

# Opturion Load Manager
# Getting Started

Version 2

3 March 2026



OPTURION

Intelligent Decision Support

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# 1 Overview

The Opturion Load Manager (OLM) is a payload optimiser for fuel tankers. It takes a set of orders, which take the form of volumes of different types of fuel to be delivered to one or more sites, and a fuel tanker vehicle, and allocates (assigns) volumes of fuel to the compartments on the vehicle. The OLM generates load plans (profiles) that aim to deliver the required volumes, and if possible more, up to the point of a maximum payload, while complying with regulations on axle weights and Gross Combination Mass (GCM) limits. It enforces these limits on each transport leg in the case of split loads (deliveries at multiple sites).

Alternatively, the OLM can be used to check that a proposed load plan satisfies regulations on axle weight and GCM limits.

This guide provides step-by-step instructions on how to set up and optimise a payload using the OLM. It should be read together with the accompanying example Excel workbooks and the "Opturion Load Manager – Data Formats and Web Service" document.

# 2 Interactive Web Interface

The OLM interactive web interface is accessible at the following URL:

https://olm-demo.opturion.com

The web interface is compatible with recent versions of most web browsers including Google Chrome, Firefox, Microsoft Edge and Safari. It is *not* compatible with Microsoft Internet Explorer or the legacy version of Microsoft Edge.

After clicking on the above link, you will be prompted to enter your username and password. These are provided for you by Opturion.

When your username and password have been accepted, you will be taken to the Dashboard interface shown in Figure 1.

## 2.1 Dashboard Interface

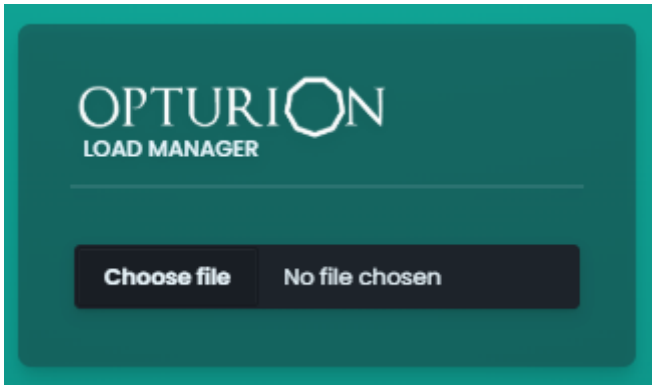



Figure 1: Dashboard interface.

The *Choose File* button lets you select an OLM-Excel input format to load into the OLM. If this input file contains errors, these will be displayed in the interface. Figure 2 shows an example of input errors.

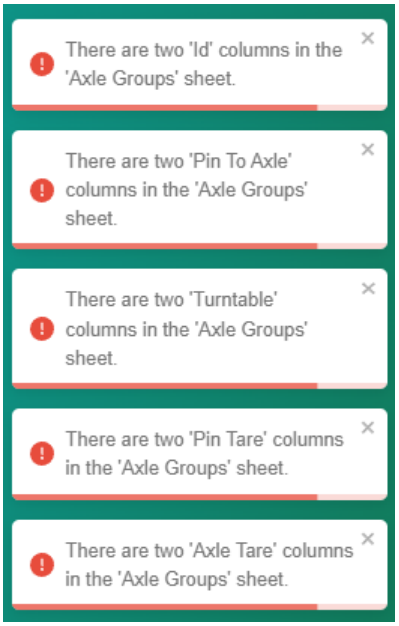



Figure 2: Dashboard errors.

If a successful upload does not contain *assignments*, the optimiser runs and a load plan will be displayed as can be seen in Figure 3. Otherwise, the optimiser will check the compliance of those assignments.

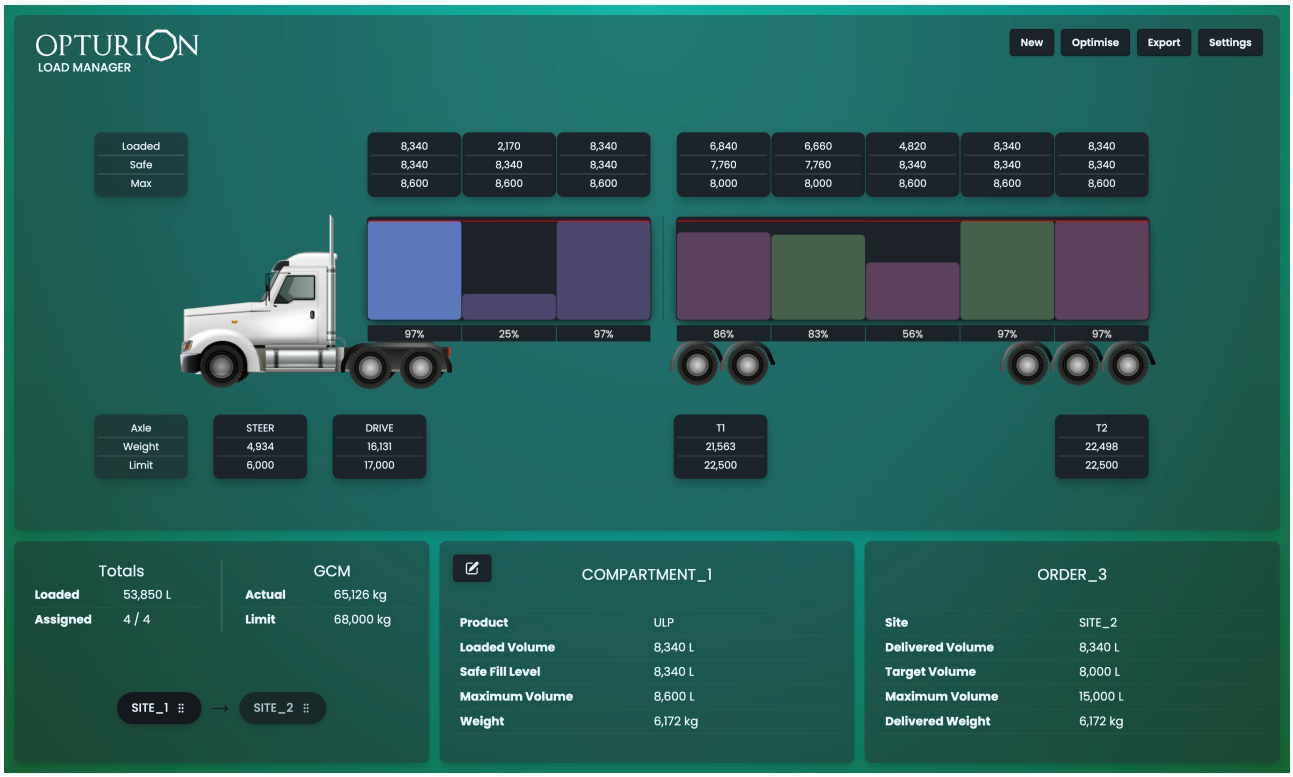



Figure 3: Dashboard solution.

The load plan interface has five subsections. We describe each in the following sections.

### 2.1.1 Options Menu

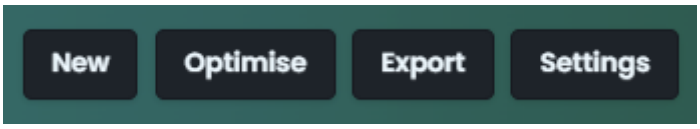



Figure 4: Options menu.

Figure 4 shows the *options* menu. It provides the following options:

- **New**

  Click this button to clear the current solution and return to the dashboard shown in Figure 1.

- **Optimise**

  Click this button to re-optimise the scenario. Re-optimisation discards any changes made to the *solution*, but preserves changes made to the *scenario*. For example, changes to assigned volumes will be discarded but any changes to the *Settings* or re-ordering of the delivery sequence will be preserved.

- **Export**

  Click this button to export the current solution to an Excel workbook and download it.

