ETABS MATE

Concrete Structure Detailing Software

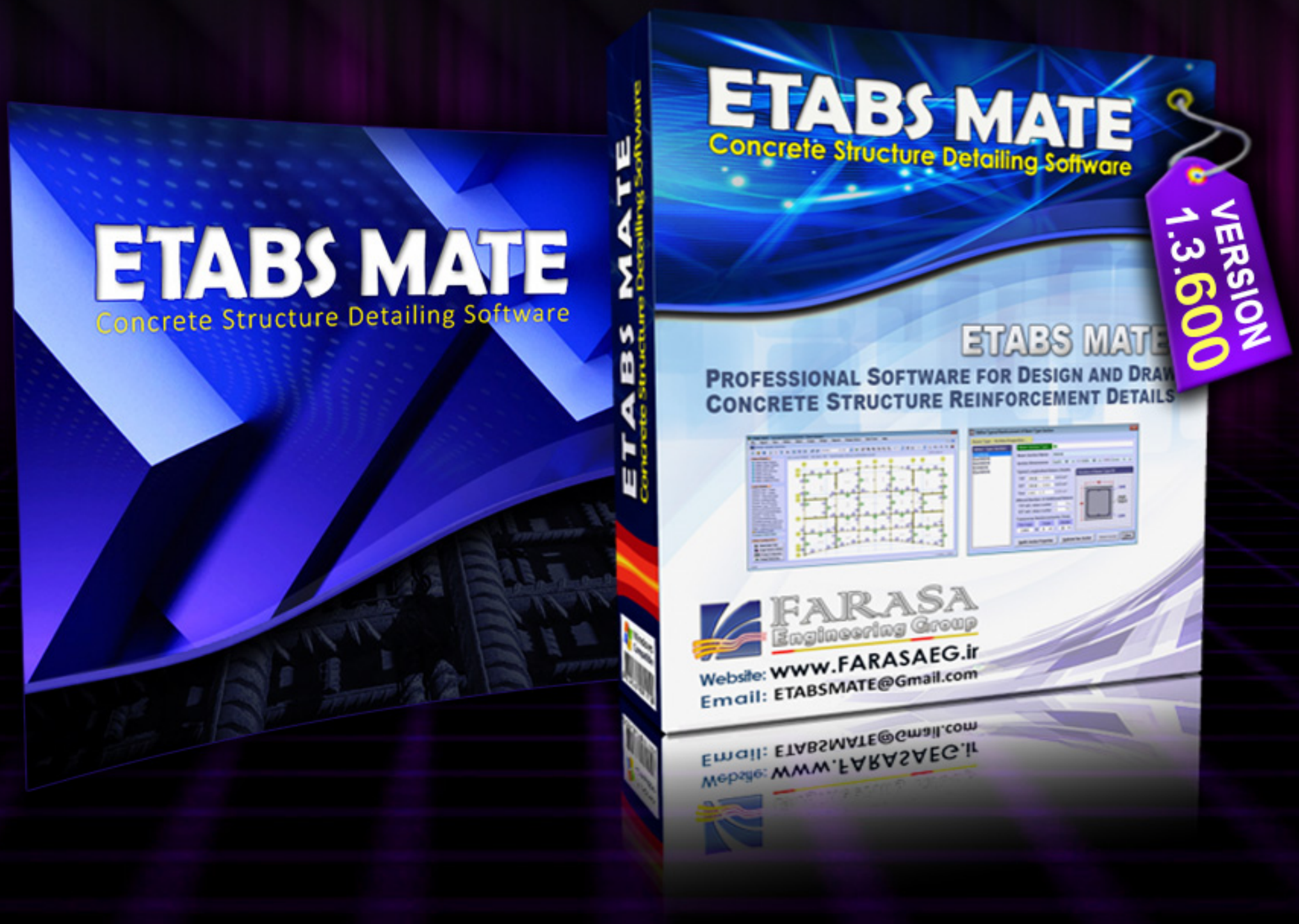
Ver 1.3.600

New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

ETABS MATE Version 1.3.600 with many additional functionality, such as Automatic generation of torsion section for beams that are subjected to torsional forces, Automatic definition of face rebar for the torsion section, Ability to automatically increase the number of tie legs to supply required transverse steel area in beams, Automatic control of Ldh or development length of hooked bars in end beams based on ACI318-2019, Calculating transverse reinforcement by ignoring the effect of crossties in torsion, Compatibility to ETABS 22 and many other features has been released.



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ETABS MATE

Concrete Structure Detailing Software

Ver 1.3.600

New Version

WHAT'S NEW

in New Edition of ETABS MATE

Changes and New Features in Version 1.3.600

- Making necessary adaptations to comply with ETABS 22 along with all previous versions of ETABS.
- Update the procedure for calculating transverse reinforcement by ignoring the effect of crossties in torsion.
- Automatic generation of torsion section for beams that are subjected to torsional forces.
- Automatic definition of face rebar for the torsion section with the possibility of editing by the user.
- Possibleity to define different transverse bars details in the torsion section and in the general section.
- Possiblity to configure how to calculate the face rebar for the torsion section of the beam.
- Addition another method for distribution of torsional steel based on Total Longitudinal report of ETABS.
- Adding the Total Longitudinal layer in order to view summation of flexural and torsional steel area.
- Ability to automatically increase the number of tie legs to supply required transverse steel area in beams.
- Control of Ldh or development length of hooked bars in end beams based on ACI318-2019.
- Adding a user interface for configuring parameters of calculating the development length of hooked rebars.
- Adding the Ldh of Beam Hooked Rebar layer to view the development length of hooked rebars.
- Possibleity to view the calculation details of development length of hooked bars by clicking on each beam.
- Possiblity to generate detailed report of calculation of the development length of hooked rebars.
- Adding sizes 10 and 12 to the list of rebars that can be use for the beam additional rebar.
- Possiblity to view diagrams of the flexural plus torsional steel area by clicking on each beam.
- Correcting the elevation leveling bug of shear walls in the level editing mode of the building floors.
- Changes in the way of generating the calculation details report of the joint shear.
- Updating the price of steel and concrete in the approximate cost estimating reports.
- Changes in user interfaces of the software in order to make it more convenient.
- Improve some routines and algorithms for better software performance.

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Concrete Structure Detailing Software

Ver 1.3.600

New Version

WHAT'S NEW

in New Edition of ETABS MATE

Making necessary adaptations to comply with ETABS 22 along with all previous versions of ETABS

In this version of the software, necessary adjustments have been made to import the model from ETABS 22 and users can use the latest version of ETABS 22 software in addition to all the older versions for modeling and transferring the model to ETABS MATE software.

The procedure of transferring the model and design results from the ETABS 22 to ETABS MATE software is completely similar to the previous versions and users can easily use this version of ETABS software like the previous versions without any problems.

ETABS MATE

Concrete Structure Detailing Software

Ver 1.3.600

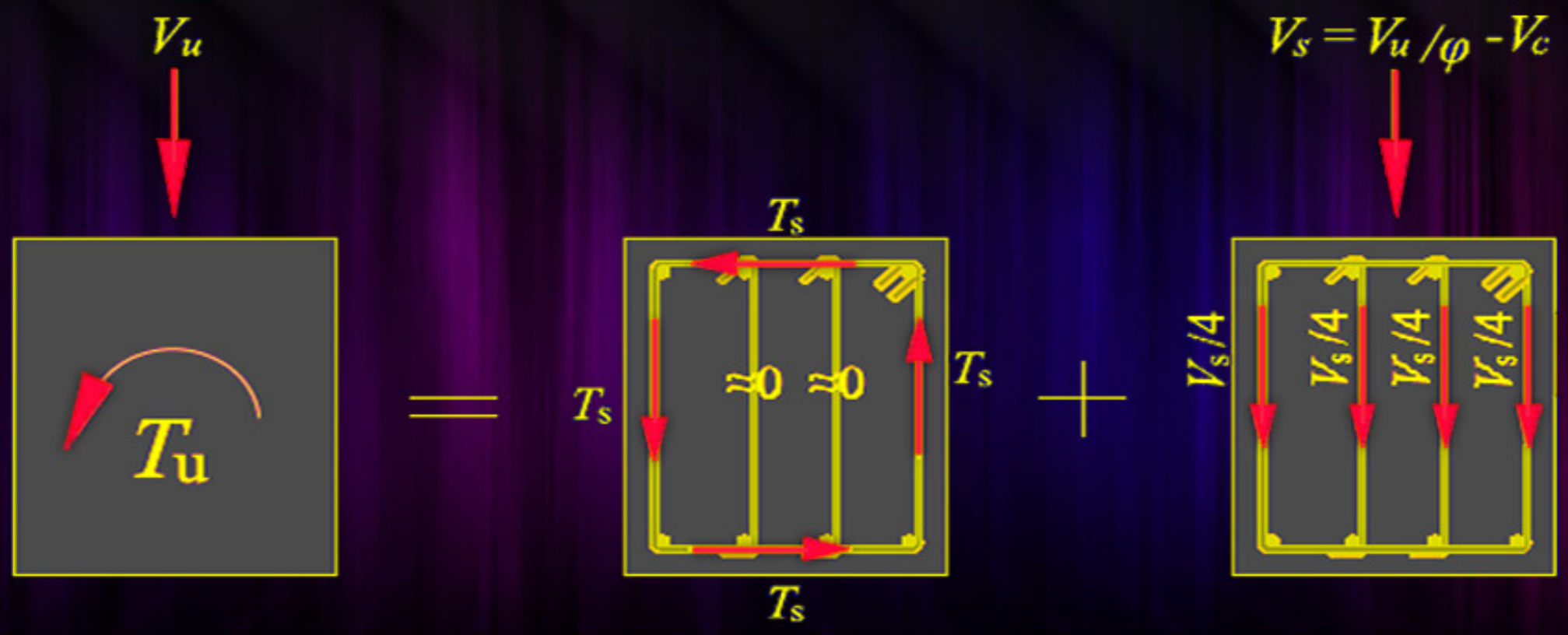
New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Update the procedure for calculating transverse reinforcement by ignoring the effect of crossties in torsion

In a section that is under the combined effect of shear force and torsional moment, as can be seen in the figure below, regarding the torsional efforts in the cross section, almost only the peripheral legs of the closed ties will have the ability to bear the torsional moment, and in the calculations of torsional transverse steel, the effect of internal legs can be ignored, but regarding shearing efforts, all legs, including closed legs and crossties, will have the ability to withstand shear force.



