

THE OCEAN-BOTTOM LINE

Shell Technology Ventures made a decision in 2010 to invest in Magseis, an innovative seismic-technology company based in Norway. Dirk Smit, Shell Vice President of Exploration Technology and Chief Scientist Geophysics, and Ivar Gimse, Magseis co-founder and Senior Vice President of Business Development, answer questions about what has turned out to be a remarkably beneficial relationship based on conducting offshore seismic surveys with receivers laid out on the seabed rather than being towed by a ship along the surface.

What was the reasoning behind the STV investment?

Dirk: Ocean-bottom seismic technology has many advantages. You acquire extra information (notably because you detect both pressure and shear waves, which cannot propagate through water) and it is of higher quality. You form a fuller picture of more-complex reservoirs because you can record seismic waves arriving from multiple directions (specialists talk about full-azimuth acquisition). The ability to carry out time-lapse studies is improved. Finally, you can often easily run surveys right up to and even beneath any offshore platforms in the target area.

Although these are indisputable benefits, the cost-effectiveness of ocean-bottom surveys has been an issue from the beginning. This was the reason for our investment in Magseis: to enable us to help bring down the cost of the technology and thus make it more accessible.

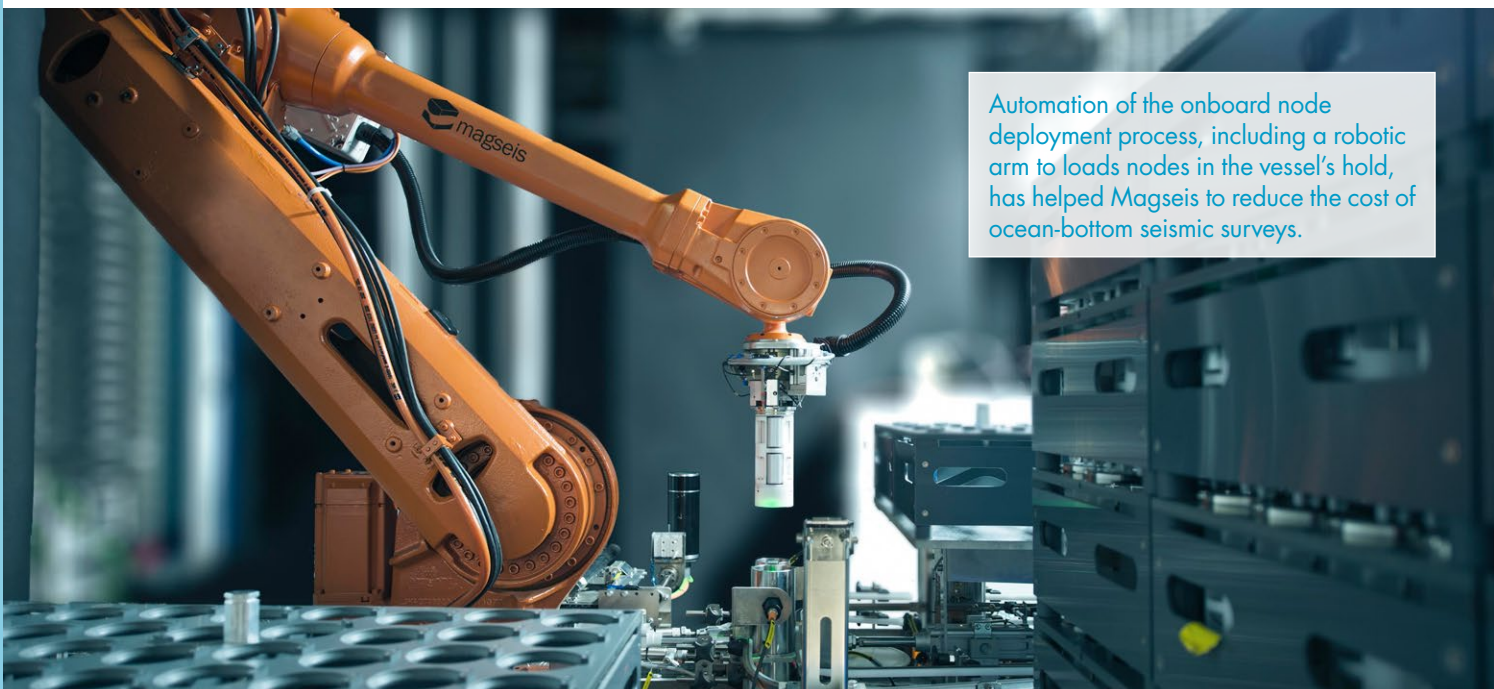
Despite not being the biggest name in the industry, or perhaps partly because of it, we felt Magseis had much to offer. The company seemed to be innovative and its research and development already focused on cost reduction. The technology it was championing was robust and being

successfully used in shallow water. However, more importantly, we felt that this technology had the potential to be deployed effectively in deep water.

