



ULSTEIN®

ULSTEIN X-BOW®



ULSTEIN X-BOW®

Turning visions into reality

- Comfort:**
Smoother ship movements improve work and rest conditions
- Environment:**
Lower fuel consumptions and less emissions
- Safety:**
Safer workplace due to extended hull
- Volume:**
Larger work deck area

Principal characteristics

- A novel hull shape, with a redistributed foreship volume and substantially reduced flare
- A raised foreship, which normally incorporates accommodations



Introducing a new bow

In order to utilise their decades of ship design experience to break away from traditional solutions and conventions, Ulstein Group started a design project at the beginning of the new millennium. The challenges experienced when combining wave-piercing technology with foreship accommodations were solved by introducing a larger volume distribution - which allows for submersion. A backward-sloping bow slowly emerged on paper.

Vision possible

Early sketches of a vessel with a backward-sloping bow were presented in an Ulstein Group magazine and shipowner Bourbon Offshore Norway encouraged further work on the concept. This materialised into the first design on an anchor handling tug supply vessel (AHTS) - ULSTEIN AX104 - in 2005. The first vessel of this type, *Bourbon Orca*, was delivered in 2006 and received a number of awards, including the Norwegian Design Council's design award, the Engineering Feat of the Year, *Offshore Support Journal's* and *Skipsrevyen's* "Ship of the Year" Awards, and a nomination for the Seatrade Award. Later versions of ULSTEIN X-BOW® vessels have also received similar distinctions.

From vision to worldwide reality

Only four years have passed since the bow concept first was launched. Positive feedback from users has caused a huge demand, and today 33 ULSTEIN X-BOW® vessels have been delivered or are under construction around the globe. The bow concept originally was limited to offshore vessels (AHTS, platform supply vessels, offshore construction vessels and seismic vessels), but has recently been introduced into the heavy offshore and short-sea shipping segments. ULSTEIN X-BOW® is patented in Norway (Norwegian Design no. 79215), and is patent pending internationally.



The first sketches on a vessel with a backward-sloping bow were printed in an Ulstein Group magazine. In 2005, the final design concept was presented, together with a shipbuilding contract with Bourbon Offshore Norway on the first vessel of this type - the *Bourbon Orca*.

Optimised hull shape

The shape of the hull has been optimised with a view to high top speeds, low resistance and reduced fuel consumption. Great emphasis is placed on the crew's comfort and safety during work and rest periods.

Comfort

- Elimination of slamming and bow impact

- Soft entry in waves
- Low acceleration levels
- Reduced vibration levels
- Available crew rest time increased
- Safer workplace due to smoother motions

Environment

- Significantly more energy efficient shape in waves

- Higher transit speed
- Reduced power consumption
- Improved fuel efficiency
- Increased operational time
- Increased schedule keeping

Inverted bow

- Larger and higher volume distribution

- Less spray
- Slender hull lines
- Safer workplace due to increased protection provided by hull



The anchor handling tug supply vessel *Bourbon Orca* was delivered in 2006, and has received numerous awards for engineering and innovation. Crew feedback is very positive for the vessel, which can maintain higher speeds in rough sea conditions - thereby increasing operational time.

ULSTEIN X-BOW® versus conventional bow

An ULSTEIN X-BOW® is a backward-sloping bow that starts at the extreme front of the vessel. This allows for the sharpest possible bow shape.

Result: A continuous and sharp bow shape, which smoothly divides both waves and calm water. Increased volume above and up front allows the vessel to efficiently respond to large waves.

A conventional bow has a forward-sloping bow shape that starts at the extreme front of the vessel and drops down and back. The actual start of the bow at the waterline is moved back, and the bow shape at the start of the waterline is less sharp.

Result: A bow that pushes the waves down and forward, - this absorption of energy slows the vessel.



Comparison testing - offshore vessels

The photos above show comparison testing of equivalent offshore vessels with the ULSTEIN X-BOW® versus a conventional bow. The wave height is 2.8 metres, with a wave period of 10.5 seconds and a speed of 15 knots.

