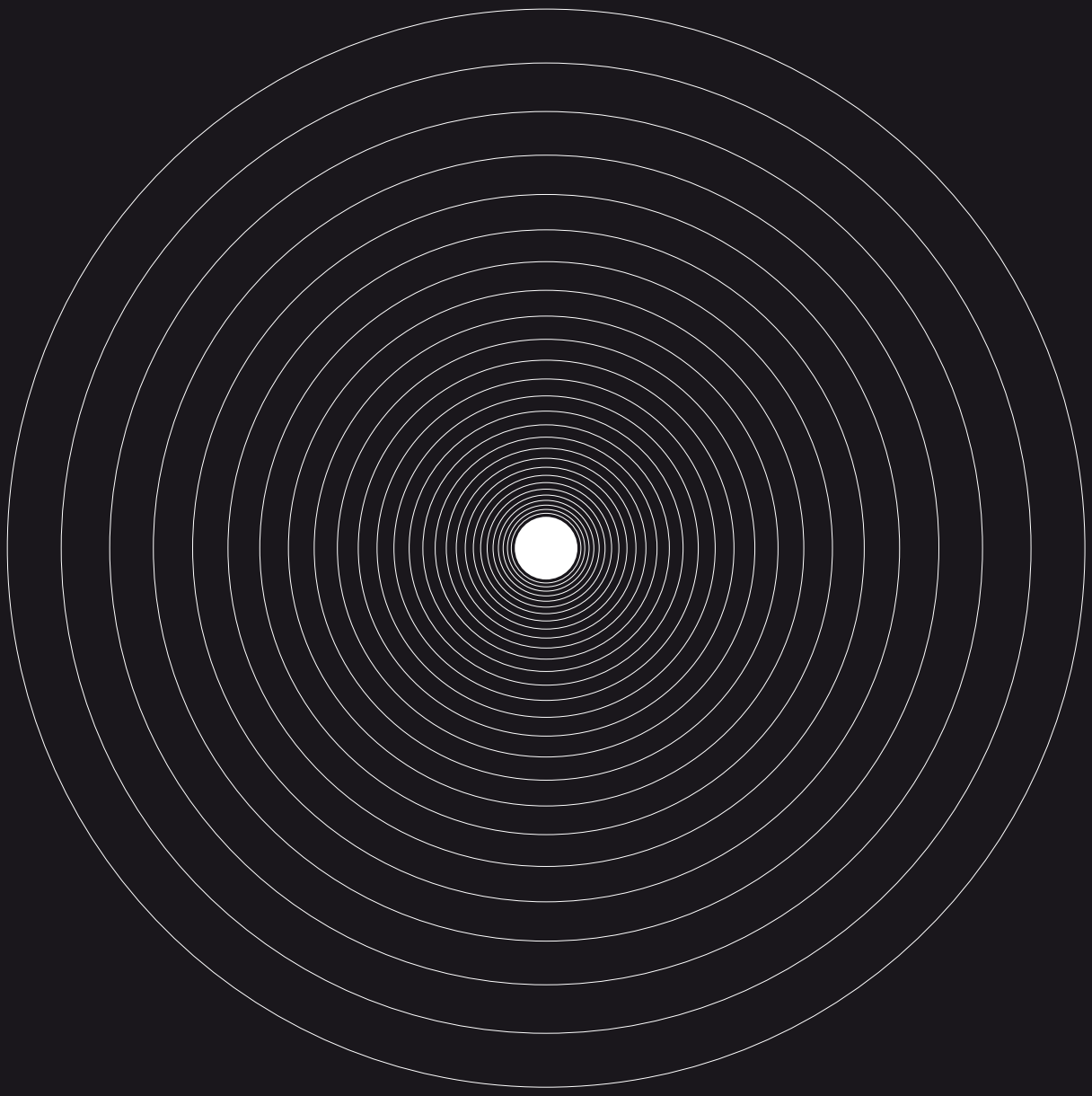
# GLOBAL REPORT 2



DENYS GLOBAL

# Trust your dreams

*Johan Van Wassenhove*
*CEO Denys Group*

Have you ever felt as if everything that can go wrong has gone wrong? As if you're suddenly losing control? It can be quite discomforting. But once you've overcome the difficulties facing you, you feel as if you have triumphed. We experienced that feeling of elation in Livorno, Italy, last year. We had been faced with an inexplicable phenomenon but, after a great deal of resourcefulness and reasoning, we finally found a solution, much to our relief and delight. Challenging projects are certainly the most rewarding ones.

Some companies like to avoid such testing situations altogether or simply go for the easy option, but that's not our approach. We love a challenge. **All around the world,** we are constantly faced with daring ideas and ambitious projects, from energy and water supply to mobility. But none of these projects is easy. Sometimes, we have to deal with unusual geological situations or extreme climatic circumstances such as flooding or drought. Sometimes, we have to overcome political issues, go through ponderous administrative procedures or help with financing issues.

It's essential to be persistent because the success of infrastructure projects is crucial **for everyone on the planet.** They can even bring us a little bit of happiness.

That's exactly what we felt when we moved into our bright, new offices: happy to work here, and **happy to work for you.**

# Going underground safely

Going underground safely

No sub-terrain in the world matches the complexity of those below long-standing international harbours such as Rotterdam (The Netherlands) and Antwerp (Belgium). Many decades of industrial activity have brought about an organised chaos of pipes, ducts and tunnels, transporting liquids and gasses, as well as electricity and digital signals.

*The sub-terrain of international harbours host an organised chaos of pipes, ducts and tunnels.*

This chaotic web is never finished. As long as the harbour lives, new ducts and pipes will have to be added, which implies **'digging' through a complex maze.** Denys knows how to do that. Decades of experience mean we know our way around here. We establish sound safety procedures when working in close proximity of existing cables and pipes. And we master all the techniques needed for going underground safely.



THE NETHERLANDS / ROTTERDAM BOTLEK

# No digging, no kidding

Constructing 4 km of 20" gas pipeline in Rotterdam Botlek is no picnic. The Botlek harbour dock was built in the fifties. Ever since, the surrounding area has played host to various petrochemical industries and storage tank facilities. No wonder the ground underneath is packed with telecommunication cables and pipes conveying a variety of hazardous chemical products.

We thought, naturally, that a good start is half the battle, so we appointed a Cables and Ducts Officer, an engineer operating as a single point of contact for all those concerned such as pipeline owners and operators and harbour authorities. He was also in charge of the preliminary examinations of the underground facilities.

## Petrochemical safety

The work itself required careful planning and preparation. **We really 'dig' that** kind of work but, of course, it's out of the question to literally just dig. We used suction trucks to remove the soil. We installed auxiliary steel beams to which we firmly attached all underground ducts before proceeding. We adopted at all times safety procedures as stringent as those imposed on the petrochemical plants themselves. The natural gas pipeline we constructed for Gasunie is in operation since December 2011.

*All existing underground ducts were firmly attached to auxiliary steel beams.*

BELGIUM / ANTWERP HARBOUR

# Keeping up the knowledge

*Our knowledge management system instructs our people in the techniques and procedures required to deal with the complex harbour environment.*

The Antwerp harbour subsoil may be one of the most complex in the world. Historically, many pipes and ducts have been laid without proper co-ordinate documentation. For the inexperienced, it's hard to find one's way. Fortunately, we have the knowledge. And we keep it up.

Denys has been laying pipes in the Antwerp harbour for more than 25 years. Half in jest, some of our partners say they know this subsoil better than the harbour authority does. It's a tease, of course, but we do take pride in our acquired experience. That's why we have set up a knowledge management system to shape information sharing and ensure knowledge continuity. Our partners can tell what's down there, they've seen it first-hand. The same management system also instructs our people in the techniques and procedures required to deal with this complex harbour environment. They know all about the existing tunnels and ducts in the entire harbour. They are authorized to work in proximity of cables and pipelines in operation. They know how to wrap up and secure existing cables and pipes. They are familiar with trenchless technologies and modern GPS controlled excavators.

*Pipes are safely lowered down shafts in order to connect them in the tunnel below.*

## Crossing locks and the river

Recently, Denys has built a pipeline for feeding demineralised water to the Total refinery in the Antwerp Hansa dock. We had to use the shared P.A.L.L. shafts and pipe tunnel to cross the Boudewijn Lock and the Van Cauwelaert Lock. This involved working in deep shafts and in proximity of pipelines in operation, so we applied the most stringent safety procedures.

