

# BEXconnect

Newsletter nr:5  
October 2003



## Dear Reader,

It's almost one year since the appearance of our previous BEXconnect newsletter. And again a lot has happened since then. So was BEXCORopes the first to develop and to manufacture a new range of Single Point Mooring Hawsers prototype tested and manufactured in accordance to the new OCIMF 2000 guidelines. The continuous efforts in research and product optimisation have resulted in 2 orders for complete sets of Polyester DeepRope® anchorlines in 2002. First part 2003 again two complete systems were booked and manufactured at our production unit in Belgium for being installed in Brunei and Brazil.

BEXCORopes is also targeting new markets. Early this year a new fishing division was set up, and BEXCORopes has developed a full range of high performance ropes made of HMPE (Dyneema) to be used as warps, upper & lower bridels, side lines and rib lines in a trawlnet, as well as a full range of ropes for assembling and anchoring cages for fish farming. The combination of the optimised braid construction together with the specially developed non-sticking fishing impregnation results in a product very suitable for application and highly appreciated by the end-users all over the world. Our ropes have been supplied to fishing companies and trawl makers in Holland, France, Denmark, Faroe Island, Sweden, England, Scotland, Canada, ... Depending on the application and external circumstances these ropes can be fully optimised, with central core, over braided protective jacket, Polyurethane coated protection, etc ... More information on these Dyneema® ropes can be found further in this issue. For having a perfect braid BEXCORopes invested in a new 12 strand braiding machine from Herzog in Germany. This unique machine was specially built as per BEXCORopes requests in order to manufacture endless ropes (without splice). The unique concept of the machine as well as some technical data are explained in the Herzog article further in this issue. Not only fishermen can take advantage of this new machine and the optimised ropes produced by it, recently we booked an order for 12 strand Dyneema® ropes from the Dae Woo Shipyard in Korea for some new buildings. An overview and technical data of other materials manufactured in this 12 strand braid construction can be found in the table further in this issue.

BEXCORopes is also developing a new mussel rope or substrate. This rope will have a specially developed surface for optimal settle and attach of the mussel and is also suitable for high speed machine processing. More details can be read in the enclosed article.

We hope you'll enjoy this newsletter and wish you a lot of reading pleasure. If you should request further info or details please do not hesitate to contact us. We'll be very pleased to assist you.

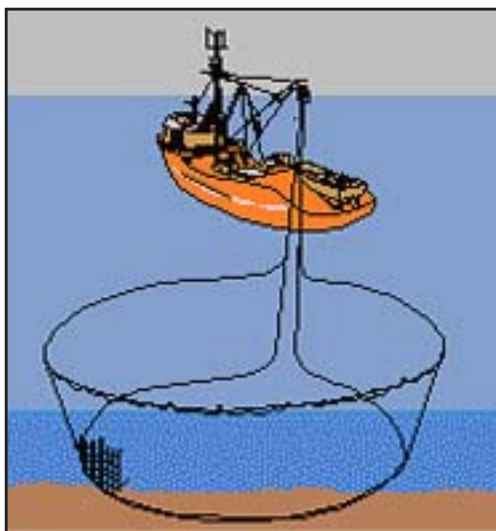
Peter Van der Voorde  
Business Development Manager  
Fishing division



## Ropes for the fishing industry Dyneema, for winners only

Ultra-high strength Dyneema fibers are produced by gel spinning, a process invented and patented by DSM High Performance Fibers. The intrinsic properties of the basic material, ultra-high-molecular-weight polyethylene, the parallel orientation of the molecules and the high crystallinity give Dyneema fibers their unique properties.

The fiber has been on the market for 14 years now and is used in a wide variety of ropes and nets. The density of the fiber is slightly less than one, which results in a fiber that floats on water. Also, the lower weight will make the net or rope easier to handle. This is combined with a tenacity, which is 10 times higher than that of steel.



