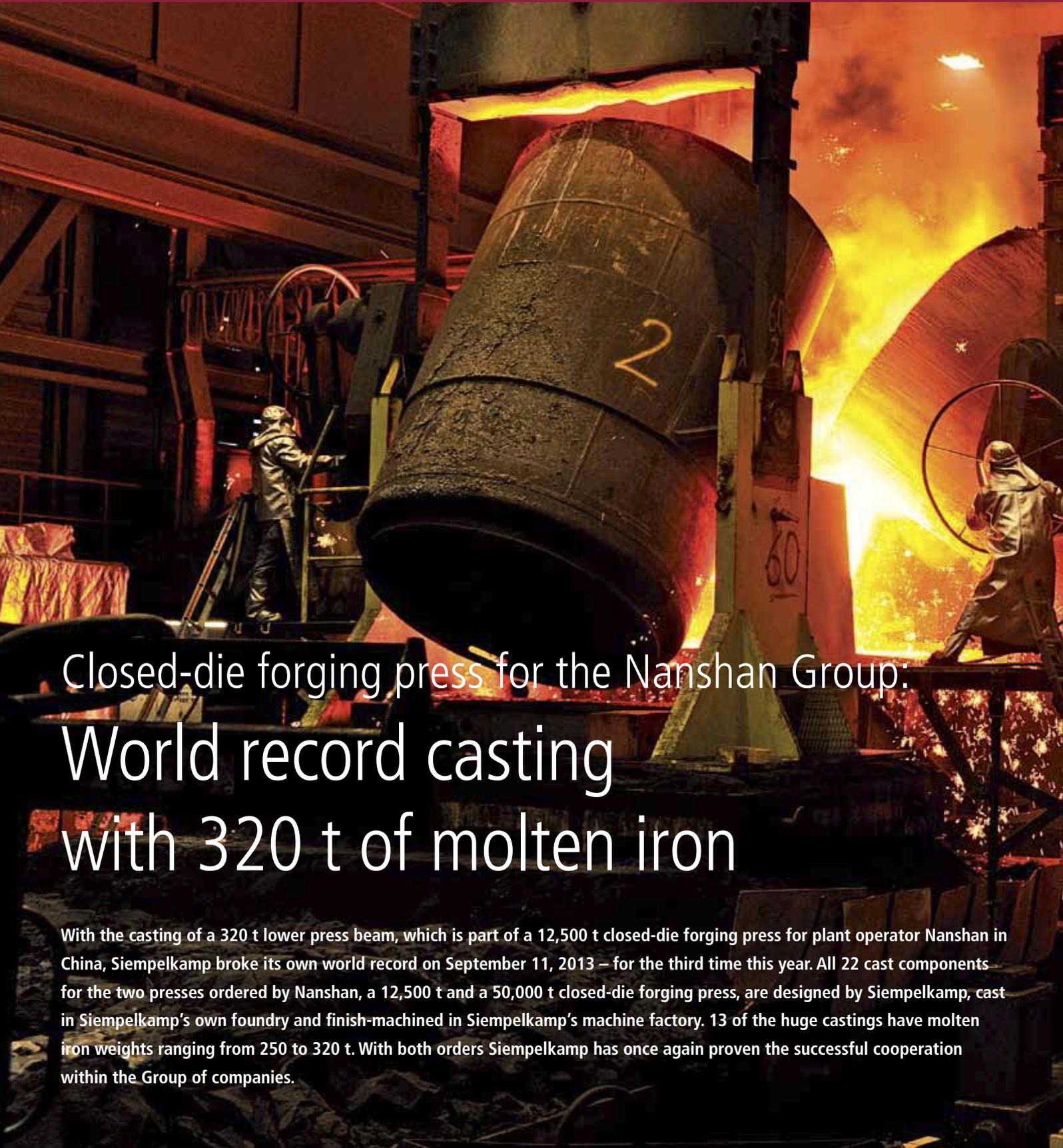




**Siempelkamp**

Giesserei



# Closed-die forging press for the Nanshan Group: World record casting with 320 t of molten iron

With the casting of a 320 t lower press beam, which is part of a 12,500 t closed-die forging press for plant operator Nanshan in China, Siempelkamp broke its own world record on September 11, 2013 – for the third time this year. All 22 cast components for the two presses ordered by Nanshan, a 12,500 t and a 50,000 t closed-die forging press, are designed by Siempelkamp, cast in Siempelkamp's own foundry and finish-machined in Siempelkamp's machine factory. 13 of the huge castings have molten iron weights ranging from 250 to 320 t. With both orders Siempelkamp has once again proven the successful cooperation within the Group of companies.



World record casting: 320 t lower press beam for the 125 MN Nanshan press

50,000 t press with sliding table



Foundation beam



Siempelkamp makes foundry history: For the third time in 2013 Siempelkamp Giesserei broke its own world record with a spectacular 320 t casting. “We have approached this new dimension very slowly and with concentration,” says Dirk Howe, sales management of Siempelkamp Giesserei. After the first world record casting of 296 t on July 12, 2013, the next world record casting with 301 t of molten iron followed only a week later. With 320 t of molten iron poured from five ladles and at a temperature of 1,350°C, Siempelkamp now – once more – broke its records from the previous months. What precedes such a casting and what happens with the cast component afterwards?

