A competitive truss design relies on many factors and your MiTek engineering software is designed to assist you in being as competitive as possible. One way the MiTek engineering software helps you accomplish this is by giving you many different plating options. These options will affect all the operations within your organization including quality control and manufacturing processes. Here is a brief explanation of each option in the "Plating Options" menu.
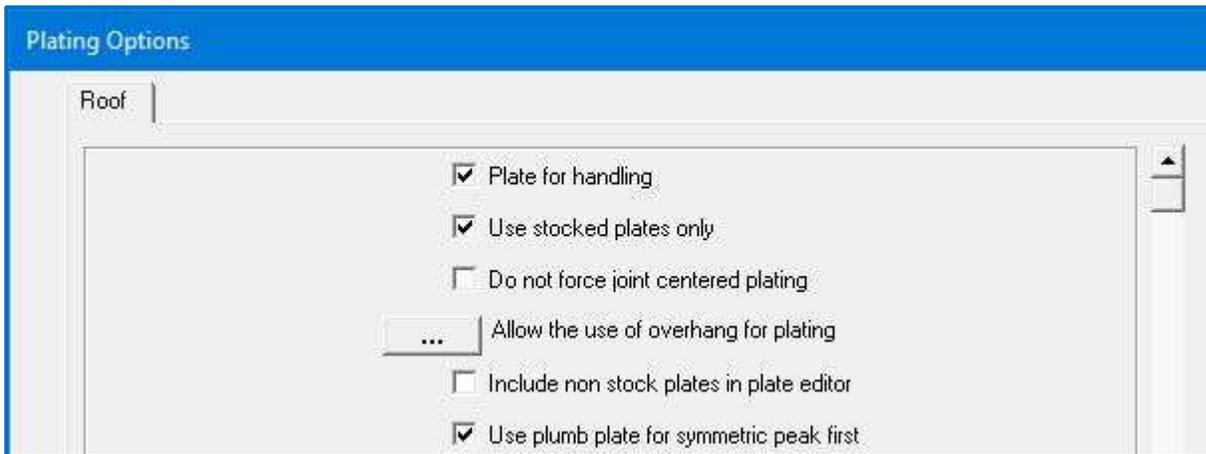
Figure 1 – Plating Options Screen 1

• **Plate for handling***:* Instructs the program to use a set of plating criteria that provides a set of minimum plate sizes based on the joint type, member sizes and truss span. The use of this option can help you reduce the number of damaged joints caused during the handling and erection process. Unchecking this option will add a note to the drawing indicating that this has been done.

• **Use stocked plates only***:* Use of "stocked plates only" instructs the program to use the plate sizes that are checked as "in stock" from your selected plate inventory. Otherwise the program will use all the plate sizes that are in your selected inventory for plating.

• **Do not force joint centered plating***:* Using the "Do not force joint centered plating" will sometimes result in the use of smaller plates being used on some joints but these plates will no longer be centered on the joint. While this option may lead to some smaller plates, your manufacturing team may have a more difficult time placing the plates in the appropriate, off center, locations.
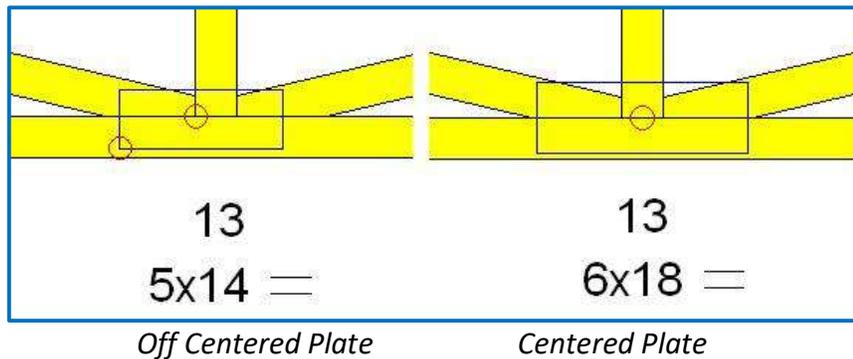
Off Centered Plate   *Centered Plate*
Figure 2

Figure 2 shows the difference in the way the program would plate a joint. Note that the off centered plate is offset in both the x and y dimensions.

