

Summary

The usage of the extreme circumstances for the transportation of oil/gas lies on the basis of this concept. In the Arctic as well in summer as in winter, a lot of ice is available. This concept makes use of the positive characteristics of ice, ice floats and it is easy to slide. Large ice fields are used for carrying gas/oil tanks to the mainland where it is transported via pipelines.

Introduction

The Arctic ocean contains large amounts of undiscovered oil and gas reserves. Future winning of these fossil fuels is seen to have a large potential for Heerema and is planned to be started within 5-10 years. The circumstances in these areas are extreme for people working on-site but also asks for the technical limits of the installation. The development of the technology for the winning in such an extreme conditions is quite new and undeveloped, this means that a lot of earnings can be yielded if Heerema is the first contractor with a practical solutions. Nowadays, most research is aimed to conquer the extreme circumstances, but it the main idea of this concept is to make use of the circumstances so that these can help with the production of oil and gas.

The challenge involves all fields of offshore contracting: fabrication, transport, installation and construction. In order bring some focus, this battle will be demarcated for the part of the transportation of oil and gas from the platform only.

In the first part the current problems will be summarized and presented. In the second part the concept will be elaborated and specified for the two extremes of summer and winter. This concept is illustrated with a sketch. Next, a brief view will be given on the feasibility and the possibilities for realization on short term. This all finally comes together in the conclusions.

Current problems with transportation

First a few transportation problems will be described which are currently present as mentioned in the battle description and can be seen as the cause of this idea:

- In summer
 - Open water is hard to use for traffic, fields of pack ice may prohibit shipping
 - Icebergs form a danger for fixed infrastructure (pipelines), risk of scraping
 - Tundra is a barrier for transport, due to the mixture of water, moss and land and, moreover, the sensitive environment
- In winter
 - Open water is iced is slightly moving, this causes cracks
 - Hardly any shipping is possible

Concluded from this, the problems are twofold. Firstly the transport from the oil platform to the land. And secondly the transport from the port to the civil world (includes the tundra). The proposed concepts tackles all these problems in as well summer and winter, because the transport will be organized on ice.

The concept: make use of the sliding properties of ice

The main principal of this concept is to use the properties of ice in order to make the transport to and from the oil/gas platform easier. The useful properties of ice are: ice floats and ice slides. Because of the great differences in circumstances in winter and in summer, the transport description is divided in these parts.

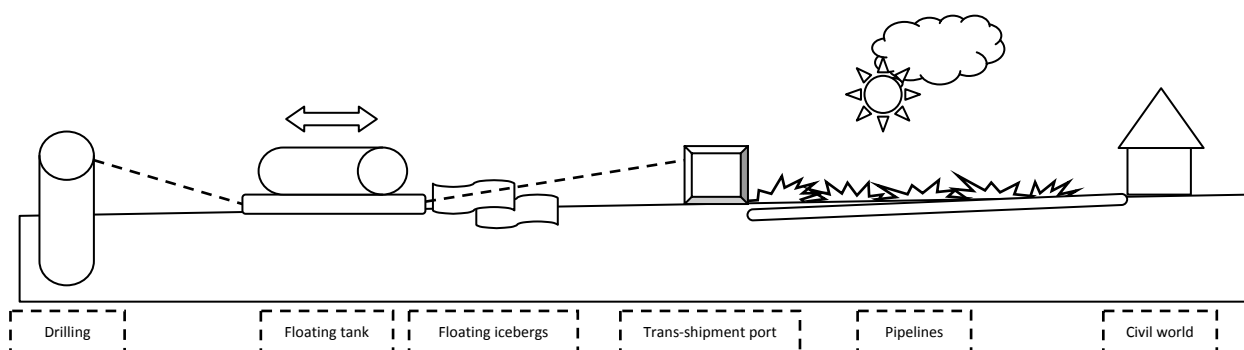
Summer

For the transport in summer from the platform to the main land will be made use of the floating ice fields. These fields are floating between the ice cap and the main land. From the vast amount of floating ice fields and bergs some qualified ones will be selected which will be re-built into a floating raft that houses some containers for the storage of gas and oil. Fields with a diameter between 10-50m and a certain thickness can be qualified. These ice fields are floating and will be propelled with a large cable system that makes more transports simultaneously possible. One side of the cable is connected to the platform and the other side on the main land and the cables are driven by a system compared with that of ski lifts used nowadays, but then a very large version of this. To save energy and forces to propel the ice fields, the movement will happen slowly and when possible there will be made use of the currents that force the fields into the right direction.

