REGULATING RAILWAY SAFETY IN A CHANGING POLITICAL ENVIRONMENT

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SUMMARY

This paper describes in outline the history of the development of the Channel Tunnel, its safety regulatory framework and the safety rules that were established during that development. It goes on to describe the changing safety regulatory framework resulting from the implementation of the Railway Safety Directive in the European Union in 2004, and the impact of those changes on the safety system for the Channel Tunnel. It demonstrates how, even with a serious and important responsibility such as safety regulation, it is possible to harmonise diverse systems to a great extent where the political will to do so exists.

INTRODUCTION

Over the last ten years the European Union has developed its regulatory framework for railway safety in order to remove potential barriers to entry to the market for new operators. This has had a significant impact on the individual regulatory arrangements of the member states, and has required them to reconsider whether the specific national requirements that have developed since the railways were established remain valid and appropriate. The safety of the railway system is of vital importance to each member state as it is only by ensuring a safe railway that user confidence, and hence growth of the sector, can be assured.

The Channel Tunnel is a very small railway system in the European context but its safety regulator nevertheless experienced all the same challenges of these changes as other safety regulators of much larger networks. In this paper I will describe what those challenges were, how they were met and what the outcome of that experience was.

HISTORY[1]

The United Kingdom (UK) is separated from the rest of Europe by the stretch of water known in English as the English Channel, which is 33km wide at its narrowest point. The UK has been a trading nation for centuries and developed both naval and merchant marine fleets to achieve international trading success.

France is England's closest neighbour on mainland Europe, and the two countries have a long history of close links throughout the last millenium, through invasion, royal marriages, alliances and treaties, but by the late 18th and early 19th centuries had become enemies, fighting each other in wars in western Europe and elsewhere. So it seems unlikely that an early 19th century suggestion, by a French mining engineer, of creating a tunnel to link these two countries would have been taken seriously. There were however serious discussions about this between senior representatives of both countries during a brief period of peace in 1802-3. Further proposals and

[1] Terry Gourvish, *The Official History of Britain and the Channel Tunnel* (Routledge 2006)

geological analyses were made throughout the 19th century and the development of railways, with its associated advances in civil engineering, added to the impetus.

The political environment in England was sceptical, and the fear of invasion through the tunnel, whether real or imagined, was a genuine reason for the unpopularity of the project. Further proposals in the early 20th century failed to overcome these concerns, and the economic scepticism, and in some cases insularity, of British politicians meant the project was never taken seriously, even when the military threat was no longer valid.

After the second world war, however, British, European and world politics shifted considerably. A renewed and serious consideration of a channel tunnel led, in the 1960s, to reports by the Anglo/French Channel Tunnel Study Group to both governments, on the options for a fixed link between the UK and France, including a tunnel, a bridge or a combination of the two.

Economic uncertainty, combined with further political difficulties (the French President had vetoed the British application to join the European Common Market in 1963), meant the project was again in doubt. Although serious geological, political and economic development continued throughout the rest of the decade, severe economic difficulties in the mid 1970s led to the British government abandoning the project in 1975.

The plans were resurrected by the new government under Margaret Thatcher in the early 1980s, following a competition in which plans for the tunnel defeated other proposals, including a bridge. This led to the Treaty of Canterbury in 1986[2] and the selection of a contractor, Channel Tunnel Group/France-Manche (CGT-FM), to build and operate a twin-bored rail tunnel under a 55 year concession agreement. Significantly the agreement required the concessionnaire to take the full financial risk, and the tunnel had to be built without recourse to any funds or guarantees from either government. Government estimates suggested that the tunnel would be highly profitable. This turned out to be extremely over-optimistic. CGT-FM subsequently split into two separate components; Eurotunnel, who were to be the concessionaire, and Transmanche-Link, to represent the contractors who were to design and build the tunnel.

