JOHANNESBURG BRANCH
Evening Meeting: English Channel Tunnel Project

by P. SMITH*

A General Meeting was held by the Johannesburg Branch on the evening of 12 September 1991 at the Johannesburg Country Club. The meeting was addressed by Mr Richard J. Robbins of the USA, President of the Robbins Company, who gave an overview of the English Channel Tunnel Project. The meeting was attended by approximately 250 people.

Mr Robbins provided a fascinating insight into a project which, at a cost approaching R37 billion, has been described as the civil engineering project of the century, and has been compared to the Suez and Panama Canal Projects.

The history of the concept of linking England and France by tunnel was described and illustrated starting from the first documented design by a French geologist for Louis XV in 1715, through a variety of proposals in the 19th century culminating in the current project which began in 1987.

A little known fact is that several attempts were actually made at installing a tunnel, all of which ended in failure for one reason or another. An interesting example of this was in 1922, using a tunnel borer designed by Whittaker. There was little documented information on the attempt—except the evidence of the boring machine stuck into a cliff in Dover, which was only recently removed and restored as a museum exhibit.

The current project was started in 1987 under the auspices of Eurotunnel, a consortium of ten English and French contractors, together with four principle bankers. The main risk of the project was described as financial, as it is highly leveraged, being funded mainly by loan capital from a total of 134 banks. Consequently, interest charges are high and the cost of time delays were astronomical, which tended to overshadow the enormous technical risks. Delays were experienced early in the program which were exacerbated by the poor ground conditions and water problems anticipated and experienced at the start of the tunnel on the French side with seawater from the Channel running through cracks into the tunnel. This was overcome by innovative design on the part of the tunnel boring machine manufacturers with the supply of water pressure sealed tunnelling machines. Lost time was made up with break-through from the two sides being achieved within the specified program.

Several technical aspects of the tunnel were also described and illustrated. The link consists of two one-way main tunnels, each 8,5 metres in diameter, and a service tunnel of 5,8 metres in diameter. The service tunnel is located between the two main tunnels with service connections at intervals along the length. Blast relief tube connections between the two main tunnels are installed at 250 metre intervals to relieve pressure build-ups in front of high speed trains. The connection is 53 kilometres long, of which 38 kilometres are under the sea, 5 kilometres are under land in France, and 11 kilometres under land in England. Traffic in the main tunnels will consist of high speed passenger trains, freight trains, and shuttle trains. New track is being laid from Paris to the tunnel entrance to accommodate the French TGV trains which travel at speeds of up to 300 kilometres per hour. However, a constraint will exist on the British side where the track connection to London is inadequate for these speeds. The shuttle commuter trains will carry motor vehicles through the tunnels. The journey will be of 35 minutes duration, and at peak times there will be a shuttle train every 17 minutes. The link will be owned and operated by the Eurotunnel Consortium and they have until the year 2041 to recover the capital, plus make an adequate return on their investment, before the tunnel ownership transfers to the British and French Governments.

Slides were shown of the tunnel boring machines, from the various stages of manufacture through to actual operation. A total of 11 tunnel borers were used on the project, 4 large main tunnel borers and 2 smaller service tunnel borers for the seaward drives, and another 5 tunnel borers for the landward drives in Britain and France. The seaward drives were made from two shafts on each coast to connect in the middle of the channel, and the landward drives were made from the same shafts to eventually exit at the tunnel portals. The main tunnel machines cost approximately R57 million each, and the service tunnel machines cost approximately R43 million each. The seaward drive machines on the British side were put into a short radius 'nose-dive' just prior to breakthrough, backfilled with concrete and abandoned. The French machines accomplished the final breakthrough and then were cut up and removed as scrap. This proved to be the most economic method of removing the machines from the tunnels. Many tunnel boring records were established during execution of the project. Advances of up to 75 metres per day and 1700 metres per month were achieved with an average for the entire programme about 730 metres per month.

The presentation closed with a short video of operations in the tunnels during boring, eventually culminating in visuals of the final breakthrough. A cocktail party was held after the presentation, kindly sponsored by the Robbins Company (Africa) (Pty) Ltd.

The Johannesburg Branch of the SAIMM wishes to express its sincere thanks to Mr Peter Horrell, the Managing Director of the Robbins Company (Africa) (Pty) Ltd., and Mr Dick Robbins of the Robbins Company (USA) for making the evening the success that it was.

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