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Tower cranes



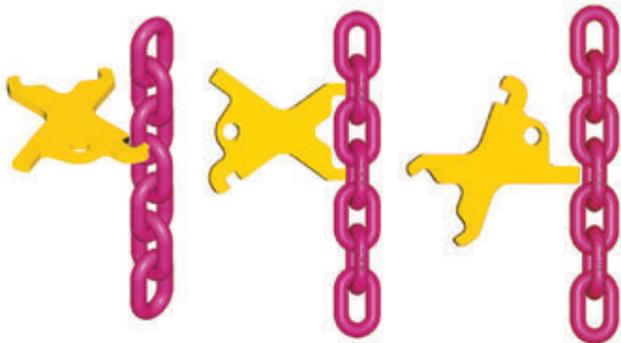
BAUMA STOP PRESS ■ KEN LOUSBERG INTERVIEW ■ REMOTE CONTROLS

Keeping it there

Lashing chains and binders for load securement are vital but under-appreciated equipment. MARCO VAN DAAL this month turns his attention to this often-neglected area

In every industry better and improved products are the result of innovation combined with research and development. Our heavy lift and transport industry is no different. This magazine highlights each month the newest trends and products available on the market. Cranes with higher capacity, longer reach, smarter computers; transporters

FIGURE 2



ABOUT THE AUTHOR



Marco van Daal has been in the heavy lift and transport industry since 1993. He started at Mammoet Transport from the Netherlands and later with Fagioli PSC from Italy, both leading companies in the industry. His 20-year plus experience extends to five continents and more than 55 countries. It resulted in a book *The Art of Heavy Transport*, available at: www.khl-infostore.com/books Van Daal has a real passion for sharing knowledge and experience and holds training seminars around the world.

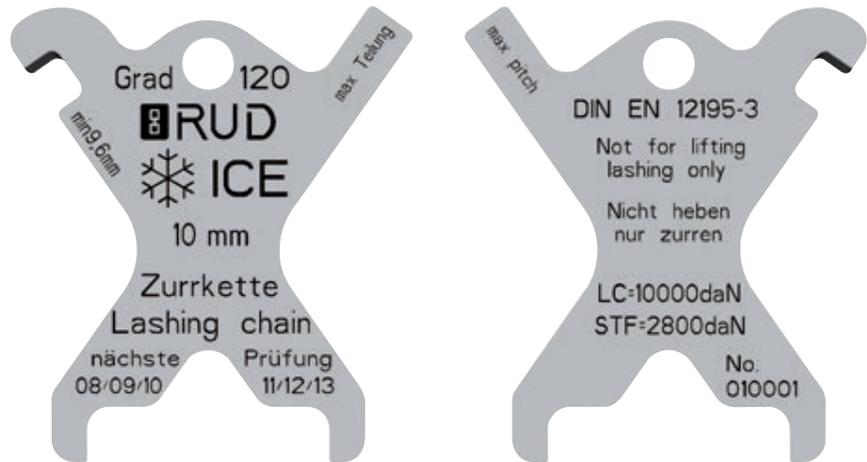


FIGURE 1

and trailers that are ever easier to ship and assemble and lighter in weight while increasing in capacity. These are developments that are worth mentioning as they contribute to man's capability to move bigger, heavier loads in a faster and/or more efficient way.

Then there is the auxiliary equipment and tools. This is not in any way less important but is often underappreciated and also thought to have reached a mature stage of the development cycle. This article highlights one such tool. Lashing material or, more specifically, chains and binders.

In this article we will not go into any calculations on how to determine how much lashing is required but rather focus on the innovation, improvement and development of two manufacturers.

Lifting or lashing

Lashing chains are manufactured with a 2:1 safety factor. This means that a chain with a minimum breaking strength of 10 tonnes has a lashing capacity (LC) of 5 tonnes. This LC should be mentioned on the chain identification tag.

The vast majority of chains in the field are sold as lifting chain. These chains are tested to the applicable standards and a 4:1 safety factor is used to determine the safe working load (SWL) or work load limit

(WLL). This means that a chain with a minimum breaking strength of 10 tonnes has a SWL or WLL of 2.5 tonnes. The SWL or WLL should be mentioned on the lift chain identification tag.

The difference in safety factor between lashing and lifting chains makes sense as the lifting operation (potentially overhead) poses a greater risk that is mitigated by a higher safety factor.

The difference in safety factor is also the reason that lifting and lashing chains should not be mixed. A lashing chain should not be used for lifting and a lifting chain should not be used for lashing.

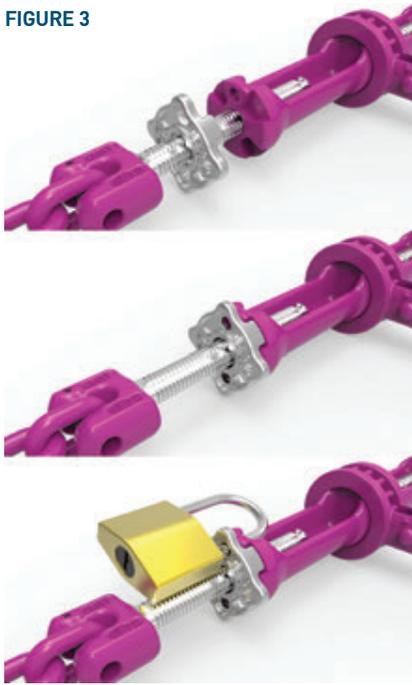
Both suppliers, as mentioned below, have correctly recognised that sling and chain capacities are normally expressed in tonnes or pounds (lbs). Although we are all used to these units they are technically incorrect as both tonnes and pounds are units of weight and the unit we are looking for in terms of chain capacity is a unit of force. Hence both alternatives below express their lashing capacity (LC) in decaNewton or daN.

