



## Moment Resistance Breakthrough: From Concept to Code Acceptance

### Webinar Q&A

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This document includes questions submitted by attendees during the live webinar, *Moment Resistance Breakthrough: From Concept to Code Acceptance*, held on December 6, 2017, along with presenter responses. In some cases, duplicate questions have been combined and noted as such. Please send any additional technical questions to [AskSimpson@strongtie.com](mailto:AskSimpson@strongtie.com).

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#### Question

#### Answer

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### MPBZ Product Features and Installation

What post sizes can be used with the MPBZ?

The MPBZ was designed to fit 4x4, 6x6 and 8x8 nominal post sizes. Rough lumber or larger dimensional lumber may be used but would need to be trimmed to fit the nominal post sizes.

Can a smaller post be shimmed into a larger MPBZ?

No, shimming a smaller post is not allowed.

Will the MPBZ66 work with a 5 1/4'x 5 1/4" post?

No. We have not tested nor do we have any details on how to shim a smaller post larger to fill the dimensional space in the MPBZ.

Can multiple individual stud posts be used in lieu of a solid post?

No. The MPBZ has been designed and tested for use with solid wood posts.

Minimum grade of lumber recommended?

We recommend that the minimum grade of lumber used is Douglas Fir No. 2.

Can we use LVL posts?

No. We have learned there are reductions in fastener performance when installed into the narrow face of SCL columns. We have not tested this condition and therefore would not be comfortable allowing this application.

Does the column have to be treated wood?  
*(Similar question asked by more than one attendee)*

It is not required for the post to be treated but the assumption is the MPBZ will be installed in exterior applications exposed to the elements. Considerations to protect the wood from exposure to the elements is recommended.

Does the post base allow wood column adjustment to make it plumb?

No, there is not adjustability in the MPBZ once it is cast in concrete. When the MPBZ is being installed, care should be given that it is plumb and level.

Is the expectation that a structural engineer must certify all installations?

The expectation is a qualified designer specifies the MPBZ. However, if installed per our recommendations, there isn't a need for certification of the installation.

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Where are the dimensions specified? On page 9 of the SST WCC Catalogue they are illustrated by a diagram but I don't actually see the numbers.

The dimensions are specified on page 105 of the Wood Construction Connectors Catalog.

Are the optional holes for trim provided for all connectors - the 'option' being the option of using trim? ... (not an order option)?

Yes, the optional trim holes are on every MPBZ model and are not an ordering option.

How do you install trim to cover up the MPBZ anchor when the plastic tabs stick out from the face of the MPBZ anchor?

The plastic tabs must be removed and the holes then filled with the SDS screw provided. Trim can then be attached using the trim attachment holes provided.

How are you to line up the trim attachment holes with the trim fasteners?

The trim attachment holes are centered on the part. We suggest measuring the height of the hole once cast into concrete and then measure and center the trim fastener accordingly.

With there only being one hole for trim attachment, does that mean the trim is attached with only one fastener?

There is only one trim attachment hole in the MPBZ. It is assumed the trim would extend above the MPBZ where you could make a second attachment directly into the wood post.

How can you cover the hardware without encouraging dry rot in the post?

It is assumed the installation of the MPBZ is for exterior use. There is a 1" stand-off designed into the MPBZ. If installed properly, the post should not be in contact with standing water. Treatment to the wood post to protect it from normal exposure to specific weather conditions is the responsibility of the installer.

Is the MPBZ available in stainless steel?

No, the MPBZ is only available in ZMAX.

Does the MPBZ manufacturing include any corrosion coatings. Or do we need to allow for long term corrosion in design by reducing section properties.

The MPBZ is manufactured using ZMAX steel which is an exterior-rated coated steel. Visit [strongtie.com](http://strongtie.com) for further corrosion information or check p. 18 in the Wood Construction Connectors catalog, C-C-2017. <https://www.strongtie.com/resources/literature/wood-construction-connectors-catalog>

Can the MPBZ be painted?