Therefore, according to the concept that the crossties should not be included in the calculation of transverse steel under the effect of torsional moments and they will only have the ability to withstand shear efforts and with the assumption that the diameter of the ties and crossties are considered as the same, the following formula can be used to calculate the details of the transverse reinforcement under the combined effect of torsional moment and shear force.

$$\frac{A_b}{s} = \frac{1}{n}\frac{A_v}{s} + \frac{A_t}{s}$$

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Ver 1.3.600

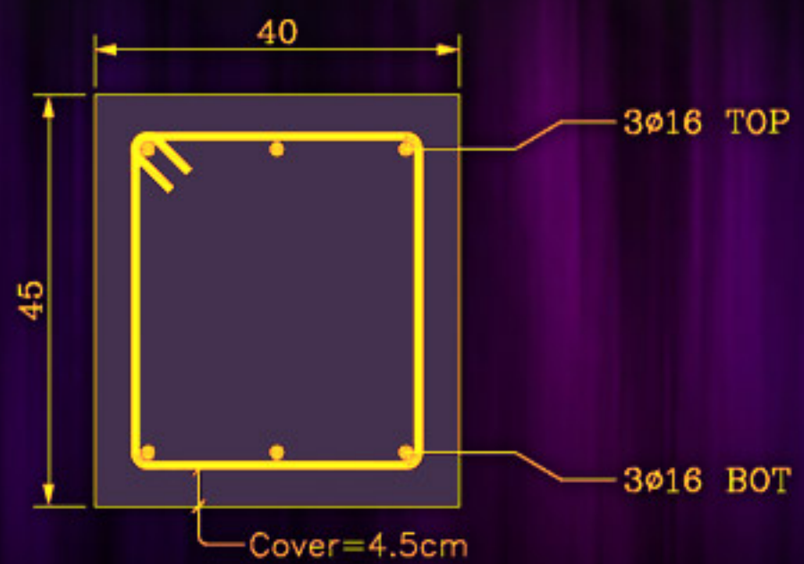
New VERSION

WHAT'S NEW

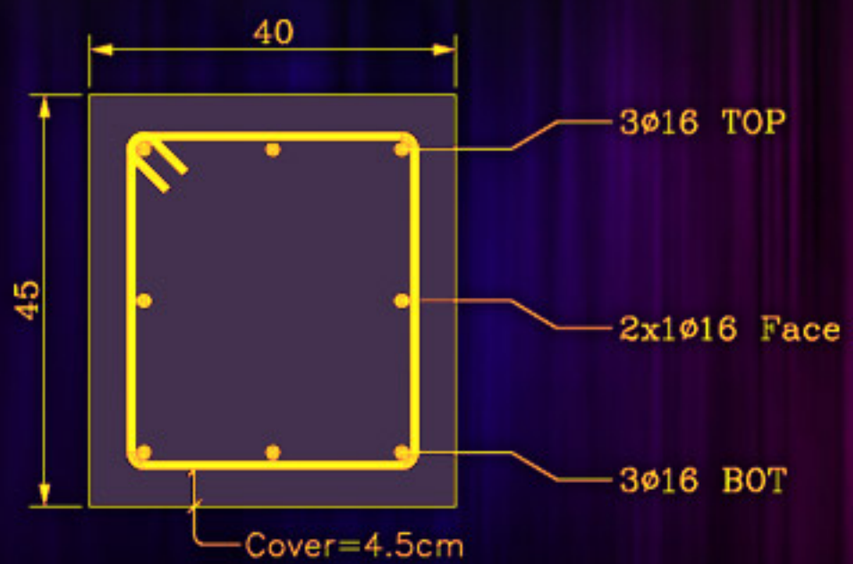
in New Edition of ETABS MATE

Automatic generation of torsion section for beams that are subjected to torsional forces

In beams that are under the effect of torsional anchors, it is better to insert face rebar in the cross-section so that the distribution of torsional reinforcements around the cross-section is done uniformly. For this purpose, the software automatically creates two different versions for each beam section used in the structure, a General version and a Torsion version that distinguishes it from the General version with the index T, then if the beam that this section is assigned to it, if it does not need torsion steel, it will use the General version of that section, for the design and detailing of the beam, and if the beam needs torsion steel, it will use the Torsion version of that section, for the design and detailing of the beam.



BEAM SECTION B1



BEAM SECTION B1T

The face rebar that the software automatically considers for the Torsion sections is calculated as a percentage of the minimum torsional steel according to clause 9.6.4.3 of ACI 318-2019 as below. The default value of the program to calculate the type reinforcement is 60% of the following value.

$$A_{t,min} = \frac{0.42\sqrt{f'_c}A_{cp}}{f_y} - \left(\frac{0.175b_w}{f_{yt}}\right)p_h\frac{f_{yt}}{f_y}$$

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New VERSION

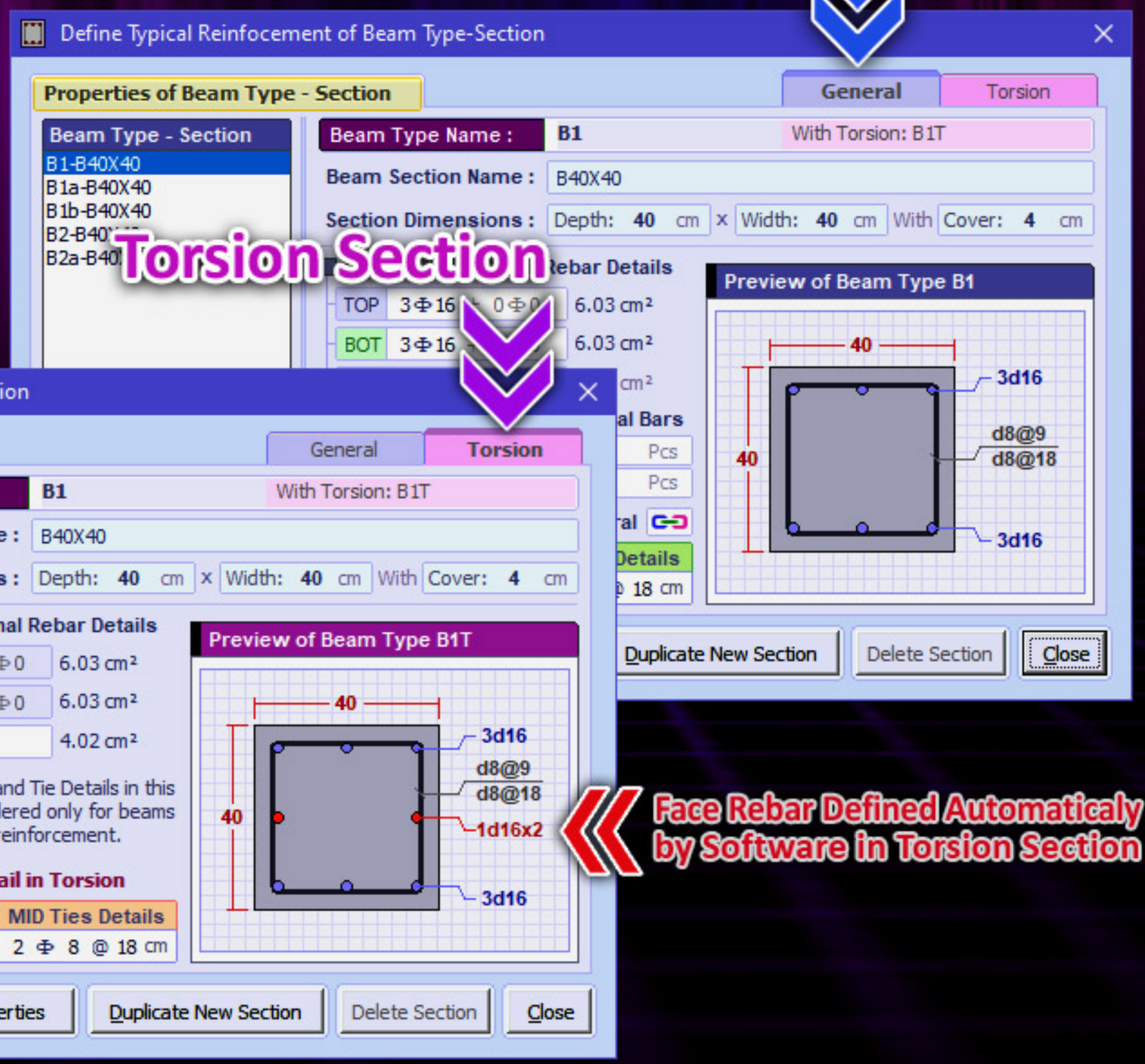
WHAT'S NEW

in New Edition of ETABS MATE

Automatic definition of face rebar for the torsion section with the possibility of editing by the user

Users can easily view or edit the specifications of face rebar in the **General** or **Torsion** version of any section that is automatically defined by the software. For this purpose, select **Beam Type Section Details** option from the **Define** menu so that the user interface of beam section specifications will appear as below. Then, by selecting any of the **General** or **Torsion** tabs in the Face section, you can view or edit the face bars in any mode. It is worth mentioning that if the beam requires torsion reinforcements, the details of the reinforcements defined in the **Torsion** version will be used.

