



Siempelkamp

bulletin

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Dismantling project Zion, Part 2
Sophisticated top performance with promising prospects for the future

Pallmann size reduction and recycling systems
Systematic fine-tuning

Milestone "First Board"
Seven project successes in three weeks!

> TO PERCEIVE THINGS
IS THE GERM OF
INTELLIGENCE

Lao Tse, Chinese philosopher



Dr.-Ing. Hans W. Fechner Chairman of the Executive Board G. Siempelkamp GmbH & Co. KG

Dear Readers:

From now on the stories in our Bulletin reach you under a common motto which leads through the entire magazine as a guiding theme. In the first magazine of 2016 this catchword is "intelligence" – the perfect binding force for everything that you and we achieve in our markets. After all, our challenge is to develop intelligent plant concepts and services which are tailored to our customers' specific needs. Intelligence also means to always think a step ahead regarding current projects in order to adjust them to constantly changing requirements and economic conditions.

"To perceive things is the germ of intelligence," was once said by the Chinese philosopher Lao Tse. This quote demonstrates the way to the true intelligent solution: Before the design work takes shape, the situation profiling, that is, the intensive dialogue with you and your teams takes the main focus. Only in this way, the really clever and innovative concept succeeds.

This Bulletin provides an overview about intelligent Eco concepts and about the application of our know-how from the wood-based materials industry to completely new areas of opportunity. We also report about the highly-specialized competence of Siempelkamp Giesserei and the successful work performed, for the second time, at the nuclear power plant Zion, USA. This and much more in our Bulletin – please read on.

We hope you enjoy reading this new issue!
With best regards from Krefeld

Dr.-Ing. Hans W. Fechner

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For the second time, our dismantling team successfully completed a project at the nuclear power plant Zion, USA. Our highly precise work was completed well within the schedule and opened up new prospects for further work for our tools and technologies within the scope of decommissioning projects.

> Read more about this project on page 8



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Precision technology for the production of strands, flakes, and fibrous materials and the expertise in the ever more important area of recycling are the benefits that Pallmann opens up within the Siempelkamp Group. What are the highlights that the company offers as a custom solutions provider? Find out more by reading our article including an interview.

> Read more about this project on page 36



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Project management at the highest level at Siempelkamp: Four ContiRoll® press lines started production almost simultaneously within one week in April; three more presses followed only two weeks later.

> Read more about this project on page 66





PEOPLE

Intelligent teams share and expand their knowledge in a constant dialog and during an international exchange. Regardless whether it is during the planning or design phase, during shipping or directly at the construction site: Siempelkamp teams form a strong unit together with their employees.



Siempelkamp Ingenieur und Service GmbH: **Zion dismantling project – full concentration on success no. 2**

→ By Christian Jurianz

In the last issue of Bulletin we reported on the activities of Siempelkamp Ingenieur und Service GmbH at the Zion nuclear power plant in Illinois. Since this is a twin-unit power plant, the story had not yet come to an end in the summer of last year after the successful dismantling of the reactor pressure vessel of Unit 2 (as we reported in Bulletin 02_2015). Instead, it was important to make use of the experience that had been acquired for the segmentation of Unit 1.





Zion team 2015

Time was not on our side, as the period left until the deadline that had been set for fulfillment of the contract was just under 6 months.

The preparatory work started on time on 25 June 2015. As our customer was working very closely with us and was also very interested in ensuring that the work progressed quickly, they not only helped us to get our equipment into the control area, but also prioritized us in terms of making their cranes available. A notable side note was also the agreement not to negotiate on any waiting times in laborious project discussions, but instead to notify any problems to the customer and find a joint solution for these. A further aspect was that commercial impacts should only be noted down and brought to account at the end of the project. So we were able to concentrate fully on the technical execution of the project! This demonstrates the high level of trust which grew between the two partners during the course of this project!

The perfectly trained staff set the saws to work at top speed. We learned from our experience from the previous project in Unit 2 how to perform the cuts to the main coolant nozzles of the reactor pressure vessel much faster and with much less exposure of the staff to radiation. The wire sawing method used to cut off the concrete structure which proved to be a hindrance above the nozzles was also extremely fast due to the optimized cutting angles. One major advantage along the timeline proved to be the fact that due to



“With the demobilization of the site and submittal of the final project documentation, Siempelkamp has fulfilled their contractual obligations.”

JOHN SAUGER, EXECUTIVE VICE PRESIDENT, CHIEF NUCLEAR OFFICER
ENERGYSOLUTIONS, GENERAL MANAGER ZIONSOLUTIONS

its previous use in Unit 2, a large proportion of the dismantling equipment that was required was already pre-assembled and had been put into intermediate storage until being used for the containment of Unit 2.

Effective Teamwork – and 17 Months on Site without an Accident!

After the strandjack system had been calibrated, work was begun to lift the reactor pressure vessel. This time everything worked perfectly straight away. In the previous project this procedure had taken much longer to perform, partly because fixing the pressure vessel in place under the decades-old corrosion layer had simply been overlooked, which prevented the initial lifting process. But such problems

were always overcome by the team working together and evaluated over dinner in order to make up for the mistakes that had been made.

There were no problems whatsoever with the installation of the lifting rod, the rotary screening platform and the flame cutting mast. After the video monitoring system and the combustion gas supply had also been connected, the first step was carried out on

**17 MONTHS
ACCIDENT-
FREE**

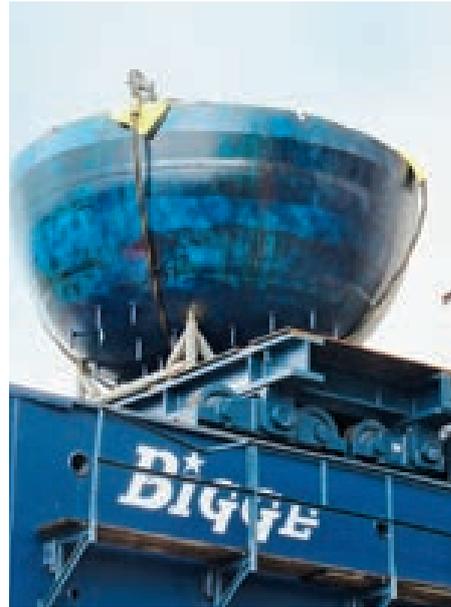
Siempelkamp's strict compliance with occupational safety and radiation protection is particularly valued by the customer.

Lifting of the first segment





Reactor floor on a lifting rod



Transport of the reactor floor (calotte)

November 11, 2015. At a cutting speed of approximately 50 mm per minute through the steel, which was up to 300 mm thick, it was possible to carry out cuts over the planned total length of 1-2 segments on each shift. The well-rehearsed handling of the cut-out reactor segments and their packing in the radiation shielding boxes provided went off so smoothly and safely that the entire pressure vessel had been dissected after just 3 weeks – faster than ever before!

A good deal of time was also saved as a result of the detailed changes to the cutting plan. Originally, the floor of the reactor pressure vessel – the dome – was to be dissected into individual parts and packed into radiation-shielding containers. But why was it necessary to go to all this trouble if at the end of the day everything was going to be buried forever in the final repository close to the surface in the state of Utah? Precise calculations of the radiation exposure and the masses to be handled showed that disposal in one piece was not only feasible, but would also save a great deal of time and effort and therefore also costs. This procedure, which had been thoroughly rehearsed in Unit 2, made a decisive contribution in Unit 1 and the overall project towards our ability to adhere to the overall project schedule.

Speaking of safety: Siempelkamp worked for 17 months on site without a single accident! All of the safety regulations governing occupational safety and radiation protection were meticulously adhered to. This was highly appreciated by our customers.

After the well-deserved Christmas break, the dismantling tools which had been used were themselves dismantled and the construction site cleared.

However, although the practical work had now been completed, this did not mean that the project had come to an end. The extensive project documentation – totaling around 600,000 pages of paper – had to be drawn up, quality-checked and furnished with a final report. These tasks were also completed in high quality to the full satisfaction of our customer.



Dismantling team of Siempelkamp Ingenieur und Service GmbH on site

INTERVIEW

“SIEMPELKAMP TECHNOLOGY CONVINCED AS THE BEST AVAILABLE SOLUTION”

Interview with John Sauger and Christian Jurianz

In December 2015 two years of teamwork in Zion were brought to a preliminary conclusion but further projects are planned. What characterized the joint approach to achieve the goal? We talked to John Sauger and Christian Jurianz about milestones, team building and the future.

Bulletin: Relative to the past 2-year cooperation between Zion-Solutions and Siempelkamp under your direction – what are your conclusions?

John Sauger: We had faced a great common challenge with the dismantling of the reactor core internals, but we were ultimately successful. The clear highlight was the use of the thermal cutting system for the segmentation of the reactor pressure vessels, which was the first time this technology was demonstrated on a large scale in the United States. It worked flawlessly, and the short time for completing the segmentation far exceeded expectations. The Siempelkamp technology is impressive and convincing as the best available solution.

Bulletin: What was the most difficult moment for you in this project?

John Sauger: Without doubt, that would be our first encounter in December 2013, just after I assumed responsibility for the Project. Both we and Siempelkamp were undergoing restructuring and a number of complicated issues existed. Disputes were discussed objectively and the conflicts were resolved through a mutually beneficial agreement. But beyond the resolution of the commercial issues, the key to success was the strengthening of the relationship and a new focus on teamwork. Because of the nature of the Zion Projects’ inherent need for constant interaction, we effectively had to adjust the traditional client-contractor relationship, and operate in a more cooperative manner. Not only did we



John Sauger,
Executive Vice President,
Chief Nuclear Officer
EnergySolutions,
General Manager ZionSolutions

bring the Vessel Segmentation Project back on track, but ended up finishing early with no claims on either side.

Bulletin: Mr. Jurianz, American and German employees worked together to master this project. Would you say there was a “clash of culture”?

Christian Jurianz: MWith this question you address an issue that indeed was rather challenging in this project. Imagine the rather high self-esteem of a German engineer facing quite some skepticism when dealing with his American colleagues. This prompted us to set up a team building program under the guidance of our Contract Manager Mike Lions in order to bring those people together and have them cooperate.

The program was evaluated every month and with the participation of all those involved. Everyone had the opportunity to play an active part. And it was not only the language barrier that had to be tackled. At first sight the work culture of the two nations looks rather similar but when you go into detail you will find that there are quite a lot of differences in approach. Over time a good deal of mutual distrust was reduced and genuine collaboration was achieved – a fundamental key to the success of this project.

Bulletin: We have heard that the teams found their very own ways of motivating themselves for top performance ...

Christian Jurianz: The motivation of this team was unique. Each one knew exactly how tight the deadlines were and that our part of the work was in the customer’s focus. They were all highly motivated to really give their very best and to prove the superiority of the thermal cutting process.

To mention just one curious example: Every day they placed bets on when which milestone would be reached and thus many a Greenback changed hands.

Bulletin: What is the next step?

John Sauger: With the demobilization of the site and submittal of the final project documentation, Siempelkamp has fulfilled their contractual obligations. Of course, for us here at Zion, the project is not yet complete. We are in the process of removing the steam generators and reactor coolant pumps. The disposal of the major components will be followed by the dismantling of the Auxiliary, Turbine, and Containment buildings through 2017. We are on schedule!

Based on the performance of Christian Jurianz and the Siempelkamp team, we have entered into a long term agreement whereby Siempel-

> THE CLEAR HIGHLIGHT WAS THE USE OF THE THERMAL CUTTING SYSTEM FOR THE SEGMENTATION OF THE REACTOR PRESSURE VESSELS.

John Sauger

kamp/NIS will be the exclusive provider of tooling and technology for all our decommissioning projects in the US. This is the longest term agreement we have entered into. We did this because Siempelkamp has worked hard to turn Zion around, delivered results and has now become a trusted partner in our reactor work.

In addition, we look towards the upcoming decommissioning projects worldwide and continuing our successful work with Siempelkamp as our partner in the future.

Bulletin: Your conclusion, Mr. Jurianz?

Christian Jurianz: This was a project that started with a huge challenge and sapped a lot of strength but owing to good technology and the full commitment of all those

involved was brought to a successful completion. With the reputation thus earned I’d like to say with a view to future projects: We would be delighted anytime to once more cooperate with this customer and this team!

Bulletin: Thank you very much for the interview and good luck for the further course of the project.



Christian Jurianz, Managing Director of Siempelkamp Ingenieur und Service GmbH

New Siempelkamp location in Qingdao: production close to the local market

→ By Dr. Jung-Ren Ni, Ralf Püschel, Uwe Pfenning

As an international supplier of technology, Siempelkamp globally pursues the strategy to be close to its customers with production locations and sales representations. The production location in Qingdao, China is new: In the course of a German-Chinese pilot project, Siempelkamp built a production location with an area of 7,000 m² to date at an industrial site which offers optimal preconditions; growth and expansion are already being planned.

In April 2015, the first employees started production at the Siempelkamp location in the coastal city of Qingdao. This production location in the south of the Shandong province opens up best conditions to serve the Asian market with press components quickly and reliably according to Siempelkamp's quality standard.

Qingdao means "green island" and is surrounded by water on three sides. More than eight million people live in Qingdao, a city that has become a tourist center. Beautiful beaches attract visitors; the coastal city is also known as the host city for the sailing competitions during the Olympic Games in 2008.



Sino-German eco-park Qingdao: a reference project

In July 2010 the German Federal Ministry of Economics and Technology and the Chinese Department of Commerce signed a memorandum for the construction of an eco-park in China. In March 2013 it was decided to build the first ecological business park on Chinese-German cooperation in the coastal city of Qingdao in the Shandong province.

Siempelkamp was the first German company that settled in the eco-park within the pilot project. Meanwhile the park has become a magnet to settle for other international companies from high-end industries and for different service sectors, for example, Siemens, Bosch, Bayer, and the Steigenberger Hotel Group.

On January 21, 2016 the opening ceremony of the German business center Qingdao in the German-Chinese eco-park took place. It marked the official opening of the largest service platform featuring the

Bird's eye view of the Siempelkamp factory hall in Qingdao

Portal milling machine "Beijing No. 1"



highest standard and equipped with the most functions for German companies in China.

The park is not only designed as an economic zone for companies but also includes a residential area built according to ecological criteria. This area uses clean energy such as solar, wind, and hydro energy exclusively.



Qingdao is also one of China's most important cities regarding international trade. One more reason to build the eco-park as a Chinese-German reference project here. Companies profit from excellent transport connections, the international seaport and the airport are in close proximity. The location also offers access to public rapid transport systems. The container port of Qingdao is the third largest seaport in China and the seventh largest in

the world which positively influences transport times and costs.

Siempelkamp decided early on to build a production location with an area of 7,000 m² in Qingdao. This area can be expanded by another 13,500 m² with a total of four factory halls. The current production spectrum consists of components for the continuous Controll® press. In 2015 the capacity of this location already



Milling



amounted to 35,000 production hours. In the coming months, the product range will be expanded step by step and accordingly the staff number will increase continuously.

Technological advantage at a reasonable price – directly on-site in Asia

Apart from a generously dimensioned sand-blasting machine and a flame cutting plant, the “initial equipment” includes a large portal milling machine. Quality assurance is a key

aspect here. “Top quality meeting the high Siempelkamp standard,” is the credo of our Qingdao team. In 2016 the machinery will consistently be expanded. The expansion around the next factory hall can already be seen: large-scale mechanical manufacturing for our hydraulic presses in a local environment for the largest market of the world is our goal and our mission.

Teamwork at the Chinese Siempelkamp location



“Here in Qingdao, we have built a great team. All employees strive to achieve a mutual goal, that is, best quality and optimized costs for the products. We are confident that in close cooperation with the Krefeld colleagues, we will direct successful business in Qingdao.”

DR. JUNG-REN NI, General Manager Siempelkamp/China



Work on pressure distribution plates



“The speed with which the business in Qingdao has developed after we settled here impresses me again and again. This also goes for the excellent infrastructure and the fact that Qingdao has the seventh largest container port in the world. Together with our high quality standards this reinforced the decision to start producing frames for our ContiRoll® presses there in the shortest time possible.”

RALF PÜSCHEL, International plant surveyor and consultant for manufacturing-relevant questions



The work volume is estimated to reach 120,000 production hours by the end of 2017. To handle such volume according to the proven Siempelkamp standard, qualified personnel is necessary. In this area, Siempelkamp cooperates with a training center located on-site in Qingdao. "This training center trains young Chinese especially for the range of careers needed in machine engineering. For welding, assembling, or machin-

ing tasks, we cooperate closely with the local training center because we want to achieve the usual high standard of our products with the best-possible qualified personnel," says Dr. Jung-Ren Ni, General Manager of Siempelkamp Qingdao.



"It was a wonderful experience in my life. I still remember my colleagues who made an outstanding contribution and who were filled with passion and vitality at work. I learned a lot."

