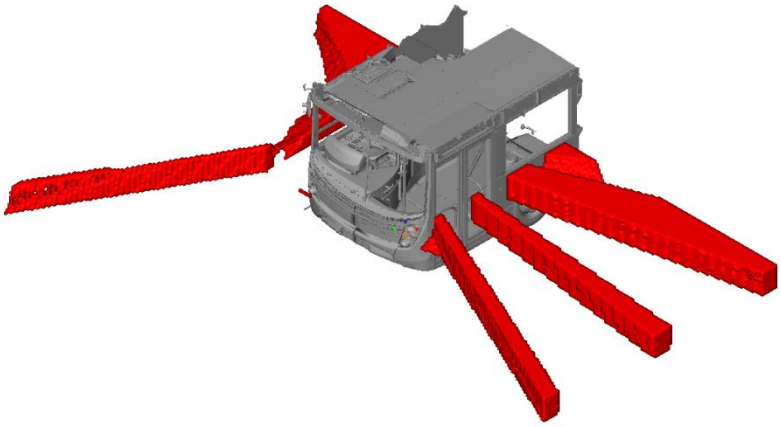
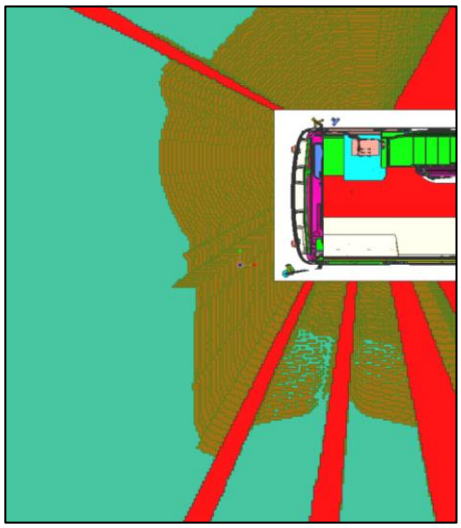
Meeting the Bus Vision Protocol of Transport for London's New Bus Specification

White Paper





SUMMARY

- TfL introduced Attachment 19 of the 2020 New Bus Specification to define a method for objectively assessing the Vision performance of new Buses for use in London.
- The means for generating a Vision Assessment score was developed on behalf of TfL, through a consortium including GRM Consulting.
- GRM developed a numeric tool to perform the Vision Assessment in an accurate and repeatable way.
- This white paper outlines the process, benefits, and results from a typical GRM Vision Assessment.

Vision Assessment Process:

– Supply of CAD, Accelerator Heel Point (AHP) and Design Details

– Vision Assessment Model Preparation

– Eye Point Positioning and Results Export

– Vision Assessment, Analysis of Results and Efficiency Score

– Discussion, Interpretation and Development of Solutions

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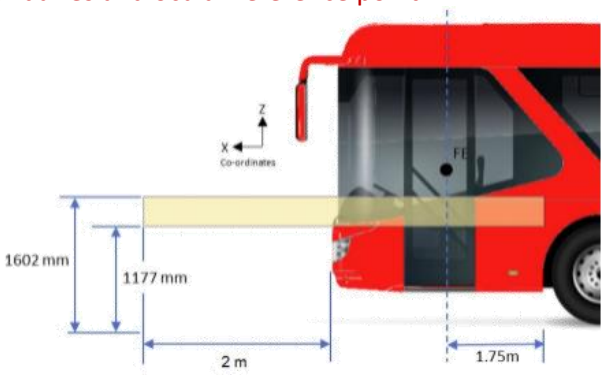
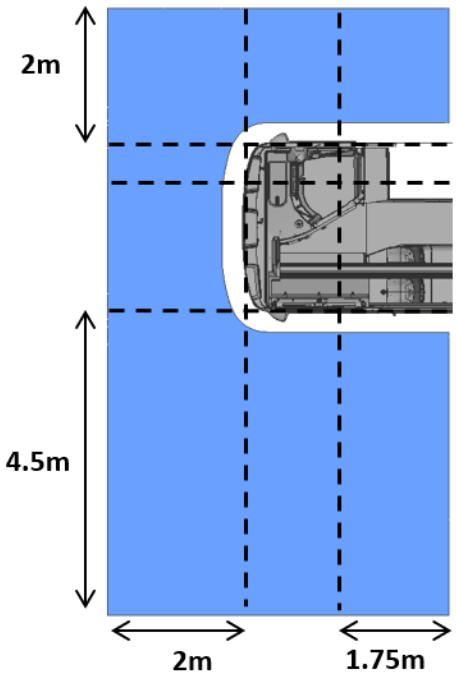
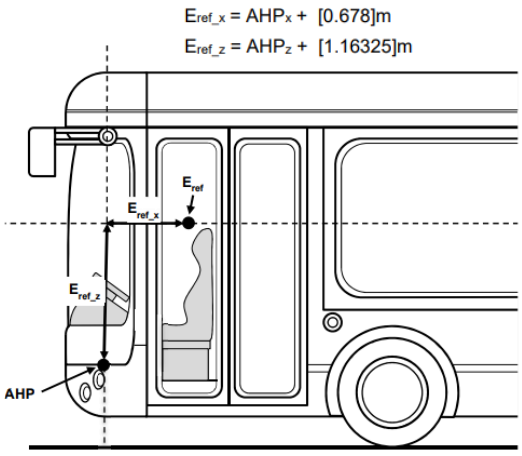
Generating the Vision Assessment

Developing the Boundary Envelope

The first step in the process is to define the boundary envelope. The dimensions are defined in the images displayed and are used as the total volume to be assessed. Dimensions are driven by the bus outer boundaries and ocular reference point.

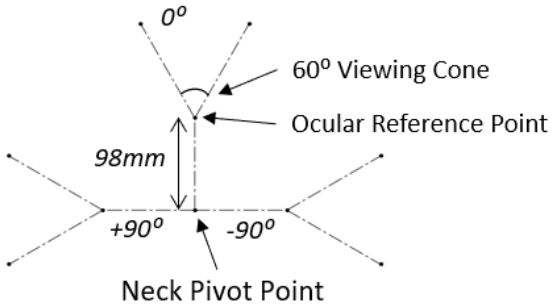






Building the Eye Template

To perform the vision assessment within the given envelope, a template has been set up which generates vision trajectories out towards the boundary layer. This template is defined by the vision assessment protocol and all elements that exist within the viewing cone trajectories will fall into a visible category.



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Key Features of the GRM Vision Assessment Tool

1. ***Rapid and Accurate Results*** – GRM typically complete one bus model vision assessment within one working week of receiving CAD data. Results are proven to be accurate and assessments can be performed in parallel with results being repeatable.

2. ***Assault Screen Opacity Filtering*** – GRM's mathematical approach provides a successful means for capturing assault screen opacity filtering, given the regulation requirements. Problematic areas are identified in assault screen simulation generating blind spots in reflective angle of incidence.

3. ***One-To-One Support*** – GRM's analysis team will work alongside design teams to meet specific needs. We provide support to interpret results and rapid design development tools to improve performance.

4. ***Development in Real Time*** – GRM's software engineering team are able to meet changing demands of the protocol, by programming updates in real time.

Vision Assessment Inputs

- CAD data for the bus model in question, including all internal features such as assault screen details, dashboard instrumentation, legal stickering/decals and glass/seals.
- Accelerator Heel Point (AHP) for generating the Ocular Reference Point.

Vision Assessment Outputs

- ✓ Vision efficiency score as a percentage compared to the latest protocol requirement.
- ✓ Breakdown of blind spots, and corresponding percentage scores for each for identification of problematic regions and the relative weighting for each.
- ✓ STL geometry for both visual and blind volumes which can be implemented in customer CAD packages for post-processing and review.
- ✓ Presentation format detailing all blind spot features, and technical breakdown of blind spot contributions to the vision efficiency to aid design solutions.

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