INOLA TOUR PLANNER

USER MANUAL

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Innovative Optimierungslösungen

inola GmbH
Schärdinger Straße 1, 4061 Pasching, Austria

Tel: +43 (720) 37 05 88 - Fax: +43 (720) 37 05 88 99

Email: office@inola.at - Web: www.inola.at

Warranty and End User License Agreement: Please note that the software and all documents are subject to inola's EULA, available for your review our web site https://www.inola.at and within the product information of inola Tour Planner.

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1 Introduction

The *inola Tour Planner* (ITP) is an intelligent planning tool which calculates an optimized route between locations to be visited. The site visit is performed by vehicles.

1.1 Overview

The *inola Tour Planner is a* tool for optimization and scheduling of tours. It combines the power and intelligence of the *inola Advanced Optimization Core* (inola's unique optimization technology) with the simplicity of Microsoft ® Excel. This innovative tool enables the user to solve and optimize tour planning tasks in a very short amount of time and a superior level of quality.

1.2 Functionality

The *inola Tour Planner* installs itself directly into your Microsoft ® Excel instance. So, you can work within your familiar environment.

Our plugin provides a Microsoft ® Excel template with which you can access its functionality. This template is directly installed to your Microsoft ® Excel template directory. Now you are able to create multiple Microsoft ® Excel workbooks based on this template. By default, the template provides some demo data, which allows you to directly start with an optimization run.

The template contains 5 sheets:

- *Transporters*: Here you will find information about vehicles you want to schedule. A transporter consists of the following attributes: *Name, Description, Capacity and the average Speed (in Kilometers per hour).*
- *Locations*: Here you will find information regarding the locations to visit. A Location consists of the following attributes: *Name and Searchstring.*
- *Shipments*: Here you provide information about required shipments. A Shipment consists of the following attributes: ID, Location, Units, Type, Splittable, Time Window (From field and To field).
- *Configuration*: Here you will find additional configuration parameters. The following configuration parameters are required: *Depot* (The starting point of each tour), *Day Start* (the earliest starting time of a tour), *Day End* (the latest ending time of a tour), *Handling Time* (the maximum time to deliver or pick up goods at a location), *Overnight Allowed* (a flag that determines whether a tour lasts a day or more days), *Max. Tour Duration* (the maximum duration of a tour in minutes).
- *Ouput*: The optimizer fills in this sheet after each optimization run.

Additionally, a new menu tab (called *inola*) within your Microsoft ® Excel instance, is created during the installation process, which allows you to:

- Start the optimization
- Configure the optimization target priorities
- Configure some optimization parameters
- Get a distance matrix of all locations
- Open/Close the visualization of the optimized schedule[1]
- Take a look at a brief instruction
- Take a look at your license state
- Take a look at some information about the company and the installed inola plugin(s)

1.3 Requirements

inola Tour Planner is a plugin for Microsoft ® Excel. Therefore, it requires a working instance of Microsoft ® Excel (and Microsoft ® Windows). The minimum system requirement is Microsoft ® Excel 2010. All other dependencies (if necessary) are checked during the setup routine. The plugin was tested using Microsoft ® Excel 2010, Microsoft ® Excel 2013 and Microsoft ® Excel 2016.

[1] Attention: The visualization does not support updates, if you modify data or open an inola Tour Planner workbook, a new optimization run is required in any case.

2 Installation

This section illustrates how to get the *inola Tour Planner* and how to install it.

2.1 Where do you get the application

The current version of the *inola Tour Planner* can be downloaded at our website, https://www.inola.at. Additionally, you will find the corresponding User Manual and EULA.

2.2 How to verify the setup.exe

The *setup.exe* file is signed with a trusted certificate. In order to verify the authenticity of the setup file please check if it is correctly signed and the certificate shows "inola GmbH" as owner.

2.3 Installation process

Please execute *setup.exe* and follow the instructions of the installation wizard. In order to execute the optimization of the *inola Tour Planner* a valid license is required. inola provides a full functional, 10-day-trial license free of charge. After installing *inola Tour Planner*, a license dialog opens, which leads you through the process of acquiring your demo license. More information about the license process may be found in chapter 5. After the installation process, please start your Microsoft ® Excel and finally agree to add the *inola Tour Planner* plugin to your instance.

3 Plugin content description

This section describes the plugin components and how they work.

3.1 inola Tour Planner Template

Depending on your Microsoft ® Excel version, the *inola Tour Planner* template is copied to your default user template folder. It is now available in Microsoft ® Excel. The template itself does not contain any code or scripts, it just provides the necessary tables for the data. You can start a new *inola Tour Planner* workbook by creating a new template-based workbook. More information about how to create the workbook specifically for your Microsoft ® Excel version may be found in the following section.

After creating a new *inola Tour Planner* workbook, it can be saved at any location within your file system.

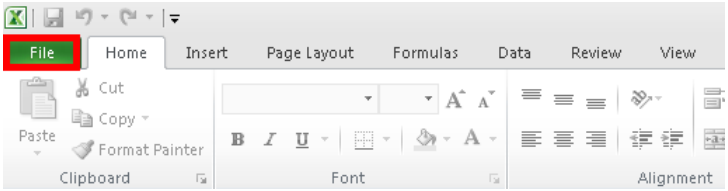
If you use the *inola Tour Planner* on other systems, please keep in mind, that an installation of our software is required. The data itself can be used and transferred to other computers just as any excel workbook.

3.1.1 Template in different Microsoft ® Excel Versions

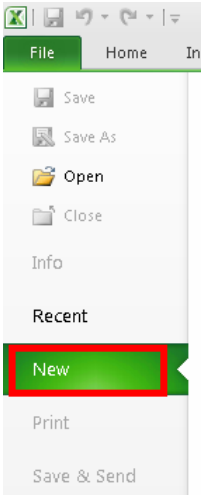
This chapter illustrates how to find and create now workbooks, based on the *inola Tour Planner* template in Microsoft ® Excel 2010 and Microsoft ® Excel 2013 / 2016.

3.1.1.1 Microsoft ® Excel 2010

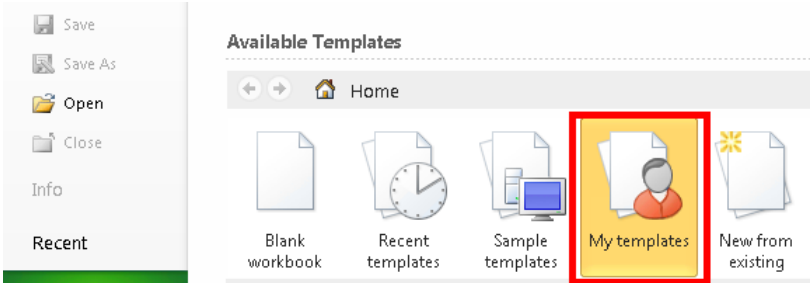
- Click *File* at the menu bar.