The tunnel, between Cheriton near Folkestone in the UK and Coquelles near Calais in France, opened for passenger traffic in 1994; it comprises two rail running tunnels and a service tunnel, each of which is 50km long, and its undersea section, at 38km, is the longest of any tunnel in the world. It is used by high speed passenger services operated by Eurostar, and for rail freight transport. Eurotunnel is the infrastructure manager and also operates two types of rail shuttle services for road vehicles: freight shuttles carry heavy goods vehicles; and tourist shuttles carry coaches and cars.

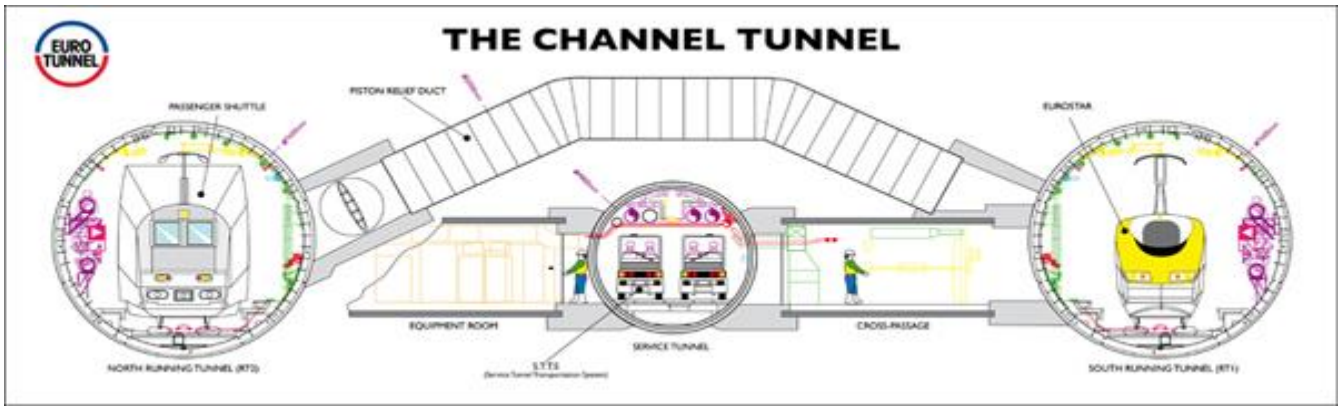

Figure 1: Cross-section of the Channel tunnel (Eurotunnel)

[2] FCO *France No. 1 (1986) Treaty between the United Kingdom …and the French Republic concerning the Construction and Operation by Private Concessionaires of a Channel Fixed Link, with Exchange of Notes, 12 February 1986*, P.P.1985-6, 1, Cmnd.9745, February 1986.

FIRE SAFETY IN THE DESIGN OF THE CHANNEL TUNNEL SYSTEM

To overcome understandable public anxiety about the potential risks of fire in the tunnel it was from the outset constructed with significant fire safety systems installed in the infrastructure, for example: multiple fire detectors; and a water main for fire-fighting, installed throughout the full length of the tunnel. The rolling stock was also designed with great attention to fire safety, and was built to ensure that, in the event of a fire on board, it could continue running for 30 minutes, ensuring that even in the worst case it could leave the tunnel and evacuate the passengers at the terminals.

In the event of a train failure before leaving the tunnel, the passengers could be evacuated into the service tunnel which would be maintained at a positive air pressure compared to the running tunnels, ensuring it would be kept free from smoke and provide a place of relative safety. The service tunnel would also provide access for the emergency services to attend fires and other incidents in the tunnel.

Other safety systems were at that time required for the high speed passenger rolling stock, including the ability to split the train into two separate sections so that one half could be removed from the tunnel in the event that a failure prevented the other section from moving. Other safety related requirements included: smoke-tight passenger compartments; fire detection and suppression equipment on traction systems; fire detection and extinguishing systems on locomotives; minimum traction performance requirements; a specified train length (to broadly align with the distance between the cross-passage doors between the running tunnel and the service tunnel); a continuous corridor throughout the length of the train; and passenger call buttons at the end of each coach. Each train was required to have a locomotive (electric only, no diesel) at each end, each with a driving cab.