Currently, Denys is building a 100 bar high pressure pipeline for feeding ethylene to the petrochemical company Ineos. The 20 km trajectory is mainly made in open trench but uses two shared pipe tunnels (the Beveren-tunnel and the MOOW tunnel) to cross the Schelde River. At some points, we use HDD to negotiate obstacles.

DRINKING WATER IN AFRICA

# Clean water everywhere

# Clean water everywhere

Safe drinking water is a fundamental human need, but many people still have to do without it. UNICEF and the World Health Organization report that in 2010 about 11 % of the world's population had no access to a safe source of water. The situation is particularly critical in sub-Saharan Africa, where more than 300 million people still do not have access to drinking water, both in dry and tropical regions. Many of those have to fetch water from miles away, a daily duty which consumes the time they could otherwise use for work or education. Imagine a city with almost 1 million inhabitants but no water supply system. That's Tshikapa, a city in the Democratic Republic of Congo. Fortunately, the rest of the world is waking up to this problem, and we are taking part in producing solutions. Denys is building a water supply system in Tshikapa. We have also built water treatment plants in Ghana and extended the supply system in the capital of Niger. We make sure we build robust, affordable systems that are well-adapted to local conditions and easy to operate and maintain. That's how we answer the water challenge, and that's how we help bring clean drinking water everywhere.

*Denys is building water supply systems in the Democratic Republic of Congo, in Ghana and an extended supply system in the capital of Niger.*

# Eau-de-vie for an expanding city

Temperatures are high and rain is scarce in Sahel-country Niger. That's why more and more inhabitants take refuge in the capital Niamey, where the Niger River brings water in abundance. However, the city's existing water supply system can't cope with its dramatic population growth.

Nigeriens refer to water as 'eau-de-vie', which literally means 'water that brings life'. Indeed, they know how important water is to survive in the scorching heat on the border of the Sahara desert. The Republic of Niger is a land-locked nation and the climate is mainly very hot and dry, with a large area of desert.

No wonder that Nigeriens take refuge in the capital Niamey, located in the south on the edges of the Niger River basin. In 2006 the capital had some 750,000 inhabitants; today the population is estimated at over 1.5 million, so the city is expanding rapidly. As a result, the existing water supply system can't service the newcomers. But things are improving now. Denys is building a new pumping-station with a capacity of 1,350 m³/h, 18 km transportation pipes, a 2000 m³ elevated reservoir an 80 km distribution network that brings eau-de-vie where it's most needed.

*Newcomers in the expanding city of Niamey no longer have to fetch their water themselves.*


NIAMEY / NIGER

ESAKYER / GHANA

# Water, not mud

The South Gomoa district in the Central Region of Ghana is one of those typical sub-Saharan 'populated zones', a rather dispersed conglomerate of villages and small towns. Near a village called Esakyer, Denys is building a water treatment plant plus supply system for the zone's 400,000 inhabitants.

The climate in this area gives us a special challenge. Water is not actually scarce here, since Ghana is a tropical region. The problem is that, during the rainy season, mud streams flood the entire place, making it difficult to obtain clean water for domestic use.

There are many solutions available for this kind of problem, including various expensive, high-tech techniques. But Ghana doesn't need cutting edge. It needs simple but robust systems. And that's what Denys is providing. We are building a small dam on the O Chi Nakwa river. The dam will capture no more than 5% of the water stream, leaving the river undisturbed. Adjacent to that, we are constructing a simple but solid water treatment station.

It's controlled manually and requires little maintenance. We will train local people on how to operate the system and adjust it to changing weather conditions and seasons.

In addition to the treatment station, we will build the transport pipes and a 38 km distribution network. It will cater for nearly half a million people.

*The dam captures no more than 5% of the water stream, leaving the river undisturbed.*

TSHIKAPA / DEMOCRATIC REPUBLIC OF CONGO

# No burden too heavy

Nearly all the people of Tshikapa, that's about 1 million inhabitants, draw water from wells. They then have to boil the water before they can use it. The African Development Bank is now investing 35 million euros in building a complete water supply system. The work brings with it some serious logistic challenges.

Tshikapa is the second largest city in the West Kasai Province of the Democratic Republic of Congo, about 600 km east of the capital Kinshasa. It has been a site of diamond mining since its founding in the early twentieth century. Despite that prosperous economic activity, the city has never been given a solid basic infrastructure. It is located at the confluence of two important waterways, the Kasai and Tshikapa Rivers. These two rivers are difficult to navigate. The roads from Kananga (200 km east) and Angola (in the south) are in poor condition, but can be used. The westward connection to Kinshasa is as good as non-existent. Sanitary infrastructure is even worse. Imagine an entire city where only about 60 families have access to potable water.

But things are changing now. A 50,000 m³/day drinking-water treatment plant is being built on the shores of the Tshikapa River along with the transport pipes and the distribution network. Given Tshikapa's poor accessibility, this comes close to a logistic nightmare. Equipment is brought on site in containers, shipped from Antwerp, unloaded in Matadi, transported to Kinshasa by truck, put on push tow barges to Djokopunda 400 km east, then brought to Tshikapa via a 100 km track upgraded for the purpose. Clearly, we think no burden is too heavy.

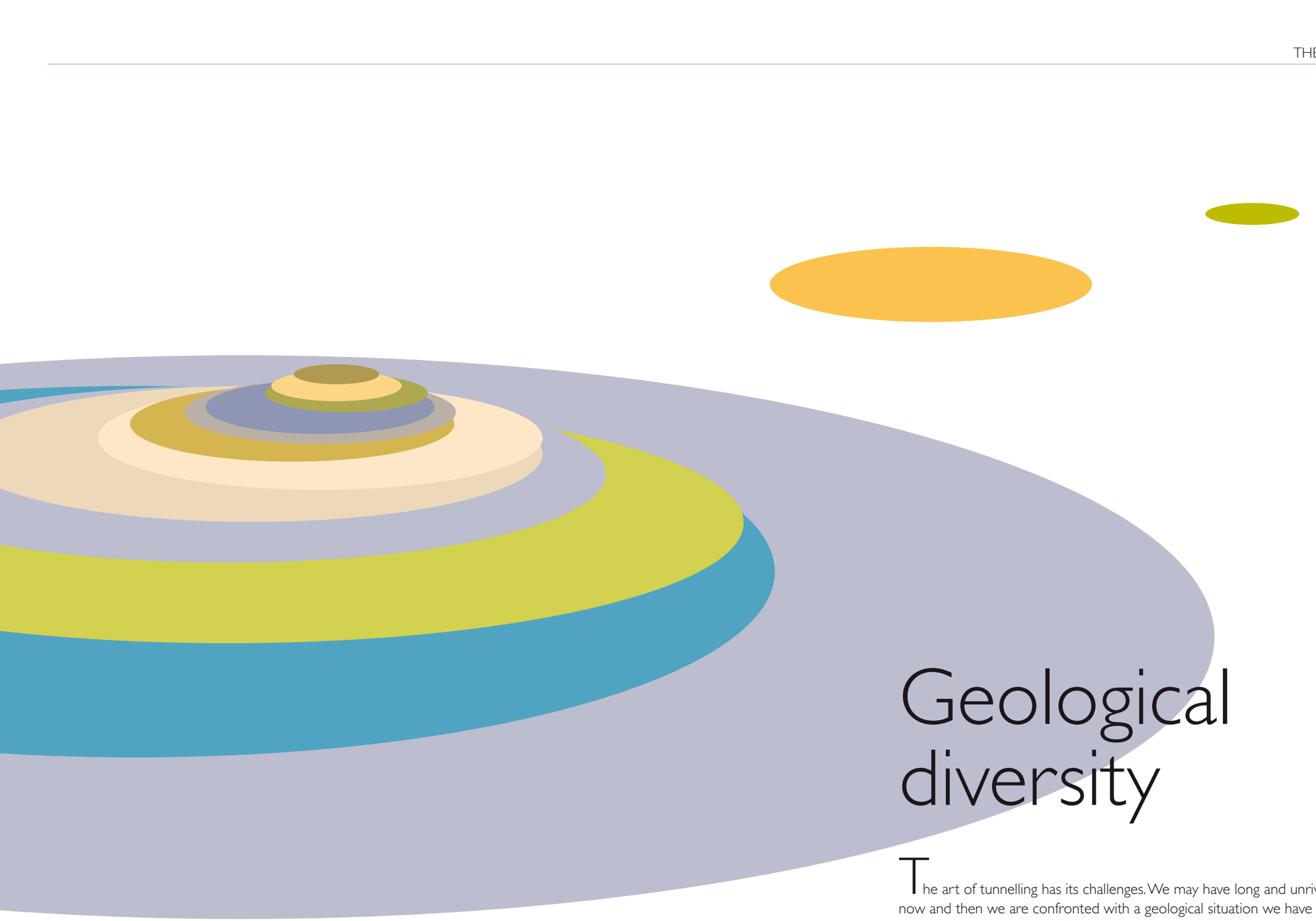
*Equipment is transported to Tshikapa via an old track upgraded for the purpose.*