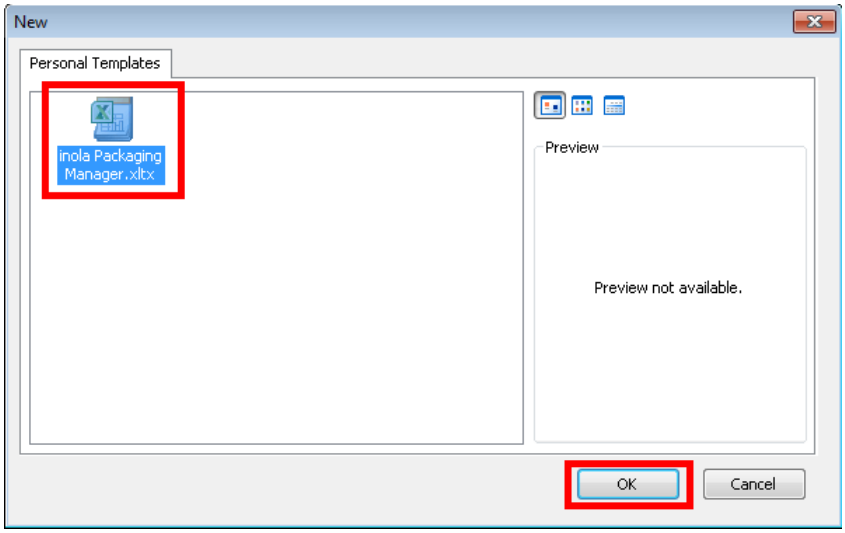
- Details of this menu item appear, click *New*.



- After clicking *New*, details of this menu item appear, click *My templates*.

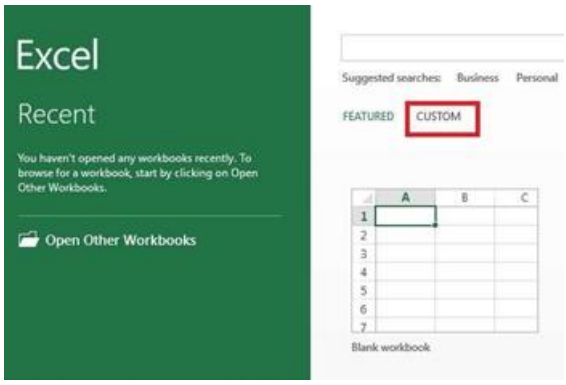


- A new tab window appears. Select the tab *Personal Templates*. You can open the *inola Tour Planner* template by double-clicking the template icon or by selecting the template icon and clicking the *OK* button.

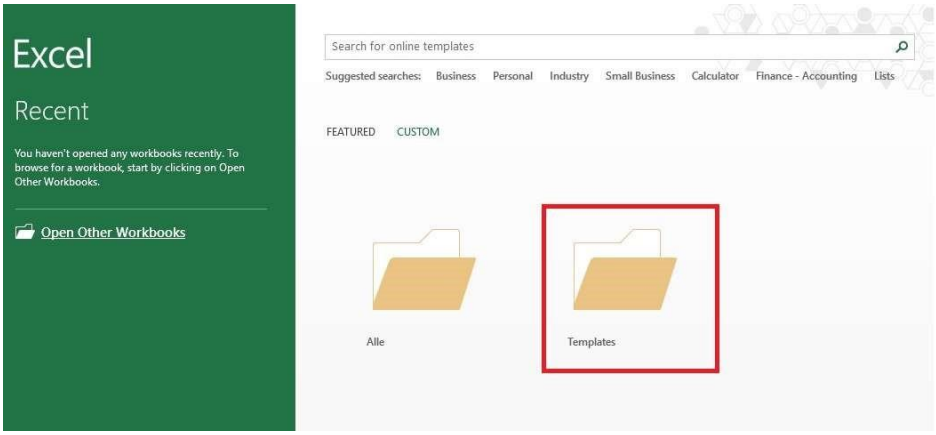


3.1.1.2 Microsoft ® Excel 2013 / 2016

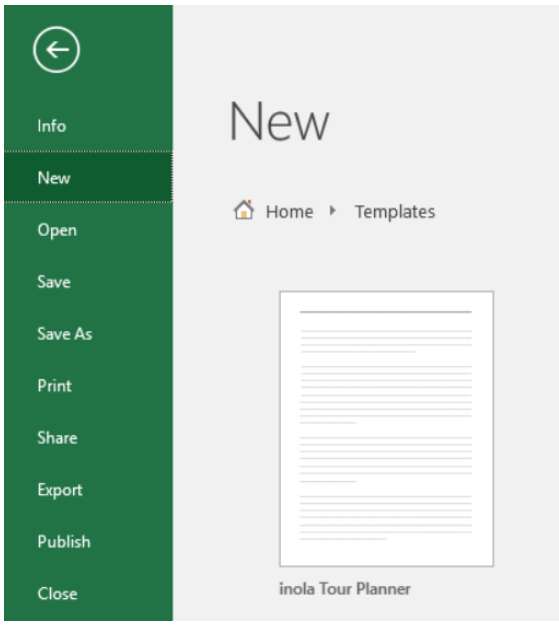
- Select *Custom*.



- After clicking *Custom*, the right side of the window changes. Click the icon *Templates*.



- After clicking *Templates*, the *inola Tour Planner template* appears. You can open the *inola Tour Planner template* by clicking the template named "inola Tour Planner".

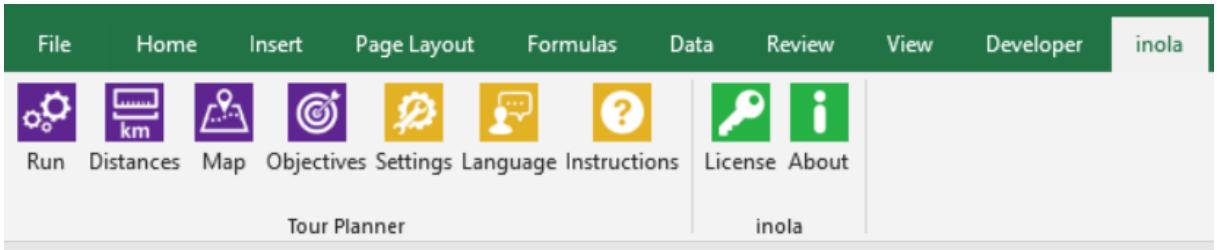


3.1.2 Change Template design

Important information: Do not change the design of the workbook! Any modification of the *Design* tab leads to an inoperable *inola Tour Planner* workbook.

3.2 inola ribbon elements description

The *inola Tour Planner* installs the *inola* menu tab:



- *Run*-button: Starts the optimizer as a separate process, works with the input data of the various input data sheets (such as *Transporters*, *Locations*...).
- *Distances*-button: Shows the location matrix with distances between locations in kilometers.
- *Map*-button: Opens a visualization of the current output.
- *Objectives*-button: Opens the objective priorities dialog that allows changing the priorities of different optimization targets.

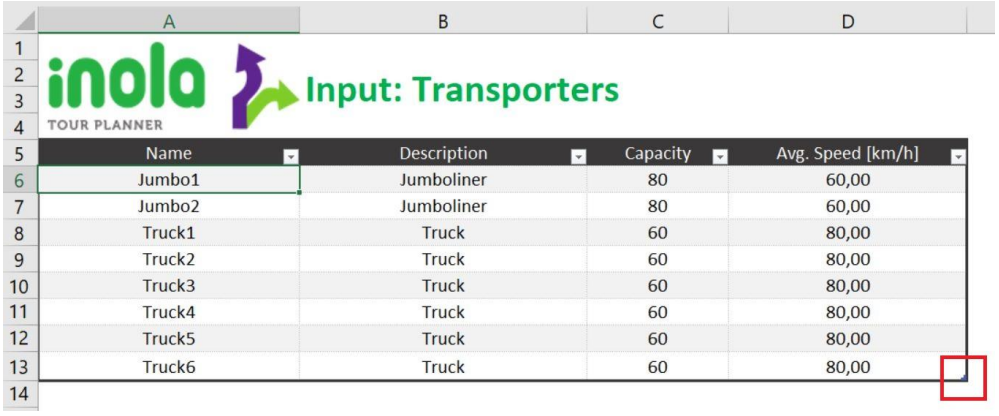
- *Settings*-button: Opens the settings dialog that allows changing parameters for the optimization.
- *Language*-button: Opens the language editor dialog that allows changing and updating of the document's language.
- *Instructions*-button: Shows a brief introduction of how to use the *inola Tour Planner.*
- *License*-button: Opens the license dialog to show information about your license state or to install/update a license file.
- *About*-button*:* Opens a dialog with information about the company and the installed inola plugin(s).