The strong Dyneema fibers can be used to make low-diameter twines and ropes with reduced resistance in the water. Drag reduction can result in energy savings and lower fuel consumption. Additionally, it can also be used to tow a larger net using the same vessel or fish at higher speed. Furthermore, Dyneema has a chemical and crystalline structure that renders the fiber a good resistance to all kind of aggressive agents and environmental influences. The resistance

to UV and seawater is excellent. Also, it has a very high abrasion resistance, compared to other synthetic fibers. Combining these interesting properties with flexibility makes Dyneema into 'a natural' for fishery. So it is not surprising that the usage of Dyneema is growing fast.

Dyneema is used in various applications in commercial fishery, like net panels, cod ends, warp lines, bridles, headlines, footropes and rib lines, but also is an excellent material for selectivity panels resulting in a strongly decreased by catch. DSM employs a team of application engineers, specialized in their field, that helps customers and end-users using Dyneema in their applications. A software package, called DynamiT, is used to give the customer insight in the effects and savings the user can expect with Dyneema in fishery. A large and well-equipped laboratory and staff is present to answer any other question that might arise.

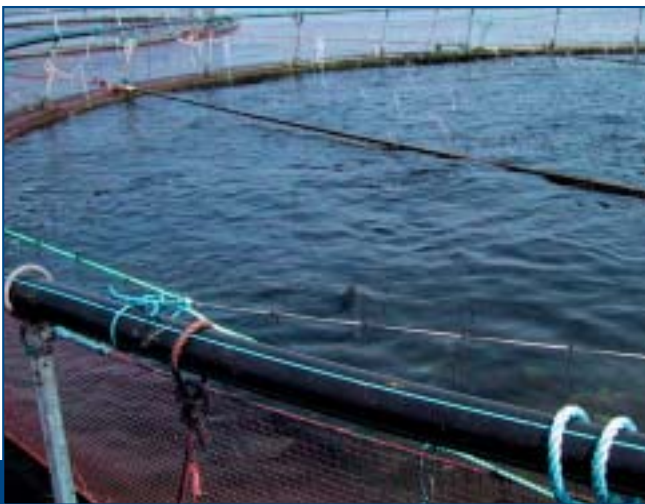


At the moment, all Dyneema fiber production lines are running at full capacity. Due to the wide variety of successful applications of this product, demand continues to increase. Therefore, DSM High Performance Fibers is going to expand its production capacity by 40% by building two production lines in Greenville (North Carolina, USA). At this very moment DSM has started up its newest and fifth Dyneema fiber line in the Netherlands.

