

Bretagne - Pays de la Loire



> The coaster quay of the commercial port of Brest was built between 1961 and 1966. It is currently operated mainly for the unloading of cement. The Rincént Bretagne Pays de la Loire agency carried out diagnostic operations of the quay, by following the rhythm of the tides.

These services can be divided into two categories, on-site testing and laboratory testing. Coring and on-site sampling are necessary for laboratory tests, measurements of pH, chlorides and durability. These are carried out by Rincént Recherche Expertise.

Measurements of reinforcement cover, chloride ions penetration profile and carbonation front accompany these tests. The use of the agency's drone to take orthophotos of the underside of the quay makes it easier to locate damages and examine them.



Investigations

> More in the north of France but still close to the ocean, Rincént Investigations carried out in Saint Omer the diagnosis of 6 bridges and 450m of retaining walls.

The detailed inspection, the recognition of the structures and their pathologies led to the recalculation of the structures. This work made it possible to establish the recommendations and the costing of the repair works.

The cherry picker lift, the photographs of which are attached, was used to inspect the structures in the Côtes-d'Armor department.



Champagne-Ardenne



> The Champagne Ardenne agency carries out in the same register, tests necessary for the rehabilitation or consolidation of structures.

The attached photos relate to:

- Samples taken in a champagne cellar for its renovation in Vertu (51)
- A test on a seal on a masonry bridge in Glannes (51)
- And a test on a micropile for the reinforcement of a building in Verdun (55)

This list of tests can be supplemented by the diagnosis of the concrete floor of the stage of a theater of the Maison des Arts et Loisirs in Laon (02).

These highly diversified tests are a prerequisite for the dimensioning of modifications or reinforcements.



Matériaux-chaussées

> The Rincenc Matériaux Chaussées Agency in Bordeaux carries out part of its activity in the external control of earthworks and especially in soil treatment.

During the treatment of the soils in place, one of the important moments on site is the determination of the water content of the materials to be treated since the value of the water content induces the percentage of binder to be mixed with the soil, over the treatment thickness.

This percentage is based on laboratory tests: IBI (Immediate Bearing Index) and CBR test (Californian Bearing Ratio). Treatment proficiency testing are described in standard NF EN 13286-49 and the methodology of laboratory formulation studies is described in standard NF P 94 102. The other important moment is the control of quantities of binders used on site, in this case either with a tarpaulin or with a metal tray. In the same register, but applied to the development of real estates, the agency checked the implementation of storage tanks for rainwater. The purpose of this process is to limit the influx of rainwater into the collecting systems.

The control operations concern the excavation of the subgrade, the installation of the bedding layer, the geotextile, the tanks and their protections.



Île-de-France Sud

> The Rincent Île-de-France Sud performs numerous floor loading tests, and, in this case, it consisted in validating the bearing capacity of 2 connecting beams on a Parisian site.

Generally, the test process is as follows: installation of basins or water tanks then loading in stages. The measurements of the deformations are carried out for 15 to 60 minutes. The last stage is applied for 24 hours. Measurements are made using invar wires combined with digital dial gauges.

Before the tests, the value of the admissible deflection is defined for each stage. The deflections measured at each stage are compared with the calculated admissible values. A measurement is carried out within one hour of unloading to verify the return to the initial position. If this measurement does not meet expectations, additional measurements are performed within a maximum of 72 hours.



Île-de-France Nord

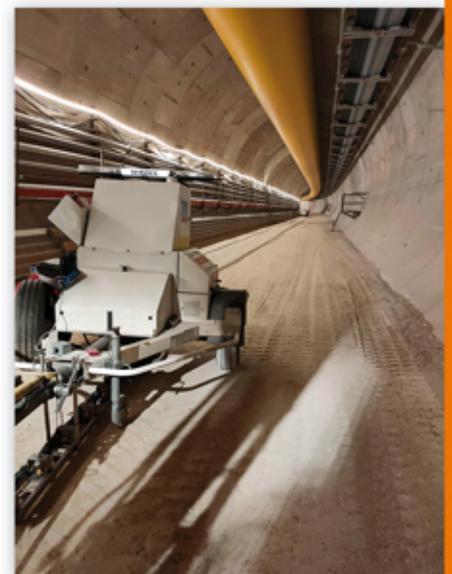
> The Rincent Île-de-France Nord agency is very present on the works of "Grand Paris", more particularly in the concrete control phases, for example on various access shafts to tunnels.