3.3 Sheets

The *inola Tour Planner* provides five spreadsheets, named: *Transporters*, *Locations*, *Shipments*, *Configuration* and *Output*. Do not change the names of these sheets without using the language editor in order to ensure the functionality of the plugin.

3.3.1 Transporters

The vehicles and the vehicles attributes can be found in the *Transporter* spreadsheet. The example consists of eight vehicles with their respective attributes. The size of this table can be changed by dragging the lower right corner at the small triangle. When its size is reduced, content outside the Transporters table is deleted. Only data inside the table is used for the optimization process. Editing outside the Transporters table isn't possible.



Name	Description	Capacity	Avg. Speed [km/h]
Jumbo1	Jumboliner	80	60,00
Jumbo2	Jumboliner	80	60,00
Truck1	Truck	60	80,00
Truck2	Truck	60	80,00
Truck3	Truck	60	80,00
Truck4	Truck	60	80,00
Truck5	Truck	60	80,00
Truck6	Truck	60	80,00

Each line represents the attributes of a specific Transporter:

- *Name*: the unique name (Code) of the transporter.
- *Description*: the description of the transporter.
- *Capacity*: the maximum capacity of goods for a transporter.
- Avg. Speed: the average speed of the transporter (in kilometers per hour).

Every column of the *Transporters* table can be sorted and / or filtered.

3.3.2 Locations

The *Locations* spreadsheet shows locations to be visited.

Input: Locations

Name	Searchstring
Wien	Maroltingergasse 73, Wien
Eisenstadt	Winzerweg 19, 7000
Innsbruck	Hauptfrachtenbahnhof, 6020 Innsbruck
Pasching	Schärdinger Strasse, Pasching
Linz	Mozartstrasse 1, Linz
Graz	Am Andritzbach 35, 8045 Graz
Klagenfurt	Muldenweg 3, 9020 Klagenfurt
St. Pölten	Wernerstraße 31, 3100 St. Pölten
Salzburg	Zeisigstraße 10, 5023 Salzburg
Bregenz	Wildeggstraße 3, 6900 Bregenz

- *Name*
  Location name.
- *Searchstring*
  The address or coordinates used to find the location.

3.3.3 Shipments

The *Shipments* spreadsheet contains information about the shipment.

Input: Shipments

					Time Window	
ID	Location	Units	Type	Splittable ?	From	To
Id1	Eisenstadt	15	D		14.03.2017 08:00:00	16.03.2017 18:00:00
Id2	Eisenstadt	10	P		14.03.2017 08:00:00	16.03.2017 18:00:00
Id3	St. Pölten	8	D		14.03.2017 08:00:00	16.03.2017 18:00:00
Id4	Wien	12	D		14.03.2017 08:00:00	16.03.2017 18:00:00
Id5	Bregenz	25	D	x	14.03.2017 08:00:00	16.03.2017 18:00:00
Id6	Klagenfurt	40	D	x	14.03.2017 08:00:00	16.03.2017 18:00:00
Id7	Salzburg	12	D		14.03.2017 08:00:00	16.03.2017 18:00:00
Id8	Graz	17	D		14.03.2017 08:00:00	16.03.2017 18:00:00
Id9	Graz	20	D		14.03.2017 08:00:00	16.03.2017 18:00:00
Id10	Linz	5	D		14.03.2017 08:00:00	16.03.2017 18:00:00
Id11	Linz	35	D		14.03.2017 08:00:00	16.03.2017 18:00:00
Id12	Wien	45	D	x	14.03.2017 08:00:00	16.03.2017 18:00:00

- *ID*

  The unique identification number of a shipment.

- *Location*

  The location where the shipment has to be delivered or picked up.

- *Units*

  The quantity of goods for the shipment.

- *Type*

  Determines whether goods are going to be picked up or delivered at a specific location. “P” or “p” stands for pick up. “D” or “d” stands for delivery.

- *Splittable?*

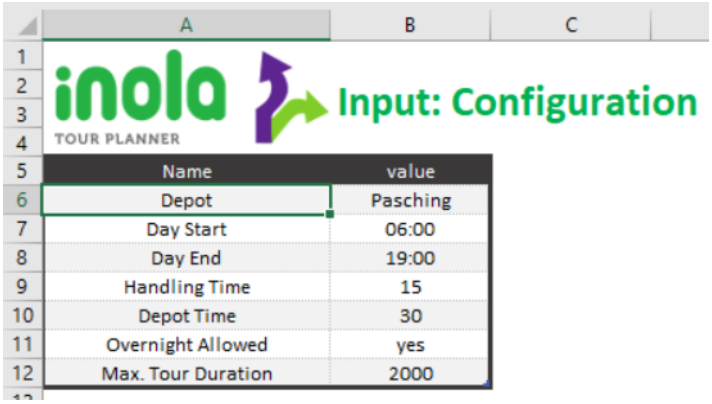
  Determines whether a shipment can be splitted or not. The splitting task is done by the optimizer, if necessary.

- *Time Window*

  The shipment should be delivered within this time range.

3.3.4 Configuration

The *Configuration* spreadsheet shows various important settings.



Name	value
Depot	Pasching
Day Start	06:00
Day End	19:00
Handling Time	15
Depot Time	30
Overnight Allowed	yes
Max. Tour Duration	2000

- *Depot*
  The starting/end point of all tours.
- *Day Start*
  The earliest starting time of a tour.
- *Day End*
  The latest ending time of a tour.
- *Handling Time*
  The required time for loading or picking up goods at a location.
- *Depot Time*
  The required preparation time for loading a truck at the depot.
- *Overnight Allowed*
  A flag that determines whether a tour can last longer than a working day.
- *Max. Tour Duration*
  The maximum duration of a tour in minutes.

3.3.5 Output

The *Output* spreadsheet shows the result of the optimization.

