Soletanche Freyssinet

#soletanchebachy
#menard
#terrearmee
#freyssinet
#nuvia
#sixense

2019

Foreword

Please note that the content of this Annual Report was written before March 2020.

At the time of publication, it is impossible for us to determine the precise consequences of the COVID-19 crisis.

Nevertheless, the pandemic is likely to have a significant impact on Soletanche Freyssinet's activities, and we anticipate a sharp but temporary decline in sales in 2020.

We are doing everything to bounce back quickly as soon as the health crisis has been brought under control.

Rueil-Malmaison, April 6, 2020

P. 02
Soletanche Freyssinet

P. 42
Soletanche Bachy

P. 54
Menard

P. 66
Terre Armée

P. 78
Freyssinet

P. 90
Nuvia

P. 102
Sixense

Discover
Soletanche Freyssinet's 2019
end-of-year movie using your
smartphone's QR reader

1

Soletanche Freyssinet's companies have played, and continue to play, a major role in building the world around us. Whether in terms of improving daily life (**#makingyourdayeasier**), accessing energy (**#accesspower**), contributing to economic growth (**#fostergrowth**), caring for people's health and safety (**#careforall**) or supporting the environmental and energy transition (**#greenisgreat**), we propose an array of technologies through which Soletanche Bachy, Menard, Terre Armée, Freyssinet, Nuvia and Sixense are well equipped to address the challenges of tomorrow's world.

Manuel Peltier,
Soletanche Freyssinet Chairman

We closed 2019 with a 3.2% increase in revenue compared to the previous year. Our order intake continued to progress, confirming the dynamic growth of the international speciality works sector and the extent to which Soletanche Freyssinet's expertise is aligned with the needs of its markets.

These figures are not only encouraging; they also reflect the trust of all those who work with or for our Group.

This trust is evident in many areas.

First of all, there is the loyalty shown by our customers around the world. This trust in our companies' techniques and expertise is the result of the relationships we have built, together over many years. I am deeply grateful to our clients.

I am also thinking of the continuing trust we have for our 22,500 employees who are committed, passionate and excited about our projects. They welcome challenges and proudly wear our colours in every country around the world. Congratulations to our staff!

We also demonstrate this trust in our interactions with young people; those who tomorrow will be our colleagues or our customers. We enjoy meeting them at student fairs, professional events, or in their learning institutions. They, too, show passion encouraging us to modernise, and to rethink our methods to be ever more agile and efficient..

And, of course, there is the trust placed in us by our families and friends, who listen to our stories, who regularly ask us about our projects and who support us throughout the year.

But we also trust in the world around us. It is a world that is constantly changing and that drives us to project ourselves into the future. As a business that is instrumental in transforming cities and regions, we are at the forefront and contribute with our solutions.

Some of our techniques are intrinsically very resource lean, such as Freyssinet's prestressing systems or Terre Armée®'s walls. We need to take these efforts further by developing ground-breaking, more frugal technologies, reducing the use of raw materials on our projects, and the fuel consumption of our machines.

"As a business that is instrumental in transforming cities and regions, we have solutions to offer for this changing world."

Finally, this trust is expressed in the purpose that drives us at Soletanche Bachy, Menard, Terre Armée, Freyssinet, Nuvia and Sixense: To be useful and to positively transform cities and territories. In fact, this is a fundamental aspect shared by all projects in which we are involved: They are all meaningful, and, once completed, they improve the daily lives of thousands of people around the world..

Alexander, Esteban, James, Ingrid or Maria – whatever their names, these people are you; they are us; they are the people we work with every day, all together, to build the world around us.

#aforceforgood #buildontrust

Governance

Manuel Peltier
Chairman
Soletanche Freyssinet

Christophe Dauchy
Chief Executive Officer
Soletanche Bachy

Stéphane Abry
Managing Director
Soletanche Bachy

Marc Lacazedieu
Chief Executive Officer
Menard

Vincent Oudin
Chief Executive Officer
Terre Armée

Patrick Nagle
Chief Executive Officer
Freyssinet

Bruno Lancia
Chief Executive Officer
Nuvia

Pascal Berger
Chief Executive Officer
Sixense

Mark Deary
Chief Administrative
and Financial Officer
Soletanche Freyssinet

Xavier Planchon
Human Resources Director
Soletanche Freyssinet

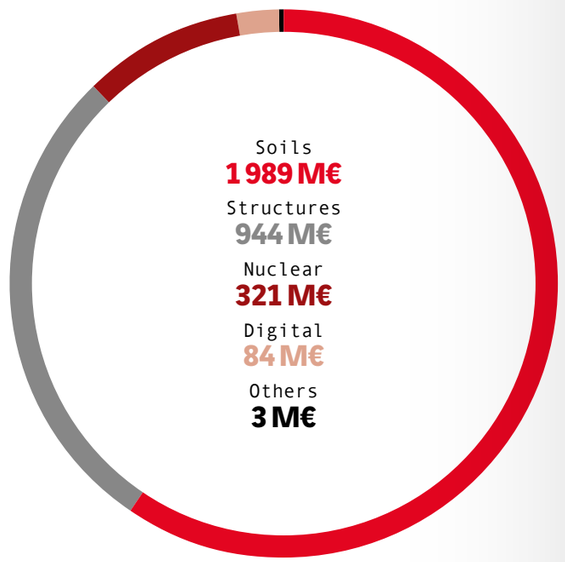
Guillaume Billaroch
Communications Director
Soletanche Freyssinet

Lorenzo Alessi
Quality, Safety,
Environment Director
Soletanche Freyssinet

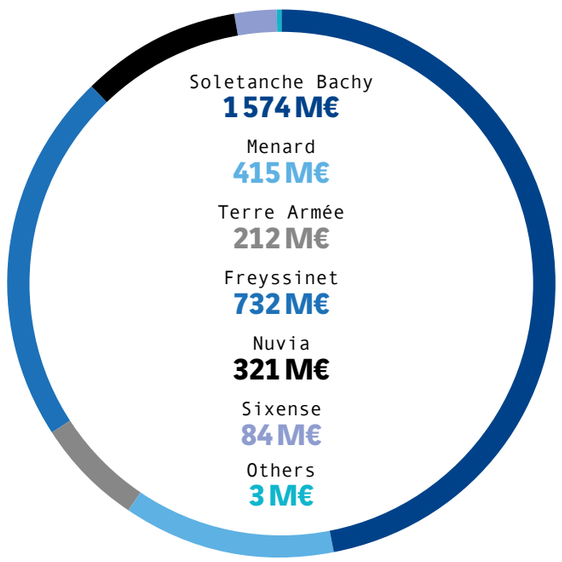
Key figures

Soletanche Freyssinet: Six brands accross four major business activities – soils, structures, nuclear and digital – generating €3,341 billion in revenue thanks to more than 22,000 employees.

Revenue[1] by business line



Revenue[1] by business activity



Revenue[1]
3,341M€

Operating profit from ordinary activities
156M€

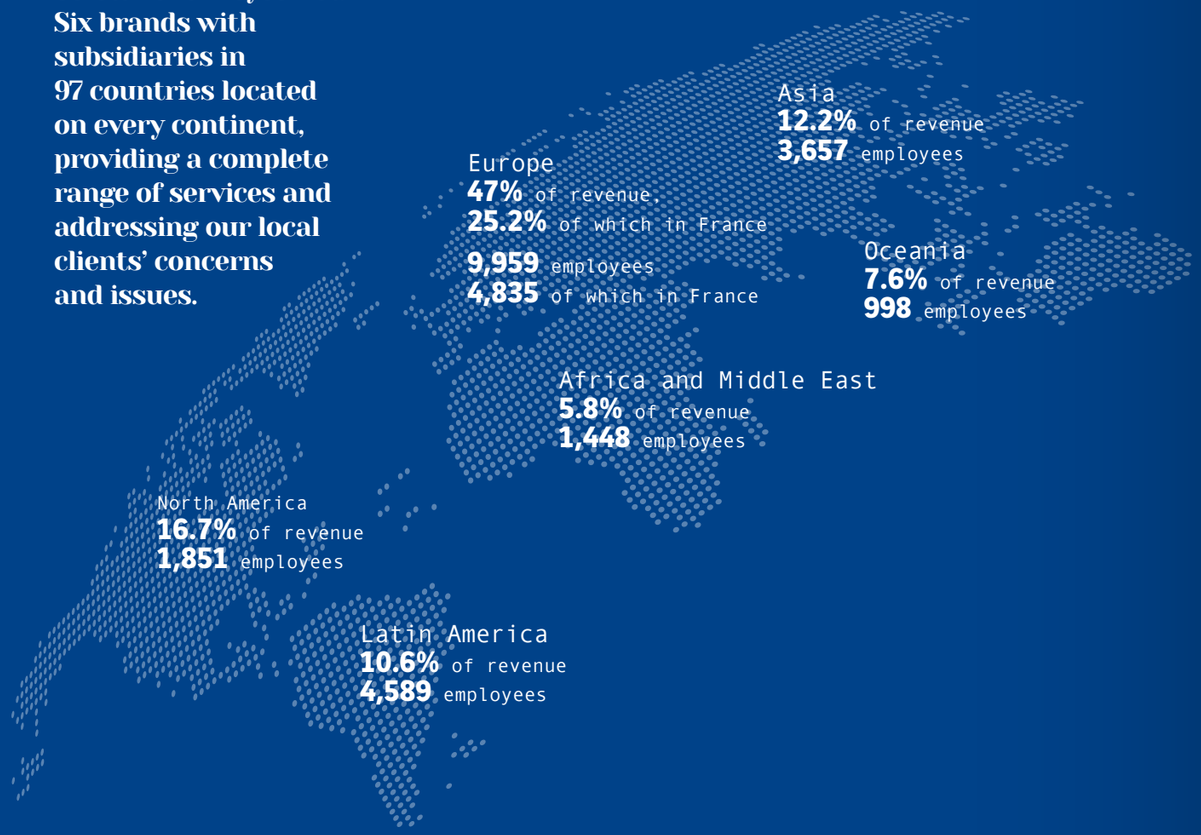
Order backlog
3,672M€

Employees
22,500 See also on p. 40

1 – Managed revenue

Locations

Soletanche Freyssinet: Six brands with subsidiaries in 97 countries located on every continent, providing a complete range of services and addressing our local clients' concerns and issues.



Subsidiaries in 95 countries

Argentina
Australia
Austria
Azerbaijan
Barbados
Belgium
Benin
Bolivia
Botswana
Brazil
Brunei
Bulgaria
Cameroon
Canada
Chile
China
Colombia
Costa rica
Croatia
Cyprus
Czech republic
Denmark
Ecuador
Egypt
El salvador
Ethiopia
France
Georgia
Germany
Greece
Guatemala
Honduras
Hong kong
Hungary
India
Indonesia
Iran
Ireland
Israel
Italy
Ivory coast
Japan
Jordan
Kazakhstan
Kenya
Kuwait
Luxembourg
Macao
Macedonia
Madagascar
Malaysia
Mexico
Monaco
Morocco
Mozambique
Myanmar
Namibia
Netherlands
New Zealand
Nicaragua
Norway
Oman
Pakistan
Panama
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Romania
Russia
Saudi Arabia
Serbia
Singapore
Slovakia
Slovenia
South Africa
South Korea
Spain
Swaziland
Sweden
Switzerland
Taiwan
Thailand
Tunisia
Turkey
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Venezuela
Vietnam
Zambia

2

As builders, we have a positive impact on the lives of men and women and we positively transform cities and territories. This is our very purpose. By building on trust, Soletanche Bachy, Menard, Terre Armée, Freyssinet, Nuvia and Sixense are improving the daily lives of thousands of people around the world.

#making your day easier

Alexandre,

a young start-up founder based in Sofia Antipolis in the South of France, **takes the tram from his hotel in the old town of Nice to the Acropolis congress centre.**

Making daily life easier is one of this world's greatest challenges. With its six companies, Soletanche Freyssinet actively contributes to addressing the many issues related to mobility. Whether it be bridges, tunnels, metro tracks, train stations, airport runways or highways, our teams are involved in designing and building the infrastructures we use daily.

Raphaël

Project Engineer

"For this project, we used many of Soletanche Bachy's flagship techniques such as diaphragm walls, barrettes, treatment grouting, jet grouting and support piles..."

New West-East LRT line in Nice, France
An iconic project in a critical urban environment. Highly technical work carried out in a tricky geological context. The company realised the design and civil engineering works for the tunnel and structural fittings of the LRT's underground section: Six engineering structures including four underground stations.

11.3 km of alignment, including a **3.2 km** tunnel running below the dense city centre, transporting **10,500** passengers daily and reducing by **20,000** the number of cars on the street.

