

# QR for Tekla Structures- User Guide

## Introduction

QR for Tekla Structures is an extension application running on Tekla Structures. With help of this extension you can access the QR web service to

- Create and modify the QR building areas and QR listings in building areas.
- Add or remove reinforcement bars of Tekla model into cut&bend and/or cage lists by simply dragging the reinforcement bars into the desired lists.
- Update the content of the lists whenever the Tekla model has been changed

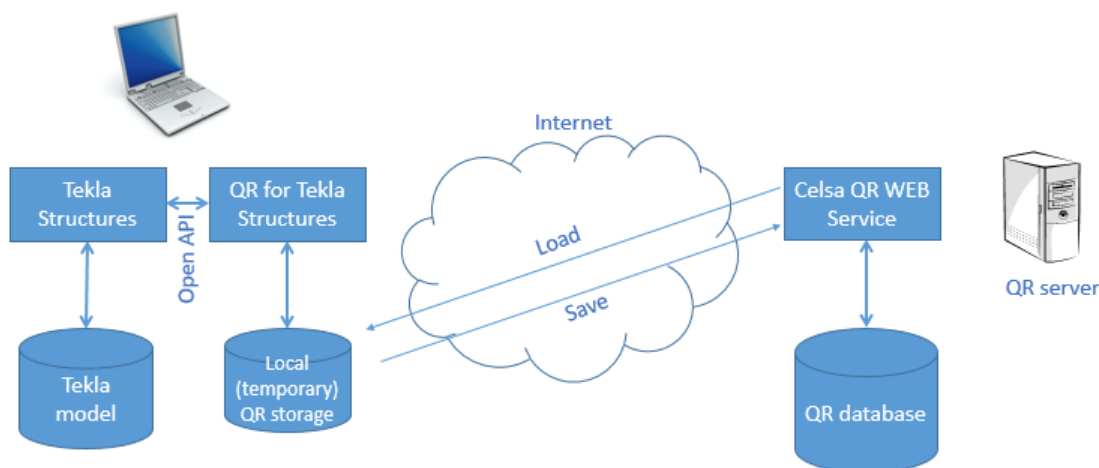
When the (model) reinforcement is added to QR listing the application is getting all available information from the model and adds the reinforcement to the new or existing row in the QR listing.

In addition the application is keeping track of which reinforcement bars are assigned into which listing and row in QR server. This linking between the model reinforcement bar and QR listing row is stored in Tekla model with help of user defined attributes.

## Basic concepts

The QR for Tekla Structures is an extension which have its own user interface containing different views showing both Tekla model and QR information, input fields and command buttons for various actions.

Extension is accessing Tekla model through the Tekla Open API interface. The extension is also accessing the QR system/database over internet with help of QR web service.



For QR data the extension have a temporary local storage. All changes to QR data are made first only tentatively in the local storage only. As soon as the user is ready and wants she/he can 'save' the tentative changes. In 'save' operation all tentative QR data changes are synchronized over internet to QR database. It is possible to save changes partially, for example only one listing but after a full save the local storage and QR database contains exactly same data.

The QR for Tekla Structures extension is also storing the linking between the model reinforcement and the corresponding QR item. With help of the linking the extensions 'knows' whether the model reinforcement object has been assigned in some QR item or not. One model reinforcement object can be assigned only to one single QR item but multiple, typically similar, reinforcement objects can be assigned into same QR item and thus one QR item may have several assigned model reinforcement objects.

Physically the 'linking' is finally stored by using the extended user defined attributes in the Tekla model.

## Typical workflow

In the simplest case to get the model reinforcement data transferred to QR server the following steps can be executed.

1. Start Tekla Structures and open the model
2. Start the QR for Tekla extension and login
3. Select the QR project from the dropdown list. Please note that the project must be created using QR web interface as there is no 'Create new project' feature in the QR for Tekla application
4. Select or create the QR building area(s).
5. Select or create the QR listing(s)
6. Assign the selected reinforcement into the desired QR listing by dragging the un-assigned reinforcement into the QR listing.
7. After all desired reinforcement bars has been assigned to some QR listing you can 'save' your work. During the 'saving' the newly added and/or modified data is finally update in QR server.
8. Save Tekla model to make sure the QR user defined attributes are stored persistently in Tekla model.