General Section



Torsion Section

User Can Change Face Rebar Detail

Face Rebar Defined Automaticaly by Software in Torsion Section

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Concrete Structure Detailing Software

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New VERSION

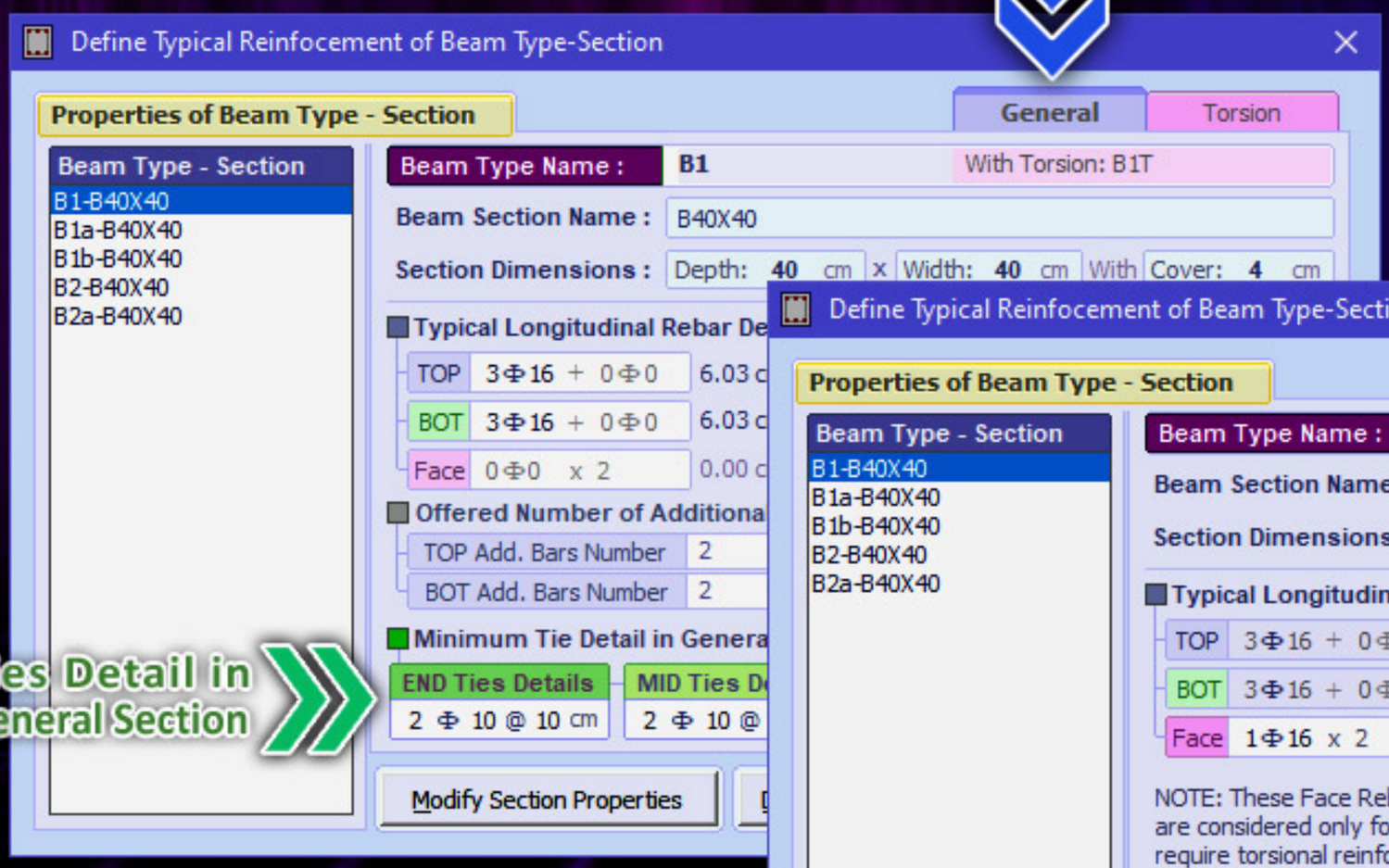
WHAT'S NEW

in New Edition of ETABS MATE

Possibleity to define different transverse bars details in the torsion section and in the general section

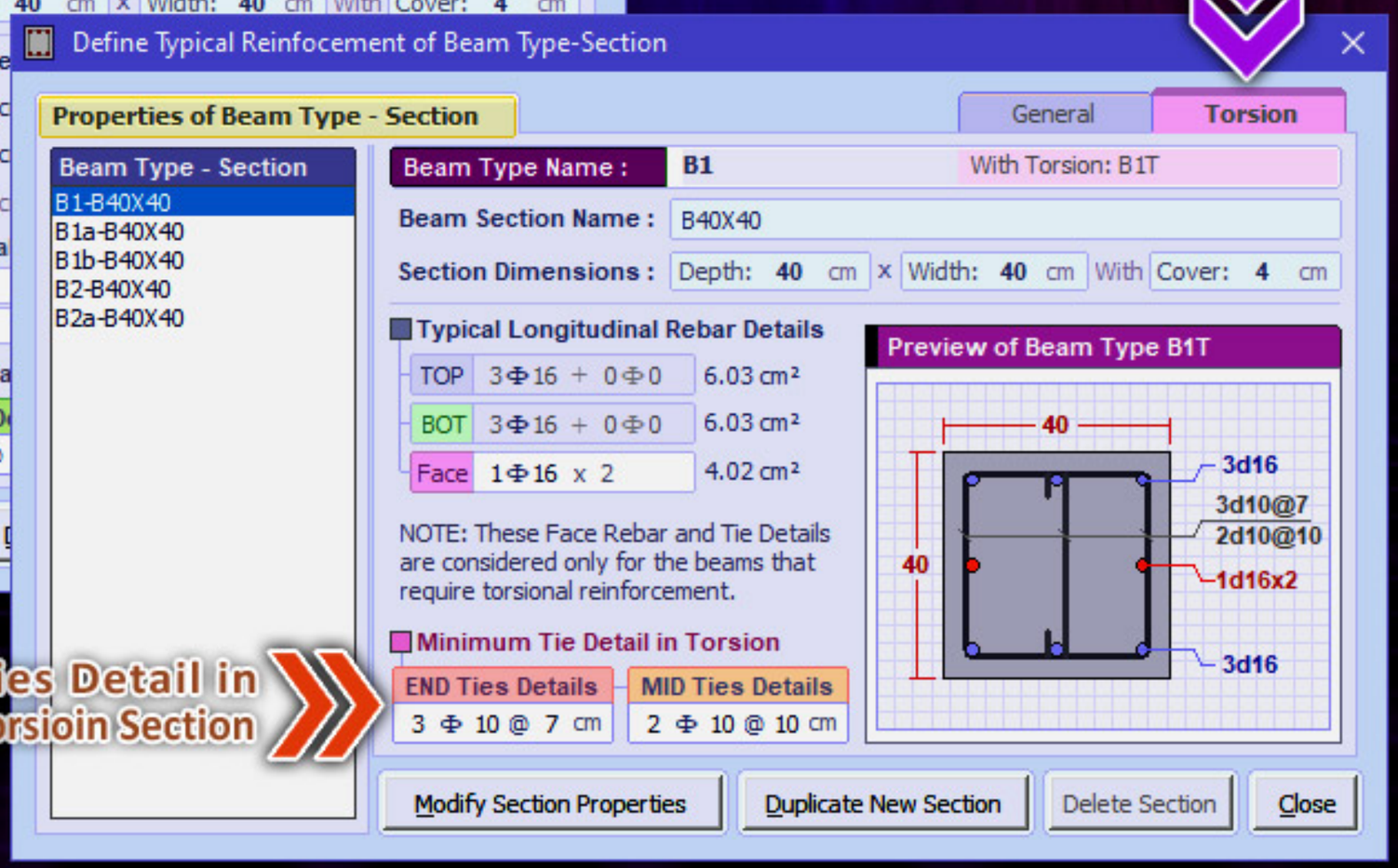
Users can easily view or edit the specifications of ties in the General or Torsion versions of each section. For this purpose, select Beam Type Section Details option from the Define menu so that the user interface of beam section specifications will appear as below. Then, by selecting any of the General or Torsion tabs in the Minimum Tie Detail section, you can view or edit the details of the ties in each mode. It is worth mentioning that if the beam requires torsion reinforcements, the details of the ties defined in the Torsion version will be used to calculate the transverse reinforcement.