These very specific safety requirements were contained within the project documents for the design of the tunnel and rolling stock. These were not published and were not available to anyone outside those involved in the design, construction and operation of the tunnel when it opened.

As well as passenger trains, the tunnel is used by freight trains, and vehicle-carrying shuttle trains (of a single approved design). There have been no significant accidents involving passenger trains, but there have been two very serious fires caused by vehicles catching fire on the shuttle trains.

REGULATING SAFETY IN THE CHANNEL TUNNEL – 1994 ARRANGEMENTS

The Treaty of Canterbury created two bi-national (UK/France) bodies to oversee the construction and operation of the tunnel: the Inter-Governmental Commission (IGC) and the Channel Tunnel Safety Authority (CTSA). The role of the IGC is „..to supervise, in the name and on behalf of the two Governments, all matters concerning the construction and operation of the Fixed Link“ including all matters relating to the concession agreement. The CTSA’s role is to advise and assist the IGC on all matters concerning safety in the construction and operation of the Fixed Link. These two bodies first met in 1986 and continue to do so, providing opportunities for bi-national discussion and agreement on regulatory matters, and giving the concessionaire a single body to work with rather than two separate teams of regulators.

Both the IGC and the CTSA are bi-national bodies with each country having the same number of delegates. The IGC includes representatives of the relevant government ministries of each country including transport, home affairs, foreign affairs as well as national security organisations. Both Heads of Delegation for the CTSA are also members of the IGC. The CTSA includes representatives of national railway safety regulators along with experts from local Fire Authorities from Kent and the Nord Pas de Calais. Both organisations can call upon experts from other bodies as required.

At the time the tunnel opened (1994) the national railway safety regulators were established in accordance with the requirements of the individual country’s government and national railway system. The IGC and CTSA developed ways of working that sought to provide a unified approach to safety regulation in the tunnel, whilst

ensuring national safety legislation was complied with. The border between UK and France is at the mid-point of the tunnel and the objective was to avoid different safety rules for the two national parts of the tunnel.

DEVELOPMENT OF A EUROPEAN FRAMEWORK FOR RAILWAY SAFETY AND INTEROPERABILITY

At the same time that the tunnel was under construction the European Union (EU) was beginning to develop its approach to harmonisation of the European railway system, which it saw as a key element of the transport system. Road congestion was significant even in the early nineties, and a simplification of the rail freight transport system in particular was seen as an important contribution to moving freight from roads onto rail.

There were two key aspects to opening the rail market: the need to introduce more competition; and the reduction or removal of the technical barriers to interoperability of trains. European Directives were introduced to tackle both of these issues in the 1990s and have been developing since then, and the most recent interoperability directive was agreed in 2008, covering the whole European railway network. Technical Standards for Interoperability (TSIs) were developed to provide harmonised technical standards for railway subsystems such as infrastructure, control command and signalling (CCS), energy, tunnels, locomotives and passenger carriages. The TSIs were intended to provide common, agreed technical standards that would open the market for railway subsystems, gradually leading to a technically harmonised European railway system and cost reductions. There were for example more than 12 different and incompatible national standard train control systems across the EU in the 1980s. The CCS TSI proposed a single common system that would enable trains to travel across borders without the need for multiple different technical installations.

The EU also recognised that there were significant differences in the way individual countries regulated the safety of railways. This meant that any railway operator wishing to develop services in different countries often found it necessary to undergo multiple testing and approval processes for the same trains, creating delays to the introduction of new services and additional costs. The EU was anxious to encourage the opening of the market for international rail services and improve competition in the sector, and this led to the development of a new directive on railway safety[3] which came into force in 2004.