## Preconditions

Ensure you have the wanted reinforcement in the Tekla model, without having the actual reinforcement in the model it won't make sense to use the QR for Tekla application.

In the model make sure you have used the materials (steel grade + size) which are available in the QR server. Also make sure the bending shape definitions in Tekla Structures are compatible with the shape definitions in the QR server. The reinforcement data to transfer is really just the shape code (bending shape), dimensions and angles. Naturally the shape codes shall be fully matching as otherwise the fabricated reinforcement bar won't be same as the reinforcement in the model.

## User interface

### Login window

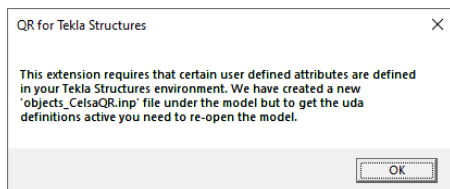
When you start the extension application you will first enter to the login window. In this window you must first select the Celsa QR server, enter the username and password of your QR account. To use the application you must have valid user account at the selected QR service. To get the account please contact your local Celsa representative.

When you click the 'Login' button the application is trying to connect the QR service with given user account. If the account is valid and active you will enter to the working view of the application; otherwise you get notified that the user name or password are not valid.

Please note that when you are running the application you must have the internet connection available as otherwise it won't be possible to check the user account and request any data from the QR service.

When you are logging into the QR service the application is getting some initial information from the QR system and simultaneously collecting the reinforcement data from Tekla model. This may take several minutes in case the internet connection is slow and/or the model is rather large.

QR for Tekla is storing the assignment data with help of user defined attributes. If these user defined attributes are not pre-defined in your Tekla Structures installation the application will copy the necessary user defined attribute definitions file into your Tekla model folder and shows the following notification.



You can continue working without reopening the Tekla model but you won't be able to review or modify the user defined attributes before the model has been re-opened.



Figure 1, QR for Tekla Structures login window

## Working window

Once you have successfully logged in the working view of the application will be shown.

The screenshot shows the 'QR for Tekla Structures' application window. It is divided into three main sections:

- Object Data:** Contains fields for Name (Schedule1), Color 1 (Sininen), Label 1, Color 2 (Vihreä), Label 2, Drawing number, Updated (never saved), and Released (not released). A 'Logout (release locks)' button is also present.
- Reinforcement in QR project:** Features a toolbar with various icons and a tree view showing the project structure. The tree view includes 'Testi \*', 'Building area 1 \*', 'Schedule1 \*', 'Cut & Bend', 'Cages', 'Stock lengths', 'Articles', and 'Schedule2 \*'.
- Unassigned reinforcement (134 item(s)):** Displays a table of reinforcement items. The table has columns for Shape, Prefix, Serie no., Count, Φ, and Name. The data shows 7 items, all with Shape 'B', Prefix '7', Count '4', Φ '10', and Name 'CORNER BARS'.

At the bottom, there is a status bar indicating '134 reinforcement bars and 0 cages were found.' and a 'Settings ...' button.

The 'Object data' area contains the properties of the QR object selected in the tree view in the middle area of the user interface.

This area contains the QR project selection and all command buttons.

The drop down list contains all projects of your QR account.

This area contains the tree view showing all QR data of the project.

When any of the tree view nodes is selected the commands are enabled or disabled depending on the type and state of the selected node.

This area contains the table view of all reinforcement in Tekla model which has not yet been listed in any of the lists in QR tree view.

You can re-order the list by clicking the column headers.

You can select one or more lines in the table and drag & drop the rebars into QR tree view.