Yes. Manufacturing leaves an oily residue and would recommend the part be cleaned of oil prior to applying paint.



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Are the fasteners sold with the MPBZ?	Yes, the fasteners are included with the part and the price of the MPBZ.
Why do SDS screws appear random?	Placement of the SDS screws was considered in regard to edge and end distance as well as spacing between fasteners as much as possible. The patterns from the overlapping side vs. the non-overlapping side is a function of steel optimization and assuring the fasteners connect through both overlapping sides.
Can you tighten the screws after the wood has dried to re-establish the dry-service strength?	No, that is not recommended.
The 1-inch standoff tabs seem like a good idea. But can they support the weight of post when it's being inserted?	Yes, we tested the 1" stand-off tabs by dropping the posts into the connectors and they were able to support the impact and the post during installation.
Can a PT cables be threaded through the embedded portion?	We have not tested the MPBZ with PT cables, however, testing with other products we found that PT cables perform similar to rebar with respect to connector performance.
Can the assembly be used horizontal for cantilevers and beam end fixity?	This is not recommended since the MPBZ was evaluated for short term (higher load duration factor) moment loading.
Do we need a diagonal bracing at the top?	It depends on the design loads. If the applied loads are less than the allowable moment capacity, then you do not need lateral bracing. However, if you need additional capacity, lateral bracing may be required.
Is concrete able to flow inside MPBZ easily to completely fill it up where it should w/o special accommodation?	The slump of the concrete could create varying installation practices. It shouldn't vary more than necessary to physically place concrete down the center of the MPBZ if the concrete doesn't flow naturally and/or after being vibrated.
What would be the max spacing between each post?	Max spacing would depend on the applied load.
What is the embedment depth of the MPBZ?	The embedment depth is 7.25" for both MPB44Z and MPB66Z.

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Emmet - will the video tell the contractor to install the screws right after the installation of the posts? It would seem as though the capacity of the (4) small tabs at the 1" standoff is minimal.

The installation sequence does have the SDS screws being installed following the placement of the post. We tested the 1" stand-off tabs by dropping the posts into the connectors and they were able to support the impact and the post during installation.

Was there any thought of adding instructions (sticker?) to instruct installer to remove the plastic tabs?

Direction of the number of required SDS screws, location of the trim attachment holes, location of the form attachment holes and embedment location are all stamped on the MPBZ to provide information. The required removal of the plastic tabs will be addressed in the installation video coming in the spring of 2018.

Does any top rebar required for spread footing and rebar hairpin threaded thru the embedded cap portion?

No. Testing was in unreinforced concrete

Would it hurt to have a 6 mil poly at the base to protect in case the concrete is placed above the check holes?

It's hard to say for sure. Depending on how it is installed, it may trap moisture on the post

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## Testing / Design Properties

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Did the FEA testing show that these bases are rigid? (i.e. they do not significantly displace from applied moments.)

For FEA, MPBZ was modelled as semi-rigid.

What FEA software was used?

We use ABAQUS.

Did you have a QA review of your fixture calculation and/or the test set up?

ICC Evaluation Services reviewed our test setups before testing. Tests were also witnessed by an independent, third party test lab. ICC-ES reviews all test reports and calculations prior to issuing a code report.

In your test set up, was the '12x12' footing poured separately from the larger supporting base?

No, it was poured monolithically.

So was the moment test done in 2' concrete cube unreinforced?

For AC398 Moment test, the footing depth was 2 feet. The plan dimensions for the top 12" of the footing were 12"x12" for the MPB44Z and 16"x16" for the MPB66Z. The bottom part of the footing was larger for allowing surface area for clamping down the footing to the test bed. The top 12" of the footing was unreinforced.