The Railway Safety Directive (RSD) introduced a number of requirements that sought to harmonise the way safety was regulated across Europe. It was based on the principle that the railway industry, in particular operators and infrastructure managers, were responsible for railway safety through effective safety management systems (SMSs). It created, among other things, the concept of a 'National Safety Authority' (NSA) responsible for assessing the SMS of infrastructure managers (IMs) and railway undertakings (RUs) and authorising the placing into service of railway subsystems. All member states were required to establish an NSA, independent of any IM or RU, responsible for SMS assessment and subsequent supervision to ensure the SMS was followed in practice.

The European Railway Agency (ERA) was also established in 2004[4] and was given the task of developing harmonised procedures for NSAs to assess SMSs and authorise vehicles and infrastructure. The Agency also took over the task of continuing to develop the TSIs, and began work on developing a common approach to safety regulation by developing harmonised processes such as: safety certification; common safety indicators to enable performance across different member states to be measured and compared; and key safety techniques such as risk assessment.

The Agency also created a forum to enable all the NSAs to come together, the NSA Network, to discuss proposed developments by the Agency and to share and learn from each others' experiences. The Network met

[3] DIRECTIVE 2004/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL *of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (Railway Safety Directive)*

[4] REGULATION (EC) No 881/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL *of 29 April 2004 establishing a European railway agency (Agency Regulation)*

for the first time in July 2005. The Agency's different outputs are developed through working groups comprising relevant experts from the railway industry and the NSAs. Each finished 'product' (e.g. a revised TSI, or a Common Safety Method) is presented to the Railway Safety and Interopability Committee of the European Commission for agreement by the Member States' representatives before becoming law. Ultimately, the vision for the European railway system is that there will be a single set of rules applying across all the countries of the EU that IMs and RUs will have to comply with, and that the many existing different national rule systems will gradually disappear.

IMPACT OF THE EUROPEAN FRAMEWORK ON CHANNEL TUNNEL SAFETY REGULATION 2004-2014

At the time the Railway Safety Directive was introduced, the IGC and CTSA had been regulating safety of the tunnel for 10 years, based on a bi-national approach that sought to achieve compliance with both national systems but that offered a unified process. The French and British governments decided to implement the Directive for the tunnel in a way that continued to build on this bi-national approach and developed a single set of regulations that each country could introduce into its national legal framework. They agreed that the IGC should be the NSA for the Channel Tunnel and in 2007 they created the first bi-national safety regulation[5] implementing many of the Railway Safety Directive's requirements e.g. for SMS assessment. This was the first step towards creating a framework for channel tunnel safety that was harmonised with all the other NSAs across Europe, but there was still a long way to go.

The process of regulating railway safety had, until the creation of the RSD, been quite different across the member states of the EU. In many cases, this was the responsibility of the national state railway itself, but the European Commission wanted to increase competition in the railway system by enabling private railway undertakings to operate train services across national borders, and this kind of regulatory control by the incumbent state operator was deemed to be anti-competitive. In France the new NSA, Etablissement public de sécurité ferroviaire (EPSF), was established in 2006. In the same year, in the UK the responsibility for railway safety regulation was transferred to the Office of Rail Regulation (ORR) which became the combined economic and safety regulator for British railways. Each member state of the EU had to decide how its NSA was to be established. There was no single model for an NSA, and the IGC had now to consider what needed to change for it to deliver all the requirements of the RSD whilst remaining true to the French and UK governments' aims and priorities for the Channel Tunnel.

Many of the aims and requirements of the RSD, and the supporting processes, had not yet been fully developed and it was the task of ERA to take this work forward, together with the NSAs and the railway industry. One of the first steps towards achieving this was the development of the Network of National Safety Authorities, established by ERA in 2005. From the beginning, even before the bi-national regulation was finalised, representatives of CTSA attended the NSA Network, on behalf of the IGC, and worked with ERA, in conjunction with other NSAs and the railway industry, to develop the harmonised processes (Common Safety Methods) necessary for NSAs to use (e.g. safety certification and authorisation, and risk assessment) and the approach to measuring safety performance (Common Safety Indicators and Common Safety Targets).