- **Settings**

  Click this button to open the *Settings* menu. This is shown in Figure 5.

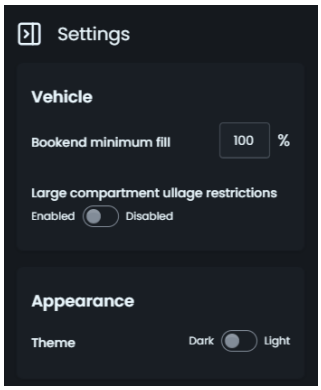



Figure 5: Settings menu.

This lets you control:

  – **Bookend Minimum Fill Percentage**

    The minimum fill percentage for *bookend* compartments. For an explanation of *bookend* compartments, see the "Opturion Load Manager – Data Formats and Web Service" document.

  – **Large Compartment Ullage Restrictions**

    A toggle that controls whether the optimiser enforces a restriction on the amount of ullage in large compartments. This is **enabled** by default. For a more detailed explanation of *ullage restrictions*, see the "Opturion Load Manager – Data Formats and Web Service" document.

  – **Theme**

    A toggle that controls whether the dashboard uses a *light* or *dark* theme.

### 2.1.2 Visualisation




Figure 6: Solution visualisation.

Figure 6 shows a close-up of the *visualisation*. It contains the following information:

- **Axle Weights:**




(a) The axle weight description table.




(b) An example of an axle weight table.

Figure 7: Axle weights example.

Figure 7 is an example of how the *axle weights* are shown in the visualisation. Figure 7a shows the KPI labels and Figure 7b shows the values for those KPIs. Here we can see that *axle* "T1" has been assigned a *weight* of 22,498 out of a *limit* of 22,500.

- **Compartments:**

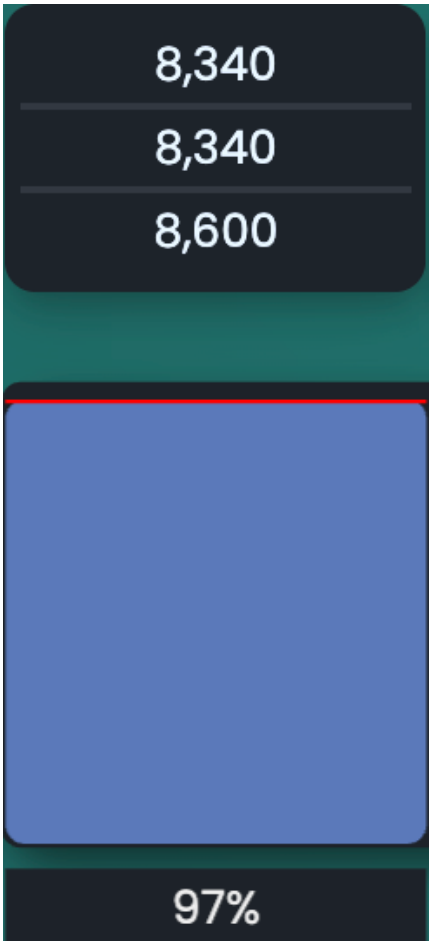



Figure 8: Compartment visualisation.

Figure 8 is an example of how the *compartments* are shown in the visualisation. It consists of the following:

– **Fill Level Percentage:**

The top label provides the current fill level as a percentage of maximum capacity. In this example the compartment is filled to 97% of its safe maximum capacity.

– **Add / Subtract Product:**

The + and − buttons let you increase or decrease the fill level in the compartment in increments of 100 litres. Finer adjustments to fill levels can be made using the Compartment Summary table.

– **Fill Level:**

The coloured component visualises the current fill level of the compartment. Each order is shown using a different colour, with all compartments containing the same order using the same colour.

Figure 6 shows an example with four orders, where some of the orders have been split across multiple compartments.

Selecting a compartment will modify the data in the compartment and order summary tables.

– **Red and Yellow Line:**

The red and yellow lines represent the *safe fill level* and the *minimum compartment volume* respectively.

Note that the *minimum compartment volume* is a property of the *order* assigned to a compartment rather than of the compartment itself.




(a) The compartment description table. (b) An example of a compartment table.

Figure 9: Axle weights example.

Figure 9 shows an example of how the *compartment levels* are represented in the visualisation. Figure 9a shows the KPI labels and Figure 9b shows the values of those KPIs. Here we can see that the compartment has been assigned a *load* of 8,340, where its *safe fill level* is 8,340 and its *maximum fill level* is 8,600

### 2.1.3 Site Summary

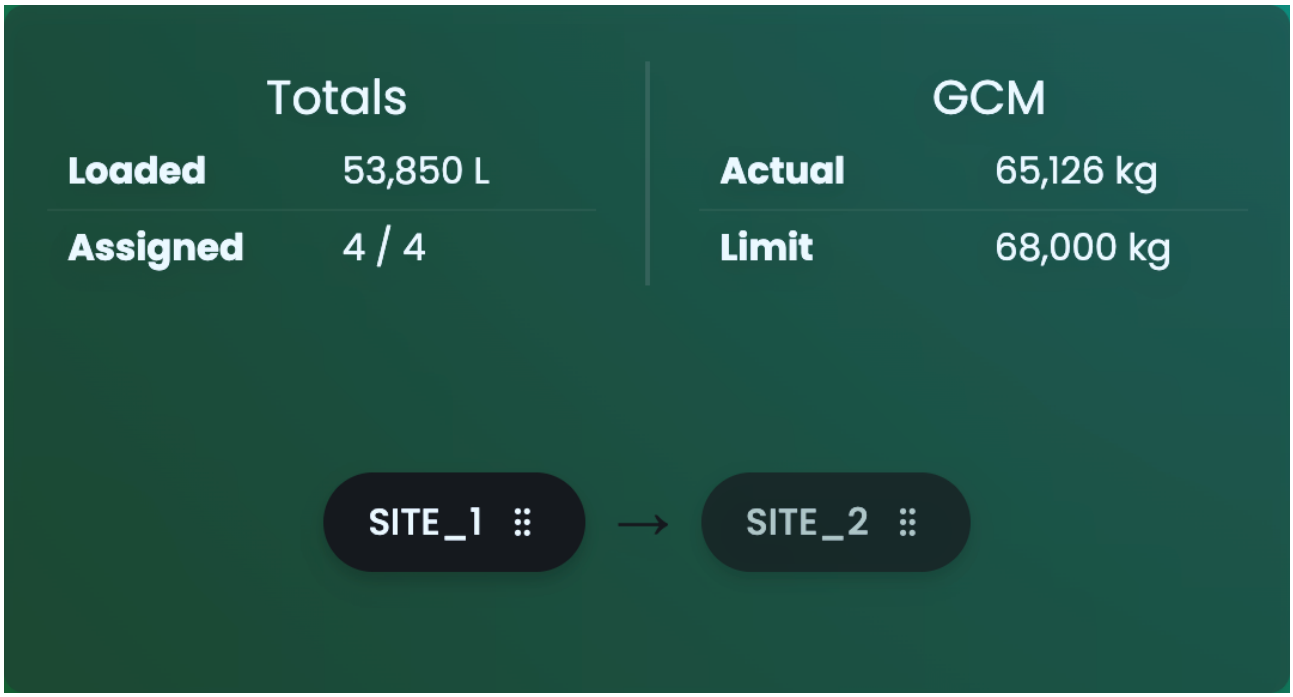



Figure 10: Site summary.

Figure 10 shows the *site summary* table. This table summarises the delivery totals and *gross combined mass* (GCM) limits for a site in the delivery schedule.

The current site is highlighted. A different site can be selected by clicking on that site's label.

The sequence in which sites are visited in the delivery schedule can be changed by dragging and dropping the site labels into the desired order. Note that this will *probably* lead to compliance violations and should be used in conjunction with a re-optimisation.