#soletanchebachy

Bridges

Bypass around Rosenheim, Bavaria (Germany)

Menard is laying the foundations – using soil improvement and piles – for a 480-metres bridge in the Munich/Salzburg/Innsbruck triangle, a vital traffic junction which also serves as a gateway to Italy. The bridge will bypass the municipality of Rosenheim, Bavaria's third largest city, and provide easy access to the A8 motorway.

Please refer to the Menard booklet on p. 62

Mobility

Grand Paris projects under scrutiny (France)

Sixense is consolidating its role as a major player in the Greater Paris development project, the largest of its kind in Europe, by offering a full range of monitoring and engineering services (defect investigation, monitoring and consultancy in relation with controlled management of acoustic and vibratory impacts, 3D imaging...). This one-of-a-kind public transport project comprises 200 km of automated metro track.

Please refer to the Sixense booklet on p. 104

#making your day easier

Highways

As part of the Transform 66-Outside the Beltway project, The Reinforced Earth Company USA is designing and supplying 186,000 m² of Reinforced Earth® walls, 4.6 km of coping and 36.6 km of concrete half-connector barriers. This is one of the largest contracts in the history of Terre Armée.

Please refer to the Terre Armée booklet on p. 73

© Work was performed as a subcontractor for FAM Construction on the Transform 66 Outside the Beltway project

Bridges

Open to traffic since 1941 and one of the major thoroughfares of Ho Chi Minh City, the Y Bridge needed to be modernised to stand up to new traffic conditions. Freyssinet was contracted to widen the deck by 1.9 m to allow for four lanes instead of two, and to reinforce the structure to accommodate heavier vehicles (weight limit raised to 18 T from 13 T). The deck widening work was carried out under live traffic conditions.

Please refer to the Freyssinet booklet on p. 87

#access power

Esteban,

a renewable energy consultant,

has prepared a very special menu for his wife, Zia's, surprise birthday party.

Opening a tap, turning on an oven, streaming the latest show, programming the heating system... these everyday things are made possible by the many sources of energy available around the world. Soletanche Freyssinet's companies work on designing, building, and modernising dams, water towers, silos, nuclear power stations and wind turbines on all continents.

Jérôme

Operations Manager

"We sealed 6,500 LM of gaps between stones, working from suspended platforms, cut back 40 m³ of granite stones and applied 230 m³ of dry-process shotcrete from scaffolding suspended from the crest of the dam to cover 1,800 m² of facing."

Mesches Dam, Alpes-Maritimes, France
100 years of age, 1,400 metres above sea level, 65 metres high. Maintenance and waterproofing work commissioned by EDF: Stones were repointed over an area of 1,400 m² of stone and a shotcrete mask applied over a surface of 1,800 m².

Supplies **50,000** people daily with electricity

#freyssinet

Dams

Underground cut-off wall for Boone Dam, Tennessee (United States)

Nicholson Construction, a subsidiary of Soletanche Bachy in the United States, is building a large underground cut-off wall at Boone Dam (255 m long, 50 m deep), involving drilling into very hard rock. This project is the final major stage in the construction of a composite seepage barrier that is designed to stop internal erosion of the dam's earthen embankment.

Please refer to the Soletanche Bachy booklet on p. 51

Hydroelectric power station

Larona hydropower plant canal gets new look (Indonesia)

In only eight weeks, CARPI, a Freyssinet subsidiary specialising in waterproofing works, completed the waterproofing of the Larona hydropower inlet canal (three turbines with continuous power capacity of 165 megawatts). The canal is 7 km long, 14.4 m wide, with a maximum flow of 148 m^3 per second.

Please refer to the Freyssinet booklet on p. 85

#access power

Nuclear power

Nuvia, through a major contract for radiation protection services with Canada's largest private nuclear power generator, will make a significant contribution to the life extension programme of the Bruce Power nuclear generating station, the largest nuclear infrastructure project in the country.

Please refer to the Nuvia booklet on p. 99

Copper mines

Tierra Armada Chile built 17 Terre Armée® walls in Chile as part of the Spence open-cast copper mine expansion project aimed at extending the lifespan of the mine by 50 years, and significantly increasing its production capacity. The maximum height of these TerraPlus® walls is 30 m.

#terrearmee

#foster growth

James,

a dockworker in the port of South Louisiana,
loads approx. one hundred containers a day that are bound for the whole world.

Construction fosters economic development. In the countries we operate, we actively contribute to the economy by helping to build ports, museums, commercial buildings or even stadiums.

Rodrigo

Branch Manager

"We installed a precast floor, which was designed specifically for the needs of the project, using more than 9,000 m³ of concrete."

Protection of the Port of Valparaíso, Chile
This is one of South America's major harbours. In 2015, the port infrastructure along the Valparaíso coastline suffered significant damage from powerful waves. Terre Armée fabricated and installed 248 precast walls to act as wave barriers and 2,200 concrete cubes to dissipate the energy of the waves.

#terrearmee

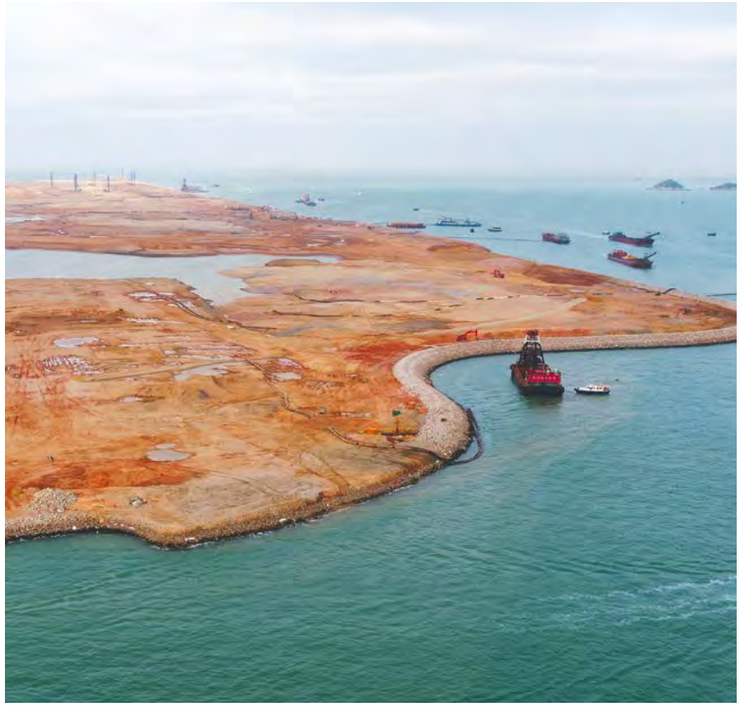
11 Mt of cargo,
1 M shipping containers,
more than **50,000** passengers per annum.

Airports

Sixense ready for take-off at Hong Kong airport

Hong Kong's authorities have embarked on an extension programme to maximise capacity at the world's eighth largest airport and serve an ever-increasing number of travellers; this includes building a third runway. Sixense is providing support by implementing a large-scale geotechnical monitoring system across this project.

Please refer to the Sixense booklet on p. 109



Industries

Reinforcing a sub-floor in an enclosed building, Dunkirk (France)

Near Dunkirk, France, Menard has taken up a unique technical challenge: to reinforce the sub-floor of an existing factory without suspending production operations. A daunting project given that the average ceiling height of 7 m prevents the use of a conventional drilling machine.

Please refer to the Menard booklet on p. 56

#foster growth

Progress in medicine

Nuvia is providing support (consulting and project management assistance) to the Bolivian Nuclear Agency and Rosatom as part of a project to design and build a nuclear research centre in El Alto, Bolivia, one of the world's highest cities (4,200 m above sea level). The centre will enable Bolivia's medical professionals to start screening and treating cancers, thereby making nuclear medicine more accessible to the general population.

Please refer to the Nuvia booklet on p. 96

Buildings

Freyssinet has taken part in the construction of the 180-metre-tall Caleido Tower, the 5th skyscraper in the Cuatro Torres Business Centre located in the heart of Madrid (Spain)'s business centre. The teams designed, supplied and installed the prestressed slabs for the tower's 35 storeys, which will house a university campus and an international convention centre.

Please refer to the Freyssinet booklet on p. 88

#care for all

Ingrid,

a social science student in Perchtoldsdorf,
attends Austria's Nova Rock Festival every year.

People's health and safety are one of the most important issues in the world. Soletanche Freyssinet's companies provide tangible solutions in this field by manufacturing medical equipment, upgrading industrial or residential installations to seismic standards, monitoring engineering structures or worksites, securing nuclear facilities or reinforcing buildings.

Dominique

Director, NUVIATech Instruments and Healthcare

"We are very proud that our NuVISION gamma camera has been approved by the Security Committee for the 2024 Paris Olympic Games."

The NuVISION gamma camera
With the ability to detect, locate, and, determine the nature and intensity of a radioactive source and to remotely track it in a crowd, this camera is an effective aid in combating radioactive threats. Developed by NUVIA in collaboration with the CEA-Leti, NuVISION is recognised as one of the most cutting-edge technologies on the market for homeland security and surveillance of major events.

4 functions combined in one unique radiation monitoring device

#nuvia

Urban development

Downtown infrastructure development and protection programme, Auckland (New Zealand)

To facilitate the hosting of large-scale international events, the city of Auckland has launched the Downtown Infrastructure Development Programme (DIDP). This ambitious project is aimed at making the waterfront more welcoming and more functional, and, most importantly, better shielded against seismic activity, thereby protecting pedestrians and cyclists. Soletanche Bachy has designed an alternative foundation solution that combines piles, anchors and jet grouting.

Please refer to the Soletanche Bachy booklet on p. 48

Buildings

Seismic isolators for Melipilla Hospital (Chile)

Freyssinet manufactured and installed seismic isolators as part of the Melipilla Hospital construction project in Chile. For Freyssinet Chile's teams, this is the third base isolation project in the public health and safety sector after another hospital and the Criminal Investigation Department's Criminology Laboratory.

#freyssinet

#care for all

Waste water treatment plant

In western Panama, Menard was commissioned to carry out soil improvement works for a future wastewater treatment plant. Crews supplied and installed dry stone columns (35 linear metres) and vertical drains (80 linear metres). Ultimately, the 250,000 inhabitants of the town of David will enjoy access to a safer and more efficient water treatment system.

Please refer to the Menard booklet on p. 64

Nuclear decommissioning

To study various decommissioning scenarios for its Brennilis nuclear power plant, EDF needs to rely on highly accurate data. The French electric utility company hired Sixense to collect the geometric and visual data from the reactor containment structure and to carry out the as-built model of the building.

#sixense

#green is great

María,

a diehard supporter of the Uruguayan team,
goes to her club's grounds every Saturday morning for football practice.

Soil decontamination, cladding facades with photovoltaic panels, dismantling nuclear facilities, building prestressed concrete wind turbines to capture the highest and strongest winds... Soletanche Freyssinet's companies offer a wide range of techniques to address the challenges of the environmental and energy transition.

Nicolas

Project Engineer

"To give you an idea of the technical aspects, here are some key figures regarding the injection phase of our soil mixing project: auger diameter 1,200 mm, 356 six-metre-deep columns, 5 t of zerovalent iron injected at depths ranging from -3 to -6 m."

Former industrial wasteland, Voiron, Isère, France
In-depth treatment, by chemical reduction, of residual chlorinated compounds located in soil below the groundwater level, followed by soil reinforcement.

#remea

The site will subsequently accommodate a new roadway designed to relieve traffic congestion in the town (**bus and cycle lane**) as part of a housing and commercial development plan

Riverbank stabilisation

Jia Bharali River (India)

Terre Armée India is involved in the Jia Bharali River bank stabilisation project. 25 km of TechRevetment® protection were deployed to protect the banks and the embankment of the river channel and to contain its course in case of flooding.

Please refer to the Terre Armée booklet on p. 75

Sustainable buildings

Audi Airport Training Centre, Munich (Germany)

Audi's specifications for its brand-new training centre were in line with their slogan "Progress through technology", i.e. to build a modern and environmentally sustainable building. Activskeen incorporated photovoltaic panels (118 modules in 32 different sizes) into the construction, thereby enabling the building to produce its own solar power, which in turn will serve to charge the centre's electric vehicles.

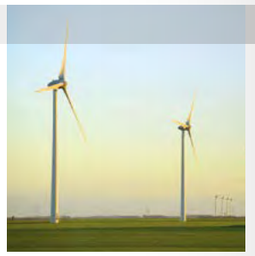
#activskeen

#green is great

Wind farms

Sixense is assisting Nordex in the development of its wind farm projects by taking part in the development of the noise abatement component of the environmental impact assessments. This long-lasting partnership has grown from a collaboration on more than 50 projects throughout France.