Tour	Transporter	Shipment	Units	Delivery Start	Arrival Time
Tour 0	Jumbo1	Id46	36	13.03.2017 15:09:50	14.03.2017 08:15:00
Tour 0	Jumbo1	Id32	4	14.03.2017 08:15:00	14.03.2017 08:15:00
Tour 0	Jumbo1	Id46	33	14.03.2017 08:15:00	14.03.2017 08:15:00
Tour 0	Jumbo1	Return Tour 0	0	14.03.2017 08:15:00	14.03.2017 14:05:35
Tour 1	Jumbo1	Id36	3	14.03.2017 14:35:35	14.03.2017 16:55:00
Tour 1	Jumbo1	Id15	22	14.03.2017 16:55:00	14.03.2017 16:55:00
Tour 1	Jumbo1	Id43	17	14.03.2017 16:55:00	14.03.2017 16:55:00
Tour 1	Jumbo1	Id40	48	14.03.2017 16:55:00	14.03.2017 16:55:00
Tour 1	Jumbo1	Id39	51	14.03.2017 16:55:00	14.03.2017 16:55:00
Tour 1	Jumbo1	Id31	12	14.03.2017 16:55:00	14.03.2017 16:55:00
Tour 1	Jumbo1	Return Tour 1	0	14.03.2017 16:55:00	15.03.2017 06:30:00

Each line represents the scheduled data of a vehicle within a specific tour:

- *Tour:* shows unique tour number.
- *Transporter:* shows vehicle information (vehicle name).
- *Shipment*: the unique identification number of a shipment or the way back to the start point.
- *Units:* the processed quantity of goods in this shipment.
- *Delivery Start:* The starting date of the shipment.
- *Arrival Time:* The ending date of the shipment.

4 How to work with inola Tour Planner

This section describes how to work with the *inola Tour Planner*.

4.1 Provide input data

The input data has to be provided in the different (input) spreadsheets of the *inola Tour Planner*, such as *Transporters*, *Locations*, *Shipments* and *Configuration*. It is possible to resize the input section in order to add/remove values (right/bottom end of the section).

4.2 Changing column names

You are not able to change column names without using the language editor. They are important for a correct usage behaviour of the application. More information about the language editor can be found in chapter 4.7. When clicking on a column name cell, the cursor is positioned inside this table.

4.3 Necessity and consistency of input data

You must fill in the data in the suitable format.

Before starting an optimization run, the following data consistency checks are done:

- The following tables must not be empty: Transporters table, Locations table, Shipments table and Configuration table.
- All tables mentioned above must contain data in suitable format.
- The uniqueness of unique attributes are checked.
- Existing rows must not be empty.

4.4 Running the optimizer

The optimization starts, when clicking the *Run*-button on the *inola*-ribbon. After the optimization, the output is written into the sheet *Output*.

Please note that during the optimization a high amount of CPU time is required. Depending on your system, other applications may work slower during the optimization process.

4.5 Interpretation of output

5	Tour	Transporter	Shipment	Units	Delivery Start	Arrival Time
6	Tour 0	Jumbo1	Id46	36	13.03.2017 15:09:50	14.03.2017 08:15:00
7	Tour 0	Jumbo1	Id32	4	14.03.2017 08:15:00	14.03.2017 08:15:00
8	Tour 0	Jumbo1	Id46	33	14.03.2017 08:15:00	14.03.2017 08:15:00
9	Tour 0	Jumbo1	Return Tour 0	0	14.03.2017 08:15:00	14.03.2017 14:05:35

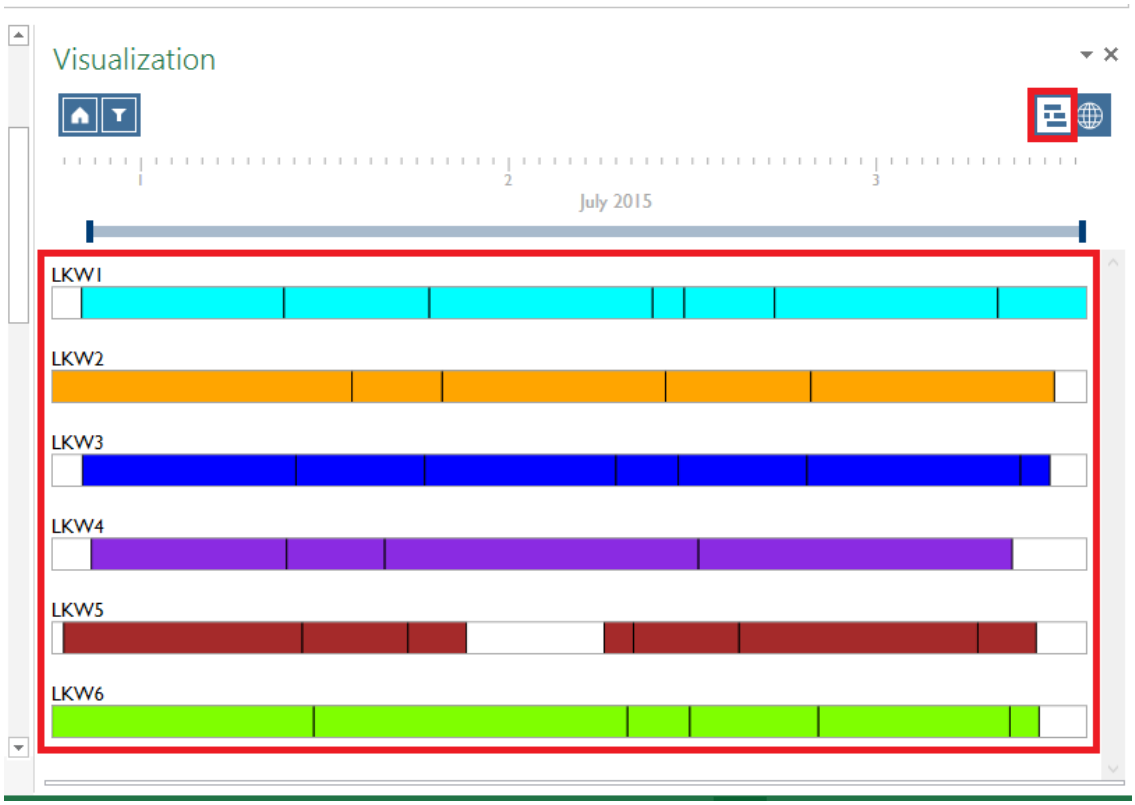
The example above shows that Tour 0 consists of 3 shipments, shown from the 6th row to the 8th row of the Output table. The 9th row is the way back to the starting point. Note that a tour always needs at least one vehicle (Transporter).

4.6 Visualization

A graphical representation of the result, visualized by a gantt chart, opens when clicking on *Map* within the *inola*-tab. The schedule opens in a docked Microsoft ® Excel window. This window can be set to a floated window, resized, and docked on every position within the possibility of Microsoft ® Excel. There are two kinds of visualization: a gantt chart visualization and a map visualization.

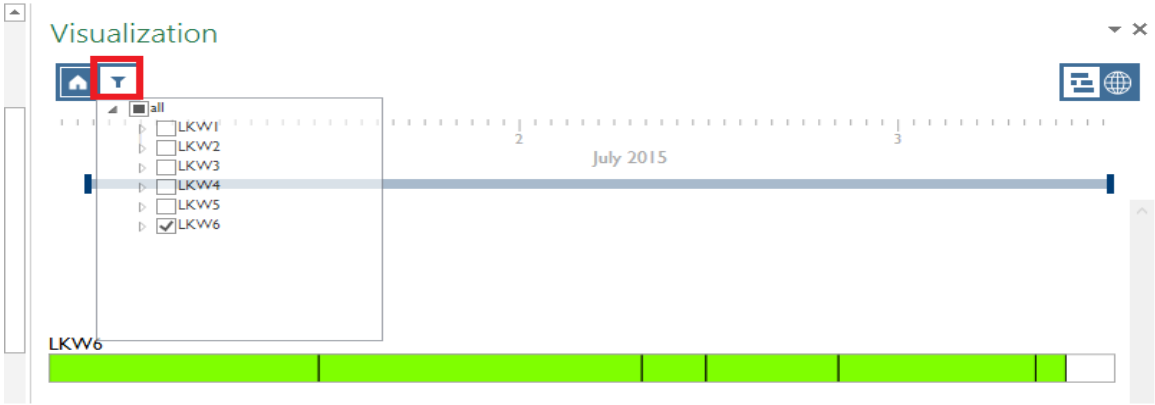
Right at the top of the Visualization window you can switch between gantt chart view and map view. Consider the example below.

