

Strategic Rail Authority  
Improving passenger rail services through new trains



REPORT BY THE COMPTROLLER AND AUDITOR GENERAL  
HC 263 Session 2003-2004: 4 February 2004

# Summary

- 1 This report focuses on the work of the Strategic Rail Authority (SRA) in overseeing the introduction of new passenger trains. Since privatisation of the railways in 1996, the Train Operating Companies (TOCs) that provide passenger train services under franchise agreements with the SRA have ordered over 4,500 new vehicles - equivalent to about a third of the fleet in operation at privatisation - worth some £4.2 billion. Orders have been in response to a 1999 statutory requirement to take all (about 1,950) Mark 1 slam-door vehicles that were then on the network out of service by December 2004, or reflect TOCs' commitments under their franchise agreements with the SRA to improve the quality of service to passengers, or have been placed for commercial reasons. Rolling stock leasing companies (ROSCOs) fund the purchase of new vehicles and TOCs pay them leasing charges out of their fare income and the £1 billion annual subsidies they receive from the SRA. Under Directions and Guidance set for it by the Secretary of State for Transport, the SRA is required to ensure that rolling stock is available so that passengers travel in appropriate modern standards of comfort and safety.
- 2 New trains generally provide a better journey experience for passengers. But there are exceptions. Most have been late entering service and are not as reliable as they should be; often, they are less reliable than the old trains they have replaced. There are six key factors contributing to these problems:

- A lack of steady demand in ordering new trains, contributing to manufacturing and managerial difficulties
- A lack of organisational coherence within the rail industry hinders getting new trains into service
- A lack of standardisation of the network, and of the trains that run on it
- A lack of information about the network
- A lack of clearly defined pass/fail criteria when assessing safety risks
- A lack of testing capacity

Source: National Audit Office

## New trains are bringing significant benefits to passengers

- 3 Fit for purpose when designed, the oldest trains on the network do not meet modern standards of safety and construction and generally provide a poor quality environment for today's travelling public. Over 2,000 new vehicles ordered since privatisation have now entered service. Passenger groups told us that these vehicles were providing greater safety and security, a better travel environment, improved facilities for passengers with disabilities and, on some routes, shorter journey times and reduced overcrowding. Passengers should see a significant improvement in the services they receive as more new vehicles enter service over the next few years. The average age of the passenger train fleet has fallen and is expected to fall further, to around 14 years by 2005.

## New trains are not, however, bringing all of the passenger benefits that they should

- 4 Passenger groups have complaints about the layout of some new vehicles and that new rolling stock is not always fully accessible to passengers with disabilities. They also consider that manufacturers and TOCs have failed to consult sufficiently early with passengers regarding the features and facilities that passengers require.
- 5 The capacity of new vehicles is restricted by the requirement for larger toilets that allow access for passengers with disabilities, and a 'crumple zone' at the ends of each carriage to improve crashworthiness, while the interior design of a train varies between vehicles. On some routes, passenger numbers have grown faster than the number of vehicles ordered and the infrastructure's ability to accommodate more frequent or longer trains. The introduction of new trains has therefore not kept pace with the growth in demand.
- 6 Nor are new trains as reliable as they should be, and they are often less reliable than the old trains they have replaced. Most new vehicles have experienced multiple problems that take time to rectify or eliminate. The most common problems have concerned mechanical failure, on-train computers and air conditioning. Poor reliability has been a particular problem in the first few months after entry into service, while TOCs' adoption of different measures of train reliability has hampered accurate comparisons and the measurement of trends over time.
- 7 Many new vehicles have been late entering service. Of the 15 TOCs that had introduced new trains at the time of our survey in Spring 2003, 12 had not brought their vehicles into service by the due dates set in the manufacturing contracts. Delays ranged from one month to more than two and a half years, with an average delay of over seven months. Delays are expected to continue for new vehicles not yet in service.
- 8 The Health and Safety Commission, which ensures that risks from work activities, including on the railways, are properly controlled, accepted the Secretary of State's request that the proposed statutory deadline for removing all Mark 1 slam-door vehicles be brought forward by three years, to 31 December 2004. This was upon advice from the SRA's predecessor bodies - the Office of Passenger Rail Franchising (OPRAF) and the Shadow SRA - that the earlier date would be achievable if all remaining Mark 1 replacement vehicles were ordered by December 2001. We were unable to find any evidence, however, that either OPRAF or the Shadow SRA did any work to check that removal by that date was feasible. On average, it takes two and a half years between placing an order and bringing new vehicles into service. Four orders, for almost 1,000 new vehicles to replace Mark 1 slam-door vehicles, were not placed until 2002 or 2003, more than two and a half years after the December 2004 statutory deadline was set. Planning to deliver many of the new