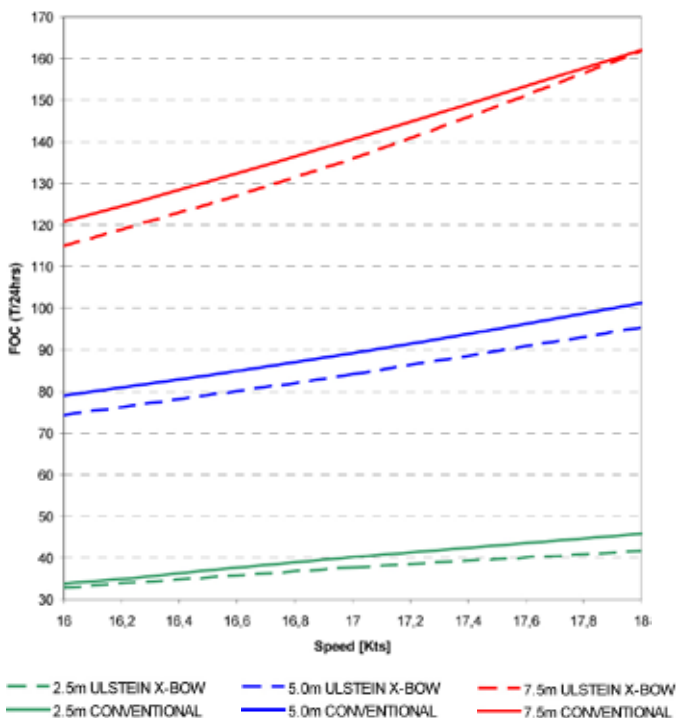
The photo to the left shows the ULSTEIN X-BOW® vessel. With a sharp hull shape, there is no spray and there's a soft entry into the waves. As

the waves are parted efficiently, wave energy transfer is minimised. This means that speed losses are reduced.

The photo to the right shows the conventional bow vessel. The waves and speed are the same, but there is spray generation, high bow impact and slamming, and a blunt hull shape. The waves are pushed forward, and wave energy is moved against the hull. This makes for greater speed losses.

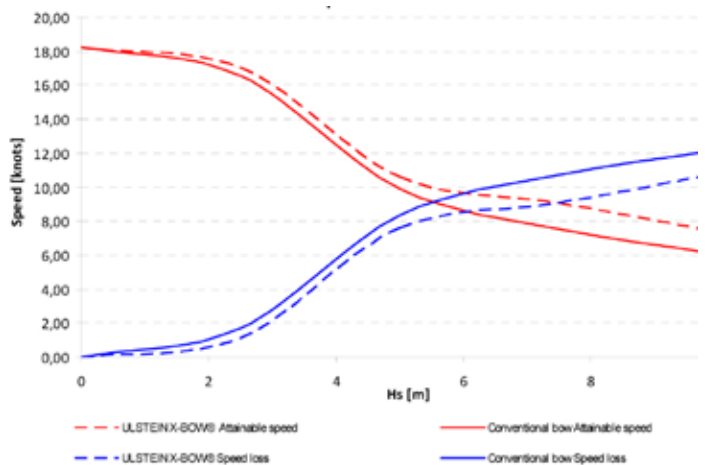
Fuel consumption

Comparison study of short sea container vessels with ULSTEIN X-BOW® versus a conventional bow in conditions expected in service has been performed. With a design speed of 18 knots, the difference in fuel consumption is shown in the chart below. Results show 7-16% fuel reduction, depending on ship speed and sea state.



Speed loss in waves

The table below shows the attainable speed in waves and the speed loss in waves of a vessel with an ULSTEIN X-BOW® compared to a vessel with conventional bow. The trend indicates that the ULSTEIN X-BOW® has a significant speed advantage in sea states most probable on a North Atlantic trade route. Waves in the North Atlantic are expected to be above 2.5 metres 74% of the time, and ULSTEIN X-BOW® vessels have an average improvement of 19% in the 2.5-10.0 metre wave height range.





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ULSTEIN DESIGN

Ulstein Design in Ulsteinvik, Norway, offers product development and sales/marketing of ship design and equipment packages to the international market with an emphasis on the offshore segment (PSVs, AHTS, seismic, OCV).



ULSTEIN SEA OF SOLUTIONS

Ulstein Sea of Solutions based at Vlaardingen, the Netherlands, designs large vessels for developing offshore oil and gas fields as well as heavy-lift and crane ships. The company develops projects for operators, contractors and shipowners in the offshore and construction market. Besides providing innovative designs for newbuildings, the company upgrades and rebuilds existing offshore ships.



ULSTEIN ES-CAD

Ulstein Es-Cad in Istanbul, Turkey, develops designs for merchant and shortsea shipping, such as tankers, dry cargo bulk and multi purpose vessels, ro-ro vessels and container vessels.



T U R N I N G V I S I O N S I N T O R E A L I T Y