During 2007, the EU agreed a package of new railway legislation that opened the market for international passenger services[6]. One of the most significant railway safety barriers to opening the market was the specific 'national rules' that each member state had for ensuring the safety requirements of its national network. These rules were both technical, relating to rolling stock design, and operational. This meant that railway undertakings

[5] *Regulation of the Inter-Governmental Commission on the Safety of the Channel Fixed Link* done on 24 January 2007

[6] DIRECTIVE 2007/58/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL *of 23 October 2007 amending Council Directive 91/440/EEC on the development of the Community's railways and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure*

had to know, and adhere to, all the rules for each country that they wished to operate in. Sometimes these rules were very similar and some member states had developed bi-lateral agreements for 'cross-acceptance' of each others' technical rules relating to rolling stock, but this was not always the case. When the Channel Tunnel was designed and built, the IGC, recognising the political and safety concerns of the time, had identified some very specific requirements for the rolling stock that was to use it. It was becoming clear that some of these requirements were different to the requirements for rolling stock using other member states' networks and which were being established as EU 'norms' within the relevant TSIs.

The IGC recognised that it need to review its specific rules relating to rolling stock design to assess whether they remained essential for ensuring an acceptable level of safety in the tunnel, or whether, with the development of European TSIs, and with the knowledge gained from the ten years experience of operating the tunnel, some of them could be removed. It embarked in 2009 on a consultation of stakeholders which enabled it to reach conclusions on the removal of some of the tunnel-specific rules relating to rolling stock. In addition, and following publication of its conclusions in March 2010, the IGC sought a 'technical opinion' from ERA concerning the rules.

Having carried out this review, the IGC worked to establish its few remaining tunnel-specific requirements as part of the new European regulatory framework by ensuring they were made transparent to all rolling stock designers through their inclusion in the new TSI relating to locomotives and passenger carriages (LOC and PASS TSI). **The key additional requirement remained the need to ensure passenger trains could continue to run, in the case of a fire on board, for thirty minutes to enable them to exit the tunnel** (the TSI norm was for 15 minute running capability for passenger trains using long tunnels). The IGC commissioned a risk analysis to enable it to assess whether it remained a necessary requirement, and submitted this to ERA's TSI drafting group for consideration.

If a member state wishes to retain requirements that are different from those of a TSI, it has to provide evidence of the need for that requirement, along with a cost-benefit analysis, in order to justify the difference. The IGC did this in 2013 for 'thirty minute running capability', and the revised LOC and PASS TSI which comes into force on 1 January 2015 includes a 'specific case' to this effect for the Channel Tunnel. During 2014 the IGC continued to work on making its requirements more transparent and has published all the details of tunnel-specific rolling stock requirements on its web site and in the National Reference Documents of both France and the UK, which can be found on the ERA web site.

There is still some work to be done to ensure all remaining additional safety rules have been identified and justified, with potential new operators having full transparent access to all the detailed requirements. The IGC expects to finish this work by the end of 2014. This will mark a significant milestone in the IGC's journey from having a very specialised safety regulatory framework, specific to its own network and difficult for potential new operators to access and understand how to comply with, to a small number of fully transparent and justified additional requirements, all of which are incorporated into a European harmonised regulatory framework.

CONCLUSION

This paper has described the history of the development of the Channel Tunnel, how its regulatory regime was established, and the importance of the requirements for fire safety in particular at the time of its opening. It has also briefly described the development of the European Union's transport policy and the impact this had on safety regulation for EU member states. In particular it has described the impact of the Railway Safety Directive since its introduction in 2004. The paper has described how, when faced with this rapidly developing new political framework, the IGC acted to review, reassess and revise the safety requirements whilst maintaining the necessary level of safety in the Channel Tunnel system. The rules concerning rolling stock using the Channel Tunnel are now transparent and available from the IGC web site and the ERA National Reference Document database.