TONY SHENG, Production Manager Siempelkamp Qingdao



"Work in the head", an impression of the location



▲
Landmark of Qingdao
with skyline



“The cooperation with the construction companies and the local team was a great experience. It is exciting to get to know the mentality of the people in China and to implement a mutual project together.”

UWE PFENNINGS, Equipment and building technician

Sicoplan engineering in a profile: The pioneers with a clear engineering line

→ By Dirk Traen

The eye for detail and the accurate drawing style, the so called “ligne claire” (French for “clear line”), are characteristics of Belgium – as is proven by many famous comics ranging from TinTin to Lucky Luke. In the Belgium city of Lauwe, Sicoplan applies the clear line to the topic of “plant engineering”. In this way, we pave the way to success from the beginning of a project.



Sicoplan building in Lauwe, Belgium

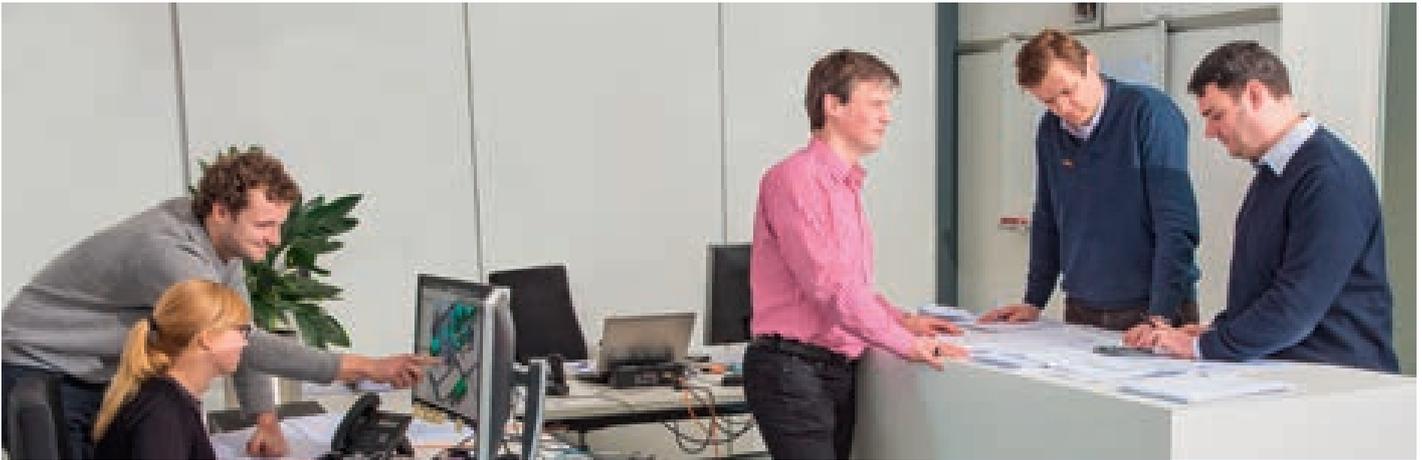
The Siempelkamp subsidiary was already involved in the design of Belgium’s first flax board line back in 1948. Today the know-how of the team from West Flanders is present in nearly all plants made by Siempelkamp because the key for optimal plant operation are comprehensive engineering solutions. Siempelkamp and its subsidiary Sicoplan look back at 60 years of experience in the process-related project planning, development, and technological start-up of plants for the production of wood-based materials – and, at the same time, we also always look ahead.

The planning and project engineering of plants are core competencies of the Sicoplan team and have been strategically further developed

in the last seven decades. The services range from technological consulting, to comprehensive project studies including calculations for raw material and energy requirements, to the planning of complete production plants. Furthermore, Sicoplan also assists with the technological start-up of a plant, is a reliable partner when it comes to process optimizations, and is involved when a customer plans to upgrade, modify, and expand a plant. How does Sicoplan manage these projects to ensure a holistic approach in the composition of its competences? “Each plant project is accompanied from three different perspectives. First, a project engineer and a leading plant designer get involved. They coordinate the interplay between all involved parties, that is,

customers, Siempelkamp, and other suppliers. Their core tasks include the development of the general plant concept as well as the technical specifications for the process equipment,” tells Dirk Traen, managing director of Sicoplan.

The second pillar in this system are specialized plant designers who contribute differentiated expertise, for example, in the areas of steel support structures, buildings, and foundations, pneumatic systems and supply. The third perspective of the “big picture” of a plant is contributed by the design engineers. They develop workshop drawings with the data to mechanical and pneumatic conveying systems which are part of the process equipment.



Sicoplan team

Team of 40 employees

- 10 project and start-up engineers (with master's degrees in engineering in different fields)
- 20 plant designers (with master's and bachelor's degrees in engineering in different fields)
- 5 machinery designers (with master's and bachelor's degrees in machinery engineering)





Pre-engineering for the MDF plant Asperbras, Brazil

**Engineering services made by Sicoplan:
from flow sheet to 3-dimensional model**

How exactly does the Belgium team, in cooperation with the Krefeld colleagues, step into action to implement the best concept for the customer? The engineering services start with the project planning which defines the concept of the plant. This step is followed by the pre-engineering. During this phase the key fundamentals for the plant design are laid down, for example, with process flow sheets and detailed layouts.

Project planning,
pre-engineering,
basic engineering:
A stringent
procedure!

The project continues with the basic engineering which coordinates and communicates all technical information between the involved partners. Based on the 3D model, the team supplies a set of basic drawings for the complete plant which is updated with technical information from the machine suppliers.

**Pre-engineering: an accurate survey of
local conditions**

When a customer is planning a new plant, the 3D models by Sicoplan offer essential support. "They demonstrate to our customers how their future plant is going to look. Since the models are developed on the basis of comparable and already implemented plants, each customer benefits from the knowledge gained from the many projects we have implemented," explains Dirk Traen. Here Sicoplan falls back on an extensive archive which provides reliable and detailed foundations for each new plant. Which advantages does the pre-engineering offer? The models, for example, provide insight about the required material quantities for the steel support structures, the dimensions for the production halls, and the data about foundations. A machinery equipment list is also part of the systematic preparation process. Advantages of the 3D models: As a basis for discussion they provide the optimum foundation needed to make decisions about the plant design together with the customer so that the next project phase can be initiated quickly.



"With the 3D scan we can bring the on-site reality onto our computers. At our desk we can examine and re-check each detail."

DIRK TRAEN, MANAGING DIRECTOR SICOPLAN

3D Scan

as an exact survey to reflect the local conditions

3D scan for modifications and upgrades to existing plants: the reality in the computer

When customers want to modify or expand their plants, Sicoplan is at their side with a 3D scan of the plant. This 3D scan is prepared on site at the plant operator's location as an exact survey reflecting the local conditions. Later, the scan is converted into a 3D model of the plant to generate an even more realistic

impression of the overall concept. "With the help of the 3D scan we transfer the local reality to our computers. At the workstations each detail can be checked and measured – all that with an accuracy in the millimeter range," explains Dirk Traen. In this way, the planning of a plant takes place with the utmost precision and offers an optimal solution which, later on, is bundled in a 3D model.

Via the perfect visualization, the plant operator has an optimal basis for making a decision when it comes to finding possible alternative solutions for the plant upgrade.

A Sicoplan 3D scan also makes a significant contribution during the collision check between existing and new plant equipment when a modification or expansion is due. The 3D scan is furthermore an excellent tool for optimizing the erection schedule and reducing production down-time.



Integrating the scan file in 3D planning

Lead

ENGINEERING

Higher level of detail with the 3D model
for the review down to the last detail

The Sicoplan portfolio is rounded off with the technological start-up, which reliably supports and ensures, from the "First Board" to the acceptance test, that all contractual guarantees regarding production quantity and quality are met.

Lead Engineering via 3D – the innovative concept

Sicoplan Lead Engineering represents all planning areas and contents including interfaces and scopes of supplies. All participating partners and suppliers are involved. Especially large building works such as steel structures, sheet metal work, as well as pipelines, electrical and media lines and their routes can be displayed perfectly in both quantitative and qualitative terms by the lead engineering.





3D scan for Kronostar
Sharija in Russia

“Processes can be pre-defined and interfaces managed better, the completeness check for all plant details is simpler and more reliable so that the development of the plant is on the right track from the beginning. Furthermore, via both 3D tools, the customer receives a high-quality visual impression of its future or upgraded plant,” describes Dirk Traen. Both tools are groundbreaking when it comes to implementing an order with minimal risks.

Basic Engineering via 3D-Scan for KronoStar

Among other projects, Sicoplan last demonstrated its strength in the course of the engineering for a Siempelkamp particleboard plant for PG Bison in South Africa and Plitspichprom in Russia. Another example is the engineering of the complete particleboard plant at KronoStar in Russia. The special feature of the order is that the new equipment will be integrated into the existing infrastructure at the Sharya location which already

includes a particleboard and MDF plant. Thanks to Sicoplan, this ambitious project is optimally prepared. With the help of the 3D scan, the Belgium team establishes the basic conditions for problem-free installation of the new press line into an existing plant with ongoing production. The Siempelkamp subsidiary plans all components with the exact knowledge of all local conditions and the given infrastructure. Existing components in

the plant are upgraded at the same time. With three-dimensional surveying of the entire factory, the new plant design can be integrated and custom-fitted into the existing infrastructure on site without any delays during planning.

Considering the complex conditions on site, it is a special feature to carry out this measurement method to such an extent. For Sicoplan, thanks to the “ligne claire”, this is no problem!

Basic

ENGINEERING

The total package including all state-of-the-art
3D tools

Siempelkamp Logistics & Service GmbH: Reliable barcode system in plant engineering – from the factory to the construction site

→ By Magdalena Schmidt

The first product marked with a barcode rolled off the production lines of an American supermarket chain in 1974 – a ten pack of Juicy Fruit chewing gum made by Wrigley's. In order to seamlessly track and trace the supply chain from factory to construction site, Siempelkamp products have been provided with a unique code since 2012. Since the end of 2015 the logistics for ocean freight have become even more transparent under our control. As a result of a change to the processes and the software, all covered packages can be tracked and traced via a barcode label in our SLS systems starting with the receipt of all goods at the packer, to the packaging progress, to the shipment of the goods.



A barcode represents a series of parallel lines of varying widths that can be read by an optical scanner. The concept is part of everyday life and is used at super market checkouts, at admittance controls and for medical applications, for example, for the allocation of blood samples. Siempelkamp uses the advantages of the barcode system for the seamless

tracking and tracing of the supply chain from the factory to the construction site and furthermore, as support for construction site logistics. Whether for the recording of incoming goods, storage location management, or as an easier way for technicians to search, a few lines on a blue Siempelkamp logo work miracles!

Safe, reliable, weather-proof: Siempelkamp barcodes

In order to simplify the allocation of parts at construction sites, but especially to accelerate installations, Siempelkamp started with the first barcode projects in 2012. "For plant operators time is money. The longer you have to look for a part, the longer the installation

While, at first, individual shipments were recorded in MS Excel and furnished with manual barcodes, Siempelkamp now uses a complex system that meets the needs of the supported plants and other requirements. A complex, but at the same time easy to manage, software supports the current barcode system whose distinguishing feature are the blue

labels, attached to every package, displaying the Siempelkamp logo. These labels have a special feature: Because the delivery to worldwide locations takes place via truck or sea freight, SLS uses weather-proof barcode labels which have been specially selected for their specific purpose. They survive the transport and adverse weather conditions and remain readable even after long transport and storage phases.

The barcode system: for seamless tracking and tracing of the supply chain from the factory to the construction site

All plant components leaving our manufacturing factories or the production locations of our suppliers are recorded centrally by SLS via the software. Afterwards, every package receives a barcode label with a unique serial number.



phases take. In this area we offer support to our customers and installation personnel by providing the barcode system. The installations are thus becoming more transparent, trouble-free, and therefore, more efficient," says Thomas Dahmen, Managing Director of Siempelkamp Logistics & Service GmbH (SLS).

- 1 Everything under control – thanks to the barcode system
- 2 Ready for takeoff ...
- 3 ... Siempelkamp parts ready for shipment





Barcode system: added value for the customer

- smooth, efficient workflow of the installation services
- high transparency and reliable completeness of the scope of supply
- minimized occurrence of missing parts
- tracking and tracing of supply chain from the factory to the customer
- quick and detailed information exchange between Siempelkamp and the construction site
- optimal, space-saving and installation-oriented storage



"Via this label and the uniquely created number, the packages can be identified and the data can be retrieved with the help of the software. We collect all data relevant to the construction sites, customs clearance processes, and our customers. This data can be retrieved at construction sites worldwide from the system," explains Thomas Dahmen.

Additional new functions: No longer does the software only display the simple data content but also contains a search function, a control of goods received, and storage location management. The output is displayed on a robust industrial tablet computer specially selected for this purpose. This device provides the ability to scan packages directly (content

request, storage place allocation) and to attach pictures to each package. A small handy scanner connected via Bluetooth is also provided. The purpose of the scanner is to request data about the package content or to record the receipt of the goods with the help of its memory function. Furthermore, an Excel table including all necessary information supports

the teams, including Siempelkamp employees as well as the employees of customers, at the construction sites.

New: secure supply chain even during packing and shipping

Since 2015 there has been another upgrade to the barcode concept used for machines that are shipped via sea freight to customers. "Through modified processes and software, the receipt of goods at the packager, the progress during the packing process, and the shipping process can be tracked and traced via barcodes for all recorded packages. Next to more precise information about the current delivery status of the packages, the complete

However, even the most sophisticated of technologies will not function completely without personal commitment: In Bad Kreuznach two employees form the "barcode team". They maintain the software and take care of all inquiries from our construction sites. The data collection and the labeling of the packages is carried out in close cooperation with the logistics specialists of Siempelkamp in Krefeld for large projects and the logistics specialists of SLS for modifications and upgrades as well as with the suppliers and sea freight packers.

So far the software has been used to handle the projects involving 40 plants. Currently,

(as of February 2016) 8 plants are being processed.

The continuous optimization of the system will see no end in the near future: The construction site teams will profit from even better software which will be further optimized in many areas. The use of lighter tablets as a contribution to a more comfortable working condition is also planned. These tablets will furthermore be equipped with a more robust frame so that these devices will be able to withstand the oftentimes harsh conditions found in the field.



supply chain becomes even more reliable," describes Thomas Dahmen. The advantage: Packages cannot be overlooked and miss the scheduled boat, but instead arrive at the construction site as planned. The packer uses a web-based version of the SLS software of which the data is constantly updated with our database.

- 4 A powerful business tool: the barcode label
- 5 On-site check of the component
- 6 The barcode provides information
- 7 Data retrieval via tablet – easy and secure
- 8 Weatherproof and durable – suitable for construction sites!

ATR Industrie-Elektronik GmbH: Switchgear cabinet manufacturing with shop floor management

→ By Timo Amels/Stefani Bovie

As a 100 % Siempelkamp subsidiary, ATR Industrie-Elektronik GmbH offers switchgear cabinet manufacturing made in Germany. These services are in demand by customers of the Siempelkamp Group as well as external customers. To convince not only with products but also with efficient processes in international competition, ATR has repositioned itself. The goal remains to have satisfied customers through best quality, lowest costs, and shortest delivery times.



Shopfloor-Management
– a communication
platform for all areas

The objective for the ATR team was clear: From the material procurement to the hundred percent inspection, international plant operators are to profit from the strong partner for contract manufacturing. On their way to transition to "Industry 4.0" it is often not economical for many machine and plant engineering companies to have their own in-house switchgear cabinet manufacturing with all its related

processes. ATR as a competent service provider and an "extended workbench" thus meets the needs of a growing market. To do so the processes have to be right. The process chain of the switchgear cabinet specialist is not only closed but also lean, consistent, and transparent according to the guiding principle of "Lean Production".