What have been the effects of the investment on both parties?

Ivar: The Shell investment in our company has never been just about dollars. Shell is the number-one oil company in geophysics, and Magseis has benefitted considerably from the broad technical input Shell has made. Notably, we have had someone to help us calibrate our ideas. Access to a top client's perspective has also been very valuable; it means we have a much better understanding of seismic operational requirements. And having a Shell representative on the Magseis board has been to our advantage in terms of business strategy: it has helped us to grow the company, despite the challenging market environment over these past few years.

We have definitely been made to feel part of the Shell family. We have made some great strides together in terms of the smart electronics behind our unusually compact, high-performance, autonomous receivers, or nodes, as they are called, and also the highly automated cable



Automation of the onboard node deployment process, including a robotic arm to load nodes in the vessel's hold, has helped Magseis to reduce the cost of ocean-bottom seismic surveys.

INTERVIEW

Dirk Smit & Ivar Gimse



handling systems that enable us to distribute thousands of these nodes across the seabed accurately and quickly. One of our main selling points now is the ability to deploy extensive seismic arrays from a single vessel with a modest crew in a short time, which has huge implications for the cost of ocean-bottom seismic surveys.

Dirk: I agree about the money. Shell did not simply write a cheque and then wait for the results. We have strived together to realise our shared objective of reducing the cost of ocean-bottom seismic acquisition. We have learned from each other. Magseis is a truly entrepreneurial company and its approach to risk and decision making differs from that of Shell. I know Ivar's team sometimes becomes frustrated at the pace at which Shell develops technology: the amount of time we require to get ideas to the market. This is partly related to the procedures and safety protocols we have to follow when applying new technology globally and then there are the various partners in our oil and gas assets to consider. All this often requires more effort than you think. I believe, however, that we have managed to strike a good balance between the speed and the quality of innovation.

What about the deepwater angle?

Ivar: About the same time as Shell invested in Magseis, we set up a jointly funded programme to develop a node deployment system suitable for deep water, or even ultradeep water. The research has gone well and we recently successfully tested a prototype system in a 1,200-m-deep fjord in Norway. We are reluctant to say too much about how the system works, but it sits somewhere between our established cable deployment system and using a conventional remotely operated vehicle to place individual nodes. We are doing more design work now and hope to have a commercial system ready by the end of the year.

Dirk: Shell's technology organisation has worked closely with Magseis on the deepwater system. For our part, we now have to work on the Shell business units around the world. As I just mentioned, Shell is normally one of several partners in an asset (in fact, the company is often a minority partner and not

always the operator) and projects are awarded through robust local tendering processes. We need to promote the new Magseis system vigorously to those various partners and make its advantages very clear. I feel that there is more we can do to leverage Shell's contracting and procurement power to support opportunities to innovate with partners like Magseis. One thing is certain though: Magseis's association with Shell does not automatically guarantee that its technology will be implemented – despite what the two companies see as its technical benefits.

So, how far has Magseis travelled following Shell's investment?

Ivar: Magseis is now established as one of the leading ocean-bottom seismic survey companies, with a reputation for high-quality data and strong operational performance. It is satisfying that we are also widely considered the lowest-cost supplier in the industry. We have some great projects under our belt, particularly the survey for Petronas in 2015 over the complex Bokor field, offshore Sarawak (Shell is a partner in this asset). Here, we deployed a record number of nodes and, for the first time, operated a so-called rolling spread using two vessels to place the nodes, shoot and then pick them up again as we went along. We used the same technique most recently in the Red Sea for Saudi Aramco. The survey went from the shallows into water as deep as 1,100 m and encountered some very challenging seabed conditions. We laid a record spread here: we had 350 km of node-carrying cable on the seabed. These projects will act as important references when pursuing work in the future.

Dirk: Shell's investment in Magseis and our subsequent working relationship combine to create as good an example of open innovation as you could imagine. It shows perfectly how it is unnecessary to invent everything yourself. What is satisfying for me is how much we have learned from each other. This is one aspect of the investment that you cannot put a value on. >>>

