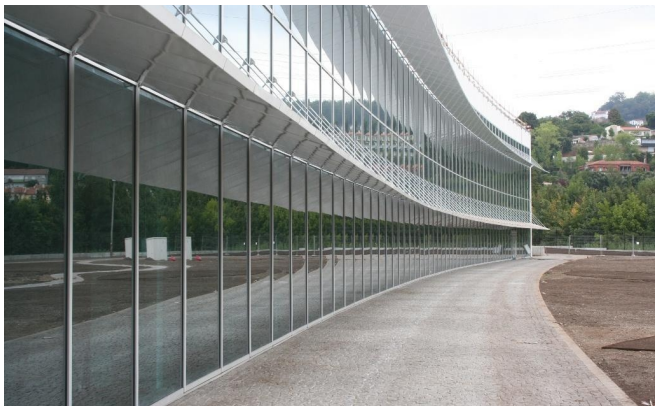
Engineering Structures for Life



BUILDINGS - INDUSTRY & SCIENCE

International Iberian Laboratory of Nanotechnology (INL)

ABOUT

Occupying an area of 47.000 m^2 in the eastern part of Braga, near the University of Minho's Gualtar Campus, the INL is divided into 3 different scientific areas and has a construction area of 2.600 m^2. The Main Scientific Building (1.200 m^2) is where the clean room for the micro and central nanofabrication, the characterisation laboratories and the biology and biochemistry resources support centres are located in the. This building also includes an auditorium with 250 seats and two conference rooms with capacity for 50 seats each, an area dedicated to administrative services, a library and a canteen. The Lab & Office Wing building where the researchers' labs and offices are located, and at the basement level, there is an area for parking. As a support of this research centre exists a building for short-term accommodations called Social Support Building.

GEG's participation in this fast-track project, as structural designer, was integrated into an international design team, having received inputs from specialists from different fields. The contribution of all the companies involved was essential to the accomplishment of this project of singular importance at an international level.

FACTS

Year: 2009-2010
Client: BMM Architects
Services: Detailed design, Structural Engineering, Foundations design, Mechanical, Electrical and Plumbing design, Geological and geotechnical studies

TEAM

Paulo Pimenta
Hugo Marques
José Cunha

LOCATION

Braga, Portugal

Research facilities buildings' are complex constructions. Hardly any other building has to fulfil such a wide range of functional features and technical requirements and for these reasons, these buildings are expensive to build and operate. They represent innovative means of production and as such, they are exposed to constantly changing technologies and modus operandi that imply the need to continually adapt to new research projects. In the case of nanotechnology, recent scientific developments have given rise to a new generation of machines and equipment, which are highly sensitive to acoustic and electromagnetic fields and to vibrations' effects.

Major constraints arising from the site location and design loads influenced the buildings' design:

1. Very demanding vibration limits due to the existence of high precision equipment;
2. High values of imposed loads were taken for the design of slabs (7.5 kN/m2 to 22.5 kN/m2);
3. Adoption of materials compatible with the requirements of electromagnetic interference;
4. Due to the equipment layout and architectural constraints, large spans and limited column positioning had to be adopted in the design;
5. Reduced soil bearing capacity and water level above basement level.

Solutions which resulted in a construction time reduction were also privileged due to the limited deadline for construction. With this purpose, we also gave particular attention to the definition of construction processes capable of efficiently build the proposed structures.

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