander	production of high-quality OSB strands from log wood	logs	• easy knife replacements • excellent strand quality
Logyards	MDF plants, OSB particleboard plants, recycling wood plants	logs, chips, scrap wood	• complete planning and start-up of plants • robust construction • long-standing experience
Secondary wood shredder	MDF plants, particleboard plants	chips	• simple, robust construction • user-friendly • easy knife replacements
Surface layer mill	particleboard plants	core layer screened oversizes	• easy adjustment of the size reduction technology • robust, solid construction

Heinz Richterich, Managing Director of Hombak

The Hombak asset: A higher percentage of complete production lines from one source

Heinz Richterich, Managing Director of Hombak Maschinen- und Anlagenbau GmbH, explains to bulletin what makes Hombak developments so strong.

Hombak's specialty are technologies and processes for the reduction of wood to chips and flakes. What role does this area of expertise play in the entirety of a plant?
Heinz Richterich: The processing of wood into high-quality chips and flakes influences the quality of the board. Therefore, its weight in the entirety of a plant takes top priority. First-class quality of the reduced material positively and purposefully prepares all subsequent processes.

To what extent is an effectively developed front-end system relevant for board quality?
Heinz Richterich: Let's take, for example, a particleboard line. The flakes for the core layer are produced by means of a drum flaker. By using these flakes, the board receives a far better transverse tensile strength.

What Hombak developments come into play here?
Heinz Richterich: With the help of frequency converters we have significantly shortened the times for ramping up and braking of the motors for universal drum flakers. From an efficiency stand point, over a period of one year the customer receives approx. 20 additional operating days due to the reduced time for knife replacements. At the same time, the start-up peak is reduced to 3.1-times of the nominal current load. The heat that is generated during the braking process is converted to electricity and fed to the power network.

What invention is the most important and successful one in the history of Hombak?
Heinz Richterich: A single outstanding invention does not exist at Hombak. The multitude of our inventions, the small and large modifications, and our patents have all served one purpose, to improve our machines and the well-being of our customers.

What opportunities do you anticipate for your future as a part of the Siempelkamp Group especially in regard to the benefits for our mutual customers?
Heinz Richterich: The affiliation to the Siempelkamp Group provides our company with the freedom for significant new developments such as knife-ring flakers and rotor debarkers. For our customers this acquisition stands for a stronger presence with regard to complete production lines from one source.

Pressure vessel head consisting of two segments and centering cantilevers

Reactor pressure vessel head prior to immersion into flooded pond

After immersion into the reactor cavity, the sealing lid approaches the open reactor pressure vessel

RPV sealing lid for the nuclear power plant Brokdorf:

Siempelkamp scores twice with time savings

By Christoph Aiglsdorfer

In late October 2008 Siempelkamp Nukleartechnik GmbH received the order for the planning, manufacturing, and delivery of an RPV sealing lid (RPV = reactor pressure vessel) for the Brokdorf nuclear power plant. A commitment to a delivery in seven months was a precondition for obtaining this order. Siempelkamp used several competitive advantages to win this contract including small and highly specialized teams of project engineers, excellent and long-standing contacts with manufacturers as well as the flexibility of teams that are well attuned to one another. In addition to being available quickly due to the short delivery time, the sealing lid also saves the operator valuable time during inspections!

The supply and retrofitting of components for existing and new nuclear power plants are core strengths of Siempelkamp's Nuclear Technology business unit. The order from Brokdorf confirms the company's excellent industry reputation especially considering the very short project time and the technically advanced solutions.

The time factor already played a significant role in the standard project planning of the preliminary-test documents. These documents are necessary for obtaining the mandatory permits from reviewers and regulating authorities and had to be compiled and submitted within the shortest time possible. During this phase, cooperation between operators, reviewers, regulating authorities and suppliers was demonstrated. The tight time schedule could be kept, the preliminary examination documents were approved by reviewers and regulating authorities after only a short time.

While preparing the preliminary examination documents, Siempelkamp received, ahead of schedule, the material approval for semi-finished parts which normally have long delivery times. "The advanced approval for the purchase of materials was an accommodation on the part of our customer and was based on the long-standing and trusting relationship. For us it meant an important milestone in the course of the project," says Christoph Aiglsdorfer, the Siempelkamp project manager. Next step in the project was the design as well as the production and manufacturing control which were carried out according to safety-related regulations established by the Nuclear Safety Standards Commission. These regulations, which are marked with the abbreviation KTA, are comparable to DIN standards. They guarantee the absolute compliance with safety-related requirements. They are also essential safe-guards to the quality of and a precaution against any damages to a nuclear installation.

The acceptance test for the sealing lid took place at the factory in May 2009. Both the test of the load attachment points and the leakage test were passed. As a result the sealing lid could be used for the first time in June 2009 at the Brokdorf nuclear power plant.

The handling of the RPV sealing lid took place with the lifting device which was delivered in May 2008.

The storage stand for the reactor pressure vessel head was included in the Siempelkamp scope of supply. It serves as a stand-by position and storage stand for the sealing lid as well as for the lifting device during power operation.