ALGERIA / AIN DALIA - OUENZA

# Black Pipe

Ever since the nineties, the town of Oueza in eastern Algeria draws drinking water from the water-treatment station at the Ain Dalia dam, 70 km northwest, near Souk Ahras. Unfortunately, the steel pipeline had deteriorated much too quickly. Denys now replaces this water mains by constructing a completely new pipeline in ND 800 ductile iron. We're installing it in close collaboration with the local contractor ETUHP Menani, who will take care of follow-up and maintenance.

*More than 10.000 ductile cast iron pipes were carefully lowered in the trench cutting through the magnificent landscape between the Ain Dalia dam and Ouenza.*



# Geological diversity

The art of tunnelling has its challenges. We may have long and unrivalled years of experience worldwide, but every now and then we are confronted with a geological situation we have never met before. In Algeria and Italy we recently came across a complex and hybrid soil structure. In Morocco we are now facing a very hard type of siltstone. Those are unpredictable soils indeed. Well, unpredictable but not unconquerable. Yes, they required us to purchase specially developed machines to do the job. And yes, we were still faced with some tricky issues. But we solved them all. A new machine is one thing, persistence another.

NORTHERN AFRICA / CASABLANCA AND ALGIERS

# Rocks and sand



*We purchased a brand new machine AVN 2500 tunnel boring machine, capable of going through various types of rocks.*


In Casablanca, Morocco, Denys is building a 2.6 km pipeline (2.5 m inner diameter) to connect a series of wastewater collectors with the newly built water treatment station at Aïn Sebâa, in the eastern part of the city. The trajectory is in a densely populated urban area, so we proposed pipe-jacking in a succession of three drives. One issue, however: Casablanca's subsoil is made of very abrasive clay stone. For this reason, we purchased a brand new machine AVN 2500 tunnel boring machine, capable of going through rocks. The drilling started in January 2012.

**Ready for the unexpected**

We use a smaller machine AVN 1800 machine for a similar project in the bay of Algiers, where we are pipe-jacking a 2.7 km pipeline (1.8 m inner diameter) in a succession of four drives. But here, the subsoil is very heterogeneous, consisting mainly of hard gneiss and schist bedrock with high quartzite content, though some areas had been backfilled with clay and sand during French colonization. As a result, we have to constantly change drill chucks and alter jacking parameters. What's more, the geological changes are very unpredictable, forcing us to keep ready numerous spare parts.

## Expertise plugged in abroad

Both the Casablanca and the Algiers project were carried out in close collaboration with local companies and with dozens of local workers, be it under supervision of our own project managers. We also sent our own experienced drilling teams – expertise that is unavailable over there.

In Algiers, we even installed a temporary manufacturing unit for the production of the concrete pipes. This guaranteed top quality and avoided sluggish import procedures.

ITALY / TUSCANY

# The livorno enigma


The construction of a 5.5 km gas pipeline north of Livorno gave us sleepless nights. Weird things happened, but we did not throw in the towel.

The pipeline is to feed natural gas coming from an offshore LNG terminal into the Italian distribution network northeast of Livorno. For environmental and economic reasons, it was decided that microtunnelling should be used to build the concrete pipeline in the bed of the water channel along the Strada Grande to Firenze. The pipeline was constructed in six drives, two of which were no less than 1177 m long, with a 2 m inner diameter.

The soil there is soft, with mostly fine sand overlaying clay with organic material. The geology may have seemed unchallenging, but some things still went wrong. To our big surprise, the tunnel screwed its way into the soil and was rotated by 200° at the end. Neither our most experienced people nor the external experts we consulted had ever seen this before. It was an enigma for everyone involved and, in a way, it still is.

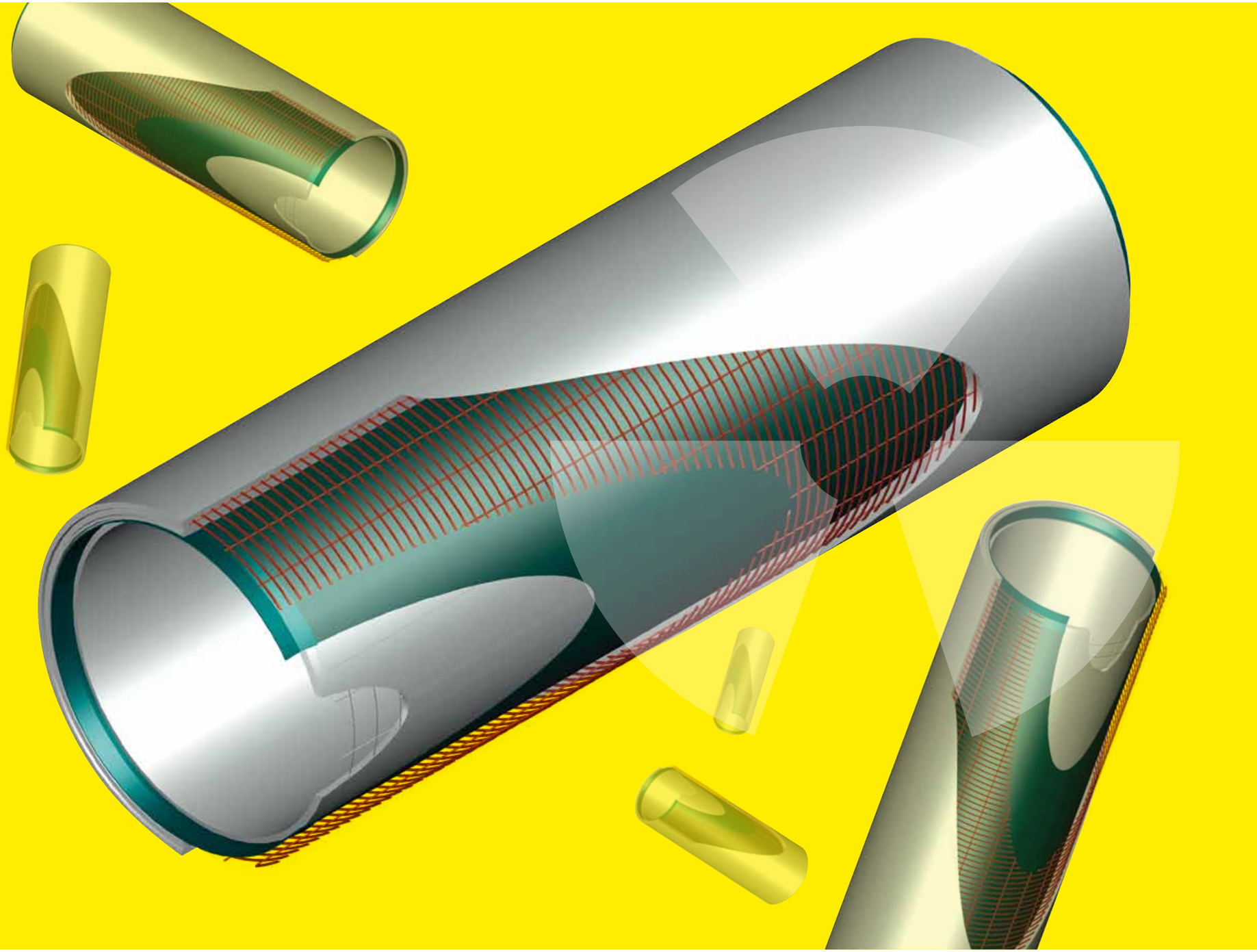
Yet we did not give up. Thanks to our persistence and flexibility, we succeeded in remedying the situation. We adapted plans and made accessory pieces to keep things together firmly and safely, saving the project.