From designer to founder to cutting machine operator: at Siempelkamp we work hand in hand – across the individual business units. For the production of the separate components for the Chinese customer Nanshan, next to the concentrated knowledge of the individual technical and business areas, the synergies within the Siempelkamp Group played an important role. This principle has proven itself once again.

#### Presses with mega press forces

The Chinese Nanshan Group in Longkou, Shandong Province, China, commissioned Siempelkamp with the design, construction, and installation of a 50,000 t closed-die forging press in December 2012. Only four months later, another order for a 12,500 t closed-die forging press was placed for a newly designed plant on a greenfield site. The decisive factor for awarding the contract to Siempelkamp was Siempelkamp’s proven competence in heavy forging presses.

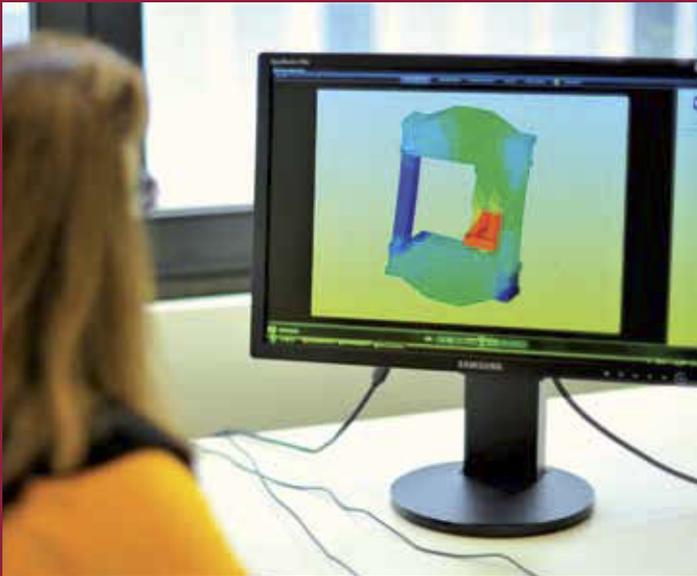
To understand the dimensions of both presses: the larger of both presses has a press force of 50,000 t, a height of 30 m and weighs more than 7,500 t. Eight cylinders with a pressure of 6,250 t each operate the moving beam. With an output of roughly 24 MW, the oil-hydraulic drive, which operates with 60 high-pressure pumps, applies a pressure of 420 bar.