Gantt chart view

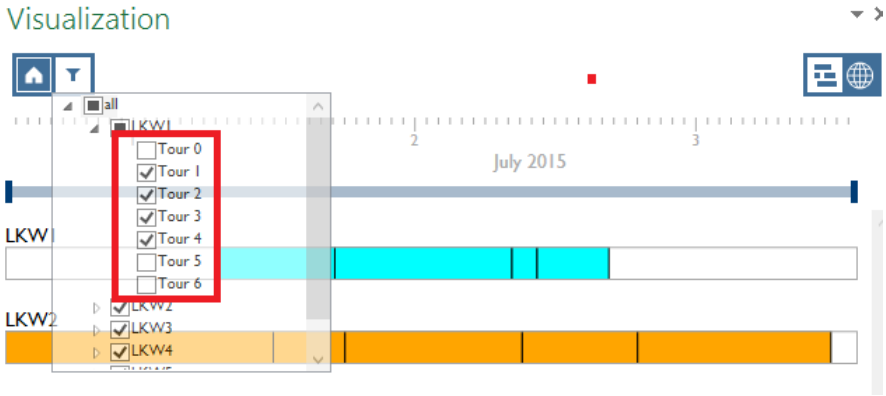


Left at the top of the Visualization window (in gantt chart view and map view) there is an icon with two symbols: a house and a hopper. The hopper has a filter function. You can hide or show transporters by clicking on the hopper, the same works for tours. By clicking on the house you make all transporters visible and reset all filters. Consider the following examples.

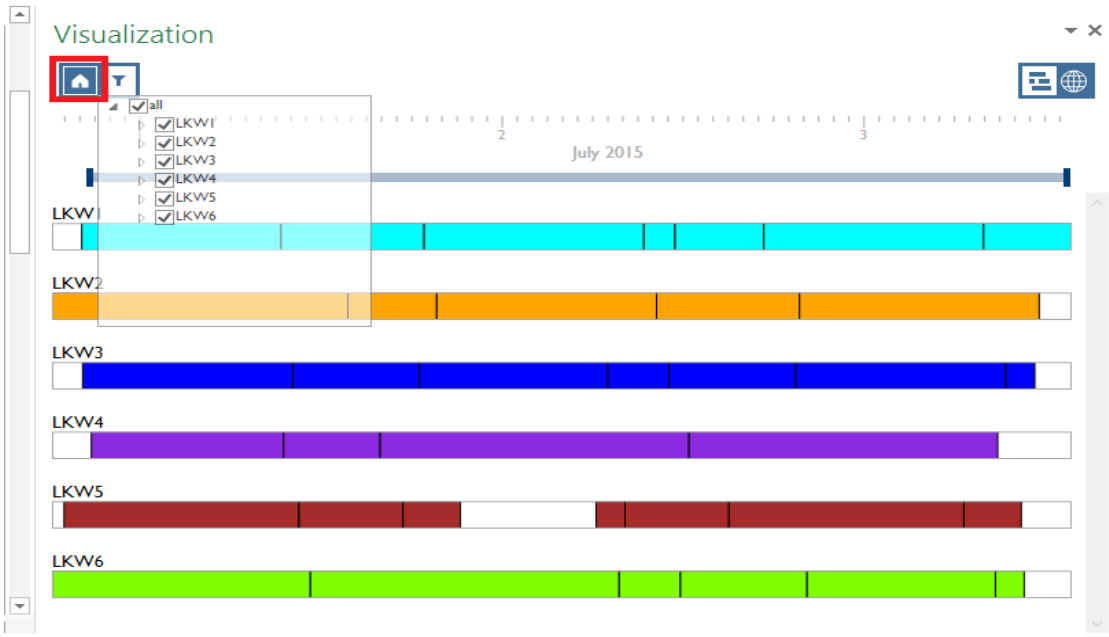
Hide or show vehicles in the gantt chart View



Hide or show tours in the gantt chart View

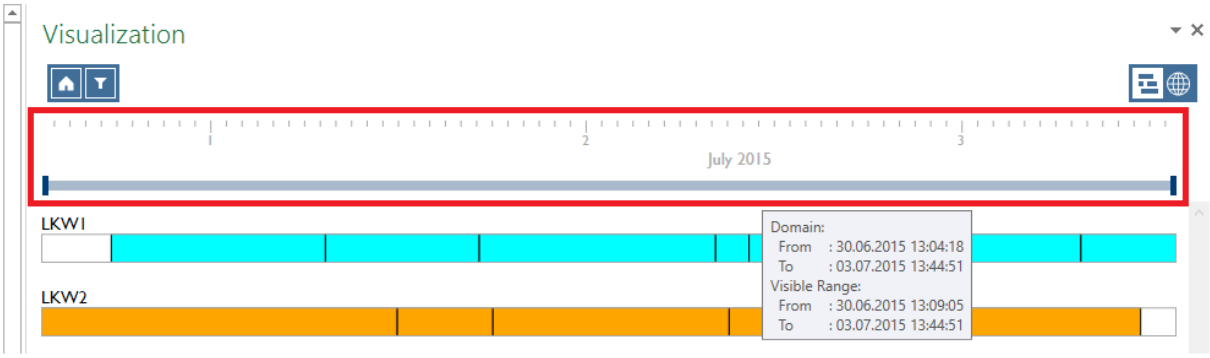


Show all vehicles in gantt chart View



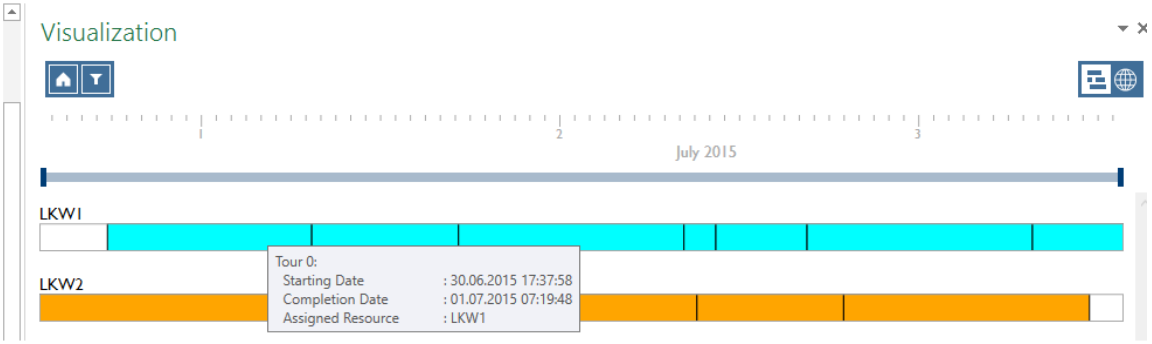
Below the filter icon, there is a scale with numbers, a date [Month Year] and a gray horizontal bar. This area provides information about the starting time and the delivery time. By focusing on the gray horizontal bar, a tool tip window appears, containing time information. Consider the following example.