#sixense



Brownfield remediation

As part of a major environmental radiation monitoring project in Ukraine funded by the European Commission, Nuvia is contributing to the development and supply of equipment and software used to measure dose rates in radioactive waste storage facilities, with the aim of improving safety for on-site personnel, the public and the environment. The purpose of the monitoring system is to prevent even the smallest living creature from coming in contact with radioactive waste and thereby contaminating an entire area via the food chain.

Please refer to the Nuvia booklet on p. 100

Discover Freyssinet's teams in Rwanda using your smartphone's QR code reader

Community engagement

Engaging with the community also means playing a role in addressing the major issues affecting our world. Here too, Soletanche Freyssinet companies are involved in many local initiatives in the countries in which they operate.

Following the success of last year's mission in Togo, Freyssinet has once again partnered with American NGO Bridges to Prosperity in a project to build a pedestrian bridge in Uganda, in partnership with Swiss company T-Ingénierie. A total of five volunteers were selected from each of the two companies to take part in the construction of the Kapkwomboloi bridge. Built with the help of Freyssinet and T-Ingénierie volunteers, the footbridge has improved daily life for members of the Kurumbono community who until then had to cross the river using tree trunks to reach the market, health centres and schools.

3

Around the world, Soletanche Freyssinet strives to apply and to develop the **fundamentals** that have created its reputation. These are based on four pillars: engineering, safety, the environment, and human resources. Combined with the recognised expertise of Soletanche Bachy, Menard, Terre Armée, Freyssinet, Nuvia and Sixense, they are the foundations that allow us to maintain our position as world leader in specialty construction activities and to daily demonstrate our unwavering commitment to our customers, suppliers, and employees.

Engineering

As the world leader in our businesses and specialties, our ambition is to provide excellence in our services. Technical innovation is part of our DNA. Our companies have always expanded by harnessing their spirit of enterprise, which entails challenging the status quo, seeking to optimise processes, inventing new techniques and bringing them to the market.

Discover Soletanche Freyssinet companies' innovative projects using your smartphone's QR code reader

Çanakkale highway viaducts (Turkey)

An innovative solution based on high-capacity dampers, presented as part of a design-build project for a series of viaducts spanning 5 km in an earthquake-prone region. Freyssinet has already won D&B contracts for 13 km of bridge decks over the past five years as part of this ongoing highway construction project.

#freyssinet

Epure – Project completed (France)

Step-by-step coordination and management of designs (from preliminary to detailed studies) and construction work for the Epure radiography facility (Franco-British collaboration agreement). The aim is to study the behaviour of materials subjected to extreme temperatures or pressures. In partnership with VINCI Construction France.

#nuvia

Innovation

Soletanche Bachy reinvents the Hydrofraise®. A more powerful, more efficient and more versatile tool, now equipped with a gripper module, the Hydrofraise® with grippers can drill diaphragm walls at greater depths, even in extremely hard soils.

#soletanchebachy

FlexiCore (patent pending) is an alternative to connectors used in Reinforced Earth® structures to attach concrete panels with geosynthetic reinforcements. A reusable casting element creates a hollow loop directly in the concrete panel through which the reinforcement strips can be pulled. Requiring fewer materials, the solution is very cost-effective.

#terrearmee

Safety

**Soletanche Freyssinet stands by its commitment to the safety, health and security of its employees on a daily basis.
As builders, we are shaping the world of tomorrow, together with all those who work for us. We therefore feel a great sense of responsibility towards the men and women of the Group.**

3.8%
Frequency rate[1]

0.3%
Severity rate[2]

232,226
training hours focused on HSE issues (Hygiene, Security, Environment)

1 – number of lost-time workplace accidents x 1,000,000 / number of hours worked.
2 – number of days lost due to workplace accident x 1,000 / number of hours worked.

Raising awareness among young people

In Warsaw, Poland, Soletanche Bachy organised an educational campaign for schoolchildren living near a construction site, aimed at informing, explaining, and raising awareness about possible dangers. The surroundings of any construction site are a constant hazard, and denser road traffic around the site entails a greater risk of accidents involving the youngest members of the public.

#soletanchebachy

Raising awareness among the business units...

"See it - Say it - Stop it!" As part of the 5th International Safety Week, Freyssinet's message aimed at jobsite crews was strong and impactful and was meant to encourage concrete actions. In addition, each BU received a complete awareness-raising kit.

#freyssinet

... and staff members at the head office

As part of International Safety Week, a several awareness-raising activities, such as road hazard recognition, an escape game "shared vigilance" and first aid training were organised at Soletanche Freyssinet's head office.

#soletanchefreyssinet

Environment

As we face challenges related to climate change, the environment is at the forefront of our business and strategy. We must set an example for our customers and for future generations, in particular by reducing the environmental footprint of our businesses.

At Soletanche Freyssinet, we are committed to reducing our CO_2 emissions by **40 %** by 2030

World first: an electrically powered Hydrofraise® in London

An electric Hydrofraise® is at work below the streets of London. By developing this electrically powered machine, Soletanche Bachy is helping Tideway, the commissioning authority, to reduce its environmental footprint (significant decrease in noise and emissions levels).

#soletanchebachy

Taking a strong stance

Soletanche Freyssinet has adopted a clear environmental approach with the slogan #GreenIsGreat, aiming to reduce the ecological footprint of its businesses. This entails defining a clear strategy and implementing meaningful, targeted and measurable actions, in particular by addressing our water and fuel use as well as improving waste management.

#soletanchefreyssinet

More than 7,000 trees planted

In keeping with the Group's Environmental Action Plan, Soletanche Bachy International is launching its first initiative: to offset 80% of its 2019 travel-related CO_2 emissions by planting more than 7,000 trees in 2020 in France and around the world (Tanzania, Indonesia, Reunion Island, etc.), through a partnership with Reforest'Action.

#soletanchebachy

Solar panels

Using solar panels at the M62 River Ouse bridge site in the UK to supply the base camp with electricity.

#freyssinet

Green Idea Award

All the Group's employees have been invited to enter a competition entitled "Green Idea Award", which promotes the most innovative ideas and best practices aimed at reducing our operations' environmental footprint..

#soletanchefreyssinet

Beehives on site

Soletanche Bachy's Eurofrance Equipment Department has installed an apiary on its site. Volunteers can tour the beehives in beekeepers' outfits, thus increasing their knowledge of bees and gaining awareness of their importance.

#soletanchebachy

Human resources

Our corporate culture is founded on values such as transparency, responsiveness, entrepreneurial and team spirit. Our employees are proud to belong to the Soletanche Freyssinet Group and enjoy a great deal of autonomy in carrying out their projects. We value our employees' expertise and support them in their development.

22,500
employees

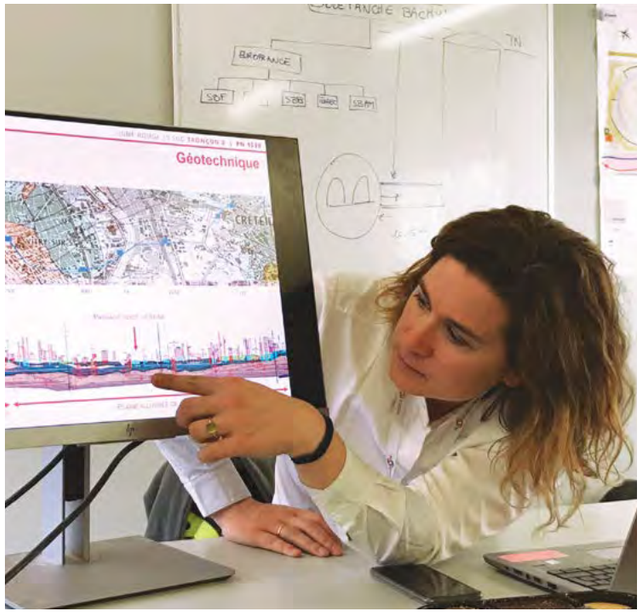
18%
of managers are women

18,321
people under permanent work contract

27%
of staff are below 30 years of age

39 years
old – average age of employees

165,349 hours
of technical skills training delivered as part of continuing education



Gender mix

Our company has partnered with "Elles bougent" (French for "They move"), a community-based organisation whose goal is to encourage school girls to consider pursuing technical and engineering careers. Actions include construction site visits and attending an Engineering Conference with a presentation on the wide array of jobs open to women in the Group.

#soletanchebachy

Employee survey

Survey on well-being at work at Menard in Poland. 70% participation, 94% interest in the company, and 80% satisfaction rate. 2/3 of employees feel that they can grow within the company and picture themselves working for Menard for the next 3 years. Enhanced employee engagement and better understanding of the company's strategy.

#menard

Programmes for young people

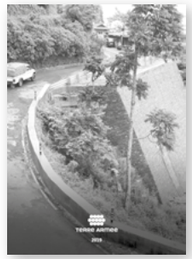
Nuvia France's "Open Career" programme: Young graduates are offered permanent contracts, and, for the first two years, receive training in nuclear engineering. They then study for a five-months period, followed by three internships of six months each in a Nuvia entity in France or abroad, before starting to work within one of our teams. On a similar note, Nuvia UK has launched a Graduate Scheme.

#nuvia

P. 42

P. 54

P. 66



P. 78

P. 90

P. 102

SOLETANCHE BACHY

2019

Soletanche Bachy is a world leader in foundations and soil technologies. The group has around 80 subsidiaries and agencies operating in 60 countries to offer effective and innovative solutions to public and private clients. The Group operates as a general contractor and a specialist subcontractor to design, build, rehabilitate and maintain infrastructure: ports, dams, car parks, metros, tunnels, energy facilities, buildings, etc.

2019 revenue
1,574 M€

Employees
9,080

Main contracts acquired in 2019

- → **C3 package for City Rail Link,** Auckland, New Zealand
- → **Phase III (berths 11 and 12) for Port 2000,** Le Havre, France
- → **Shafts and tunnels for Annacis Island wastewater treatment plant,** Canada
- → **Extension of Hyatt hotel,** Mexico City, Mexico
- → **Phase 2 of Ituango dam,** Colombia

On cover

La Rotule quay, Fos-sur-Mer, France

At the Grand Port Maritime in Marseille, which activity is growing fast, Soletanche Bachy built a 240m long extension for a container quay, to a depth of 17m. The works include the connection to two existing quays as part of an expansion of the container handling capacity. Our teams have implemented an alternative solution using diaphragm walls. This project was completed with ForSHORE, Soletanche Bachy's new brand for maritime works.

#fostergrowth

Three questions to...

Christophe Dauchy, Chief Executive Officer

What were the key events for the company in 2019?

First and foremost, safety! We must not become complacent or lower our guard, because nothing can ever be taken for granted. But thanks to the commitment of our teams and their transparency, the safety culture is gaining ground everywhere across the group.

In 2019, we worked on over 4,000 projects, including showcase projects such as the Grand Paris Express, the construction of the largest shopping mall in Warsaw, the foundations of Hong Kong airport's third runway, or repair works on the Boone dam in Tennessee. Our teams have also won major new contracts, such as the Annacis Island waste water treatment plant in Canada, City Rail Link C3 contract (in cooperation with VINCI Construction Grands Projets) in Auckland, or Phase III of the Port 2000 extension in Le Havre.

These successes have led to an increase in our backlog, which is now close to €2 billion. We have also seen our profitability rise quite uniformly across all our geographies. These results seem to indicate that our strategy, based on strong local roots, is the right one. Now the time has come to convert the try!

And lastly, we have continued to innovate, through the launch of Z-Lyze, our big data platform which to date has been deployed across more than 1,000 jobsites.

What are your priorities for 2020?

Our goal is to become the preferred ground engineering contractor, delivering the best global performance on each market.

And to achieve this, our strategy is very clear:
- Push further our local rooting;
- Leverage locally on our global presence, by further strengthening the collaboration between Soletanche Bachy Major Projects and our local business units;
- Develop new lines of business, such as ForSHORE, our brand specializing in ports and maritime works;
- Innovate and accelerate our digital transformation.

> "To become the preferred ground engineering contractor, delivering the best global performance on each market."

In early 2020, you launched an Environmental Action Plan. What are its main lines?

All of society, our communities, and our clients are really asking us for concrete actions in response to today's environmental challenges.

With our Action Plan, we have set ourselves an ambitious goal: to reduce our greenhouse gas emissions by 40% between now and 2030 (scopes 1 and 2). We will also be placing a special focus on treating and recycling our waste, and significantly reducing our cement consumption (scope 3) in the coming years.

True to our DNA, we favour a pragmatic and local approach. Each of our subsidiaries will develop its own Action Plan and we will be vigilant and make sure that each of them is relevant, high-impact and truly applied.