vehicles - together representing 54 per cent of the Mark 1 replacement programme - in the six months leading up to, or shortly after, the statutory deadline is high risk. On-site work to upgrade the power supply and other aspects of the infrastructure on Network Rail's (previously Railtrack's) Southern Region to enable new trains to run did not start until mid-2002 and is unlikely to be completed in time to allow the statutory deadline to be met. The SRA and the Health and Safety Executive have recognised that it might be necessary for the three relevant TOCs - South West Trains, South Central and Connex South Eastern<sup>1</sup> - to apply for an exemption from the deadline. In the meantime, many passengers continue to travel on older trains.

## The process for introducing new trains is complex, bringing delay and contributing to reliability problems once trains enter service

- 9 Bringing new trains into service is a complex task, involving many organisations and many different and re-iterative stages, which may vary from train order to train order (Figure 11 on page 26). There is a lack of strategic direction or design of the process by a single body with, at least, nine organisations and 60 key stages involved. It is difficult to believe that the process would have been so complicated and drawn out had it been designed from scratch.
- 10 There are several key problems in the current process and, although the current process has started to change for high speed routes, and is expected to change for other routes, in response to European legislation, we found that there was considerable confusion in the industry about what impact the legislation will have. The SRA represents the UK on the European Committee that approves common technical specifications under the legislation. The Health and Safety Executive, which has a role in protecting everyone in Great Britain against risks to health and safety in the work place, is responsible for enforcing compliance with the legislation. The Executive told us that it recognises that the changes are likely to be perceived as complex, and that its role will be helping the rail industry through the transition. The Executive believes that the new European process will ultimately deliver a simpler, easier to operate system for the industry.

## Lack of steady demand for new trains

- 11 Manufacturing and managerial problems, such as delays to sub-contractors' supplies and faulty parts, have delayed the delivery of many new vehicles, which are much more technically sophisticated than the old ones they are designed to replace. The paucity of orders for new trains in the two to three years leading up to privatisation in 1996 contributed to a shortage of manufacturing and managerial expertise within the UK railway industry. When this was followed by a surge in orders following the first round of TOC franchises and the introduction of the statutory deadline for the replacement of all Mark 1 slam-door vehicles, there was insufficient expertise to deliver the orders on time. Expertise has gradually returned to the UK industry, but the SRA does not expect there to be a business case for any further public investment in new vehicles until 2005 at the earliest. There will still be a need, however, for vehicles to be refurbished and possibly cascaded<sup>2</sup> between TOCs. Much of the expertise acquired during the building and introduction of new trains will therefore still be relevant.

<sup>1</sup> The SRA terminated Connex South Eastern's franchise in November 2003 over concerns about the TOC's financial management. The franchise is now being run by South Eastern Trains, a wholly owned subsidiary of the SRA.

<sup>2</sup> Making best use of vehicles over their whole life requires older, but still useable, stock to be cascaded between TOCs, or between different routes operated by the same TOC, when new trains are introduced. Stock cascaded between routes has to go through acceptance procedures in the same way as new stock.

## Lack of organisational coherence within the rail industry hinders getting new trains into service

- 12** There has been a lack of common understanding and agreement within the industry about the current process and this, together with a lack of clarity in some key parts of the process, has contributed to delays in new vehicles' entry into service, increased costs and poor reliability of new vehicles in service. There is a lack of organisational coherence within the railway industry; not all of the key public and private sector parties involved have common interests in, or have been sufficiently incentivised for, the smooth introduction of new trains. Nor do the various organisations involved have a collectively agreed programme, route map or timetable for trains' introduction.
- 13** In a statement to Parliament in January 2004, the Secretary of State acknowledged that, more generally, the structure and organisation of the industry was a serious problem. There were too many organisations, some with overlapping responsibilities, which got in the way of effective decision-making. He announced a review, intended to examine how the industry works together and streamline the structure of the railways, making it as simple and as straightforward as possible and with clear lines of responsibility and accountability. The review will include railway safety, currently the responsibility of the Health and Safety Commission and Executive and the Rail Safety and Standards Board. The SRA will be advising the government, based on industry views, and the government will publish its proposals in the summer of 2004.