*The tunnel rotated by 200°, no one had seen this before.*

# Proven trustworthiness

The Fukushima disaster has spurred a new fear of nuclear technology. Yet fear is a bad adviser. Nuclear power plants already exist and will for many decades to come. Nuclear waste is a reality the planet will have to deal with for hundreds of years to come, no matter what we do now. Nevertheless, it matters greatly how we tackle nuclear technology today. Stress tests are being conducted all over the world to check whether installations can withstand the severest calamities. As a consequence, several improvements are being implemented and long-term solutions for nuclear waste are being developed. Denys is happy to provide some of the building blocks in dealing with these issues. Recently, we constructed the emergency cooling circuits in the Borssele (The Netherlands) and Flamanville (France) plants, using steel cylinder concrete pipes. This is the same technique we used thirty years ago in the Belgian plants of Doel and Tihange, where the circuits still prove fit for the purpose. Denys is eager to develop more activities in this sector. Our broad experience enables us to build trustworthy solutions based on proven technology. We make things you can rely on.

*The steel cylinder core technique is unrivalled in terms of quality, strength, durability, and efficiency.*



# Keep it cool, take no risks

In order to extend the lifetime of the Borssele Power Plant (the Netherlands), the emergency cooling circuit installation was replaced. Denys provided a zero-risk solution by applying steel cylinder concrete pipes. In January 2006, the Dutch government allowed the 450MWe nuclear unit at Borssele to stay open two decades longer than the originally planned 2013. As a result, measures had to be taken to extend the useful lifetime of safety devices by 20 years.

## Zero-risk proven solution

Measures involved replacing the emergency cooling circuits that connect the reactor with the Westerschelde natural water supply. Denys proposed using precast concrete pipes with steel cylinder core and additional helical reinforcement. Unlike the newer solutions with glass reinforced polyester pipes, this solution has **proven to be 100 % leak-proof and very durable**, even when subject to high pressure (10 to 15 bars) and high surface load or impact.

The new circuits were put into operation in April 2012.

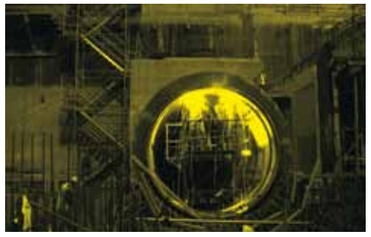
*Denys offers a guarantee of up to 80 years on its steel cylinder concrete pipes.*

THE NETHERLANDS / BORSSELE

FRANCE / FLAMANVILLE

# Under pressure

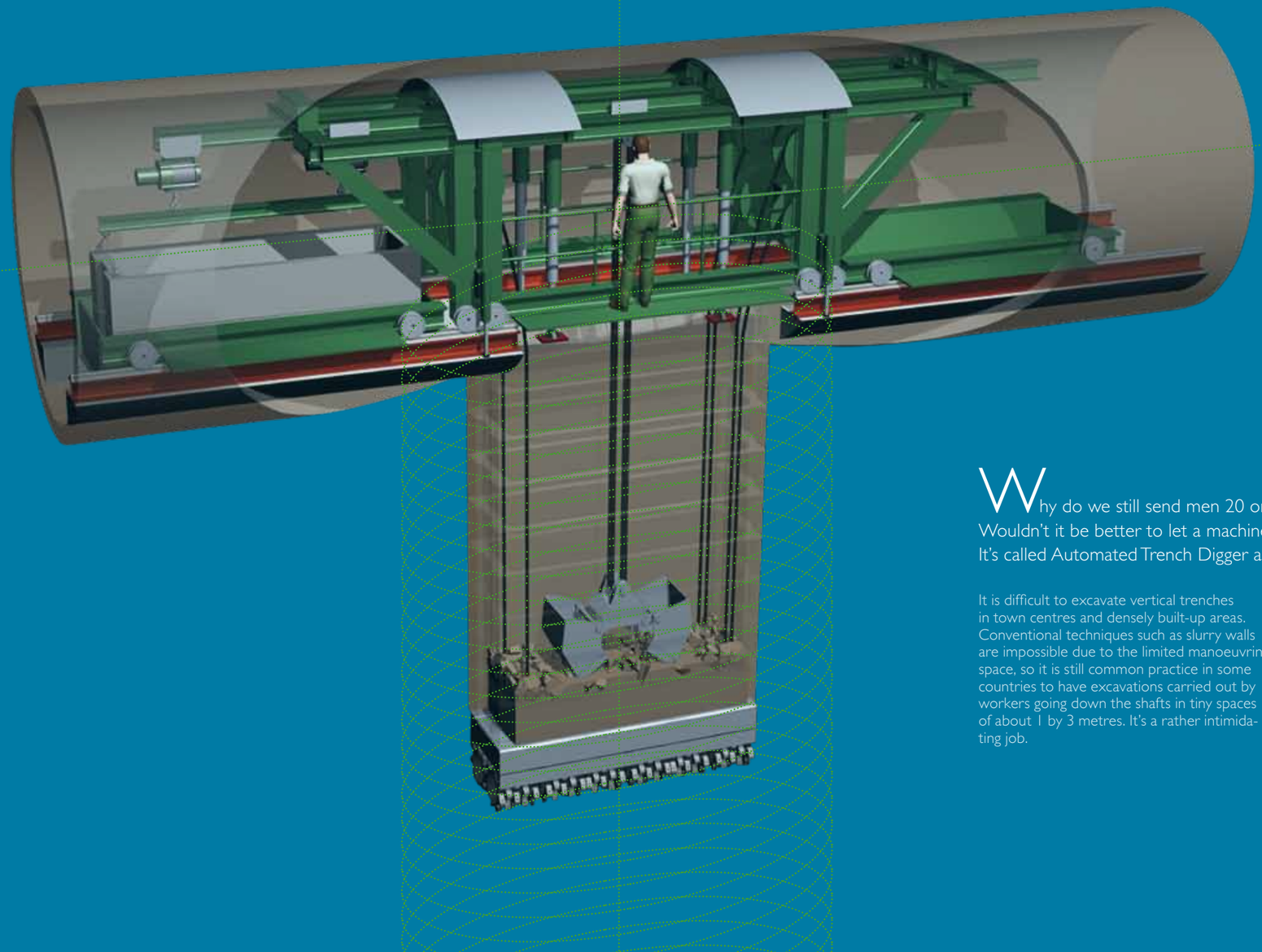
The construction of a nuclear power plant is fiercely intense. At peak times, about two or three thousand people from various contractors are working in close proximity of each other, often day and night. This calls for the highest of safety measures.
In 2006, Denys took up this challenge by agreeing to construct the main cooling circuit of the new unit at Flamanville, France. This unit is one of the first third-generation EPR nuclear reactors in the world. We designed and manufactured 280 pieces of large diameter (up to ND 3500), high pressure (up to 5.5 bars) steel cylinder concrete pipes, the largest of which weighs more than 30 tonnes. Of course, our work has been closely watched by the Nuclear Safety Authority ASN, setting the highest quality standards. Construction works were completed in 2010, with a last consolidation phase to be done at the end of 2012.



*The Nuclear Safety Authority ASN sets the highest quality standards.*

AUTOMATED WALL SLOT EXCAVATION

# WallslotRobot
# a machine for the work down there



Why do we still send men 20 or 30 metres down in tiny shafts to excavate deep vertical trenches? Wouldn't it be better to let a machine do the work down there? Well, Denys has developed such a machine. It's called Automated Trench Digger and it is fast, clean, safe and versatile.

It is difficult to excavate vertical trenches in town centres and densely built-up areas. Conventional techniques such as slurry walls are impossible due to the limited manoeuvring space, so it is still common practice in some countries to have excavations carried out by workers going down the shafts in tiny spaces of about 1 by 3 metres. It's a rather intimidating job.