By focusing on the gray horizontal bar, a tool tip window appears

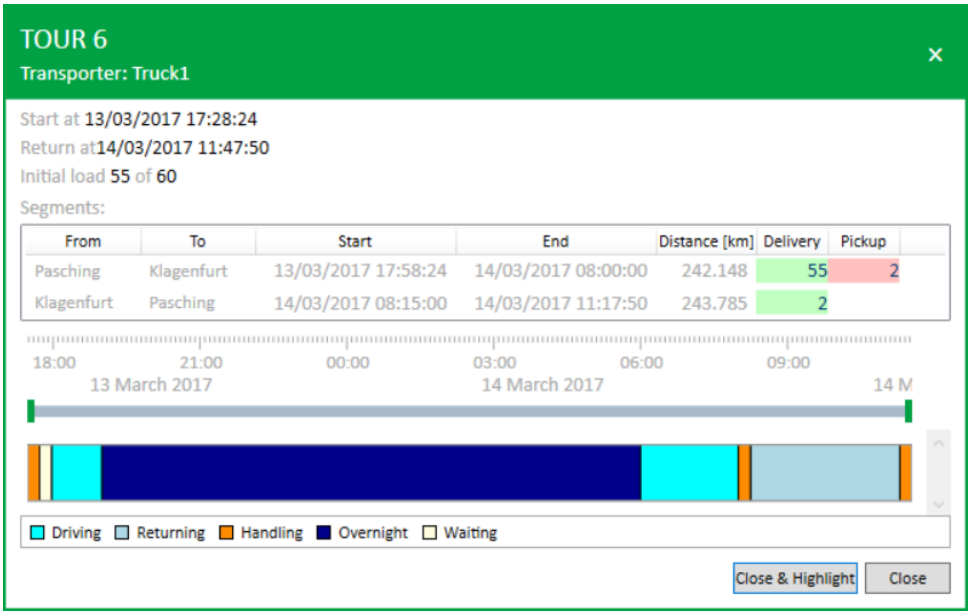


Below the gray horizontal bar there are bar charts. Each of them represents a transporter. A bar chart is separated in single pieces by black lines. Each piece stands for a fulfilled tour of this transporter. By focusing on a bar, tour specific information appears. Consider the following example.

By focusing on a bar, a tool tip windows appears



By clicking a bar, a separate window appears, containing all information about the chosen vehicle within a tour. Consider the example below. Here the bar for TRUCK1 was clicked.



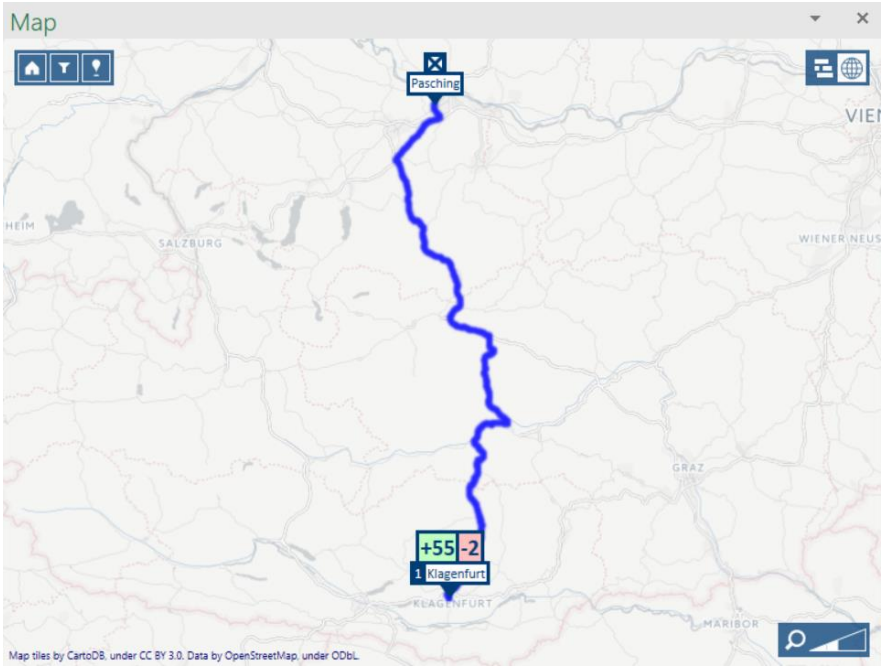
The following information is given in this box:

- Right at the top of the window (in the green area), you see the Tour name and the Transporter name.
- Below you see several labels:
  - *Start at*: the starting date of the tour
  - *Return at*: the returning date of the tour
  - *Initial load*: amount of goods at the tour start.
- Below the labels you see the segments table. This table shows further information about the tour:
  - *From:* the starting location.
  - *To:* the destination.
  - *Start:* the starting date of the tour.
  - *End:* the returning date of the tour.
  - *Distance [km]:* the distance between two locations in kilometers.
  - *Delivery:* if the shipment is delivered, this field contains the amount of pieces.
  - *Pickup:* if the shipment is picked up, this field contains the amount of pieces.

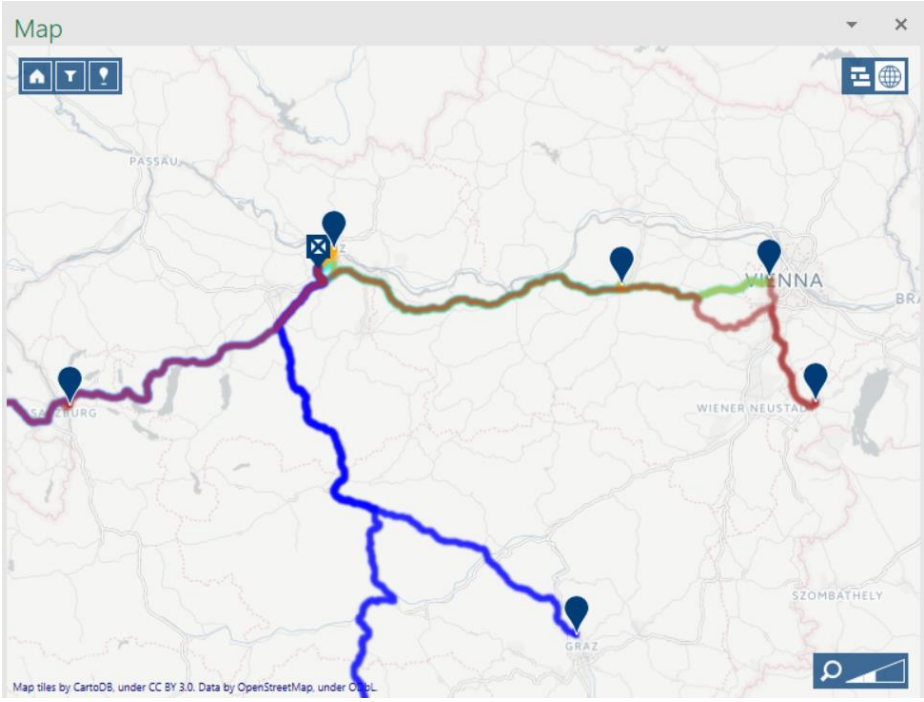
- Below the segments table you see a scale and a gray horizontal bar. This area shows the time window between the starting date and the ending date of the tour. You can adjust this time scale by clicking and holding either on the right or on the left extremity of the gray bar and moving it to the right or to the left direction.

