IN THE GROOVE

The bulletin of Lebus International Engineers GmbH

LEBUS Germany INTERNATIONAL

Issue 3: Autumn 2005

Expansion will double production capacity

Lebus International Engineers GmbH is to double the size of its Bavarian production facility over the next three years.

Lebus moved into its current headquarters in Finning, near Munich, in 2002, but already the 3,600m² site, including 1,200m² of production area, is proving insufficient to meet market demand for original Lebus winch drums and sleeves.

An adjacent plot of 2,000m² has been acquired and negotiations are concluding on a further 2,000m².

As previously reported, Lebus is enjoying record demand, particularly from the offshore sector, where grooved sleeves up to 14 metres in diameter are required. The company is also receiving record orders for its grooved drums from crane manufacturers, such as Terex.

Lebus International managing director Cris Seidenather said that Lebus was also now recapturing market share lost more than 20 years ago when the Lebus design patents on parallel grooving expired. “We are getting a lot of new business from customers who have previously used parallel grooved drums made by our imitators but have realised that only original Lebus grooving can solve their spooling problems,” he said.

China is also proving to be a significant source of new business for Lebus.

While the three-year factory expansion plan will not solve the immediate problem of meeting today’s demand, Lebus has also invested in new milling machinery, including a five-axis CNC horizontal boring mill and an additional turning lathe. These are in addition to the existing eight lathes for cutting grooves and two vertical cutting machines.

The new five-axis CNC horizontal boring table

To support the new CNC machine, a new concrete foundation had to be poured into the factory floor, covering an area measuring 8 metres square and 1.6 metres deep.

Dalia winch passes tests

Lebus grooving has ensured that the 405 tonne capacity winch built for Total Fina Elf’s new Dalia FPSO vessel has comfortably passed its spooling tests.

The winch was made by NFM Technologies in France, using split drum sleeves supplied by Lebus International.

The 2690mm diameter winch holds the the biggest non-rotating wire rope ever produced. The 120mm diameter rope, which will be wrapped in five layers, is supplied by Radaelli of Italy. Lebus worled closely with Radaelli to ensure that the groovings were precisely engineered to meet the specifications of the rope construction.

On a winch this size, smooth spooling is essential to ensure continous production on the FPSO vessel.

The drum of huge Dalia winch has Lebus grooved sleeves

University researchers explore benefits of Lebus system

The Institute for Materials Handling & Logistics at the University of Stuttgart is to research the benefits of the Lebus grooving system for rope drums in multi-layer spooling applications. The project team are expected to come up with scientific proof that will support what Lebus customers have known for years – that in multi-layer spooling, Lebus grooving improves rope life significantly.

They will also investigate 'resetting'. This is where the cable is taken off the drum, cut by 30cm and reset on the drum. Even with Lebus grooving, the cable eventually becomes worn where it is pressed between the flange and the adjacent wrap, and in the crossover areas.

By resetting the rope periodically, before this wear becomes critical, rope life can be extended significantly. Resetting the rope means the crossover sections, which are subjected to high peak stresses, are moved into the parallel sections of the drum where stresses are low. This can only be done with parallel groove drums because the spooling is controlled and the crossover sections can be identified. With helical grooving it is impossible to predict where the crossover may take place.

The researchers plan to produce guidance on the ideal time to reset wire ropes, and so help users of winches to maximise the life of their cable.

The new research project is a follow-up to an earlier project conducted by the Institute from 1999 to 2002. The earlier project, exploring the endurance of wire rope in multi-layer spooling, observed the benefits of the Lebus system in multi-layer applications in comparison with drums with helical grooving. The findings were published by the VDMA in October 2004. The new project is expected to produce the scientific proof to support the earlier observations.

Like the first project, the latest research is being funded partly by the German government and partly by industrial partners that include manufacturers of cranes and wire rope as well as Lebus itself.

The Institute for Materials Handling & Logistics has a massive test rig that stands five metres high and has two winches. It was built specially for research into lifting technologies.

Cris Seidenather, managing director of Lebus International GmbH, said: "The first research project confirmed what Lebus has been saying for years - even what our founder Frank LeBus was saying 50 years ago. In multi-layer spooling, wire rope lasts longer with a Lebus-style parallel grooved drum than with a helical drum. Maybe the next research project step will come up with new rope constructions that eliminate the crushing problems, or maybe – who knows? – find an even better geometry for drum grooving."

Saipem success leads to follow-up contract

Following the successful refurbishment of six anchor winches on Saipem Indonesia's Semac 1 pipe laying barge, Lebus International has been awarded a follow-up contract to refurbish the remaining six winches on the barge.

Lebus technicians travelled to Singapore in the mid-part of 2005 to remove the old grooves on the first six winches and weld on Lebus split sleeves, false flanges and compensation plates. Semac 1 was then deployed to the Sakhalin oil field.

Semac 1 is scheduled to return to Singapore in March 2006 for Lebus to refurbish the other six winches.

Refurbishing the winches instead of replacing them saves Saipem hundreds of thousands of dollars, mainly by reducing downtime for the pipe layer.