## Lack of standardisation of the network, and of the trains running on it

- 14** There is a lack of standardisation in the 20,000 miles of track and signalling, the height and length of the platforms at the 2,500 stations and the height and width of the 65,000 bridges and tunnels that make up the network. There are also 46 designs of rolling stock on the network, with 13 new designs ordered since privatisation. Trains have to be individually tailored to fit the route or routes on which they will run, complicating and delaying the process of bringing new trains into service and limiting the flexibility with which TOCs can deploy their stock. Railway Group Standards setting out the safety requirements that railway assets and equipment must meet are not, nor were they ever intended to be, prescriptive and comprehensive for procuring new trains. As a result, they do not cover all eventualities, such as how new vehicles might affect the network. There is also a range of other standards and specifications, ranging from mandatory legislation to good practice guidance, set by a number of bodies including Network Rail, the Department for Transport and the Health and Safety Executive. Much of the infrastructure on the network is over 100 years old and does not comply with current Railway Group Standards, so a train designed to meet the Standards might still be unable to run on the network.

## Lack of information about the network

- 15** Network Rail does not yet have a complete database of its infrastructure, making it difficult for manufacturers to build trains that are compatible with the network without some adjustment either to the infrastructure or to the vehicles before the trains can enter service. In particular, there has been a lack of attention at a sufficiently early stage to the way in which new rolling stock will affect, and be affected by, the infrastructure on which it runs. Network Rail is now required



under its network licence to establish and maintain a comprehensive and reliable register of the condition, capacity and capability of its assets and provide manufacturers and TOCs with timely and accurate information as necessary. Network Rail told us that it had put most of the register in place by the end of 2003, and that it expects the remaining information to be in place by June 2005.

### Lack of clearly defined pass/fail criteria for assessing safety risks

- 16** Acceptance of new trains onto the network is governed by the Health and Safety at Work Act 1974 and other more specific regulations. The Act requires employers to carry out their activities in such a way as to ensure that, so far as reasonably practicable, their employees and other people are not exposed to risks to their health or safety. In applying the Act, the Health and Safety Executive regards 'so far as reasonably practicable' as having the same meaning as 'as low as reasonably practicable' ('ALARP'). It therefore advises TOCs that, when introducing a new train onto the network, they should reduce the safety risk to 'as low as reasonably practicable'. As part of their applications for approval, TOCs submit evidence from Network Rail that the risks associated with a new train are, in its view, 'ALARP'. Although this approach leads to incremental improvement in standards, the method for assessing 'ALARP' is subjective, lacking clear criteria or thresholds that new trains must pass. The Health and Safety Executive expects the 'ALARP' principle to be applied at the train design stage; in practice, it is not always carried out until a new train has been built. Given the incremental improvement in standards inherent in the process, views on what is 'ALARP' might have changed since the time that the new train specification and design were developed. The way in which 'ALARP' is implemented therefore leads to a lack of certainty of outcome on the part of TOCs and manufacturers. It also produces the perverse outcome of delaying the introduction of safer new trains while keeping less safe older trains running longer than necessary. In some other European countries new trains need only be as safe as existing trains to be accepted onto their networks. A European Railway Safety Directive, which is close to adoption under the Department for Transport's lead, will require Member States to ensure that railway safety is generally maintained and, where reasonably practicable, continuously improved. The Health and Safety Executive interprets this requirement as consistent with the 'ALARP' principle.

### Lack of testing capacity

- 17** There is no national facility for testing new trains off the network and there are difficulties in gaining access to the network for testing because parts of the network are running at full capacity, while the need for essential maintenance and renewal of the infrastructure further reduces the opportunities for testing of new trains on the network. Moreover, until a new vehicle has been shown to be safe, it is usually necessary for Network Rail to impose restrictions in order to ensure that the safety of the network is not compromised and that other train services are not put at risk. Limited access to test trains on the network has meant that new vehicles have entered service without sufficient testing, contributing to reliability problems. Some manufacturers have tested their new vehicles in other countries.



## CASE STUDY

### South West Trains and Siemens

South West Trains placed the biggest order for new trains - 785 vehicles to replace its Mark 1 stock - with the manufacturer Siemens. The trains (Desiros) had not previously been supplied to the UK market and therefore needed to undergo significant amounts of testing in accordance with UK requirements before they could be accepted on to the network. Siemens told us that, due to uncertainty in obtaining sufficient access to the UK network to test the new trains, it decided to undertake more testing at its own test facility at Wildenrath in north west Germany. The condition of the facility was not, however, an accurate proxy for the condition of the tracks in the UK Southern Region where the new trains would run. Siemens therefore spent £10 million simulating the condition of the Southern Region at its test centre, including adding a third rail (with associated gaps) in order to create power supply conditions more representative of those in the UK.