That's why Denys has developed Automated Trench Digger, a technique that lets a machine do the dirty work:

1. Reinforced concrete elements are driven into the soil by means of four hydraulic cylinders to form a shaft.
2. An excavator machine, attached to the first concrete element, digs into the soil. The soil is taken up and removed via a rail on ground level.
3. Once the shaft is finished, the excavator is removed.
4. Reinforcement is lowered into the shaft and concrete is cast in place.

The system has many advantages, besides the obvious one of working in comfort and safety. While manual excavation usually requires a week to complete, this technique takes just two days, one for the excavation and one to cast the concrete. The technique also enables the consecutive excavation of neighbouring shafts. And, unlike with slurry walls, the concrete casing makes for a clean wall surface.

The technique can be used for various types of projects such as the construction of underground railway stations, the restoration of foundations, and the extension of buildings with subterranean floor levels or underground parking space.

# Keep moving

Mobility is a major challenge in the post-industrial world. Regardless of the population growth, we increasingly expect to be able to travel from one place to another in a shorter space of time. In today's frantic society, we don't want to waste precious time stuck in traffic or waiting for trains, buses and trams. We want to move as quickly – and as safely – as possible from point A to point B. The call for increased mobility is driving numerous infrastructure projects. Yet these very projects are likely to cause traffic jams and delays. And we don't want that, do we?


# Rails and bridges

The Regional Express Network (REN) is under construction. It's not something you can miss. Building the Brussels equivalent of the Paris RER means broadening railway beds and replacing bridges along some major routes. Meanwhile, traffic must keep moving on a daily basis.

Denys is involved in expanding railway line 50A, between Brussels and Ghent, from two to four tracks. We are renewing and widening no less than 17 bridges around Ternat and Dilbeek. We're also doing the associated groundwork, foundations and sewerage, always employing the most appropriate techniques.

One particular challenge was the bridge on the N8 road. Located between Ninove and Brussels, the bridge passes over the railway at Dilbeek. But the N8 is a four-lane national route, with heavy peak-hour traffic to and from Brussels each morning and evening. So, to keep traffic flowing while we did the groundwork below, we had to jack up the bridge. This was particularly difficult with trains still passing by on the existing tracks. Afterwards, the new bridge roadway was constructed in different phases, making sure that three lanes were available at all times, with two lanes reserved for the heavy peak traffic to and from Brussels.

*The work was carefully planned in fourteen phases to keep traffic moving.*

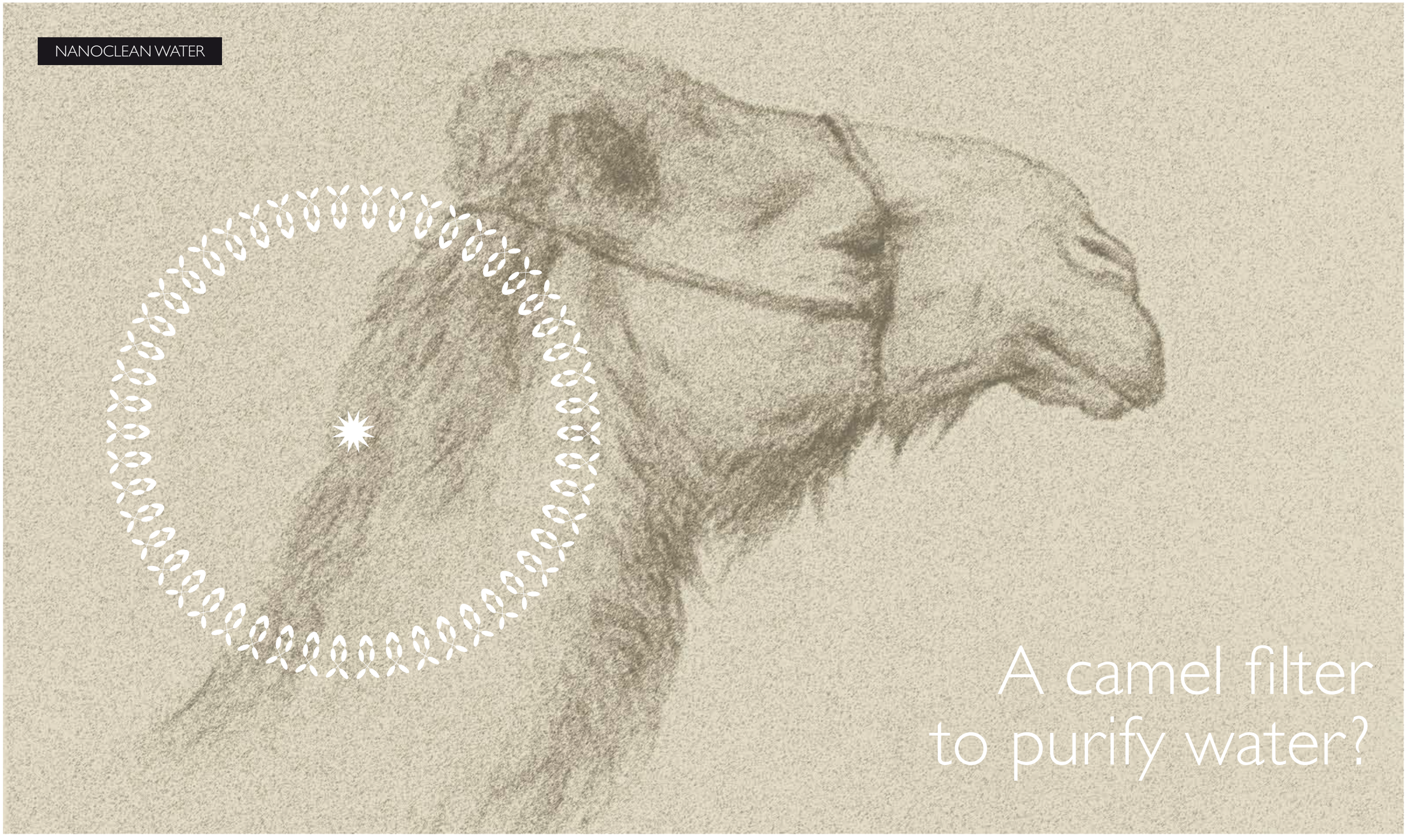
BELGIUM / BRUSSELS, GHENT AND ZEEBRUGGE

# Plug and play tramways

Constructing tramways is a time-consuming affair, and it usually leads to congestion or frustrating detours. Minimizing the lead time is essential, which is why we are increasingly using our own prefabricated tramway slabs with pre-mounted rails. Now, old tramways can be broken up and replaced overnight, without any traffic hold-ups. As long as we pay close attention to the precision of measurements, we can build virtually any track lay-out. Recently, we have successfully completed projects in Brussels, Ghent and Zeebrugge.

*Prefabricated tramway slabs make for a shorter lead time.*

NANOCLEAN WATER



# A camel filter to purify water?

NANOCLEAN WATER


" The aim of the NanocleanWater programme is to find an affordable way to purify wastewater from organic micro-pollutants. "

No, this is not about cigarettes. This is about finding an affordable way to purify wastewater from contemporary organic micro-pollutants. Denys has set up a consortium to develop NanocleanWater, a new technique to remove the tiny fractions of antibiotics, pesticides, herbicides and estrogens that find their way today into the environment and into our drinking water. The technique is based on the use of nanoscopic organisms produced by camels.

*The technique uses antibodies which camels produce to protect themselves against various organisms.*

The European Water Framework Directive 2000 already stresses the negative impact of contemporary contaminants on the environment. Commonly used anodynes, drugs and contraceptives have harmful effects on crustaceans and fish and lead to the 'feminisation' of male sea species. Further downstream, these micro-pollutants even impact human fertility, hence the importance of removing them from any wastewater.

There are various techniques available for the job, but all of them have significant drawbacks. Ozonation can be used, but it emits additional toxic products. Activated carbon is used, but the technique is very expensive and energy consuming.

The NanocleanWater programme, set up by Denys in collaboration with Recticel and the Flemish agency for Innovation by Science and Technology IWT, has a different approach. It uses antibodies which camels produce to protect themselves against various organisms. Known as nanobodies, they prove to be very effective in binding the contaminants mentioned above. They are also very stable. During a three-year programme, we will be developing foams capable of hosting these nanobodies and we will be building and testing filters made of this foam.