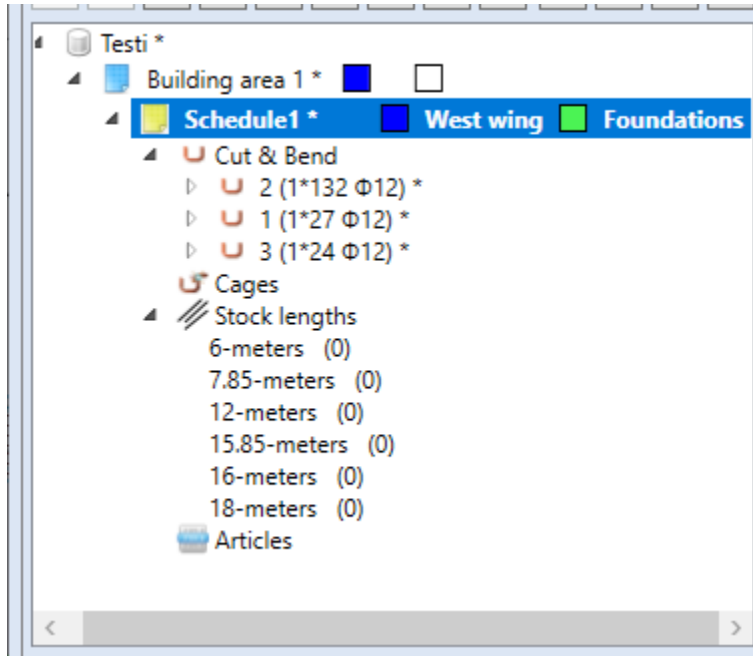
By ticking the check box you can also select the table rows by selecting the rebar in Tekla model view.

## Object data

The content of 'Object data' depends on the selected node in the tree view. This area contains the properties which are editable by QR for Tekla application. More editable properties may be available in QR web interface.

You can shrink or extend the 'Object data' area by clicking the top left button .

## Tree view



The tree view contains the selected project node as a root node in the view. Project node contains all building areas of the project.

Building area node contains all listings of the building area.

Every listing has following sub nodes.

- Cut & bend
- Cages
- Stock lengths
- Articles

## Unassigned reinforcement

 **Unassigned reinforcement (110 item(s))**

| Shape | Prefix | Serie no. | Count | Φ  | Name         |
|-------|--------|-----------|-------|----|--------------|
| D     |        | 1         | 9     | 12 | FOOTING BARS |
| D     |        | 3         | 8     | 12 | FOOTING BARS |
| D     |        | 2         | 11    | 12 | FOOTING BARS |
| D     |        | 2         | 11    | 12 | FOOTING BARS |
| D     |        | 2         | 11    | 12 | FOOTING BARS |
| D     |        | 1         | 9     | 12 | FOOTING BARS |
| D     |        | 3         | 8     | 12 | FOOTING BARS |

This table contains the list of model reinforcement item which has not been added/assigned to any of the lists.

The model reinforcement item can be either a single bar, rebar group or a cage in Tekla model.

The 'cage' item is a reinforcement 'assembly' where all single bars and/groups forming the cage are attached into a (dummy) steel part.

Typically the steel part is an extra part which only role is to collect the reinforcement into a single assembly which can be numbered and you can make an assembly drawing for fabrication.

In addition to cages modeled as assemblies it is possible to create manually the QR cages as will be described in later paragraphs.

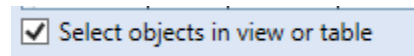
The table contains the basic information of the reinforcement and you can re-order the table rows by clicking the table column headers.

The intention of the table is that you can select the reinforcement items either directly in the table or indirectly in the Tekla model view and drag & drop the selected reinforcement items (=table rows) into desired listing.

You can shrink or extend the 'Unassigned reinforcement' table by clicking the top left button .

### Selecting reinforcement items

To get the table rows selected by selecting the item in the Tekla model view you need to check the tick box 'Select objects in view or table'.

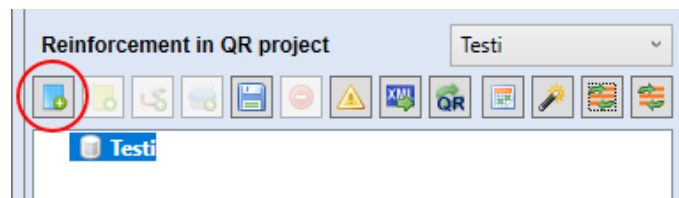


Please note that the effect of this check box is two directional in the way that changing the selection either in Tekla model view, unassigned table view or tree view will select the corresponding items in the others. Selecting a reinforcement which has been assigned into some listing will select the corresponding node in the tree view whereas selecting an unassigned reinforcement selects the row in node in the unassigned reinforcement table.

