Disclaimer
All information, data, recommendations, etc. relating DSM Dyneema products (the Information) is supported by research. DSM Dyneema assumes no liability arising from (i) the application, processing or use made of the Information or products; (ii) infringement of the intellectual or industrial property rights of third parties by reason of the application, processing or use of the Information or products by the Buyer. Buyer shall (i) assume such liability; and (ii) verify the information and the products.

DSM Dyneema B.V., Mauritslaan 49, 6129 EL Urmond,
The Netherlands. Tel. +31 (46)4 76 79 99

DSM Dyneema LLC, 1101 Highway 27 South,
Stanley, NC 28164, USA. Tel. +1 800 883 7404

DSM Dyneema, 476 Li Bing Road,
Zhang Jiang, Shanghai 201203, China.
Tel. +86 (21)61 41 80 58

www.dyneema.com

Dyneema®
With you when it matters

Dyneema®
With you when it matters

Norwegian aquaculture company sees a healthy future with cage nets made with Dyneema®

Mainstream able to reduce cost and scale up with larger – but lighter – cage nets to meet present and future demand

Whether on land or at sea, when it comes to food production, size matters. Today's aquaculture industry faces the challenge of providing sufficient quantities of high-quality fish to satisfy an evergrowing world appetite. To efficiently meet this demand, companies need to install larger cage nets to leverage economies of scale and to compete on price. Larger capacity cage nets hold more fish, which enables the company to spread fixed costs for labor, equipment and repairs over a greater volume. In addition, larger cage nets position the company to meet the anticipated increase in demand for farmraised fish. And as fish farms move further offshore due to the scarcity of sheltered locations (such as the fjords of Norway), larger and stronger cage nets are needed to withstand the harsher conditions of the open sea.

But there's a downside to larger cage nets. They are heavier and more difficult to handle, which can require additional equipment and personnel, not to mention higher fuel costs. Larger cage nets - up to 160m in circumference - when made of traditional nylon, can weigh up to four to five tons. They also have more surface area that is susceptible to fouling and traditionally require more inspections and repairs. Within this highly complex and competitive environment,

Mainstream Norway AS, one of the world's biggest players in the salmon fishing industry, needed to expand. In cooperation with MøreNot AS, a major Norwegian net maker, Mainstream found a way to increase cage net size without exposing itself to the extra risks and expenses typically associated with such as upgrade. Their solution lay in cage nets made with Dyneema®, the world's strongest fiber™.

All the strength, a fraction of the weight

In 2006, Mainstream purchased two 120m circumference-18m deep Plexus® nets made by MøreNot using Dyneema®, an ultra high modulus polyethylene fiber from DSM Dyneema. Each net was installed at the Nordland site. After careful evaluation in these harsh condition, they were convinced of the benefits and so the following year, the company bought ten more and put five at each site (Finnmark and Nordland). When used in netting, this ultra-strong yet light fiber for the same mesh breaking strength of nylon twines, only requires up to a third of the weight. This makes them much easier and safer to lift in and out of the water. Nets made with Dyneema® are also extremely durable, have minimal elongation and are highly resistant to most chemicals including salt and sea water. This is exactly what Mainstream needed.

"We were experiencing problems of poor durability and short life spans with nets made with nylon," said Truls Hansen, production manager of Mainstream Norway. "We needed a new solution that would better withstand harsh conditions and avoid shrinkage over a longer period." In addition, nets made with Dyneema® have thinner twines, which improves water flow through the cage and increases the net shape stability, all of which contributes to a healthier environment for the fish and a potentially more productive harvest. The lower weight reduces the annual anti-fouling treatment by about half.

A safe investment in many ways

For Mainstream, the Plexus® nets made by MøreNot with Dyneema® solved many of the drawbacks of traditional netting. First, the light weight reduces wear and tear on the boats that place the cage nets into the Norwegian fjords. It also makes it safer and easier for workers to handle these very large cage nets. Also, due to the reduction in weight, there is significant less strain on the equipment holding the cage nets in place. Thinner twines, which present less resistance to currents, help the cage nets maintain their shape. Hansen added, "Mainstream expects the lifetime of a net made with Dyneema® to be between ten and twelve years, compared to

Dyneema®
With you when it matters

five or six years for traditional material nets."Referring to his company's involvement with nets for the cod industry, MøreNot's Davik said, "The cod industry at that time was still very small, and the financial situation was not very strong... so investing in nets made with Dyneema® was a very big step. The fact that so many fish farmers made and continue to make the investment shows their strong confidence in the product."

Moving offshore with Dyneema®

Looking to the future, both Mainstream and MøreNot see opportunities to use nets made with Dyneema® to farm in remote locations. Hansen explained, "For the next five years or so, Mainstream has enough good locations in the fjords for our salmon farming. However, as we run out of sheltered sites, we may need to consider expanding offshore into the open sea. This is where Dyneema® can offer a solution due to its great strength without heavy weight." Davik added, "The size of cage nets in the salmon industry is steadily growing as farmers seek to improve return on investment. Dyneema® can help salmon farmers achieve greater profitability by making it possible to deploy very large nets in exposed locations without excessive risks or high expenses for repairs, maintenance and replacement."

Why cage nets made with Dyneema®?

To sum up, the key advantages of netting made with Dyneema® for aquaculture include:

- *Lighter weight, yet strong.* This not only reduces antifouling costs, but also enables easier and faster installation and handling. It also can improve worker safety, and allows the fish farmers to use bigger cage nets with existing equipment.
- *Thinner twines:* Twines can be made thinner, for larger openings in the netting. This improves the fl ow through the cage and improve the net shape stability and therefore improving lets in more oxygenated water overall for improved fish health.
- *Better protection:* Dyneema® fibers are extremely wear and tear resistant. This extends the life span of nets, including those used at high-energy sites. Furthermore, the extreme bite and cut resistance ensures protection of the farmer's most valuable asset: the fish.
- *More durable:* Dyneema® fibers are extremely wear and tear resistance, providing a longer service life for the netting they are used in.

Cage nets made with Dyneema® have clearly proven successful for both Mainstream and MøreNot. Find out what they can do for your operation.

For more information, visit www.dyneema.com

About Mainstream

The Mainstream Group produces Atlantic salmon, as well as trout and coho. It has undertakings in Chile, Canada, Norway and Scotland. The Mainstream companies have approximately 3,200 employees and an annual turnover of over NOK 2.62 billion (2007). The companies Mainstream Chile S.A., Mainstream Canada Ltd, Mainstream Norway AS and Mainstream Scotland Ltd supplied a total of 111,000 tons of salmon in 2007. Mainstream Norway farms salmon at two production sites – Finnmark and Nordland – located in the northern-most area of the country. Each site has 10 farms. Each site required - and received - new, larger cage nets made with Dyneema®.

MøreNot AS: a history with Dyneema®

MøreNot began making nets using ultra-strong Dyneema® fiber in 2003 to help cod farmers avoid unwanted escapes caused by the fish biting through conventional netting. "By 2005 we had sold 50 cage nets made with Dyneema®," said Dag Davik, sales manager of MøreNot AS. "Because this material offers higher performance than nylon, the cage nets cost more to buy – but they cost much less to use. The initial investment in Dyneema® can be recouped quickly through lower handling and maintenance costs, fewer escaped fish, and significantly increased life span of the cage net. In addition, the healthier growth environment can lead to higher harvest numbers." This is the kind of performance Mainstream – and other fish farmers - was looking for in their new, larger cage nets

DSM
BRIGHT SCIENCE. BRIGHTER LIVING.