After the ice fields reach the main land the oil/gas will be trans-shipped for further transport over the tundra. When the tanks are empty they return by the same cable system to the platform to collect a new load. For the trans-shipment a special facility will be build, this is build the same way as a port, which was possible to built according to the battle description.

The second difficulty that has to fought is the transport over land to the civil world. Here the tundra have to be passed. The best way to do so is via pipelines which lay under the thick layer of moss which covers water. The pipelines are placed in summer when the underground is not frozen and easy reachable. This has to be done with much care to secure that it leads to less environment damage as possible.

The whole process is sketched in the understanding sketch:



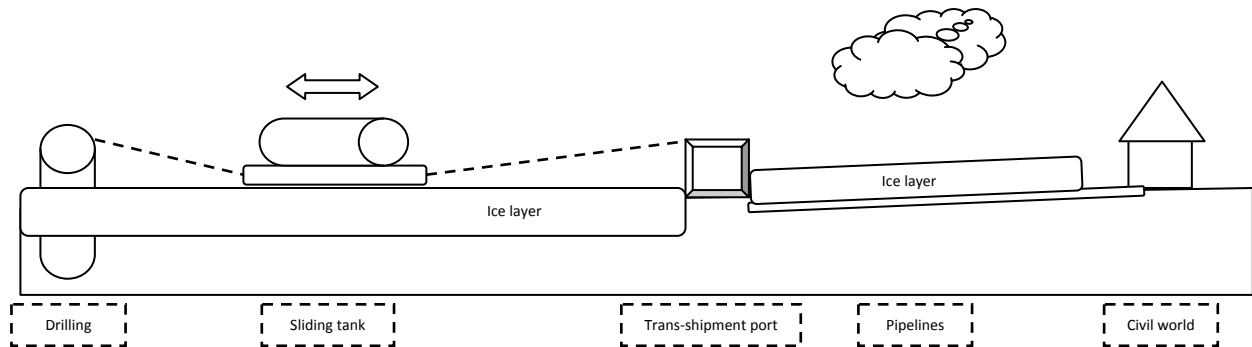
Winter

The transport from the platform to the main land will be done over the ice that covers the Arctic ocean. Just as in summer, this will be done by using ice layers which carry oil/gas containers. Instead of floating in the water, the ice field now slides over the iced layer. By using large ice field the problem with the deep cracks in the ice layer is solved, because the weight of the tanks are divided

over a large area. The iced layers will be propelled by the same cables that have been built for the transportation in summer.

The transportation over the tundra will be organized by the same pipelines, that were installed in the summer. These pipes are now covered with snow and ice, but the usage is still possible.

The whole process is depicted in the following sketch:



Realization

This concept is quite easy to realize, due to the use of existing technologies. The installation of pipelines in extreme circumstances is proved, the use of the cable system is comparable with that in ski lifts, the use of containers to store and to transport oil/gas is already used on large scale and trans-shipment ports are built all over the world.

One of the main challenges before this concept be implemented is the installation of an oil/gas platform on Arctic grounds. This installation faces tremendous problems, but these are not taken into account while writing this battle, but it is a serious point for research.

Conclusions

This concept is a new and eye-opening concept, because it uses low-tech characteristics of ice for transportation. Moreover, it is a combination of technologies that are already used in and applied by the industry and innovative and new ideas, such as the cable system and the use of the floating fields.

Concept is innovative and by the applications of this concept the oil and gas reserves on the Arctic can be exploited. Of course assuming that there will be a good innovation that makes the winning of oil/gas valuable in the difficult to reach wells.