A more anachronistic operation was implemented to characterize subgrade layers made of treated materials.

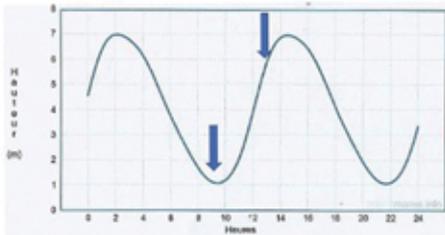
The chosen solution was to convoy the FWD equipment through the shaft to access the tunnel 35 meters below. The FWD Deflectometer manufactured by Rincent ND Technologies is a trailer for deflection measurement generated by a falling weight (Falling Weight Deflectometer).

The application of this dynamic load makes it possible to obtain the deflection equivalent to the measurement with the Benkelman beam. The use of retro-calculation software makes it possible to calculate the modulus of the pavement layers.

This equipment is compact and easy to operate. The tests are carried out quickly thanks to a high-speed hydraulic system.

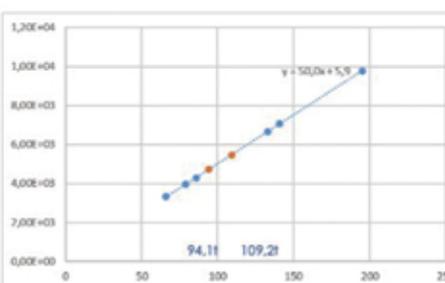


ND Applications



> Tests on tie rods in a deep water port are often carried out during high tidal range because the low tide level allows access to the heads of the tie rods which are generally submerged.

In the example below (Figure 1) at this location the tidal range was 6 meters. Rincént ND Applications carried out non-destructive tests on the tie rods of the port, from a cherry picker lift. The exploitation of the results led to the plotting of the curve in figure 2, tensile forces as a function of the square root of the stiffnesses.



Tests carried out on the same day at different times on the same tie rod show a difference in force of 15 tonnes. This phenomenon related to the water pressure on the sheet pile wall is known and is much more difficult to identify with static tests. These cyclic loads of varying amplitudes are part of the stresses on the tie rods.



Airports

> Rincént Airports carried out the regulatory measurements of skid resistance (CFL index) and the longitudinal roughness (IRI) for the reception of the runway works at Nouméa-Tontouta international airport in New Caledonia.

The studies and tests carried out allow to comply with the specifications of Annex 14 of the ICAO and ITAC Chapter 7 of the STAC.

The longitudinal roughness is the measurement of variations in level of the pavement, for example oscillations, degradations, etc. Roughness depends on the constituent materials of the pavements and the equipment used for the works and the conditions of the works execution. The NF EN 13036-6 standard defines the measurements of the transverse and longitudinal profiles in the wavelength range corresponding to the roughness.

The measurement of the longitudinal profile makes it possible to evaluate the road conditions and the ride comfort.

The works were programmed and planned at the airport according to operating constraints, starting with the 3,250 meter long and 30 meter wide runway. Works to widen the turnaround areas and taxiways is scheduled, as well as the refurbishment of the light beacons.



Chad

> The project to build a trans-Saharan road was born in the 1960s at the initiative of the Economic Commission for Africa. The trans-Saharan roads are made up of four main roads linking Algiers and Tunis, Bamako, Niamey, N'Djamena and Lagos. Most of these roads are completed.

The Rincenc Tchad agency is assisting the company that is building the 85 km long road section between the towns of Bol and Liwa near Lake Chad. The agency's staff monitors the geotechnical work and carries out control tests on site and in the laboratory. The site photos relate to density measurements and plate load tests on the platform.

The link below of the satellite map is centered on the city of Liwa and changing the scale will allow you to visualize the region and the Lake Chad.

https://satellites.pro/carte_de_Liwa.Tchad#13.870864,14.262857,15

Rincenc Labogec Tchad is carrying out the technical control of the construction works of the Djoumane - Laï road, in the south of the country. The agency participates in the control of the construction works of the two towers of the "Cité Internationale des Affaires" in Ndjamen. This center will be the headquarters of the Regulatory Authority for the downstream oil sector of Chad - ARSAT and the Hydrocarbons Company of Chad (SHT), each with a 23-storey tower. The civil works of the SHT tower is being finished and earthworks have begun on the ARSAT tower.