INTELLIGENT PRODUCTION

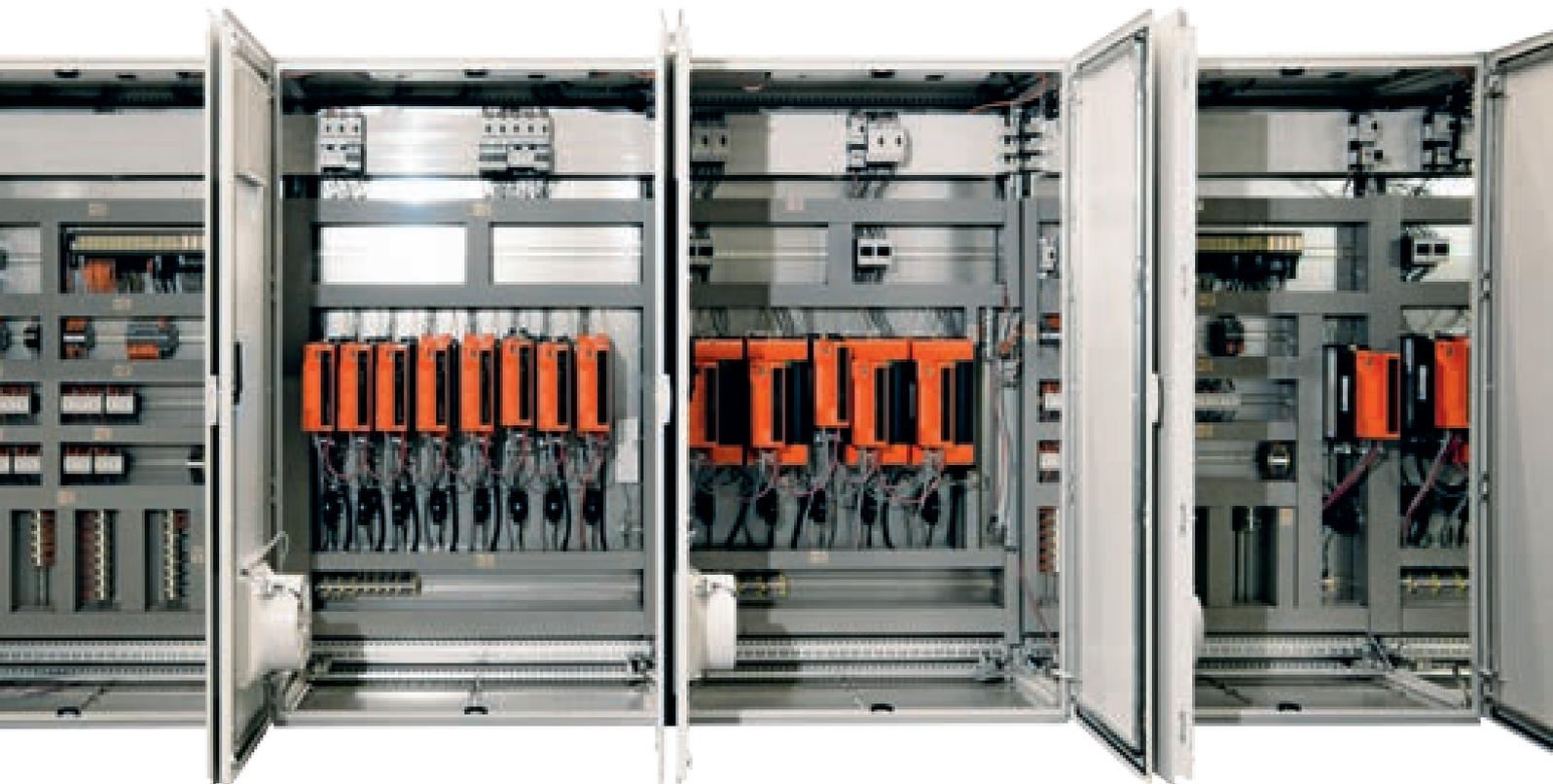
First of all, at the Krefeld plant, was a detailed status analysis of value streams, tools, and methods. "Here we even addressed possible roadblocks, which if handled incorrectly, could lead to significant malfunctions during the course of the process chain. An important part of our 'Kaizen' (Japanese for 'good change') is a continuous improvement process. Even the smallest malfunctions are quickly eliminated. Each operator of a complex production facility knows the problem: workstations, delivery areas, transport methods and shipping store make up a production layout which is vulnerable to weaknesses. These need to be addressed so that the work areas can be perfectly controlled and organized," explains Timo Amels, ATR managing director. Simple but effective changes here included, for example, visual control systems which enhance the transparency of the work areas.

From Push to Pull Principle and performance indicators for all!

A fundamental change started on the production side. Here ATR copied from the supermarket principle according to the motto: "Goods on the shelves are only replaced if they have been used by customers." Applied to switchgear cabinet construction this means: Products are only manufactured if the subsequent cubicles or work areas have free capacities. This reduces throughput times and minimizes storage times. At the same time, sufficiently available buffer zones ensure maintaining the

flexibility for individual needs-based customer service. Customers profit from cost optimization without cutting corners regarding individual customer care. Thus, the support is aimed more specifically at and tailored to the plant operator.

Attention was also given to the topic of "performance indicators": These are no longer just of concern for the area of controlling but for the entire staff. Under the catchword of "Shop Floor Management" (see box), a synergetic link takes places between production and



Thanks to a continuous improvement process, the ATR specialists for switchgear cabinets are well-positioned

Production according to the pull principle reduces throughput times and minimizes storage times



Production and administration work synergistically together – leading to better communication and higher self-responsibility

administration. Performance indicators are considered weekly; current topics, objectives, problems and their solutions are discussed daily with the team leaders and employees. "This not only improves communication but also increases the personal responsibility of each employee who can better evaluate his/her value in the team," says Timo Amels.

ATR carried out the implementation of the new process system during operation, partly when the plant was at its highest capacity utilization. The team developed and implemented step by step measures for the improvement of the individual subsections. The 5S (see box) present a guideline which is as striking as it is pragmatic for each employee. The achievements pass through continuous monitoring so that, at any time, it can be recognized where and how further developments can be realized.



Shop floor management: factory building meets desk

Shop floor management describes the control and management functions inside a manufacturing facility which overcome the physical separation between production and administration with the help of an interdepartmental communication platform. With efficient shop floor management in place, all workplace-related information is available in such way that each party can quickly get an overview of the tasks, processes, and goals of the team.

The ATR motto: "You are the specialist for your plants and machines – we are the specialist for your switchgear cabinets," is carried across all hierarchies via a coherent overall concept by the Krefeld team. It's no wonder that this is convincing to customers from various industries. "Our international orientation goes hand in hand with an increasingly larger range. Our switchgear cabinet technology is in demand by customers from the air-conditioning and cooling, paper, automotive, materials hand-



5S for cleanliness, order and safety

The 5S methodology describes a method used in Japanese production concepts. It supports in keeping and maintaining the workstation and working environment in such a state that full concentration can be given to the value adding tasks at hand.

- ① **Seiri = Sorting** Everything not needed to perform a job should be removed from the workstation.
- ② **Seiton = Setting in order** Everything needed to perform a job receives a defined and fixed marked place.
- ③ **Seiso = Systematic cleaning** Each employee is to be the caretaker of his or her workstation.
- ④ **Seiketsu = Standardized cleanup** Maintain order. Consistent clean up avoids new objects from finding unplanned access to the workstation.
- ⑤ **Shitsuke = Sustaining discipline** It takes discipline to maintain order and cleanliness. If a tool is assigned a certain storage space, then that is where it belongs – at all times.



“Each customer not only orders a product but also a clean process. Our entire team works to ensure this claim.”

TIMO AMELS, Managing Director ATR

ling, and energy supply industries. However, the services of our company are also benefiting the plastics, wind power and photovoltaic industries as well as many others. Each of these customers does not only order a product but also a clean process. Our entire team works to ensure this claim,” says Timo Amels.

ATR Managing Director Timo Amels







MARKETS

How do we succeed in developing intelligent plant concepts in ever-changing industries to market-readiness? One key to success is a vision; another one persistence. Thus, Siempelkamp plants operate safely, soundly, and efficiently.

Pallmann size reduction and recycling systems: Systematic fine-tuning



→ By Dr. Silke Hahn

As an internationally leading supplier of size reduction technology, Pallmann Maschinenfabrik GmbH & Co. KG complements the Siempelkamp product spectrum by another important service offering. Since 2012 Siempelkamp has been closely connected with Pallmann via minority shareholding which was increased to 45 % in 2015. The benefits for the customers include: precision technology for the production of strands, flakes, and fibrous materials and the expertise in the ever more important area of recycling.

The company located in Zweibrücken, Germany, specializes in size reduction machines and systems which are primarily used for the production of strands and flakes for the OSB and particleboard industries and fibrous materials for MDF production.

What is the challenge in this market segment? The raw material wood arrives at the woodyard with different quality and in different conditions. Despite this diversity, the panel industry requires strands, flakes, and fibrous material in consistently high quality. To process the natural products effectively, Pallmann develops and supplies all necessary machines and systems all the way to complete plants.

Pallmann offers standard products as well as individual concepts that are tailored to customer



Pallmann drum chipper

requirements: "Next to our proven standard series, we build wood-processing machines that are adjusted to the infeed material and optimally meet each requirement," explains Hartmut Pallmann, managing director of the Pallmann Group. "Our control and visualization programs, as well as our technological consulting services support our customers from the wood-based material production and wood-processing industries to optimally use their raw materials."

In addition to the extensive machine program, Pallmann plans and implements complete projects for the areas of wood yard and wood

preparation regardless if for particleboard, OSB or MDF production. Such installations are operating worldwide and contain all key components such as log processing, conveying and size reduction technology. From the engineering to the complete installation and the startup, the company provides a comprehensive range of services.

Recycling: to sensibly use valuable raw materials

As a result of the consistently growing world population and the increasing industrialization, the demand for natural resources is ever increasing. Natural resources have become

Material samples –
Pallmann reduces
anything to a smaller
size!



Pallmann: custom solutions for special materials

- Founded in 1903 as machine factory
- Headquarters in Zweibrücken, Germany
- Expertise in size-reduction technology and preparation systems
- 1,000 machine designs in numerous industries
- 700 employees in manufacturing facilities, subsidiaries, custom grinding plants, and sales offices in Europe, North and South America, Asia, China
- In-house research and technology center in Zweibrücken
- More than 150 valid patents
- ISO-certified engineering company, among other certificates, has the certificate for dust explosion class ST 3
- Manufactures according to "good manufacturing practice" (GMP) regarding quality assurance for all production processes ranging from the raw material to the operational use
- Basis of the company's policy: "Constant innovation is our tradition"



Particleboard, OSB, MDF: The Pallmann range of products

Particleboard industry

- ▶ **Drum chipper**
Area of application: Standard feed material, for example, chips which have been produced from round wood, industrial scrap wood, and sawmill waste, but also from annual plants (e.g., hemp, straw, bagasse, bamboo, reed)
- ▶ **Disc chipper**
for the production of quality chips, primarily from round wood
- ▶ **Knife ring flaker**
used for dry- and wet preparation of chips into flakes at best possible consistent flake geometry and -quality
- ▶ **Hammer mill**
used for the economical preparation of chips from round-, residual or waste wood and annual plants into quality flakes for core and surface layers
- ▶ **Hammer mill for wet chips**
used for the economical preparation of moist and wet chips into quality flakes for the briquetting and pelletizing industries
- ▶ **Double stream mill**
used for the production of surface layer flakes from course material or core layer flakes of wood or annual plants

OSB industry

- ▶ **Drum debarker**
for the economical and gentle debarking of logs. Used in the OSB-industry but also in all industries where thoroughly debarked round logs are required
- ▶ **Rotor debarker**
used in the OSB industry but also in all industries where thoroughly debarked round wood is required
- ▶ **Long log flaker**
for the production of quality flakes / strands with a low percentage of fines



◀
Recycling refiner

scarce and expensive. As a consequence the topic of recycling is gaining increasing importance. In order for waste materials to turn back into valuable materials, which can be used as secondary raw materials, perfectly functioning technology with specified material preparation and proven logistics concepts are needed. Pallmann sets the standard here: The specialist



MDF industry

- ▶ **Drum debarker**
for the economical and gentle debarking of logs
- ▶ **Rotor debarker**
used in the MDF industry but also in all industries where thoroughly debarked round wood is required
- ▶ **Drum chipper**
Area of application: standard feed material for the production of fibers in the MDF industry such as chips which have been produced from round wood or slabs / splinters
- ▶ **Disc chipper**
Area of application: used for the production of quality chips, mainly from round wood. Depending on the feed material, the chippers are available with vertical or slanted discs
- ▶ **Chip washing system**
for the separation of dirt and contaminants from chips. Chip washing reduces wear and minimizes the mineral proportion of the MDF-board
- ▶ **Fiberizing / Fiberizer / Refiner / Pressurized Refiner**
used for the preparation of chips into high quality flakes for MDF production and for the production of door leaves and insulating material

Recycling area: roller mill (white) and Guillotine knife mill with horizontal feed



Surface layer mills



for size reduction technology builds performance-strong recycling machines which are adapted to the special requirements in modern recycling operations. Next to recycling machines for plastics, flooring, and metal waste as well as scrap tires, Pallmann is primarily dedicated to developing solutions for waste wood and waste paper recycling. Depending on the type of material to be recycled, the company offers double shaft shredders, single shaft shredders, shearing ledge shredders, and turbo mills. These machines are equipped with controlled

hydraulic drives. They offer high continuous throughputs and high system reliability at low maintenance costs. They further ensure homogenous output qualities, protection from unwanted materials, and low maintenance effort.

The Pallmann scope of supply in the area of "Recycling" furthermore includes hammer mills, screen basket mills, double stream mills, turbofiners, and air-swept mills. These economic recycling machines and systems not only

utilize waste and residual materials and open up new raw material sources, but also reduce pollutants and greenhouse gases.

New bio-refinery concept using wood waste

What happens if one of the largest developers and manufacturers of innovative size reduction technology joins forces with an expert in biomass conversion technologies? Pallmann and Standard Bio demonstrate what all is possible: In 2015 both partners developed a



Precision work

Pallmann holds

150

ACTIVE PATENTS

new bio-refinery concept that will use low-value organic waste as a resource for clean energy, natural fertilizers and animal protein.

The concept is based on the conversion of renewable resources – primarily trees from commercial timberland – into solid briquettes for energy generation, as well as natural oil.

At its center is a patented high-pressure wood press and a drying machine developed by Pallmann and Standard Bio. This press is capable of producing 500 m³ of compressed wood daily, along with fifty 160-liter barrels of nature oil. Pallmann will develop and build various equipment main components to reduce the dried wood to particulate sizes that can then be converted into the briquettes.

Briquettes are produced by mixing dried wood chips with a small amount of tree oil and then compacting them to form bio-briquettes (also known as HerbBalls). Charcoal briquettes can also be formed from pyrolyzed sawdust. Some of the output can also be combined with other natural resources rich in nitrogen to produce fertilizer and animal feed. The construction of a demonstration plant is planned in an area of forest in Norway. The plant will use the wood surplus from timber processing operations in the area.



Corundum disc refiner



◀
Truck tire shredder

In this way, Pallmann is devoting all its energy to new developments that will determine the markets of tomorrow. So it is only logical that the company in Zweibrücken runs the world's largest research and technology center. Find out how in the interview with Hartmut Pallmann, managing director of Pallmann Maschinenfabrik GmbH & Co. KG.

At Pallmann, constant innovation is a tradition especially at the in-house technical center.



Technical center for wood: among others, home to a turbo mill and a shredder



Waste wood crusher "Dracula"

INTERVIEW

“THE LEADING COMPANIES OF TOMORROW ARE THE PALLMANN CUSTOMERS OF TODAY”

Interview with Hartmut Pallmann

Bulletin: Mr. Pallmann, your product spectrum is aimed at effectively producing strands, flakes, and wood fibers. What does a specialist for size reduction technology need to do to offer the best possible support to customers?

Hartmut Pallmann: Our diverse range of products is an asset. Add to this our fundamental business belief to not only focus on the category of size reduction. Size reduction and energy efficiency go hand in hand. To provide optimal support also means to not just want to generate new orders. To work for the panel material industry means to enter into lifelong relationships. It means to support each machine at the customer's premise throughout its entire lifecycle.

Bulletin: To do that you use a special tool ...

Hartmut Pallmann: We use “Agile”, a product lifecycle software, which generates kind of a biography for each machine – with entries regarding upgrades, new use areas, or modifications. Size reduction machines do not only “live” 10 or 20 years; they can be used over many generations. During the machine's lifecycle it can be optimized in many different ways. Investments in new spare parts bring a machine to the latest state of the art without having to spend the money for a new investment.

> 120

SIZE REDUCTION
MACHINES ARE
INSTALLED AT
THE PALLMANN
TECHNICAL CENTER.

Hartmut Pallmann

Bulletin: Keyword spare parts and wear parts – which service to you provide customers?

Hartmut Pallmann: We offer an excellent cost-benefit ratio. It is our objective to keep the costs for a part significantly lower than its achieved increased use. Twice the cost for a new part but an operating life that lasts four times longer – that is brilliant. And this is what we offer our customers. It is also important to know that we are capable of bringing each machine of a competitor in the panel industry to Pallmann standard.

Bulletin: Service for you does not only mean to be available 24 hours 7 days a week ...

Hartmut Pallmann: ...but also means having true customer relationships and proximity. It is not about providing our customers' managers and mechanics with a telephone number so they can call when they need support. In our company there is a human being behind each business card who the customer knows personally and who is able to provide support to customers on site. Our team is globally interlinked, there is an active exchange of experiences with our customers. Pallmann's service area has been its own business unit for decades. This unit

Hartmut Pallmann,
Managing Director
of the Pallmann Group



builds on enriching and strengthening knowledge with the experiences from worldwide operating customers time and again.

Bulletin: You operate a research and development center in Zweibrücken, Germany. What makes this technical center the largest of its kind in the world?