General Section



Ties Detail in General Section

Torsion Section



Ties Detail in Torsioin Section

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Ver 1.3.600

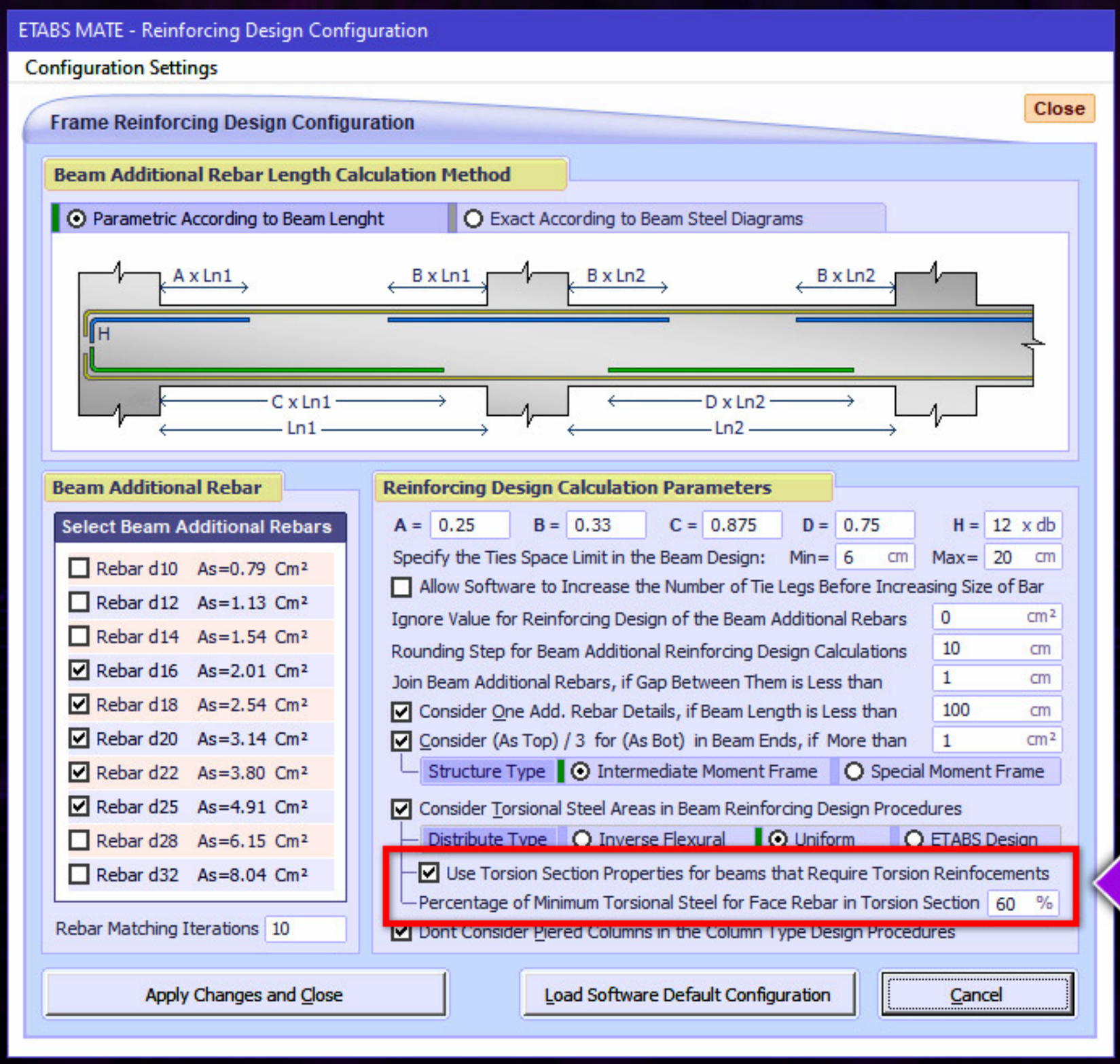
New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Possiblity to configure how to calculate the face rebar for the Torsion section of the beamthat Require Torsion Reinforcement

The face rebar that the software automatically considers for the **Torsion** section of the beam is calculated as a percentage of the minimum of torsional steel for the section and user can configure this percentage. As shown in the picture, by using the parameter **Percentage of Minimum Torsional Steel for Face Rebar in Torsion Section**, you can specify what percentage of minimum of torsional steel of section should be considered as face rebar, and also by the option **Use Torsion Properties for Beam that Require Torsion Reinforcement**, you can enable or disable the use of the torsional version of the section for beams that require torsional reinforcement.



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Ver 1.3.600

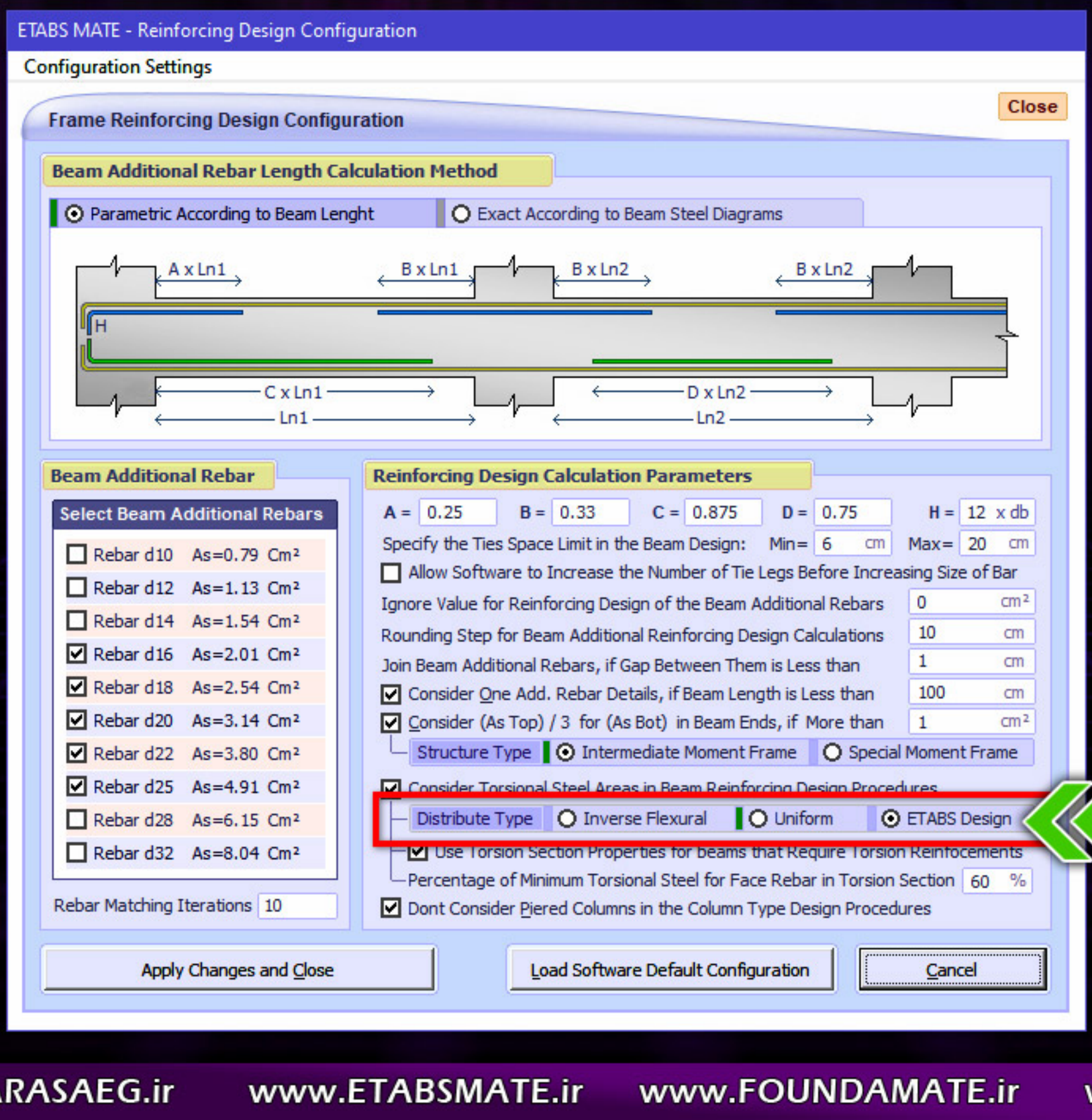
New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Possibleity to define different transverse bars details in the torsion section and in the general section

In versions 20.3 and later of ETABS, a new report has been added to the design outputs as **Total Longitudinal Reinforcing**. In this report, ETABS software presents the maximum amount of longitudinal steel due to flexural plus torsional steel area of beams in all design load combinations . Sometimes these values are lower than the sum of the maximum longitudinal steel due to flexure and the maximum longitudinal steel due to torsion. In order to use this data to design the reinforcement of beams in the ETABS MATE software, a new option has been added to the software, you must select the **Frame Reinforcing Design Configuration** option from the **Design** menu, then as in the image in the section of **Distribute Type**, select the **ETABS Design** mode. In this mode the calculation of reinforcement is done based on the mentioned report.