Governance

From left to right:

Lorenzo Alessi
Quality, Safety, Environment Director

Laurent Lefebvre
Managing Director - Eastern Europe, Turkey, Middle East, Central Asia area

Raphaël Mailhé
Executive Vice President in charge of the Administrative and Financial Division

Alexandre Miletitch
Communications Director

Nicolas Patrier
Operations Director

Julien Landrot
Managing Director – Asia Pacific Area

Christophe Dauchy
Chief Executive Officer

Mark Bader-Hellstrom
Managing Director - North America area

Daniel Viargues
Managing Director - Eurofrance area

Stéphane Abry
Managing Director

Serge Borel
Executive Vice President in charge of the Technical, Marketing and Equipement Division

Maia-Gaëlle Lacassagne
Human Resources Director

Philip Hines
Managing Director - United Kingdom area

Jean-Luc Gobert
Managing Director - Africa area / Director of Major Projects division

Wolf Kurzel-Runtscheiner
Legal Director

Bernard Théron
Bessac President

Pierre Guiot du Doignon
Managing Director - Iberoamerica area

Urban development

Downtown infrastructure, Auckland, New Zealand

To host international events, the city of Auckland launched the Downtown Infrastructure Development Programme (DIDP). Its aim is to make the waterfront more resistant to earthquakes, more pleasant and functional. Soletanche Bachy International has designed an alternative foundation solution that combines piles, anchors, and jet grouting.

#careforall

Shopping centres

Młociny gallery, Warsaw, Poland

Soletanche Polska executed geotechnical works for the construction of the new shopping centre Młociny, the largest one in Warsaw. We implemented an optimised solution comprising diaphragm walls over 1,000lm at an average depth of 16 metres, nearly 900 ground anchors and over 2,300 micropiles. The first clients came into the shopping mall May 23, 2019.

#fostergrowth

Buildings

Mohammed VI Tower, Rabat, Morocco

In 2022, the Mohammed VI Tower in Rabat will become the tallest building in Morocco, and one of the tallest in all Africa. Driven by Soletanche Bachy International and Solsif Maroc, this outstanding project is notable for the close internal collaboration between the Group's various divisions to create the building's foundations. 3,000 stones columns, over 100 barrettes and 1,800 CFA piles have been used for this project..

#fostergrowth

Subways

Grand Paris Express, France

Soletanche Bachy France is working with Bessac and Soletanche Bachy Tunnels, our subsidiaries specialised in tunnels, on T2A, T3A and T3B packages of the Line 15 South of the future Grand Paris Express metro. Our teams delivered 7 stations and several additional structures using diaphragm walls (down to 70 metre depth). They also started boring the tunnels with three tunnel-boring machines. In addition, we have also used grouting and freezing techniques to make drilling possible for a station located under neighbouring buildings.

#makingyourdayeasier

Airports

New runway for Hong-Kong airport, China

For the construction of Hong-Kong airport's third runway, Soletanche Bachy is carrying out one of the largest-ever Geomix® ground reinforcement projects. For this outstanding project, 16 bespoke compact Cutter Soil Mixing (CSM) machines have been designed and manufactured in order to install close to 85,000 CSM panels with restricted headroom and without altering the airport's operations. In order to protect biodiversity, especially pink dolphins living in the Pearl river delta, the pace of the works has been adapted to the observations of a team dedicated to supervising marine wildlife in the area.

#makingyourdayeasier

Dams

Boone Dam, Tennessee, USA

The teams from our subsidiary Nicholson Construction, in joint venture with Soletanche Bachy International, are building a massive, underground cutoff wall at Boone Dam (255-metre length and 50-metre depth), which requires drilling in very hard rock. To do this, we are using the secant pile wall method with RCD. It will be the final, major piece of a composite seepage barrier designed to stop internal erosion of the dam's earthen embankment.

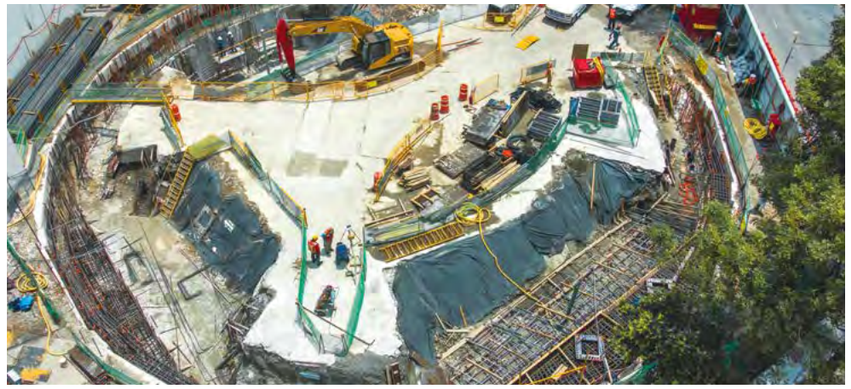
#accesspower

Buildings

University Tower, Mexico City, Mexico

This mixed-used building with commercial and housing spaces will comprise 58 storeys and 18 circular basement levels. It is constructed on a foundation system comprised of barrettes at 74 metres depth and a self-supporting circular diaphragm wall at 48 metres, both built by our Mexican subsidiary Cimesa. The concreting of the slab required yet another magnificent performance by the site team, with more than 1000 m^3 concreted to a depth of 48 m in 12 hours!

#makingyourdayeasier #fostergrowth



Ports

Port of Barranquilla, Colombia

Soletanche Bachy Cimas, one of the Group's Colombian subsidiaries, delivered the repair and extension of 800 metres of quay. Our teams have implemented a solution combining soil improvement, boring piles, driven steel piles, a precast concrete structure (pile caps, prestressed precast beams and deck panels, built at the PREFA plant in Bogota), and a 15 cm concrete cast in-situ slab as topping. The use of precast piles and beams allowed to speed up the works and reduce the impact on the exploitation of the existing quay. This project was completed with ForSHORE, Soletanche Bachy's new brand for maritime works.

#fostergrowth

Water management

Thames Tideway, London

As part of the London sewer upgrade program, Soletanche Bachy is working on the construction of 2 tunnel sections and 5 large shafts. 75% of the special works have now been completed: deep Hydrofraise® shafts (up to 75 metres in depth), connections to existing elements via dedicated structures (KS wall, secant piles, etc.), grouting for the entrance and exit of the tunnel-boring machine expected in 2020, soil improvement using Deep Soil Mixing process, and various jet grouting consolidations.

#careforall #greenisgreat

Urban development

Lorong Kuda, Kuala Lumpur, Malaysia

Acting as a general contractor, Soletanche Bachy is building a new underground access to the KLCC housing and commercial complex, located in the centre of Kuala Lumpur. These works take place in a very dense urban environment, which requires very complex planning and methods. The foundations are comprised of diaphragm walls, bored piles, micropiles and jet grouting.

#makingyourdayeasier #fostergrowth

Other 2019 important projects

- **Trocka metro station**, Warsaw, Poland
- **Testimonio II,** Monaco
- **Edificio Playa Cochoa building,** Viña Del Mar, Chile
- **Muelle C extension,** Montevideo, Uruguay
- **Subansiri dam,** India
- **Canakkale Bridge,** Turkey
- **Fresh water storage tank,** Dubai
- **Salé marine outfall,** Morocco
- **Meudon railway tunnel,** France
- **Launch of the new brand ForSHORE,** dedicated to ports and maritime works
- **Launch of Z-Lyze,** Soletanche Bachy's Big Data platform
- **Launch of grippers kit for compact Hydrofraise® HC05,** France

Find out more
www.soletanche-bachy.com

Director of publication: Guillaume Billaroch

Editor-in-chief: Alexandre Miletitch

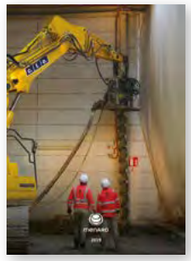
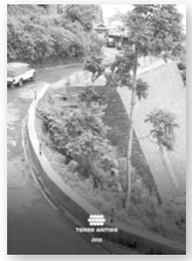
Photo credits: William Beaucardet, Cédric Helsly, Luc Dobigeon, Unsplash, Mediathèque Soletanche Bachy

Design and layout: **Alkimiki**

Printed in May 2020 by **Dynaprint**

Soletanche Bachy
280 avenue Napoléon Bonaparte
92500 Rueil-Malmaison
France

P. 42 P. 54 P. 66

P. 78 P. 90 P. 102

menARD

2019

Key soil investigation, improvement and remediation provider, Menard develops foundation solutions based on ground improvement and reinforcement technologies that eliminate the need for the deep foundations traditionally used to support surface structures. The Group operates throughout the infrastructure life cycle, offering expertise in soil investigation and remediation through its ConeTec and Remea brands.

2019 revenue
415 M€

Employees
1,500

Main contracts won in 2019

→ **Route 1 & 9T new road,** United States
→ **Sihanoukville Airport runway extension,** Cambodia
→ **Rail access to the port of Gdansk,** Poland
→ **Waste-water treatment plant, Gandharbpur,** Bangladesh
→ **Wind farm, Collipulli,** Chile

On cover

Building

Controlled Modulus Columns

Near Dunkirk, France, Menard has taken up a unique technological challenge: to reinforce the sub-floor of an existing factory without suspending production operations. A daunting project given that the average height of 7 m makes it impossible to use of a conventional drilling machine. A solution using Controlled Modulus Columns (CMC) rigid inclusions was chosen to reinforce the damaged slab.

#fostergrowth

Three questions to...

Marc Lacazedieu, Chief Executive Officer

When you look back on 2019, what do you see?

2019 was a very good year for the Menard group. In terms of safety, the continuous drop in the frequency rate of lost-time injuries demonstrates that our efforts are paying off; we are incorporating more and more best practices and are moving closer to our «zero accident» goal. We also saw a 15% increase in sales compared to the previous year. These exceptional results are due to a strong recovery in the soil improvement business in North America thanks to a successful regionalisation approach, and the expansion of two subsidiaries, ConeTec and Remea. ConeTec is experiencing further growth in North and Latin America and has just opened a subsidiary in Australia, while Remea has established a long-term presence in Poland and has just signed the country's largest soil remediation contract there.

What do you intend to do to ensure these results are sustainable over the next few years?

At our triennial seminar in Warsaw last November, we presented our strategy for the next three years, which is based on two pillars. The first, which we began implementing three years ago, consists in broadening and intensifying our local presence by adopting a more regionalised structure, bringing decision-making closer to the projects and encouraging our managers to combine local entrepreneurship with a thorough knowledge of their markets. The second is to identify replicable success models. This involves simplifying and streamlining our processes, thereby increasing our efficiency, and adapting our organisation to the realities of our business.

What are your priorities for 2020?

At Menard, we make it part of our DNA to constantly search for alternative and resource-saving solutions. We are more than ever eager to apply this creativity to our projects with the aim of limiting the impact of our activity on the environment. One example of this is the integration of Remea, a business specialising in soil remediation. We have also rolled out a number of initiatives across our jobsites, such as the Omnibox integrated monitoring solution, which can, among other things, monitor the quantity of resources used. Additionally, the focus group we set up in 2019 has developed an environmental plan and is overseeing its deployment across all our business units. All these actions are in line with the objectives set by the VINCI Group to reduce our greenhouse gas emissions by 40% by 2030.

> **Our goal is to simplify and streamline our processes to become more efficient.**

1. Number of lost-time injuries x 1,000,000/number of labour hours.

Governance

From left to right:

David Maltman
HSE / Security Director

Édouard Poisson
Chief Financial Officer

Marc Lacazedieu
Chief Executive Officer

Emmanuelle Jacquemot-Sharma
Human Resources Director

Cyril Plomteux
Deputy Managing Director

Seth Pearlman
CEO - North America

Real estate projects

Dynamic Compaction

Dynamic compaction of 80,000 square metres of soil: such is the challenge that Menard has set out to address in Egypt to stabilise and densify the soil on the site earmarked for the construction of the Celia complex, which will form part of the new administrative capital east of Cairo.

#fostergrowth #makingyourdayeasier

Railway lines

Stone columns

One metre in diameter, 230,000 linear metres in total, these are the dimensions of the stone columns supplied and installed by Menard in Malaysia as part of the construction of a new electrified railway line. With planned works taking place without any rail traffic downtime, the new infrastructure is expected to save passengers 2.5 hours on their journey between Gemas and Johor Bahru.

#makingyourdayeasier

Oil terminals

Controlled Modulus Columns & Vertical drains

In Mexico, as part of the construction of an oil terminal in the port of Tuxpan in the state of Veracruz, Menard has supplied and installed 55,000 vertical drains and 5,500 Controlled Modulus Columns, the deepest ever built in Mexico. Once completed, the infrastructure will accommodate 10 fuel tanks.