### 2.1.4 Compartment Summary

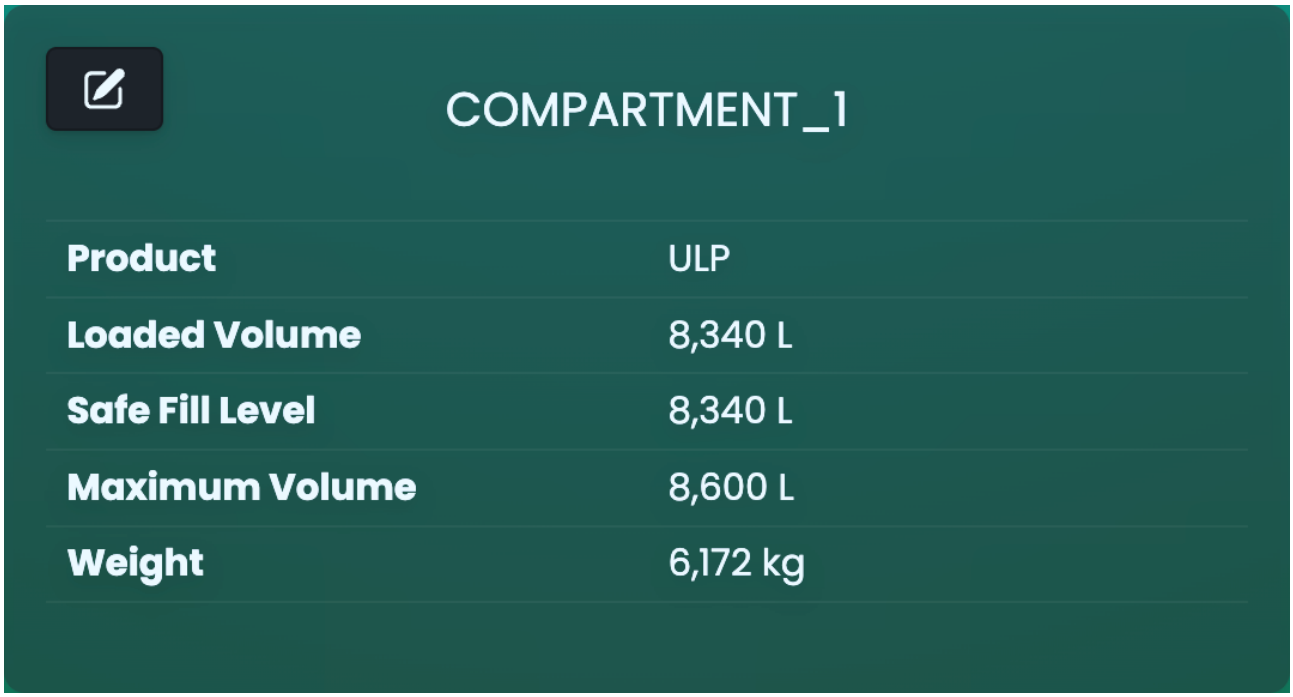



Figure 11: Compartment summary.

Figure 10 shows the *compartment summary* table. This table contains KPIs for the selected compartment. Other compartments can be selected using the visualisation.

Clicking the *edit* icon in the top left of the table will open the sub-menu shown in Figure 12. This lets you make manual adjustments to the contents of the compartment. Note that this can lead to compliance violations.

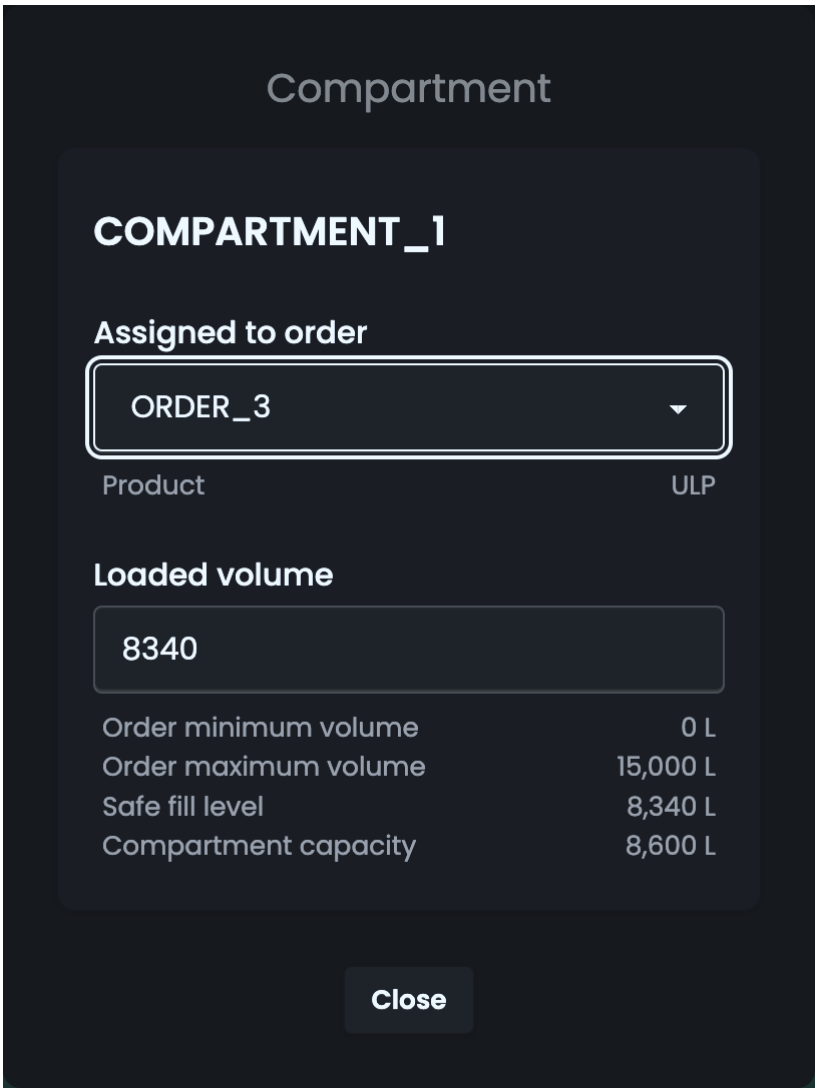



Figure 12: Compartment summary sub menu.