DSM HPF

# TECHNICAL TABLE for Ropes

| TYPE of ROPE                              | circumference in inches<br>diameter in mm | 1.5<br>12 | 1.75<br>14 | 2<br>16 | 2.25<br>18 | 2.5<br>20 | 2.75<br>22 | 3<br>24 | 3.25<br>26 | 3.5<br>28 |
|---|---|-----------|------------|---------|------------|-----------|------------|---------|------------|-----------|
| <b>BRAIDED<br/>12 strand construction</b> |   |           |            |         |            |           |            |         |            |           |
| <b>POLYPROPYLENE LINE</b>                 |   |           |            |         |            |           |            |         |            |           |
| Bexcord 091                               | MBL kN                                    | 25.0      | 33.8       | 43.8    | 55.2       | 67.2      | 81.8       | 97.0    | 113.0      | 131.0     |
|   | Weight kg/100m                            | 6.2       | 8.5        | 11.1    | 14.0       | 17.3      | 21.0       | 24.9    | 29.3       | 33.9      |
| <b>HMPE LINE</b>                          |   |           |            |         |            |           |            |         |            |           |
| USD12/60                                  | MBL kN                                    | 97.0      | 145.0      | 193.0   | 242.0      | 290.0     | 338.0      | 391.0   | 477.0      | 513.0     |
|   | Weight kg/100m                            | 6.4       | 9.6        | 12.8    | 16.0       | 19.3      | 22.5       | 26.7    | 33.1       | 36.4      |
| USD12/75                                  | MBL kN                                    | 120.9     | 181.3      | 241.7   | 302.1      | 362.6     | 423.0      | 489.0   | 596.0      | 642.0     |
|   | Weight kg/100m                            | 6.4       | 9.6        | 12.8    | 16.0       | 19.3      | 22.5       | 26.7    | 33.1       | 36.4      |
| USS12                                     | MBL kN                                    | 120.9     | 181.3      | 241.7   | 302.1      | 362.6     | 423.0      | 489.0   | 596.0      | 642.0     |
|   | Weight kg/100m                            | 6.4       | 9.6        | 12.8    | 16.0       | 19.3      | 22.5       | 26.7    | 33.1       | 36.4      |
| <b>POLYESTER LINE</b>                     |   |           |            |         |            |           |            |         |            |           |
| Bexcopet 138                              | MBL kN                                    | 25.9      | 36.2       | 46.2    | 57.8       | 72.3      | 86.6       | 104.0   | 122.0      | 139.0     |
|   | Weight kg/100m                            | 9.2       | 12.4       | 16.4    | 20.6       | 25.5      | 30.8       | 36.7    | 43.0       | 49.9      |
| <b>POLYAMIDE LINE</b>                     |   |           |            |         |            |           |            |         |            |           |
| Bexcolon 114                              | MBL kN                                    | 31.3      | 43.0       | 55.6    | 70.4       | 86.4      | 106.0      | 125.0   | 148.0      | 171.0     |
|   | Weight kg/100m                            | 8.0       | 11.0       | 14.2    | 18.0       | 22.1      | 27.0       | 32.0    | 37.8       | 43.7      |
| <b>BEXCOLINE</b>                          |   |           |            |         |            |           |            |         |            |           |
| Bexcoplex                                 | MBL kN                                    | 30.6      | 41.8       | 54.1    | 68.4       | 84.7      | 102.0      | 122.0   | 141.5      | 161.0     |
|   | Weight kg/100m                            | 8.0       | 10.9       | 14.1    | 17.8       | 22.1      | 26.8       | 31.9    | 37.2       | 43.4      |
| Bexcopfloat                               | MBL kN                                    | -         | -          | -       | -          | 62.6      | -          | 94.1    | -          | 125.0     |
|   | Weight kg/100m                            | -         | -          | -       | -          | 14.5      | -          | 21.8    | -          | 28.9      |



## BEX-strap

## BEX-strap for fishing industry

BEXCOfibres, the sister company of BEXCORopes, is sole manufacturer in Belgium of polypropylene strapping mainly for all packaging purposes, also in the fishing industry.

They produce since more than 25 years polypropylene strapping within a range of 5 mm till 16 mm on different core sizes.

Depending on the demand of the customers, special core sizes and colours are possible, of course provided that the tonnage is important. BEX-strap is running faultless on any kind of machine, but also semi-automatic and hand use are of course possible.

Thanks to the know-how and dedication BEXCOfibres can be proud of an undeniable good quality, for which the ISO 9001 quality certificate according to the newest qualification norms, was attributed.

To be able to offer you a more complete program of packaging straps, we added to our product range also an excellent polyester strap, available in different sizes depending on the requirements of the customer.



