

## NETICS

# The Innovation Engineers

The technology is still new, the applications are numerous and the market more or less covers half the world: anywhere where people live near flowing water, dredged material can be used as a sustainable and cheaper alternative for building conventional civil engineering structures. And there is only one company in the world currently engaged in this work on a daily basis: NETICS from Alblasserdam in the Netherlands. Both founders face the issue of how to manage the company's growth and how they can best profit from their unique know-how.

It's common in twins or couples who have been married for thirty years. Eldert Besseling and Hugo Ekkelenkamp, the two founders of engineering consultants NETICS in Alblasserdam, do the same. One of them completes the thoughts and sentences of the other, after which the first person resumes the story and calmly continues. At no point during the interview is there any sign of a disagreement. Sometimes one of them will remember a conversation of three weeks ago which still needs following up, just as the other person picks up the phone to do it. "It might seem a coincidence, but that kind of thing happens regularly."

Besseling and Ekkelenkamp are neither twins nor a married couple. They met ten years ago when they were both doing research into building a smart flood barrier using dredged material, Besseling on behalf of engineering consultants Arcadis and Ekkelenkamp as a civil engineering student at Delft University of Technology. They spent their evenings making plans to start their own business together one day. "We immediately saw that our formula works. We always do what we enjoy doing: learning every day, both in our work and personal lives. Another important thing is that we both have the same work ethic. And we complement each other well too." Ekkelenkamp has a better theoretical grasp of the subject and is good at applying structure, while generalist Besseling is pragmatic and particularly skilled at networking and creativity. But above all, there's a lot of overlap. One says: "We just have the same view about many things." The other says: "Because we've developed in this alongside each other and have experienced the same things together."

## Bought a drone

The two men started their current enterprise NETICS (subtle: The Innovation Engineers) in 2013, when it became clear that definite choices needed to be made. "If you want to develop something, you have to put all your time, energy, and in our case all your money in it too." From the start, NETICS has therefore been all about building with dredged material. This is used as a material or building element to construct dams, dykes, quays, sheet piling, breakwaters and nature-friendly banks, among many other applications. Things were very different at BESEKK, the first company they founded. "We then really did everything: underground storage, green roofs, infrastructure, stabilisation of beaches, as long as it was innovative and related to civil engineering. We once even bought a drone to perform aerial inspections of structures and landscapes."

One of the reasons why Besseling and Ekkelenkamp launched BESEKK in 2010 was their dissatisfaction with how traditional engineering firms worked. Besseling: "They generally work on the basis of hourly rate billing and projects are often so tightly budgeted that they look for conventional solutions because there's no time to develop new things." Ekkelenkamp: "We wanted to do things differently. We really wanted to focus on innovations. Now we say: we do what engineering consultants should be doing, which is taking the time to think up the best solutions, even if these are not standard and therefore ingenious solutions." The idea is that you can make a lot of profit with innovations. In practice, and perhaps in spite of its image, the civil engineering sector in the Netherlands is not

as pioneering as we think, say Besseling and Ekkelenkamp. "You only have to produce a different idea and you're called innovative. It was our experience, however, that we were so keen to be innovative that the market didn't understand us any more. 'We ask for something concrete and you go far beyond our brief', is often the response."

#### The sky is the limit

And although BESEKK has grown rapidly in a short space of time, it clearly needs to change direction. The founders spend too much time dealing with management issues and too little time working in their field. The engineers need to rediscover their niche and go back to their roots. "We have looked very carefully at how we can distinguish ourselves and where the future lies, and at what is sustainable. With NETICS, we have really found our niche. There's no other engineering consultancy in the world which focuses solely on dredged material. And in principle, our market covers all the river deltas in the world. Such a large part of the world's population lives there, that the sky's the limit in that respect."

The big dredging companies in the world tend to be involved in moving sand, for the construction of ports and canals, wind parks at sea or a series of islands off the coast of Dubai, for example. However NETICS works with dredged material or sludge, the sediment which is deposited on riverbeds. This material regularly has to be removed in order to improve water drainage and water quality and to keep rivers accessible for shipping. "The traditional chain still consists of dredging, dewatering, transporting and depositing. We break that chain. We study how we can functionally use dredged material as a material or building element, preferably locally."

#### A giant sausage

The idea of using dredged material for building is based on a technique which has been used for decades for dewatering sand. In this process, the sand fills a fine-meshed plastic casing, like a giant sausage, from which the water is extracted. Around fifteen years ago, the first experiments were conducted using these geotextile tubes to dewater sludge too. "The principle remains the same, but the execution is more complex. Sludge is a suspension, so you need additives like a flocculant to cause the solid particles to clump together and then sink." It is still usual for the casing to then be opened and discarded and for the dried content to be taken away. This can be done more smartly and sustainably, so Besseling and Ekkelenkamp invented the Baggertube®: "In 2006, we invented the principle of leaving the sludge in the tube and building dykes with it. Our idea brought us a lot of publicity and prizes and it's still the basis of what we do today."