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Concrete Structure Detailing Software

Ver 1.3.600

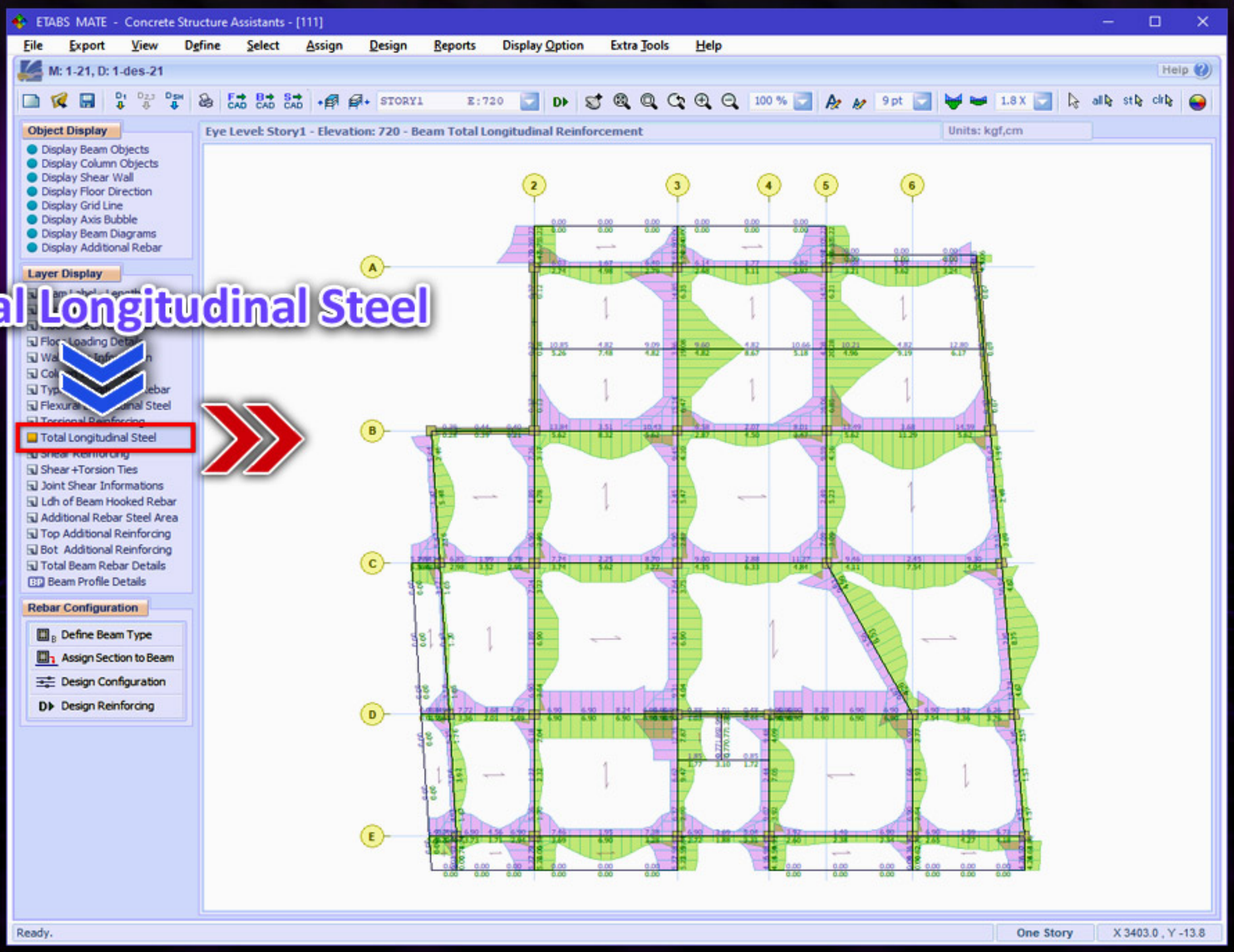
New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Adding the Total Longitudinal layer in order to view summation of flexural and torsional steel area

In the new version, a layer has been added to the software to view the details of the total flexural plus torsional longitudinal steel area. For this purpose, select the **Total Longitudinal Steel** option from the **Layer Display** panel as shown below. It should be noted that if ETABS software versions 20.3 and later are used for modeling the structure, the displayed values are taken directly from the Total Longitudinal Reinforcing report, and otherwise, these values are sum of the top flexural steel plus half of the longitudinal torsional steel for top as well as the sum of the buttom flexural steel plus half of torsional longitudinal steel for the buttom of the beam.



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Concrete Structure Detailing Software

Ver 1.3.600

New VERSION

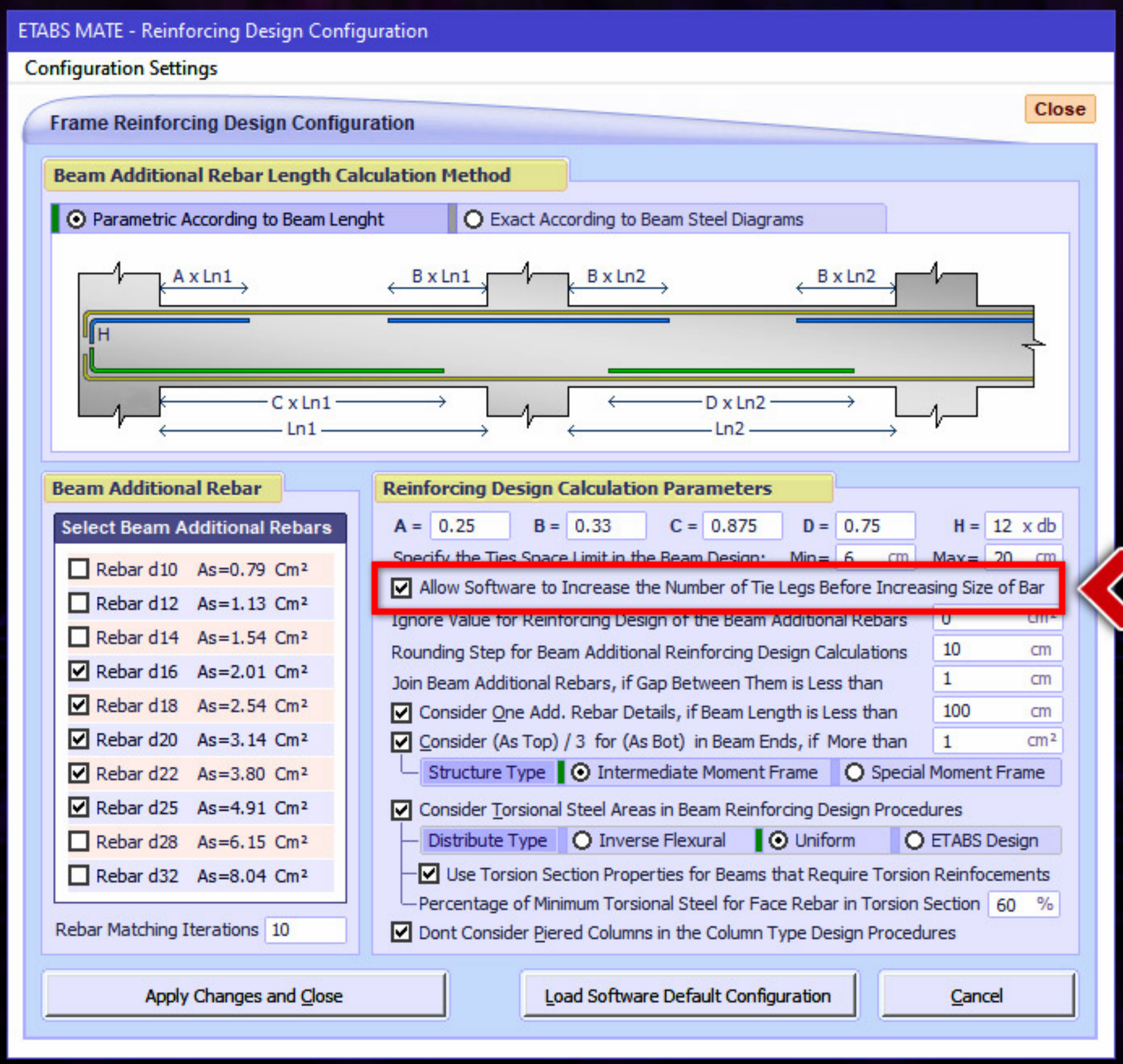
WHAT'S NEW

in New Edition of ETABS MATE

Ability to automatically increase the number of tie legs to supply required transverse steel area in beams

In the new version, the procedure for designing the transverse reinforcement of beams has been changed in such a way that if the user allows, the software will first increase the number of crossties before increasing the diameter of tie. To use this option, select **Frame Reinforcing Design Configuration** from the **Design** menu, then as shown in the image below, you can use the **Allow Software to Increase the Number of Tie Legs Before Increasing Size of Bar** to activate the mentioned mode. In this case, software will calculate the transverse reinforcement as follows:

1. Reduce the distance between the ties as much as possible.
2. Increase the number of crossties as much as possible.
3. Increase the bar diameter of tie.



ETABS MATE

Concrete Structure Detailing Software

Ver 1.3.600

New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Control of L_{dh} or development length of hooked bars in end beams based on ACI318-2019

In the new version, software will calculate the development length of hooked rebar according to the ACI318-2019 based on the maximum values obtained from the following equations:

Maximum

$$l_{dh} = \frac{\psi_e \psi_r \psi_o \psi_c}{\lambda} \frac{0.043 f_y}{\sqrt{f'_c}} d_b^{1.5}$$

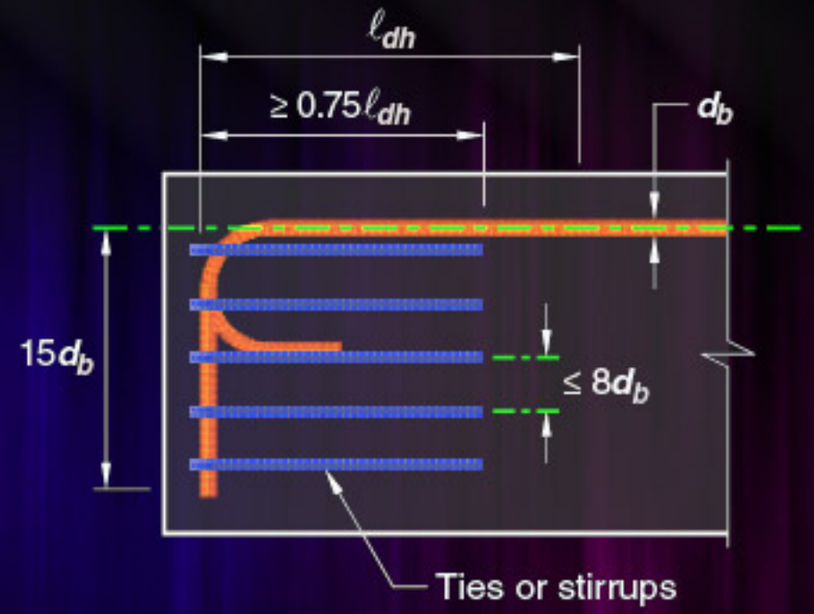
$$l_{dh} = f_y d_b / (5.4\lambda\sqrt{f'_c})$$