- **Allow the use of overhang for plating:** "Allow the use of overhang for plating" gives you the option of allowing the plate to extend out into the top or bottom chord overhangs or past the bearing. This may result in more efficient plating of the heel joint but if the overhang needs to be removed it will likely need to be repaired if the plate is disturbed.

Figure 3 – Plating in the Overhang

- **Include non-stock plates in plate editor:** If a joint requires you to use the "plate editor", the use of this option would show you all the plate sizes that are in your selected plate inventory. Otherwise, you will only have available your current in stock plate sizes from your selected plate inventory.

- **Use plumb plate for symmetric peak first:** When "Use plumb plate for symmetric peak first" is checked the program will try plates positioned either horizontally or vertically at the peak before trying other orientations. The complete selected plate inventory will be checked, including thicker gauge or high strength before rotating it. With this checked off, more peak plates will not be positioned horizontal or vertical and will require more attention by your manufacturing team.
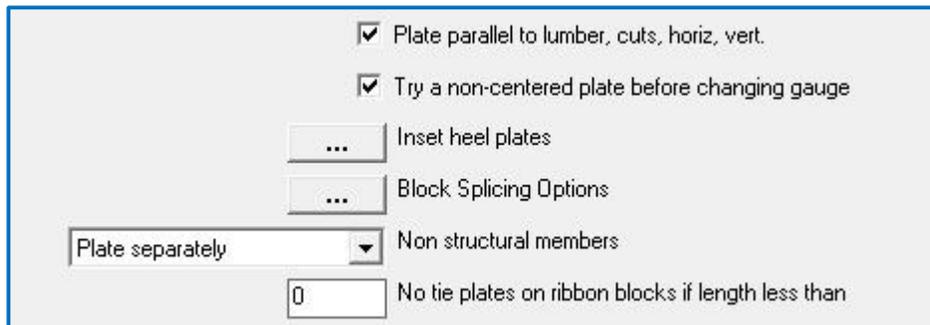
Figure 4 – Plate Options Screen 2

• **Plate parallel to lumber, cuts, horiz, vert.:** When "Plate parallel to lumber, cuts, horiz, vert." is checked on the program will only place the plate parallel to the lumber cuts, horizontally or vertically. If this is not checked on the program will try other plate orientations in an attempt to plate the joint. Using this setting generally affects the pitch break joints of hip trusses and keeps the program from using rotated plate orientations.

• **Try a non-centered plate before changing gauges:** With this clicked on the program will cycle through the smallest gauge of plates first before advancing to the next highest gauge. In other words, the program will try each of small gauge plates positioned in all the possible orientations before going to the next larger gauge plates in your inventory. If you have your plate inventory ordered in the way you would like to use them, typically by cost, you would have this turned off as your plate sort order has the plates in the order you would want to use.

• **Inset heel Plates:** This option allows you to set an inset distance from the outside edge of heel to edge of the heel plate. You have the option to set a specific inset distance based on the building category or classification of the building. The program does require at least 1/16" of plate to extend over the bearing.
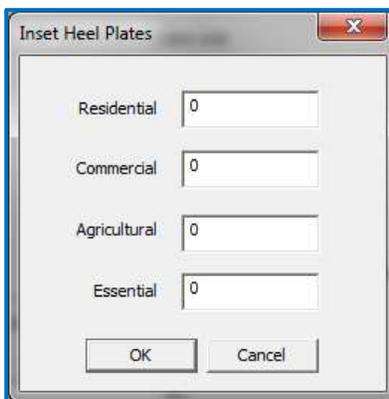
Figure 5 – Inset Distance Options

• **Block splicing option:** The "Block splicing option" governs the way the program will use splice blocks. A splice block is typically used to increase the plating capacity of a plate that extends beyond

the edge of the chord. The "Block splicing options" dialog box gives the user a great deal of control over how splices will be plated. You can choose whether you want to use a block splice at all or to increase the plate gauge before using a block splice. Checking "Plate to extend beyond width of chord" but not "Blocks" will prevent the program for using blocks but allow the use of ½" beyond the width of the chord for the tension capacity per TPI. The last option, "Use Safety blocks" allows you to add blocks anytime the plate extends past the edge of the chord by more than ½" as a safety precaution.