| 3.75<br>30 | 4<br>32 | 4.5<br>36 | 5<br>40 | 5.5<br>44 | 6<br>48 | 6.5<br>52 | 7<br>56 | 7.5<br>60 | 7.75<br>62 | 8<br>64 | 8.5<br>68 | 8.75<br>70 | 9<br>72 | 9.5<br>76 | 9.75<br>78 | 10<br>80 |
|------------|---------|-----------|---------|-----------|---------|-----------|---------|-----------|------------|---------|-----------|------------|---------|-----------|------------|----------|
| 150.0      | 181.0   | 238.0     | 295.0   | 351.0     | 406.0   | 480.0     | 535.0   | 627.0     | -          | 699.0   | 790.0     | -          | 880.0   | 988.0     | -          | 1,078.0  |
| 40.0       | 48.4    | 58.0      | 72.6    | 87.1      | 102.0   | 121.0     | 136.0   | 160.0     | -          | 179.0   | 204.0     | -          | 228.0   | 252.0     | -          | 286.0    |
| 624.0      | 707.0   | 820.0     | 974.0   | 1,165.0   | 1,350.0 | 1,570.0   | 1,784.0 | 2,033.0   | -          | 2,276.0 | 2,514.0   | -          | 2,785.0 | 3,052.0   | -          | 3,351.0  |
| 41.8       | 47.6    | 60.2      | 74.3    | 89.9      | 107.0   | 126.0     | 146.0   | 167.0     | -          | 190.0   | 215.0     | -          | 241.0   | 268.0     | -          | 297.0    |
| 780.0      | 883.0   | 1,025.0   | 1,218.0 | 1,456.0   | 1,687.0 | 1,963.0   | 2,230.0 | 2,541.0   | -          | 2,845.0 | 3,142.0   | -          | 3,481.0 | 3,815.0   | -          | 4,189.0  |
| 41.8       | 47.6    | 60.2      | 74.3    | 89.9      | 107.0   | 126.0     | 146.0   | 167.0     | -          | 190.0   | 215.0     | -          | 241.0   | 268.0     | -          | 297.0    |
| 780.0      | 883.0   | 1,025.0   | 1,218.0 | 1,456.0   | 1,687.0 | 1,963.0   | 2,230.0 | 2,541.0   | -          | 2,845.0 | 3,142.0   | -          | 3,481.0 | 3,815.0   | -          | 4,189.0  |
| 41.8       | 47.6    | 60.2      | 74.3    | 89.9      | 107.0   | 126.0     | 146.0   | 167.0     | -          | 190.0   | 215.0     | -          | 241.0   | 268.0     | -          | 297.0    |
| 155.0      | 179.0   | 190.0     | 235.0   | 279.0     | 329.0   | 384.0     | 439.0   | 489.0     | -          | 568.0   | 550.0     | -          | 707.0   | 678.0     | -          | 867.0    |
| 57.3       | 66.8    | 84.5      | 104.0   | 126.0     | 150.0   | 176.0     | 204.0   | 235.0     | -          | 267.0   | 301.0     | -          | 338.0   | 377.0     | -          | 417.0    |
| 196.0      | 224.0   | 282.0     | 347.0   | 417.0     | 490.0   | 569.0     | 658.0   | 749.0     | -          | 850.0   | 954.0     | -          | 1,066.0 | 1,182.0   | -          | 1,306.0  |
| 50.0       | 56.8    | 72.1      | 89.2    | 108.0     | 128.0   | 150.0     | 174.0   | 199.0     | -          | 227.0   | 256.0     | -          | 287.0   | 320.0     | -          | 355.0    |
| 182.0      | 300.0   | 345.0     | 417.0   | 482.0     | 546.0   | 630.0     | 713.0   | 796.0     | -          | 886.0   | 1,025.0   | -          | 1,107.0 | 1,315.0   | -          | 1,448.0  |
| 47.1       | 68.5    | 79.5      | 96.6    | 112.0     | 128.0   | 149.0     | 169.0   | 190.0     | -          | 211.0   | 246.0     | -          | 267.0   | 315.0     | -          | 348.0    |
| -          | 187.0   | 228.0     | 312.0   | 394.0     | 464.0   | 545.0     | 626.0   | 712.0     | -          | 810.0   | 912.0     | -          | 1,020.0 | 1,117.0   | -          | 1,251.0  |
| -          | 43.3    | 52.9      | 72.2    | 91.5      | 106.0   | 126.0     | 145.0   | 164.0     | -          | 188.0   | 213.0     | -          | 237.0   | 261.0     | -          | 295.0    |