Bjørn-Eric builds up Norwegian business

Thirty years ago Lebus International was nowhere to be seen in Norway. Today more than 25% of the company's turnover comes from Norway.

Lebus's success in Norway is down to years of relationship-building by its agent, Bjørn-Eric Hansen (***right***).

Says Lebus International managing director Cris Seidenather: "In 1977 we were looking for an agent in Norway, where we had zero turnover, to get us into the rapidly growing offshore market. Now, thanks to Bjørn-Eric, we have close relationships with customers such as TTS Marine, Rapphydrema, National Oilwell, Hydramarine, Pusnes and Hydraulic Bratvaag."

An annual highlight in Lebus's home state of Bavaria is the Munich Oktoberfest. This year's festival coincided with a visit to Lebus by an important customer from Brazil, Sergio Barros of Petrobras, seen here in the hat. On his right is Rosario de Gaetano, export manager of Casar, and to his left is Reinhard Koenen, Casar's representative in Brazil – also guests of Lebus for the evening.

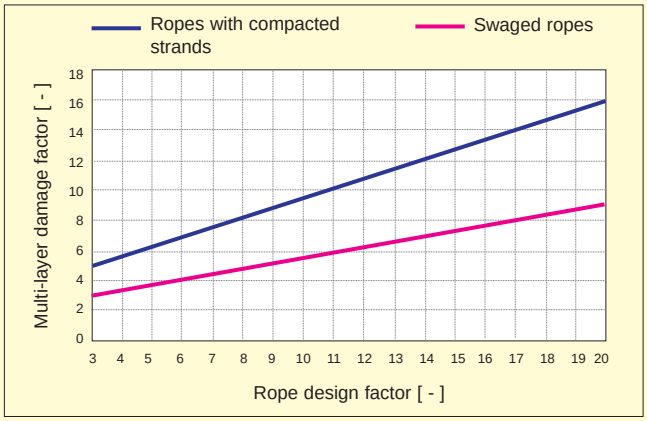
Swaged ropes recommended for multi-layer spooling

Casar Drahtseilwerk Saar GmbH, a leading producer of wire rope, has tested different constructions of rope to explore how they cope with the stresses of multi-layer spooling. Swaged ropes came out on top, as Dr.-Ing. Ulrich Briem and Roland Vereet explain

When wrapping several layers of wire rope on a drum, the mechanical loads experienced by the rope are substantially higher than with single layer spooling. Additional mechanical stresses arise at the turn and layer crossover points. Combined with the normal tensile and bending stress, these mechanical stresses increase the overall stress in the rope wires significantly. The life expectancy of the rope is therefore dramatically reduced.

Casar has built a drum test rig with which it can examine the damage behaviour and the lifespan of ropes in multi-layer spooling. The rope spools from one drum to the other via sheaves in a tensioning unit. This rig can be loaded up to 45 tonnes. It can also slide, pivot and vary the fleet angels between the rope and the drums.

To describe lifetime behaviour of ropes in multi-layer spooling, a so-called multi-layer damage factor is defined. This factor is the ratio between the number of bending cycles until discard on a single layer drum or sheave and the number of bending cycles until discard on a multi-layer drum. Tests performed on the drum test rig have shown that the multi-layer damage factor increases with increasing design factor, (e.g. with decreasing wire rope line pull).



In multi-layer spooling, lower layers of rope become crushed against the drum by layers that are wrapped on top. Spooling is a constant hammering of one rough rope surface against another rough surface of the same rope. A logical step is to smoothen the rope surface in order to reduce the damage. Several manufacturers, including Casar, have achieved exceptionally round cross-sections and extremely smooth wire rope surfaces by hammering different types of steel wire ropes using a rotary swager. Great care is taken to avoid internal wire rope damage by the swaging process itself.

The use of these hammered (swaged) special wires ropes can significantly increase rope life in multi-layer spooling applications. For conventional wire ropes with compacted outer strands, the life expectancy in multi-layer spooling (with a design factor of 7) is only 13% of what it is when running on a single layer drum or over sheaves only. This means a multi-layer damage factor of 7.7 (a reciprocal value of 0.13).

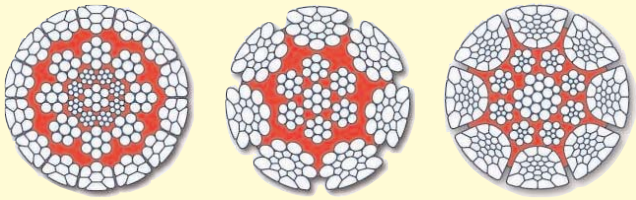
Casar's test rig

In comparison, the life expectancy of swaged ropes in a multi-layer application is 23% of what it would be when running onto single-layer drums or over sheaves. This means a multi-layer damage factor of 4.3 (a reciprocal value of 0.23).

Therefore, assuming that both types of rope have the same life expectancy in single-layer applications, swaged ropes have a 77% longer life expectancy than conventional ropes in multi-layer spooling (0.23 divided by 0.13).

