Melliss LLP

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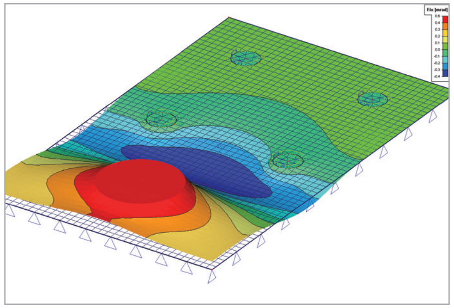
Melliss was formed in 1878 by J.C. Melliss, a former Royal Engineer Officer and part of the Melliss family that are synonymous with St. Helena.

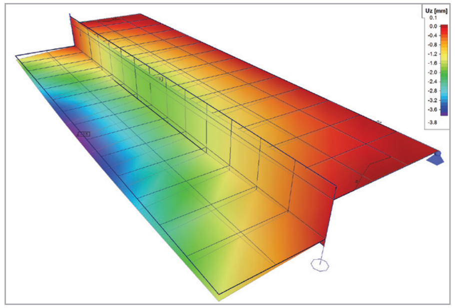
Until the 1960's the firm was responsible for mainly civil engineering works, especially water towers and supplies in London and Norfolk. During WWII, Melliss was involved in the PLUTO (Pipe Line Under The Ocean) project.

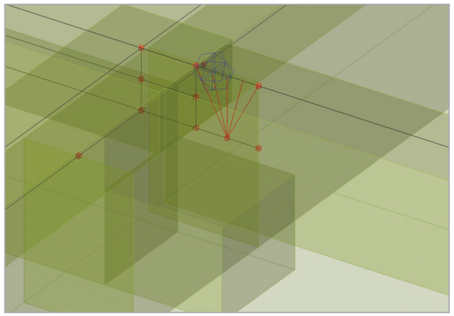
From the 1960's onwards Melliss have increased the structural content of its work and have been involved in a variety of building projects.

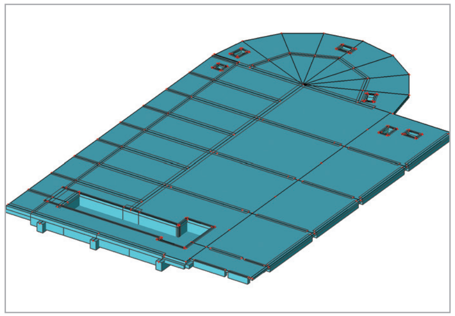
Melliss offer a broad range of Structural Engineering services and have a broad experience of working on multi million pound projects.

In our commitment to quality improvement, we are constantly training our staff, and using advanced 3D modelling software coupled with extensive knowledge of communication technology to ensure information is shared throughout the design team.









Software: Scia Engineer

Botwell Green Sports and Leisure Centre - London, United Kingdom

The initial brief included the construction of a swimming pool area with plant rooms and viewing galleries, a semi-circular two storey fitness suite area with aerobics studio, community areas and changing village, and a library area with parking and a sports hall. The building was constructed to provide community and leisure facilities to Hayes.

The building was U-shaped in plan to be sympathetic to the existing landscaping. The pool and the library areas were designed as independent frames comprising 30 m glulam rafters over the pool, 20 m curved cellular rafters over the sports hall, 8.4 m trusses to the side of the plant room and a complex arrangement of the roof plan bracing trusses over the fitness suite and the library areas. The pools and the basement were in-situ concrete with permanent perimeter sheet piling. To improve buildability, the viewing galleries were designed as 8.4 m precast Z-planks supported by steel columns and beams to the side of the plant room.

During construction, the design team was instructed to add a gymnasium, which had to be sited between the pool and the library areas. The erection of the superstructure to the original scheme was already complete prior to the commencement of the gymnasium, which therefore had to be fully independent.

The Challenge

The major technical challenge was to build new foundations next to the pool basement. To avoid surcharging the basement during piling, the closest line of CFA piles had to be bored at least 4.5 m from the building. The main column line was set out at 3 m from the pool area and was supported by cantilevering foundation beams. The minor column line at 0.5 m from the pool area and part of the ground floor slab were supported by the sheet piled wall.

Gas contamination on site necessitated the use of ventilation and a gas membrane under the entire building. The erection of the gymnasium was phased in three stages: foundations, superstructure and the ground floor slab. 3D structural analysis of the slab and foundations was carried out using Scia Engineer for both the construction stage and permanent condition to ensure that the cantilevering foundations were effectively tied back avoiding any uplift.

Simulation of the foundation's behaviour during construction phases was the modelling challenge. As the construction stage analysis is not a usual service in the company's scope of works, the associated modules were not in the supplied program package. The solution was found in the application of the Absences: the ground floor slab and the third phase ground beams were associated with an absence group and were excluded from load combinations created for the construction stage.

The ground floor slab was modelled at a level higher than the first phase foundation beams and was linked with the latter using plate elements with edge hinges representing the gas membrane and allowing the transfer of vertical loads only. The third phase ground beams, integral with the slab, were isolated from link elements using beam end hinges and connected to foundation corbels using rigid arms. Slab hinges were used extensively throughout to model slab joints. Such an approach has aided more accurate simulation of the structure and reduction of building costs: the slab thickness was reduced from 350 mm to 300 mm, the depth of foundation beams was reduced from 1100 mm to 900 mm, etc.

Use of Scia Engineer

Scia Engineer was used throughout the project for modelling various building structures and, as a value engineering tool, allowed construction costs to reduce which would not have been possible using hand calculations or non-FE software programs.

Botwell Green Sports and Leisure Centre

London, United Kingdom

Project information

Owner	London Borough of Hillingdon
Architect	Burke Rickhards
General Contractor	GB Building Solutions Ltd
Engineering Office	Melliss LLP
Construction Period	From May 2008 to May 2010
Location	London UB3, United Kingdom

Short project description

The project is situated in West London, and is a £20M recreation complex offering state-of-the-art facilities, including a National Standard Gymnasium, a 25 m competition pool, a leisure pool, a spacious gym suite with aerobics studios, multipurpose sports hall, community meeting areas and the library. The Centre involved various types of construction, including reinforced in-situ and precast concrete, steel and composite, Glulam timber and masonry. Scia Engineer was used to model various parts of the building, including foundations of the Gymnasium integrated with the ground floor construction.