#fostergrowth #accesspower

Mines

Soil Investigation

In North America, ConeTec and Mud Bay Drilling are collaborating on major mining projects on both sides of the U.S.-Canada border. In particular, the two companies are piloting soil investigation programs at depths of up to 200 metres using an innovative combination of in-situ drilling and testing methods..

#accesspower

Bridges

Controlled Modulus Columns & Vertical drains

In Germany, Menard is putting its know-how to undertake the foundations for a 480-metre bridge that will be part of the bypass around Rosenheim, Bavaria and facilitate access to the A8 motorway. In addition to the bridge piles, two soil improvement technologies have been combined, i.e. Controlled Modulus Columns rigid inclusions and vertical drains, reaching a record depth of 50 m with no soil anchors.

#makingyourdayeasier

Ports

Controlled Modulus Columns & Deep Soil Mixing

In Brisbane, Australia, Menard is taking part in the huge project for the construction of a port terminal specifically for large cruise ships. The company's full range of skills in soil improvement and foundation work was harnessed to offer a solution combining innovation, durability and cost control. The first cruise ships are set to dock as early as October 2020.

#fostergrowth

Industries

Soil Mixing

On a former industrial site in Voiron, France, Remea has taken up the challenge of plunging deep into the soil to clean it up. The challenge is twofold as it involves in-depth treatment of a residual source of chlorinated substances and reinforcement of the surface soil. Soil Mixing technology is to be used to keep impact to a minimum and to preserve the characteristics and stability of the soil, which is to be re-used.

#greenisgreat

Wastewater treatment plants

Stone columns & Vertical drains

In western Panama, Menard was commissioned to carry out soil improvement works for a future wastewater treatment plant. Our crews have supplied and installed 35 linear metres of dry stone columns and 80 linear metres of vertical drains. This project will deliver a safer and more efficient water treatment system for the 250,000 residents of the city of David.

#careforall #greenisgreat

Highways

Controlled Modulus Columns

In the United States, after two successful initial phases that began in 2012, Menard is carrying out a third phase of soil improvement work on behalf of the New Jersey Department of Transportation (DoT). The package is part of a major highway project that is intended to improve the flow of traffic by 2024.

#makingyourdayeasier

Find out more
www.menard-group.com

Director of publication: Guillaume Billaroch
Editors-in-chief: Marie Brunel & Sophie Fromion
Photo credits: William Beaucardet, Yves Chanoit, Vianney Thibaut, Photothèque Menard

Design and layout: **Alkimiki**
Printed in May 2020 by **Dynaprint**

Menard
22 rue Jean Rostand
91400 Orsay
France

P. 42

P. 54

P. 66

P. 78

P. 90

P. 102

TERRE ARMEE

2019

Designers and suppliers of civil engineering solutions that retain, cross, and protect, Terre Armée pioneered the Reinforced Earth® technique. The company has unrivalled experience in the field of reinforced backfill solutions and soil-structure interaction. Our techniques' wide range of applications provide solutions for a variety of markets, including highways, railways, industrial and energy, as well as environmental and water engineering projects.

2019 revenue
212 M€

Employees
972

Main contracts won in 2019

- → **Patreksfjordur avalanche bunds,** Iceland
- → **Geostrap® and geoconnectors supply for Lucknow and Aligarh projects,** India
- → **Geotextile supply for Vadodara Mumbai Expressway,** India
- → **M4 Smart Motorway noise walls,** Australia
- → **Industrial structures for a copper mine in Aktogay,** Kazakhstan
- → **Walls for the California High-Speed Rail,** USA
- → **Prefabricated TechSpan® concrete igloos for the Picatinny Arsenal Explosive Ordnance Disassembly Complex,** USA
- → **MSE Walls for the Cotton Belt Corridor Silver Line Regional Rail Project,** USA
- → **MSE walls for the All Aboard Florida highspeed railway projects,** USA
- → **North-South Trillium Line Extension in Ottawa,** Canada

On cover

Railways

Tindharia, India

To reinforce and rebuild the century-old Darjeeling Himalayan Railway and the adjacent road following a landslide, Terre Armée India proposed a bespoke structural solution using the TerraLink® technique, reducing the amount of backfill compared to the client's initial solution.

Reinforced Earth®, TerraLink®

#makingyourdayeasier

Message from the CEO

Vincent Oudin

As we begin not only a new year but also a new decade, we feel excited about what the future holds.

Looking back on 2019, we worked on impressive projects around the world – among them our largest to date: the I-66 in the US and the very impressive Tindharia project in India.

We also diversified the application of our products –for instance with the use of soil mattresses in the reinforcement of 25 km of the Jia Bharali river banks in India, the use of concrete cubes in the reconstruction and protection of Valparaíso harbour in Chile, or the construction of avalanche protection structures in Iceland.

Meanwhile, we've improved our production capacity with a new precast plant in Florida and reaffirmed our commitment to the North American market with several investments. Thanks to an excellent dynamic in these markets, we ended 2019 with a record backlog.

Finally, last year saw us take us a first step in improved digitalised services with Precastarches.com. Dedicated to our TechSpan® line of products, this platform enables our clients to identify and define their project needs. We have recently launched a new corporate website and plan to further expand our digital offer.

This year, we are excited to start implementing our new strategic plan, which marks a strong orientation towards the themes of soil reinforcement, erosion protection, geosynthetics applications, the diversification of our offer on infrastructures, and a more integrated model at product level.

With this expanded portfolio, we look forward to working on many exciting projects, providing more tailor-made solutions and high-quality service.

> "Thanks to the excellent dynamic of our key markets, we ended 2019 with a record order backlog."

Governance

From left to right:

Nicolas Freitag
Chief Technical Officer

Laurent Coens
Human Resources Director

Stéphane Beaune
Finance Director

Keith Brabant
Vice President Engineering

Vincent Oudin
Chief Executive Officer

John Shall
Vice President Business Development

Miriam Itzeck
Communications Manager

Philippe Héry
Chief Operations Officer

Somnath Biswas
Zone Manager Asia

Riccardo Musella
Zone Manager Oceania

Missing:
Melissa Berkebile
Zone Manager North America

Railways

New Regional Express Train in Dakar, Senegal

Terre Armée was responsible for the engineering, design, supply, technical assistance, and provision of formwork for 12 Reinforced Earth® access ramps. A total of 17,000 m² of access ramps were built, all made from TerraPlus® rectangular precast concrete facings and GeoStrap® 5 synthetic reinforcing strips.

Reinforced Earth®, TerraPlus®, GeoStrap®

#makingyourdayeasier #fostergrowth

Ports

Valparaíso Harbour, Chile

A mangitude 8.3 earthquake generated waves so powerful that they destroyed parts of the port infrastructure of Valparaíso, Tierra Armada Chile fabricated and supplied 248 precast wall parts with swell deflectors that will act as wave barriers, and 1,600 concrete cubes placed in front of the walls for energy dissipation.

Precast walls, precast concrete cubes

#fostergrowth

Airports

Access ramps, Clark Airport, Philippines

Reinforced Earth Philippines designed, supplied, and fabricated Reinforced Earth® walls as part of construction work for two access ramps. The solution proved quick to build, cost effective and aesthetic. Reusing soil excavated on site, in full compliance with the specifications, generated significant cost savings for the client and dramatically decreased the environmental impact of the project.

Reinforced Earth®

#makingyourdayeasier

Highways

© Work was performed as a subcontractor for FAM Construction on the Transform 66 Outside the Beltway project

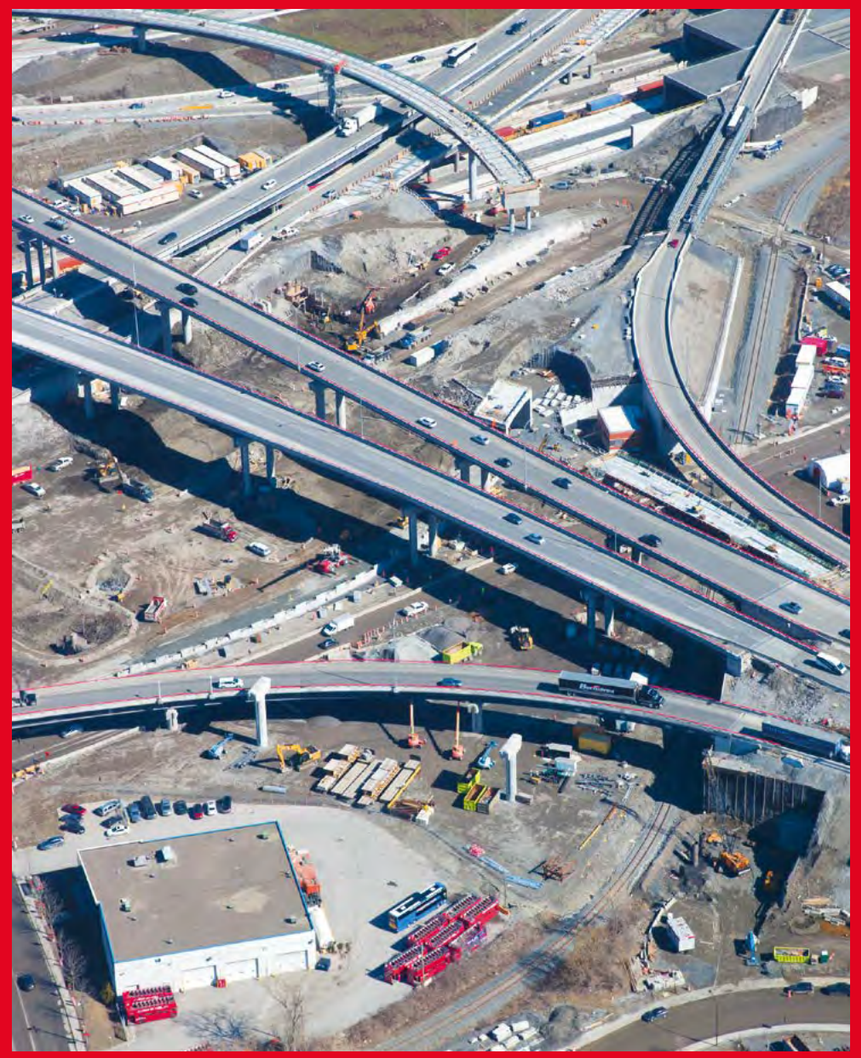
Interstate 66, United States

As part of the Transform 66-Outside the Beltway project, The Reinforced Earth Company USA designed and built 186,000 m² of Reinforced Earth® walls, 4.6 km of coping and 36.6 km of concrete half-connector barriers. This is one of the largest contracts in the history of the Terre Armée.

Reinforced Earth®

#makingyourdayeasier

Highways



Turcot Interchange, Canada

As part of the reconstruction of an interchange that had been in service for nearly 50 years, The Reinforced Earth Company Ltd. Canada designed and supplied approximately 70,000 m² of Reinforced Earth® structures which consisted mainly of retaining walls fitted with TerraPlus® rectangular precast concrete facings. Approximately 25,000 m² of temporary Reinforced Earth® structures were also designed for traffic diversion purposes.

Reinforced Earth®, TerraPlus®

#makingyourdayeasier

Rivers

Jia Bharali, India

Terre Armée India participates in the Jia Bharali River bank stabilisation project preceeding the construction of a bridge. The project involves TechRevetment® protection works over a length of 25 km and a launching apron of 30 m. This innovative solution is in line with Terre Armée's goal of expanding the range of environmental protection solutions using geosynthetics.

TechRevetment®

#careforall #greenisgreat

Ports

Container Exchange Route, Port of Rotterdam, Netherlands

As part of the construction of the Port of Rotterdam's Container Exchange Route, Terre Armée Benelux built 11 Reinforced Earth® retaining structures for a total surface of 21,000 m² of dark grey TerraPlus® architectural facing panels.

TerraPlus®

#fostergrowth

Highways

Toluca-Naucalpan Highway, Mexico

Tierra Armada de México designed, shipped, and assembled two precast concrete arches for a drainage system. 276 parts 25 to 30 cm thick were required to build the two structures measuring a final 151 metres.

TechSpan®

#makingyourdayeasier

Highways

Transmission Gully Project, New Zealand

Reinforced Earth Ltd Australia was contracted for the design and supply of materials for 11 bridge abutments in a complex environment, due its proximity to the Ohariu Fault and magnitude 7 seismic shocks recorded in the region. The project also included a TechSpan® concrete arch system with extensive associated TerraPlus® Reinforced Earth® walls. The abutments for the 11 single-span bridges required a total of about 8,500 square meters of TerraClass® precast concrete facing panels.