## Actions of the application

### Creating a new building area

To create a new building area select the project node (root) in the tree view and click the 'Create new building area' button.



The new building area node is created and you can fill in the building area properties in the 'Object data' area.



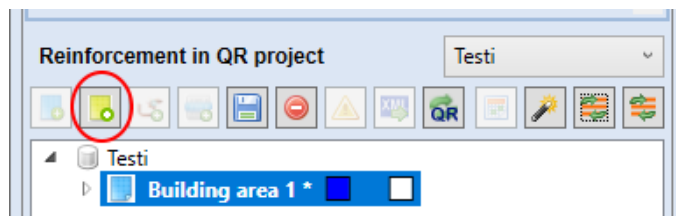
Please note that the new building area is tentatively created and modified only in the tree view and it won't be visible in QR web until you save the created building area.

In the tree view the building area name has an extra star (\*) denoting the fact that it is a new or modified building area.

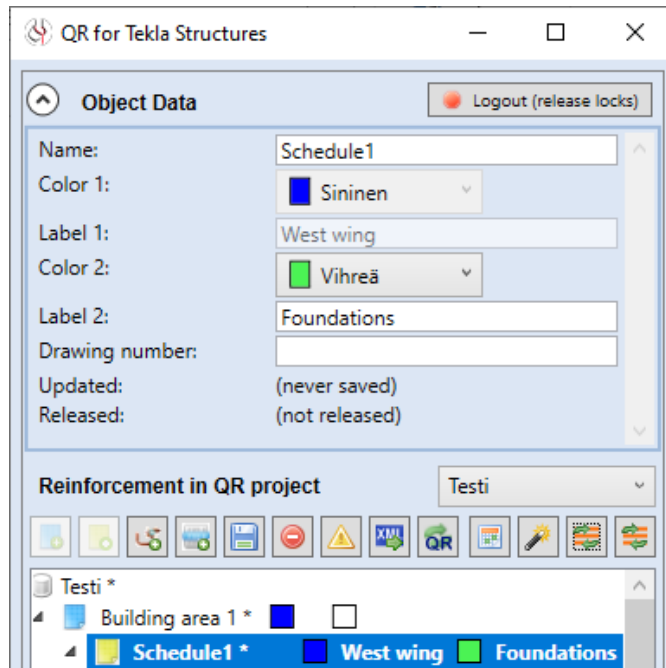
Please note that saving the building area node will also save all sub objects including the listings and all items in the listings.

### Creating a new listing

To create a new listing select the building area in which you want the new listing to be created and click the 'Create a new schedule ...' button.



The new listing is created with a default name and you can change the name and fill in other listing properties in the 'Object data' area.



Please note that the new listing is tentatively created and modified only in the tree view and it won't be visible in QR web until you save the created listing.

In the tree view the extra star (\*) denotes the fact that the listing is a new or modified listing.

Please note that saving the listing will save the listing properties (name, colors and the label) and all new or modified items in the listing.

## Adding reinforcement bars into the listing (Cut&Bend)

Once you have one or more listings in the tree view you can start to add reinforcement into the listing.

Simply select desired reinforcement items and drag & drop them into desired listing.

To select the reinforcement item you can select the line in the unassigned table view or in Tekla model view as described in paragraph Selecting reinforcement items

You can drop the items either on top the listing node or the sub node 'Cut&Bend'.

Please note that the application is either creating a new row or adding the number of cut&bend bars in an existing row automatically based on the current model properties of the reinforcement.

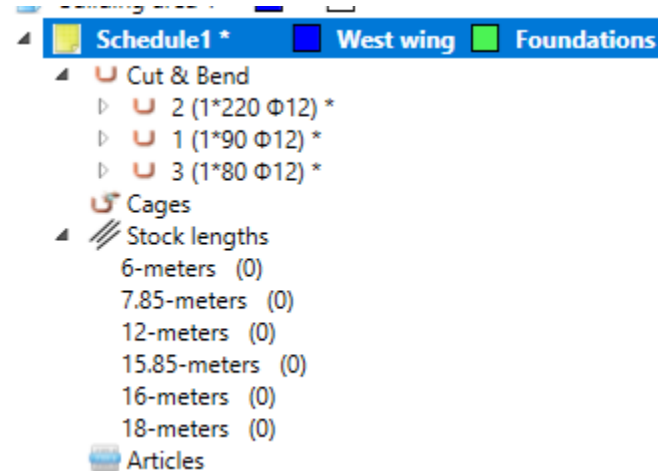
In QR you are able to enter separately the number of groups and number in

group but by default QR for Tekla sets the number of groups to one and the total number is equal to the number of bars in the model. You can change the number of groups in the 'Object data' panel but you can't modify the total number.