10 Newton = 1 decaNewton. In daily life we can use the following rule of thumb; 1 decaNewton = 1 kg (Note that the formula $F=m \cdot g$ has been applied as an approximation).

Rieger und Dietz

The RUD company is a family business with more than 140 years of experience. RUD stands for Rieger und Dietz, the names of the two founders in Germany. The company manufactures chains, not just for the heavy lift and transport industry but also for military applications, conveyor and drive systems, snow and tyre >

FIGURE 3



protection chains, chain link fences, chains for manual and driven hoists, plus other applications.

We all know our challenges when it comes to using chains and ratcheted binders. They are mostly thrown in a box, we have no idea where they have been or what our crew has done with them. When it comes to (annual) inspection or testing for certification, the ID tags are mostly gone due to daily use and abuse. In many countries lashing chain does not require any certification, only lifting chain is certified. With multiple transport companies on the same job site, it is not impossible that we end up with a number of “foreign” chains or worse, some of our own chains have gone missing. In either case, somebody ends up with a mixture of different chains from different sources with possibly different capacities.

While in use, chains and binders are small enough to be prone to theft, especially when the transport is parked overnight. With multiple chains on a heavy load it can be difficult to spot if one or two chains have gone missing but this can have disastrous results for engineered transports.

Last but not least, chains are heavy, they have to be taken from the box, carried to the lashing point and, often, you need to climb on the load to reach the lashing point while carrying (at least) part of the weight of the chain with you.

RUD has basically addressed all the above issues with its chains and binders. The RUD chain and binder come in a very recognisable pink colour. It is a powder coating that does not wear off in daily

FIGURE 5



use. Pink is only used for the grade 12 of the RUD product, a previous grade was manufactured in a different colour. The pink colour resulted in the name VIP-120 for the grade 12 product. VIP stands for “verwechslungsfrei in pink” which is in German and can be freely translated as “foolproof in pink”.

The company’s manufacturing process allows the chains to remain tough in extreme low temperatures, even below -60 Celsius. It inspired the name for this generation of chain to be ICE-120 with ICE meaning “international chain evolution”. The forging of the patented ICE material has resulted in a 45 % weight reduction compared to a regular grade 8 chain of the next bigger nominal size.

Besides its distinctive colour, weight reduction and usability in cold climates, RUD has also recognised that inspection, testing and certification is challenging. See Figure 1. This is the patented and galvanised identification tag made from 5 mm (0.2 inch) thick steel. The shape helps the crew in the field to determine if a chain has to be taken out of service.

Take a look

Figure 2 left: if any link diameter fits in

the small “mouth” on the identification tag, the link diameter has been reduced to 90 % of the original diameter. The chain should be taken out of service.

Figure 2 middle: each link should fit in the big “mouth”. If a link has been stretched more than 3 % it does no longer fit in this big “mouth”. The chain should be taken out of service.

Figure 2 right: if the “tongue” fits between any two links it means that the chain has suffered at least 5 % wear on the interlink surface. The chain should be taken out of service.

To prevent unintended loosening, for example by continuous vibration, RUD invented a magnetic disk on its binders that prevents this from happening. This disk can also be used for a padlock to avoid theft. See Figure 3.

RUD offers radio frequency identification (RFID) on its lashing equipment for ease of inspection and maintenance checking.

Figure 4 shows a 300 tonne electrical transformer secured with RUD lashing chains and binders.

Another solution

Load Solutions is a young Norway-based company that provides lashing and loading solutions to the transport industry. The product line consists of the synthetic Tycan fibre link chain. Tycan chains are made from Dyneema fibre, a man-made fibre developed by DSM, which claims it as the world’s strongest.

For the manufacturing of the Tycan chain, the Dyneema fibre is woven into a 25 mm (1 inch) wide strip of webbing that is wound up into an 8 layer thick link that is sewn together in a zigzag pattern. The

FIGURE 4



THE KNOWLEDGE

inner length of each link is 100 mm. Each link has a twist in it, see Figure 5. This is a so-called Mobius twist named after German mathematician August Ferdinand Mobius (1790-1868). This Mobius twist ensures proper load sharing in the interlink surfaces, the webbing layer that is on the outside on one end of the link is on the inside on the other end of the link. This avoids overstressing the webbing material when it slightly elongates (3 %) under maximum load.

The standard Tycan chain comes in a 10,000 daN lashing capacity (LC) and a 20,000 daN minimum breaking strength.



FIGURE 6

The safety factor is therefore 2:1. Other capacities, both higher as well as lower, are under development. Tycan chains come with their own hooks and load binders. Regular hooks and binders used for steel chains will not work and could potentially damage the Tycan fibres. The Tycan hook has a bigger clevis to ensure proper seating of the link. The hooks on the load binder have a larger saddle to prevent the synthetic material from getting pinched. The load binder itself is bigger as well, as the links of the Tycan chain are roughly twice as long as a steel link, the load binder extends further to grab that next link and still tighten the chain. See Figure 6.

With its weight of 0.58 kg/metre, the Tycan chain is up to 80 % lighter than its steel equivalent - a welcome benefit for any rigger in the field.

Tycan chains are non-corrosive and are poor electrical conductors which makes them very safe to use, even in demanding environments. They do not rust and do not soak up water when submerged, their specific weight is less than water, therefore they float, which is a nice side effect when these chains are being used on ships and barges. Tycan chains are in great demand when it comes to lashing cargo with



FIGURE 7

sensitive finishes as the chain itself serves as a softener. See Figure 7.

Despite its young age, Tycan is available in North America and will shortly be available globally. The product has been tested and is in use by a number of large transport companies. Preparations and talks with DNV GL have started to use the Tycan chain as a lifting chain. ■

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