The sealing lid seals the open reactor inside the flooded pond

Transport of the sealing lid with the SNT lifting device inside the containment

The use of the sealing lid results in time savings of approx. 17 hours because the process of pumping the water out of the reactor cavity becomes unnecessary for some inspections (see inset 1). These time savings reduce the downtime of the power plant during inspections, and thus allow for a quicker start-up.

The advantage for the customer is obvious: Higher effectiveness together with a tremendous cost reduction during inspections. To integrate the power plant a day earlier into the mains supply reduces the costs of an inspection in the 6-digit range! The quick delivery, which was crucial in obtaining the order, as well as time savings of 17 hours made Siempelkamp Nukleartechnik GmbH in Brokdorf a strong partner.

These achievements are joined by our endeavors to precisely compile our customer's needs. Test plate, lifting device, RPV sealing lid, and storage stand are components that were systematically developed and manufactured according to customer-specific requirements.

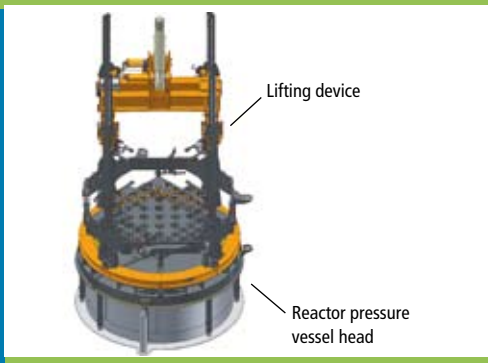
Siempelkamp has supplied the nuclear power plant Brokdorf with components used in the reactor containment since 1998. "Meanwhile we can speak about a system solution which has been developed and proven as sustainable over the years," says Christoph Aiglsdorfer.

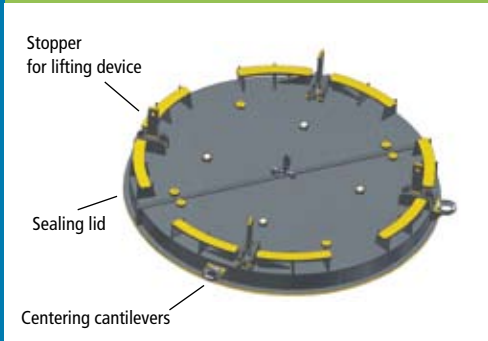
RPV sealing lid: convincing savings effect!

Nuclear power plants are shut down at regular intervals and disconnected from the power mains to carry out overhauls. Mandatory recurring checks are performed on most components and internals of the power plant during these inspections.

In order to inspect the main cooling water circuit including the valves and steam generators, it is necessary to remove the cooling water from inside the steam generators and main cooling water circuits. This requires a pumping process of many hours during which vast amounts of water have to be pumped out of the reactor pond. After successful inspection this water has to be returned to the pond.

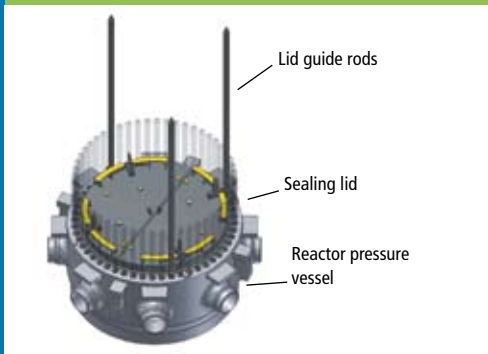
Using the RPV sealing lid makes this pumping process and the following return of the water unnecessary. Inside the flooded pond the lid is placed on the already open reactor and seals it with a special sealing system. For the aforementioned inspections, the water is moved between the sealing lid and the main cooling water circuit. The water level increases the pressure on the lid and thus prevents the pond water from running into the reactor. Using the SNT sealing lid at the nuclear power plant Brokdorf resulted in time savings of approx. 17 hours.





Technical details

- Total weight approx. 12,000 kg (13.2 US tons).
- All components of the sealing lid are made of an austenitic material (1.4541) according to DIN EN 10088.
- The RPV sealing lid consists of two segments and is connected via fitted bolts. Leakages between the two cover segments and to the reactor pressure vessel are prevented by special seals.
- For the alignment of the sealing lid to the reactor pressure vessel adjustable centering cantilevers for the lid guide rods are attached to the vessel.



First class biomass:

Biomass power plants made

Energy plant SES Chile

by Siempelkamp

By Ines Veckenstedt

Wood is what Siempelkamp knows best. This fact has endured in the wood-based products industry. Our activities in the area of biomass power plants are once again proof of this. In this field the Siempelkamp Group demonstrates its competence. The advantages include a clean and safe energy supply based on a renewable resource and a partner that is well schooled in the processing of wood.

Biomass is regarded as one of mankind's oldest energy sources. Wood was the preferred material for heating and cooking before coal, crude oil, and natural gas were introduced. Traditionally, the representatives of the wood-based products industry are tapping the full potentials of renewable resources by operating their plants with biomass. Rightly, because what would be more obvious than to generate a part of the energy used in plants from waste that accumulates during board production? Bark, wood waste, and abrasive dust, to name a few examples, are suitable fuel materials.