*Source: South West Trains and Siemens*

- 18 An industry-led working group that reported to the SRA in February 2001 concluded that lessons could be learned from the airline industry and other European countries, where there was more thorough testing. Although SRA studies have concluded that a national test facility could be justified, the Department for Transport, Local Government and the Regions - the sponsoring Department at the time - did not approve the SRA's case for a £50 million government grant to build such a facility because it was deemed to be insufficiently well founded. The Department for Transport considers that the need for such a UK test facility has now reduced.

Although the SRA is taking action to address these problems, more needs to be done to protect passenger and taxpayer interests

- 19 Where new trains enter service late and have a materially adverse effect on passenger services in breach of a TOC's franchise agreement, the SRA is required under its Directions and Guidance to seek from the TOC compensation for passengers, such as the provision of additional new rolling stock. In most such cases, however, the SRA has sought to work with the various parties to secure the earliest introduction of new trains rather than seek compensation. The SRA and its predecessors have secured compensation for only two of the 23 fully completed orders where trains have been late entering service. In other cases, the SRA considered that TOCs had done everything they could to facilitate trains' timely entry into service, or that seeking compensation would be counter-productive to the main aim of getting trains into service as early as possible. In these cases, the SRA and TOCs have negotiated revisions to new trains' entry into service dates in TOCs' franchise agreements. The SRA and its predecessors have not always been able to prove that TOCs have been in breach of their franchise agreements, where those agreements have required TOCs to make 'reasonable' or 'best' endeavours to bring new vehicles into

service by the due dates, because there is uncertainty about courts' potential interpretation of the meaning of these terms. The SRA considers that it is unlikely that TOCs would accept stronger obligations in their franchise agreements for the delivery of new trains, unless the costs of such obligations were reflected in higher franchise subsidies.

- 20 The SRA has paid, or has a commitment to pay, additional subsidies of some £760 million to four TOCs to offset additional costs associated with the introduction of new trains. In addition, because of infrastructure problems, the SRA expects that a backlog of new vehicles, ready to enter service but unable to do so, might build up to a peak of some 300 vehicles in the first quarter of 2004 before receding. The SRA has been working, and continues to work, with the industry to reduce the level of liabilities that might arise as a result of the backlog of vehicles. It currently estimates that it might have to pay TOCs up to £7.2 million to cover their costs until the infrastructure work is complete and the new vehicles are able to enter service, and to cover the costs of modifications that might be required to Mark 1 vehicles to enable them to remain in service beyond the statutory deadline of 31 December 2004. As most of the SRA's income comes from grants from the Department for Transport, taxpayers are likely to have to meet most of these liabilities. The SRA has also underwritten Network Rail's costs by £400 million to allow Network Rail to progress the infrastructure work while private finance is arranged to pay for it. Network Rail will recover the costs of infrastructure work through track access charges that TOCs pay for using the network, which is the usual approach in such cases. As TOCs' principal sources of income are subsidies from the SRA and fares, ultimately taxpayers and passengers will pay for the work.
- 21 The government established the SRA in February 2001 to deliver the strategic leadership to the railway industry that the government considered was previously lacking. The SRA's Directions and Guidance of April 2002 stated that the Authority needed to address vigorously the difficulties affecting the delivery of new trains. The SRA has little direct involvement in the process of introducing new trains. Nor does it have powers to direct, manage or control the process or other organisations' involvement in it. It cannot therefore by itself take the action required to improve the process or ensure that new trains enter service on time and provide a reliable service. The SRA is therefore required to guide the industry through dialogue and persuasion, set priorities for action by itself and others and address the problems caused by the fragmentation of the industry, ensuring in particular that incentives and commercial interests are properly aligned to achieve common goals.
- 22 The SRA initially took action to progress particularly difficult cases involving the delivery of new trains, while industry working groups set up by its predecessor to tackle problems on a strategic and process-wide basis fell into abeyance. As well as getting to grips with the impact of the Hatfield derailment and Railtrack's year in administration, the SRA has been involved in establishing Network Rail in place of Railtrack, developing its new franchising policy and tackling cost escalation in the industry. Most of the TOCs that responded to our Spring 2003 survey considered that the SRA had made little or no progress against its rolling stock objectives. Nor did we find any evidence of the SRA exploiting its strategic position to identify and disseminate best practice across the industry to help new train introduction.
- 23 The SRA has been encouraging partnership working in the introduction of new trains since August 2002 through an Industry Plan for Mark 1 replacement agreed with the other key stakeholders, and is taking other action to bring about improvement. It also published a Rolling Stock Strategy in December 2003, which includes how it would address some of the key problems associated with the introduction of new trains. It is too early to assess the impact of these recent initiatives and progress has been slower than the SRA would ideally have liked, given the problems in the rail industry. Several key problems - particularly the lack of organisational coherence within the industry and the lack of testing capacity - remain to be solved.