TechSpan®, TerraPlus®, TerraClass®

#makingyourdayeasier

Health campus

Ikitelli Health Campus, Turkey

Reinforced Earth İnşaat Proje ve Tic A.Ş worked on the design, supply, and construction of 34,700 m² of Reinforced Earth® walls fitted with TerraPlus® rectangular precast concrete facings. The company won the project because of its experience with geosynthetic reinforcing strips, which proved to be superior to the initially proposed steel strip solution for this 3-step tiered wall measuring more than, not over 30 m in height.

TerraPlus®, Reinforced Earth®

#careforall

Find out more
www.terre-armee.com

Director of publication: Guillaume Billaroch

Editor-in-chief: Miriam Itzeck

Photo credits: William Beaucardet, Photothèque Terre Armée

Design and layout: **Alkimiki**

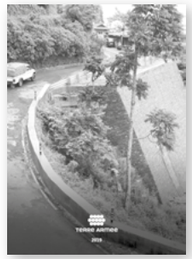
Printed in May 2020 by **Dynaprint**

Terre Armée
280 avenue Napoléon Bonaparte
92500 Rueil-Malmaison
France

P. 42

P. 54

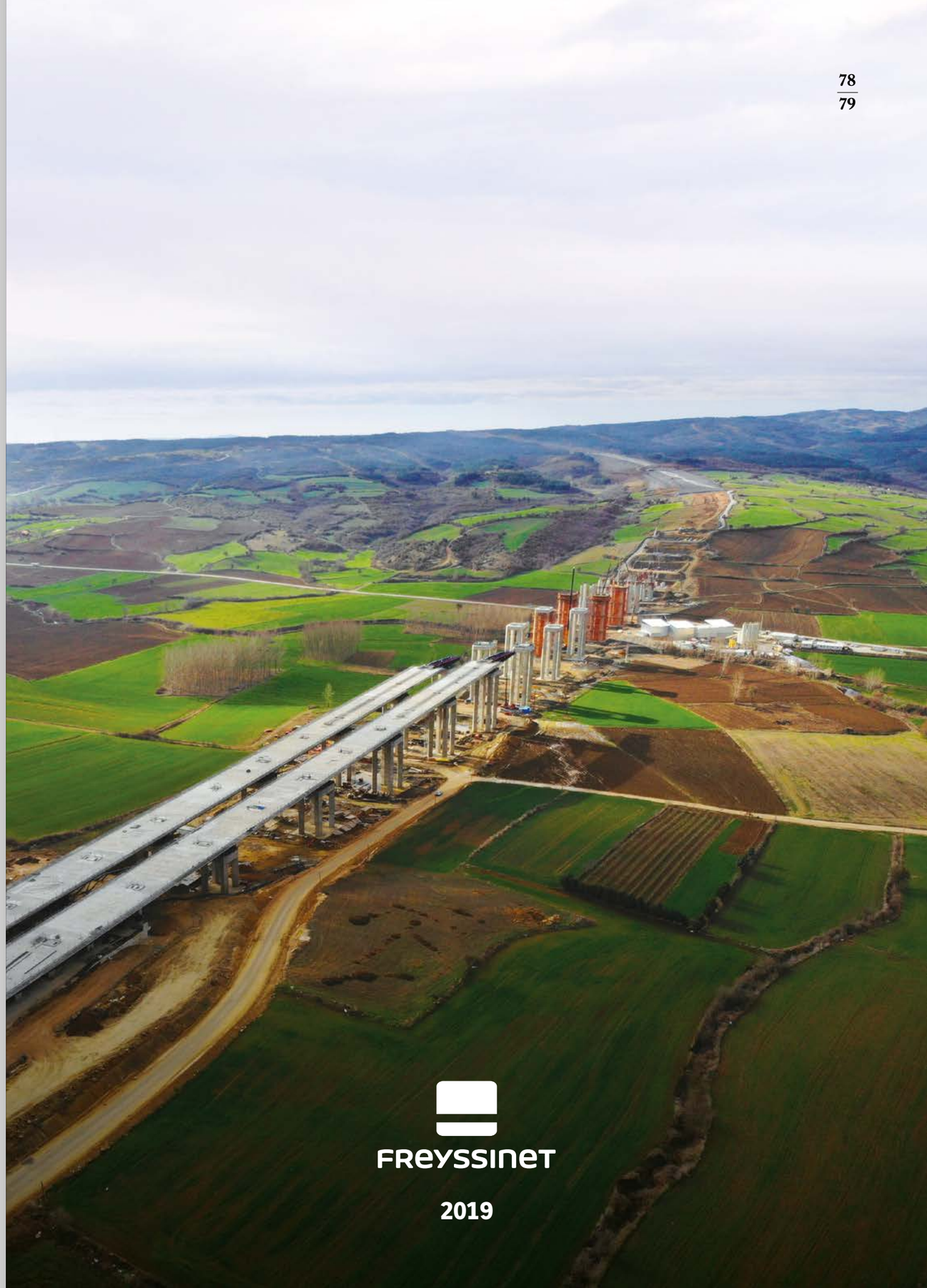
P. 66



P. 78

P. 90

P. 102



Setting the standard in specialised civil engineering. Post-tensioning, construction methods, cable-stayed structures, structural fittings, structural reinforcement, concrete repair, reinforcing steel protection, earthquake protection and specialised maintenance – Freyssinet puts its specialist services to work in two major areas: construction and structural repair.

2019 revenue
732 M€
of which 80% out of France

Employees
7,576

55%
of the business in construction

45%
of the business in repair

50
countries

10,000
projects per year

Main contracts won in 2019 (construction or repair)

- **West Gate Bridge,** Australia
- **Kariba Dam,** Zambia
- **Hinkley Point nuclear power plant,** United Kingdom
- **Thu Tiem 2 cable-stayed bridge,** Vietnam
- **Gwangarm cable-stayed bridge,** South Korea
- **Saemangeum cable-stayed bridge,** South Korea
- **Launched bridge, A16 Rotterdam De Grœne Boog,** Netherlands
- **Garden Island wharf,** Australia
- **Sasol cooling tower,** South Africa
- **Kokhav Hayarden reservoir,** Israel
- **Carrefour shopping centre, Zárate,** Argentina
- **Upper Bhavani dam,** India
- **Interchanges and bridges at Al-Nawaseeb Road,** Kuwait
- **Housing complex in Limeil-Brévannes,** France

On cover

Three new motorway viaducts in Turkey

Freyssinet is maintaining its involvement in the transformation of the Turkish road network. The company signed a design and build contract which was signed for 3 viaducts including studies on deck launching operations, building of the deck, PT works and fittings. The alternative designs proposed are aimed at enhancing seismic performance and reducing concrete and steel quantities by 50%.

#makingyourdayeasier

Message from the CEO

Patrick Nagle

Results

We recorded revenue of €731 million in 2019, up 2.5% from 2018, with earnings showing particular strength in France, the United Kingdom and Australia. Order intake was exceptional, and our backlog stood at €722 million.

Development

Targeted development actions have been carried out to expand our business in new areas, particularly in New Zealand. On a global scale, the stakes associated with bridge maintenance are enormous. Working in partnership with Sixense, we are now able to offer a comprehensive service package that includes inspection, monitoring, design, maintenance and repair work.

Innovation

Innovation is critical to maintaining our leadership. Our primary challenges are to stay one step ahead in our core lines of business, and to excel in newer, but strategic areas such as repair work. In the field of stay cables, a new milestone was reached last year with the qualification of our strands and anchoring systems at 2,160 MPa. These ultra-high-performance cables will be used for the first time on the Saemangeum bridge in South Korea. Also noteworthy is the broadening of our offer with the launch of a new tendon duct incorporating options that our customers have been eagerly awaiting, such as LED lighting, fire and blast protection, and de-icing systems. In the repair business, we have been working on developing an ultra-high-performance fibre-reinforced shotcrete solution (UHPC-S). The first projects completed in 2019 aimed at structurally reinforcing metal culverts, which are used extensively on road and motorway networks in Europe.

Teams and collaborative tools

In support of our diversification efforts, we have developed a digital collaboration platform called e-FOREVA to leverage our expertise in the field of repair work. The platform was rolled out in 30 countries last year and has quickly become a key resource for our teams. Our internal convention in Dubai was one of the highlights of the year; the convention was an opportunity for the spirit and commitment of all our teams to shine through. We see this as a huge strength that will help to guide us across the waters ahead.

> **“Our primary challenges in the field of innovation to stay one step ahead in our core lines of business, and to excel in newer, but strategic areas such as repair work.”**

Governance

Patrick Nagle
Chief Executive Officer

Jean-Philippe Ricard
Vice-President and North-Atlantic Managing Director

Jorge Moreno
Vice-President and Ibero-Latin America Managing Director

Pascal Thillerot
Chief Finance Officer

Julien Erdogan
Engineering and Technical Director

Marie-Pierre Bayle
Marketing and Communication Director

Laurent Coens
Human Resources Director

Jean-Daniel Lebon
Renewable Energy Director

Olivier Forget
Industry and Products Director

Krzysztof Berger
Central and Eastern Europe Managing Director

John Marchese
Australia-Pacific Managing Director

Yves Barge
Asia Managing Director

Khalil Doghri
MENA-India Managing Director

Erik Mellier
Major Projects Director

Christian Lacroix
France and Switzerland Managing Director

Ports

A brand new ore loading wharf

Nelson Point wharf is used to load tons of iron ore for export. It remained active throughout the year-long reinforcement project consisting of concrete repairs, pile wrapping and concrete protection. It has paved the way for Freyssinet to becoming more involved in the mining market in Australia.

Repair and reinforcement

#fostergrowth

Platforms

Dubai: Freyssinet at the forefront

The Pointe is the newest station on the Dubai Monorail which runs across the Palm Jumeirah artificial island. Freyssinet contributed its experience, building 2 passenger platforms which were lowered and rotated into place and held using brackets and Freyssibars fastened to inclined hanger pipes, to match the train floor level.

Construction methods

#makingyourdayeasier

Nuclear power plants

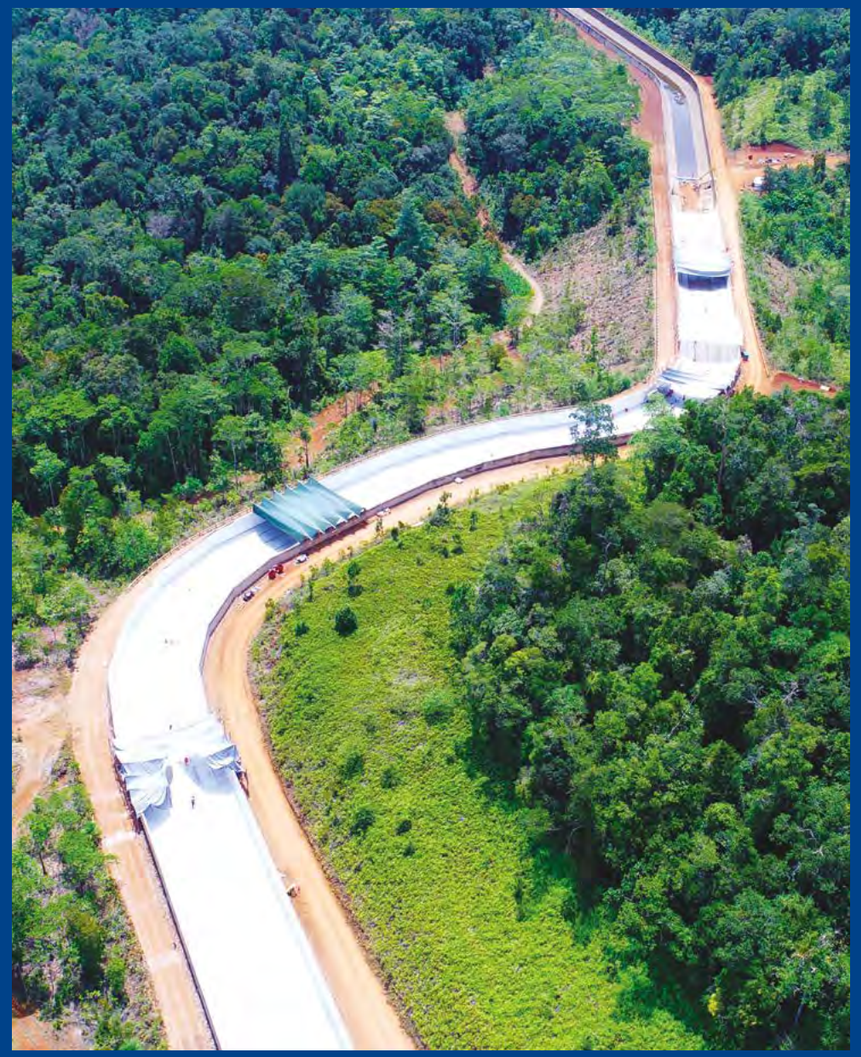
Exporting Freyssinet's post tensioning to Bangladesh

Freyssinet supplied, certified and installed the 3,500-ton post tensioning system for two reactor vessels at Rooppur nuclear plant, using innovative technology (greased sheathed strands, new-generation anchor blocks). This is a strategic project for Bangladesh, which should help to produce low-cost electricity and move towards energy independence.