When it comes to the energy supply of private households or companies, an increasing number of decisions are made in favor of biomass power plants. Rightly, because the benefits for the environment and society, customer and operator are obvious. Biomass is the world's most important renewable energy source providing its users with security of supply. Compared to fossil fuels, wood can be tapped directly from on site sources and secures operators as well as users a piece of independence from foreign markets. The security of supply is joined by cost certainty because the heating costs for a biomass heating system are to a large extent independent from prices for fossil energy sources.

Due to the closed CO_2 circuit, biomass is a climate-friendly energy source generating no additional greenhouse gases. The burning of wood only discharges the amount of carbon dioxide (CO_2) which was removed from the atmosphere during photosynthesis. However, when fossil fuels are burned, they release all the CO_2 they have been collecting over millions of years at once.

Another advantage: The energy from biomass can be stored and used when needed and it has a high degree of efficiency. Last but not least the local and regional value creation are benefiting from biomass. Biomass power plants that can be erected close to the resource are an advantage for the domestic forestry! Long transports and their resulting higher energy demand are omitted.

Wood: home advantage for Siempelkamp!

For many decades the Siempelkamp Group has been a world market leader in the wood-based products industry. This position has been the solid foundation for the Krefeld specialist to become involved in the area of biomass power plants. "We have put the technology and machinery for the optimal preparation of biomass made of

Top: Waste wood
Bottom: Green wood

Green wood feeding

Wood feed to the chipper

Chipper

Chips

either green wood, annual plants, or waste woods in many wood-based material production lines worldwide to the test. Furthermore, with our subsidiary Siempelkamp Energy Systems (SES) we have the experience to erect energy plants for the generation of process heat," says Dr.-Ing. Hans W. Fechner, chairman of the Executive Board of the Siempelkamp Group.

The right technology for material reduction is the beginning of all concepts regarding the erection of a biomass power plant. The Siempelkamp subsidiaries Hombak and CMC Texpan supply and install debarkers and chippers, screens, conveyor and bunker installations as well as wood recycling plants and metal separators. With these tools we prepare every type of biomass for optimal burning.

To further optimize burning, the correct moisture content of the biomass is important. The world's largest producer of dryer systems, the Siempelkamp subsidiary Büttner, has the expertise to design equipment that can regulate the moisture content. A 125-year history and 1,800 dryers produced are well-founded references for Büttner customers in the wood-based products and other related industries. The service spectrum includes the planning of individual dryer plants, the supply of all core components, the production of drums, pipelines and cyclones close to the customer site, the assembly, the testing of all installations, the start-up, and the service.

Last but not least the competence of Siempelkamp Energy Systems GmbH (SES) completes the portfolio. Located in Hanover,

Layout biomass power plant

Bunker installation

Dryer

Grate furnace

Germany, this specialist stands for more than 50 energy systems built and started up for the generation of process heat (steam or thermal oil). The SES portfolio includes:

- combustion capacities ranging from 10 to 100 MW
- extensive experience in the area of flue gas cleaning
- long-standing competence in the overall planning and implementation of projects
- implementation of steam and ORC turbines from well-known manufacturers.

With this knowledge and equipment portfolio, Siempelkamp is best positioned to offer discerning users customized concepts.

Complete plants from one source

As with all areas that Siempelkamp represents, it is better to receive complete plants from one source than receiving plant components from many different providers. This also goes for biomass power plants. Each Group company specializes in a certain field. The sum of these specializations leads to a fine-tuned overall concept which is based on the well-attuned dialogue of all involved teams under the roof of the Siempelkamp Group. "This is, for example, represented by our internationally experienced project management which provides for a smooth implementation of equipment. Furthermore, the after-sales organization keeps a constant eye on the overall concept and ensures the highest plant reliability," adds Dr.-Ing. Hans W. Fechner.

Whether for regional-political, ecological, or economical reasons, the justifications for increased use of biomass are as convincing as they are wide-ranging. In the end, the competence of the partner responsible for the planning and erection of the equipment is crucial for an effective plant concept. Siempelkamp's competence around the biomass resource is a reliable guarantor for our customers to receive exactly the service that is needed.