# USD 12/60 & USD 12/75



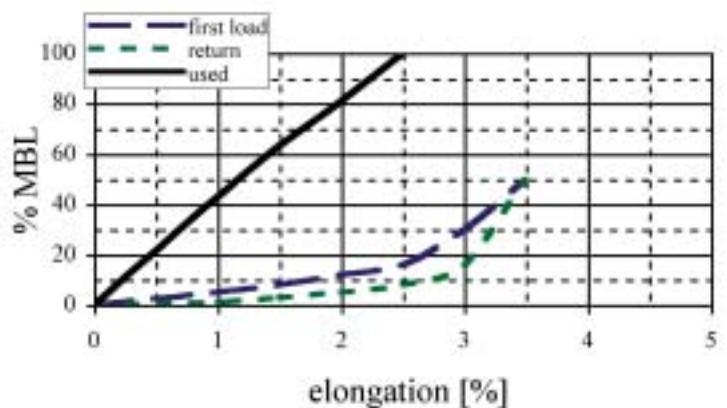
Plaited ropes of the HMPEline range are well established in fishing, marine and offshore applications, because of their ease in handling and non-rotating behaviour. They are produced on a plaiting machine containing twelve reels, each containing one strand, to braid a twelve strand rope.

Polyethylene is an amorphous plastic with relatively low tensile strength. Through gel spinning the crystals achieve a maximum orientation, which gives the material a high strength and stiffness and it is commonly known as High Modulus PolyEthylene. It has an extremely low coefficient of friction and is extremely resistant to internal and external abrasion. The thermal properties of HMPE are similar to standard Polyethylene.

### Features

- Material: Ultra – High Molecular Weight Polyethylene
- Construction: 12 strand braided
- Treatment: Marine finish
- Color of rope: Grey (others on request) a green marker yarn in the centre (SK 6o)
- Approx. spec. density: 0,975 floating
- Melting point: 145° C
- Abrasion resistance: Excellent
- U.V.resistance: Good
- Temperature resistance: 70°C max continuous
- Chemical resistance: Excellent
- Dry & wet conditions: Wet strength equals dry strength
- Range of use: Fishing, offshore installation, mooring

USD12/75



|            |          |            |          |           |           |           |           |           |           |           |           |           |
|------------|----------|------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 10.5<br>84 | 11<br>88 | 11.3<br>90 | 12<br>96 | 13<br>104 | 14<br>112 | 15<br>120 | 16<br>128 | 17<br>136 | 18<br>144 | 19<br>152 | 20<br>160 | 21<br>168 |
|------------|----------|------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|

|   |         |   |         |         |         |         |         |         |         |         |         |         |
|---|---------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| - | 1,275.0 | - | 1,489.0 | 1,755.0 | 2,002.0 | 2,284.0 | 2,583.0 | 2,915.0 | 3,247.0 | 3,596.0 | 4,013.0 | 4,395.0 |
| - | 358.0   | - | 430.0   | 494.0   | 571.0   | 653.0   | 745.0   | 842.0   | 949.0   | 1,060.0 | 1,180.0 | 1,307.0 |

|   |         |   |         |         |         |         |         |          |          |          |          |          |
|---|---------|---|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| - | 3,942.0 | - | 4,520.0 | 5,090.0 | 5,810.0 | 6,576.0 | 7,385.0 | 8,238.0  | 9,134.0  | 10,072.0 | 11,053.0 | 12,077.0 |
| - | 360.0   | - | 428.0   | 502.0   | 582.0   | 668.0   | 760.0   | 858.0    | 962.0    | 1,072.0  | 1,188.0  | 1,310.0  |
| - | 4,927.0 | - | 5,649.0 | 6,362.0 | 7,263.0 | 8,220.0 | 9,231.0 | 10,297.0 | 11,417.0 | 12,590.0 | 13,817.0 | 15,096.0 |
| - | 360.0   | - | 428.0   | 502.0   | 582.0   | 668.0   | 760.0   | 858.0    | 962.0    | 1,072.0  | 1,188.0  | 1,310.0  |
| - | 4,927.0 | - | 5,649.0 | 6,362.0 | 7,263.0 | 8,220.0 | 9,231.0 | 10,297.0 | 11,417.0 | 12,590.0 | 13,817.0 | 15,096.0 |
| - | 360.0   | - | 428.0   | 502.0   | 582.0   | 668.0   | 760.0   | 858.0    | 962.0    | 1,072.0  | 1,188.0  | 1,310.0  |