Post tensioning construction

#accesspower

Canals



A deep refresh for the Larona canal (Indonesia)

In just 8 weeks, CARPI, a Freyssinet subsidiary specializing in waterproofing, lined the sinuous 7km-long Larona hydropower inlet canal, whose internal concrete surface had suffered deterioration. The operation required 70 km of stainless-steel profiles, 160,000 m2 of geomembrane and 500,000 mechanical anchors and fasteners.

Waterproofing

#accesspower

Airports

Freyssinet on track at Orly airport, France

For this highly technical project comprising various airport, road and rail interfaces, engineers designed a "wrap-around" post-tensioned exostructure enveloping the existing one. Amongst other works, Freyssinet installed precast girders under the slab and reinforced the technical galleries with TFC® (carbon-fibre fabric).

Reinforcement

#makingyourdayeasier #fostergrowth

Bridges

A more fluid traffic at the heart of Hô Chi Minh City

Open to traffic since 1941 and one of the major thoroughfares of Ho Chi Minh City, the Y Bridge needed to be adapted to new traffic conditions. Freyssinet was contracted to widen the deck by 1.9 m and increase the truck weight limit from 13 to 18 T. The two main challenges were dealing with an ageing complex structure of steel, composite steel and concrete, and working under heavy traffic conditions.

Widening and reinforcement

#makingyourdayeasier

Buildings

Freyssinet at the top of the Caleido Tower in Madrid

In Madrid, Freyssinet took part in the construction of the Caleido tower, a 180m-high skyscraper that will become a universitary campus. The teams have conceived, supplied and installed the prestressed slabs for the 35 floors of the tower. This represented a total of 550 tons of strands and 4,000 anchoring units.

Prestressed concrete slab

#fostergrowth #makingyourdayeasier

Bridges

Reinforcement of the Zacatal bridge

Composed of 124 spans, the longest bridge in Mexico suffered from severe corrosion of its reinforcement and pre-reinforcement steels. Freyssinet undertook to reinforce the bridge foundations and superstructure thanks to corrosion protection, post tensioning, anticarbonatation coating and carbon fiber reinforcement techniques.

Protection and reinforcement

#makingyourdayeasier

Bridges

Freyssinet introduces stay cables to the New York landscape

In New York, Freyssinet designed and supplied the first stay-cable system equipped with fire and blast protection systems and provided assistance during their installation on the new Kosciuszko bridge, on the expressway connecting the boroughs of Queens and Brooklyn.

Cable stayed structures construction

#makingyourdayeasier

Find out more
www.freyssinet.com

Director of publication: Guillaume Billaroch

Editor-in-chief: Marie-Pierre Bayle

Photo credits: William Beaucardet, Bernstein Associates Photographers, Laurent Chartier, Sergei Akulich, Unsplash

Design and layout: **Alkimiki**

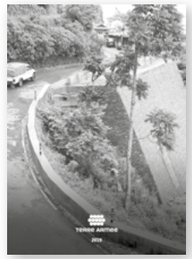
Printed in May 2020 by **Dynaprint**

Freyssinet
280 avenue Napoléon Bonaparte
92500 Rueil-Malmaison
France

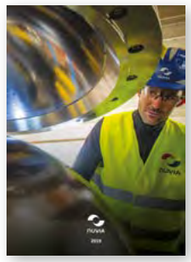
P. 42

P. 54

P. 66



P. 78



P. 90

P. 102

Drawing on its world-renowned nuclear expertise, NUVIA supports its industrial customers operating in sensitive and highly regulated environments throughout the life cycle of their facilities.

2019 revenue
321 M€

Employees
2,400

Main contracts won in 2019

- → **Contract for radiation protection services with Bruce Power,** Canada
- → **Contract for the modernisation of the standby diesel-generator control system for Energoatom**, Ukraine
- → **Corium-stabilisation project for EDF,** France
- → **Container transport project for the European Spallation Source (ESS) research facility,** United Kingdom

On cover

Iter, France

After 3 years spent on design, qualification and manufacturing, the Cryostat Support Bearings project entered the home stretch, ready for installation in 2019. Designed to support the structure of the tokamak, the bearings accommodate displacements and transfer loads from the Cryostat to the supporting wall.

#accesspower

Message from the CEO

Bruno Lancia

In 2019, we recorded sustained activity in France, where our teams took part in the dismantling of the Superphénix power plant (opening of the vessel), the Iter project (design, supply and installation of the bearings supporting the structure of the tokamak building), and the construction of the Flamanville EPR (fire protection). The year was also marked by the commissioning of the Epure project (Franco-British radiography facility at the CEA site in Valduc), the largest project in our company's history. In the United Kingdom, where we completed the dismantling of the Sellafield stack, our operations slowed down due to a challenging environment.

On the other hand, we recorded growth on other international markets, thanks in particular to operations carried out in Canada (new contract for radiation protection services for the operator Bruce Power), in Ukraine (radiation measurement systems at nuclear waste storage sites), in Bolivia (programme management for the construction of a nuclear research centre), in India, where we carried out our first design-build operation for an effluent treatment facility, and in Sweden (radiation protection in the oil and gas industry), where we expanded our market position by taking over Elajo's engineering division.

Our strategy based on diversification and international development paid off in 2019, and is expected to continue to generate exciting opportunities in 2020. It is reinforced in particular by the global challenges posed by climate change, which are prompting many countries to rethink their energy mix in favour of nuclear power, one of the sources of energy with the lowest CO2 emissions. Our 2,600 employees are proud to contribute to building a safer, cleaner and sustainable world.

> “We are proud to contribute to build a safer, cleaner and sustainable world.”

Governance

From left to right:

Marie Planchard
Communications and Marketing Director

Dominique Rothan
NUVIATech Instruments and Healthcare Director

Martin Pazur
NUVIA Czech Republic Director

Sandrine Toupiol
International development Director

Bruno Lancia
Chief Executive Officer

Keith Collett
NUVIA United Kingdom Director

Émilie Chamla
Legal Affairs Director

Hervé Ridoux
NUVIA France Director

Simone Markering
Human Resources Director

Hervé Contamin
Chief Financial Officer

France

Extrados project – EDF Cattenom

This project was a real success for the NUVIA - LASSARAT consortium, which took on the first extrados renovation project on the nuclear power plant of Cattenom. The project consisted in waterproofing rework on the extrados of the inner containment, and involved applying a composite skin on a surface of 250m² during a unit outage.

#accesspower

India

Kakrapar Atomic Power Station

NUVIA delivered a demineralised water supply plant for units 3 and 4 of the Kakrapar Atomic Power Station in India. Specific filtration work was carried out and state-of-the-art equipment was supplied to attain an optimal level of purity of the demineralised water.

#accesspower

Bolivia

Programme management for the construction of a nuclear research centre

NUVIA is supporting the Bolivian Nuclear Agency in its large-scale project to design and build a nuclear medicine research centre in Bolivia. NUVIA has set up a mixed project team on site, combining nuclear expertise and local construction skills.

France

Means of access and containment for Naval Group

As part of the contract signed with NEOM for the dismantling of five SSBNs at the Naval Group base in Cherbourg, NUVIA designed and installed a watertight structure for team access to the six work areas on the submarine le Redoutable.

France

Superphénix project – dismantling of the reactor

One of the most impressive remotely operated cutting projects performed on large equipment in the nuclear environment. Before the Superphénix reactor vessel was opened, NUVIA designed and built the workshop where the most radioactive parts of the Core Head Cover Plug, which it has just received, will be remotely cut using the RODIN robot, developed by NUVIA.

#greenisgreat

United Kingdom

Sellafield site – dismantling of the tallest stack

The Sellafield nuclear site has embarked on a project to demolish its tallest stack, which is a technical challenge due to the highly sensitive surrounding environment. NUVIA designed and installed an innovative self-climbing platform around the stack, enabling it to be gradually dismantled in a controlled way while ensuring the safety of personnel and facilities.

#greenisgreat

France

Epure – Final acceptance

After more than nine years of mobilization for the NUVIA teams, the Epure project received final acceptance this year as planned. This complex EPC project proved NUVIA's know-how in terms of engineering and management of complex projects.

#accesspower

Canada

Radiation Protection Services for Bruce Power station

NUVIA won a major contract for radiation protection services for Bruce Power, Canada's largest private producer of nuclear energy. NUVIA provides radiation safety services on all the projects related to the replacement of the station major components.

#accesspower

United Kingdom

Dounreay Nuclear Research Site

In collaboration with Dounreay Site Restoration Limited, NUVIA is designing, installing and commissioning equipment to remove and treat NaK (sodium-potassium alloy) residues from the pipework of the fast reactor facility.

#greenisgreat

Sweden

Radiation protection in the oil and gas industry

Thanks to its nuclear expertise, NUVIA has recently achieved two important projects of security technical assistance during production shutdown operations.

#careforall

Ukraine

Automated integrated environmental radiation monitoring system

Funded by the European Commission, this large-scale project covers the design, supply and deployment of an integrated automated environmental radiation monitoring system in 5 radioactive waste storage facilities in Ukraine.

#greenisgreat

Czech Republic

Supply of portable gamma-ray detectors

Mobile monitors were specifically conceived by NUVIA for the quick detection of people and equiments radioactive contamination in emergency situations.

#careforall

France

EPR Flamanville

More then 100 NUVIA employees were on hand to complete the hoppers sealing, the ventilation ducts wrapping and the protection of cable trays.

#accesspower

Qatar

Monitoring system of the potential contamination of drinking water

NUVIA has designed an in-situ system for rapid and accurate monitoring of potential radioactive contamination of drinking water. The self-powered, in-line system sends real-time data to an observatory that monitors the country's various natural and artificial water reservoirs.

#careforall

Find out more
www.nuvia.com

Director of publication: Guillaume Billaroch

Editor-in-chief: Marie Planchard

Photo credits: Sellafield Ltd, Photothèque NUVIA, Giovanni Cittadini Cesi, Thomas Laisné - La Company - JM Huron

Design and layout: **Alkimiki**

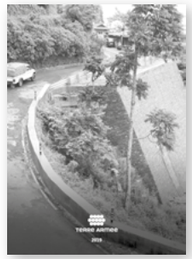
Printed in May 2020 by **Dynaprint**

NUVIA
280 avenue Napoléon Bonaparte
92500 Rueil-Malmaison
France

P. 42

P. 54

P. 66



P. 78

P. 90

P. 102

At SIXENSE, our mission is to monitor the condition and behaviour of structures and infrastructures, to secure their construction and operation, and to optimise maintenance.

2019 revenue
84 M€

Employees
705

Main contracts won in 2019

- **Digitalisation of jobsite processes at VINCI Construction using the DigitalSite software,** international locations
- **Structural monitoring on the project for the construction of the 3rd runway at Hong Kong's international airport,** China
- **Defect investigation on bridges within the Bordeaux city area,** France
- **Contract with EDF for lasergrammetry surveying and 360° photos of the Paluel nuclear site, including data processing,** France
- **InSAR Satellite Monitoring of the Thames Tideway tunnel in London,** United Kingdom

On cover

Mobility

Grand Paris projects under close scrutiny

SIXENSE is consolidating its role as a major player in the Greater Paris development project by taking on responsibility for investigating defects as well as performing the acoustic and vibration monitoring of a large number of jobsites for future metro lines or stations. SIXENSE also provides associated consultancy services with controlled management of acoustic and vibration impacts, and carries out geophysical surveying campaigns with precise subsoil 3D imaging using the SISSTERRA® solution, as well as in-situ monitoring of jet-grouting columns.

Monitoring/Engineering

#makingyourdayeasier

Message from the CEO

Pascal Berger

In 2019 we brought to market many innovative services and solutions for our construction and infrastructure customers, in key areas such as safety, quality, risk prevention and operations optimisation. By combining our legacy know-how in engineering and monitoring with major investments in digital solutions, digitisation and modelling, we at SIXENSE have strengthened our leadership in 2019 to support our customers in their digital journey towards better control over their operations.