An overview of Siempelkamp services

Our service components for the design and construction of turnkey biomass power plants include:

- Planning and engineering
- Wood processing systems and dryers
- Fuel storage bunkers and feeding systems
- Biomass combustion furnaces and steam generators
- Flue gas cleaning and emission measurement technology
- Steam turbines with generator and condenser
- Water-steam cycles
- Pipelines
- Automation and control technology as well as switch cabinet construction for large plants
- Electrical and safety engineering
- Building services engineering
- Secondary equipment engineering
- Assembly and start-up
- Training and technical documentation

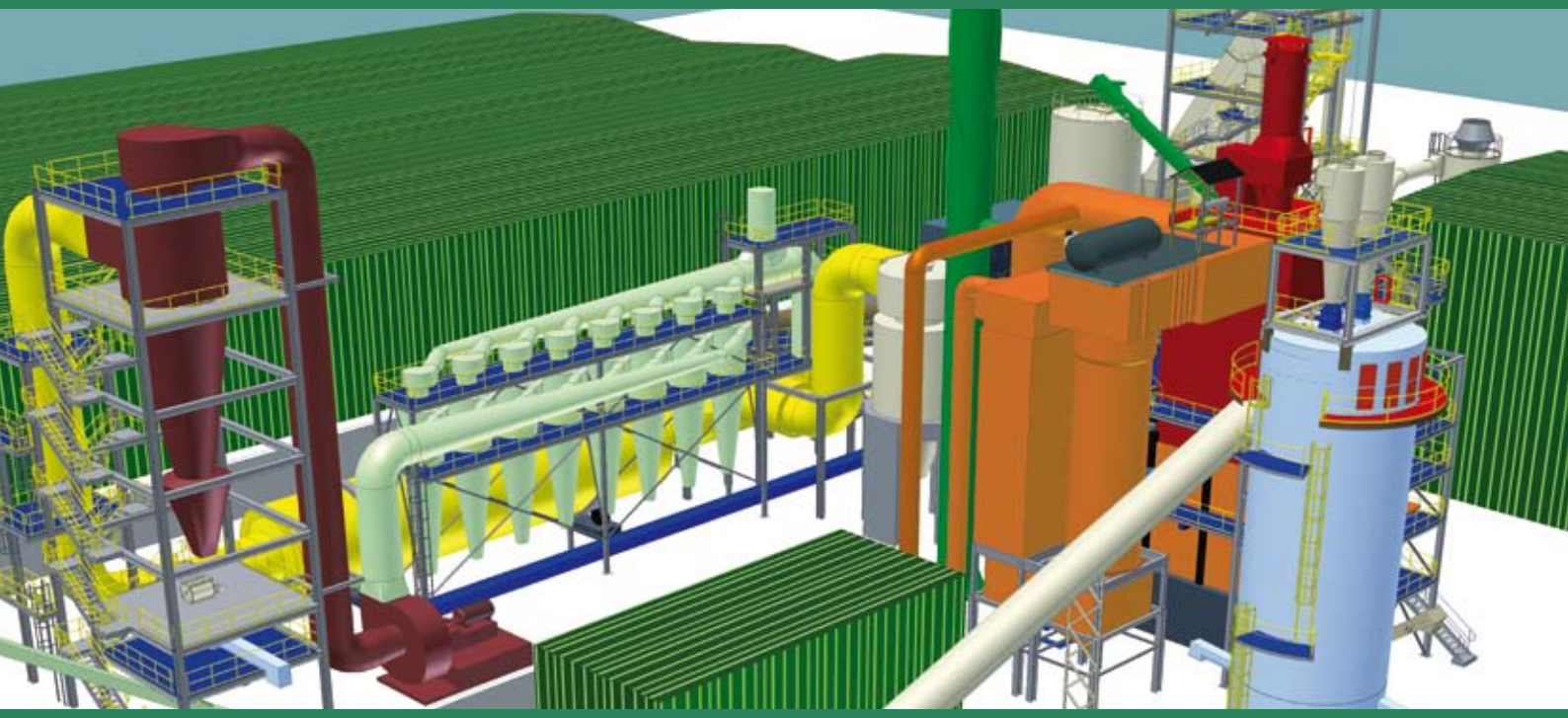
References for energy systems erected over the last few years

Ivatsevichdrev	Belarus	31 MW	PB Plant
SPF	Indonesia	41 MW	MDF Plant
Metro	Thailand	48 MW	PB Plant
ART Progres	Ukraine	72 MW	MDF Plant
Egger/St. Johann	Austria	38 MW	PB Plant
Laminex	Gympie, Australia	24 MW	MDF Plant
MDF Grajewo	Grajewo, Poland	66 MW	MDF Plant
Masisa S.A.	Cabrero, Chile	64 MW	MDF Plant
Advance Fiber	Karnchanaburi, Thailand	54 MW	MDF Plant

Digital prototyping in 3D:
How a 3D presentation of a plant saves tim

Is it possible to look at a plant including the balancing of all its interfaces and cost savings before even buying it and starting construction? Siempelkamp's Belgian subsidiary makes it possible. In 2002 the planning expert from Lauwe, Belgium, started including the first 3D drawings; since 2005 it has become the standard procedure to include 3D drawings of the largest steel structures in every planning process. Sicoplan has started to comprehensively integrate the advantages of digital product development into the design process. Today the technology has become impressively demonstrative and fascinatingly detailed. It provides customers with numerous advantages.

By Dirk Traen



3D planning as a virtual tour

Since 2002 Sicoplan has been using the software Autodesk Inventor to provide Siempelkamp customers with a full color virtual tour of their plant as early as during the planning phase. This is more than just a nice gimmick: Based on a single digital model with integrated AutoCAD® and 3D data, the program is able to generate a virtual representation of the finished product. The result is an exact digital prototype with the help of which the design of the plant can be optimized and analyzed. Form and function can be tested extensively prior to construction start.