The second press with a height of 20 m and a total weight of 2,200 t is smaller but nevertheless a colossus. It is equipped with two hydraulic cylinders. The press table has dimensions of 2 x 4 m. Both presses will be installed by Siempelkamp and are forecast to be started up in early summer 2015.

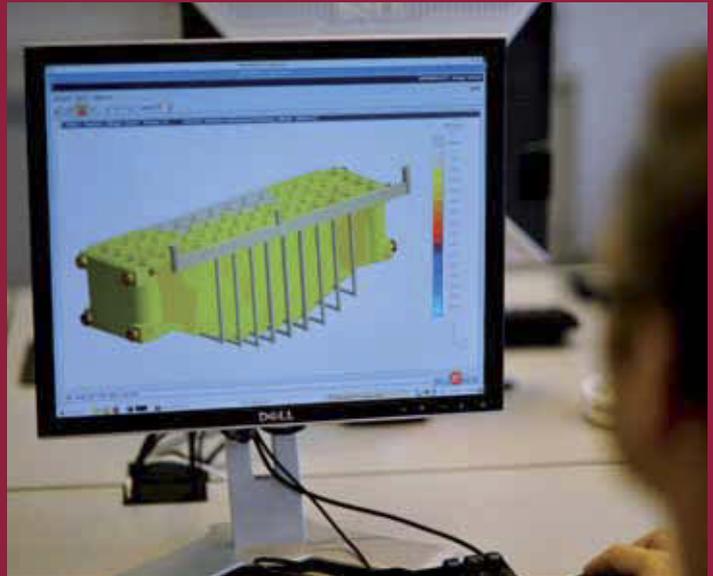
### Nanshan Aluminum

The Nanshan Aluminum company is part of the Nanshan Group and located in Longkou in the Shandong Province. The company which was founded in 1978 has become one of China’s best known aluminum processors. Next to aluminum rolling mills, the company primarily operates extrusion presses for the production of aluminum profiles. Currently, Nanshan is investing in the production of forged parts made of aluminum and titanium alloys. To do so Nanshan is building a completely new forging mill including open-die and closed-die forging presses for the manufacturing of structural component parts for the aircraft industry.

FEM calculations



Casting process simulation



### Siempelkamp's Machine and Plant Engineering business unit, Foundry Technology and Machine Factory work hand in hand

Siempelkamp will supply the complete presses from a single source. This includes the design, the casting and machining processes of the component parts as well as their installation and the start-up of the presses on site. Siempelkamp is the world's only manufacturer of presses of this magnitude which can offer customers such a large scope of supply. One of the deciding factors for winning this contract was the material: the heavy component parts of the press with finished weights of up to 300 t are made of nodular graphite cast iron. Siempelkamp's foundry manufactures a total of 22 castings for this order in Krefeld. Afterwards, on the same company premises, at the Siempelkamp Machine Factory, these castings are machined. In order to handle such large orders efficiently, the production inside the Krefeld facilities was strategically equipped for heavy component manufacture in 2010. With its important synergies with the Siempelkamp Giesserei were created. Large casting components and their mechanical machining from one

supplier – that is a unique selling point for the Krefeld location. Nowhere else can customers obtain precision-machined and pre-finished castings of this magnitude made of nodular graphite cast iron.

### Each step a milestone: from the concept to the finished product

For presses from a performance category such as both closed-die forging presses for Nanshan – ultimately for each Siempelkamp metal forming press – each press concept is unique. Everything starts with the design: designing a new press is a repetitive process in which engineers of different fields take part. Design engineering, engineering, foundry and production departments of the Foundry Technology and Machinery and Plants Engineering business units make sure that the optimal solution is found for each customer. The latest simulation methods and the experience of more than 130 years in designing and building large presses support this process.