Hartmut Pallmann: The center is home to 120 size reduction machines which are installed there and ready for operation. All machines are designed for our smallest production sizes. With this equipment we focus on process development, further development of our machines, and testing new developments. We also concentrate especially on customer-specific trials. The center is not only a laboratory but a large-scale industrial operation that customers worldwide use to carry out tests with our process engineers.

Bulletin: What are the topics customers want to explore when they approach you to use the technical center?

Hartmut Pallmann: Our customers work on the products of the future and develop, for example, car bodies made of carbon fiber. Their production also results in scrap material – and this is where Pallmann comes into play. We have developed a procedure that allows us to recycle the scrap material from carbon fiber mats. The resulting down-sized scrap pieces can be used just as the original material as secondary raw material – according to the principle of “upcycling” which we follow. We also support customers that want to introduce a product to the market and need a permit to do so. For such permits, products that are identical with the final product are needed. We support our customers in their efforts to introduce innovations to the market in the best possible way!

Bulletin: Let’s talk about your competence field “Recycling”: Which trends are your currently pushing forward?

Hartmut Pallmann: We have developed a method to remove the 30 % steel content from the natural rubber used in truck tires, which is then formed into briquettes and used in smelting furnaces. Pallmann also has a patent for a special procedure that allows the use of the steel inside scrap tires to grind the rubber into a fine powder. Pulverized rubber can be used, for example, in conveyor belt production. We have also developed a multi-stage procedure to recycle scrap conveyor belts by isolating the steel from these belts.

Bulletin: What trends do you see for the wood-based materials industry, the core discipline of the Siempelkamp Group?

Hartmut Pallmann: Most customers in this industry use recycled waste wood as energy source for their energy plants. Here, far more interesting possibilities can be opened up: Waste wood can be professionally processed into strands or flakes and used in panel production. To meet the corresponding quality criteria for flakes and strands made of waste wood, appropriate cleaning systems are required – and, in this area, optimal cross connections can be opened up within the Siempelkamp Group.

Bulletin: Which competence areas within the Pallmann range of services will be focused on in the future?

Hartmut Pallmann: We will concentrate on four main areas. On the one hand, we will focus on the process of fiberizing raw materials to fibers used in MDF production; on the other hand on the grinding of raw materials to strands and flakes for particleboard and OSB production. Third on our agenda will be the agglomeration process used in the production of insulation material. Thus, wood-plastic-composites made of wood flour and plastics or fiber-plastic-composites containing natural fibers from hemp or cork are produced. This will meet a large interest of the market! Last but not least, we will concentrate our efforts on the recycling of scrap tires.

Thank you very much for this interview, Mr. Pallmann!

Knife mills,
UltraGranulator

Punchings from the
automobile industry



OAO UVADREV:

Excellent performance under extreme conditions, or: Attempting the impossible to achieve the possible

→ By Joachim Galinski

“Attempting the impossible to achieve the possible” is the motto of Vyacheslav Nikolayevich Serov, owner of the Uvadrev company and an institution in the Russian wood-based materials industry. The Russian wood-based materials industry has only a few players. Vyacheslav Serov is one of them – a bold entrepreneur with great vision and a heart just as big.

The swampy terrain had to be made loadbearing with almost 3,000 concrete piles.

In a place where the summers are short and the winters indefinitely long and very cold exactly such people are needed. In precisely such a place a large and ambitious investment project was to be implemented. Vyacheslav Serov decided in late 2012 to significantly expand the capacity of its particleboard plant. To do so, he ordered from Siempelkamp a completely new particleboard plant with a yearly capacity of more than 300,000 m³.

The Uvadrev company is located approximately 1,000 km (621 miles) east of Moscow between the rivers Kama and Vyatka in the Russian Republic of Udmurtia. The city of Ufa, situated in the Volga Federal District of the

Russian Federation, has just under 20,000 inhabitants. In 1922 the first forest base was established here which was connected to civilization in the 1930s by a railway link. For the economic development of the area this was of enormous importance.

Today Ufa is a center for the forest and wood-processing industries, including several European companies who settled here several years ago. In winter temperatures of -40°C (-40 F) are measured in this area. With -31°C (-23.8 F) it was altogether 9 °C warmer when the construction and installation works for the new particleboard plant were already in full swing in winter of 2013/14. Normally, under

Installation works for die-hard people – in the depths of the Russian winter





Installation works on the Büttner drum dryer

such climatic conditions, all outside work is discontinued and postponed until temperatures warm up. This was not the case at OAO Uvadrev because the date for the start-up of the new particleboard plant was fixed in the calendar at contract conclusion.

The new production was scheduled to run at full capacity in spring 2015. In 2015 the company was to celebrate its 80th anniversary and this event was supposed to be crowned by doubling the existing production capacity to 500,000 m³ annually.

So everything was being subordinated to this objective. The tight time schedule was ambitious, there was no room for planning errors. "Attempting the impossible to achieve the possible" Vyacheslav Serov was personally involved. He demands everything from his team; even the suppliers are asked to commit to the company's objective. Vyacheslav Serov shows personal commitment, he is present at the construction site every day. Even though his team is experienced and dedicated, he is an example to his employees and his advice is welcome.

The swampy terrain had to be made load-bearing with almost 3,000 concrete piles. Factory halls with an area of more than 10,000 m² as well as almost 3 km of support structures for mechanical and pneumatic conveyors had to be built. A highly motivated team performed this task with ease. When the machines and equipment arrived, everything was ready; a well-coordinated team was available for the Siempelkamp installation

specialists waiting for the next challenge. These conditions were a good foundation and indispensable prerequisite for the successful installation and start-up of the new equipment.

Since the new equipment had to be integrated into the existing infrastructure of the old plant, continuing the ongoing production and utilizing the existing production machines in a trouble-free manner during the installation represented a special challenge. Each planning error would be twice as bad. Not only could

Thermometer at the head office at Uvadrev:
-31°C (-23.8 F)



the production capacity of the old plant be jeopardized but also the installation of the new production line could fall behind, or even worse, both could happen at the same time.

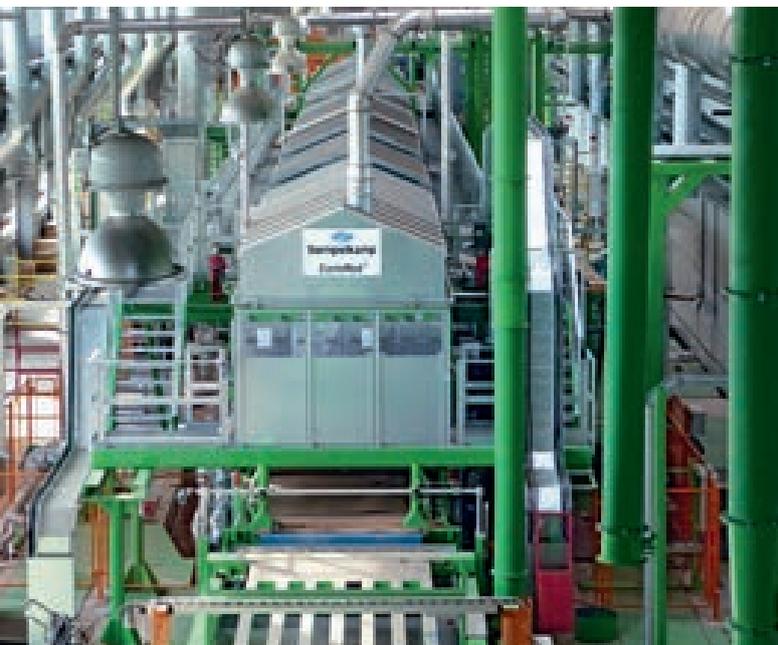
Professional 3D planning – the optimal foundation

Wie gut, dass sich Siempelkamp auf seine belgische Tochter Sicoplan als kompetente Instanz für solche Planungsszenarien verlassen kann. Durch die gewohnt professionelle 3 D-

Fortunately, Siempelkamp can trust in its Belgium subsidiary Sicoplan as a competent entity when it comes to such planning scenarios. Through the usual professional 3D planning of the project, the team was aware of all local conditions ahead of time. Existing production facilities and other buildings were considered and served as a planning basis. In this way, planning errors were eliminated in principle, possible conflicts with existing building components were recognized and resolved.

possible” Vyacheslav Serov personally looked after this project and has once again reached his objective.

The Generation 8 ContiRoll® press with a length of 30.4 m and a production width of 6’ is the heart of the plant. This high-tech press alone with its innovative pressure distribution plate concept not only saves up to 15% in material and energy but also guarantees a top quality of the produced particleboards including



30.4 m long ContiRoll® press line inside the production hall



Vyacheslav Serov (3rd from left) and his team visit the new production line

The future of the location is on a solid foundation.

The dictum “The best was intended but everything turned out differently”, which is often used in Russia, should therefore never be said in Ufa.

As always, spring once again arrived late in Ufa in 2014, however, the new plant was installed and ready to be started up. The new ContiRoll® had its big day on March 25, 2014. After just seven month of construction, the press was officially started up and named Jaroslav after the grandson of the owner. “Attempting the impossible to achieve the

unsurpassed mechanical properties and enormous capacity reserves.

Together with the Russian installation teams, the Krefeld specialists installed a complete production plant for particleboard in record time. And best of all, ranging from the log-yard to the sanding line, chipper, flaker, silos, sifters and screens, to the particle dryer, the resin kitchen and resin blending system, to the forming and press line, and to the finishing line – everything was supplied from a single source!

Multi-cyclone of
the chip dryer



pelkamp Group. It includes components which were not only developed to save resources and energy but, most of all, to supply high quality wood-based products which provide high competitive advantage in their markets.

The Siempelkamp team is proud about the successful implementation of this order. It became possible through the constructive cooperation of all areas of the company. Siempelkamp can be counted on even when it comes to very complex and sophisticated projects, even at -31 °C, in the middle of the Russian winter, not far from the Ural Mountains.

Next, the performance checks and the start-up first without and then with material followed. The goal was in sight. Just as planned, the ramping up of the production took place. Early hiccups were quickly overcome and the 80th company anniversary could be celebrated. The future of the location is built on a solid foundation.

"Attempting the impossible to achieve the possible." – his plan succeeded. Today Vyacheslav Serov has a plant that produces 30% above the guaranteed production capacity every day – and all that while offering highest plant availability and best board quality. Almost the complete scope of supply for the new plant was supplied by companies from the Siem-



The Ecoformer SL had its premiere. For the first time, this system is integrated in a production plant at Uvadrev. This innovative surface layer wind former provides for homogeneous distribution of the surface layer particles while, at the same time, reducing material and energy consumption. The absolutely smooth surface now makes the use of especially light papers with delicate colors and intricate designs possible.

The completed installation of the
ContiRoll® is celebrated



Strothmann received largest order in the company's history: Press automation for VW de México

→ By Henning Seffers and Eugen Reimer

In recent years, Strothmann has specialized in the automation of the full range of handling processes in and around press lines – especially for leading automotive companies. The most recent contract, the largest in the company's history, illustrates the fact that major corporations rely on Strothmann's know-how: Volkswagen de México has commissioned Strothmann to modernize a press line in the Volkswagen production plant in Puebla, Mexico. This is the sixth time that VW decided to employ the support of the Siempelkamp subsidiary from Schloß Holte-Stukenbrock.

Volkswagen has opted for electronic parts transfer by means of the established Compact-Transfer system which – true to its name – is ideally suited for small installation spaces. Strothmann's work far exceeds the delivery of a catalog solution. The systems partner will adapt the CompactTransfer to the peculiar requirements on site. Two highly dynamic linear technology modules per press gap are mounted on the existing press bolsters. Both sides are identical. Suspended between the actuated axes, a crossbar made of CFRP (carbon fiber reinforced plastics) adapts the tooling to grip the blanks.

Automating the blank loading section, Strothmann draws on a comprehensive range of handling technology components developed and manufactured in-house: blank carts that can be flexibly positioned to accommodate any blank type, two unloading stations with sturdy,



VW in Mexico: key data

The Volkswagen factory in Puebla is the largest automobile factory in Mexico and at the same time one of the largest vehicle production plants within the Volkswagen Group. All processes related to automobile production including the pressing of the sheet metal parts, the production of engines, axles, and catalytic converters are carried out here.

Volkswagen de México in Puebla produces the following models: Volkswagen Jetta 4 (Clasico), Jetta 6, Beetle, and Beetle Convertible. Additionally, in 2014, Golf 7 for the northern American market went into production.

low-maintenance double feeders designed for continuous operation, two blank separating stations, a magnetic belt conveyor, and an optical centering station. Strothmann will also enable the loading section for ferromagnetic as well as aluminum blanks and implement an automatic tooling change. The entire front of the line will be enclosed for noise protection. Strothmann will also retrofit the end of the line with unloading robots and a shuttle that transports press parts for further processing.



“Good communication with all teams involved in the project was and remains important and guarantees the project’s success.”

EUGEN REIMER, PROJECT MANAGER

Volkswagen factories in Wolfsburg and Emden, both Germany. “We consider the sixth order that we received from Mexico a compliment for our reliable work,” emphasizes Henning Seffers, managing director at Strothmann.

First, the design of the complete system was successfully adjusted to the local conditions. Then, the system was built, installed, and finally, pre-commissioned and tested in-house at Strothmann. On schedule by the end of the year, the entire scope of supply was pre-accepted by VW and released for shipment on time. The time period of six months anticipated for the



Pre-commissioning of the CompactTransfer system in Schloß Holte-Stukenbrock



Pre-commissioning of the front-of-the-line equipment in Schloß Holte-Stukenbrock

Automated handling solutions from Strothmann enhance work safety and plant efficiency. Flexible concepts enable manufacture of diverse parts geometries and quick line changes for new vehicle parts.

Sixths order since 2010 – a compliment for sound work

Since 2010 Volkswagen has repeatedly commissioned Strothmann with extensive press line retrofits. To date, the handling specialist has successfully completed five retrofits in

retrofit started at the turn of the year 2015/2016 and is now in its final stages. With great expectations the entire project team awaits the production of the first finished parts from the retrofitted line.

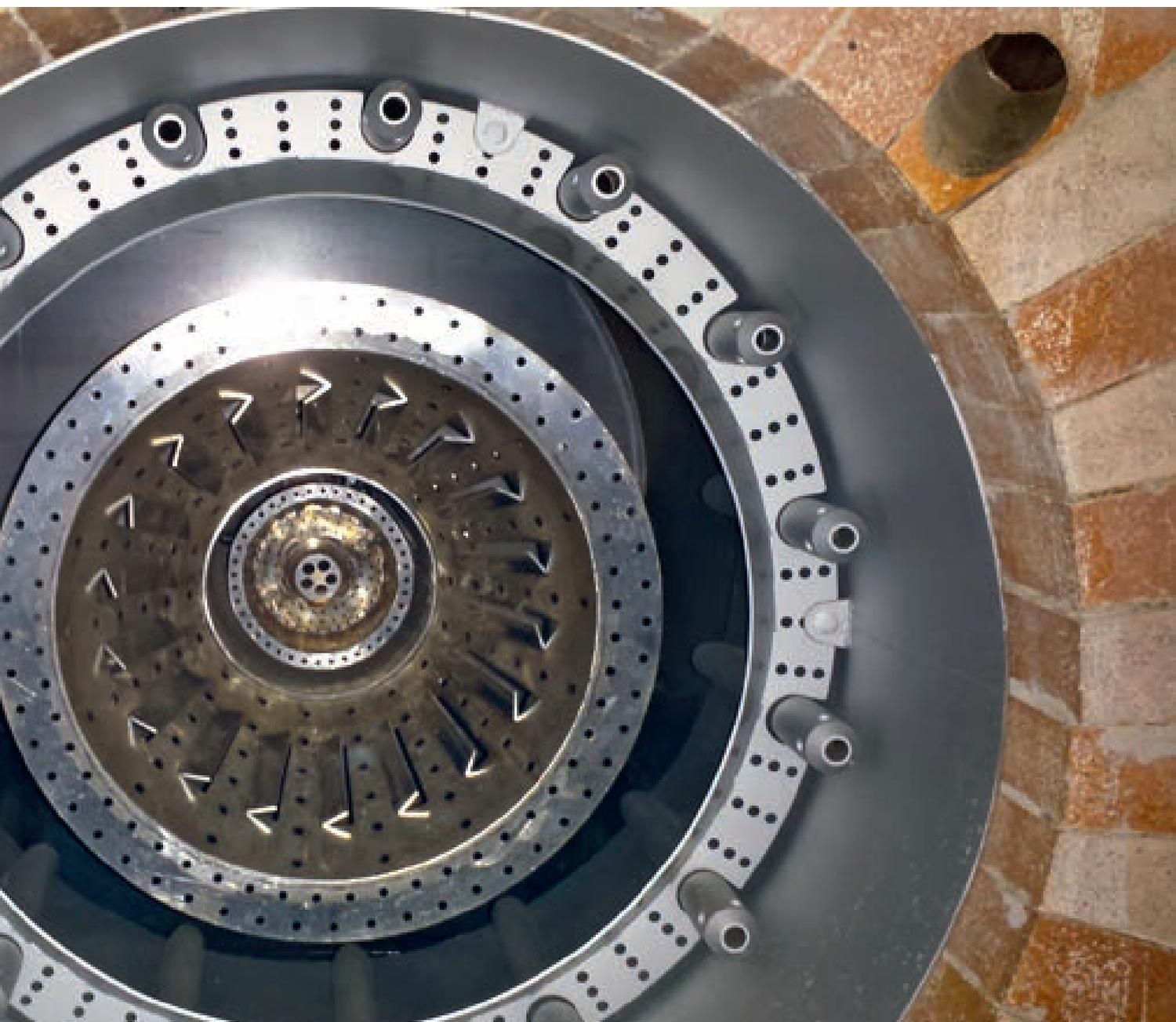
The largest single order in the company’s history is a special milestone for the entire Strothmann team. Project manager Eugen Reimer, who already oversaw all other VW projects, is also involved in Mexico and regularly on site. Currently, he coordinates the implementation of the software for the system which is provided by a partner company. “In this way, we are keeping the overview even beyond our own scope of supply and ensure that our customers receive an all-inclusive concept,” says Eugen Reimer.