Figure 6 – Block Splicing Options

• **Non-structural members:** The "Non-structural members" options govern the plating of members that you have designated as "nonstructural"; i.e. those that are not part of the structural assembly and not designed to resist load and or force (an example would be a bottom chord filler on a scissor truss). "Plate as structural" should be used in cases where separate plating at the heel is not possible, due to limited heel height; this option allows the non-structural member to be plated with the truss with one plate at the heel. The program still recognizes that this is a zero force member and puts only a minimal amount of plate area on the member. You will not get any plates when "Do not plate" option is selected. The "Plate separately" option will use the minimum plate area at each joint and the program will not merge any joints.

Figure 7 – Non-Structural Member Plating Options

• **No tie plates on ribbon blocks if length less than:** When ribbon blocks are present on floor trusses, the program defaults to using a small plate for the attachment near the top of the block. If you would prefer to use three 0.131"x 3" nails to attach the top of the ribbon block versus a connector plate, the maximum ribbon block length should be entered. If the ribbon block length exceeds this length a plate will be used. When using nails for this connection a note will provide the requirements for attaching the ribbon block.

Figure 8 – Plate Options Screen 3

- **Split heel plate before changing gauge:** Heels of trusses that have a small pitch difference between the chords can have a long scarf cut. To satisfy the plating requirements for a joint like this, with one plate, requires a long plate. If the "Split heel plate before changing gauge" option is checked the program will use two plates before cycling to the next gauge of plates. The maximum length of plate the program will use is dependent upon your plate inventory.

- **Number of plates before not showing label:** This allows you to reduce the visual clutter on your truss designs, both onscreen and in print. You select a number which represents the number of joints that have the same size and type of connector. When the program recognizes that this number has been exceeded the plate label will not appear around the truss image. The program will instead add a note stating all plates are a certain size and type unless otherwise indicated. This will only be done for the plate size and type that appears the most within a design.

- **TPI QC Fabrication Tol. (%):** This factor is used when designing per ANSI/TPI 1-2014 and your Quality Control Program. A positive factor other than 0 will essentially reduce the grip capacity of the connector plates. The reduction in the grip capacity may result in having more plate area on the members of a joint or allowing for more plating defects to be present with no corrective action required. Chapter 3 of ANSI/TPI 1-2014 provides the information on how to determine your Fabrication Tolerance factor, which you will enter as a percentage. MiTek recommends using 20% and 11% respectively for 2x_ and 4x_ trusses, until your in-plant QC program determines different values are permitted. This factor will be reported on your truss design drawings and in a variety of your quality control print outs. Note: The setting "Use Existing Materials" prevents the changes in Fabrication Tolerance values from being applied. Any changes to these values will only be applied when you start the analysis from the beginning using Analyze Redesign.

- **Incremental Decrease of Fabrication Tol.(%):** This factor works in conjunction with the TPI QC Fabrication Tolerance factor. By introducing a factor that allows for plating defects you may have more un-plated joints. This is a factor that the program uses to automatically prevent as many un-plated joints as possible. When the plating routine is run and a joint cannot be plated based on the TPI QC Fabrication Tolerance you have set, the tolerance will be reduced by the factor you have input here. The plating routine will cycle through checking the joint until a plate is found that satisfies the joint or until the Fabrication Tolerance is 0 and no plate is found acceptable. Note, the smaller the number used here, the greater number of plating cycles and thus time will be needed in designing some trusses. Any joint that require the use of this decrease is considered a critical joint and will have the joint's id called out on the design. If the truss is used in your quality control process, the joint will require an inspection.

- **To reduce critical joints, try to limit JSI below:** Within ANSI/TPI 1 quality procedures, a critical joint is defined as a joint where (required plate area / actual plate area) >= 0.8. These critical joints require inspection as part of the Truss Manufacturer's In-Plant Quality Assurance Program. When the plating routine is called by the program, this factor will be considered when sizing a connector plate for the joint in an effort to reduce the number of critical joints on a truss.