## Nodular graphite cast iron casting – the technically best and most economical solution

Cast iron with nodular graphite allows the casting of thin but stable structures for highly stressed components. The mechanical properties of nodular graphite cast iron in regard to tensile strength, yield strength and elongation offer clear advantages compared to steel castings – especially for components that are exposed to large forces. Siempelkamp Giesserei processes cast iron grades which are adjusted to the specific customer requirements of different industrial sectors. High fracture toughness and fatigue strength as well as good damping properties stand for a long life of nodular graphite cast iron and are convincing factors for many customers. The fact that no heat treatment is necessary and mechanical machining is simplified due to near-net-shape castings relieves the customers' budget and is the guarantee for a quick return on investment.



Molding shop: inserting of the cores



Lift out of the lower press beam



Inside the fettling shop

Presses of Siempelkamp's size present challenges even to the experts. This starts with the planning of the casting process. How can component parts exhibit high strength and have the lowest possible weight at the same time? How can the look of a component part be optimally adjusted to its function? In what places can material be added and where can material be taken away? To manufacture

an optimal product, detailed knowledge of the used material is essential.

After calculation and design processes are completed, Siempelkamp carries out the casting process of the structural components in one of the largest hand-molding foundries worldwide: the company's own foundry. Here, roughly 70,000 t of molten iron are produced

annually. Castings with more than 200 t of molten iron are routine; castings with up to 320 t are possible from now on. The entire production process from the design stage, calculation, to the construction of a pattern, to the pouring of the casting to the fettling shop is centrally monitored and controlled.



301 t heavy-weight on the way to the Siempelkamp machine shop

After casting, cooling and fettling, the cast components are transported on special heavy-weight transporters across the company's premises to the machine factory. Here, Siempelkamp operates large CNC-controlled machinery as well as a portal machining center in gantry design which can process parts with a length of up to 22 m and a height of up to 6 m. The factory also houses a large-

scale vertical turning lathe with a diameter of 16 m. Next to presses for wood-based products and components for job order production, primarily customer-specific metal-forming presses with large press forces including open-die forging presses, closed-die forging presses, straightening presses and others are manufactured here. The delivery of the parts anywhere in the world and for every industry takes

place from Krefeld. The installation and start-up on the customer's site are part of the scope of supply and complement Siempelkamp's range of products and services.

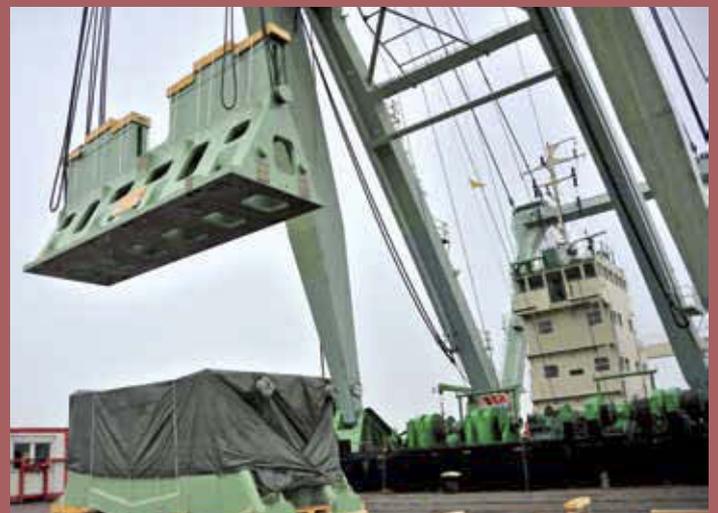
Finest surface finishing



Final inspection via ultrasound



Transport of the heavy components to the port



Transport via ocean freight



**Siempelkamp**

Giesserei

# Siempelkamp

World's largest hand-mold foundry – world record cast components  
with unit weights of up to 320 tons made of ductile cast iron

**Siempelkamp Giesserei GmbH**

Siempelkampstrasse 45  
47803 Krefeld  
Germany

Phone: +49 (0) 2151/894-201

Fax: +49 (0) 2151/894-456

giesserei@siempelkamp.com

>>> [www.siempelkamp.com](http://www.siempelkamp.com)