

Simulator Tutorial

This tutorial is intended as a brief manual to use and understand all settings and information displayed in the Simulator. Being this demo built on a reduce dataset of routes and nodes, for some search could happen that the system is not able to provide any solution. In the file "*Simulator Nodes.xlsx*" it is possible to find a list of cities, sorted by country, that should be connected with each other. Beside that there are few ship routes going from Shanghai to Piraeus that can be used to simulate a shipment from China to Europe.

To use the Simulator, we suggest to first try a simple search (defining only *start*, *end* and *depart not earlier than*) to verify that the route in which you are interested exists, then try to modify other settings to meet your needs. Take also into account that the following settings could slow down the Simulator with proportionality with different factors:

- *Multi-Destinations Mode* for each additional destination;
- *Forced Routes* for each additional route;
- *Pass by* for each additional stop;
- *Risk Analysis* if enabled;
- *Capacity Mode* if enabled.

Trip Options

Basic settings

- **Start/End:** You can write the name of the departure/arrival node, when the Simulator suggest the corresponding stop you must select it by clicking it with the mouse or by highlighting it with the up/down arrow keys and pressing enter. If you select the stop correctly a label start/end will be placed on the corresponding position on the map;
- **Depart not earlier than:** You can specify time (am/pm) and date (mm/dd/yyyy) of when the shipment is ready to start;
- **Now:** Set departure time and date to the current time and date;
- **Arrive not later than:** If enabled you can set the maximum arrival time (am/pm) and date (mm/dd/yyyy), all the routes arriving after that will be discarded;
- **+:** By clicking on the "+" you enable the "*Multi-Destinations Mode*", another "*End*" field is displayed together with a corresponding "*Arrive not later than*" in the basic settings and "*Number of containers*" in the advanced settings (*Figure 1: one destination, Figure 2: two destination*).

Trip Options

Start:

End:

Depart not earlier than: 12:25pm 09/18/2018

Arrive not later than : 12:25pm 09/18/2018 ☐

▼ Advanced

Travel by: Full MultiModal ☒ Truck ☒ Rail ☒ Ship ☒ Barge ☒

Banned routes: (None)

Forced Routes: (None)

Pass By: (None)

Banned Stops: (None)

Number of containers:

Driver Rest Time: ☐

Figure 1: Basic and advanced settings

Trip Options

Start:

End:

End2:

Depart not earlier than: 12:25pm 09/18/2018

Arrive not later than : 12:25pm 09/18/2018 ☐

End 2 Arrive not later than : 12:48pm 09/18/2018 ☐

▼ Advanced

Travel by: Full MultiModal ☒ Truck ☒ Rail ☒ Ship ☒ Barge ☒

Banned routes: (None)

Forced Routes: (None)

Pass By: (None)

Banned Stops: (None)

Number of containers:

Number of containers(End 2)

Driver Rest Time: ☐

Figure 2: Basic and advanced settings with Multi Destination Search

Advanced settings

- **Travel by:** Here you can select which mode you want to use;
- **Banned routes:** You can use this setting to ban any route from your search. To ban a route, you should insert departure and arrival nodes, then select one of the routes displayed and press ">" to add it to the banned list. If you want to remove a route from the list, you should select the corresponding route and press "<";
- **Forced routes:** You can force the search to use any specific route. To force a route, follow the instructions of "Banned Routes";
- **Pass by:** You can force the search to pass by any specific node. Write and select the desired node, then press ">" to add it to the pass by list. To remove a node, you should select it and click on "<";
- **Banned stops:** You can use this setting to ban any node. To ban a node, follow the instructions of "Pass by";
- **Number of containers:** if empty it simulates the shipment of one container. You can insert any number to start a simulation with the "Capacity Mode";
- **Driver Rest Time:** enabling this field will apply a default driver rest time to each truck leg (Small break of 45 minutes every 4:30 driving hours, Long break of 11 hours every 9 driving hours).