When the Tekla model reinforcement object is added into one listing row it is assigned to that particular row. All model reinforcement objects are assigned into the particular listing row and are also shown as a sub nodes for the row in the tree view.

## Adding reinforcement cages into the listing (Cages)

## Adding stock length reinforcement into the listing (Stock lengths)



Instead of adding reinforcement into cut&bend or cages list you can drop the reinforcement into one of the sub nodes in the 'Stock lengths' node.

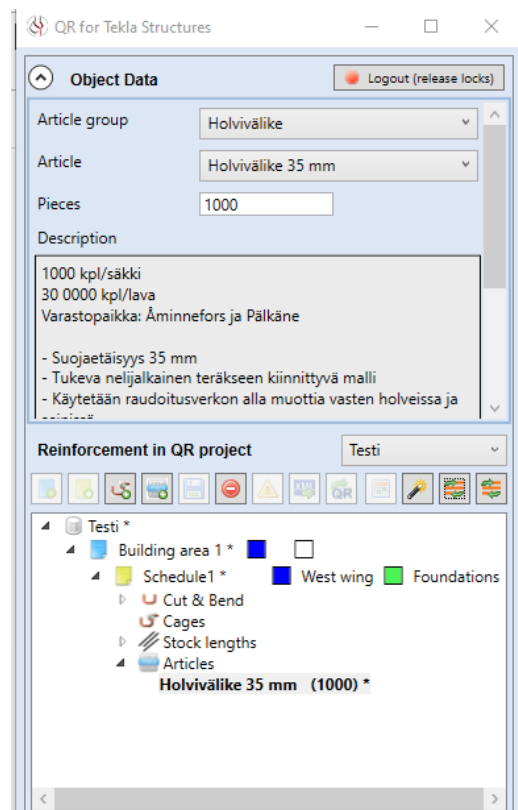
The actual stock length alternatives (=sub nodes) varies per country and QR server. Also the grades and sizes available as stock length bars do vary and QR for Tekla only allows you to drop bars into node which is available in the QR server.

When the reinforcement item is dropped into one of the stock length nodes the QR for Tekla

application is either creating a new row or increasing the quantity of an existing row automatically.

When the reinforcement (model) item is added into a stock length row it is

## Adding and modifying article items (Articles)



You can add, modify and remove available article items using QR for Tekla but keep in mind that currently article items have not any link or connection to the Tekla model.

To add a new article item row in the listing select the listing and click the 'Create article item' button .

In the 'Object data' panel you can enter or modify the article group, article name and quantity.

Please note that article groups and articles varies per country and the QR server.

## Saving

All changes made in QR data (tree view) are stored only locally and to get the data updated in QR server you need to 'save' the changes. Saving in this context means that all new, modified or deleted data is sent over internet and stored in QR server.

After saving the up-to-date QR data will be visible in QR web interface for all other users.

You can do saving in different levels and QR for Tekla is saving the selected item (project, building area or listing) and all sub items of the selected items. Please note that only modified data needs to be transferred over internet and thus it does not matter are you saving a single listing or whole project if only one listing row was changed.

## Deleting (QR) items

You can delete any of the QR items in tree view by selecting the item and clicking 'Delete' key or delete button 

You can delete on individual row in the listing, whole listing or even the building area. In any case the selected item and all sub items gets deleted. However, like in case of creating new QR items the items are deleted only in the local temporary storage. The final delete (in QR server) happens only when you save the modified listing, building area or project.

When the QR items is deleted all model reinforcement items assigned to any of the deleted QR item or sub items will be returned in the 'Unassigned reinforcement' list and number of items in the list is increasing.

## Updating the QR listings

In case you have modified the reinforcement data in Tekla model which has been assigned to some QR listing row you can run the repair and update operation which will go through the listing checks whether the QR data is up-to-date or not.