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Has any testing been performed to determine fatigue failure given that connections are likely induced by wind?	No, the testing criteria does not require fatigue testing.
Is it true that the concrete allowables based on "plain" or unreinforced concrete?	Yes, unreinforced concrete was used for testing.
Previous slide indicated testing on shrinkage. Has there been any testing done on wood swelling or freezing causing splitting of steel sleeve	The suggested scenario has not been tested.
What is the required Concrete compressive strength f'c? <i>(Similar question asked by more than one attendee)</i>	The required concrete compressive strength f'c is 2,500 psi.
What was the actual strength of the concrete being used in the test, not the design value. <i>(Similar question asked by more than one attendee)</i>	It was 2500 psi, +/- 10%.
Breakout/pryout failure seems to govern allowable loads. Are there plans to test connection with adequate reinforcement to ignore breakout failure and achieve higher allowable moment loads?	Based on the overwhelming requests for higher loads, we will be testing MPBZ for (i) higher strength concrete (ii) reinforced concrete (iii) greater edge distances
Are there any plans to develop more testing results for higher compressive strength or reinforced concrete? <i>(Similar question asked by more than one attendee)</i>	If there are any other conditions that you would like us to evaluate, please send in your requests to <a href="mailto:AskSimpson@strongtie.com">AskSimpson@strongtie.com</a> . We expect that all of the above conditions will result in higher allowable loads, but we will let testing determine that for us. Until we have the definite load values, our recommendation is to use the lower allowable moment loads for your design.
Given overlap of steel, is one direction stronger than the other and Simpson uses the weak direction for tbl ?	Yes, one direction is stronger than the other, and the weak direction allowable loads are listed.
Technically, the stand-off tabs and side friction will also aid in vertical load transfer. Just extremely minimal.	Correct. Our tested loads are actually higher than the screw calculations. The code requires we use the lower of the two loads, so we use the SDS screws calculated capacity only.
Why is the 4x4 stiffer than 6x6?	The stiffness in the graphs is relative to the stiffness of the post. The 6x6 post is much stiffer, so the post base is less stiff as a percentage of the 6x6 post stiffness. The actual stiffness of the MPB66Z is stiffer than the MPB44Z.



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What is the most common ultimate failure mode?	It is concrete breakout.
How is wood shrinkage addressed?	We have evaluated wood shrinkage by testing, however, it is in review with ICC-ES. Additional information shall be made available upon approval from ICC-ES.
If exposed to weather what is the expected life of the moment bases?	There are too many variables to even speculate life expectancy. Simpson advises annual inspection for connectors used in outdoor applications. If corrosion is suspected the connections should be evaluated by a qualified engineer or inspector.
The load capacity shown does it account for orthogonal effect	We haven't done bi-directional testing, however, you may evaluate by using the unity equation for combined loading.
Why did Simpson decide to not use a bottom plate for the wood post to rest upon that would allow for greater download capacity of the system as opposed to relying upon screw shear capacity only?	Our market research didn't yield the need for higher downloads. Secondly, utilizing the SDS screws for download eliminated the need for additional parts and assembly and helped keep costs down.
Do tables allow for increase capacity with good rebar detailing such as stirrups?	Yes, see footnote 9 on page 105 of the Wood Construction Connectors Catalog (C-C-2017). <a href="https://www.strongtie.com/resources/literature/wood-construction-connectors-catalog">https://www.strongtie.com/resources/literature/wood-construction-connectors-catalog</a>
In the allowable load table. What is 'download' under the wood assembly allowable loads section?	It is Post Axial Compression load (Sustained loads - Dead, Live).
Is this being accepted at City of Los Angeles building department?	The MPBZ is in review for Moment Loads with ICC-ES. Upon approval from ICC-ES, the MPBZ will receive acceptance from the City of Los Angeles building department.

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### Design / Design Example / Project-Specific

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Do you publish any standard use details?	Product drawings (CAD drawings) are available on the product web page at <a href="https://www.strongtie.com/mpbz">strongtie.com/mpbz</a>
Can you get these same values if just a 16"x16"x12" deep isolated footing, without a slab, is used?	No. 16"x16" is the minimum size for concrete breakout. Footing design shall be by Designer for applied loads.