### 2.1.5 Order Summary

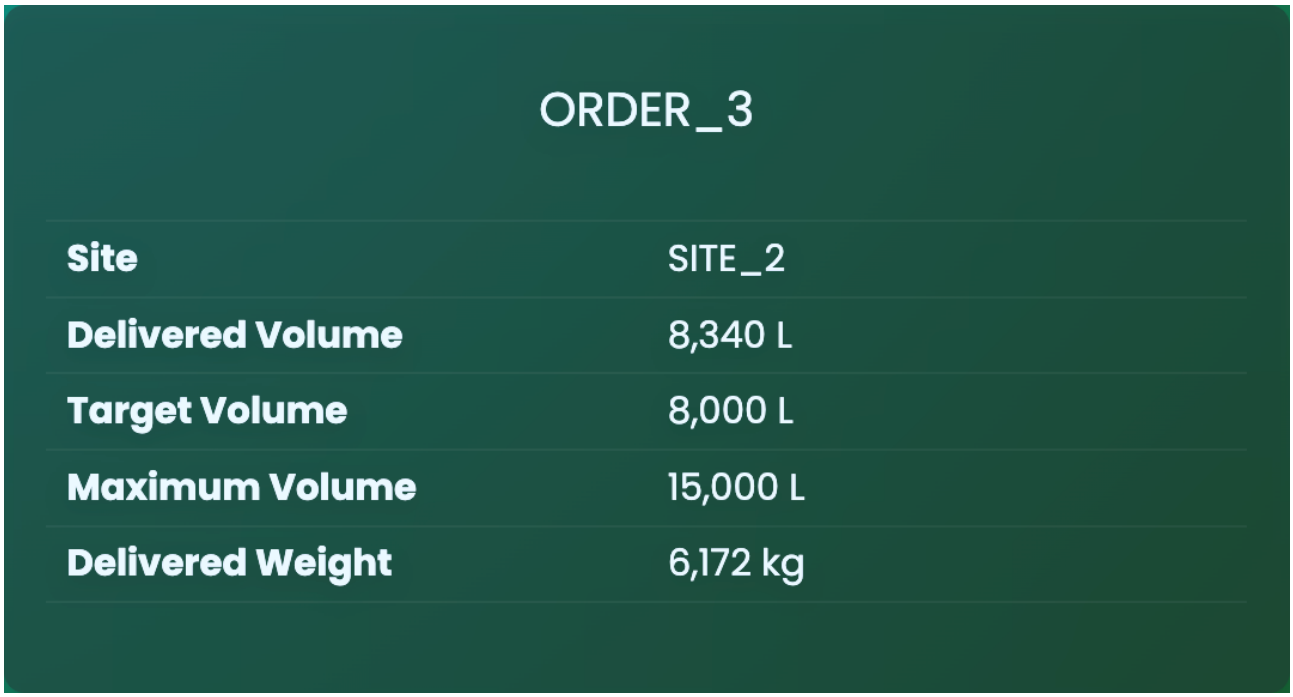



Figure 13: Order summary.

Figure 13 shows the *order summary* table. This table summarises the KPIs for the currently selected order. Other orders can be selected using the visualisation.

### 2.1.6 Compliance Violations

As you make modifications to the solution returned from the OLM, they can violate some of the compliance constraints. These violations are shown in the interface using a combination of red highlighting and warning labels. Figure 14 shows an example of this.

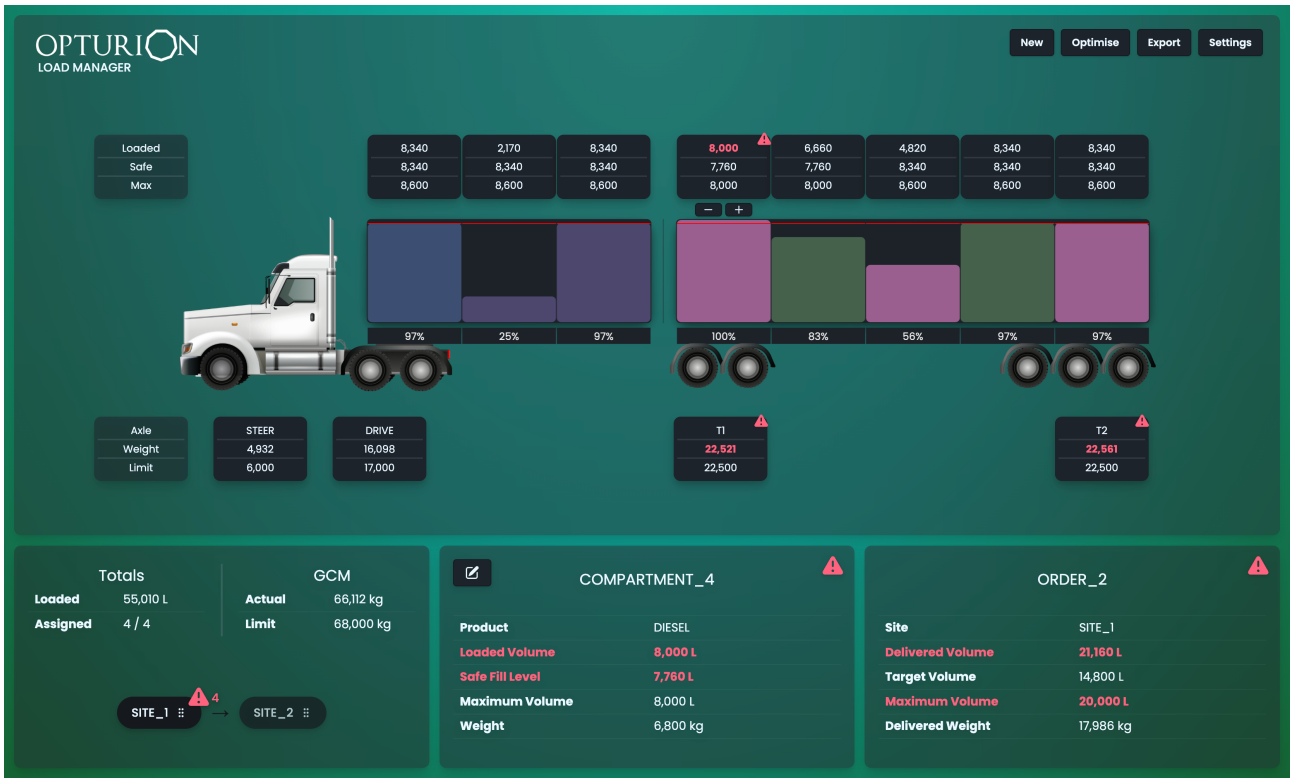



Figure 14: Compliance violations.

Hovering over the icons will cause a pop-up describing the violation to appear. For example, hovering over the warning attached to the “T1” axle group will show the error in Figure 15.

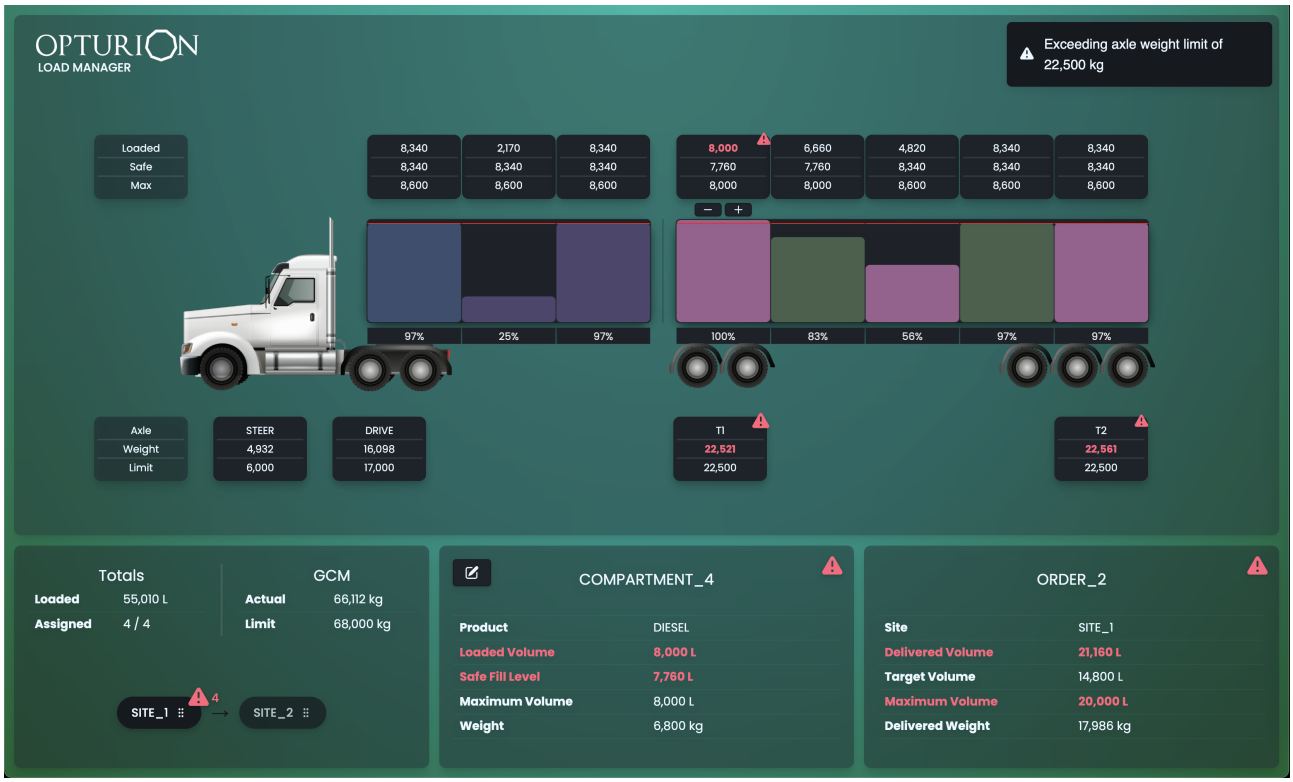
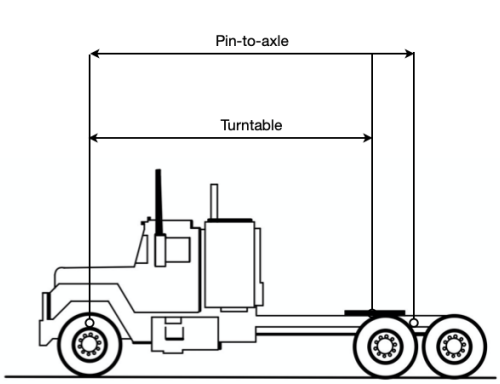