- **Plating tolerance (16ths of an inch):** This feature is used to allow for small misplacements of the plate on a joint. It effectively reduces the size of the plate used for lateral resistance or "grip". For example, entering a value of "4" subtracts 4/16" from the perimeter of the plate for grip. Most CM's enter a value of "0" here, and instead account for this tolerance by using the TPI QC Fabrication Tolerance setting along with the TPI QC plate rotational tolerance discussed next.

- **TPI QC plate rotational tolerance (degrees):** Similar to the QC Fabrication Tolerance, ANSI/TPI 1 quality procedures have a plate rotation tolerance factor. MiTek recommends using 10 degrees, until your in-plant QC program determines different values are permitted. This factor will be reported on your truss design drawings and in a variety of your quality control print outs.The plating routine at each joint will check the connector plate rotated at this angle in both directions about the joint center.

- **Qr factor:** This is a factor that is currently under development. Leave set at 1.00.

- **Max plate length at heel before split plate:** The "Max plate length at heel before split plate" option will check the heel joint with two plates when single plate requires a plate longer than your input value. A shallow heel joint with a long scarf cut will benefit from this option. These heels typically require more plate length along the scarf and you can reduce the total square inch of plate at the heel using two plates versus one.
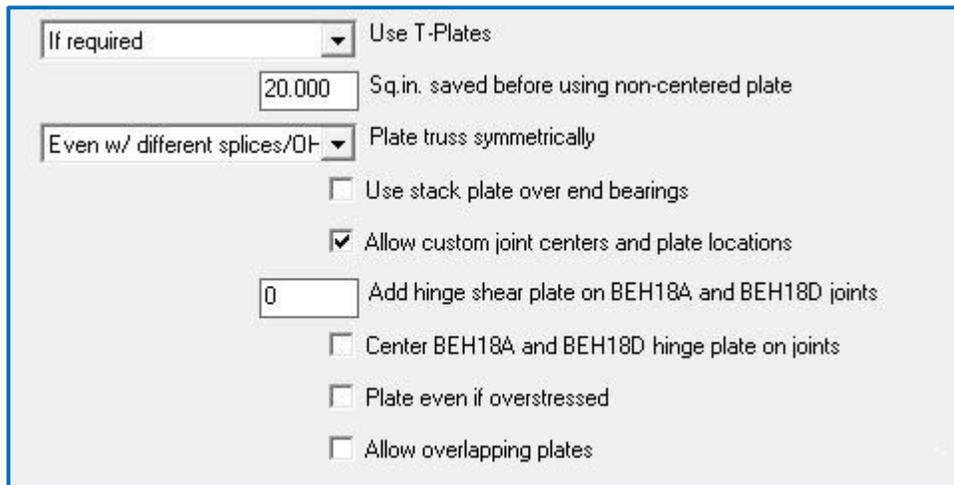
Figure 9- Plate Options Screen 4

- **Use T-plates:** This option applies to the use of the MiTek "T-plate". This product is used to increase the top chord bearing reaction limits for flat trusses. They are normally used on flat chord floor trusses, but they can be used on 2x4 on-edge flat trusses.
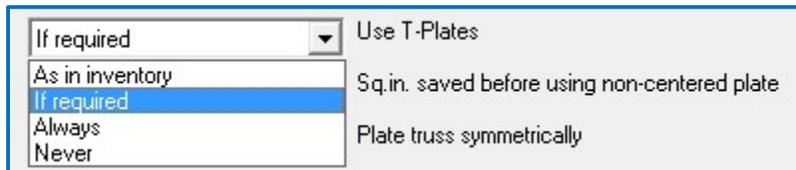

Figure 10 – "T-Plate" options
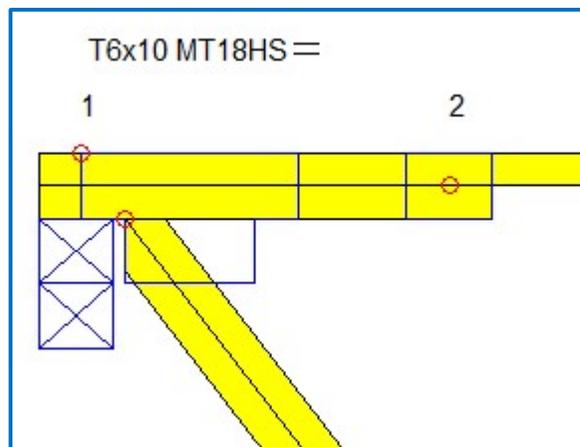
Figure 11 – "T-Plate" joint

- **Sq. in. saved before using non-centered plate:** The option "Sq. in. saved before using non-centered plate" will check a joint with the plate centered and then non-centered and when the difference in total plate size is greater than your input value it will use the non-centered plate. The

value you input should be balanced with any increased cost in manufacturing due to a more specific plate placement.

