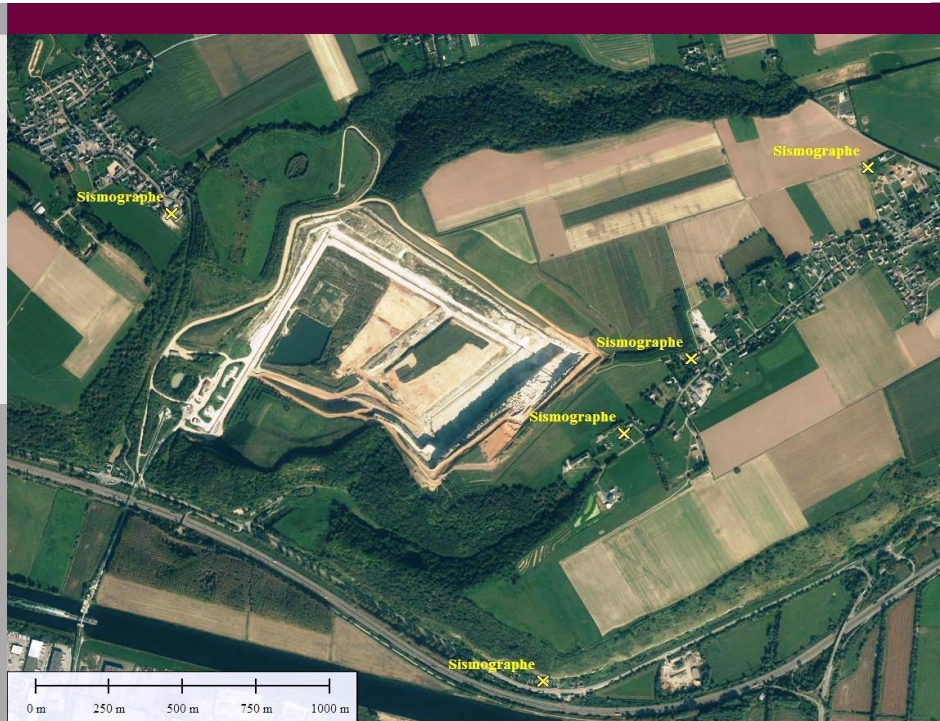


**A 7-YEAR PARTNERSHIP
AIMING AT SAFETY,
NUISANCE REDUCTION
& OPTIMISATION OF
THE EXPLOITATION**

CLIENT	LAFARGE-HOLCIM GROUP
SITE	LE HAVRE
LOCATION	ST VIGOR D'YMONVILLE, FRANCE
PERIOD	2009-2015



GOALS & CONSTRAINTS

The quarry of the cement plant Lafarge-Holcim in Saint-Vigor d'Ymonville is one of the most important chalk extraction sites in France. With a 50-year sustainability, its main mission is cement manufacturing. It is a very technical site, with an important production (4000 t/d) from 5m to 30m quarry faces presenting an unfavourable vibratory behaviour, in which low frequencies are predominant.

Located on Europe's busiest seaway, the cement plant of the Havre Saint-Vigor is reachable for bulk vessels. 60% of its production is sent by boat, the rest is transited by train or truck. Thanks to fully computerized facilities and an ambitious investment program, the plant presents an annual production capacity of 1,1 Mt of a high quality cement, included in particular as a component of concrete used for the construction of the iconic "Pont de Normandie".

Since 2009, EPC France has been entrusted by the Lafarge Holcim Group with the drilling and blasting works on this complex and challenging site.

