Heavy Lift Hovercraft

logistics problems? rise above it
Who is HFL?

Hoverbarge Freight Ltd (HFL) incorporated in Ontario, Canada is owned by the leading experts in Hoverbarges/hovercraft, and since the first modular Hoverbarges that were operated on the successful Yukon River crossing for the Alaskan pipeline in 1976. They have been involved in all the commercially successful heavy lift Hoverbarge operations around the world. Our latest modular design is ABS classified for coastal and inland waterways use.

This has lead to the formation of a new Hoverbarge Charter company.
What is a Hoverbarge?

A standard cold weather marine steel barge, built to marine rules with an air cushion system to provide lift.

Hovering 1.8m in the air, the Hoverbarge is amphibious enabling it to traverse, wetlands & mudflats etc.
What is a Hoverbarge?

Hoverbarge floating off hover with a 90 tonne payload.
Hovercraft v Hoverbarge

Hovercraft reach a speed where the skirt lifts out of the water (over hump) and then hover just above the water surface.

The Hoverbarge travelling a slower speed of 5 knots will always remain under hump speed with the tip of the skirts in the water. This results in less spray than high speed Hovercraft.
Air is fed into the skirt plenum chamber and the skirt creates a flexible seal around the periphery of the barge.
Air feeds into the skirt that seals the periphery

Cold weather marine steel hull

The base is flat with no feet or protrusions
Previous Hoverbarge Projects

The management team have been involved in all of these Hoverbarge projects.

Hoverbarge projects conducted by:
Mackace Ltd., Hovertrans Inc. and Hovertrans Ltd.
Hoverbarge Environmental Advantages

Minimal Environmental Footprint
The Hoverbarge only exerts 1psi ground pressure when on hover, compared to a human footprint of 7-8psi, thus the Hoverbarge has minimal impact to the terrain it travels over.

Large Flat top deck
The Hoverbarge has a large cargo deck, clear of any equipment, along with being flat top (rather than in a well deck) the Hoverbarge provides huge flexibility in the type of operations it can be deployed on.
Hoverbarge Operational Advantages

**Redundancy**
In soft mud / water conditions, the Hoverbarge has 100% redundancy built into its lift fan capacity, ensuring minimal disruption to operations in the event of an engine failure.

**Engine Enclosures**
Engine enclosures are designed to ensure the engine, fuel tank and lift fans are protected from extreme temperature. The housing also reduces sound levels and shore power can supply heaters in the enclosures whilst the craft is not in service.
Hoverbarge Sound Levels

LOUDNESS COMPARISON CHART (dBA)

<table>
<thead>
<tr>
<th>Common Outdoor Activities</th>
<th>Noise Level (dBA)</th>
<th>Common Indoor Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snow Mobile</td>
<td>110</td>
<td>Rock Band</td>
</tr>
<tr>
<td>Self Propelled Hoverbarge</td>
<td>100</td>
<td>Food Blender at 3 ft</td>
</tr>
<tr>
<td>Gas Lawn Mower at 3 ft</td>
<td></td>
<td>Garbage Disposal at 3 ft</td>
</tr>
<tr>
<td>Non-Propelled Hoverbarge</td>
<td>90</td>
<td>Vacuum Cleaner at 10 ft</td>
</tr>
<tr>
<td>Diesel Truck at 50 ft at 50 mph</td>
<td></td>
<td>Normal Speech at 3 ft</td>
</tr>
<tr>
<td>Noisy Urban Area, Daytime</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Gas Lawn Mower at 100 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Area</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Heavy Traffic at 300 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>Large Business Office</td>
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</tbody>
</table>
Hoverbarge Skirt System Advantages

Skirt System
The segmented skirt system provides added redundancy, where if a segment is damaged the one either side balloons out to fill the gap, minimising any air loss. Replacement of damaged skirts can be done on site and does not require special skills or tools.

Skirt following contours of the ground

Missing skirt segment – the one each side fills the gap

Skirt R&D – Hoverfreight is constantly improving designs for different applications
Modular Hoverbarge

- Reduced Shipping Costs
- Access to inland areas via trucks
- Easy to use on different projects
- Use the pontoons as standard marine pontoons
- Steel Construction
- Easy to assemble on site

The first Modular Hoverbarge was invented by the Technical Director of HFL in the 1970’s.
Modular v Monocoque
Mono Hull Hoverbarge

• Increased payload
• Can be built on-site
• Ideal for long term contracts
• Built to certification
Launching the Hoverbarge

Once built or re-assembled the Hoverbarge can be launched direct from a beach or graded river bank.
Yukon Princess Working Across the Yukon

95% availability working 24/7 when river was in full flood and even when frozen over
Loading/Unloading

A portable steel framed ramp with wooden decking was used to enable easy movement up or down the graded approach to the river depending on the high of the water was all that was required.
This shows the extreme conditions that the Hoverbarge coped with over breaking ice.

Crew member looking at ice
Ex Employee Comments From Yukon Project.

‘I did every bit of the fabrication that went into the building of the two ships and both of the ships were constructed on the north bank of the Yukon during the winter of 1975. Upon completion the ships engines were fired up, the ships hovered up and after tying off lowered onto the banks of the river via bulldozers. It was quite a sight.

