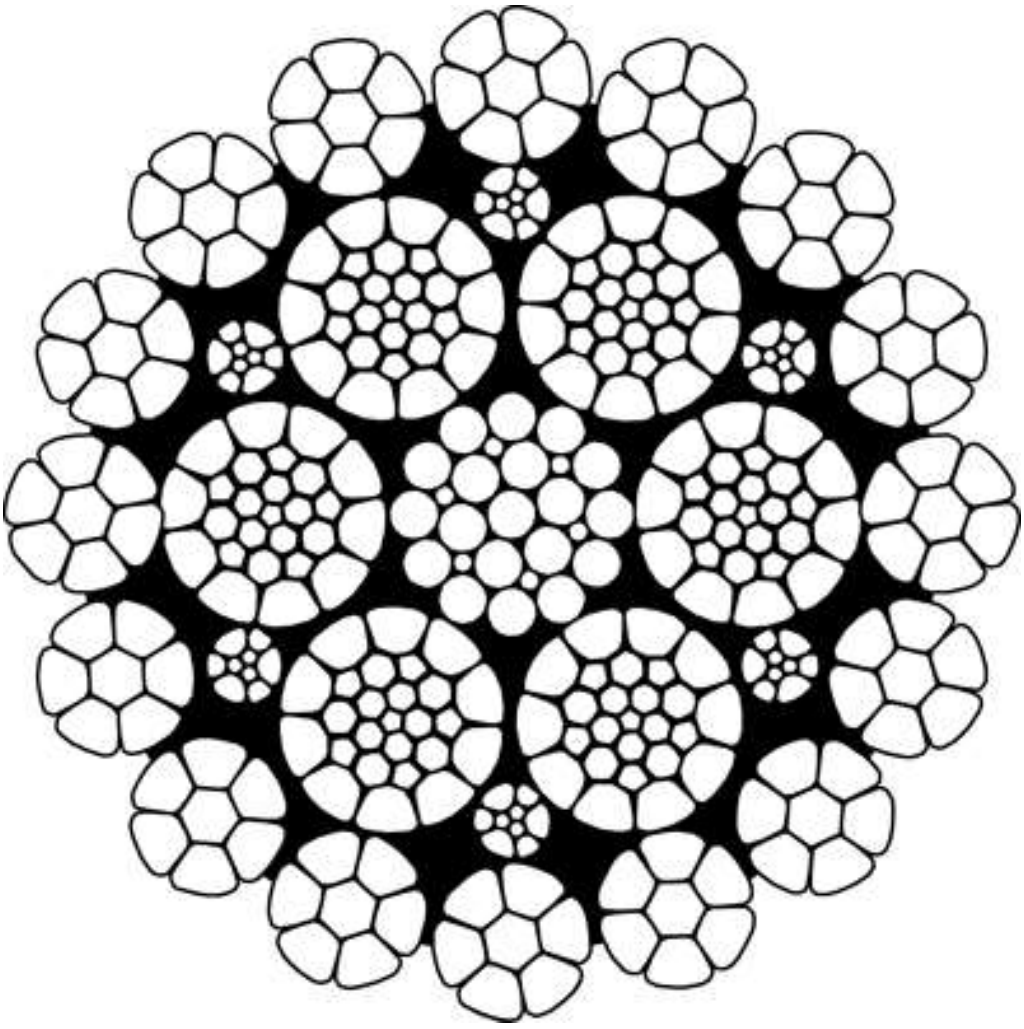
Flexibility in wire rope

By Alex Dahm | 8 January 2009



Verotop S's design has high flexibility and high non-rotation properties

Flexibility is very much the trend in the wire rope industry, as it is for crane manufacturers. With it come pitfalls. Euan Youdale reports

"When a crane maker designs a crane, first he has to choose a rope diameter. The rope diameter determines the size of sheaves and drum. The smaller the rope diameter is, the smaller the sheaves and drum. The whole crane will be smaller and more competitive in the market. Therefore, most crane designers look for ropes with high breaking forces in order to get a smaller rope diameter and subsequently smaller sheaves and drum," says Michael Gehring, Diepa managing director.

Diepa, in Germany, has 17 facilities, with a workforce of 410 people.

Two examples of hoisting ropes from Diepa that offer high breaking forces and long service are the rotation resistant Diepa B 65 and the non-rotation resistant luffing rope Diepa H 50, says the company.

"Crane users are interested in a long and safe service life time of ropes because sometimes the down time of the equipment is more expensive than the rope," adds Gehring.

Diepa ropes consist of many single wires to increase flexibility and bending resistance. Compacted strands, steel cores and/or compacting of the whole rope provide high breaking forces and resistance to abrasion. The solid rope structure ensures that the rope diameter will not be reduced significantly when the rope is loaded. This provides big advantages when the rope is spooled in a multi-layer spooling system on the drum, explains Gehring.