$$l_{dh} = 8d_b \quad (10d_b \text{ for lightweight concrete})$$

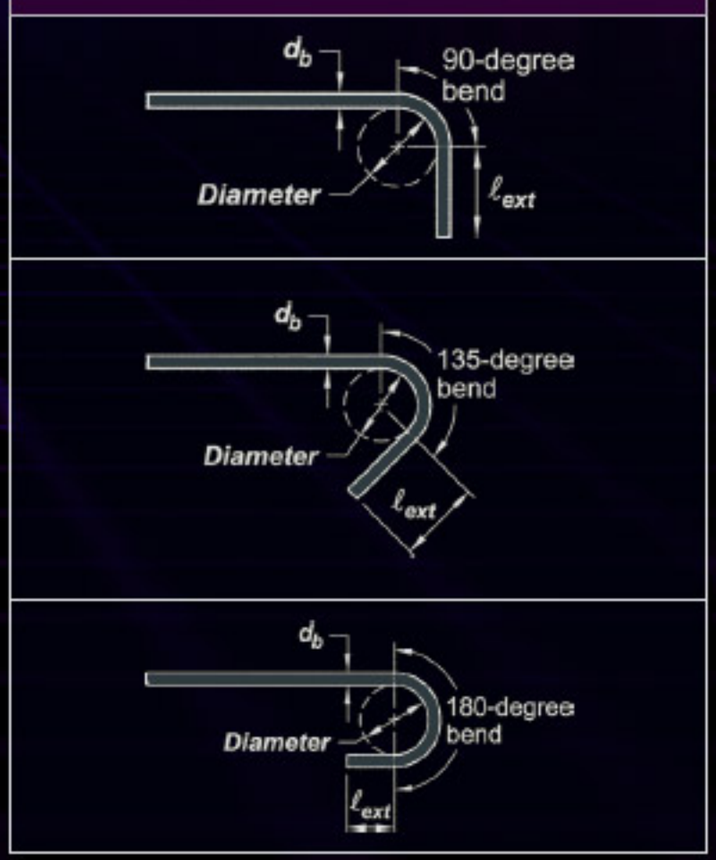
$$l_{dh} = 150mm \quad (190mm \text{ for lightweight concrete})$$

Table 25.4.3.2 Modification factors for development of hooked bars in tension

Modification factor	Condition	Value of factor
Lightweight λ	Lightweight concrete	0.75
	Normalweight concrete	1.0
Epoxy ψ_e	Epoxy-coated or zinc and epoxy dual-coated reinforcement	1.2
	Uncoated or zinc-coated (galvanized) reinforcement	1.0
Confining reinforcement ψ_r	For No. 36 and smaller bars with $A_{tr} \geq 0.4A_{bs}$ or s[1] $\geq 6d_b$[2]	1.0
	Other	1.6
Location ψ_o	For No. 36 and smaller diameter hooked bars: (1) Terminating inside column core with side cover normal to plane of hook $\geq$ 65 mm, or (2) With side cover normal to plane of hook $\geq 6d_b$	1.0
	Other	1.25
Concrete strength ψ_c	For $f'_c < 42$ MPa	$f'_c/105 + 0.6$
	For $f'_c \geq 42$ MPa	1.0



Type of standard hook



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WHAT'S NEW

in New Edition of ETABS MATE

Possiblity to configure how to calculate the face rebar for the Torsion section of the beamthat Require Torsion Reinforcement

Users can configure all the parameters for calculating the development length of hooked rebars. For this purpose, select the **Development Length of Hooked Bars Parameter** option from the **Define** menu so that the relevant user interface appears as shown in the below.

As can be seen, all these parameters are configured by default based on ACI318-2019 and there is no need to change them normally, but users can change these parameters according to their opinion. It is worth mentioning that these settings can be saved and restored through the Configuration Setting menu. Also, the software provides an exportable table containing the restraining length of the hooked rebars based on the rebar size and different conditions, which can be seen in the image below.

Define Menu » Development Length of Hooked Bars Parameter

Development Length of Hooked Bars Configuration

Configuration Settings | Export

Calculation Parameters of Development Length of Hooked Bars

Development length (Ldh) for deformed bars in tension terminating in a standard hook shall be the greater than below equations based on the ACI318-19 (25.4.3.1) and also the ACI318-19 (18.8.5.1).

$$l_{dh} = \frac{\psi_e \psi_r \psi_o \psi_c}{\lambda} \frac{0.043 f_y}{\sqrt{f'_c}} d_b^{1.5}$$

$$l_{dh} = f_y d_b / (5.4\lambda\sqrt{f'_c})$$

$$l_{dh} = 8 d_b$$

$$l_{dh} = 150\ mm$$

f_y	4000	kgf/cm² = 392.26 MPa
f'_c	200	kgf/cm² = 19.61 MPa
λ	1	Lightweight Concrete Factor
ψ_e	1	Epoxy Reinforcement Factor
ψ_r	1	Confined Rebar Factor
ψ_r	1.6	Not Confined Rebar Factor
ψ_o	1	Rebar with Thin Side Cover
ψ_o	1.25	Rebar with Thick Side Cover
ψ_c	0.787	Concrete Strength Factor
Minimum Allowable Clear Distance of Rebars	4	cm

Development Length of Bars in Tension Terminating in a Standard Hook (Ldh)

Conditions		Rebar Diameter									
ψ_r	ψ_o	Φ10	Φ12	Φ14	Φ16	Φ18	Φ20	Φ22	Φ25	Φ28	Φ32
1.6	1.25	19	25	31	38	46	54	62	75	89	108
1.6	1	16	20	25	31	37	43	50	60	71	87
1	1.25	16	20	23	26	30	34	39	47	56	68
1	1	16	20	23	26	30	33	36	41	46	54

Apply Changes and Close | Close

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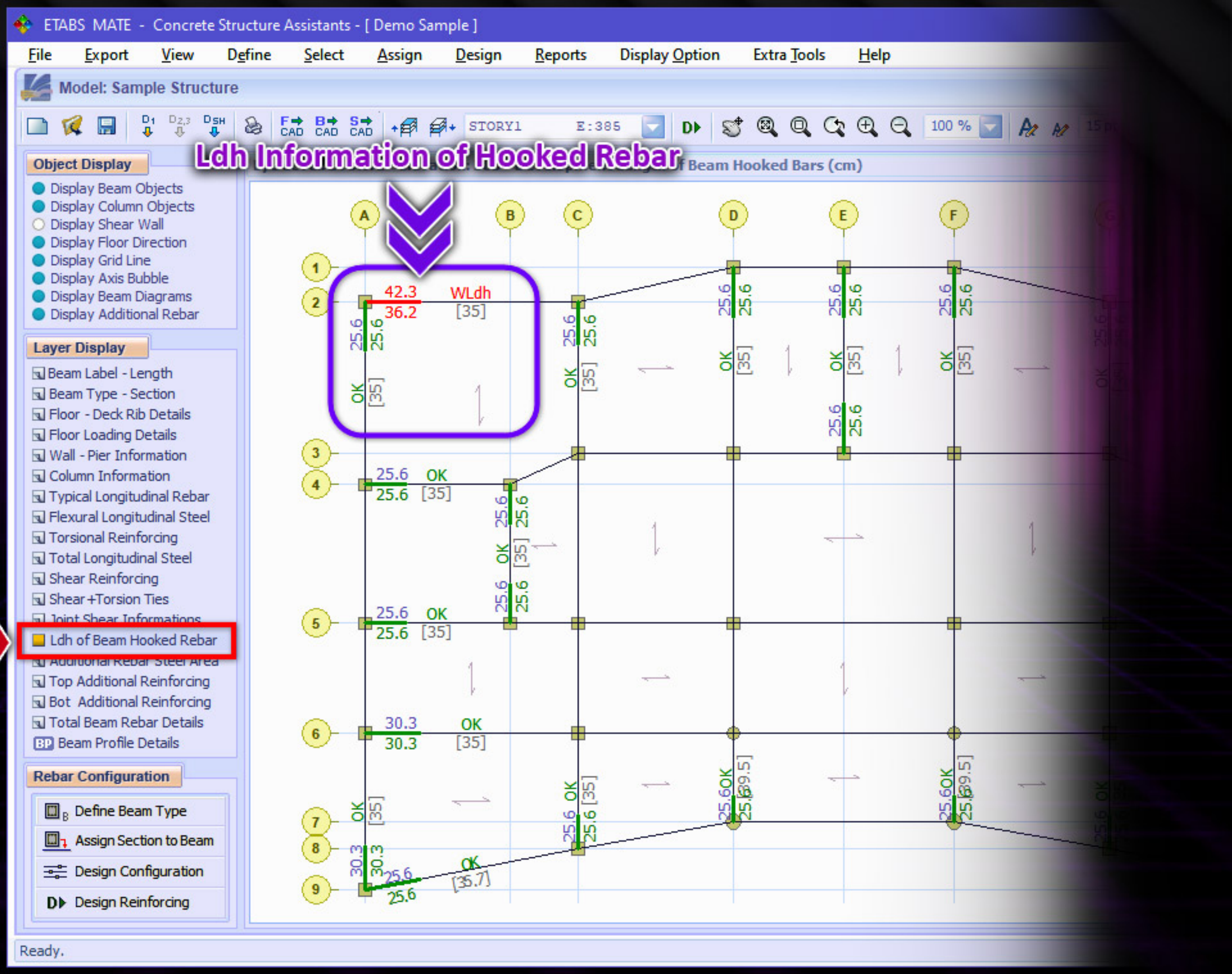
New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Adding the Ldh of Beam Hooked Rebar layer to view the development length of hooked rebars

To view the details of the development length of the hooked rebars in the end beams, select the **Ldh of Beam Hooked Rebar** option from the **Layer Display** panel, so that the calculated values of the required length of the hooked rebars above and below for the end beams are displayed on the plan as shown in the image below.