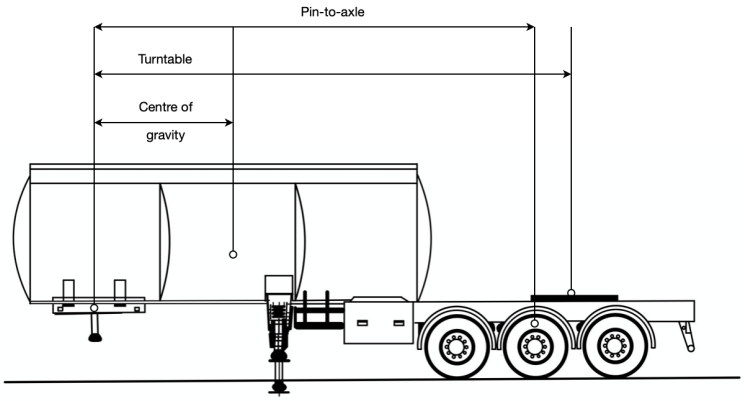

Figure 15: Violation description.

# 3 Vehicle Measurements

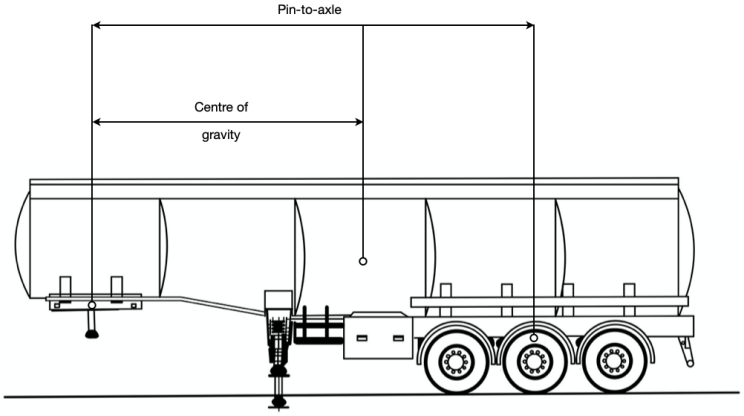
*Compartments* and *axle groups* are defined by various measurements. Figure 16 shows how these are defined.



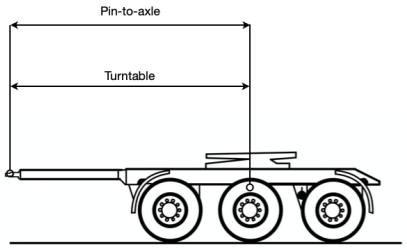

(a) Prime Mover




(b) A-Trailer




(c) B-Trailer




(d) Dolly

Figure 16: Vehicle measurements.

# 4 Worked Examples

This section contains a series of worked examples using the OLM. The first one sets up a basic scenario. Subsequent examples build on this.

Each example should be read in conjunction with its accompanying Excel workbook. The Excel workbooks can be downloaded from the OLM documentation website.

## 4.1 Basic Example

**Accompanying Workbook:** olm_base.xlsx

*Opturion Fuel* is a small (and fictitious) fuel transport company operating a fleet of *semi-trailers*. The planner wishes to build a delivery schedule for the delivery of ULP to a single site. We begin by creating an input workbook for use with OLM.

### 4.1.1 Excel Data Conventions

Before stepping through the input to the optimiser, we describe how various types of data required by the optimiser are represented in Excel.

- **Identifiers**
  Entities in the optimiser input, such as orders, sites, compartments and axle groups must have an *identifier* (Id) that uniquely identifies them.

  These identifiers are used to refer to those entities in the optimiser output.

  Identifiers are represented using text or number cells in Excel. Their names must satisfy the following rules:

  1. They must contain at least one character.
  2. They must not contain the semicolon (";" ) character.

  Identifiers are not case sensitive or "underscore" sensitive. Whitespace in the identifier name is *not* significant. For example: "`S1`", "`s1`" and "`S_1`" are all treated as a reference to the *same* entity by the optimiser.

### 4.1.2 Optimiser Input

In this example, our Excel workbook contains six sheets. They are:

1. **Orders**
   This sheet contains details of the orders that we want to deliver. It has the following columns:
   - **Id**
     The unique identifier for the order.
   - **Site**
     The identifier of the site where the order is to be delivered.
   - **Product**
     The identifier of the product being delivered.
   - **Target Volume**
     The target volume to be delivered for this order.
   - **Maximum Volume**
     The maximum volume to be delivered for this order.
2. **Sites**
   This sheet contains details for each site that is referred to in the *Orders* sheet.

   It has the following columns:
   - **Id**
     The unique identifier for the site.
   - **Weight Scheme**
     The identifier of the weight scheme that applies for travel to this site.
3. **Products**
   This sheet contains details for each product that is referred to in the *Orders* sheet.

   It has the following columns:
   - **Id**
     The unique identifier for the product.
   - **Density**
     The relative density of the product in kg/L.

4. **Axle Groups**
   This sheet contains details for each axle group on the vehicle.

   It has the following columns:

   - **Id**
     The unique identifier for the axle group.
   - **Pin-to-Axle**
     The distance between the kingpin, or front of the drawbar, to the centre of the axle group. Refer to Figure 16 for further explanation of this measurement.
   - **Turntable**
     The distance between the kingpin or front of the drawbar, to the turntable. This cell can be left blank if there is no turntable on the axle group (i.e. on the trailer/dolly). Refer to Figure 16 for further explanation of this measurement.
   - **Pin Tare**
     The tare weight as measured under the kingpin. Can be left blank (i.e. zero).
   - **Axle Tare**
     The tare weight as measured under the axle group (wheel set).
   - **Axle Count**
     The number of axles associated with this group. Used to display the correct number of wheels in the visualisation.

5. **Compartments**
   This sheet contains details for each compartment on the vehicle. It has the following columns:
   - **Id**
     The unique identifier for the compartment.
   - **Trailer Axle Group**
     The axle group of the trailer to which this compartment belongs, as defined on the *Axle Groups* sheet.
   - **Safe Fill Level**
     The safe fill level (in litres) for the compartment.
   - **Capacity**
     The capacity (in litres) for the compartment.
   - **Centre of Gravity**
     The centre of gravity for the compartment, as measured from the kingpin. Refer to Figure 16 for further explanation of this measurement.
6. **Configuration**
   This sheet contains configuration options for the optimiser.

   It has the following columns:
   - **Parameter**
     The name of the configuration parameter.
   - **Value**
     The value for the configuration parameter.
7. **Weight Schemes**
   This sheet defines each weight scheme referred to by the *Sites* sheet and for each axle group defined by *Axle Groups* sheet. It also defines the GCM (Gross Combination Mass).