**Structurally the ships were invincible. The frame work design that the skirts were installed on was very unique in themselves because at no time were they ever exposed to damage by landing on the rocky shores of the river. The only maintenance that was ever really addressed was occasionally blowing out a skirt.**

Unless one was there it would hard to grasp the full picture of a hundred different trucks on each side of the river waiting to cross. Although it was nearly always 45 to 50 below zero that winter of 74/75. The bottom line is that they were designed, built and put into service. They never failed us and did the job they were designed to do.

Respectfully, Andy Rogers’

Note at the time of writing this reference Andy Rogers was Public Works Director, City of Colfax, Washington State. USA
Size & Cost

- As the Hoverbarge size increases, the cost increases in steps.
- For a small increase in size with little extra power, the payload increases significantly.

<table>
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<th>Cost</th>
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<td>Hoverbarge 200t Payload</td>
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Example Hoverbarge Applications
Ice roads – an alternative

Recently 2015 warmer winters means thinner ice making ice roads dangerous places Another warm winter will probably mean the closure of many mines if the ice roads start failing. The Hoverbarge would mean an environmentally friendly year round service.
IMPROVING ON THE TRADITIONAL ICE ROAD ROUTES CAN BE MODIFIED AND PORTAGES AVOIDED

Hover route would avoid narrow portages
320 tonne Self Propelled Hoverbarge on frozen lake (Mining Transport)
All Weather Road Alternative

The Eureka highway is only 20km but provides an important link. Long 300km roads cost $1bn and do effect animal migration linking only two points, whereas the Hoverbarge is flexible and can delivery out of gauge loads to mines and communities without roads.
Ship to Shore

• Access tidal zones
• No need for docks / port
• No need to dredge
• Gain access quickly without having to build infrastructure
• Operate over mudflats and shallow water

Stores Unloading Baffin Island
Shallow Water Oil Spill Response

- Shallow water oil spill response
- Environmentally sensitive areas
- Reed beds / Wetlands
- Access when shore based approach is restricted
Moving Modules Reduce Cost and Time

- Transport large prefabricated modules to remote sites
- Avoid building infrastructure such as road, rail and bridges
- Avoid dredging
- Use on multiple projects

Moving pre fabricated modules into a process site such as the oil sands is a game changer saving cost and time

Length = 177m
Width = 75m
Payload = 2500t
Moving Anchor

To move the large Hoverbarges, a smaller Hoverbarge can be used as a moving anchor point for the larger Hoverbarge to winch up to causes no environmental damage.
Shallow Water Drilling

7000 tonne hover drilling complex, designed for working in 0-5m of water.

Beach can be used as a safe haven.

Hoverbarges can be brought together to form a larger drilling pad.
Wetlands / Swamp Drilling

330 tonne payload hover drilling barge in Suriname

Keyway drill slot
Wind Farms

- Access shallow water

- **Operate regardless of tide** – help against limiting operational factors such as wildlife seasons

- Transport parts

- Cable laying

- Move equipment such as excavators

- Offshore support platform for directional drilling

No need to stop work when the tide is out!
The Pipe Laying Hoverbarge Fleet

- Enclosed Pipe Laying Hoverbarge
- Feeder Hoverbarge
- Workboat Hoverbarge
- Hotel Hoverbarge
- Piling Hoverbarge
The Hover Onshore Pipeline Fleet

Construction onshore reduces **man power** and time
Hoverbarge Flexibility Covers all Phases

- Equipment delivery
- Oil spill response 24/7
- Piling
- Repair and maintenance
HOVER90TM – Military Test Hoverbarge

The successful HFL skirt working without anti spray skirt.
Periodic Maintenance Requirements

CAT Engines:
- Oil & Filters: 500 hours
- Top and overhaul: 5,000 hours
- Major Overhaul: 10,000 hours

Fluid Drives:
- Oil change: 4,000 hours
- Life: 10-20 years

Lift Fans:
- General inspection: 1,500 hours
- Bearings life: 50,000 hours

Propellers:
- Overhaul/replace: 2,000 hours
- Spare sets of propellers, belt drives to be kept in store

Main Structure:
- Normal paint repair

Skirt:
- Depending on operating conditions and utilization.
- However, hover barge skirt requires far less maintenance than traditional high-speed hovercraft.

Chain mail wear pads to protect front of skirts

Skirts being repaired on site
Propulsion

Methods of propulsion include:

• Amphibious tractors
• Tugs
• Winching
• Ducted Props (for smaller Hoverbarges)

Pictures on the Right: Some examples of methods used to move the non propelled Hoverbarge
Self Propelled Hoverbarge

Ducted Propellers – as currently used on Hovercraft can propel the Hoverbarge up to speeds of 5 knots

Picture shows Canadian Coast Guard Hovercraft
Self Propelled Charter Hoverbarge
100 tonne payload self Propelled Hoverbarge
Supply Hoverbarge Local Communities
Summary

• Hoverfreight has the **most experienced** Hoverbarge design team in the World:
  – Route Surveys / viability reports
  – Full Feasibility Studies
  – Hoverbarge Design & Manufacture
  – New charter Modular self propelled Hoverbarge being built in 2017

• Heavy loads can be transported to sites using Hoverbarges

• Smaller self propelled Hoverbarges can be used for supplies

• Eliminates the need for infrastructure
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Thank You