Strothmann, specialist for handling and transport solutions, is an established brand for press and industrial automation as well as for the intra-logistics. The automobile industry is an important core market.

Single-path drum dryer for Agroholding Kuban: **Beets sown, high outputs harvested**

→ By Gottfried Bluthardt

“You reap what you sow,” says an old Russian proverb which is also popular in other nations. The Russian Agroholding Kuban Holding had a good harvest in two senses of the word: On the one hand the company was spot-on in 2015 with its yearly sugar beet harvest campaign. On the other hand the company’s new dryer by the German partner Büttner contributed in smoothing the way to a viable business relationship. Find out more about this project in this article which will also illustrate what distinguishes beets from wood.



Büttner gas burner type BCB-G-35 with a capacity of 35 MW (120 MMBTU). The picture shows the gas nozzles and the air ring gap from inside the combustion chamber

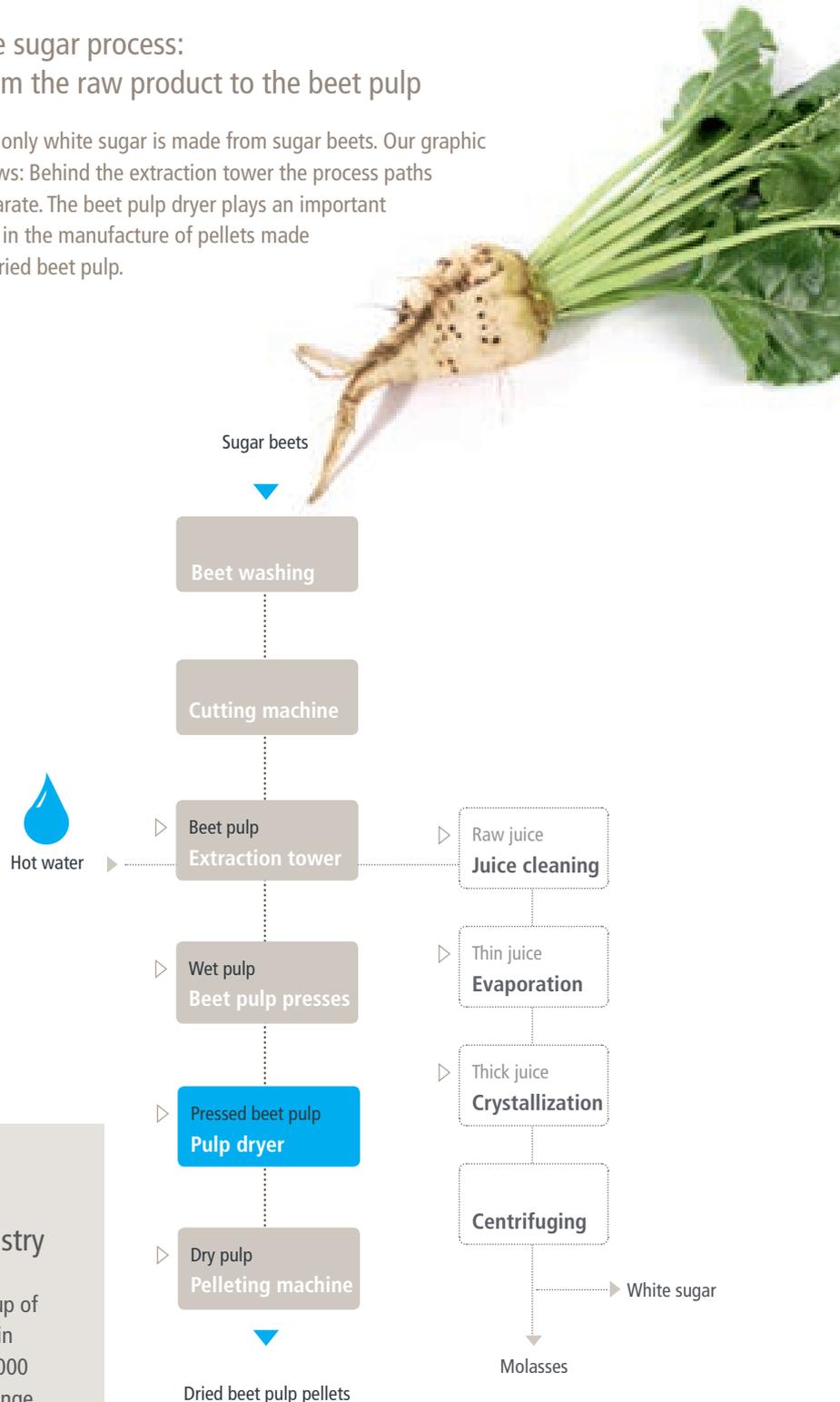
Sugar beets in fields are the beginning, white sugar and beet pulp as a component for fodder the results: At first glance this process seems to contain few spectacular stations. When taking a closer look, however, an exciting market opens up at a precisely defined time in which reliable equipment has to operate at top performance during a precisely defined time frame.

Thanks to a stable reputation and a name that is well known in Russia, Büttner played a decisive role in this process in 2015: In October 2014 the Krefeld specialist for dryer and energy plants received from Agroholding Kuban Resurs the order for a 3,8 x 20 R single-path drum dryer. At the Ust Labinsk location the sugar factory "Svoboda" of the Russian customer processes 600,000 metric tons (661,387 US tons) of sugar beets annually to 80,000 metric tons (88,185 US tons) of white sugar. The Büttner dryer is utilized during the production process after the sugar has already been separated from the beet pulp (see illustration): Every day the Büttner dryer processes wet, pre-pressed beet pulp to 300 metric tons (331 US tons) of dry beet pulp – a preliminary product for fodder.

The customer Agroholding Kuban Resurs scheduled the startup of the dryer to align with the 100-day beet campaign in Russia: This initiates the concentrated process

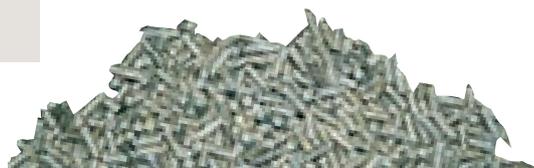
The sugar process: From the raw product to the beet pulp

Not only white sugar is made from sugar beets. Our graphic shows: Behind the extraction tower the process paths separate. The beet pulp dryer plays an important role in the manufacture of pellets made of dried beet pulp.



Agroholding Kuban: Big player in the agricultural industry

The Russian Holding is one of the largest group of companies working in the agricultural sector in Southern Russia. It employs approximately 5,000 people in the Krasnodar area. The activities range from the cultivation of barley, wheat, sunflowers, soy, corn, and sugar beets to cattle and pig farming, to milk and meat production, to the production of sugar, seeds, and flour.





Chief engineer Eduard Zasyplin (4th from right) with his project team and our start-up engineers Dirk Panzram and Alan Bihorac

contained within the short time frame between the delivery and the processing of the sugar beets. If the core business is managed within this time frame, the sugar factory concentrates mainly on the maintenance of the equipment. "In light of this cycle, the order for the dryer is a special compliment for us," says Büttner sales director Carsten Otto. Why? Carsten Otto explains the general conditions: "The sugar industry changed drastically worldwide in the last few years; less and less larger companies share a concentrated market. Correspondingly, a lot of used equipment is available in this industry. Added to this is the fact that the special process for sugar production leaves every company with a lot of time for detailed maintenance of machines, presses, and dryers."

[Concentrated processes, narrow time frames, precise support: the Büttner dryer was spot on for the Russian beet harvest campaign](#)

Apples and pears, wood and beet pulp: Not all dryers are the same

Against this background the new investment in a Büttner dryer is a first-class reference for the Krefeld company which already delivered its first dryers to Russia 100 years ago. Numerous older Büttner dryers from later generations are still performing well. The fact that a sugar manufacturer requests Büttner products demonstrates great confidence in the supplier whose primary industry is the wood-based materials industry.

"Our unique selling point is our large flexibility which we use to tailor dryers specifically to diverse industries. A decisive difference between a dryer for wood chips and a dryer for beet pulp is the difference in moisture content. Wood chips have a moisture content of approximately 100 %; beet pulp, on the other hand, 300 %," explains Gottfried Bluthardt, sales engineer at Büttner. An extremely high moisture content of the raw product requires an even higher temperature inside the dryer – at Agroholding Kuban Resurs the dryer achieves a temperature of 750 °C (1382 F).



BÜTTNER dryer for beet pulp for Agroholding Kuban – key data

- Dryer size: 3.8 x 20 R
- Moisture content input: 76 % wet = 317 % bone dry!
- Beet pulp input: 49,000 kg/h
- Water evaporation capacity: 36,000 kg/h
- Drying temperature, approx.: 750 °C (1382 F)

Büttner scope of supply

Büttner supplied the single-path drum dryer including the drive and bearing stations. The heating of the dryer is achieved with a 35 MW gas burner Type BCB, also made by Büttner. The burning and mixing chamber was supplied completely. So was the ventilation system consisting of a high-performance fan with drive, frequency converter, and automatic control dampers. The customer also ordered the necessary machines and airlocks for the material handling from Büttner as well as the complete power- and control switch plant, the sensor system, and fire-extinguishing units.

Due to cost and transport reasons, the customer manufactured the cyclone separators and the connecting duct work as well as the steel support structure according to Büttner drawings.

By ensuring a homogenous drying level, pellet presses are able to operate efficiently and without interruption during the next production step.

After receiving the order, the objective was to have the dryer ready for the sugar campaign in 2015. The project started in November 2014; in December Büttner supplied the first production drawings and the preliminary foundation plan to the Russian customer. In May 2015 the components of the dryer arrived at the construction site in Ust Labinsk. With the startup of the dryer, the moment of truth had come: Would the dryer function immediately and without a preliminary testing phase; would it be able to perform its job in the manufacturing process for which it was intended? It did. "Everything ran smoothly," was the comment of the Russian customer which accepted the dryer immediately after its successful startup. This project was a great success for the Büttner team and demonstrated the company's area of expertise.

750 °C

DRYING TEMPERATURE

The high moisture content of the raw product requires a high temperature inside the dryer.



The drying drum is brought into position in front of the already installed combustion chamber



Dirk Panzram, long-time start-up engineer at Büttner after completion and acceptance

A milestone start-up: **First Siempelkamp-made inside the creel direct tensioning concept for Europe**

→ By Steffen Aumüller

For some years now Siempelkamp steel cord conveyor belt press lines have featured an innovation: The controlled steel cord tension distribution system enhances steel cord conveyor belt lines with numerous unbeatable advantages. In 2013 Siempelkamp's steel cord tensioning concept celebrated a start-up in Australia; at the end of 2015 a similar plant for the production of conveyor belts was started up in Europe.



Siempelkamp presses and plants for the rubber industry are characterized by their long life cycles, high efficiency, and transparent process control. They are used for the production of flooring materials, rubber sheets and mats with smooth surfaces as well as conveyor belts.

These belts are used in the steel and cement industries, but their preferred field of applica-

tion is in the mining industry. In this field they are put under an incredible strain while performing transport tasks in mining operations and quarries. Two characteristics come as standard with conveyor belts: While they have to withstand extreme stresses, they have to maintain optimum operational tracking characteristics. Why? Conveyor belt lines can be up to several kilometers long. During operation the belt conveyor often adjusts to

the topology. During the engineering phase of the belt conveyor, the behavior of the conveyor belt is also taken into consideration. It is important that the conveyor belt is centered on the conveyor rollers as far as possible. If the conveyor belt is not positioned in the center, as a result of uneven tension distribution of the steel cords, operational interruptions can occur. The load can fall off, the drive drums cannot transmit the necessary power, the



Ore mining and conveyor belts: a productive synergy

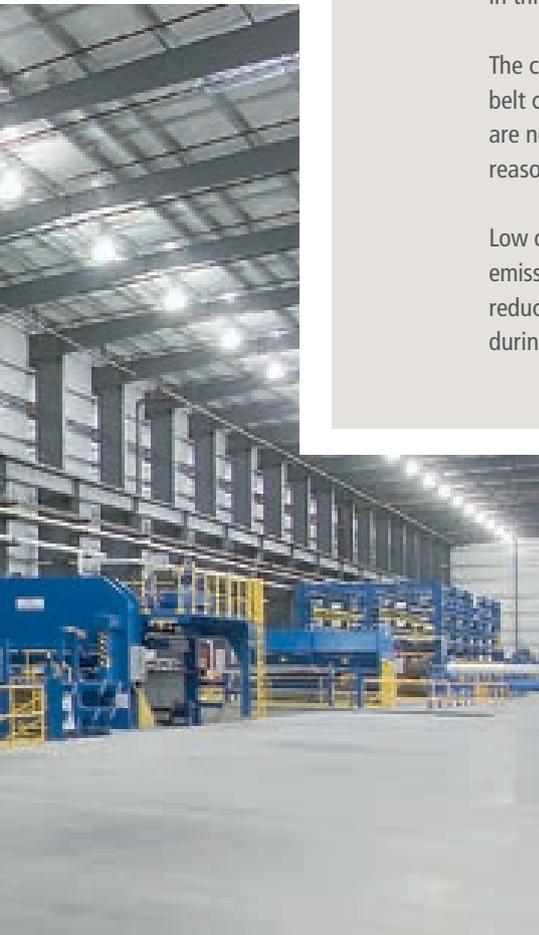
The oldest form of raw material extraction, the mining sector, dates all the way back to the Stone Age. Small work teams extracted raw material for the production of their tools in flint mines. First ore mines already existed approx. 3,000 years BC in India and China.

Today, ore production plays an important role specifically in correlation with the increasing demand for raw materials and energy throughout the world. Cost efficiency has become increasingly more existential in this sector due to cut-throat competition.

The concept of "In-Pit Crushing and Conveying" (IPCC) has become ever more important. In this area belt conveyors represent the key component. The upcoming method to transport bulk goods out of mines are no longer trucks but continuous conveying systems using belts. For economic as well as ecological reasons, IPCC has become the more intelligent solution.

Low operational costs during the life cycle of the mine, the use of electrical energy instead of fuel, reduced emissions, shorter transport distances, a reduced need for spare parts, low maintenance costs, significantly reduced investments in road construction, and lower risk of injury due to reduced movement patterns during the process are numerous reasons that support the use of belts!

Conveyor
belt press



speed has to be reduced, and, should the conveyor belt touch the supporting steel structure, even stable steel supports can be destroyed. That said, the topic of belt tracking characteristics is of particular significance.

Siempelkamp supports the manufacturers of these belts with powerful and precise presses. Due to the multi-piston concept these presses provide optimal pressure distribution and

guarantee unbeatable process stability and transparency. Our in-house developed core competence – the multi-piston press system – demonstrates all its advantages in this application field including the most uniform pressure distribution and heat transfer of a hydraulic-mechanical press onto the product. "With this know-how we have become the world market leader in the field of steel cord and textile conveyor belt presses. Due to this technological advantage, the bulk of all conveyor belts used worldwide are manufactured on Siempelkamp equipment", explains Steffen Aumüller, head of sales for rubber presses at Siempelkamp.



The new steel cord tension distribution concept

Siempelkamp's latest presses and plants for this industry open up even more advantages to operators due to the individually controlled steel cord tension distribution system. The prototype of this system was started up at Veyance, Australia, in 2013. In 2015 we carried out another start-up in Europe. The success concept: The steel cord tension distribution is individually controlled, product changeover times are significantly reduced. The electro-motive individually controlled tensioning system is located directly in the Direct Tensioning Device including tensioning, measuring and control functions for a more transparent steel cord tension distribution.



Top and bottom right:
The roller comb

Individually controlled steel cord tension distribution system



Steel cord tension motors

The advantage for the plant operator is obvious: At any time our customers have 100% control over the steel cord tension distribution of their plant. This, in turn, smoothes the way for exact reporting and an improved quality level for the products. Another advantage is opened up by the rotating roller comb concept which replaces the fixed finger comb used in previous systems.

