Outline specification for research project

Rail Vehicle Seat Comfort

T1140

This project is being developed to define a seat comfort specification and a seat comfort rating scale, to be validated in industry with a range of Train Operating Companies (TOCs). A budget of up to £150,000 is being considered.

The outline draft research specification which follows, details RSSB’s proposed research into Rail Vehicle Seat Comfort.

A pre-tender suppliers meeting has been arranged for **Friday 6 October 2017** at **14.00** at the RSSB offices in Moorgate, London. The purpose of this meeting is to:

* Provide an outline of the project scope and objectives
* Provide interested suppliers an opportunity to influence the draft research specification
* Validate the proposed budget

Suppliers should be prepared to discuss the following:

* What factors might impact successful delivery of the project objectives?
* Are timescales achievable? How might the outputs change with a variation to the time?
* Does the proposed budget reasonably cover the requirements to undertake and deliver this work? How might the scope change with a variation to the budget?

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| Procurement ID number | TBD |
| Procurement Manager |  |
| Version  | 1.0 |
| Date | September 2017 |

# Background

Passenger comfort during rail travel is an important aspect of the customer experience, and forms part of the rolling stock vision for comfortable and attractive train interiors (Rail Technical Strategy, 2012). One key aspect of passenger comfort is the seat, and the comfort of the seating area may contribute up to 5% of the overall impact on customer satisfaction (National Rail Passenger Survey, 2016). Recent passenger satisfaction scores also revealed that 72% of passengers (n = 25,541) reported satisfied or good level of comfort of the seating area (National Rail Passenger Survey, 2016). Whilst such satisfaction scores appear promising, continuous improvement of customer satisfaction is a key object of the Rail Technical Strategy, under the theme of Customer Experience. As guidance, a general target to achieve 90% passenger satisfaction levels by 2035 (not specific to seat comfort) was proposed in the Long Term Planning Ahead Framework (2010[[1]](#footnote-1)), and subsequently supported in the Rail Technical Strategy (RTS). Clearly, improvements in seat comfort satisfaction scores may contribute to reaching this industry wide target.

However, currently there is a lack of quantifiable parameters available to sufficiently assess and demonstrate passenger seat comfort for new and refurbished trains, which risks overlooking customer experience. A recent RSSB Knowledge Search (S240, 2016) on seat comfort revealed that while few measures exist to quantify passenger seat comfort, a standardised specification of seat comfort is yet to be established. Moreover, the knowledge search findings indicated that current measures do not provide a minimum threshold value accounting for subjective tests of perception from the general public. Subsequently, quantifying passenger seat comfort may build a predictive model to support Train Operating Companies (TOCs) & Rolling Stock Operating Companies (ROSCOs) to select cost-effective new and refurbished seats in line with the passenger experience.

Accordingly, the Rail Industry Vehicle/Vehicle System Interface Committee[[2]](#footnote-2) set up a Seat Comfort Group specifically to look at passenger seat comfort, and identified that the RDG Key Train Requirements (KTR)[[3]](#footnote-3) could benefit from specifying more information on passenger seat comfort. In doing so, it is hoped that this research will impact improvements in seat quality and enhanced customer experience, while also facilitating innovation options and potential competition among TOCs to provide comfortable seating across the industry.

# Work package objectives

The purpose of this project is to develop a seat comfort specification that may enable manufacturers to design seats in line with a range of performance parameters, possibly presented as a star rating system. As such, the following hypothesis is set to be tested: Seat comfort can be defined, tested and validated, in a specification that details a range of comfort scores based of seat performance parameters. The project should also provide a benchmark seat comfort specification that will feed into Issue 5/6 of the KTR. Accordingly, the following key activities are required:

* A literature review of current comfort and performance parameters
* Definition of a benchmark seat comfort specification
* Research design and laboratory testing of seat comfort performance parameters
* Validation exercises/case studies

# Scope

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| **In scope**  | **Out of scope** |
| * Desk based review of static geometric parameters of seat comfort dimensions, including: Seat pan width, seat pan height, seat pan length, backrest height, backrest width, backrest angle, armrest height and lateral position, size / position of lumbar support, headrest (if applicable).
* Defining a seat comfort specification as a benchmark that feeds into the KTR, and used for comparison in the subsequent seat comfort testing[[4]](#footnote-4).
* Testing of seat comfort including consideration of:
* A representative sample range of train seats (including first and standard class, and tip-up seats), currently in production, to measure subjective dimensions of passenger seat comfort.
* A diverse anthropometric population to measure comfort.
* Dynamic, static and temporal aspects of seat comfort, including testing for: Cushion softness, cushion durability, thermal comfort, vibration control.
* Validation against the National Rail Passenger Survey measure of passenger satisfaction of the seating area (of the sample seats).
* Validate seat comfort ratings with a sample of TOCs.
* Ongoing engagement with the project steering group.
* Delivery of presentation of findings to cross-industry groups.
 | * Reviewing and testing comfort parameters for the whole vehicle carriage (e.g. noise, lighting, temperature).
* Seats from automobile, marine, and aviation industries, and rail seats that are not currently in production.
* Tests of seat crashworthiness and fireworthiness, and tests that assess comfort of the layout of the whole vehicle carriage.
* Comfort ratings that provide recommendations for the layout of the whole vehicle carriage.
* The development of new seats.
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# Methodology

Suppliers will be expected to define the methodology that they are intending to use to successfully meet the project objectives and cover the scope.