- Below the gray horizontal bar, you see a multi-colored bar. Colors of this bar are explained in the legend underneath the multi-colored bar. Each color represents a fulfilled action within a certain duration. You can read the duration by observing the time scale.
- At the bottom right of the window you see two buttons: “Close & Highlight” and “Close”. By clicking the button “Close”, you close the window. By clicking the “Close & Highlight” button, the map view appears displaying the chosen route. Consider the picture below.

Map view of the selected route



Map view



The map view offers a zoom feature. At the bottom right of the window you see an area with a blue background, containing a magnifier and a triangle. By clicking on the triangle, you can adjust the zoom of the map.

At the top left of the visualization window there is an icon with three symbols: a house, a hopper and a location mark. The hopper has a filter function. You can hide or show transporters by clicking on the hopper. By clicking on the house, you make all transports visible and reset the filters. With the location mark you can display the coordinates of a point within the map.

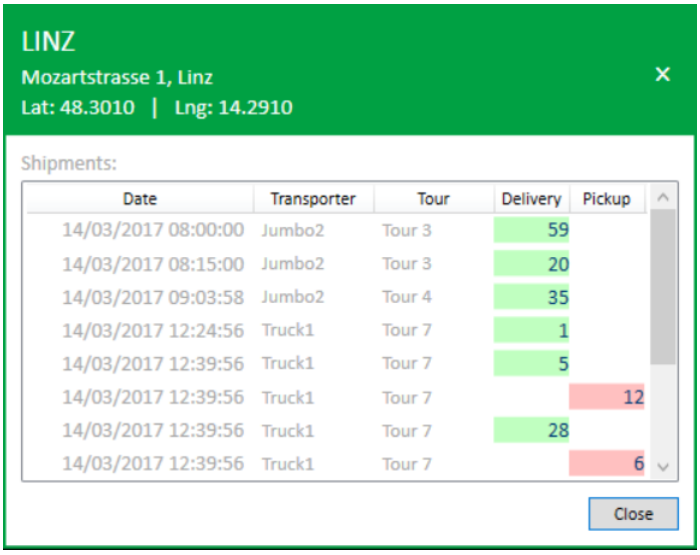
Each colored line stands for a route. The icon symbolizes the starting point of all tours. A marker is a visited location within a tour.

At the top right of the visualization window there is an icon with two symbols: horizontal bars and a sphere. With these symbols you can switch between gantt chart view and map view.

When you focus on a tour, a tool tip window appears, containing the tour's name. When you focus on a location, a tool tip window appears, containing the location's name.

By clicking on a colored line, a window appears, containing detailed information about a tour.

By clicking on a location in the map view, a window appears, containing detailed information about this location. Consider the picture below.



- At the top of the window, you see the name of the location, in a green background in addition to the geographic coordinates of the location.
- Below you see the Shipments table. This table contains shipment information concerning this location.

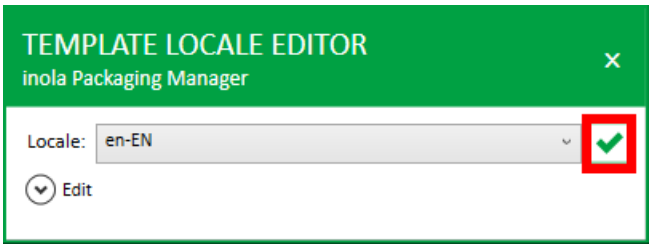
4.7 Language Editor

The language editor allows you, to customize the display language of your *inola Tour Planner* workbook.

4.7.1 Change the language

The language editor can be activated by clicking the *Language*-button on the *inola*-ribbon. The language of the currently active Microsoft® Excel workbook (only if it is an *inola Tour Planner* workbook) can be set with the language editor.

Please note: Only the language of the workbook, but not the language of the Microsoft® Excel software or of *inola Tour Planner*, can be changed with the language editor. For the change of the Excel standard language, please refer to the documentation of this software. The *inola Tour Planner* uses the standard language of Microsoft ® Excel, or if there is no language pack, English by default.

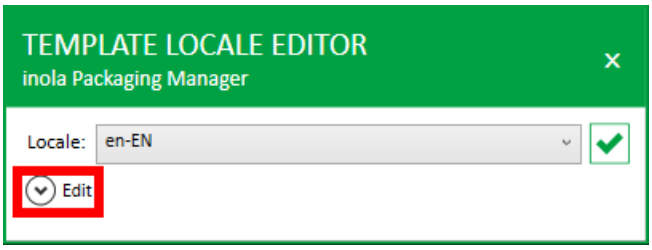


If a language template is complete (more in the following section), it can be selected in the combo box and set active for the current workbook by using the button *Activate locale*. This action can be performed or repeated at any time.

4.7.2 Adapt locales (language templates)

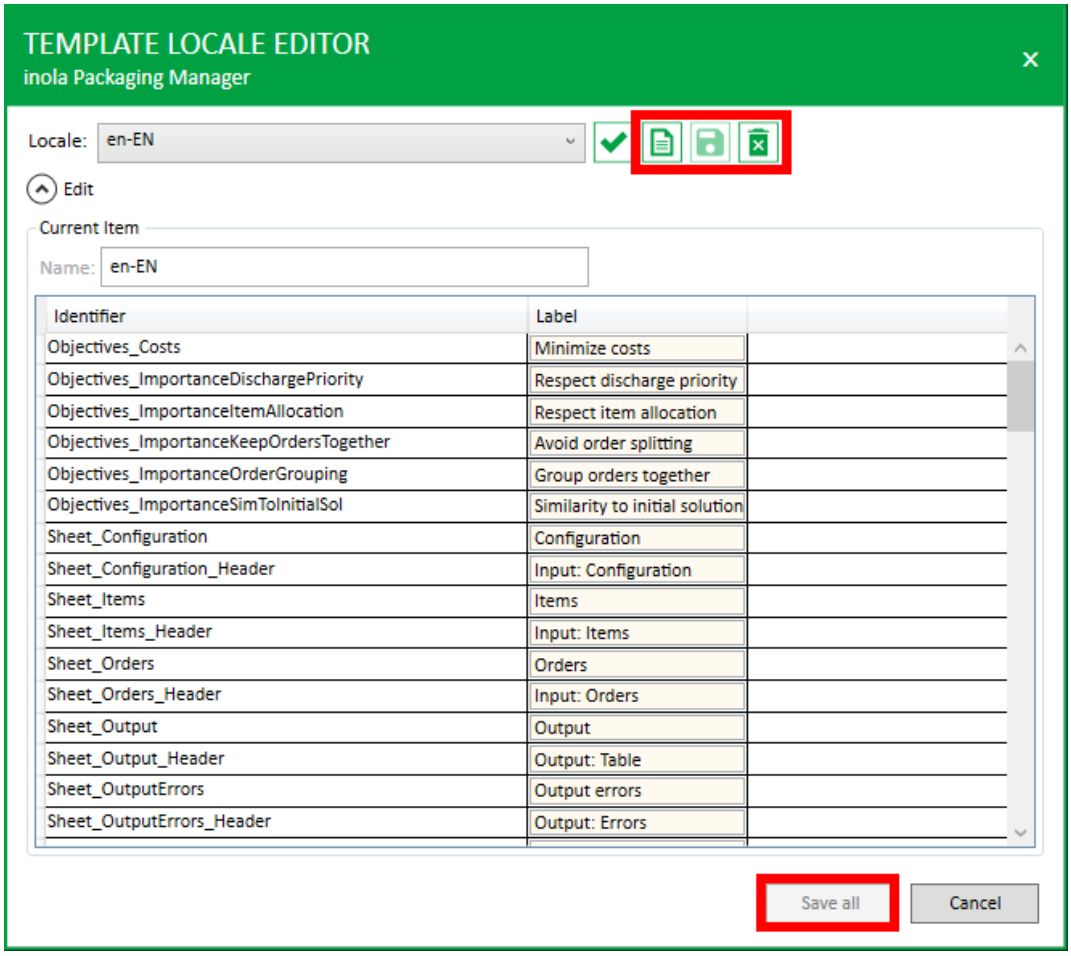
The language editor allows any changes to current locales, new locales can be created or deleted.