   It has the following columns:
   - **Id**
     The unique identifier for the weight scheme.
   - **Axle Group**
     The identifier of the axle group to which the weight limit applies, as defined by the *Axle Groups* sheet, or the value **GCM** (for the Gross Combination Mass limit). Each axle group must have a weight limit. The GCM is optional.
   - **Limit**
     The weight limit (in kg) on the axle group or GCM.
8. **Forbidden Compartments**
   This sheet defines the constraints that prevent specific orders from being allocated to specific compartments.

   Each row represents an order that must not be allocated to a compartment.

   It has the following columns:
   - **Order**
     The unique identifier for the order.
   - **Compartment**
     The unique identifier for the compartment.

For further details, such as sheets or columns not described here, refer to "Opturion Load Manager – Data Formats and Web Service".

### 4.1.3 Running the Optimiser

We will now run the optimiser using the dashboard interface. Instructions for accessing the dashboard interface can be found here. After logging in, you will see the screen in Figure 1.

Click the *Choose File* button and select the workbook file. When the scenario has loaded, the OLM will run and the solution will be displayed. Figure 17 shows an example of this.

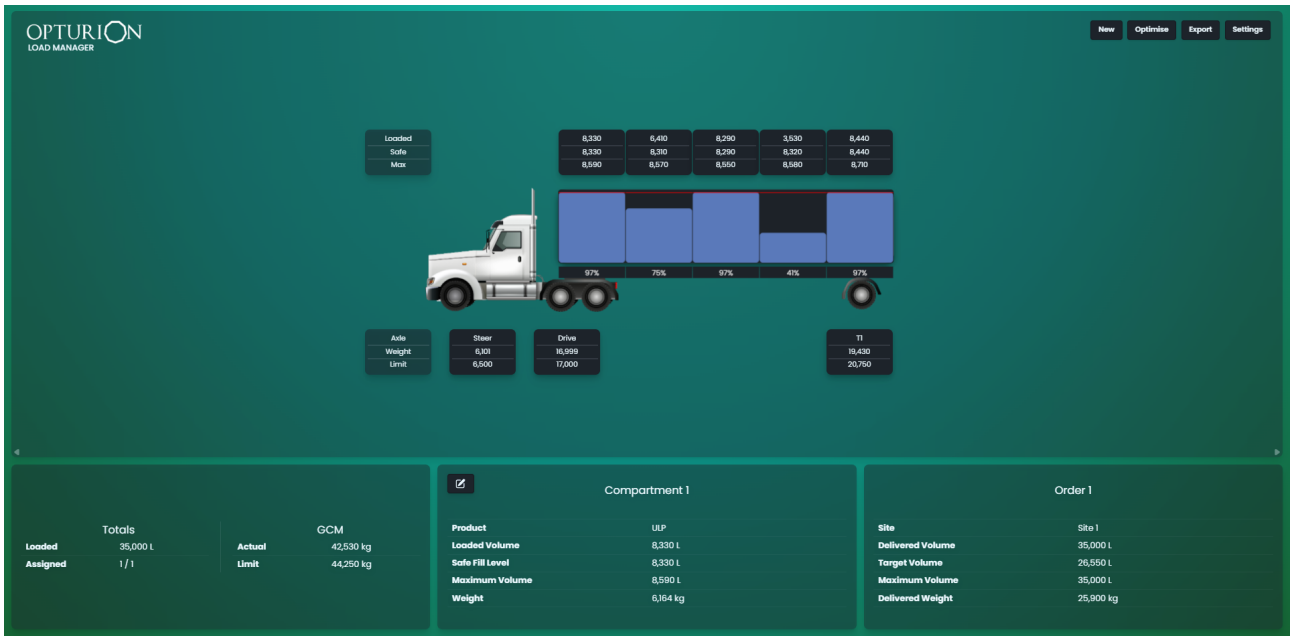



Figure 17: Base solution.




Figure 18: Base solution compartments.

Click the *Export* button to download an Excel workbook containing the solution produced by the optimiser.

### 4.1.4 Solution Excel

The Excel workbook you have just downloaded will contain five sheets. These are:

1. **Assignments**
   This sheet contains assignments of (portions of) orders to compartments. It has the following columns:
   - **Order**
     The unique identifier for the order as defined by the *Orders* sheet.
   - **Compartment**
     The unique identifier for the compartment as defined by the *Compartments* sheet.
   - **Product**
     The unique identifier for the product as defined by the *Products* sheet.
   - **Volume**
     The volume allocated to the compartment.
   - **Weight**
     The weight allocated to the compartment.
2. **Delivery KPI**
   This sheet contains a summary of KPIs for the orders. It has the following columns:
   - **Order**
     The unique identifier for the order as defined in the *Orders* sheet.
   - **Site**
     The unique identifier for the site as defined in the *Sites* sheet.
   - **Product**
     The unique identifier for the product as defined in the *Products* sheet.
   - **Target Volume**
     The target volume to be delivered for this order.
   - **Delivered Volume**
     The volume that was delivered for this order.
   - **Maximum Volume**
     The maximum volume to be delivered for this order.
3. **Axle Weights**
   This sheet contains a summary of axle weights at sites in the solution. It has the following columns:
   - **Axle Group**
     The unique identifier for the axle group as defined in the *Axle Groups* sheet.

   For each *site* defined in the *Sites* sheet there will be a column describing the weight on the axle group when arriving at that site.
4. **Delivery Sequence**
   This sheet contains a summary of the order in which sites are visited in the solution. It has the following columns:
   - **Site**
     The unique identifier for the site as defined in the *Sites* sheet. The sites are visited in the order in which they are listed in this column.
5. **Compliance**
   This sheet contains a list of all compliance violations found in the solution. These should only be present if the solution has been modified by you as the OLM should only produce solutions which are free of violations. It has the following columns:
   - **Compliance Errors**
     A compliance error found in the solution.

   **Note:** If no compliance violations were found then this sheet will contain a single entry: *No Compliance Errors*.

## 4.2 Extension 1: Minimum Compartment Volumes

**Accompanying Workbook:** olm_extension_1.xlsx

In our first example, there were no minimum volumes associated with compartments. *Opturion Fuel* desire to have compartments filled to at least 3,600 litres.

We will now add the *minimum compartment volume* constraint. This constraint is applied to the *order* and ensures that any compartment containing that order is filled to a minimum level. An example of this is shown in Table 1.

| Id | Site | Product | Target Volume | Maximum Volume | Minimum Compartment Volume |
|---|---|---|---|---|---|
| Order 1 | Site 1 | ULP | 16,600 | 16,600 | 3,600 |

Table 1: Minimum compartment volume.

Re-running the optimiser with this new constraint produces the compartment volumes seen in Figure 19. Note that here we now see the yellow lines indicating the minimum fill volume for that compartment.

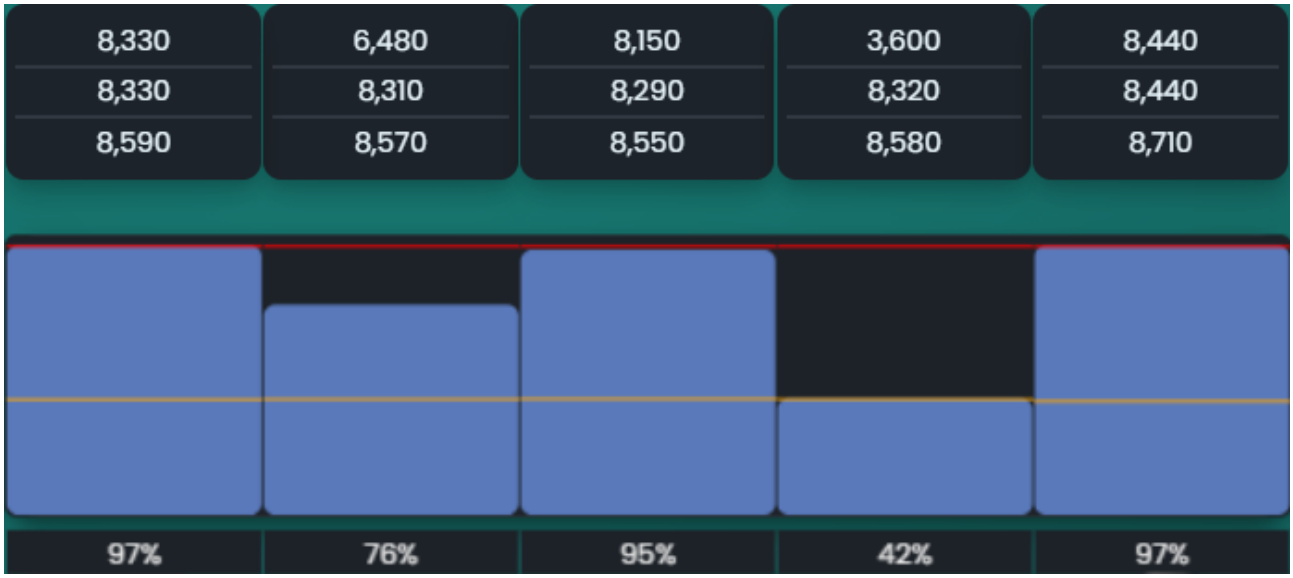



Figure 19: Extension 1 solution compartments.