The concept allows quick product changeovers. Compared to the traditional concept, the rotating roller comb also ensures that the tension distribution will be deflected as little as possible. A positive side benefit when using this system is that the abrasive wear on the galvanized steel cables is reduced.

With permanently optimized process control for increasingly better products, we are contributing a key component to the mining megatrend. Instead of a steel cord tension distribu-

tion that was previously uncontrolled and unverifiable, now measurability, controllability, and transparency are introduced with our concept.

The service chain is thus clearly defined: Siempelkamp supplies presses which optimally support plant operators in the manufacturing of extremely robust steel cord and textile conveyor belts. These belts then are used in mines to carry out exactly the tasks they were intended for!

100%

CONTROL

... over the steel cord tension distribution

THREE QUESTIONS TO Steffen Aumüller



Steffen Aumüller,

Head of sales for rubber presses at
Siempelkamp

Mr. Aumüller, what is new regarding the direct tensioning concept?

Steffen Aumüller: Traditionally, steel cords are tensioned using a hydraulic tensioning station. Using this method, the individual steel cord tensions during the pull-through process as well as the condition of the hydraulic tensioning station influence the tensioning result tremendously. Since the tension and its distribution are not measured or corrected in the further course, the real steel cord tension distribution inside the conveyor belt remains unknown.

Here, the direct tensioning concept comes in. For the first time, the steel cord tension is continuously measured and controlled during the complete process cycle. Each steel cord is individually tensioned by a motor and the resulting steel cord tension is separately measured for each individual steel cord. These measured values are available to the motor at any time and variations are continuously adjusted.

What consequences does the individually controlled steel cord tension distribution concept have for the production processes?

Steffen Aumüller: First of all, the steel cord tensioning process and the control of the steel cord tension distribution have become more transparent. For the first time the manufacturers of conveyor belts are able to monitor and control these values during the entire production process, and, if necessary, provide a detailed account of the process parameters. In this way the product, the steel cord reinforced conveyor belt, has been enhanced with a new quality.

Furthermore, the traditional hydraulic steel cord tensioning device has been removed from the production line. All process steps regarding this device were also dropped. This included the threading of the cords during the cord connection process as well as during product changeovers which could take up to one hour.

Another aspect is the roller comb. In contrast to the previously used fixed finger comb, with the new roller comb concept the steel cords are evenly spaced by a grooved roller. This leads to reduced abrasive wear on the galvanized steel cables as well as to an almost complete avoidance of the friction forces which can influence the steel cord tension distribution.

Does the individually controlled steel cord tension distribution concept change the product, the belt?

Steffen Aumüller: Since in traditional press lines for steel cord conveyor belts there is no continuous systematic quality monitoring as it is the case for many other manufacturing processes, there is unfortunately also no quantifiable comparison of before and after the use of the concept. Here, we have to rely on the feedback of the belt manufacturers. The starting point for this new development was the desire to be able to measure the steel cord tension distribution in a traditional production line because some belts demonstrated unexpected effects during use. This regarded especially the belt tracking characteristics. Since the end of 2013 the prototype of this new development is in operation. Another press line equipped with the individually controlled steel cord tension distribution system started operation at the end of 2015. In both cases we have not received any information regarding the steel cord tension distribution control. Therefore, we assume that both production lines meet the targeted expectations. We consider such type of feedback a good sign for the machine manufacturer.

Quality creates records: Cask manufacturing at the highest level

→ By Dr. Wolfgang Steinwarz

With 45 large cask bodies for the disposal of spent radioactive fuel elements, Siempelkamp set milestones in 2015 in the field of cask technology on an international scale. One thing is clear: only those who maintain their quality assurance in all process steps at the highest level are capable of breaking records. Accordingly, at Siempelkamp it is not only the size of the castings that sets benchmarks, but also – and in particular – the finely tuned quality concept.

445 large cask bodies (CASTOR®, TUK) in 2015, 450 MOSAIK®1 casks in 2010: These are internationally impressive records each achieved by Siempelkamp's annual production of ductile cast iron components for the disposal of radioactive wastes. What is remarkable here is not only the logistical performance on which these records are based. Also the spectacular and extreme safety tests on prototype casks for the verification of material and design encounter a lot of interest.

*
CASTOR® and
MOSAIK® are
products of
GNS, Essen; the
design license
for the TUK cask
bodies lies with
ECNC, Russia

Often, the huge amount of daily work required for quality assurance measures is underestimated, and the devil (really in this case) is in the detail. Whether traffic law, the Atomic Energy Act, the Radiation Protection Ordinance or the storage conditions of the repositories: the clearly defined framework for cask production consists of numerous requirements. Depending on the radioactivity inventory, the casks must ensure, for example, the necessary radiation shielding and sealing. Furthermore, it is important to satisfy certain integrity criteria, taking into account defined transport conditions and accident scenarios. The basis of the assessment are international regulations



Production of CASTOR®
cask bodies

– for example, provisions of the International Atomic Energy Agency (IAEA) or the ASME codes. These codes govern the requirements, for example those relating to quality assurance, design, material selection, production and testing, which are essential for certifications. National authorization requirements also have to be considered.

The first test steps

The quality assurance chain starts with the inspection of the casting feedstock, which among other things confirms the sophisticated chemical analysis with special trace elements. The key points of the additional test measures are the casting structure and the parameters which are relevant to the actual casting process, for example the casting temperature.

Large order: MOSAIK® casks and cast iron containers ready for transport





Casting of a CASTOR® cask body with a melting temperature of 1,320 °C



Examination of the structure of polished specimens

On the polished blank, the cask technology experts carry out the first quality tests, check the thickness of the walls of the cask body, for example, and the surface structure. Furthermore, examinations are carried out on the structure of polished specimens. These mainly serve the purpose of determining the ferritic microstructure with embedded spherical graphite particles, which ultimately guarantee the positive material behavior with respect to safety.

material flaws such as cavities (missing material) and cracks. The sound waves penetrate the casting and are reflected from the respective rear wall.

The testers derive the required results from the variation in time and the magnitude of the echo signal. The team benefits here from the continuous developments in ultrasonic technology over recent years. In contrast to conventional ultrasonic technology, in which only one transducer per test head is used as a sound generator, the modern phased array technology uses phased array probes. This allows a visual representation of possible casting defects not only in 2-D, but also as a spatial – and therefore realistic – image. The latest development step of this test technology is based on complex (partial) automation. However, people cannot be replaced by even the best technology, since the basic confirmation of the manufacturer continues to be provided by highly qualified test personnel.

With the developed process and the resulting new technical possibilities, flaws in the low millimeter range are clearly identifiable. The size of permissible defects has been reduced

Spatial and realistic presentation: modern phased array technology in contrast to conventional ultrasound testing in 2D.

Ultrasonic testing as the key to product quality

The key test step for materials and casting products is non-destructive ultrasonic testing, which is performed after casting and near-surface rough turning. Here, the surfaces of the casting are scanned from the outside by ultrasonic measures in order to confirm their integrity. The aim here is to exclude relevant

accordingly; the requirements placed on the casting technology and the selection of the materials have increased.

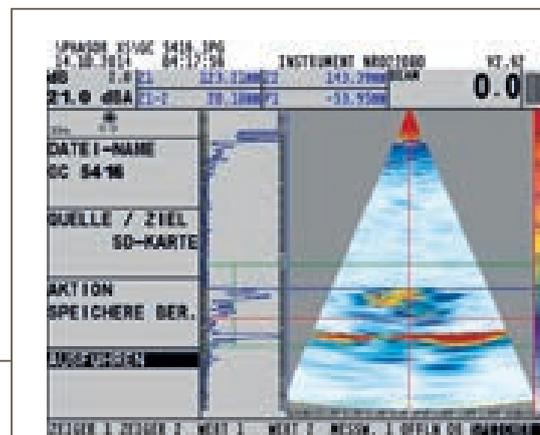
Highest requirements, another complex inspection program

One impressive example of the high requirements placed on the mechanical processing of the cask body is in particular deep hole drilling. Here, up to one hundred longitudinal bores are made with a depth of up to 5,500 mm in the cask wall to subsequently receive the neutron moderator rods. Depending on the cask design, the required diameter is a minimum of 90.4 mm and a maximum of 90.5 mm, for example. This means that the thickness of a pencil stroke can decide on acceptance or rejection! Furthermore, the position of the hole may only deviate by a maximum of 10 mm at its end over a length of more than 5 m, which corresponds to an angular deviation at the beginning of the drill of only 1°.

In order to check the material properties, the experts draw several hollow drill cores from the raw casting material in order to determine the mechanical and technological characteristics. The so-called dye penetrant test focuses

particularly on the sealing surface areas in order to make visible any existing near-surface defects such as micropores.

The requirements placed on the coating of the finished casks have also increased enormously over the years. While more than ten years ago it was the "hammered finish" with occasional dust inclusions which was highly appreciated, today it has to be of automotive paint quality.



Direct comparison: conventional ultrasonic image (center) compared to a spatial phased array image (sector right)

Manual ultrasonic testing on a CASTOR® cask body



Coatings from two historical worlds using MOSAIK® components as an example



MOSAIK® components: "Hammered finish"

Another extensive inspection program with, for example, dimensional checks, overload and tightness tests rounds off these safety and quality measures.

All acceptance tests, as well as the production itself, are performed in accordance with the production testing flowcharts and test instructions/specifications set up by the Federal Institute for Materials Research and Testing

(BAM) as a yardstick. Up to four independent institutions are particularly involved in the safety-related requirements for the tests. This eight-eye principle is implemented by the manufacturer, the customer, the TÜV as the supervisory authority and the BAM. This combined know how is based on extensive documentation, which for the cask body alone comprises 60 and more documents.



Deep hole drilling on a CASTOR® cask body





MACHINES

You desire that your plant can already accomplish today what is needed tomorrow? Regardless which business area – machine and plant engineering, casting technology, or engineering and service: We develop intelligent concepts which combine performance, energy-efficiency, and customization.

Milestone “First Board”: Seven project successes in three weeks!

→ By Egbert Schulte

In the wood-based products industry it's something that is awaited with great excitement by plant operators and suppliers alike: the first board. In April seven ContiRoll® press lines from Ireland to Vietnam produced their première boards. The seven milestones were celebrated locally and are a record for the Siempelkamp project team.

Four ContiRoll® press lines commenced production almost simultaneously within the first week of April and three further ContiRoll® press lines followed two weeks later. That's project development at the highest level: design, engineering and development, manufacturing, delivery, assembly and start-up on location – everything came together perfectly!

Project managers, site managers, start-up engineers and process technologists from Siempelkamp Maschinen- und Anlagenbau demonstrated their skills to the highest technical level in all seven projects. They were all committed to providing the customer with planning security and adhering to deadlines at every stage of the project.

The Siempelkamp team commissions even complete integrated plants on all continents simultaneously, to the full satisfaction of the customers. All from one source – the tried and tested concept from Krefeld provides reliability at all stages of the project when dealing with new plants, extensions and upgradings.

“With this record, we once again demonstrate that adherence to schedule and smooth project implementation and control take place to the highest standard at Siempelkamp,” explains Stefan Wissing, Spokesman of the Executive Board at Siempelkamp Maschinen und Anlagenbau GmbH. “This enables us to provide all the crucial competitive advantages.”



Seven first boards in three weeks in April – the milestones

- 1st board on the 9'x 48.7m MDF/HDF ContiRoll® at Egger Gagarin, Russia
- 1st board on the 9'x 45.4m OSB ContiRoll® for Smartply, Ireland
- 1st board on the 4'x 33.3m MDF ContiRoll® for Vietnam Rubber Group in Kien Giang, Vietnam
- 1st board on the 7'x 55.3m MDF/HDF ContiRoll® for Yildiz Starwood, Turkey
- 1st board on the 7'x 48.7m MDF/HDF ContiRoll® for Camsan Entegre in Sakarya, Turkey
- 1st board on the 9'x 37.1m MDF/HDF ContiRoll® for Guararapes, Brazil
- 1st board on the 7'x 30.5m PB ContiRoll® for Saib in Caorso, Italy



The first board manufactured at Camsan Entegre in Sakarya, Turkey

Werner Schischkowski, Egbert Schulte and Dr. Andreas Steffen (from left to right) are each crucially involved in the success of a first board. In these three profiles we reveal the people behind the processes.

FIRST BOARD TEAM SUCCESS: THREE PROFILES



The questions:

1. What is your current professional position?
2. How long have you been working at Siempelkamp?
3. What is your general technical/specialist contribution to the first board?
4. What is your biggest challenge in this context?
5. What is the most exciting moment for you in a project?

WERNER SCHISCHKOWSKI

1. Head of automation (from development to start-up)
2. since 1992
3. Automation plays an important role in the functions of the machinery and equipment – from electrical design for the manufacture of the switchgear units, installation planning for the electric installation, electrical commissioning and production support up to approval. The production of the first board, and thus the production start is only possible thanks to the organisational and professional interaction of employees in the automation department. The team consists of experts from a wide range of different electrical engineering disciplines. Staff from the electrical engineering and start-up fields is equally involved in the results.
4. Inter-branch staff and deployment planning. The number of first boards within one month means that maximum organisational performance is necessary. Specialised personnel from the specialist departments in

Krefeld and the international branches had to be deployed as effectively as possible, in terms of specialist knowledge and timing, in order to meet customer deadlines.

5. When starting up the Saib plant in Italy we only had six working days from completion of the electric installation to production of the first board. The additional, targeted use of our staff from the development department meant that production of the first board was delayed by just one day. The customer thanked our employees personally for their commitment. It was a brilliant performance by everyone involved.

EGBERT SCHULTE

1. Head of project management, external assembly and start-up coordination
2. since 2000
3. Supporting the project manager with particular issues on site. Staffing all assembly locations optimally in order to achieve the goal.
4. One of the biggest challenges was definitely ensuring that the right specialists were able to start and complete their work at our installation sites at the right time. As is usually the case in plant construction, during assembly and start-up there are unexpected disruptions that have to be dealt with quickly and objectively. Regular, intensive meetings were held between colleagues from all disciplines, but particularly between the project managers and the assembly and automation divisions. This

teamwork was stepped up significantly in the last few weeks before the first of the first boards was due to be produced, and is still ongoing.

5. The production of a first board shows how ultimately, all the planning, preliminary considerations and struggling to find optimum solutions together with our customers lead to a functioning system – one that is made up of machines which are often provided by different suppliers, is on schedule and meets our customers' expectations. At the current plants we were able to tackle this exciting management task once again, with outstanding results.

DR. ANDREAS STEFFEN

1. Head of assembly and start-up department with additional responsibilities in the process development of our wood-based products plants and of the Siempelkamp Academy
2. since 1999
3. Staffing the plants with start-up engineers that have the suitable personal and professional skills
4. Coordinating the staffing of all plants to be started up worldwide with the appropriate start-up engineers for the mechanical, electrical and technological equipment, taking into account expertise, experience and entry requirements
5. Keeping an eye out for the unexpected, even when everything is running smoothly.

Isothermal forging press for Leistritz: **High-end forging technology for more economical and quieter aircraft engines**

→ By Christian Hassler

To achieve significant fuel savings in air travel, the aircrafts of the future are being designed increasingly lighter. Particularly the complex turbine technology inside the nacelle is a heavy load under the aircraft wings. The highest degree of expertise is required to manufacture the components for the drive technology from lighter materials. A weight-saving design must, however, maintain the same operational reliability as before. Leistritz Turbinentechnik, a business unit of the Leistritz Group with headquarters in Nurnberg, Germany, offers this type of expertise. Leistritz manufactures 50 % lighter turbine blades made of titanium aluminide for the latest generation of aircraft engines in its factory in Remscheid. To do so, the company has been using an 8 MN isothermal forging press made by Siempelkamp since March 2016. Two identical presses will start operation by 2017.



Isothermal forging press, front view

Titanium Aluminide

THE MATERIAL OF THE FUTURE

Leistritz's choice to go with Siempelkamp as the systems supplier for the new production plant for the most advanced turbine components was not a matter of chance. The manufacturer of the latest turbine technology has been operating a 50 MN Siempelkamp isothermal forging press since 1984 to produce components that have to comply with the strictest standards of the ICAO (International Civil Aviation Organization). Because component parts made from new alloys require new and extremely precise production methods, the time had come to invest in new production technology.

The limiting factor in the further development of innovative, fuel-saving, and quieter jet engines for civil air traffic are the rotor blades which drive the turbine. Due to the extremely hot and compressed air, these components are subject to high thermal stresses. The stresses resulting from extreme centrifugal forces caused by the high rotation speed of modern turbofan engines have to be added to this. After a while, this combined operating load on the rotor blades results in a material flow which is moving radially outwards towards the turbine housing. The result: the rotor blades become longer with increasing operating life. In the worst case scenario they can touch the turbine housing and cause the total failure of the engine. Conventional rotor blades are currently still made of high-alloyed nickel-based alloys – a material with high thermal stability due to a high inner mixed crystal strength and the related strengthening of the grain boundaries within the material structure.