SIXENSE carries out projects and partnerships with other companies of the VINCI Group as well as with many other companies that rely on our expertise to help them address their day-to-day technical challenges and boost their performance. We have proven able to anticipate the build-up of a strong market trend driven by the challenges our clients face in so many areas (environmental, regulatory, safety, financial...), and that are reflected in the impact of climate risks, ageing infrastructure, urban concentration and increased mobility. For SIXENSE, they represent significant international growth opportunities, particularly in Europe, North America, the Middle East and Australia/New Zealand. In 2019, these opportunities came to fruition with the incorporation of SIXENSE's solutions into a number of projects in France (Grand Paris Express) and internationally, such as the expansion of Hong Kong airport and the construction of tunnels in Australia (Melbourne subway) and Canada (Highway 401 in Toronto).

SIXENSE's solutions and services cover the entire infrastructure life cycle, from design to construction and operation. Thanks to a platform dedicated to the life cycle of infrastructure called Beyond, we can now perform faster roll-out of these services. Beyond enables us to manage all stages in the data management process (capture, storage, visualisation, analysis, interpretation and traceability) from a single, secure location, whatever the source of the data and the context in which our customers use it. The platform was made available to a number of customers in 2019 and is currently being deployed on a large scale, thanks to which SIXENSE is now positioned as a technological leader in the construction, operation, management and maintenance of infrastructure.

> **SIXENSE launched several innovative solutions in 2019, reinforcing thus its reference position helping clients improving their performance."**

Governance

From left to right:

Michel Aroichane
Innovation Director

Jean-Ghislain la Fonta
Deputy managing Director and International Director

Richard Loudin
Marketing and communication Director

Emilie Chamla
Legal affairs Director (SIXENSE & NUVIA)

Stéphane Aubert
Commercial development Director

Christophe Bourlart
Mapping department Director

Pascal Berger
Chief Executive Officer

Fabrice del Aguila
Deputy managing Director and Platform Solutions department Director

Vincent le Quellec
Chief financial and administrative Director

Pascale Dumez
Deputy managing Director and Engineering department Director

Franck Martin
Human Resources Director

Urban development

SIXENSE keeps an eye on pedestrian footbridges

In the heart of the La Défense business district on the outskirts of Paris, SIXENSE carried out detailed inspection of 5 pedestrian footbridges used daily by hundreds of thousands of people. Each footbridge was entirely digitised and the data collected analysed, thus enabling predictive maintenance operations that will contribute to the long-term viability of the structures.

Digital inspection

#careforall

Stadiums

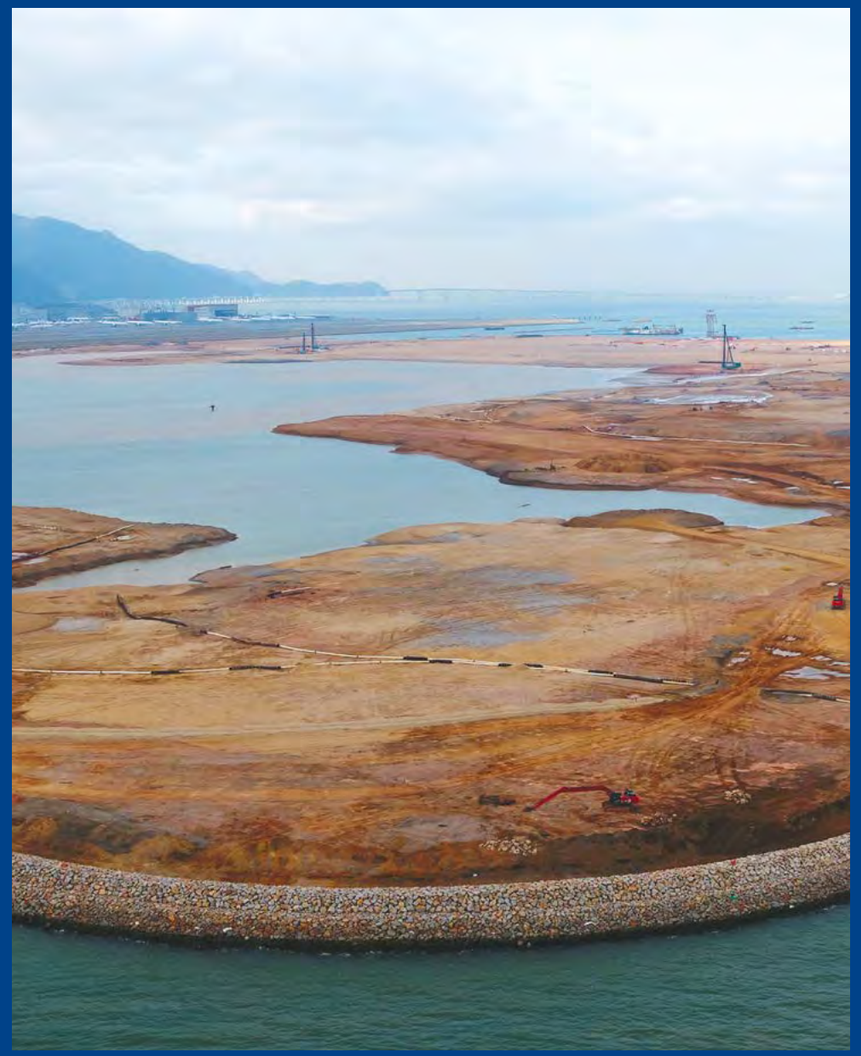
SIXENSE pushes it over the goal line in Nevada

In the United States, SIXENSE is taking part in a project of gigantic proportions: the building of a new US football stadium. Thanks to the DigitalSite tool and using a bespoke application, SIXENSE has built a 3D model of the structure's cabled roof which allows components of the structure to be controlled in real time.

Digitalisation

#fostergrowth

Airports



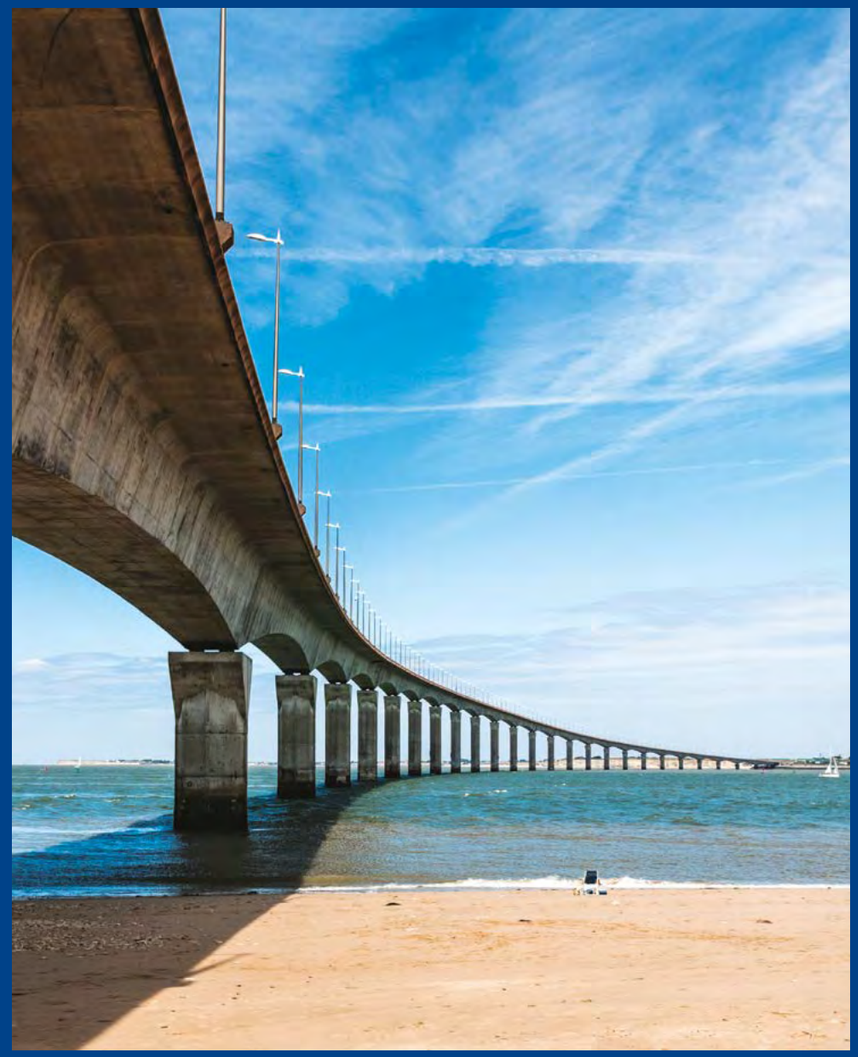
SIXENSE ready for take-off at Hong Kong airport

Hong Kong's authorities are faced with the challenge of maximising the airport's capacity in order to serve an ever-increasing number of travellers. SIXENSE is providing support by implementing a large-scale geotechnical monitoring system across this project. Over 1,500 automatic sensors and instruments have been installed to monitor the backfill and surface of the runway throughout the 4-year duration of the construction project.

Monitoring

#makingyourdayeasier

Bridges



Bridge to the Île de Ré: defect investigation and monitoring of external post-tensioning tendons (France)

Thorough defect investigation of anchors using the UScan method and implementation of an acoustic monitoring system were part of the "shock treatment" applied by SIXENSE to the Île de Ré bridge as part of operations aimed at safely replacing a damaged post-tensioning cable.

Monitoring

#makeyourdayeasier

Sanitation

3D sewer mapping to facilitate management of a sanitation system (France)

SIXENSE completed an experimental project to develop a novel technology for data acquisition in a large-scale sewer system. This complex environment requires innovative processes and technologies for data capture and georeferencing. The aim is to provide sewer network managers with high-precision 3D mapping capabilities, thus contributing to optimised infrastructure management.

Digitalisation

#makingyourdayeasier

Bridges

SIXENSE is keeping watch over the Dardanelles bridge

In Turkey, the Dardanelles strait will soon be spanned by the Çanakkale 1915 bridge, a suspension bridge with a main span of 2,023 metres.
A close watch will be kept on the project, with SIXENSE providing 32 corrosion sensors, 16 load sensors and 88 fibre optic strain gauges to monitor the behaviour of the bridge upon construction, as well as after commissioning.

Monitoring

#makingyourdayeasier

Railways

Data capture for the future London-Birmingham high-speed railway line

In Britain, as part of the construction of the HS2 high-speed railway line between London and Birmingham, SIXENSE provided data capture services using a combination of LiDAR technology (laser remote sensing) and heliborne photography. Once the data was compiled and processed, the construction consortium had all the topographical information it needed to begin the engineering design phase of the project.

Digitalisation

#makingyourdayeasier

Highways

Digital convergence for VINCI Autoroutes (France)

To help VINCI Autoroutes digitise, harmonise and optimise its processes, SIXENSE has collaborated with IBM to design a central database and a range of business tools that are intended to interact with each other. This modern system, used daily by more than 4,000 highway employees, should provide a cross-functional view of asset management.

Digitalisation

#makingyourdayeasier

Find out more
www.sixense-group.com

Director of publication: Guillaume Billaroch

Editor-in-chief: Richard Loudin

Photo credits: William Beaucardet, Stef. Candé photographe, Airport Authority Hong Kong, Fotolia, Freepik, Shutterstock, SIXENSE

Design and layout: **Alkimiki**

Printed in May 2020 by **Dynaprint**

SIXENSE
280 avenue Napoléon Bonaparte
92500 Rueil-Malmaison
France

Visit our website

www.soletanchefreyssinet.com

LinkedIn Instagram Facebook YouTube

Director of publication: Guillaume Billaroch

Editor-in-chief: Magali Mounier

Contributors: Marie-Pierre Bayle, Guillaume Billaroch, Marie Brunel, Marie Ducourtil, Juliette Dumoulin, Sophie Fromion, Miriam Itzeck, Richard Loudin, Alexandre Miletitch, Magali Mounier, Marie Planchard, Charlotte Renard, Karine Vercher.

Photo credits:
P. 4: Thomas Laisné, La Company
P. 6-7: Thomas Laisné, La Company – William Beaucardet
P. 23, 36: Yves Chanoit
P. 63: Vianney Thibaut pour EPFL du Dauphiné
P. 15, 34: Stéphane Cande
P. 31: Peter Zauner Architektur
Couverture, P. 16, 20, 24, 28: Getty Images
P. 12: Ville de Nice
P. 12, 20, 36: iStock
P. 10: Freepik

© Soletanche Freyssinet

Illustrations: Jérémie Claeys

Design and layout: **Alkimiki**

Printed in May 2020 by **Dynaprint**

Soletanche Freyssinet
280 avenue Napoléon Bonaparte
92500 Rueil-Malmaison
France

Build
on trust