|   |         |   |         |         |         |         |         |         |         |         |         |         |
|---|---------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| - | 1,040.0 | - | 1,230.0 | 1,420.0 | 1,620.0 | 1,860.0 | 2,110.0 | 2,400.0 | 2,650.0 | 2,542.0 | 3,270.0 | 3,574.0 |
| - | 505.0   | - | 601.0   | 705.0   | 818.0   | 939.0   | 1,068.0 | 1,206.0 | 1,352.0 | 1,506.0 | 1,669.0 | 1,840.0 |

|   |         |   |         |         |         |         |         |         |         |         |         |         |
|---|---------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| - | 1,569.0 | - | 1,856.0 | 2,163.0 | 2,492.0 | 2,848.0 | 3,226.0 | 3,624.0 | 4,051.0 | 4,494.0 | 4,959.0 | 5,443.0 |
| - | 430.0   | - | 512.0   | 600.0   | 696.0   | 799.0   | 910.0   | 1,027.0 | 1,153.0 | 1,285.0 | 1,424.0 | 1,569.0 |

|   |         |   |         |         |         |         |         |         |         |         |         |         |
|---|---------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| - | 1,719.0 | - | 2,014.0 | 2,308.0 | 2,639.0 | 2,951.0 | 3,330.0 | 3,722.0 | 4,081.0 | 4,551.0 | 4,971.0 | 5,526.0 |
| - | 415.0   | - | 489.0   | 563.0   | 646.0   | 725.0   | 821.0   | 920.0   | 1,011.0 | 1,131.0 | 1,239.0 | 1,381.0 |
| - | 1,499.0 | - | 1,780.0 | 2,082.0 | 2,422.0 | 2,767.0 | 3,145.0 | 3,539.0 | 3,960.0 | 4,401.0 | 4,871.0 | 5,266.0 |
| - | 352.0   | - | 417.0   | 492.0   | 573.0   | 658.0   | 747.0   | 848.0   | 946.0   | 1,057.0 | 1,171.0 | 1,264.0 |

| dia<br>mm | circ.<br>mm | MinBreakLoad<br>USD12/60<br>tf | MinBreakLoad<br>USD12/75<br>kN | MinBreakLoad<br>USD12/60<br>tf | MinBreakLoad<br>USD12/75<br>kN | weight<br>kg/100m |
|-----------|-------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------|
| 12        | 1 1/2       | 9,9                            | 97                             | 12,3                           | 120,9                          | 6,4               |
| 14        | 1 3/4       | 14,8                           | 145                            | 18,5                           | 181,3                          | 9,6               |
| 16        | 2           | 19,7                           | 193                            | 24,6                           | 241,7                          | 12,8              |
| 18        | 2 1/4       | 24,6                           | 242                            | 30,8                           | 302,1                          | 16,0              |
| 20        | 2 1/2       | 29,6                           | 290                            | 37,0                           | 362,6                          | 19,3              |
| 22        | 2 3/4       | 34,5                           | 338                            | 43,1                           | 423                            | 22,5              |
| 24        | 3           | 39,8                           | 391                            | 49,8                           | 489                            | 26,7              |
| 26        | 3 1/4       | 48,6                           | 477                            | 60,8                           | 596                            | 33,1              |
| 28        | 3 1/2       | 52,3                           | 513                            | 65,4                           | 642                            | 36,4              |
| 30        | 3 3/4       | 63,6                           | 624                            | 79,5                           | 780                            | 41,8              |
| 32        | 4           | 72,0                           | 707                            | 90,0                           | 883                            | 47,6              |
| 36        | 4 1/2       | 83,6                           | 820                            | 105                            | 1025                           | 60,2              |
| 40        | 5           | 99,3                           | 974                            | 124                            | 1218                           | 74,3              |
| 44        | 5 1/2       | 119                            | 1165                           | 148                            | 1456                           | 89,9              |
| 48        | 6           | 138                            | 1350                           | 172                            | 1687                           | 107               |
| 52        | 6 1/2       | 160                            | 1570                           | 200                            | 1963                           | 126               |
| 56        | 7           | 182                            | 1784                           | 227                            | 2230                           | 146               |
| 60        | 7 1/2       | 207                            | 2033                           | 259                            | 2541                           | 167               |
| 64        | 8           | 232                            | 2276                           | 290                            | 2845                           | 190               |
| 68        | 8 1/2       | 256                            | 2514                           | 320                            | 3142                           | 215               |
| 72        | 9           | 284                            | 2785                           | 355                            | 3481                           | 241               |
| 76        | 9 1/2       | 311                            | 3052                           | 389                            | 3815                           | 268               |
| 80        | 10          | 342                            | 3351                           | 427                            | 4189                           | 297               |
| 88        | 11          | 402                            | 3942                           | 502                            | 4927                           | 360               |
| 96        | 12          | 461                            | 4520                           | 576                            | 5649                           | 428               |
| 104       | 13          | 519                            | 5090                           | 649                            | 6362                           | 502               |
| 112       | 14          | 592                            | 5810                           | 740                            | 7263                           | 582               |
| 120       | 15          | 670                            | 6576                           | 838                            | 8220                           | 668               |
| 128       | 16          | 753                            | 7385                           | 941                            | 9231                           | 760               |
| 136       | 17          | 840                            | 8238                           | 1050                           | 10297                          | 858               |
| 144       | 18          | 931                            | 9134                           | 1164                           | 11417                          | 962               |
| 152       | 19          | 1027                           | 10072                          | 1283                           | 12590                          | 1072              |
| 160       | 20          | 1127                           | 11053                          | 1408                           | 13817                          | 1188              |
| 168       | 21          | 1231                           | 12077                          | 1539                           | 15096                          | 1310              |