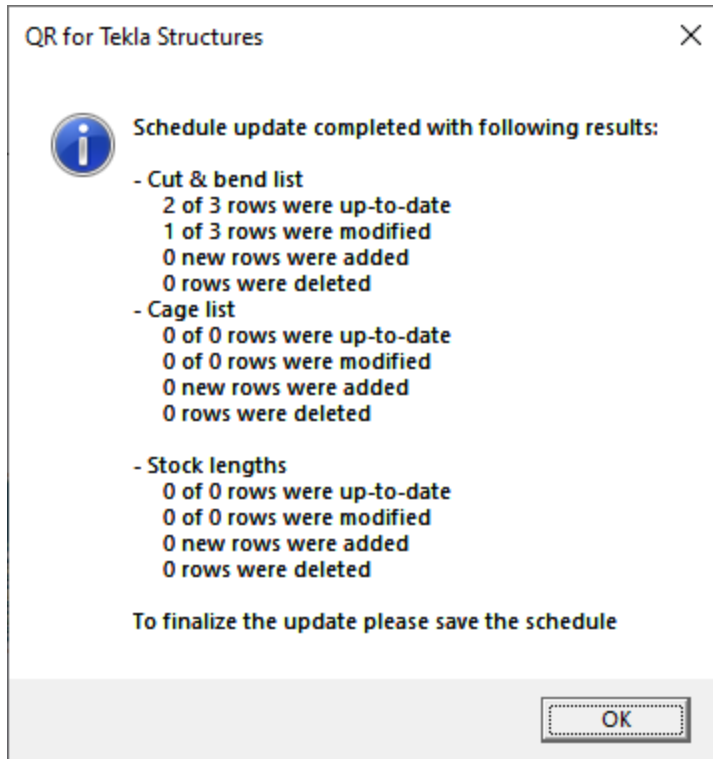
The repair and update process will take care of following change scenarios

- Update the count of QR item if the model reinforcement was deleted or the count was changed. Any QR item where the count gets zero will be removed.
- Update the QR item data to match the modified model reinforcement. Existing QR item gets split and a new QR item gets created in case two or more assigned model reinforcement can't be anymore represented by a single QR item
- Merge two or more QR items into one in case after the model changes would be duplicate (equal parameter values excluding the quantity) QR items

Before running the repair and update operation it is good to reload the model reinforcement data, just to be sure the update is based on latest up-to-date model reinforcement data. To run the repair and

update operation select the listing in the tree view and click the 'Repair and update' button 

Once completed the message box with following information will be shown.



If any of the rows in the listing were changed they appear as modified in the tree view. Please note that also in this case the changes were made only tentatively in local storage and you need to save the listing to get the listing updated also in QR server/web interface.

### Reloading data from QR

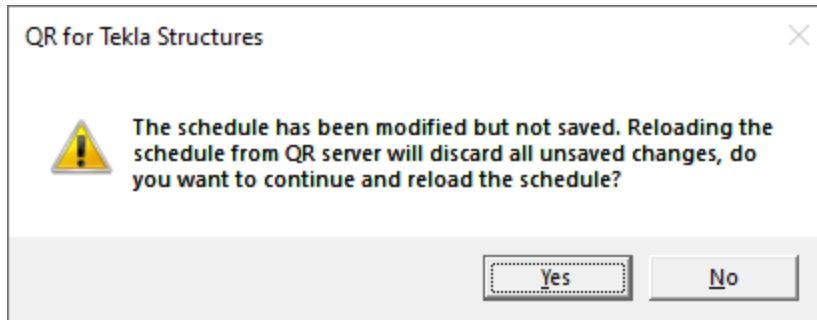
When you run the extension first time in certain model and select the QR project first time the extension is getting all current building areas and listings from QR server.

After saving of any changes the QR data in server and QR web interface is up-to-date and you don't need to reload any data from QR.

However if you or someone else have made any 'manual' changes in QR Web interface to same project you can update the local QR data by running the reload from QR command 

You can reload the selected listing, building area or the whole project from QR server by selecting the QR item in the tree view and clicking the command button.

If you try to reload any QR item which has any tentative changes the following notification is shown.