"For these reasons the demand for special wire ropes will further increase. Higher breaking loads, increased resistance to bending will become even more important in future. Continuous research and development, along with tests in the field, always opens new doors for an improvement of ropes."

In September Diepa began production with its new wire rope closing machine, which means the company's "special wire ropes" are available up to 120 mm diameter and 100 tonnes single weight, it says.

New developments

Pierre Verreet, managing director at Verope, based in Switzerland, agrees that the ongoing challenge is to develop solutions for lifting loads higher, for example, in wind turbine erection.

"Rope manufacturers need to produce ropes with high fill factors, for example, high breaking loads, good non-rotation properties, increased form stability and high flexibility in order to allow proper spooling of increased rope length under changing load spectrums." One such product is the new Verotop S, says Verreet.

Ship to shore lifting is another application in which wire rope is seeing new developments, because of the "tendency of longer horizontal load ways and higher rope speed, etc. Here rope manufacturers need to supply rope solutions which feature high structural stability - steel-plastic combination rope - which can, under the given circumstances of high dynamic loads, achieve high bending cycles."

These results can be achieved using the Veropro 8 & Veropower 8, says Verreet.

The company's new facility, named the Hyrope Factory, in Busan, South Korea, has been in operation since April 2008. Capacity is 1,000 tonnes a month in October 2008, increasing to 1,250 by January 2009,

says Verreet. That figure will, again, rise to a possible 1,700 tonnes/month during 2009.

"We invest in wire drawing machines to achieve the highest precision in diameter, highest ductility for the wire and reduced tensile after drawing. All drawing machines in the new factory are focusing on highest quality. Rod wire prices are certainly a problem for us. However, it is more important to secure the volume of quality raw material, which we successfully did."

Verreet adds that there is also a light weight rope under development at the company, although the details remained confidential at press time.

Grooving

The name Lebus has become synonymous with multilayer-spooling. The Lebus-Groove system pattern was patented in 1950 but is still a globally recognised winching solution today. Ropes are continually being updated, however, and their reliability is an important element in ensuring the system runs smoothly.

The company has a consultancy service offering instant help in reducing spooling problems as and when they occur around the world. The service takes up about 30% of the company's time and is open to all users, not just Lebus customers.

As Christof Seidenather, Lebus managing director, explains, the sudden problems can occur in extreme environments. "The grooving is not a miracle, you always need your partners. You need ropes to seat properly, you need a rope that is crush resistant, you need tension and you need the geometry around the winching - the fleet angle. And you need and an operator who can take care of watching the spooling."

Tall buildings and deep water lifting applications have seen some of the biggest demand for multilayer-spooling and effective ropes over the last ten years, adds Seidenather. "The best way to spool is using a one layer system, but you cannot have a 10 m long drum. A problem being that the design of the rope is not crush resistant enough."

The rope manufactures have developed ropes to solve these kinds of issues. The main problem is putting out a lot of metal, to resist crushing and be flexible, and they have made a very good job of it. They are, of course, still working on 100% crush resistant rope."

Seidenather adds, however, that with that crush resistance, comes the need to keep the diameter as small as possible.

Deadlines

"The deliveries have become so short that testing is not sufficient. You have to run it in." Seidenather explains that too often a new rope is placed in the drum, a quick test is carried out, before it is delivered to the customer, who then might place 40 layers on the drum immediately. The operator will then attempt a heavy lift, for example, a wind turbine component. The result can be that the rope cuts through to the first layer.

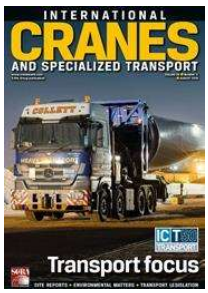
Seidenather adds that in the past ropes would be tested on each layer until they formed their correct laying position and ropes would last two or three years. This, Seidenather says, might be down to time pressures or the fact that knowledge is not passed down through the generations of operators. "So every ten years we will get the same questions from the same company," he adds.

The assistance of computer software has also reduced the skills, Seidenather says, because operators are not required to put in so much practice to repetitive skills.

Safety is also a primary consideration. Whereas in the past rope manufacturers had six months to a year to develop a product, they now have to deal with a customer who wants to pick up a 300 tonne load at 2,000 m depth, with a breaking load of 4,000 tonnes. "The rope manufacturer may never have made a rope like that before and gets under pressure - that is a safety issue."

Of all the sectors offshore has seen the most change in the last four years, says Seidenather, adding, "I never thought we'd make a groove for 122 mm wire rope, 22 km long."

Lebus has, like many manufacturers in the crane industry, recently built new facilities - in its case a 1,300 square metre factory in Germany. Seidenather says he investigated setting up a factory in China, but determined that the quality of manufacturing would not be strong enough, and decided to increase capacity in the Germany, UK and US.



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