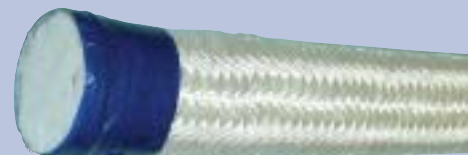
Depending on the application and external circumstances these ropes can be optimised with following options:



**Polyurethane coated cover :**  
The cover made of Polyurethane gives the Dyneema® rope an extra protection against abrasion and improves the stiffness of the rope. The cover is not loadbearing. Specific colors on request.



**Central core :**  
The central core keeps the Dyneema® rope nicely round and improves the stiffness as this core is not loadbearing. Breaking load is not influenced.



**Overbraided composite cover:**  
The overbraided cover, made of composite yarns, which is a mix of high tenacity polyester and high tenacity Bex-yarns, gives the Dyneema® an extra protection against abrasion. If necessary the non-loadbearing cover can be removed and repaired afterwards without damaging the Dyneema® loadbearing part of the rope.

**A combination of these different options is possible as well.**

*Dyneema, the world's strongest fiber*

***For winners only!***

DSM High Performance Fibers BV **Dyneema**

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# Bexco & Mussels...

The aquaculture is at present a fast growing business with a minimum annual growth of at least 7% - 10%. Studies showed that natural mussels anchor themselves with tiny threads called "byssus" (or beard) to more or less stationary seawater submerged objects.



Mussel, clearly showing their byssus threads

mon practice. 2.000.000.000 kg mussels at 5 kg/meter means that worldwide seen, about 400.000 km of mussel rope is suspended in the water, a distance of 40 times around the equator.

Constructive talks took place between parties involved including mussel farmers, cooperatives, machine manufacturers, (mussel) biologists and BEXCO engineers. The conclusion was that a BEXCO substrate rope must be developed where the tiny larvae, juvenile and adult mussel would love to settle, attach and grow out to a consumption-ready-size.

Developing a rope or substrate as it is called in aquaculture is not an easy job. Mussels can be categorised in 3 development stages: the larval stage, the juvenile stage and the adult stage. During each of these stages the mussel has a different preference for the surface to settle and attach. For instance during the larval stage the mussel likes to attach to more fibrous thin weed-like structure while at a later stage more solid surfaces are preferred. A multitude of other properties were studied, like colour, shade, roughness, turbulence, etc. BEXCO is in full swing to test a number of substrates in practice now. The ropes are in the water at Neeltje Jans facilities in Zeeland Holland.