Since the thrust power of the engines has continuously increased from 4,500 N to more than 40,000 N (!) since the aircraft industry started using them more than 75 years ago, any further development requires weight reduction at the same time. The objective in a nutshell: efficiency increase, fuel savings, reduced noise emissions, and maximized operational safety.

Titanium aluminide alloys weigh only half as much as nickel-base alloys.



Finish-forged blade in die

Material of the future: titanium aluminide Forged gamma titanium aluminide (γ -TiAl) is regarded as the material of tomorrow for the rotor blades in jet engines. This material is already used as casting alloy for housing components and guide vanes. For its future application in rotor blades, it makes sense to forge γ -TiAl. The advantage: With a material weight of $< 3.8 \text{ g/cm}^3$, titanium aluminum

alloys with a 50 % titanium content weigh approximately half as much as nickel-based alloys, the conventional material for rotor blades. All this at an excellent ductility (here tensile strength) which counteracts the centrifugal powers that occur at high turbine speeds. Using rotor blades with a significantly reduced weight leads to drastically reduced centrifugal forces, a welcome effect. Despite

all material properties that are favorable for the future application area, γ -TiAl also has some properties that prove as tricky. Unless specific parameters are meticulously kept during material forging, the material is simply not forgeable.

This is where Siempelkamp's expertise comes in: Since the beginning of 2014 Leistriz Turbinentechnik developed together with the press specialist from Krefeld a shared requirements profile to implement a new process technology for the forging of γ -titanium aluminide through suitable press technology. In November 2014 the time had come; the first two isothermal forging presses were ordered.

Compared to forging other materials, forging gamma titanium aluminide requires a longer forging process. A quick forging process, such as the sudden hot forging of metals, does not work here. The forging of gamma titanium aluminide requires a slow process and involves plastic forming with dynamic recrystallization. Only with isothermal forging presses the inter-metallurgical cast structure, hard and brittle like ceramics, can be changed into a



Insertion of the one-piece press body consisting of nodular graphite cast iron

fine microstructure that will withstand future stresses. If the process is carried out any faster, cracks in the material are inevitably developed. With its isothermal forging presses, Siempelkamp masters extremely controlled press speeds and optimum temperature balance.

While γ -TiAl is not forgeable at low temperatures, it shows an excellent formability in a temperature range between 1,150 and 1,300 °C, which however has to be given special attention: the forging process has to take place without the unfavorable slip-stick effect.

Forging as a slow flow process.

Siempelkamp solves the problem with a slip-stick free hydraulic axis control in a symmetrically built one-piece press frame which ensures the exact alignment of top and bottom dies with its cross-thread guidance system. The continuous problem-free forging process is guaranteed by special thermally isolated guiding and sealing systems. A Siempelkamp-developed process control with visual process mapping controls the individual phases of the press process whose parameters are reliably monitored and documented.

Make way for an innovative manufacturing process

The entire press is enclosed in a housing since the press process has to take place within an inert gas atmosphere. Automated ejectors ensure the safe removal of the rotor blades.



Turbine blades



Afterwards, an integrated cleaning system removes possible deposits from the die surfaces. The scope of supply also includes a rotary hearth furnace as well as an automated loading and unloading manipulator. Siempelkamp developed all electrical and hydraulic drive systems as well as the system control for monitoring of all components. After a timely and straightforward installation and start-up, starting in December 2015 and concluding in February 2016, the plant passed the acceptance test following the first forgings.

uses approximately 17 % less fuel during operation, lowers the operational costs by 20 %, and significantly reduces noise. To meet the increasing demand of such components in the future, Siempelkamp will supply a third identical press next year.

With the new isothermal forging press and an innovative manufacturing process, Leistriz Turbinentechnik is able to produce rotor blades for a new generation of jet engines which



First of three isothermal forging cells for Leistriz

Complete plant for Homanit: The world's most modern production plant for thin MDF and HDF starts operation

→ By Jochen Dauter

April 2015 – the regular three-shift operation for the production of ultra-thin MDF and HDF runs reliably. Boards featuring a smooth surface that is ready to be painted and widths ranging from 1.5 – 7 mm are produced. The Homann subsidiary HOMANIT Krosno Odrzańskie Sp. z o.o. supplies boards that are already painted from even the smallest production batches primarily to the furniture industry. A Generation 8 ContiRoll® press as well as innovative plant components enable the manufacturer to work with such flexibility and allow for resource-conserving and energy-saving production processes.



The new HOMANIT plant Krosno Odrzańskie in numbers:

- 300,000 working hours
- 25,000 m³ concrete
- 2,000 container with material
- 3,000 metric tons of steel
- 50,000 m² wood yard
- 5 km internal rail connection
- 400,000 m² area
- 1 km factory hall length
- production speeds 2,000 mm/s
- 2,500 mm board width
- 300,000 m² unfinished board production/day
- 1.5 – 7 mm board thickness
- 100 million m² saw capacity



The 28.8 m x 8' ContiRoll®

During the planning phase of the plant, the existing customer was already able to view and move around in the complete production plant including all other exterior components, such as the 38 MW energy plant. The virtual components become available with the help of 3D glasses, fast computer hardware and modern CAD software. The most innovative surveying technology provides the engineers with an exact survey of the topology and buildings of the customer's business premises. All factors, even existing equipment and plant components, are recorded electronically and prepared and are the basis for the project engineering.

The long-term Siempelkamp customer started up its first ContiRoll® press in Herzberg, Germany, in 1991; the second press in Losheim, Germany, in 1995. Since then HOMANIT has been producing HDF/MDF HOMADUR® wood fiberboards for the furniture and door industries, for the interior design industry and for fair construction there. HOMANIT opened up this broad customer base through the excellent quality of its HOMADUR® wood fiberboards. The dense, rigid, but most of all smooth surface of the boards, which is made possible by superior ContiRoll® technology, makes the boards ideal for painted applications. Another reason for the wide application range of HOMADUR® wood fiberboards

is that these boards can be produced in flexible production capacities tailored to the needs of the customer.

With its new production location in Krosno Odrzańskie, which is the company's second location next to the one in Karlino, Poland, Homanit remains true to its fundamental philosophy of manufacturing thin boards with high quality surface finishing. The furniture industry demands pretty much constantly ready-to-install products in flexible batch sizes and best quality. With the production start date in mind, the assignment to replace, in nine months, the outdated production plant for thin boards using a wet-manufacturing process started. The goal was ambitious: about half of the area of 400,000 m² was to be built on; 20,000 m³ of concrete and 3,000 metric tons of steel needed for the factory halls and



From left to right:
CAD view by Sicoplan
and view of real plant



Fiber dryer (foreground) and view of production halls with a length of 1 km (1093 yd)



„Good things don't need more than nine months.“

FRITZ HOMANN, MANAGING DIRECTOR, HOMANIT GMBH & CO. KG



38 MW biomass power plant by Büttner

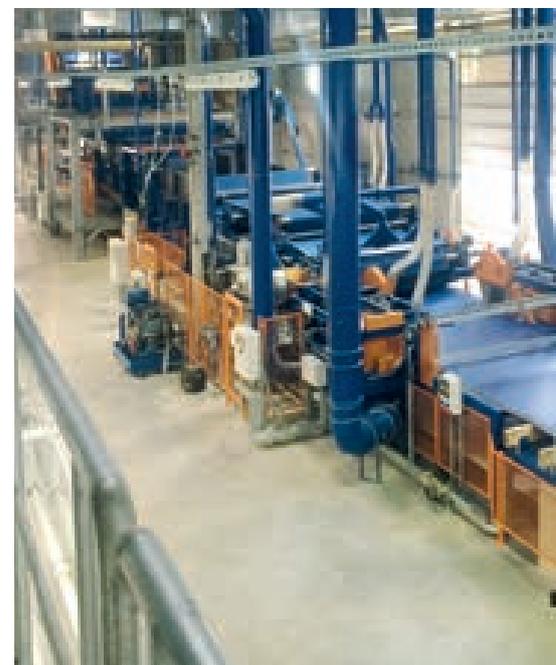
foundations. 5 km of international rail connection had to be considered to ensure that the 50,000 m² wood yard could be supplied with material and a daily production capacity of 300,000 m² of unfinished boards could be transported away. Thanks to the outstanding planning work of the Siempelkamp subsidiary Sicoplan, the targeted assembly start in July 2014 was met.

Based on the sophisticated high-end engineering by Sicoplan, the Siempelkamp scope of supply consisted of an energy plant and a fiber dryer

made by Siempelkamp's subsidiary Büttner. The 38 MW biomass power plant uses residual and waste wood, such as bark, or residual waste from its in-house operation, heats the thermal oil for the press, and used flue gases for the fiber dryer. The fiber dryer is designed as a flash tube dryer. These are only the components at the beginning of the production chain which optimize the entire plant in regards to energy consumption and thus help save resources. A sustainable production is part of the company principle at HOMANIT. For the production of HOMADUR® boards the manu-

facturer uses roundwood and scrap wood from saw mills. The applied resins are E1 classified, that means, their equalization concentration of formaldehyde is below 0.1 ppm. Painting is done with watery dispersion paints which are oftentimes protected by UV-protective seals based on acrylic resins. The economic production philosophy of Siempelkamp plants emphasizing saving potentials of raw material, material, and energy fits ideally into the HOMANIT profile.

The Ecoresinator resin blending system with automatic dosing adjustment reduces the resin consumption. Steam and resin are injected into the blowline. The optimized swirling of the fibers in the blowline ensures that practically every fiber is coated with resin and guarantees the production of boards with ideal mechanical properties without resin spots. HOMANIT guarantees its high production depth in Krosno



with the Generation 8 ContiRoll® press line. Additional differential cylinders produce a special pressure profile in longitudinal and traverse direction which is essential for the optimal production of thin boards because the pressure at the outside edges of the mat can be reduced, thus avoiding crowning of the board. The measuring system Sicoscan monitors the actual material thickness of the finished board at the press outfeed over the entire production width. The weight and moisture of the mat are measured at the press infeed and compared with the reference values. The board thickness is kept constant via a control circuit between thickness measurement and press hydraulics. A product changeover to different board thicknesses is possible at any time without changeover times.

The perfect board with homogeneous material thickness and smooth surface is the absolute production condition for HOMANIT because a majority of the boards are directly painted. For MDF and HDF this is only possible if the surface is so smooth that sanding is not necessary. The new and modern Siempelkamp production line achieves this quality level and at the same time offers greatest production flexibility. A combination of rotary clipper and double diagonal saw, applied for the first time, cuts the boards to length at the end of the press line. With this highly modern production plant HOMANIT is now, after nine months, able to provide custo-

mers from the furniture industry who have individual needs in different batch sizes. Fritz Homann, managing director at HOMANIT GmbH & Co. KG is satisfied in all respects with the services provided by the Krefeld specialists. After all, one of his mottos was confirmed: "Good things don't need more than nine months."

Direct painting of MDF and HDF is only possible if the surface is so smooth that sanding is not necessary.



The first produced board is signed by all participants



From left to right: the pre-press with trimming saw and press infeed

The Fascination of Iron Casting: A Manufacturing Process throughout the Ages

→ By Christoph Freudenberg

In the Lower Rhine city of Krefeld, our colleagues accomplish the nearly impossible every day: Up to 320 tons of glowing molten iron is shaped in such a way that it satisfies the highest demands in every respect. The individuals involved in this process are mechanics, carpenters, smelters, fettlers, businessmen and women and engineers – at all events a team! This team acts as advisers, supporters, partners and planners for current and future Siempelkamp customers.



Shaping massive castings from metal which was previously molten has held a fascination on people since time immemorial. For over 7,000 years we have known about the possibilities and advantages which the molding method brings with it. At the same time, the manufacturing process of casting has been continuously refined against the background of increasing demands on the part of the manufacturers and users of castings, so that today ground-breaking colossuses which place the highest possible demands on tolerances and mechanical properties can be produced.

Production Processes in the Foundry Business

In principle, during the history of the development of iron casting, two fundamentally different production methods have emerged for the industrial production of castings. These are fundamentally distinguished on the basis of the pattern equipment, the mold materials, the mold making and the casting method. This results in the process of casting in lost molds and casting in permanent molds.

The term "lost mold casting" indicates that the mold produced to shape the casting is rendered unusable for a second casting, and is therefore "lost". Lost molds are usually molds and cores which are made of silica sand and are providing the casting with an outer and inner contour. The initially loose, free-flowing molding sand is mixed with binding agents in mixing apparatus and can only be shaped and compressed after the mixing process for a

320^t

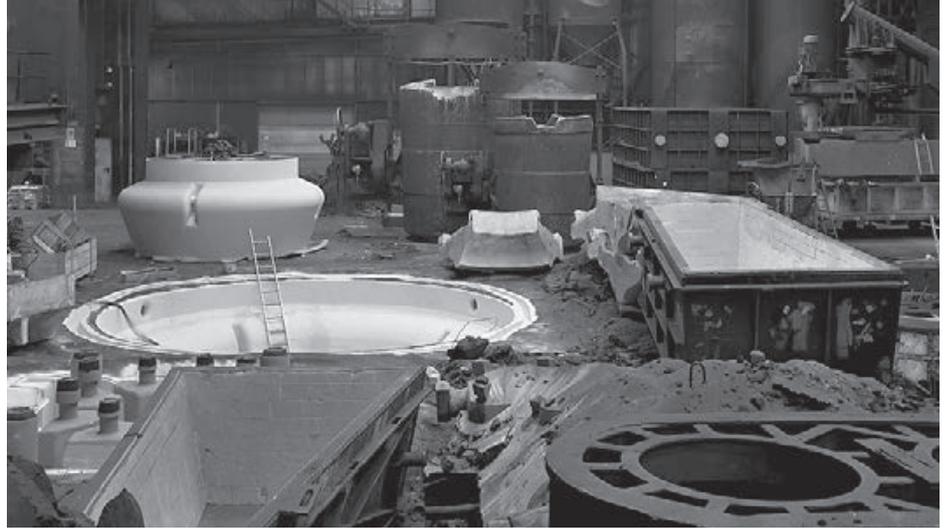
... poured into a mold is a high accomplishment



The History of Iron Casting

The historical development of the casting of metals begins over 6,000 years ago in the Near East, where the technology of metal smelting – initially of copper – is of major importance. Charcoal – and subsequently also ore – is fed into the furnaces and the method of firing optimized by blowing in air. Continuous technical progress then leads from the simple charcoal furnace, through shaft furnaces, to the crucible induction melting furnace known today.

The shaping of the molten metal starts at that time with the creation of negative molds made of sandstone, soapstone or other forms of stone. With these it is initially possible to use half-shells to produce shapes which are flat on one side, followed by other items which are shaped on both sides by means of double-sided molds, and finally also hollow casting geometries through the use of cores. More complex casting molds, e.g. for the creation of works of art, are designed by wax models that have been produced beforehand and which are ultimately melted out of the surrounding mold. Since the Middle Ages, so-called permanent patterns have been increasingly found. At the time these were already made of wood, among other materials, in order to be able to supply the ever-increasing quantities required, for example for gun barrels or bells. Today the "pattern maker" mainly uses wood, plastic, foam material or metal to manufacture patterns for a wide range of requirements and applications.



Hand-molding with lost wax casting molds

defined time before the binding agent system reacts and the sand then hardens in the shape which it has assumed. Samples of the external (positive, pattern) and internal contour (negative, core box) are produced beforehand from materials such as poly-styrene, wood and/or metal and used for molding the molding sand.

As a rule, a casting is molded on both sides, i.e. only half of the pattern is molded in each case in molding sand, so that the two molded halves can be separated again and the pattern removed. If necessary, cores are also inserted

into the mold. Once the mold has been fully assembled, the molten metal can be poured in through the so-called gating system, which is also shaped into the mold. After solidification and sufficient cooling of the metal, the sand can be knocked off and the raw casting removed.

Molding in "permanent molds" allows a greater number of castings which can be produced using one and the same mold, since this is not destroyed during the casting process. Permanent molds are usually negatives which are produced from metallic materials and cast using various mold-filling processes. The work is carried out here, for example, using only the force of gravity (gravity die casting), a defined pressure (metal pressure casting) or the centrifugal force (centrifugal casting). Through the cost-intensive manufacturing of molds and the additionally required systems engineering, this method is only suitable for large-volume production, however.