"The inadequacy of 2D drawings in the context of highly complex tasks has become more obvious. Compared to the former 2D planning, in 2006 we started to establish the preconditions that would allow us to generate 3D drawings without overhead utilizing the fine-tuned Autodesk Inventor software. Meanwhile, we have tremendously advanced the area of digital prototyping and have been able to present the pre-engineering significantly more efficient and graphic," reports Dirk Traen, Manager of Sicoplan.

e and costs before the real plant is built

One advantage of this pre-engineering is that time and cost budgets are noticeably relieved because the simulation for the assembly and maintenance takes place in the digital model before the planning and purchasing. This provides valuable support in bringing all partners that are part of the project together. Interfaces present themselves in the visualization before the work starts. This helps identify possible critical points, eliminates friction losses, and ensures full integration.

A jump start prior to the launch

Since 2009, Sicoplan has increasingly used digital prototyping as early as during the offer stages. Especially during this phase the time factor is an invaluable advantage. "Prior to buying a machine, the future operator is presented with all details, which are relevant for the possible purchase of local equipment, via a 3D model. The customer is able to inform partners, suppliers, and manufacturers about important details early on. As preliminary information the digital prototype is so detailed that it can represent a useful basis for planning during price negotiations. Furthermore, the contractual partners on site are put on the right track early on by receiving all the facts regarding dimensions, interfaces, and locations at the site and can start thinking in the right direction before the project even starts.

As a result, idle times, for example in the scope of a financing process, now carry little weight for the customer. "Thanks to the 3D modeling, projects that were put on hold due to the global financial crisis could be introduced during a meaningful pre-engineering phase. If the order then later receives the go-ahead, the 3D modeling provides the optimal foundation to proceed with the planning phase without time delay," describes Dirk Traen.

Another advantage is the speed with which modifications on and additions to the digital prototype can be carried out. As soon as the detail-engineering of the machine suppliers becomes available, Sicoplan can adjust the 3D model to the new data in a short amount of time. Furthermore, the focus is on the complete equipment instead of individual components. "Since all drawings for the following pro duction are developed from one model, there is little risk that certain drawings are no longer attuned to one another after revisions," says Dirk Traen. Based on the 3D planning, the layout and steel structures can be better optimized. With this technology, the simulation, visualization, and analysis of plants in many different what-if scenarios is no longer a dream of the future!

Digital product development on screen

Example for the planning reliability: before …

… and after

The metal of the gods:

Tough, light and economical – but difficult to form

Components made of titanium as close to the final shape as possible are in high demand in many industries. The tendency for more complex and larger components which are robust and at the same time light is growing in the area of technical developments. Consequently, the relevance of titanium for machine and plant engineering as well as the automobile and aviation industries is rising. For all process steps in the forming of titanium Siempelkamp provides press systems which are specifically tailored to this material.

By Samiron Mondal

Turbine blades have to be robust and light at the same time

Titanium – the German Society for Metallurgy declares it the 'metal of the gods' inside a recently published news release. It is an attractive material for many innovative and technically challenging products because it provides the highest ratio between strength and density of all metals. Design engineers in the areas of aircraft manufacturing and astronautics like to make use of these characteristics. Designers have also discovered titanium and use the material in watches, high-tech golf clubs or covers for luxury mobile phones.

The chassis of an Airbus A 380: Many components are forgings made of titanium

Even though, due to its complicated production process, titanium is approximately ten times more expensive than conventional steel, its worldwide demand has been consistently growing for years.

The characteristics that make this metal so desirable are also the reasons that titanium is extremely unruly during forming. The high strength and low heat conductivity are the reasons that the dies are subject to high temperatures and wear. For the manufacturers of forming presses this behavior is a tough nut to crack.

The mechanical machining after forging is also time-consuming and costly. Since this process can cost up to 50% of the total cost it is important to make a forging that is as close to the final shape as possible.

Titanium sponge is extremely porous and has to be compacted

Titanium compacting press

Frame plate compacting press
on the Schiess milling machine

Rutile

UKTMP ordered from Siempelkamp a compacting press for titanium sponge

The main source material for the manufacture of titanium is a mineral by the name of ilmenite. The second main source of titanium dioxide is a mineral called rutile.

Even though the chemical element titanium was already discovered in 1791, the commercial manufacture of the metal did not succeed until the 1940s. Titanium dioxide is first converted into titanic chloride which is afterwards reduced with magnesium and sodium. This process results in titanium sponge which is either re-melted with various alloy-additions to create a titanium alloy or processed to pure titanium.