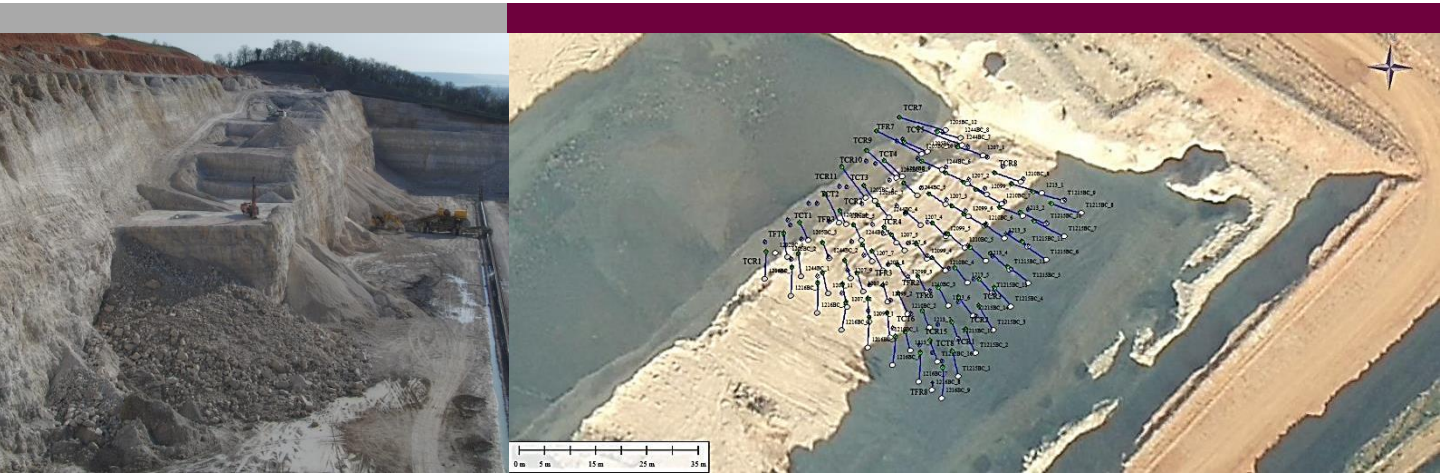
EPC-France brings its sophisticated know-how, as well as the latest technologies in the industry (in particular the control of the geometry of the blasts, EXPERTIR software, mastering of the drilling parameters, on-site production of emulsion) for controlled blasts and a productivity in line with the goals that were assigned to the Group.

KEYS FACTS & FIGURES



- 700.000 m³ blasted on average each year
- A contract to the m³ cut since 7 years
- 50 to 60 blasts each year (150/200t of explosives per year)
- 90% of blasts under the weighted 2,5 mm/s threshold
- Dominant frequencies <5HZ
- Shots only 235 m away from the first houses
- 95% of blasts under 120 dB
- 5 seismographs in continuous control
- 40% expansion of the average size of the blasts





CLIENT BENEFITS AND SOLUTIONS

A PROACTIVE ATTITUDE ABOUT SAFETY

- Transition from 65 to 98% of on-site explosive manufacturing, enabling a significant improvement of safety during transport and the use of products, of the treatment of potential misfires, and a reduction of the arduousness of the loading operations (reduction of the handling from **40 to 50 tons of products per year**).
- Entire substitution of dynamites by initiation boosters and emulsions, while maintaining a high quality mining.
- Active participation in the Lafarge Safety days (presentation of materials, animations)
- Safety measures for the quarry faces (fences, minimal distance between the edge of the face and the mines).
- Equipment of the vehicles and machines (fuel Wiggins filling system, « Cri de Lynx » alarms, control of the equipment).
- Follow-up of the operating methods and analysis of the risks at each intervention.
- ¼ of an hour of safety, internal EPC auditing, certifications (MASE and OSHAS).

EPC's TECHNOLOGY AT THE SERVICE OF THE LAFARGE-HOLCIM QUALITY

The reduction of nuisances

- Scaling of the blasts and optimisation of detonation sequences (EXPERTIR software), application with the electronic initiation (transit from 1/3 to 2/3 of initiation), strict control of the geometry and follow-up of the vibrations for each blast).
- Conservation of vibratory amounts close to the seismic limit of 2.5mm/s imposed, and below the regulation despite dominant frequencies below 5Hz and the proximity of houses (235 m).

Optimisation of the exploitation

- Technical study causing the modification of the exploitation plan (transit from 2 faces of 5,5m to one face of 13m, enabling an improvement of the grain size and recovery of the raw blasting).
- 4m x 4m mesh trials to test the reduction of the deterioration of the Emeraude crusher (290 tons, 29 m long and 17 m large)
- Pre-blast measurements, including 3D laser modelling of the fronts, the measuring of hole deviation by the probe and the XYZ position of the mines.
- Know-how of the drilling team, rigour of the equipment: compass, inclinometer, depth meter, associated to the centimetrically precise GPS to facilitate the selection of the material (chemistry of the mixture between 3 types of chalks).