Mold for the bell casting



Excursus: Bell Casting

Approximately 1,000 years ago, European monks developed a method of manufacturing bells with the help of metal casting processes. Previously produced by other manufacturing processes, bells became increasingly important in the Middle Ages. Today's principle of bell casting can be traced back to the shape of the "Gothic rib", which from the 15th century on represented the preferred bell shape. With the casting of the Maria Gloriosa, which is today housed at the Cathedral in Erfurt, development was considered to have been completed. This is known as one of the best bells ever to be cast. In the manufacture of a bell shape,

Machine Mold Casting

A manufacturing process which is used in particular for the efficient production of large batches, but only for small to medium-sized castings, is the so-called machine mold casting process. As a generic term, this is a partially automated sand mold casting process, although there are also many different subtypes of machine molding which differ from one another above all in terms of the manufacturing and compression of molds and cores. In general, the two halves of the mold and the cores are shaped by machine, the halves of the mold manually loaded with cores, put together automatically, partly cast automatically and cooled in a defined manner. The high repeat accuracy of the processes makes it possible to achieve a high level of uniformity and output quantity of the castings produced.

Hand-molding: Core Competency of Siempelkamp Giesserei

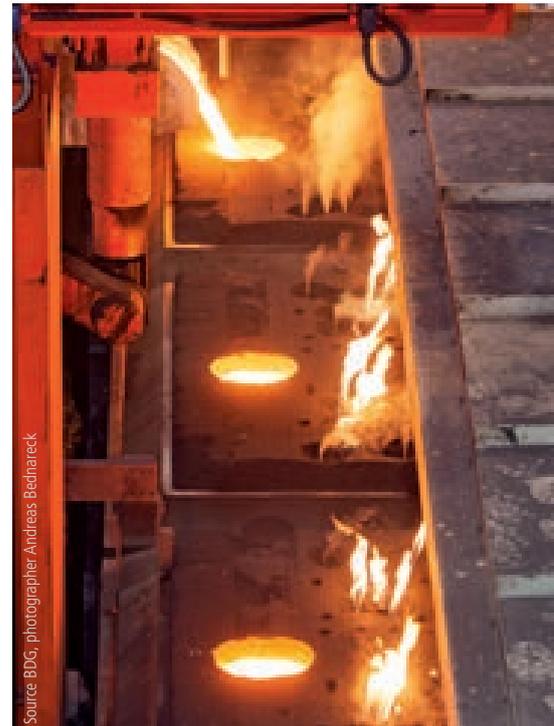
In contrast to machine mold casting, hand-molding is mostly used for single castings or small volumes of large castings. The molding process is carried out here in large molding boxes or directly in a specially prepared pit, in which the pattern is molded in molding sand. In some cases work is carried out on a mold for weeks here in order to complete the actual casting process in a maximum of just two minutes.

Here, the entire production is characterized by the high level of manual work performed by the employees at melting furnaces, in core-making shops and molding shops. There is de facto no automation which could be helpful with manufacture. With the exception of the melting technology, cranes and sand mixers, the employees in a hand-molding foundry rely exclusively on their technical skills. The treatment of the casting after solidification in the form of fettling and coating work is a working process which is very much characterized by manual work due to the large number of various products which are typical for this type of production.

High Demands, a Complex Job: Hand-molding in the Field of Conflicting Priorities

In the highly automated world of industrial production today, the demands placed on hand-molding foundries are extremely high. Operating the business against the background of tolerance, time and price windows which are becoming increasingly tight is a major challenge. Furthermore, large castings are traded on a world market on which the

Machine mold casting



Source: BDC, photographer Andreas Bechareck

a brick core is initially produced which is covered with a layer of clay and smoothed by means of a template. A second layer of clay then forms the so-called "false bell". After a final layer of alumina, the structure is dried by fire, the surrounding casing lifted off again, the second layer of clay re-moved and the casing reapplied. The result is a hollow clay mold whose empty volume is filled with liquid bronze. After the solidification of the liquid metal, the casing is removed and the raw cast bell withdrawn.

Casting pits and casting patterns being used in hand-molding



Wind power plant construction, large engine engineering or mill industry: Various industries rely on Siempelkamp Foundry

competition not only makes use of geographical and political advantages, but on which logistical tours de force are also required. Ultimately, the most important aim is to transport the casting which has been produced on time and safely to its point of use.

The customers of Siempelkamp Giesserei include, for example, large corporations from the fields of wind turbine construction, large engine construction or manufacturers of mill components in the production of raw materials. These customers place the highest demands on the cast product, as subsequent maintenance or even the replacement of the part is very protracted or simply not possible. The failure of one of the said components results in considerable economic damage to the operating company. The highest quality and mechanical requirements are the result, which can only be provided by a foundry which delivers 100% quality.

The work at the Siempelkamp Giesserei is fascinating and grueling at the same time. There is hardly any other production environment in which the extremes are so close

The Siempelkamp 2014
training year



together: A form of work which is seemingly almost archaic, but which nevertheless produces state-of-the-art system components. "That is what makes working with us so appealing," says Mathias Weil, Sales Engineer at Siempelkamp, "this is where opposites meet which ultimately create a product that is unequalled. Of course this is not possible without reliable colleagues who display high levels of commitment." And so it is: People who have committed themselves to the world of the foundry are rarely able to tear themselves away from it again.

The vocational range of those who participate in the production of a casting is very varied: The foundry mechanic whose special field is hand-molding, and who is also called a molder, is responsible for an important part of the manufacturing

process. His skills in producing and setting up sand molds and cores play a decisive role in determining whether the valuable molten iron leaves the molding pit with the right properties and tolerances.

The pattern maker specializing in foundry work plans and producing the plastic or wooden patterns for the production of large castings, incorporates changes and optimizations into existing pattern equipment or repairs worn areas. As a consequence, he forms the basis for a high-quality casting result.

The industrial business management assistant plays an active part in the overall organizational chain that implements the production of the foundry product. From purchasing and materials management, through order processing to sales, logistics and dispatch and the associated accounting system, the occupational profile is very varied. These lay the groundwork for the smooth execution of the entire process.

The team is rounded off by further professional fields: Warehouse operators, process mechanics and materials testers also play their roles in producing the large whole casting.

Cast Materials are Everywhere

Did you know that you probably come into contact with Siempelkamp cast materials every day without knowing it? The probability is large – at least indirectly. The castings from



Fixed mounting plate of an injection molding machine



the foundry, which today are sometimes as high as a house, are also jointly responsible for the production of many articles of everyday use. Under the motto "A piece of Siempelkamp in every home", grinding tables for vertical mills are produced in Krefeld, for example, on which construction materials such as cement or clinker are ground after being extracted. Also components for tile presses, which shape the raw material into a ready-to-use ceramic tile, are produced behind the gates of the foundry.

Not only ceramic materials get the casting from Krefeld in good shape. Without the hand-molded cast components made by Siempelkamp, your

daily use of PET drinks bottles or hair dryers would not be possible. Many plastic parts are molded from thermoplastics in injection molding machines. At the heart of these machines is a closing unit made from cast iron mounting plates. These can weigh up to 70,000 kg in order to ensure that the casting tools are fixed in place and take up the enormous forces.

The energy conversion sector is also a prime example of an industry which is served by Siempelkamp. For many decades the company has served both the conventional media for energy generation and the renewable energies. Engine blocks for large seagoing and cruise ships which even when cast can weigh up to

85,000 kg and in some cases are as large as a freight container line up in the Siempelkamp outdoor area similar to a skyline. They await transport to customers all over the world. After the entire unit has been assembled there, the "power plants" guarantee the power supply to drive units and units that ensure passenger comfort.

"Wind Power without Siempelkamp? Unthinkable!"

The main components of wind machines for offshore and onshore wind farms largely consist of resistant components made of ductile cast iron. These include machine carriers, rotor hubs, axle journals, stator stars and

bottom decks which lie within the weight range between 4,500 and 64,000 kg.

Visionen made in Krefeld

Siempelkamp has long been the creator not only of products, but also of visions. "Always one step ahead of the market, both in terms of technology and partnerships" is the motto. Siempelkamp Giesserei is therefore much more than just a supplier: "Together with our clients, we see ourselves as part of the development and creation process of a system or machine, so that with our foundry skills, which we have acquired and tested over 130 years, we are able to ideally complement the expertise of the customer. Creating solutions with and for our customers, the all-round care-free casting package made in Krefeld for our customers – that is what is most important to us," explains Dirk Howe, Managing Director of Siempelkamp Giesserei.

State-of-the-art equipment, patternmaking and processing skills directly on our own premises, quality assurance and management



Cast component for a tile press

85.000 kg

HEAVYWEIGHT

... not unusual for engine blocks in large ships

of the highest level – these are the cornerstones of our quality standards. Our employees are the foundation on which our most important asset is based: customer satisfaction without compromise.

Record casting of a 283-ton upper beam for a press system



“Safety first”:

NIS-PAR – a safety concept in demand throughout the world for nuclear power plants

→ By Dr. Aldo Weber

As the public have also known since Fukushima, the release of hydrogen can have devastating consequences not only for the power plant itself, but also for the indirect surroundings. The company Siempelkamp NIS Ingenieurgesellschaft mbH developed a catalytic system for controlling hydrogen already in 1989 – after the accident at the Three Mile Island nuclear power plant. We report on a highly proven Siempelkamp product.

In various accidents at nuclear power plants, hydrogen combustion has been ascertained as the cause of the rupture of the containment – not for the first time in Fukushima, but already in 1979 at the American nuclear power plant at Three Mile Island near Harrisburg (see box).

Releases of hydrogen have a devastating effect on power plants, especially their sur-

roundings – an image which has been all the more vivid since Fukushima. What is less well known is the background: During the operation of a nuclear power plant, the high-energy radiation splits water into hydrogen and oxygen (radiolysis). These gases can penetrate into the containment – the protective enclosure of a nuclear power plant – through leaks. “This is not a harmless side-effect during the operation of a nuclear power plant. Upon the

ignition of a combustible mixture, which can hardly be avoided, the protective shell can be destroyed, so that it is no longer possible to guarantee the retention of radioactive substances,” explains Dr. Aldo Weber, CEO of NIS. Hydrogen can be produced not only during normal operation. It is possible that during a (beyond design basis) accident, approximately 1000 kg of hydrogen will be released within a relatively short time, depending on the reactor.

The NIS team





“Fukushima has contributed significantly to the fact that safety requirements to avoid hydrogen explosions have been reconsidered worldwide and especially in Japan. The demand for our passive, that is, currentless hydrogen recombiners, jumped up rapidly after Fukushima. In Japan, power plants that are scheduled to go online again, are retrofitted with passive hydrogen recombiners. This is a measure that has long been part of the safety standards in Germany.”

DR. ALDO WEBER, SPOKESMAN OF THE MANAGEMENT

The reason for this is the drying-out of a core which contains hot steam. The hot steam then reacts with the zirconium of the fuel rod tubes; in addition to zirconium oxide, the dangerous hydrogen is produced. A similar chemical reaction can be observed with pure sodium and water at room temperature.

In the past, and sometimes even today, the hydrogen produced was depleted with active hydrogen igniters – e.g. with coiled filaments or standing flames. The grave disadvantages of this system are: On the one hand, supply lines are required for these active systems, which have to be routed through the containment. On the other hand, a more extensive periodic inspection of the individual facilities is indispensable.

Furthermore, in the case of the so-called station black out, the active systems stop functioning in the worst case, so that the detonation of hydrogen can occur in spite of these preventive measures. The greatest disadvantage, however, is that the systems only work effectively from the deflagration limit of hydrogen (approximately 4%). This deflagration limit means that a fire can spread independently.

View into the “engine room” of an NIS-PAR



Three Mile Island/Harrisburg: Review

On March 28th, 1979 an accident occurred in Unit 2 of the Three Mile Island nuclear power plant near Harrisburg. As was subsequently determined, a third of the reactor core was destroyed – although the pressure vessel of the reactor remained intact and only relatively small quantities of radioactivity escaped into the environment. All over the world, the safety guidelines which had applied to nuclear power plants up to that time were reviewed and revised.



Equipping an NIS-PAR with cartridges

Palladium-containing catalyst material – the core of the NIS-PAR



Impetus from "Three Mile Island": The NIS safety concept NIS-PAR is launched

In various accidents in nuclear power plants, hydrogen combustion has been identified as the cause of the rupture of the containment. After the accident at Three Mile Island, Siempelkamp NIS was commissioned with the development, testing and verification (use under realistic test conditions) of a catalytic system for controlling hydrogen by the company RWE (Rheinisch-Westfälisches Elektrizitätswerk AG). The requirements ranged from the production rate of the hydrogen to the requirement of developing a completely passive and therefore, independent and self-sustaining system.

Cross-section through the catalyst material

Part of this assignment involved the testing of carrier materials, catalytic metals, different installation systems, seismic requirements and chemical influences. The result of these diverse analyses was the NIS-PAR – a stainless steel housing which together with catalyst cartridges forms a flow channel and can increase the flow through chimney elongations.

At its core, the NIS-PAR consists of palladium-containing catalyst material (see Figure), which due to its very large specific internal surface ensures the optimum distribution of the precious metal. Here, attention is specifically paid to the distribution on the outer layer of the carrier material, so that the NIS-PAR is a cost-efficient, reliable and above all safe method of depleting hydrogen.

Experiments have shown that the NIS-PAR starts up reliably not only at very low temperatures ($<0^{\circ}\text{C}$), but also at very low hydrogen concentrations ($\leq 0.5\%$ by volume) and that the concentration of the hydrogen is still limited even after 72 hours. The resulting H_2

concentration does of course depend on the number of NIS-PARs installed.

For an initial estimate of the quantity required it is sufficient to know the mean hydrogen release rate (source rate), the expected pressure and the temperature, as well as the permissible hydrogen concentration. With this, the approximate number of NIS-PAR to be installed can then be determined.

With a more detailed analysis using CFD (computational fluid dynamics) it is possible to confirm or even optimize this initial estimate. After all of the theoretical considerations it is nevertheless essential to carry out an on-site inspection in order to determine the condition of the installation locations with respect to the spatial restrictions.

Since the hydrogen can be produced not only in large spaces, but also in small areas which are difficult to access, Siempelkamp NIS offers 3 standard versions for this (NIS-PAR types 11, 22 and 44, with 11, 22 and 44 cartridges respectively). These can be equipped as an option – and depending on the space available – with chimney elongations in order to increase the depletion rate by up to 25%. In order to protect the cartridges against spray solutions, the integration of a hood into the design is recommended.



NIS-PAR type 11

To meet specific customer requirements, Siempelkamp NIS incorporates these into the existing design and therefore offers individual solutions. As a result, different sizes (e.g. NIS-PAR type 46) and special designs (protective grid, closure) have been produced in the past.

NIS-PAR: in worldwide demand from the USA to Japan

With the NIS-PAR concept it has been possible for Siempelkamp NIS to make an important contribution towards a worldwide improvement in the safety of nuclear power plants. In the last six years the power plants Paks 1-4 (Hungary), Vogtle 3 + 4 (USA), Summer 2 + 3 (USA), Krško (Slovenia), Kashiwazaki-Kariwa 1 + 5-7 (Japan), Shimane 2 + 3 (Japan), Gundremmingen B and C (Germany), Angra (Brazil), Temelin 1 + 2 (Czech Republic), Shika 2 (Japan), Onagawa 2 (Japan), Higashidori 1 (Japan), Ascó 1 + 2 (Spain), Vandellós 2 (Spain) and Zaporizhia 1 + 2 (Ukraine) have been equipped or retrofitted with NIS-PAR. This means 1050 installations in the last six years and a total of 1483 installations at 33 power plants altogether!



Catalyst material filled into a cartridge

1.483

NIS-PAR INSTALLATIONS

... in a total of 33 power plants thanks to NIS know-how



Prototype for investigating flow behavior



Siempelkamp

G. Siempelkamp GmbH & Co. KG

Machinery and Plants



Siempelkamp
Maschinen- und Anlagenbau

Siempelkamp Maschinen- und Anlagenbau GmbH
Krefeld, Germany



Büttner Energie- und
Trocknungstechnik GmbH
Krefeld, Germany



Sicoplan
Engineering

Sicoplan N.V.
Belgium



Siempelkamp
Logistics & Service

Siempelkamp Logistics & Service GmbH
Bad Kreuznach, Germany



CMC TEXPAN

CMC S.r.l.
Italy



Siempelkamp

Maschinenfabrik

Siempelkamp Maschinenfabrik GmbH
Krefeld, Germany



ATR

ATR Industrie-Elektronik GmbH
Krefeld, Germany



Ventilatoren – Apparatebau
Kempen, Germany



Pallmann Maschinenfabrik GmbH & Co. KG
Zweibrücken, Germany



Wolfangel GmbH
Ditzingen, Germany



Hombak Maschinen- und Anlagenbau GmbH
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STROTHMANN
Machines & Handling

W. Strothmann GmbH
Schloß Holte-Stukenbrock, Germany



Siempelkamp

Siempelkamp (Qingdao) Machinery & Equipment
Co. Ltd., China



Siempelkamp

Siempelkamp L.P.
USA



Siempelkamp

Siempelkamp Pte. Ltd.
Singapore



Siempelkamp

Siempelkamp (Wuxi) Machinery Manufacturing
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