Figure 3: Pop-up windows for Banned routes, Forced Routes, Pass By and Banned Stops

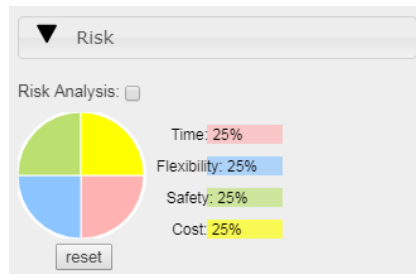
Configuration settings

Figure 4 Configuration settings

- **Cost per kg CO2:** to set the conversion factor for the CO2 that will be used in the optimization phase;
- **Cost per hour:** to set the conversion factor for the time that will be used in the optimization phase;
- **Cost per km (truck/train/ship):** to set the conversion factor for the distance that will be used in the optimization phase;
- **CO2 per km (truck/train/ship):** to define the amount of CO2 per kilometers produced by a truck, a train and a medium steaming ship;
- **CO2 per km (ship slow):** to define the amount of CO2 per kilometers produced by a slow steaming ship;
- **CO2 per km (ship fast):** to define the amount of CO2 per kilometers produced by a fast steaming ship;
- **Boarding time (truck/train/ship):** to define the time needed for a truck, a train and a Lift-on-lift-off ship to completely board the vehicle;
- **Alighting time (truck/train/ship):** to define the time needed for a truck, a train and a Lift-on-lift-off ship to completely alight the vehicle;
- **Boarding time (ship RoRo):** to define the time needed for a Roll-on/roll-off ship to completely board the vehicle;
- **Alighting time (ship RoRo):** to define the time needed for a Roll-on/roll-off ship to completely alight the vehicle;
- **Capacity (train/ship):** to define the default capacity of train and ship;
- **KPIs Triangle:** moving the cursor it is possible to set the weight of the different KPIs (CO2 emission, time and distance) in the optimization;
- **Reset:** to set the KPIs cursor in the center of the triangle.

Consider that in this set of data all the ships are LoLo and medium steaming, and moreover some routes have specific values for CO2, boarding, alighting and capacity that are used in the optimization phase, being more accurate than the configuration settings.

Risk settings



- **Risk analysis:** to enable the risk analysis;
- **KRIs Circle:** by clicking on any slice it is possible to increase the weight of time deviation, flexibility, safety and cost deviation in the risk analysis;
- **Reset:** to divide the circle in 4 equal slices.

Result Summary

- **Transport Modes:** This is the list of transportation modes used in the itinerary;
- **Quality:** This indicates which itineraries fit better our settings with a colored rectangle shading from green (best result) to red (worst result);
- **Elapse Time:** The total amount of time passed since the beginning of the boarding at the first leg till the end of the alighting at the last leg;
- **Emission:** Total amount of kilograms of CO2;
- **Length:** Total travelled distance;
- **Total Cost:** Approximation of the cost in euro of the total shipping of all the containers;
- **Stops:** Number of intermediate stops with a change of transport mode;
- **Travel Time:** The amount of time in which the shipment is travelling;
- **Operational Time:** The amount of time in which the shipment is boarded or alighted;
- **Waiting Time:** The amount of time in which the shipment is waiting in every node.

| RESULT SUMMARY | | | | | | | | | | |
|----------------|--------------------|-------------|---------------------|------------------|-------------|----------------|-------|---------------------|--------------------------|----------------------|
| | Transport Modes | Quality | Elapse Time (hh:mm) | Emission CO2(kg) | Length (km) | Total Cost (€) | Stops | Travel Time (hh:mm) | Operational Time (hh:mm) | Waiting Time (hh:mm) |
| 1 | TRUCK, SHIP | <div></div> | 818:00 | 982.34 | 18032.00 | 20191.12 | 2 | 681:12 | 26:00 | 110:48 |
| 2 | TRUCK, TRAIN, SHIP | <div></div> | 844:02 | 932.92 | 18088.00 | 20276.72 | 3 | 682:58 | 30:00 | 131:03 |
| 3 | TRUCK, SHIP | <div></div> | 1237:57 | 1193.66 | 19810.00 | 22191.30 | 2 | 878:09 | 26:00 | 333:48 |
| 4 | TRUCK, TRAIN, SHIP | <div></div> | 1255:27 | 1112.03 | 19882.00 | 22311.52 | 3 | 880:43 | 30:00 | 344:43 |
| 5 | TRUCK, SHIP | <div></div> | 936:44 | 1167.83 | 17794.00 | 19811.32 | 1 | 754:56 | 14:00 | 167:48 |
| 6 | TRUCK, TRAIN, SHIP | <div></div> | 943:25 | 1088.20 | 17872.00 | 19934.14 | 2 | 757:33 | 18:00 | 167:51 |

Figure 5: Result Summary