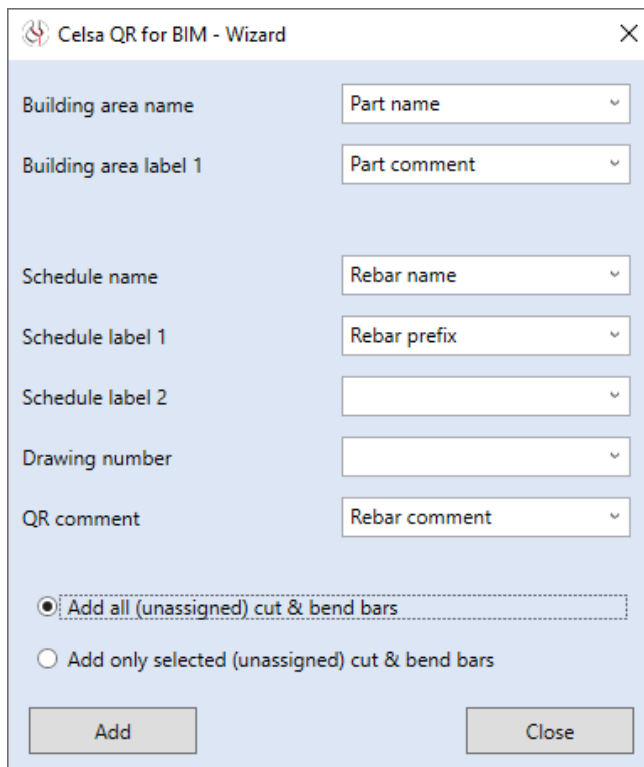


### Running the wizard to create building areas and listings automatically

With help of the 'Wizard' command you can create semi automatically the building areas and the listings with content.

However, in order to get the wizard outcome to make sense you must ensure that the Tekla model reinforcement has been created consistently following some modeling convention.

To run the wizard click the button  and the following dialog will be shown.

A dialog box titled "Celsa QR for BIM - Wizard" with a close button (X) in the top right corner. It contains several input fields and buttons. The fields are: "Building area name" (dropdown menu with "Part name" selected), "Building area label 1" (dropdown menu with "Part comment" selected), "Schedule name" (dropdown menu with "Rebar name" selected), "Schedule label 1" (dropdown menu with "Rebar prefix" selected), "Schedule label 2" (empty dropdown menu), "Drawing number" (empty dropdown menu), and "QR comment" (dropdown menu with "Rebar comment" selected). At the bottom, there are two radio buttons: "Add all (unassigned) cut & bend bars" (selected) and "Add only selected (unassigned) cut & bend bars". Below the radio buttons are two buttons: "Add" and "Close".

Here you can select from which Tekla model property the building area name and label 1 are taken.

Here you can select from which Tekla model property the listing name and other parameters are taken.

You can create the building areas and listings for selected or all unassigned rebars.

## Reloading the model reinforcement

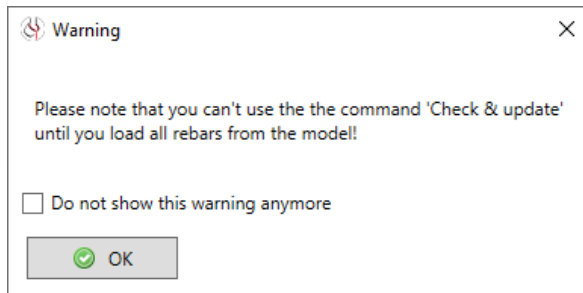
When you start the QR for Tekla extension the current model reinforcement data gets automatically loaded into 'Unassigned reinforcement' table.

If you make any changes to reinforcement in the model after the extension was started you should reload the reinforcement data to make sure the 'Unassigned reinforcement' list is up-to-date.

To reload the list you can use the 'Reload all'  or 'Reload selected'  commands.

Typically you should reload all reinforcement but in case of very large models reloading might take lot of time and thus you may want to reload only selected reinforcement which you are planning to add/assign next.

The only drawback of loading only selected reinforcement is that you can't use the 'Repair and update' command to update an existing QR listing which may contain other than just the selected rebars. As a remainder of this limitation the extension shows the following notification.



## Logging off

## Working offline