Therefore, the edit mode of the language editor must be activated. This adds the editing area to the language editor.

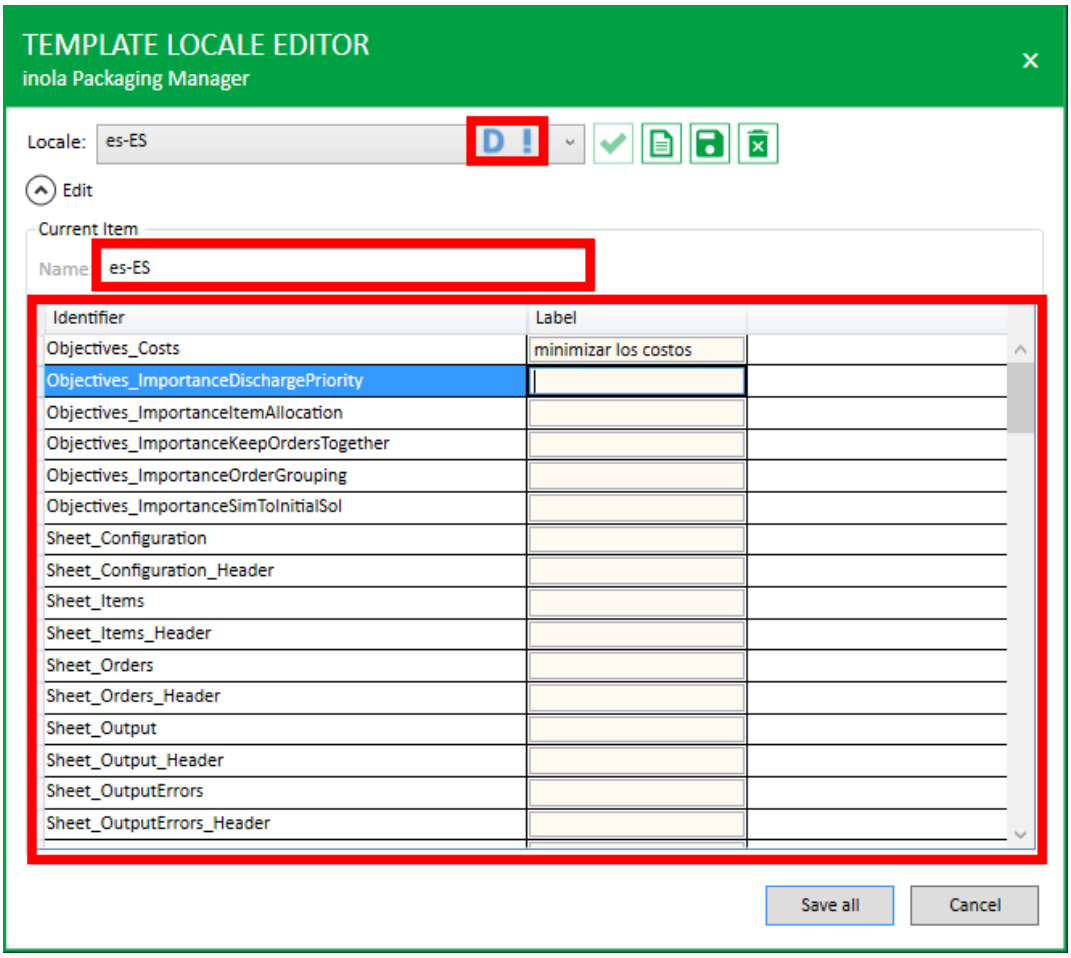


In edit mode, you can either create new templates, edit existing templates, or delete them.

Please note: If all locales are deleted or no complete locale is available, the *inola Tour Planner* will no longer work correctly and the application may have to be reinstalled completely.



The corresponding actions are set by using the buttons *Delete locale* or *Add locale* in the upper area. Changes are only activated, if saved. To do so, you can either use the *Save* button above for the current selected language template or the button *Save all* at the bottom right.



If a locale has been changed but has not yet been saved, this is indicated by the blue letter 'D' in the locale combo box. Furthermore, a blue exclamation mark indicates whether a language template is complete. A language template is complete if a Label has been inserted in the lower area for each Identifier. The name of a language template is freely selectable but must be unique compared to other templates. The name can also be customized at any time.

Different rules are defined in the background for the different Identifiers (e.g. worksheets may not have the same name or label), which are checked during the input and saving process. If necessary, we point occurring problems are denoted.

5 Licensing

This chapter explains how to proceed with the *inola License Manager* in order to get a valid license for the *inola Tour Planner*. Note that inola grants a fully functional demo license for 10 days. If you want to use *inola Tour Planner* for a longer period, please contact our sales team (sales@inola.at).

5.1 Licensing policy

In order to use *inola Tour Planner*, you have to accept our end user license agreement (EULA) during the installation process. inola grants a fully functional demo license for 10 days. In order to get a license, you have to provide a valid e-mail address. The license file is sent directly to the given e-mail address and can be installed using the *inola License Manager*.

5.2 inola License Manager

The license tool is modelled as a wizard, which leads you through the installation process. It is opened after the installation process of our software. Additionally, you can open the license tool by clicking onto the *License*-button on the *inola*-ribbon at your Microsoft ® Excel instance.

The image above shows the last step of the license tool wizard, which shows you the state of your license.

The optimizer only runs, if a valid, not expired license is provided. If your trial license expired, the license dialog will show you more information how to get a new license.

6 About inola

inola GmbH, located in Pasching near Linz, Austria, develops and sells innovative optimization solutions, based on our own technology **Advanced Optimization Core**. The framework allows solve **quantitative optimization tasks** for supply chain management and other areas of industry. Our customers benefit from our technology by **improved efficiency** in production, logistics, transportation, warehousing and duty roster planning.

At the heart of the technology (**Advanced Optimization Core**, short: AOC) is a self-learning optimization approach that is capable of **swiftly solving complex problems** to an extremely **high standard**, unlike other established approaches. inolas's software is **particularly suited** for applications with continuously changing boundary conditions typically encountered in **dynamic environments**.

inolas's technology originates from a **long-term research cooperation** between **the Johannes Kepler University Linz** and **Siemens Corporate Technology** in Munich. Since 2016, the software is property of inola. The Advanced Optimization Core can solve complex optimization problems in the shortest possible time.

Visit our Website (https://www.inola.at) or contact our sales team (sales@inola.at) to find out what we can do for you.

7 Credits

Microsoft, Excel and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.