CZECH REPUBLIC / GAZELLE PIPELINE

# Speeding up the process

## CZECH REPUBLIC / GAZELLE PIPELINE

" Automated sandblasting and coating is the most recent innovation in speeding up the pipeline construction process. "

Denys is building a 106-kilometre ND 1400 pipeline in the west of the Czech Republic. The Gazelle pipeline transports natural gas coming from the Nord Stream supply line in the Baltic Sea. In this project, we're further speeding up the construction process. Several years ago, we introduced fully automated welding on the main line. Now, we also automate the tie-in welding. Plus we invested in an automatic sandblasting system to prepare the joints according to specifications, avoiding that this would become the new bottleneck in large diameter pipeline construction. We've developed the technique in close collaboration with the Canadian pipeline manufacturer Canusa-CPS.

*The Gazelle pipeline transports natural gas coming from Nord Stream and OPAL supply lines.*

BELGIUM / 'REMISE EN ETAT'

# Choreography with cranes

A pipeline project is only completed when it is invisible again: the landscape is restored to 'as found'. We call that 'remise en état'.

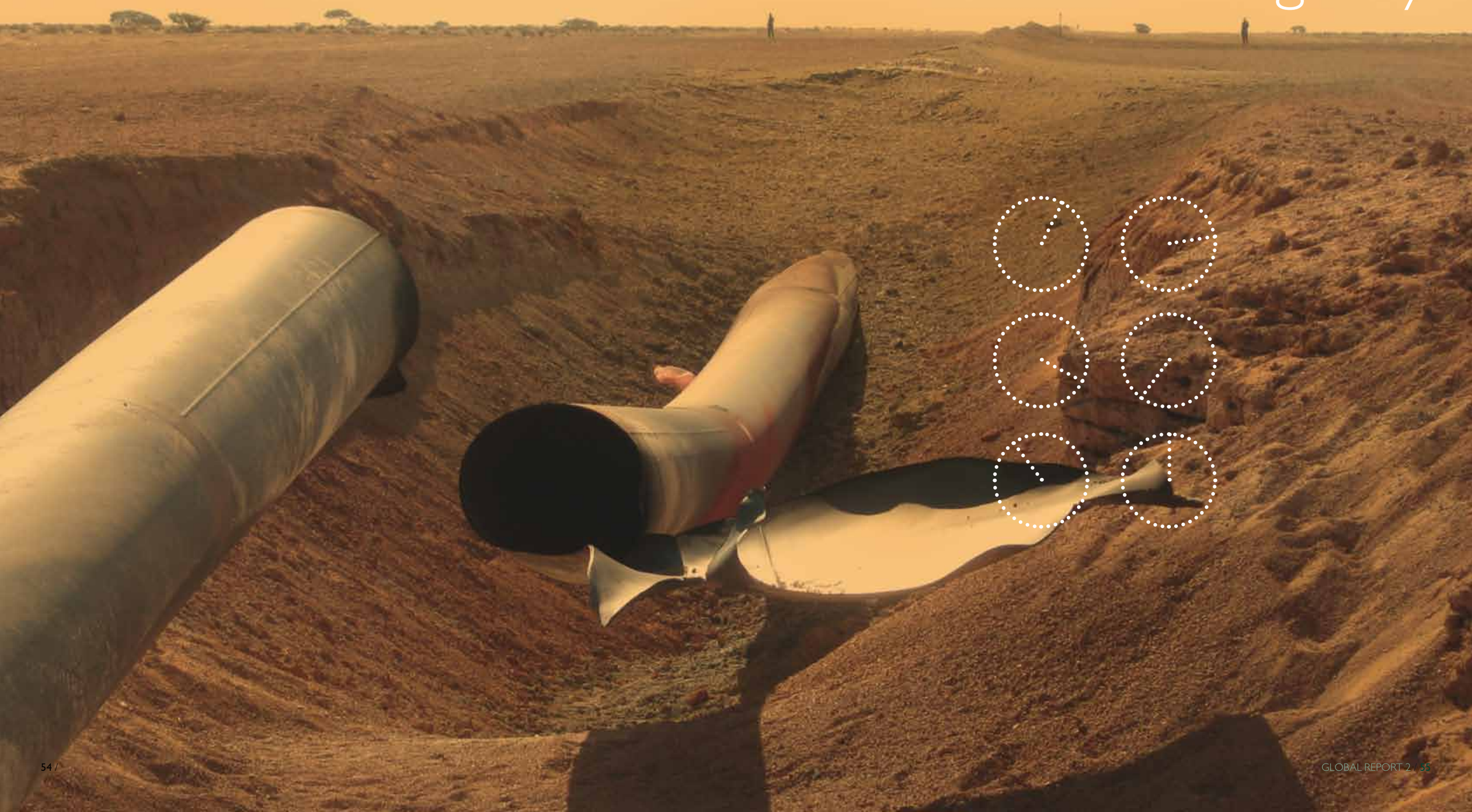
And it's when we're carrying out this 'remise en état' that we sometimes think about ballet. Construction and ballet may not seem natural partners, but there is a certain symmetry. Just look at the graceful movement of the cranes' arms as they refill the trenches and smooth out the scenery.

It's reminiscent of dancers performing a great choreography. From a distance, it's a beautiful spectacle. The cranes move and turn with utter precision and discipline. Just like ballet dancers, they follow a series of well-defined instructions, yet serve a higher cause.

*Having finished the pipeline installation on the Fluxys VTN II project, Denys carefully restored the landscape, and made it even better than in the original condition.*

YEMEN

# Sense of urgency



## Sense of urgency

*The intervention teams are drawn from ongoing projects, so we pick the best people for the task at hand*

In recent years, Denys has been gradually developing its capacity to conduct emergency repairs and on-demand maintenance interventions on pipelines. Only a handful of companies worldwide are well-prepared for this kind of work. This is due to several reasons.

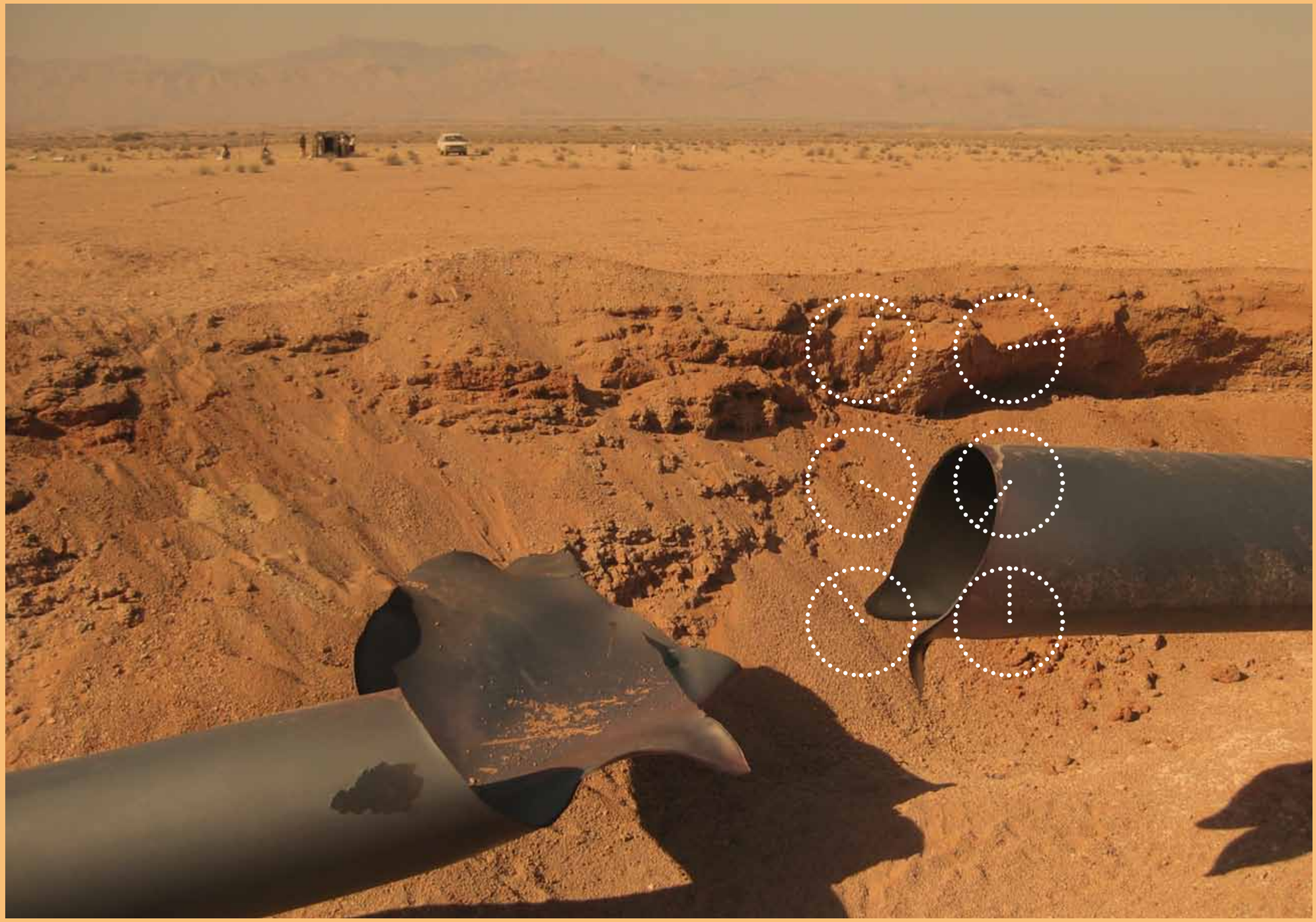
First: it's impossible to plan the work weeks ahead. When a call comes in, it's all hands on deck. You can't afford to have a complete intervention team on constant standby, so you need to build one on the spot. At Denys, we draw these people from ongoing projects. We can do that because we have a large enough volume of work worldwide. Withdrawing one or two workers for a short while doesn't have to affect the project's time plan. And there is a big advantage, too: you can pick the best people for the emergency task at hand.