Also Franken, the worldwide specialist of mussel processing and harvest machines, based in Zeeland Holland, is involved as a partner. As the rope or substrate is not only designed for ideal settle and attach of the mussel, and must be suitable for high speed machine processing, their assistance and experience was highly appreciated.

The Food and Agriculture organisation states that the annual world aquaculture production of mussels alone is a conservative 2.000.000 metric ton. Almost all mussels are rope cultured. An average harvest of about 5 kg of consumption ready mussels per meter rope length is com-

# BEXCORopes invests IN HEAVY BRAIDING EQUIPMENT

In order to be able to meet the increasing demand for braided twelve strand rope, BEXCORopes decided to invest in a production line for this specific rope construction.

Twelve strand ropes are gaining popularity in a number of heavy marine applications like fishing industry, offshore industry and mooring lines. Markets in which BEXCORopes is known as an innovative player. The ropes can be used either as a twelve strand rope only or as a core in a double braid construction.

To realise the project BEXCORopes contacted the August Herzog Maschinenfabrik from Oldenburg in Northern Germany. August Herzog has an outstanding reputation for building highest quality braiding equipment for nearly any kind of application. During technical discussions on the project in order to define the



most appropriate type of machine it became clear that a standard braiding machine would not be enough. The wish of BEXCORopes to be able to braid "endless" length of ropes led to the idea to construct a braiding machine with a body that can be splitted. This principle of a splittable body was already realised by Herzog in the past, however for other applications and for smaller size machines.

The combination of a splittable machine body and open strand guides on the carriers allows an exchange of bobbins without the need of making knots to tie strands together.

The braiding procedure has the following steps:

- First set-up of the machine is done with full bobbins whereby each bobbin has a different length of strand. One full bobbin is positioned beside the machine.
- Braiding process is started in the normal way and continues until the first bobbin is nearly empty. The machine is automatically stopped by an optional device.
- The strand from the bobbin positioned beside the machine is introduced into the braid as a core. The strand runs through a closed pipe which is installed inside the machine frame.
- Braiding process is continued for several meters ; the core strand becomes a load carrying element of the rope
- Machine is stopped by the operator and the bobbin which has run nearly empty is positioned at a certain point on the machine
- Then the machine frame is opened electrically. One machine half is moved aside approx. 350 mm on linear guides.
- By means of a crane the operator lifts the nearly empty bobbin out of the carrier. The strand is still part of the braided rope. The bobbin is positioned beside the machine and the strand is now put into the pipe which contained the core strand. NOTE: the pipe consists of two halves from which the top half is attached to the moving part of the machine body.
- The strand that was introduced as a core is now taken out of the pipe and with a crane the full bobbin which was installed beside the machine is put into the empty carrier.
- The machine frame is closed again and braiding process continues.

Result: The original core strand coming from the full bobbin becomes part of the braided rope. The original braided strand ends as a core strand.

This process of exchanging empty bobbins for full bobbins is repeated with the remaining eleven bobbins.

In this respect the Herzog SE 1/12-1088 with splittable body is a unique machine as this technique was never realised before for such a heavy rope braiding machine.

#### The machine has following dimensions:

|                        |                    |
|------------------------|--------------------|
| Length approx.         | 7 meters           |
| Bobbin dimensions:     | flange 560 mm dia. |
| Width approx.          | 4 meters           |
| Traverse:              | 900 mm             |
| Height approx.         | 7,5 meters         |
| Capacity:              | 213.426 ccm        |
| Weight approx.         | 20.000 kgs         |
| With PES yarn: approx. | 250 kgs            |
| Horn gear diameter:    | 1.088 mm           |
| Horn gear speed:       | 24 rpm             |

Ropes in 12 strand constructions ranging from smaller diameter up to 140 mm dia. or even bigger can be produced. All kinds of natural and man-made fibres ranging from sisal to Dyneema.

The take off is done by means of a caterpillar, which is integrated in the electronic lay length control system of the Herzog SE 1/12-1088. The production line installed under supervision of Herzog technicians in the middle of December 2002 and is fully operational since the beginning of 2003.



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