Special wire rope constructions with internal plastic layers and compacted outer strands are already known to give lifetime improvement factors of more than twice that of standard ropes. New developments in swaged rope technology increase the tolerance to damage on the drum and maximise rope life in multi-layer spooling applications.

Casar's swaged ropes



Starfit | Ultrafit | Parafit

N.B. Lebus works closely with most leading wire rope producers. Publication of this article does not imply any endorsement by Lebus. IN THE GROOVE welcomes articles from all wire producers and other related organisations. Items for consideration should be sent to the editor, phil@pdmediaservices.com

Engineers' Corner

THE TWO DOLLAR SOLUTION

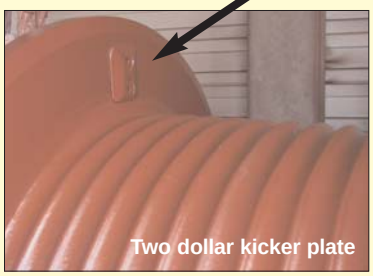
Aside from the design of the drum itself, the fleet angle is probably the single most important factor in the smooth winding of multiple layers of rope onto a drum.

The fleet angle is the largest angle at which the rope comes of the sheave onto the winch. It is measured between the first fixed sheave and the flange of the winch.

If the fleet angle is too large, the rope may pull away from the flange too rapidly, leaving gaps into which the rope on subsequent layers will fall. This destroys the controlled spooling pattern and damages the rope.

If the fleet angle is too small, the rope may not pull away from the flange soon enough. It will pile up on the flange for perhaps two or three wraps, and then drop down with considerable force. The resulting impact can damage both the rope and the equipment on which it operates.

There is a simple solution if the fleet angle is too small. A flat iron plate (known as a kicker) is welded or bolted onto a specific point on the flange. This kicker costs no more than two dollars. Since the Lebus groove controls the movement and spacing of the wire rope between the flanges, and from layer to layer, it is easy to identify the location on the drum circumference where the rope must return (kick back) from the flange to regain the proper position to assure proper spooling for each repeated layer. This is where the kicker is placed. Once installed near the centre line of the Lebus crossover sections, the rope is given a kick after each complete wrap to take its proper position on the pattern.



Two dollar kicker plate

Technical Q&A

Why is it necessary to break in a new rope?

A new rope needs to be run it through its operating cycle several times under light load and reduced speeds. This allows the rope to adjust itself to the working conditions and enables all strands and wires to become seated. Depending on rope type and construction, some stretch and a slight reduction in diameter will occur as the strands and core are compacted. Breaking in makes the rope less liable to be damaged when full load is applied.

In many cases the equipment has to be tested prior to use. During the test, the equipment gets purposely overloaded to varying degrees. The magnitude of overloading depends on the type and capacity of the lifting equipment.

NEVER test equipment before the rope has been broken in. Overloading a rope that has not yet been broken in may inflict permanent damage to it. This is especially important in multi-layer spooling as severe overload of the top layers may damage the lower ones and/or crush the rope.

If possible, the winch should be tested with the rope spooled on the first drum layer only.

What causes misspooling?

There are numerous possible causes, including:

- **Slack line may have worked its way down into the dead turn causing the rope to miss a wrap by a cable being high or misplaced.**
- **Misspooling sometimes occurs when a new cable is installed which is slightly larger in diameter than the groove pitch. Check that the rope is staying in the grooves in the first layer.**
- **Misspooling may also occur when the cable becomes worn and its diameter is reduced. Look for the rope beginning to lie low in the wraps adjacent to the drum flange and/or any cutting in of the rope.**

About Lebus rope drums

In 1937 Frank LeBus, a supplier of equipment to oilfields, patented the use of a groove bar on hoisting drums to guide the spooling of rope. In the 1950s he refined the grooving geometry and came up with the LeBus Counterbalanced Spooling System, which today remains the most effective and sophisticated way to ensure that wire rope wrapped around a hoist drum in multiple layers continues to spool onto and off the drum totally smoothly, and in a way that maximises the life of the rope. Tests have shown that a Lebus drum, with grooves designed specifically to match rope size, can extend rope life by more than 500%.

Today, the term 'Lebus' is often used incorrectly to refer to any drum with parallel grooves. In fact, only a drum or sleeve produced by Lebus can truly claim to be a Lebus drum.

About Lebus International

Lebus International Engineers GmbH is a sister company of the US company Lebus International Inc., still owned by Charles Lebus, grandson of the inventor of the Lebus system. It also has sister companies in the UK and Japan. Lebus International has manufactured Lebus drums and rope spooling systems in Germany since 1962 for a wide range of onshore and offshore winching applications. Products include:

- Rope drums with grooves cut directly into them (with or without bolted or welded flanges, as required)
- Grooved split sleeves that can be placed over smooth, ungrooved drums – good for retrofitting and for applications where drums may require replacing in future.
- Spooling accessories such as spooling angle compensator and cross thread spindles.

Contact us

For any queries concerning wire rope spooling, Lebus products or details of how Lebus can help you, please contact:

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