#### Settling and deposition processes

Building with dredging tubes is more than just laying or stacking sausages filled with sludge. "In 50 years, no one ever made any calculations regarding the use of tubes like these, filled with dredged material, as a construction element. In order to build with them, you need to understand the settling and deposition processes and exactly how the tubes behave under varying loads. This is where part of our unique knowledge comes in. We have developed models for this purpose, we can make simulations and we even publish

*'The NETICS solution proved to be around ten times cheaper than the conventional dam structures'*

articles on the subject in scientific journals." Besseling and Ekkelenkamp mention the Salhouse Broad project in Norfolk in England as one of the highlights in their portfolio of construction work using sludge. The bank of the River Bure was close to collapse. This would have had a dramatic impact on the ecosystem of the Broads, and a large recreational area would have been lost. Various contractors had already submitted plans to build a heavy dam with stone blocks and other heavy material. NETICS had a very different idea. "We built a balanced structure made of dredging tubes measuring 170 metres in length and 6 metres in diameter, resting on a softer substrate. This meant that we only had to remove some of the dredging slurry, saving money because we could work with the local construction material and had no transport or dumping costs. Furthermore, we filled the tubes in a very innovative way, without needing expensive flocculants." The NETICS solution proved to be around ten times cheaper than the conventional dam structures.

In the Netherlands, part of the bank belonging to the canal around the Haarlemmermeer polder was strengthened with dredging tubes, "the most high quality application of dredging tubes so far." They thus comply with the many different demands and requirements of the organisations involved – province, municipalities, water authority, *Landschap Noord-Holland* – something which used to be faced with a lack of financial resources. "The great thing is that all the parties came together thanks to the integral business case which we produced for the project. The savings which were

possible thanks to our technology have been partly reserved for managing the structure and the surrounding nature area for a period of ten years.”

#### Transformation of a dredging factory

NETICS may distinguish itself with its extremely ingenious and innovative structures, but its earning model is no different from that of a traditional engineering firm, i.e. the notorious hourly rate billing. However, that earnings model is now also being reviewed. “We are transforming NETICS. NETICS is basically a dredging factory: dredged material comes in and a product goes out. Except that this is mainly on paper at the moment, for example in the form of a structural calculation. Later we want to also sell our own technology and products. That’s a completely different approach in our sector.”

The transformation is largely based on the brown, stony block of material packed with fibre which ‘the innovation engineers’ had placed on the table at the start of the interview. It’s a piece of GEOWALL®, the now patented invention in which dredged material is pressed together into a water-resistant wall. And where concrete walls are often reinforced with steel, a GEOWALL® derives some of its strength from additions like flax or hemp fibre. One of the first applications which NETICS developed for its GEOWALL® together with TNO is a more sustainable and cheaper alternative for the hardwood facings which are mainly used as riverbank protection. In this process, the excavated dredged material or earth is deposited on site in a mould and then compressed, along with the required additives, into a construction element. NETICS is about to launch its first pilot projects in the Netherlands and England using the new invention.

#### Recipe book

The use of locally dredged material is not just practical, cheap and environmentally friendly, there is also a potential disadvantage: the composition and quality of the material varies from project to project. “Our skill lies in the fact that we know exactly when we need to apply which stabilisation method. We have developed an entire recipe book, as it were, for dredged material with many different characteristics: so much water out, add so many of these additives, use so much compression force.” The use of dredged material as a building element might seem very simple, but the underlying technology is very sophisticated, is what Hugo Ekkelenkamp is saying. “It’s therefore important to patent an invention like GEOWALL®. You want to prevent contractors from building one themselves without knowing exactly how to do it.” The resulting damage to

their reputation which could occur is one of the reasons for protecting the invention and trade name.

Another reason has to do with the previously mentioned transformation in which NETICS is currently involved. “We are studying how a product like the GEOWALL® can best be marketed. Do we want to keep everything in house and develop NETICS as the manufacturer of GEOWALL®s? Or would it be better to license the product to bigger contractors so that we can continue to focus on developing new solutions? In that case, a patent is essential to secure your revenue.” Furthermore, intellectual property increases the value of the business, as NETICS knows from experience after it sold a patent relating to the dewatering of dredged material. “Engineering firms are not normally worth very much; all the value is in the people. Patents are a good way of making all the time that you spend developing knowledge and products worth something.”

#### Hypothetical scenarios

NETICS has been approached by several countries where building with dredged material could be a solution. Contacts have already been made in India, China, Indonesia, Vietnam, Surinam and Turkey. Eldert Besseling repeats: the sky’s the limit for building with dredged material. He mentions that controlling the growth and ensuring that the company does not become a victim of its own success is another important challenge for NETICS – which now has seven engineers. But what about the hypothetical scenario in which NETICS is asked to start constructing a 1000 kilometre GEOWALL® in China immediately? Besseling and Ekkelenkamp have their answer ready. “We’d just have to organise everything as quickly as possible, because it would be a shame not to seize an opportunity like that. We are now exploring how we should scale up NETICS. As part of this process, we are talking to bigger parties which could help us speed things up.”

And what if you received an amazing takeover bid tomorrow from a big partner? Of course, they would seriously consider such a bid, they both answer. “But,” adds Besseling: “we are true entrepreneurs. We don’t want to become managers at a big engineering firm.” Ekkelenkamp: “No, that won’t happen.”