Ldh of Beam Hooked Rebar

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Ver 1.3.600

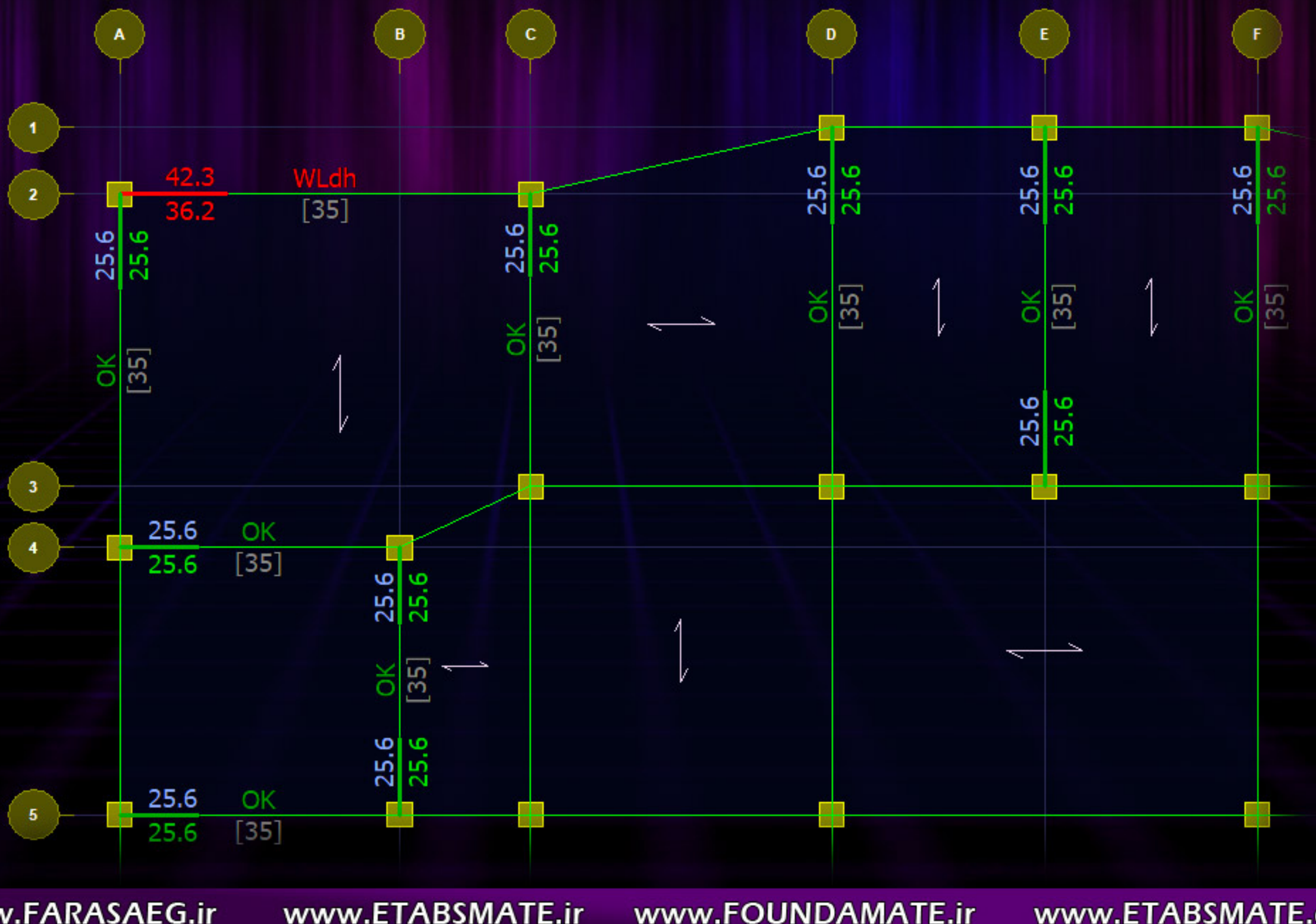
New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Adding the Ldh of Beam Hooked Rebar layer to view the development length of hooked rebars

In the **Ldh of Beam Hooked Rebar** layer, the development length of the hooked end rebars at the top and botom of the beam will be displayed as shown in the image. Also the provided length by the dimension of the column will shown in the middle of the beam inside the characters [ ] in **gray** color. If the calculated development length is less than the length provided by the column dimension along the beam, the required development length is displayed in **blue** for the upper bars and in **green** for the lower bars of the beam, Otherwise, the required development length will be shown in **red** color also WLDH warning will also be inserted in the middle of the beam. It is worth mentioning that by right-clicking on each beam, you can view the calculation details of the development length of the end hooked bars.



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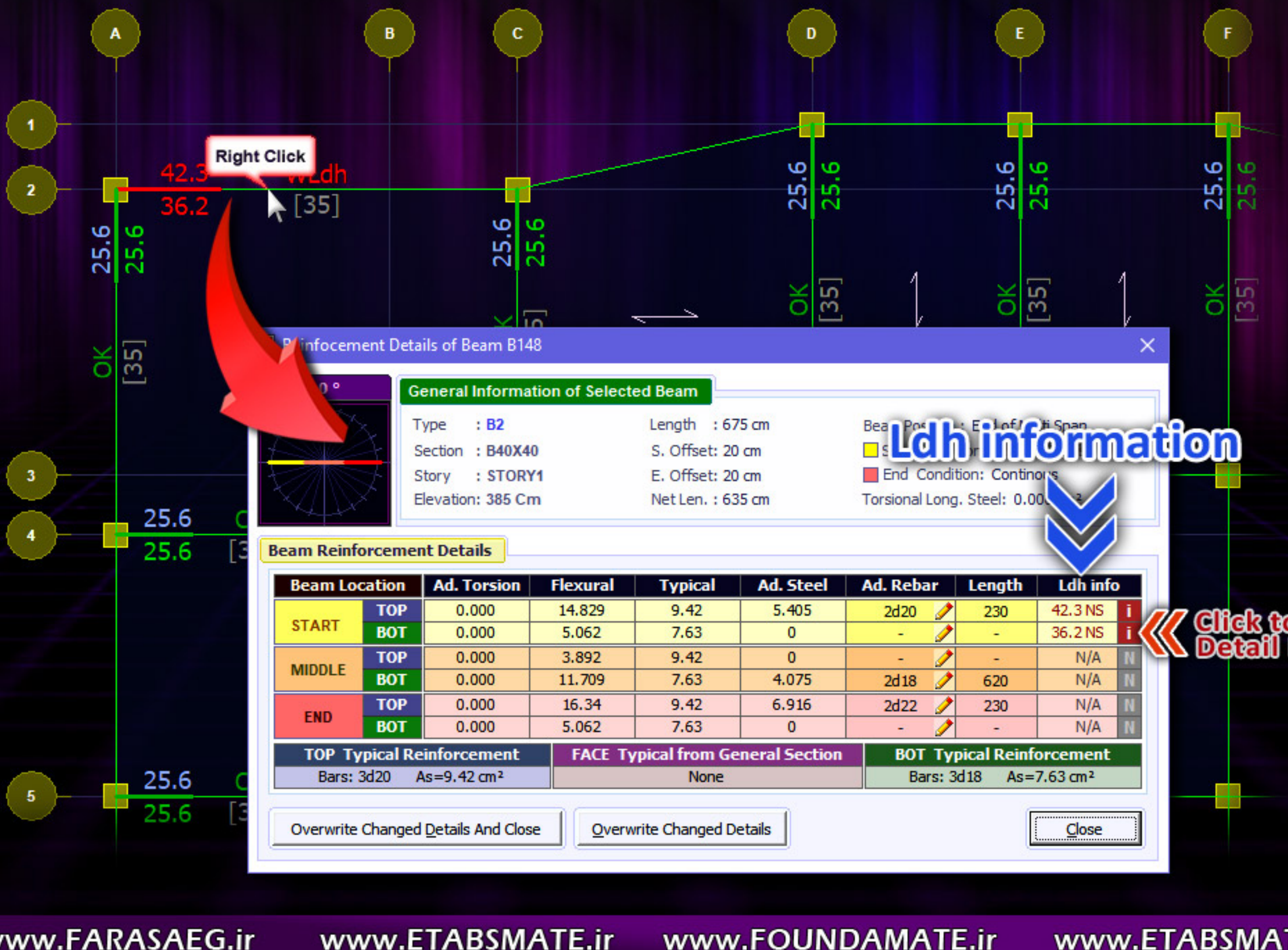
New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Possibleity to view the calculation details of development length of hooked bars by clicking on each beam

To view the calculation details of the development length of the hooked rebars in the end beams, select **Ldh of Beam Hooked Rebar** or **Total Beam Rebar Details** from the **Layer Display** panel, then right-click on the desired beam to display the reinforcement details user interface. As you can see in the picture below, in the column **Ldh info** of the amount of development length calculated for the rebar of the beams, on the side where they are not continuous, both for the upper rebars of the beam and for the lower rebars of the beam, and in addition, an icon **i** is also included for each part that calculation has been done, it will be activated by clicking on any of them, the user interface will be displayed to view the details of the corresponding development length of the hooked rebar.