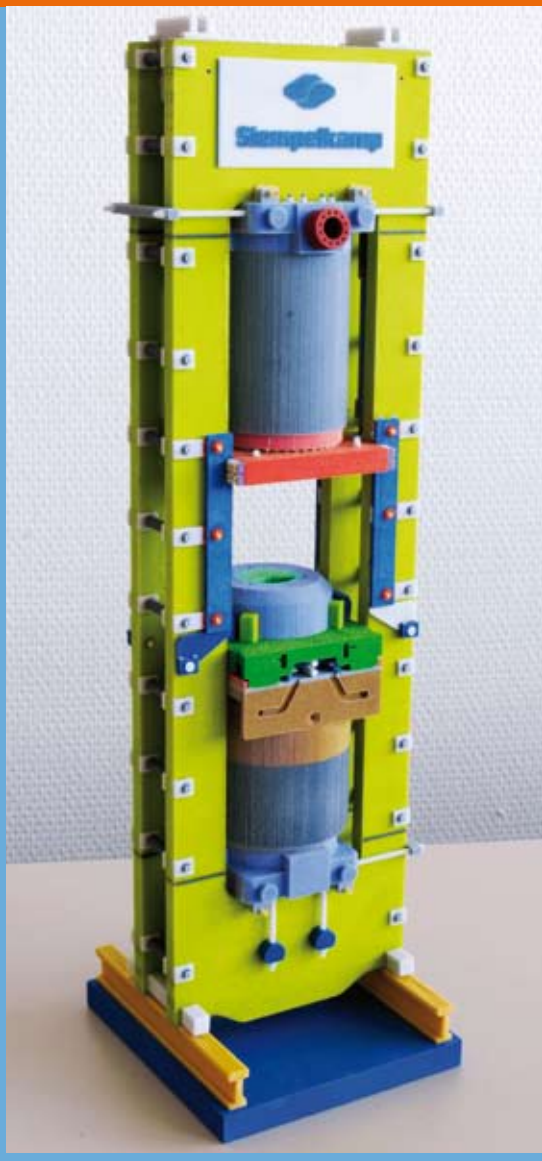
Due to its broad experience with the material and the individual process steps, Siempelkamp could develop new concepts for forming presses which make it possible to optimally exhaust the potentials of titanium. In this way, our customers obtain not only reliably reproducible material properties but also components that are close to their final size and, consequently, require only minimal post-machining.

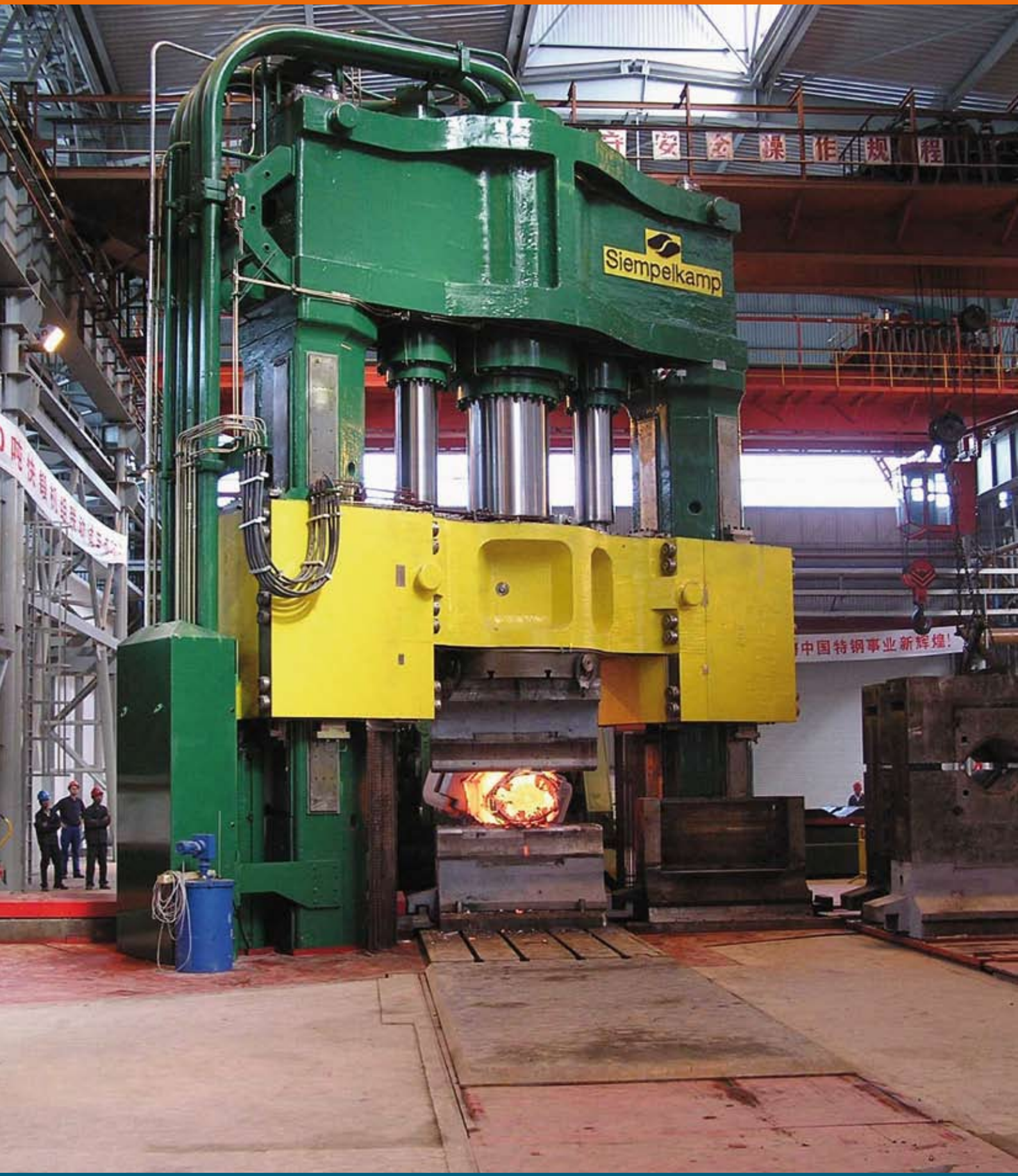
First forming step: Titanium sponge becomes a strong metal alloy