Second: it's difficult sourcing equipment for emergency interventions. We never rely on just one source. Some of our own equipment is always on standby, and we have a large stock of spare parts, but we also go to our worldwide network of partners.

*We rely on various sources to provide equipment for emergency interventions*

# Act fast, keep cool

When a strategic gas pipeline suddenly goes out of service, losses run into millions of dollars a day. That was the case on Saturday, 15th October 2011 at 0:30 am UTC, when the Total LNG refinery in the port of Balhaf, Yemen was destroyed by a bomb. Here's an account of what happened next at Denys.



**1:00 am UTC**
Incoming phone call from Total: request of putting on alert the emergency team. The pipeline has been destroyed at 75 km from the LNG plant.

**2:10 am. UTC**
Conference call of Denys management. Team members are chosen and alerts are forwarded.

**4:21 am UTC**
Total sends official request the mobilization of the emergency team.

**4:38 am UTC**
Team members receive instructions to mobilize to our head office in Belgium.

**3:15 pm UTC**
After coming in from all over Europe, the team members get a briefing on their mission. Visa and flight tickets are handed over.

**4:30 pm UTC**
Taxi leaves for Paris Charles De Gaulle Airport in order to take the flight to Djibouti at 10:05 pm.

**10 days later, on 25th October 2011, the pipeline was in service again.**

# A great way of working together

Denys is sure it will participate in many more PPP's in the future.

A growing number of public investment projects are being run by public-private partnerships (PPPs). Many things have been said about the advantages and disadvantages of this co-operative model. Well, the proof of the pudding is in the eating, so we decided to tuck in.

Our experience with PPP has been very positive so far. Yes, these projects require much more preparation, time and effort for all parties involved, but the gains are considerable. In the preparatory phase, the public authority is encouraged to formulate its objectives as clearly as possible. What is the project's goal? What are the expected operational benefits? These things have to be agreed on, so we don't discuss specifications, we discuss targets. As a result, the private partners are inspired to propose solutions that best fit the project's goals.

In these projects Denys is also more than a contractor, we have a financial stake in the projects. As a result, we are concerned about the Total Cost of Ownership, dealing with the long-term implications of project decisions. This makes for a much higher quality level and a completely different team spirit during the construction phase. Our project managers say: "What a great way of working together!"

Denys is sure it will participate in many more PPPs in the future.

# Good agreements make good friends



The De lijn project won the first PPP Award from Flemish government

Five years ago, the Flemish Public Transport company De Lijn was facing the challenge of building thirteen new bus depots within the next decade – depots that had to be fully-equipped with a carwash and a service station. The management decided that this huge investment should be financed by operational leasing, so they took a DBFM-contractual approach, meaning that the private partner would take responsibility for the entire project, from financing to maintenance. The depots were to be built on lands owned by De Lijn and were planned to stay operational for at least 25 years.

Denys was eager to participate in this venture from the start. In 2008, we started negotiations with two other contractors and a finance group. We finally established the partnership firm Sicurant with Australian finance group Macquarie and a Belgian general contractor. Half way through 2010, after nearly eighteen months of negotiations with De Lijn, we agreed contractually on the construction of the first three depots in Bruges (196 busses), Overijse (46) and Zomergem (51). Sicurant then commissioned Cofely Services to carry out the building maintenance for the next 25 years.

Construction started in August 2010 and all three depots had to be ready by October 2011, so construction time was shorter than the preparatory phase. Nevertheless, we managed to honour the deadline. The DBFM approach clearly paid off: we had more freedom during construction to make project decisions without having to discuss details with De Lijn or submit time-consuming requests to make changes. That was for the better. No wonder the project won the Flemish PPP Award for its innovative approach and successful delivery.

*The De Lijn project won the first PPP Award from the Flemish Government.*

DENYS

# Making dreams come true




The financial 2008 crisis may have had a severe impact on the number of PPP projects worldwide, but the model is now making a recovery. In the European Union, the yearly PPP transaction size is coming close to 20 billion euros again. More importantly, the PPP market is diversifying. Public Transport is still the largest in transaction size, but Education has the largest number of deals, followed by General Public Services and Public Order and Safety. The UK, France, Germany and Spain are the most active countries, but other countries are gradually catching up. In Belgium, the Flemish Government is actively promoting the PPP model. Denys is currently preparing for the construction of nine communal sports centres, a PPP contract financially closed in April 2012.

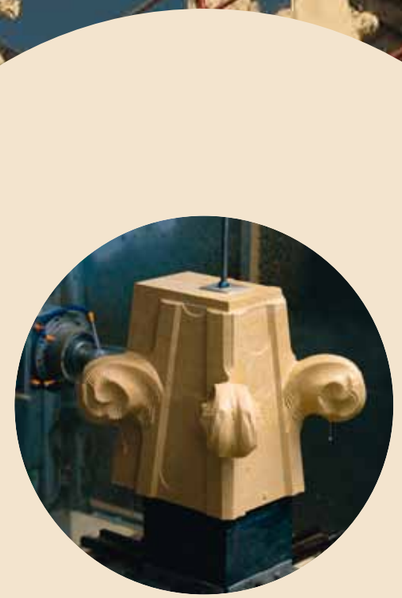
**We are also convinced that the PPP approach could prove successful for some of the larger infrastructural needs in developing countries.**

Huge investments are required to dramatically expand cities in sub-Saharan Africa such as Kinshasa or Lagos, but local governments and authorities are unable to finance them. Why not use PPP there? It could make dreams come true. Roads, bridges, dams, water supply networks.