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For seismic applications, are the ACI provisions for anchorage (ductile or brittle failure modes) applicable with the MPBZ base?

The cast-in-place cold-formed connector such as the MPBZ is a specialty insert as per ACI 318, therefore, not covered under the Code, which is why we test them per AC398. Ductile or brittle failure modes do not need to be evaluated by the designer.

What mass would you allow at the top of each post?

It depends on the height of your post and is then limited by the MPBZ allowable load capacity.

If there is a mass at the top of single post, would you design for  $F_p$ ?

Yes, it can be designed for  $F_p$ , however, the design shall be in accordance with the Code and subject to the judgement of the Designer.

Why n F1 value for wood? And you can use the higher wood values with a proper concrete design?

The F1 values listed in the allowable load table are the lowest of concrete and wood assembly allowable loads.

Do you have a preference for the practical use? I.E. covered patios only vs full structural lateral lines.

As long as the design and calculations for load and drift comply with the building code, the use is not limited. Given the high seismic forces due to the low R-factor for cantilever columns, and the relatively low flexural strength and stiffness of wood posts, it may not be practical to use for full structural lateral lines. We expect covered patio type structures may be the more typical use.

Why aren't uplift loads for the wood connection published?

The uplift loads are limited by the lesser of the wood or concrete capacity. We lumped those together under the concrete. This will be clarified in future publications.

In your flyer for the MBZ, you use different post bending deflection formula. Why?

The post bending deflection formula used in the Sign-Post design example in the engineering flyer is for a concentrated load applied at a distance "b" from the fixed end of the post. For the design example used in the webinar, the post bending deflection is based on concentrated load applied at the free end of the cantilever member.

Relative to deflection associated with rotation at the base; is that considered elastic? In other words, when the load is removed, will the deflection return to zero?

Yes. Deflection associated with rotation at the base due to applied loads within the allowable load range is considered elastic.

If engineered lumber columns (PSL's) are used, do the capacity tables address any reductions for screws into the laminations of the PSL?

We have not evaluated installations into engineered lumber such as PSL, LSL or LVL material.

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Would the mpbz eliminate the need for angle bracing at top of post?

It depends on the design loads. If the applied loads are less than the allowable moment capacity, then you do not need lateral bracing. However, if you need additional capacity, lateral bracing may be required.

Do these bases require a continuous slab around them in addition to the minimum footing size?

Additional slab is not required, however, the footing shall be designed by the Designer for applied loading.

Is there a minimum foundation depth for this system?

Foundation design shall be by Designer.

In your design example, I believe that you applied an equal lateral load to all columns. However, shouldn't the load on the center columns be greater for a flexible diaphragm?

We assumed that the diaphragm is rigid relative to the flexibility of the post & post bases, therefore, more even distribution of lateral load.

*(Similar)* When determining the lateral load to the columns, does not 50% of the shear load transfer to the middle two columns do to tributary area?

WHY P 342 NOT HIGHER VALUES TAKEN

With reference to the design example shown in the webinar, for the combined loading equation only dead load (432 lbs) was used for axial load "P" based on IBC 2015 ASD Load Combination Equation 16-12. The live load in the design example is roof live load, therefore Equation 16-13 or 16-14 will not govern.

Just to confirm, the post base used in the design example is not yet approved, correct?

We have not received our code report recognizing the part for moment loads. It is in process with ICC-ES review.

I notice that the structure used to illustrate the calculations is a pergola. Please comment on use of the moment connector for elevated occupied decks. For example, a structurally independent second story residential porch.

As long as the design and calculations for load and drift comply with the building code, the use is not limited. Given the high seismic forces due to the low R-factor for cantilever columns, and the relatively low flexural strength and stiffness of wood posts, it may not be practical to use for full structural lateral lines. We expect covered patio type structures may be the more typical use.