When comparing this solution against that in Figure 18 we can see that the volume in the fourth compartment has been increased to meet the minimum compartment volume of 3,600 litres. This causes the volumes in the other compartments to be adjusted to ensure the compatibility constraints are met.

## 4.3 Extension 2: Multiple Products

**Accompanying Workbook:** olm_extension_2.xlsx

As *Opturion Fuel* continue to expand they begin to deliver products other than ULP.

The planner modifies the Products sheet to include the additional information, as seen in Table 2.

| Id | Density |
|---|---|
| ULP | 0.74 |
| Diesel | 0.85 |

Table 2: Extension 2 products.

The Orders sheet is also updated to add an additional order ("Order 2") with a "Diesel" product type. This can be seen in Table 3.

| Id | Site | Product | Target Volume | Maximum Volume | Minimum Compartment Volume |
|---|---|---|---|---|---|
| Order 1 | Site 1 | ULP | 26,550 | 35,000 | 3,600 |
| Order 2 | Site 1 | Diesel | 10,000 | 11,000 | 3,600 |

Table 3: Extension 2 orders.

Re-running the optimiser with this new product and order produces the assignments seen in Figure 20.




Figure 20: Extension 2 solution compartments.

## 4.4 Extension 3: Split Loads

**Accompanying Workbook:** olm_extension_3.xlsx

As *Opturion Fuel* expand, they are contracted to make deliveries to an additional site.

The planners identify a delivery sequence that services "Site 1" first before continuing to "Site 2". This sequence is expressed in Table 4 by the order in which the site appears in the table.

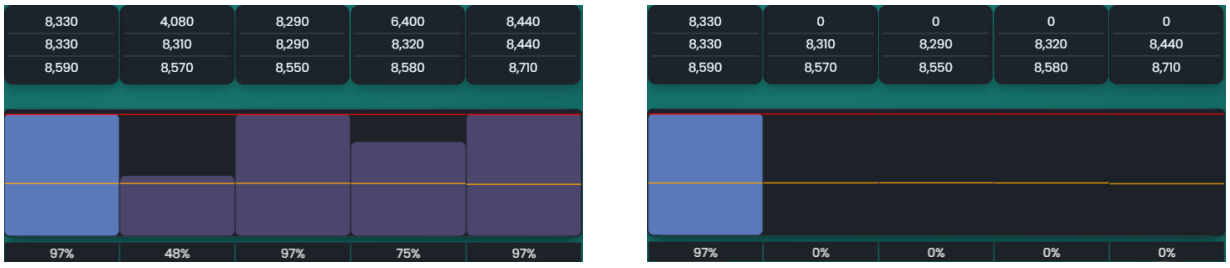
| Id | Weight Scheme |
|---|---|
| Site 1 | WS1 |
| Site 2 | WS1 |

Table 4: Extension 3 sites.

| Id | Site | Product | Target Volume | Maximum Volume | Minimum Compartment Volume |
|---|---|---|---|---|---|
| Order 1 | Site 1 | ULP | 26,550 | 35,000 | 3,600 |
| Order 2 | Site 2 | Diesel | 10,000 | 11,000 | 3,600 |

Table 5: Extension 3 orders.

Re-running the optimiser with this new site and order produces the compartment volumes seen in Figure 21. There are now two colours used in the visualisation, each indicating a different order. Figure 21a shows the compartment profile when the vehicle arrives at "Site 1". Selecting "Site 2" from the Site Summary lets you to view the profile for "Site 2". This is shown in Figure 21.




(a) Site 1 (b) Site 2

Figure 21: Extension 3 solution compartments.

As described in Site Summary, the order in which the sites are visited can be modified via the user interface. The effects of reversing the site order can be seen in Figure 22.




(a) Site 2 (b) Site 1

Figure 22: Extension 3 solution compartments.

## 4.5 Extension 4: B-Doubles

**Accompanying Workbook:** olm_extension_4.xlsx

*Opturion Fuel* decide to purchase a *B-Double* to make larger deliveries.

The planner modifies the Axle Groups sheet to include the additional axles associated with the trailer, as seen in Table 6.

| Id | Pin-to-axle | Turntable | Pin tare | Axle tare |
|---|---|---|---|---|
| Steer | 1 | 1 | | 4420 |
| Drive | 4570 | 4190 | | 4720 |
| Trailer 1 | 6935 | 7485 | 1590 | 4350 |
| Trailer 2 | 5975 | | 1250 | 3460 |

Table 6: Extension 4 axle groups.

They also modify the Compartment sheet. This can be seen in Table 7. Of interest here is the negative *centre of gravity* for *Compartment 1*. This is because the compartment's *centre of gravity* is 373mm ***in front*** of the *pin-to-axle* value for *Trailer 1*.

| Id | Trailer Axle Group | Safe Fill Level | Capacity | Centre of Gravity |
|---|---|---|---|---|
| Compartment 1 | Trailer 1 | 8290 | 8550 | -373 |
| Compartment 2 | Trailer 1 | 6920 | 7140 | 11548 |
| Compartment 3 | Trailer 1 | 6910 | 7130 | 3298 |
| Compartment 4 | Trailer 2 | 7250 | 7480 | 5069 |
| Compartment 5 | Trailer 2 | 7400 | 7630 | 579 |
| Compartment 6 | Trailer 2 | 7670 | 7910 | 2531 |
| Compartment 7 | Trailer 2 | 7950 | 8200 | 4458 |
| Compartment 8 | Trailer 2 | 8130 | 8390 | 6334 |

Table 7: Extension 4 compartments.

Running the optimiser with this scenario produces the compartment volumes seen in Figure 23.

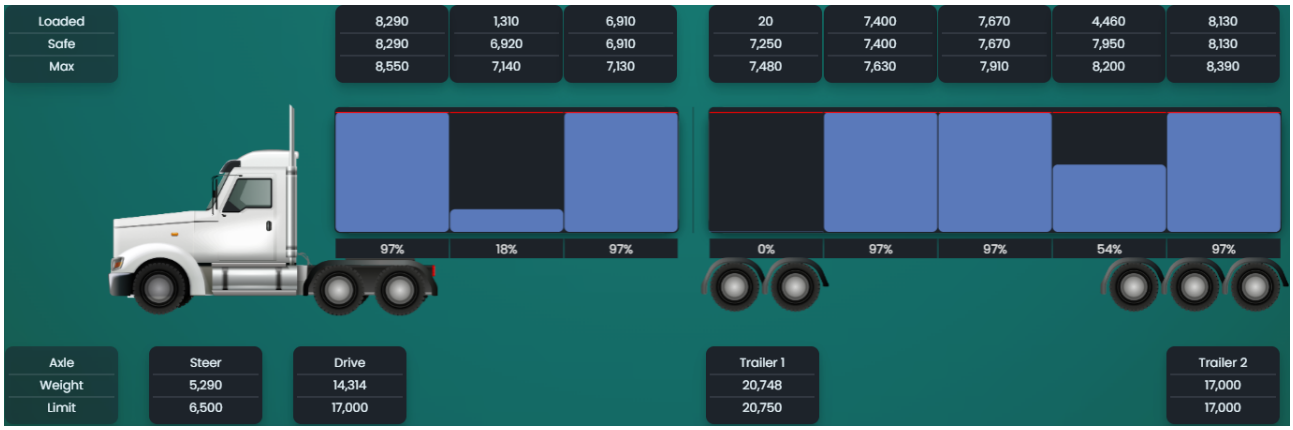



Figure 23: Extension 4 solution compartments.