Brazil

> In Brazil, Rincenc BTP Recife carried out non-destructive tests on the tie rods of the Rasgao hydroelectric dam located on the Tietê river in the state of Sao Paulo.

This dam was commissioned in 1925. In 1989, renovation works led to the addition of 80 sub-vertical tie rods to the structure. In addition to checking the integrity and length of these tie rods, analysis of the vibration response allows Rincenc Sao Paulo to calculate the existing tensile stresses®.

One of the steps consists in carrying out a tensile test in stages and non-destructive tests simultaneously.

The operation has several objectives:

- Define the internal tensile force of the tie rod
- Link static and dynamic stiffnesses
- Calculate the tensile force existing on the other tie rods by carrying out only non-destructive tests.

Beforehand, a bibliographical search concerns the nature of the tie rods. The value of the initial tensioning force is calculated according to the rules applied at the time of implementation. Then come the means to be implemented to carry out the direct tensile test simultaneously with the dynamic tests without disturbing the operation of the tie rod.



ND Technologies

> Rincent ND Technologies manufactures and markets non-destructive testing equipment for the diagnosis of pavements and earthwork platforms.

The type II Dynaplaque is one of the equipment with the most commercial success for its maneuverability, its comfort of use and its adaptability to different carriers. The essentially French market is a renewal market and has reached 30 units to date. The production of portable dynaplaque type LWD (lightweight deflectometer) is 90 units. One of the photos attached represents the annual certification tests in England for the LWD.

The 15 FWD Falling Weight Deflectometers already sold are used to measure road pavement deflections. This same equipment can be modified to carry out tests on airport pavements, it becomes a HWD, meaning Heavy Weight Deflectometer. The market is mainly French speaking, but it did not prevent from selling one in England where it successfully underwent authorization tests.

Rincent ND Technologies is ISO 9001 certified for the activity: Design and manufacture of trailers, instruments, measuring and control devices for building and road works, maintenance, and metrological services for these instruments.

All the sensors used are connected to the COFRAC, French Accreditation Committee. Rincent ND technologies calibrates by its own means or by external laboratories the elements of the measurement chain of the deflection trailer according to the LABOROUTE reference system, especially the paragraph 43.3.3b: Connection subcontracted to a service provider.

Non-destructive tests

> The non-destructive tests carried out by Rincent Laboratoires and Rincent ND Applications in particular are theoretically based on the vibration analysis of the vibrations generated by a hammer fitted with a force sensor.

One of the parameters measured during these tests concerns the stiffness. The definition of the stiffness of a system is given for example in standard NF 94 160-4 and is calculated from the V/F curve as a function of frequency and has the same units as a modulus.

The stiffness is a complex number with a real part and an imaginary part which are constant for the frequency values lower than 80 Hz for our field of use.

The stiffness of the system is related to the foundation element itself, to the ground surrounding this element and to the load applied to this element.

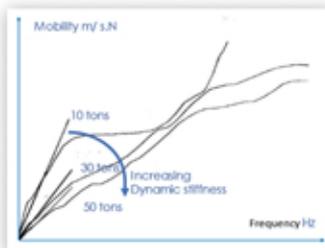
P. Guillermain's 1979 thesis links the diameters of unloaded foundations to dynamic stiffness as well as the link between dynamic stiffness and static stiffness for deep foundations.

The rigidity of the system increases when the element is subjected for example to a tensile force. The performance of static tests simultaneously with dynamic tests on tie rods from 2005 materializes this relationship between force and dynamic stiffness and the link between static stiffness and dynamic stiffness.

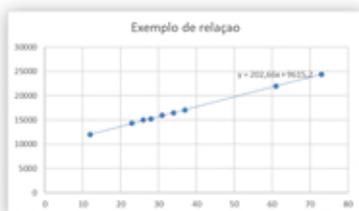
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Below is an example of a curve linking the square root of the stiffness and the tensile forces in tonnes®.



Finally, the variation of the rigidity under cyclic solicitations makes it possible to approach the phenomena of fatigue for example on the tie rods and dowels. Rincent Laboratories has already used this technique to control the fixings of industrial robots receiving cyclic loads.