- **Plate truss symmetrically:** This feature will plate a truss symmetrically even when the truss is loaded and or spliced asymmetrically. This may cause a plate to be increased on the side of the truss with the lighter load but it reduces the likelihood that the truss will not work if it is installed backwards. Note, the use of this feature requires special attention to the heels; heel heights, sliders or wedges will need to be symmetric for this feature to work.
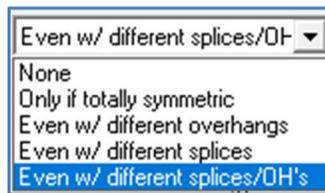
Figure 12- Plate Symmetrical Options

- **Use stack plates over end bearings:** "Use stack plates over end bearing" allows the user to plate the area above the bearing on a top chord bearing truss to add support to the area. Turning on this feature in plate options will add a plate above the bearing if one will fit. This is a non-structural plate.

- **Allow custom joint center and plate locations:** Allow custom joint center and plate location gives the user the ability to set custom joint center and plate locations for particular joints. For a full explanation of this feature refer to our Technical Support Group.

- **Add hinge shear plate on BEH18A and BEH18D joints:** For this option, if you enter a "1", the program will add a small shear plate on one face of the truss perpendicular to the hinge plate for hinge joint types A and D. If you enter a "2", the program will add a small shear plate to each face of the truss perpendicular to the hinge plate for hinge joint types A and D. If a "0" is entered, the program will not add a shear plate for hinge joint types A and D.

- **Center BEH18A and BEH18D hinge plate on joints:** This option will allow you to have the program place the hinge plates on the centerline of the truss chords for hinge joint types A and D.

- **Plate even if overstressed and Allow overlapping plates:** These two options are available as investigative tools. You can check existing designs for new load conditions and see if the original plating works even if the lumber does not, this is effective in repair situations. There are times when you may not like the results of the plating due to joints getting merged. Allowing overlapping plates lets you see the actual problem and there might be slight adjustments that you can make that you like better by using the Plate Editor feature. Note designs with overlapping plates ARE NOT valid.
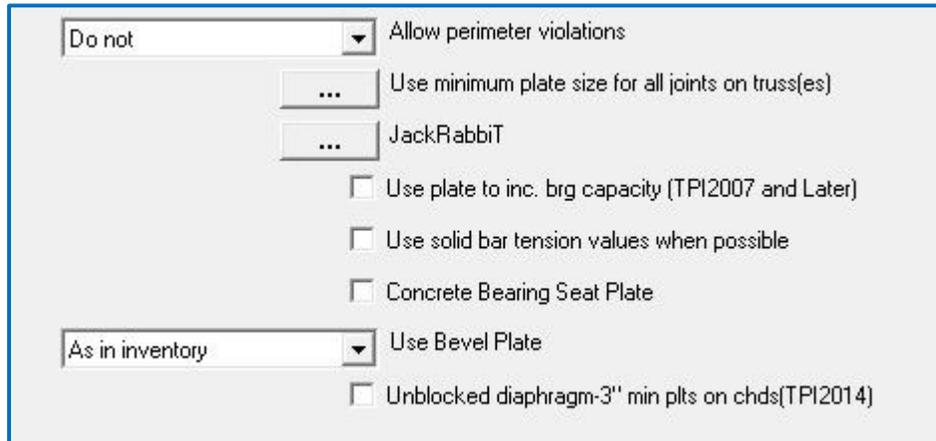
Figure 13 – Plate Options Screen 5