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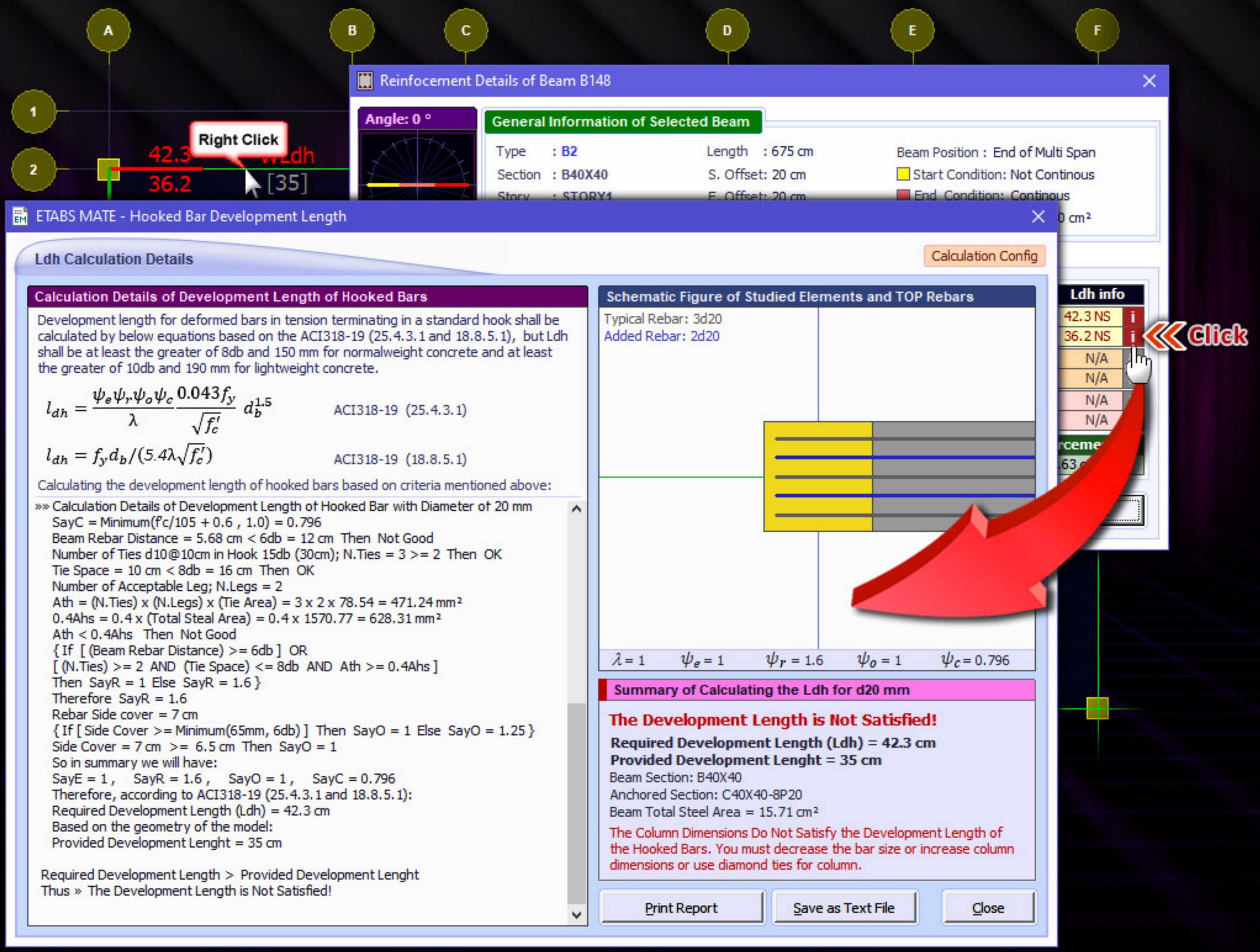
New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Possibleity to view the calculation details of development length of hooked bars by clicking on each beam

By clicking on the i icon, you will see the details of how to calculate the development length of hooked rebars as in the image below. These details include the beam information, reinforcement details, dimensions, information of column connected to the beam, details of calculating coefficients, Ath, Ahs and all the calculation process resulting in calculating the development length of hooked rebars.



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WHAT'S NEW

in New Edition of ETABS MATE

Possiblity to generate detailed report of calculation of the development length of hooked rebars

In the software, you can prepare a complete report on how to calculate the development length of hooked rebars in a complete and beautiful way. For this purpose, you should use the **Print Report** button in the interface of **Hooked Rebars Development Length** interface.

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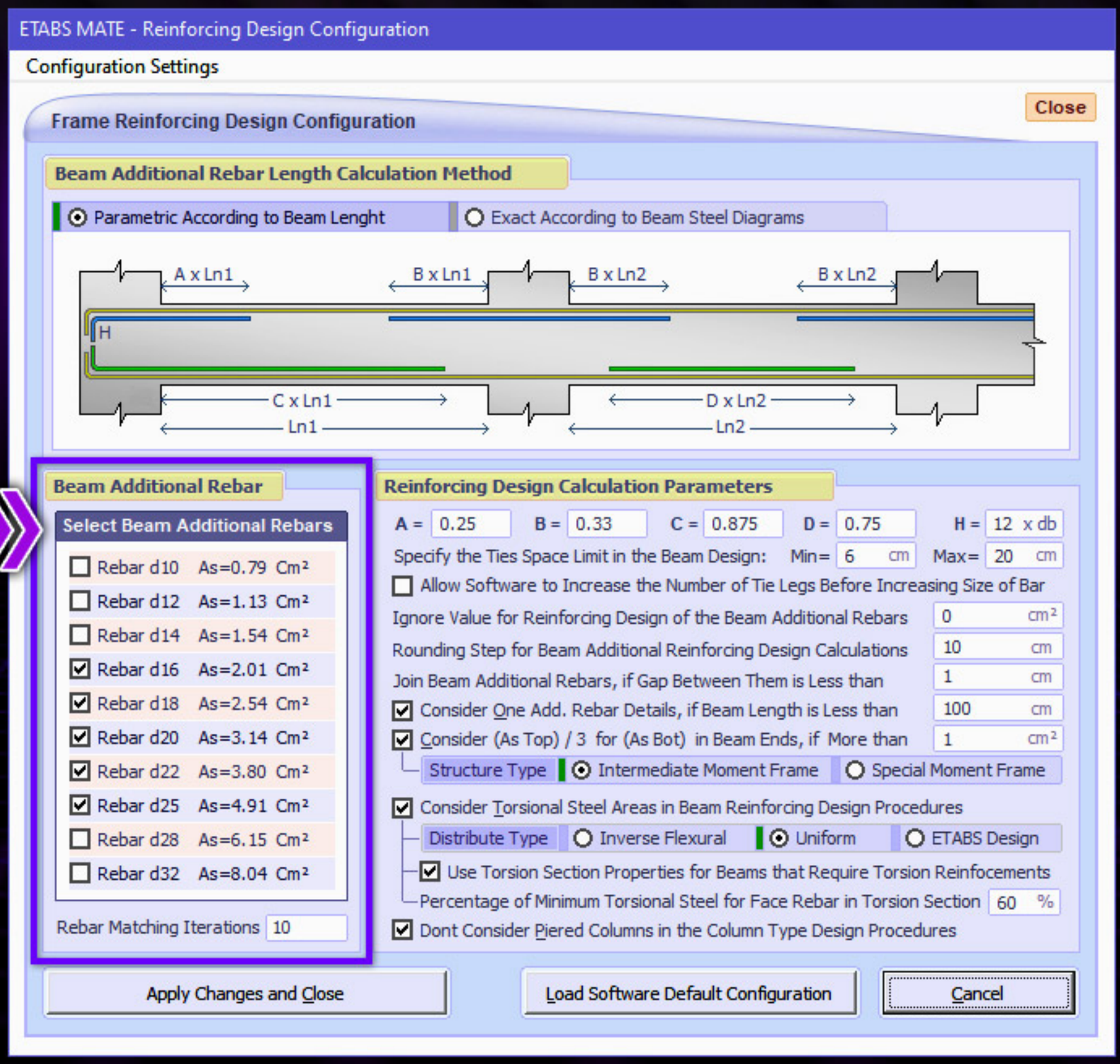
WHAT'S NEW

in New Edition of ETABS MATE

Adding sizes 10 and 12 to the list of rebars that can be use for the beam additional reinforcement

Rebars with diameter of 10 and 12 mm have been added to the list of reinforcements that can be used to additional reinfocement of beams.
To use these rebar, select the **Frame Reinforcing Design Configuration** option from the **Design** menu, then as shown in the image below, in the **Beam Additional Rebar** list, you can specify which rebar diameter the program is allowed to use in the beam calculation process of additional reinforcement of beam.



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New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

Possiblity to view diagrams of the flexural plus torsional steel area by clicking on each beam

In order to check the steel diagrams carefully, a user friendly graphical interface has been designed. By clicking on each beam, the steel diagrams of that beam will be displayed graphically, and by moving the mouse over the beam, all the information related to the desired position will be displayed graphically.
For this purpose, first activate the **Total Longitudinal Reinforcing** layer in the **Layer Display** panel, then by right-clicking on each beam, the corresponding user interface will appear and display the details of the corresponding diagram as shown in the image below.

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New VERSION

WHAT'S NEW

in New Edition of ETABS MATE

- Correcting the elevation leveling bug of shear walls in the level editing mode of the building floors
- hanges in the way of generating the calculation details report of the joint shear.
- Updating the price of steel and concrete in the approximate cost estimating reports
- Changes in user interfaces of the software in order to make it more convenient
- Improve some routines and algorithms for better software performance

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