## 4.6 Extension 5: Stability Constraints

**Accompanying Workbook:** olm_extension_5.xlsx

The optimiser has additional configuration parameters to enforce additional stability constraints.

- **Bookend Minimum Fill Percentage:**

  This specifies the percentage of the safe fill level of a bookend compartment that is the minimum to which the compartment must be filled to satisfy the *stability constraints*.

  By default the optimiser uses a value of 100%.

- **Large Compartment Ullage Restrictions:**

  The optimiser optionally enforces a constraint to restrict the amount of ullage in large compartments when the vehicle is loaded with certain products. The requirements of this constraint are taken from section `10.3.1.2` of the "Australian Code for the Transport of Dangerous Goods by Road & Rail". [1]

  This constraint is enabled by default.

For a more detailed description of theses constraints please refer to the "Opturion Load Manager – Data Formats and Web Service" document.

*Opturion Fuel* wish to reduce the *bookend minimum fill percentage* to 85% and to disable the *large compartment ullage restrictions*.

The planner adds the Configuration sheet to include the additional information, as seen in Table 8.

| Parameter | Value |
|---|---|
| Bookend Minimum Fill Percentage | 90% |
| Disable Large Compartment Ullage Restrictions | TRUE |

Table 8: Extension 5 configuration.

Running the optimiser with this scenario produces the compartment volumes seen in Figure 24.

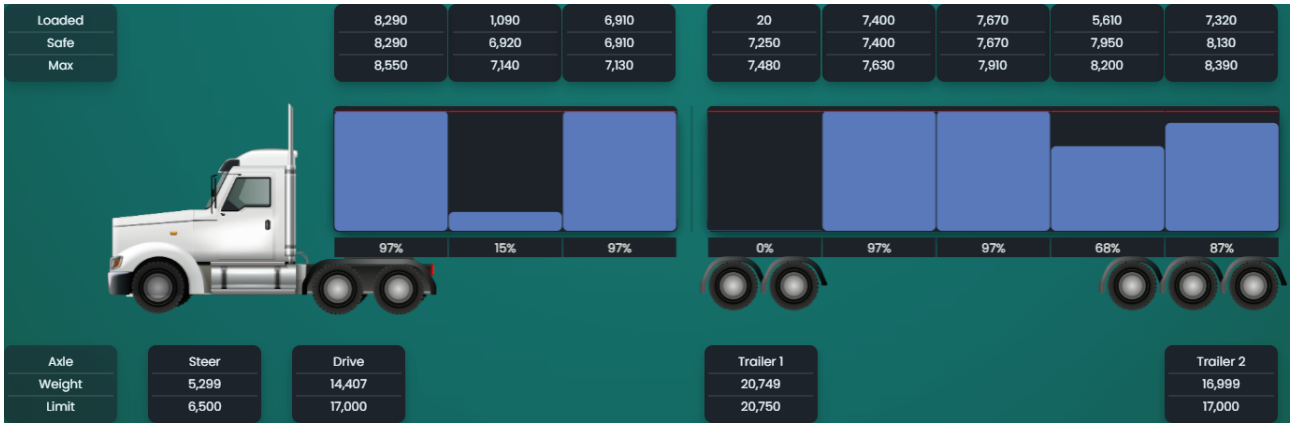



Figure 24: Extension 5 solution compartments.

[1] https://www.ntc.gov.au/codes-and-guidelines/australian-dangerous-goods-code

## 4.7 Extension 6: Order Compartment Restrictions

**Accompanying Workbook:** olm_extension_6.xlsx

You may want to prevent an order from being assigned to a specific compartment. This might be due to physical restrictions or safety considerations at the delivery site. We refer to such compartments as being *forbidden* for the order in question.

Let's take the scenario from Extension 5, but this time will forbid *Order 1* from being assigned to *Compartment 2*.

To do this, add the Forbidden Compartments sheet shown in Table 9.

| Order | Compartment |
|---|---|
| Order 1 | Compartment 2 |

Table 9: Extension 6 forbidden compartments.

Figure 25 shows the assignments that result when this new scenario is run. When compared with the original scenario's assignments (Figure 24), you can see that the solution has changed to avoid violating the forbidden compartment constraint.

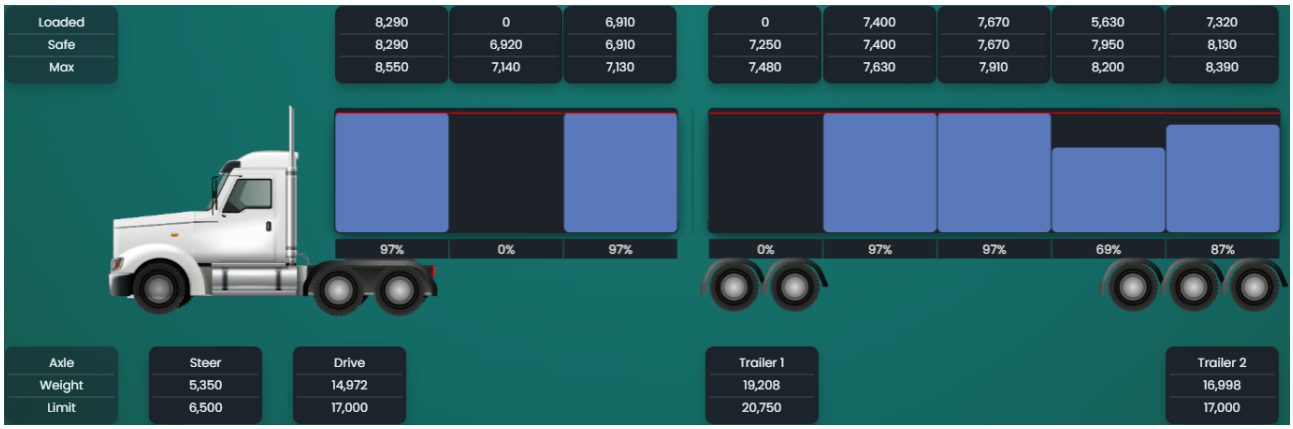



Figure 25: Extension 6 solution compartment.

## 4.8 Extension 7: Rigid Vehicles

**Accompanying Workbook:** olm_extension_7.xlsx

*Opturion Fuel* decide to purchase a *rigid body* vehicle.

Rigid vehicles are interesting in that whilst in reality they lack a turntable, the optimiser uses a *pseudo-turntable* for the front-most axle group, as seen in Table 10. This should ***always*** be configured to be the same as the *pin-to-axle* length.

| Id | Pin-to-axle | Turntable | Pin tare | Axle tare | Axle count |
|---|---|---|---|---|---|
| Front | 1 | 1 | | 7590 | 1 |
| Rear | 5087 | | | 5470 | 2 |

Table 10: Extension 7 axle groups.

Running the optimiser with this scenario produces the compartment volumes seen in Figure 26.




Figure 26: Extension 7 solution compartments.

# 5 What Next?

Congratulations! You have now used the Opturion Load Manager to effectively plan fuel deliveries. Hopefully, you have gained an understanding of the OLM and its capabilities.

There are a range of templates available to help you model vehicles not covered in this tutorial.

If you are interested in learning more, please contact Opturion to discuss the best options for your business.