

The channel tunnel project construction essay



**ASSIGN
BUSTER**

Two centuries ago, in 1802, a French mining engineer called Albert Mathieu was the first one to propose a tunnel under the English Channel to link the UK and France. Since that time several proposals have been put forward however none of them could be realized due reasons such as lack of technology or the critical relationship between these two countries.

In July 1985 a proposal submitted by the Channel Tunnel Group/France-Manche (CTG/F-M) beat those put forward by their four main competitors and was accepted. This proposal was amongst others more favoured by the British and French government due to the privately funded nature, financial robustness and technological simplicity.

Scope of the Project

The channel tunnel was project was completed over 7 years time, involving 15, 000 workers at the peak of construction. The tunnelling commenced in 1988 and began to operate in 1994. Eleven tunnel boring machines were used on both sides of the channel to cut through the chalk marl and to construct 3 tunnels, 2 for rails and 1 for maintenance. The shuttle terminals are at Folkestone and Coquelles near Calais and the main aim for constructing such a massive tunnel of 32 (50km)miles length, of which 23. 6 (30km)miles are underwater, was to allow people to travel between those countries in an unprecedented travel time of only 35 minutes.

Main Participants

The main participants were Channel Tunnel Group/France-Manche (CTG/F-M), which formed a new entity called Eurotunnel (ET), a bi-national company. ET was owned by banks and 10 other companies and is the owner and operator

of the project for 65 years, until 2052. and client of the contractor Transmanche Link (TML). Design, construction and commissioning fell in the responsibility area of TML and commissioning of the project. An interesting sidenote is that both groups consisted of employees from France and the UK.

This project is supervised by the Intergovernmental Commission (IGC), on behalf of both governments to ensure the Eurotunnel's compliance with the Concession. This body was in charge of the reviewing design, procedures, specifications and in particular issues related to environment, operation and safety of the tunnel.

The Maître d'Oeuvre, an independent Consulting engineer, has been appointed technical auditor and was reporting to ET, the IGC and the Banks.

Technology Used

Eleven tunnel boring machines (TBM) have been used in total on both, the French and the British sides, to work their way through the chalk marl stratum, which is between the gray chalk and glauconitic layer. (See Figure XXX).

On the English terminals 6 TBMs were operating while on the French side five TBMs were used. Due to the high pressure nature of the water which were present in the folded and faulted chalk on the French side, three special TBMs, namely Earth Pressure Balance machines (EPBM), had to be used. On the English side, simpler but faster open face TBMs started digging from the Shakespeare Cliff.

On average the TBMs worked 873 m per month. In the best month it set a world record of 1, 719m per month which yet has to be beaten.

Project Life Cycle

1) Initiation

- April 1985 Promoters were formally invited by the French and UK government to submit scheme proposals for a “ fixed link” between those countries

-January 1986 Mandate awarded to the Channel Tunnel Group/France-Manche

-Feb 1986 Treaty of Canterbury is signed allowing the project to go ahead

Setup of IGC to supervise the project

-April 1987 French Parliament allows the project

2) Planning – Design and Financing

- Jan 1987 - Design phase was relatively short as it was based on the 1975 project and the proposal which was submitted in 1985.

- Aug 1987 - TML and 5 banks (Founder Shareholders) put initial equity of £47 million (Equity 1)

-Sep 1987 - Loan syndication of £6bn with the European Investment Bank (EIB)

- Oct 1987- Private placement of £206m in shares with institutions (Equity 2)

- Nov 1987 - Public Issue (Equity 3) worth £750 million and £5bn bank loan is agreed

- Nov 1990 - Rights Issue (Equity 4) Second round of financing worth £566 million

- Nov 1994 - Rights Issue (Equity 5) Second round of financing worth £566 million

3) Execution and Controlling

- June 1988 First tunnelling commenced in France

- Dec 1988 British TBMs start to drive towards France

- Dec 1990 Service tunnel breaks through under the sea linking the UK and France

4) Closure (Delivery)

- Dec 1993- Contractor TML hands tunnel over to client ET

- May 1994 - The tunnel was formally opened by HM The Queen and President Mitterrand

- June 1994 - First passenger train travelled through the tunnel beneath the English Channel,

- A brief definition of the roles and responsibilities of the project sponsor and the project manager at each of the stages of the life cycle shown above.

The project manager was appointed in the initiation phase after the concessioner agreement was signed. Separate project managers were appointed to manage the British side and French side; they were Atkins and Partners (UK) and Setec (France) respectively. During the initiation phase the project managers planned the project, agreeing on milestones and determining the tasks that would need sub-contracting. The project sponsors - Eurotunnel justified the funding required and set up the success criteria.

In the equity phase the project manager did not have a very big role.

The optimistic plan to open the tunnel by May 1993 meant that the design phase was short with insufficient accuracy and detail. This had many repercussions and was the main contributor to the delays felt later on in the project. In this stage the project manager was managing the overall drive of the project and ensuring the design met the concessions specifications. Eurotunnel set the time, cost, and quality specifications and set all minimum constraints. All major changes made to the design had to be approved by the sponsor.

In the Development phase the project manager had to make a variety of managerial decisions to maintain and bring the project back on the required time schedule. The project manager was also in charge of ensuring there was sufficient linking of tasks. The two teams met monthly to review progress and adapt schedules. Eurotunnel monitored the project progress from an

objective point of view. Eurotunnel also reviewed and had final say on all major changes made to the design in this phase.

In the Delivery phase the project manager and the sponsors review the project and decide whether the deliverables had been met. The contractors TML and the project managers handed over full responsibility of the channel tunnel to Euro-Tunnel who would have to fulfil the Concessions agreement for the rest of the duration in which they would run the Tunnel.

- A statement of the ORIGINAL PROJECT OBJECTIVES:

– TIME

The channel tunnel took 7 years to build. The first train carrying passengers and their cars journeyed to France on the 22nd December 1994. The initial plan has foreseen the tunnel to be ready on the 15th May 1993 therefore the work has been completed more than one and a half after schedule.

– COST

The Channel tunnel is the largest privately funded project in history. It was clear from the beginning that the two governments would not get involved in the funding of the project as this was the only basis on which Margaret Thatcher, British Prime Minister, would accept the project.

Funds have been raised through equity raising in capital markets and loan agreements. In total more than 200 banks, including the founder shareholder banks Natwest and Midlands in the UK and the French banks Credit Lyonnais, Banque Nationale de Paris, Banque Indosuez raised a total capital of £4bn in various equity issues.

The actual completion costs were at an 80% cost overrun in 1994 compared to the cost estimate of £2600 compared by the contractor group TML in 1985. Underestimation of rolling stocks, changes in the fixed equipment work and terminals as well as the initially poor tunnelling process all contributed to the cost overrun.

– QUALITY

As mentioned above an organizations such as Intergovernmental Commission(IGC) and Maître d'Oeuvre (Md'O) was a form of engineering supervision employed by the Eurotunnel. The main task of this body was to monitor all activities on the project and write quarterly reports to keep government and banks updated whether the project was executed in accordance with the requirements of the Concession and the quality assurance standards established by TML.

To achieve the required quality of standards a classification system has been used on the management plane to make the whole process more flexible by assessing and prioritizing the tasks. Although quality requirements were of equal importance for every single task, the management style was categorized in 3 different levels according to complexity, maturity of the technology and overall impact of the task.