• **Allow perimeter violations:** Allow perimeter violations allows the plate to stick into an attic room, a chase or outside the profile of the truss based on settings under the Perimeter violations tab of *Setup\Manufacturer\Plate Options - Advanced\Joint Types\Perimeter Violations* dialog. This option is almost always set to "Do not", and should only be changes to the other options with extreme care.
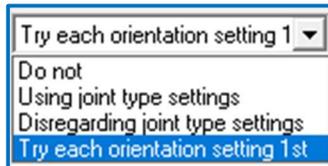

Figure 14 – Perimeter Violations setup screen

• **Use minimum plate size for all joints on truss(es):** Use minimum plate size for all joints on truss(es) allows you to enter the minimum size plates that the program will use, whether it be on all the trusses or only gable end trusses. This option can save you time on a particular job if the owner is requiring a minimum size plate to be used.

• **JackRabbiT:** The "JackRabbiT" option sets the requirements for building jack trusses with the "JackRabbiT "machine.
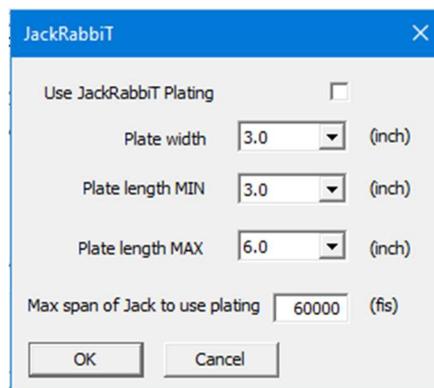
Figure 15 – JackRabbiT settings

- **Use plate to increase bearing capacity (TPI2007 and Later):** Starting in ANSI/TPI 1-2007 there is an option to increase the bearing capacity of a truss when the plate over the bearing is positioned in a certain way. Using this option you are required to manually position the plate over the bearing correctly. The plate shall cover the bearing completely and the lowest edge be positioned within ¼" of the bottom edge of the truss member. This factor only works if the bearing is 18% or less overstressed. You will find a note on the drawing cautioning on the plate placement when the increase is being taken.

- **Use solid bar tension values when possible:** This option is a tool for tension splices wherein the steel properties of the plate are highly stressed in tension, typically the bottom chord. You now have the option to check a splice joint and take advantage of the higher tension capacity of the connector when the "solid bar" of the plate is centered over the splice. Due to the stringent plate positioning requirements, these joints will be labeled as critical joints and would require quality control inspection.

- **Concrete Bearing Seat Plate:** If you have the bearing set to concrete wall and Moisture Barrier Plates in your inventory, check this box and trusses with concrete bearing types will show Moisture Barrier Plates near each concrete bearing.

- **Use Bevel Plate:** When Beveled Plates are to be used at the bearing of your top chord bearing trusses, typically 4x2 trusses, check this box. With these plates in your inventory the design will be checked accordingly.
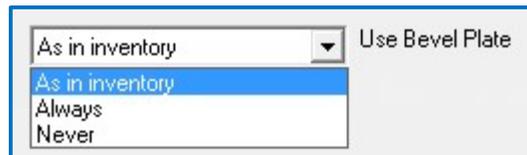
*Figure 16 – Bevel Plate options*
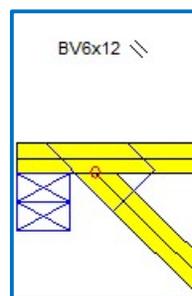
Figure 17 – Bevel Plate Joint

- **Unblocked diaphragm- 3" min plts on chds (TPI2014):** This is a new requirement per TPI 1-2014. Unblocked roof diaphragms require 3" wide connector plates at any joint where a change in roof pitch takes place.

This lengthy list of options, when used in conjunction with your quality control program and manufacturing processes, will allow you to be as balanced as you desire between connector plate usage vs. efficient manufacturing. One other thing to keep in mind is that most of the plates on trusses are sized based on the minimum plates and minimum bite settings that have been incorporated in the software. Therefore, for example, setting the TPI % defect to say, 20%, will not increase all plates by 20%. Rather, it will only increase the plates on joints that are more highly stressed. This concept is true on many of the settings we have discussed in this article.

For additional information, or if you have questions, please contact the MiTek Engineering department.