# RECOMMENDATIONS

- 24** To smooth new trains' entry into service and deliver the expected benefits to passengers on a timely basis, we make the following recommendations:
- (i) As a condition of its direct agreements with ROSCOs and its franchise agreements with TOCs, the SRA should require ROSCOs and TOCs to work more closely with manufacturers and passenger representatives to take account of the features and facilities that passengers, including those with disabilities, need in the design of new trains (paragraphs 4 and 2.14).
  - (ii) The SRA should include in its franchise agreements with TOCs the requirement for new trains to meet specified levels of reliability, and establish the expectation that reliability targets will be included in TOCs' agreements with the ROSCOs, manufacturers or other organisations responsible for maintaining their new vehicles (paragraphs 6 and 2.24).
  - (iii) The SRA should assess the need for any further new passenger trains, in the light of the likely future demand for passenger services, the age of trains on the network and likely changes in the train manufacturing base. The SRA should make indicative information available to the industry, to be reviewed on a periodic basis, so that the industry may better plan for the future provision of new trains (paragraphs 11, 3.5 and 3.6).
  - (iv) The SRA should take the lead in establishing, with the Office of the Rail Regulator and the rest of the industry, protocols for sharing essential information and service level agreements on completing key stages within an agreed period of time, as means of aligning the various bodies' incentives and commercial interests to facilitate the timely introduction of new trains (paragraphs 12 and 3.7).
  - (v) Under its franchise agreements with TOCs, the SRA should specify the requirement that TOCs agree, with all of the parties involved in introducing a new train fleet, a robust and realistic programme and timetable for the trains' introduction (paragraphs 12 and 3.8).
  - (vi) The Department for Transport should work with the SRA, the Office of the Rail Regulator, the Rail Safety and Standards Board and other relevant stakeholders to bring the range of railway industry specifications, standards and guidance under a single body responsible for rationalising them within a single, comprehensive and coherent set of requirements (paragraphs 14, 3.15 and 3.16).
  - (vii) The SRA should work with the Office of the Rail Regulator and Network Rail to improve the availability of the network for testing new trains and, in consultation with the Department for Transport and the industry, re-assess the case for a national test facility in the light of the likely future demand for passenger services and new trains (paragraphs 17, 18 and 3.27 to 3.29).
  - (viii) The SRA should establish clear, consistent and robust obligations in all of its franchise agreements with TOCs to bring new trains into service on time, to strengthen its ability to secure compensation for passengers in cases where TOCs bear some responsibility for the late entry of new trains into service. Otherwise, the SRA and the Department for Transport should consider whether the requirement in the SRA's Directions and Guidance to secure compensation in cases of late delivery of new trains is appropriate and, if not, revise the Directions and Guidance where necessary (paragraphs 19 and 4.3).
  - (ix) The SRA should more actively exploit its strategic position to identify and disseminate best practice across the industry to help new train introduction (paragraphs 22 and 4.21).
  - (x) The SRA should bring this report to the attention of all of the parties involved, to develop a common understanding across the industry of the current processes and issues involved in bringing new trains into service.

- (xi) Using the map developed as part of the National Audit Office study (Figure 11 on page 26) setting out the current process involved in bringing new trains into service, the SRA, in partnership with the Health and Safety Executive, the Department for Transport and the Office of the Rail Regulator, should take the lead in assessing how the various stages in the process will be affected by European legislation and make those changes, and their timing, clear to the industry. As part of this, the SRA should also take the opportunity to work with the industry to rationalise and streamline the process where possible (paragraphs 9, 10 and 3.24 - 3.26).
- (xii) In looking at railway safety, and as it considers how European legislation will change the process of introducing new trains, the Health and Safety Commission should review, in consultation with all of the key stakeholders in the industry, how the requirement of "continuous improvement where reasonably practicable" should operate for the approval of new trains (paragraphs 13,16, 3.12 and 3.23 to 3.26).
- (xiii) In the meantime, the Health and Safety Executive should work with the SRA to promote greater understanding within the industry of how the 'ALARP' principle for assessing train safety risks should be applied at the train design stage, and what TOCs need to do in applying it through the build and acceptance stages in order to demonstrate that the risks of their new trains are acceptable (paragraphs 16, 3.20 and 3.22).

