**THE SOLUTION?** Seabed Rig, seen illustrated here, could be used for subsea tunnel drilling, says professor Ove Tobias Gudmestad (ILL: SEABED RIG)



Tunnel drilling:

# Robotic tunnel vision

Tunnel drilling is no new idea, but filling the tunnel with water and submerging the Seabed Rig robotic drilling solution to do the job is. A joint team of Norwegian and Russian scientists has now patented the concept.

By: **Inger Johanne Stenberg**

Though the concept of drilling for hydrocarbons via tunnels from shore has been floating around in different forms for some years already, so far they've all been rejected due to safety aspects. With good reason: It would take just a minimal gas leak in one of those tunnels for workers to pass out; a risk few or none are willing to take. Another solution might just be around the corner, though.

At the University of Stavanger (UiS) and the Russian Gubkin University for Oil and Gas, professors Ove Tobias Gudmestad and Anatoly Zolotukhin have joined forces with four Russian students to come up with a new solution, where tunnels are filled with water before drilling commences.

Professor Ove Tobias Gudmestad. (Photo: Inger Johanne Stenberg)

- The option of drilling via tunnels has been mentioned before but so far no one has made such a tunnel, at least not for exploration drilling. To be fair, that would be madness, as all it takes is a small gas leak for people to drop. That formed the basis for our work, explains Ove Tobias Gudmestad to PetroNews.

**In Arctic river deltas**

Initially, the idea is to use a tunnel solution in relation to hard-to-reach Russian river deltas in the Arctic. Other alternatives in such areas include constructing artificial islands, but that concept is threatened by water force and rapidly rising water levels, as well as large quantities of ice. It might also be an option in offshore fields close to shore, say 40-50 kilometer offshore. That includes fields like Sakhalin, Labrador and maybe even Greenland. In Norway though, not so many, especially if the Lofoten and Vesterålen areas stay off limits, says Gudmestad.

Gudmestad points out several advantages of tunnel use, even if the drawbacks are many. By



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using tunnels to drill production wells, you'll drill 20-30 kilometer long parallel tunnels merging in mountain caves approximately 15x15 meters. At the end of the tunnel, you'll have fill mass to catch hydrocarbons in case of a blowout, limiting the impact and ensuring safety.

- In our patent application, we suggest filling the entire tunnel with water, which in reality would turn it into a subsea operation, says Gudmestad.

*Isn't it possible to operate it as a subsea solution without filling it with water?*

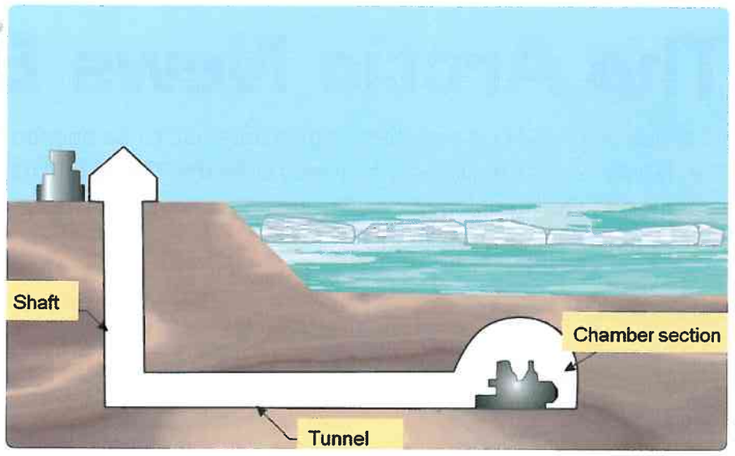
- In theory, yes but we'd like it to be impossible to send people down there. If that should be necessary, it would require planning, and draining the tunnel first. It's also a point that some things are easier to handle under water, the professor explains.

**What about drilling equipment?**

As soon as you go subsea, the question arises: What about the actual drilling equipment? Until now, placing drilling equipment under water has not been an option but Gudmestad and Zolotukhin have thought of that, too: They'd like to use the Norwegian Seabed Rig, a fully automated autonomous robotic drilling machine.

Lars Raunholt, CEO of Seabed Rig, says the professors' idea is a vote of confidence for his company:

- Of course it is. People know we have been working on this for the last five years, and it's particularly suited for deep waters and Arctic environments. It's great that someone sees the possibilities of the technology we have developed, says Raunholt.




**THE CONCEPT:** Deep in the tunnel, the professors would like to place equipment similar to Seabed Rig. (Ill: Gudmestad/Zolotukhin)

Seabed Rig is currently working on the construction of a full-scale version of their rig to be tested on shore. They're also working on a topside version. For the professors behind the patent, a pre-study is now waiting. They're depending on getting more companies on board to be able to launch a joint industry project.

- We've talked to government representatives and several other industry players. Some are more interested in new solutions than others. Some politicians might be interested in looking into new options and applications. If more options are presented to them, it might open up for new areas to be looked into, says Gudmestad.

*Are you thinking of the LoVe areas?*

- In Lofoten and Vesterålen you have other challenges too, like hard soil, but we're here to launch ideas for other people to run with. Primarily, we're thinking of Russian rivers and offshore fields close to shore, he says. ■