While steel and aluminum are both directly smelted from ores, during the production of titanium first an intermediate product is formed – that is, the extremely porous titanium sponge. For the production of titanium another process step, the compacting of the titanium sponge, is required. Siempelkamp has been building presses for the compacting of titanium sponge for a long time and has gained a lot of experience in this area.

The Kazakh titanium and magnesium manufacturer UKTMP will press titanium sponge to so called 'compacts' with a new Siempelkamp-made press which is currently being assembled. In a subsequent process, the compacts are then re-melted using an electric arc furnace. When designing this press the engineers not only had to deal with controlling the large forces involved but, because of the high oxygen affinity of titanium, their design required that the compacting would take place under vacuum.

The distinct feature of the new press is that it works from both sides. Because it has a press capacity of 2 x 80 MN, it generates an extremely high specific forming pressure which so far is new for the compacting of titanium sponge in presses of this dimension. The resulting compacts have a high density and, consequently, are easier to process.




Siempelkamp

Open-die forging press

This saves time and energy during the following forming in open-die or closed-die forging presses.

Second forming step: open-die forging at an ideal forging temperature

Utilizing a new Siempelkamp forging press with a press capacity of up to 45 MN, our Chinese customer Goldsky Titanium Industry Technology will forge rods, square bars, flat bars as well as tool blocks, flanges, washers and pins. These parts are primarily made of titanium but also contain tool and stainless steels. The investment in the new press was triggered by an increasing demand for high-strength and, at the same time, light-weight components for the aircraft industry.

Because of the tight temperature range, which has to be maintained when forging titanium, the Siempelkamp design engineers had to design a press with a short forging process. Siempelkamp's solution to this technological challenge was an optimized press design and an optimized control concept for the hydraulics and electrical engineering which would increase the forging frequency per minute. This high forging frequency not only results in shorter processing times but it also applies thermal energy to the workpiece. This, in turn, reduces the temperature drop of the workpiece during forging. The results are almost tension-free semi-finished products with very homogenous properties.

Our design engineers have since continued their work: In 2011 we will install a new high-performing forging line for products made of titanium alloys. This new press is characterized by its unmatched number of planishing strokes per minute. For standard forging, using all cylinders, 48 strokes per minute are normal, for the planishing up to 100 strokes per minute are possible. And all that with movable dies weighing approx. 200 t (220 US tons)!

Siempelkamp will supply the complete die change and hydraulic systems as well as two manipulators which position workpieces precisely for forging. They can move forgings with a weight of up to 15 t (16.5 US tons).

Third forming step: die forging of the semi-finished titanium products with unmatched precision

Since 2007 ADH has been operating one of the world's largest and strongest closed-die forging presses at its factory in Pamiers, France. Among other parts, this press

Siempelkamp supplies the new open-die forging press including hydraulics, die change system and two manipulators which position workpieces precisely for forging

Near-net-shape forging
with a closed-die forging press

Turbine ring

Airplane turbine

Titanium joints

produces structural parts and turbine disks for the aeronautical and aerospace industries, such as for the Airbus A380.

The request from Aubert & Duval was to provide a large and flexible space that would allow fitting the dies and the use of dies with a height of 4,500 mm (14.7 ft). Furthermore, the press should guarantee high working accuracy and low press deformation even under extreme concentrations of pressing forces, high eccentric loads, and crosswise forces. In this connection ADH specified that the crosswise movement of the upper bolster under a horizontal force of 1,500 t (1,653 US tons) can amount to no more than 3.2 mm.