# Deliverables

Suppliers will be expected to produce the following outputs as part of the project.

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| **Deliverable Name** | **Type** |
| Vehicle Seat Comfort: Specification  | Report |
| The development of a seat comfort specification should include the following:* A literature review of seat comfort performance, including static and dynamic seat factors as well as temporal factors associated with train travel (time), to evaluate a wide range of seats. The literature review should also consider lifetime performance, seat durability, relevant standards that may affect passenger seat comfort, passenger anthropometry, international best practices and seat comfort parameters from other transport industries.
* The development of a seat comfort benchmark specification to be included within the Key Train Requirements issue 5/6.

The seat comfort specification will feed into a final report, which will be reviewed and accepted by the project steering group and V/V SIC. The report will be produced in the RSSB template and will be made available on SPARK to RSSB members. |

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| **Deliverable Name** | **Type** |
| Vehicle Seat Comfort: Rating Scale Development  | Guidance and Evaluation Tool |
| The development of a seat comfort rating scale will include the following:* A rigorous research design to quantify passenger seat comfort. This should include detail on the representative seat sample and participant selection, and the methods used to test and analyse passenger seat comfort.
* Laboratory seat comfort performance testing to assess static, dynamic and temporal factors. The findings should apply the seat comfort benchmark (specification) and National passenger survey as a basis of comparison to the sample selection.
* Detail on how the findings can be used as a seat comfort rating scale for static, dynamic and temporal performance parameters of seat comfort.
* Testing the benchmark and rating scale for validation exercises/case studies in industry.

The seat comfort rating scale will feed into a final report, which will be reviewed and accepted by the project steering group and V/V SIC. The report will be produced in the RSSB template and will be made available on SPARK to RSSB members. |

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| **Deliverable Name** | **Type** |
| Vehicle Seat Comfort: Industry validation exercises/case studies | Report  |
| Findings from the industry validation exercises/case studies should be presented in a report which details:* The method used to validate the seat comfort specification and rating scale.
* The TOCs, seats and passenger selection used to validate the specification and rating scale.
* Validation findings of the seat comfort specification and rating scale.
* Lessons learnt from testing and recommendations for implementing the seat comfort specification and rating scale industry wide.

The Industry validation exercises/case studies will feed into a final report, which will be reviewed and accepted by the project steering group and V/V SIC. The report will be produced in the RSSB template and will be made available on SPARK to RSSB members. |

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| **Deliverable Name** | **Type** |
| Vehicle Seat Comfort: Final report  | Report |
| The seat comfort benchmark specification, rating scale and validation exercises/case studies should be presented in a final project report, which will be reviewed and accepted by the project steering group and V/V SIC. The report should provide the key elements of the following activities:* Literature review
* Development of a seat comfort benchmark
* Research design for seat comfort laboratory testing
* Results of the seat comfort performance tests
* A seat comfort rating scale
* Validation of seat comfort specification and rating scale
* Next steps for industry

The report is expected to be no longer than 50 pages and will be produced using the RSSB template; and will be made available on SPARK to RSSB members. |

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| **Deliverable Name** | **Type** |
| Vehicle Seat Comfort: Presentation of Key Findings  | Presentation |
| The presentation summarises findings on all components defined as ‘in scope’ earlier in this specification document. This presentation is to be created in an easily accessible manner, fit for presenting to cross industry groups of technical experts. The presentation aligns with the full report, majors on key findings, and also consider the implications of these. The presentation will be made available on SPARK to RSSB members. The presentation will be provided by the supplier at RSSB, to disseminate the key project findings of the seat comfort specification and performance testing, to the project steering group and the V/V SIC. |

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| **Deliverable Name** | **Type** |
| Vehicle Seat Comfort: Research in Brief  | Report |
| The research in brief should be created by the supplier, in partnership with RSSB, to summarise the findings of the work package, in no more than 4 pages. The research in brief will summarise the aim, findings, impacts and benefits, background, and summary method of the project. The document should also identify where to find out more information, identify recommendations and next steps for industry and further research and development.The draft research in brief will be produced in a RSSB template, and an example can be provided.The research in brief will be made available on the SPARK and RSSB websites.  |

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# Budget, timescales and dependencies

The budget for this work is expected to be up to £150,000*.* The work is expected to start in February 2018 and be completed by February 2019. The project is expected to feed into the issue 5/6 release of the KTR document.

1. <https://www.raildeliverygroup.com/about-us/publications.html?task=file.download&id=469762560> [↑](#footnote-ref-1)
2. More information about RSSB committees can be found here: <https://www.rssb.co.uk/groups-and-committees> [↑](#footnote-ref-2)
3. The Key Train Requirements is a document that supports the specification of new and refurbished trains. [↑](#footnote-ref-3)
4. This may require some engagement with the KTR team to ensure the specification is a suitable fit within the KTR. [↑](#footnote-ref-4)