I've got a project right now where I spec'd the MPBZ, and they installed a CB. What would you recommend be done at this point? Can you retrofit an MPBZ somehow, or would the whole caisson have to come out and be repoured?

There is no way to retrofit install the MPBZ. All testing is based on cast in place

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Do you have an example where Wind governs?

We chose seismic load evaluation in our design example to clarify deflection check & P-D effects. Wind loads shall be calculated as per ASCE 7. Once you have the design loads, the design is essentially the same. Please see our sign post design example in the engineering flyer available under literature at [strongtie.com/mpbz](http://strongtie.com/mpbz)

For a free standing deck, I does one evaluate the lateral forces involved in people moving in a direction and then abruptly topping?

There is no code requirement for evaluating occupancy loads on free standing decks. However, there has been some research in this area. You may refer to Wood Design Focus - A Journal of Contemporary Wood Engineering - Volume 23, Number 2. This issue discusses lateral loads for Exterior Decks and Balconies. For more information visit [http://www.forestprod.org/buy\\_publications/wood\\_design\\_focus\\_online.php](http://www.forestprod.org/buy_publications/wood_design_focus_online.php)

Any torque restriction for connection

We have not evaluated MPBZ for torsional loads since there is no criteria defined in AC398 for evaluating torsional loads.

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### Canadian Use

Is this product available in Canada and does it met the Canadian code?

*(Similar question asked by more than one attendee)*

The MPBZ product line is available in Canada too. Limit states design loads are included in the newest C-C-CAN2018 catalogue. You can download a copy on our website or call 800-999-5099 to request a copy be mailed to you.

Can you get these same values if just a 16"x16"x12" deep isolated footing, without a slab, is used?

No. 16"x16" is the minimum size for concrete breakout. Footing design shall be by Designer for applied loads.

Is there an LRFD table? Do you have table for Canadian Code?

From page 105 in the Canadian catalogue:  
Multiply tabulated Seismic and Wind loads by 1.4 or 1.6 (1.67 for 2015 IBC) respectively to obtain LRFD capacities.

*(Similar)* How do we get LRFD values?

Limit States values are included in the Canadian Wood Connectors Catalogue, C-C-CAN2018.

*(Similar)* US doesn't have Limit States design criteria like Canada. What do we use for design criteria for US codes?

For applications in Canada, will the Tables include deflection tolerance values or will these calculations need to be carried out as well?

See page 91 of C-C-CAN2018 Catalogue for MPBZ. This can be found at <https://www.strongtie.com/resources/literature/wood-construction-connectors-catalog-cn>



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For applications in Canada, will the Tables include deflection tolerance values or will these calculations need to be carried out as well?

The table for MPBZ on Page 91 of C-C-CAN2018 Catalogue does not include deflection tolerance values. These will be required to be calculated. The catalogue can be found at <https://www.strongtie.com/resources/literature/wood-construction-connectors-catalog-cn>

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### Product Development / Future Plans / Miscellaneous

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Are you working on a post-installed moment base?

We currently do not have an active project, but we are investigating the opportunity of a post-installed option.

Are you working in increasing the stiffness of the 6" base?

Not at the moment (no pun intended).

HOW ABOUT UTILIZING THE SAME mpb TO GUARD RAILS WHERE THERE IS NO CONCRETE UT ATTACHED TO WOOD BEAMS INSTEAD OF USING dt2Z?

Thank you for the suggestion.

Did you say that you are working on one for 8x8 posts?

Yes. The MPB88Z will be available January 2018.

Any plans to do moment capacity testing for post cap connectors?

We currently do not have an active project but we are investigating the opportunity of a post cap with moment capacity.

Are these all currently available, and what is the approximate unit cost?

The MPB44Z and MPB66Z are currently available. The MPBZ will be available January 2018. Check with your local suppliers for current pricing.

Where can I find the slides used during the webinar?  
*(Similar question asked by more than one attendee)*

A PDF of the presentation slide deck, including the correct design example values, can be downloaded [here](#).

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