**Denys is eager to participate by contributing the necessary know-how.**

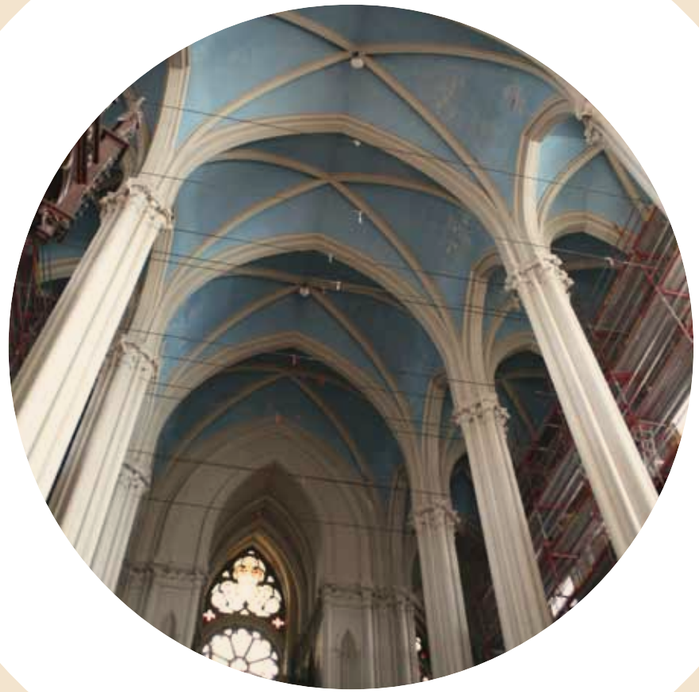
*Denys is preparing for the construction of nine communal sports centres, a PPP contract closed in April 2012*

# Lasting grandeur



BELGIUM / BRUSSELS

## Lasting grandeur



Monument preservation is much more challenging and complex than people may think. Restoration is not, as some believe, restoring monuments to their so-called 'original state'. It's about re-establishing the monument's majestic and artistic value in a sustainable way. For instance, a building cannot have its past splendour reinstated without being given a new or adapted contemporary function. This means compromising between historical authenticity and modern comfort. It also means constraining the duration and cost of the work without neglecting artistic finesse. At Denys, we think true craftsmanship is exactly this: being able to revive a building's grandeur so that it endures.

BELGIUM / BRUSSELS

# Robot-aided Louis XVI

The large tympanum of the Palace of Charles of Lorraine in Brussels had to be reconstructed. Our 3D carving robot did more than its share of the work.

The palace, built around 1760, is a masterpiece of Louis XVI style and is still the jewel in the crown of what is now the Museum Square in Brussels. Denys has been doing façade restoration work here for several years now. The tympanum, which crowns the main entrance of the building, is the tailpiece of that work. At first, we were asked to preserve and restore the original work, but our preliminary investigations revealed too much erosion, so we proposed reconstructing it from scratch.

The challenge was the size of it: the triangular tympanum is 9 metres wide and 1.5 metres high, to be carved and sculpted out of stone coming from the Saint Maximin quarry near Paris. First, we went on site to make a polyester mould from the original. From this, a plaster copy was made, which was then touched up with plasticine to give it the necessary detail.

Next, we made a 3D scan of the touched-up plaster for the cad-cam system controlling our carving robot. Since it was impossible to reach the entire surface in one operation, the carving work was done in small quadrants, one after the other.

Of course, the finishing touch was done by real sculptors, enlivening the relief. Our robot is an efficient carver, but he's no artist.

*The robot couldn't reach the entire tympanum surface in one operation, so carving was done in small quadrants.*

BELGIUM / LEFFINGE

# The ‘cathedral’ stands proud

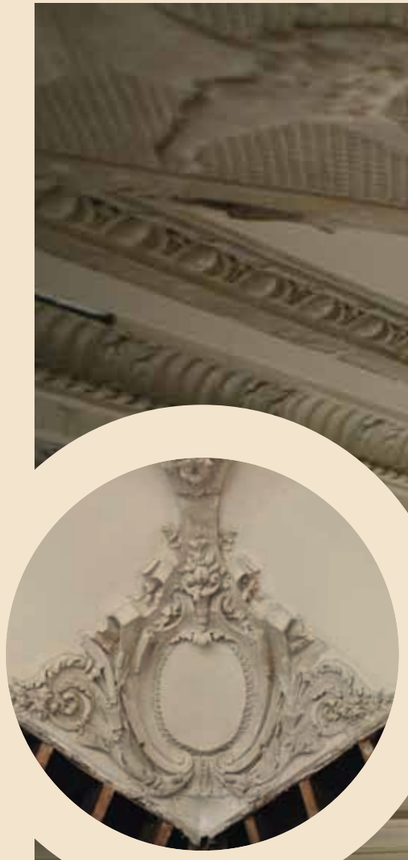
In January, the Church of Our Lady of Leffinge (near the Belgian coast) finally reopened its doors. The monument’s restoration had seemed a never-ending story until Denys took over the work.

Although Leffinge is a small village with only 2,300 inhabitants, the church is monumental, a ‘present’ from Bishop Johan Josef Faict to the village where he was born. The church was inaugurated in 1879 after thirty years of construction and soon acquired the nickname ‘Cathedral of the North’. Alas, it was founded on poor subsoil and it slowly began to settle, at one point up to 20 centimetres. In 1980, the local authorities decided to do something about it, but the preservation and restoration work was taking much longer than planned.

Call it bad luck? Many contractors have worked on the project, but few of them proved equal to the occasion. At any rate, Denys did one fundamental thing in 1990: we improved the foundations under the tower with micropiles, stopping the settlement. But the contractors commissioned with the restoration work went bankrupt, one after the other. We took over in 2010 and finished less than two years later. The ‘cathedral’ is once again standing proud.

*The work included the repair and reconstruction of masonry, stones, leaded windows and cabinetwork.*

# Real craftspeople required



## BELGIUM / LEUVEN

The art of renovation and restoration requires more than just mastering the techniques. It requires insight into the feasibility of a plan and the courage to propose alternatives. Such is the case with the renovation of the railway station in Leuven, a distinguished 19th century neo-cla ssicist building with three impressive tower blocks, heralding the pride of this provincial town. The goal is to revive the entire interior of the building with its beautiful stucco decoration. In 2009, the railway company called for tenders, but the contracting-out took longer than planned because the project was clearly more complex than they had estimated.
The main complication was the false ceiling in the central tower. It was installed in 1953, but in a rather careless way, damaging much of the stucco. "Just cleaning and repainting will not do," said the railway spokesperson. "We need real craftspeople to restore it." Denys made a well-thought-out proposal. We saw that much of the stucco was too damaged to make restoration feasible. It would not be impossible, but it would be too expensive and time consuming. So, at these points, we proposed partly reconstruction instead of restoration. Our plan has been greatly welcomed. The work is planned to be completed by mid-2013.

*In 1953, a false ceiling was installed in a rather careless way, damaging much of the stucco.*

BELGIUM / ASSE CULTURAL CENTRE

# Cool Cultural Centre

*The new centre will integrate perfectly with the existing library.*

**Asse, a municipality of about 30,000 inhabitants on the outskirts of Brussels, will soon have the cultural centre of its dreams. It's a fine, polyvalent building which houses some intriguing green technologies.**

The core of the new building is a 513 seat auditorium, which will be used for a variety of cultural events such as theatre or concerts. It's exactly what Asse needs because the current building cannot host big events. Denys plans to complete the building by mid-2012, after a 21-month construction period.

An interesting aspect of the project is the fact that the centre is built on a hundred so-called energy piles. These piles are equipped with plastic ducts to enable a constant water flux from the building to the soil and back again. This enables the building to cool off during the summer and warm up during the winter, with very low energy consumption. The concert hall itself is cooled with evaporative cooling ('adiabatic cooling'), which consumes much less energy than conventional air conditioning. Furthermore, the roof is equipped with photovoltaic cells. The combined effect is expected to save 35% on primary energy consumption.

BELGIUM / DENYS HEADQUARTERS

# Promises Fulfilled

## BELGIUM / DENYS HEADQUARTERS

2011 will be remembered by Denys as the year we moved into our new Ghent office building. What a pleasure it is! Every day, we enjoy bright open spaces, restfulness, clarity and comfort. It's the perfect place to work in, and it's a warm home to welcome our customers and partners.

*On the face of the building, a huge dynamic sunblind system keeps out the sun's rays but lets in daylight.*

The design by Crepain Binst Architects has fulfilled its promises without a hitch. Our old building has been stripped to the bone, modernised and perfectly integrated with the new extension. The architectural rhythm of it has been preserved, but it's definitely a 21st century building with much more space, great facilities and contemporary convenience. All the special technologies installed live up to expectations. The radiant ceiling cooling system works perfectly, and the ventilation system brings in fresh air all year long without changing the temperature. Extensive isolation, automated workplace heating and presence-related lighting make for low energy consumption. We are proud of the eco-friendly nature of the building. It's even received a 'very good' assessment by BREEAM, which sets the standard for best practice in sustainable building design, construction and operation.

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