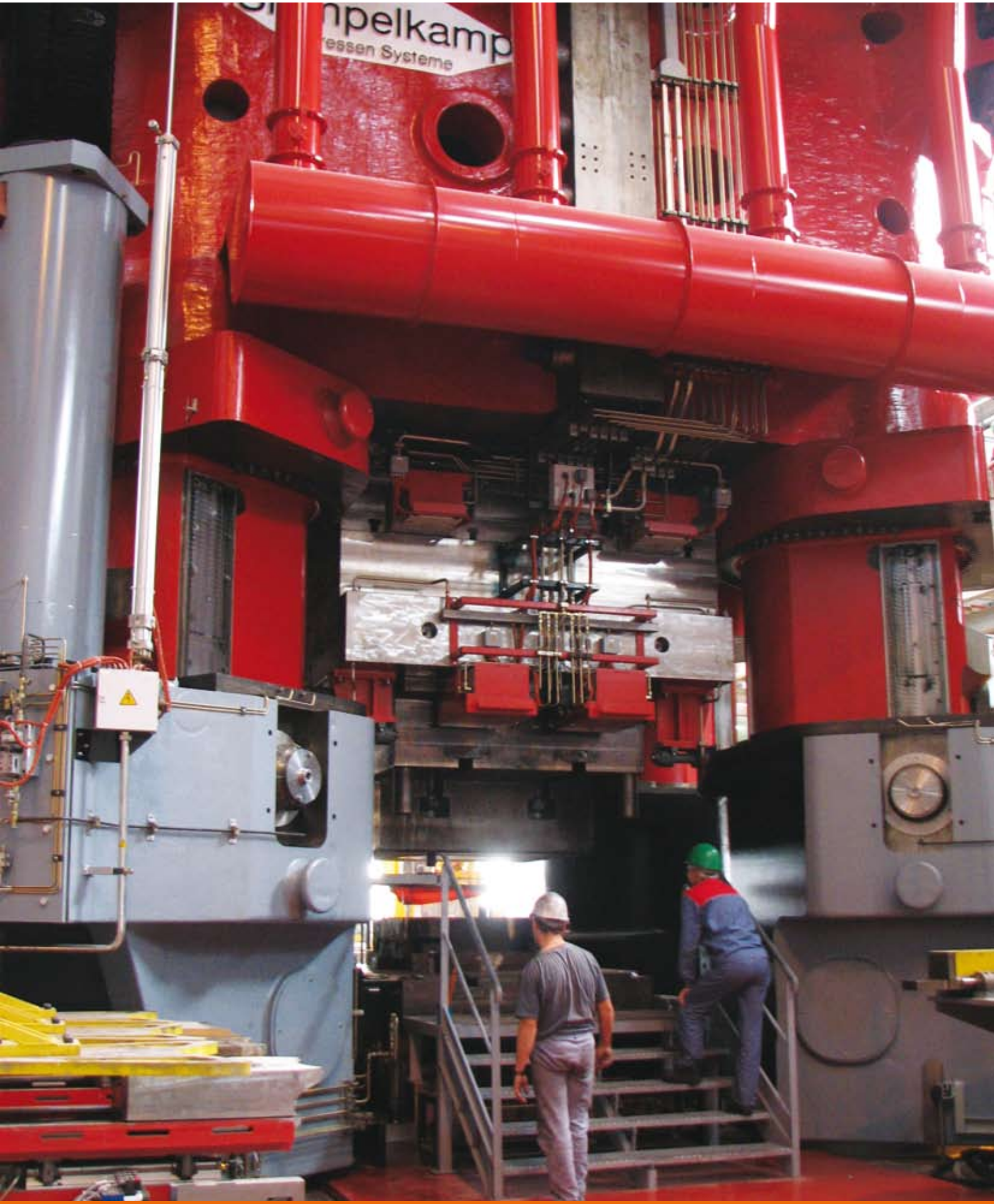
Since three dies are installed next to each other, the press is under high eccentric loads whenever either one of the outside dies is in use. Despite the high eccentric loads, unparalleled shape precision was requested. With the new concept Siempelkamp combined all requirements into one solution. This solution is a 4-column underfloor press with outside-installed main cylinders and hydraulic parallelism control which can compensate the different vertical strains during high eccentric loads. The press has a press force of up to 40,000 t (44,092 US tons). ADH seems to be satisfied with this press because only a few months after the start-up, the company ordered from Siempelkamp the above mentioned high-frequency forging press.

Each large press is one of a kind

The complex titanium production process requires from the manufacturers of forming presses special know-how about the process cycle starting with the preparation of the minerals to the forging of the final product. For all orders within the complete process chain for the production of titanium Siempelkamp scores again and again with unique concepts. Continuous dialogue between design engineering, engineering, foundry and production departments, close cooperation with the customer as well as the design engineers and foundry men working under the same roof led to the optimal solution being found for each task.

The design process of presses for titanium is especially unique. For a relatively small market, every press is one of a kind. Oftentimes the press represents the centerpiece of a factory. If it is not working, production comes to a standstill.

This means that from the day the press is put into operation the prototype has to work reliably, efficiently, and precisely day in and day out for many decades. That is why the designing of new presses at Siempelkamp is a repetitive process in which engineers of different fields take part. This is the guarantor for efficient operation on one hand and high quality of the forgings on the other hand.



The closed-die forging press at Aubert & Duval in France is one of the world's largest and strongest

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Machinery and Plants

Siempelkamp Maschinen- und Anlagenbau GmbH & Co. KG

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