

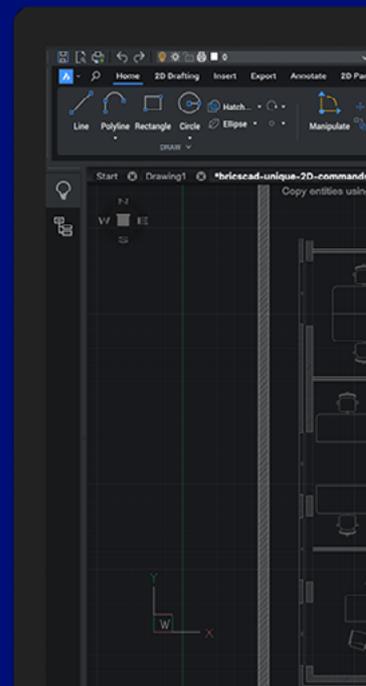
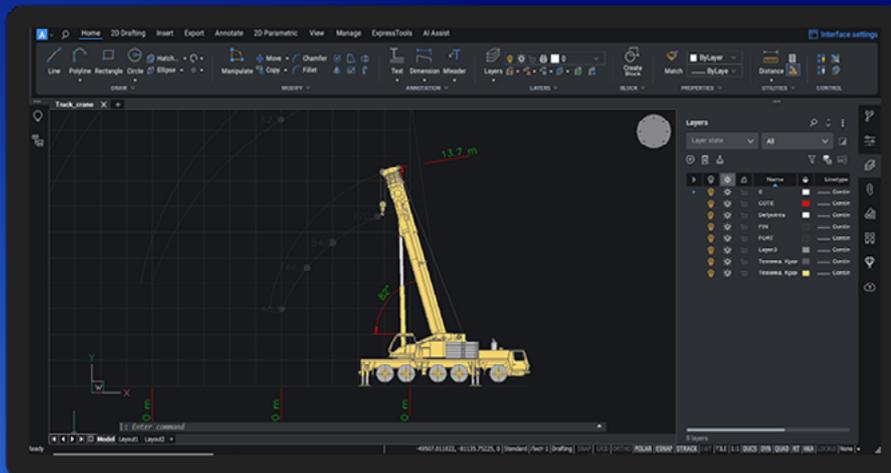
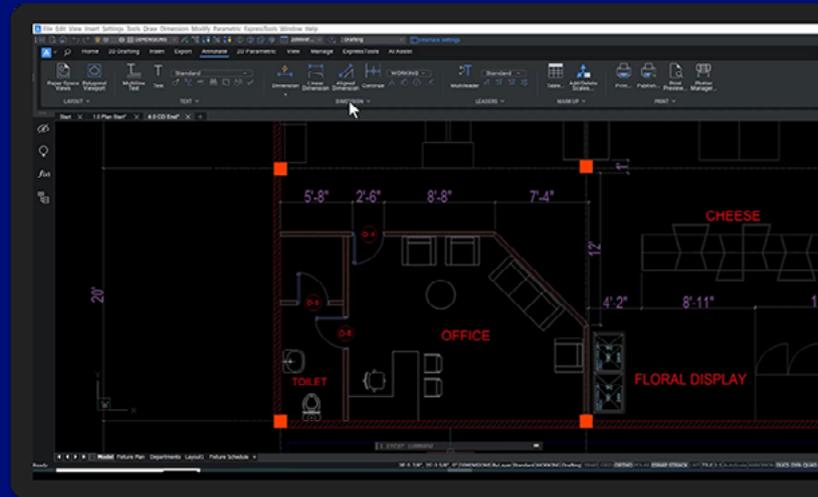
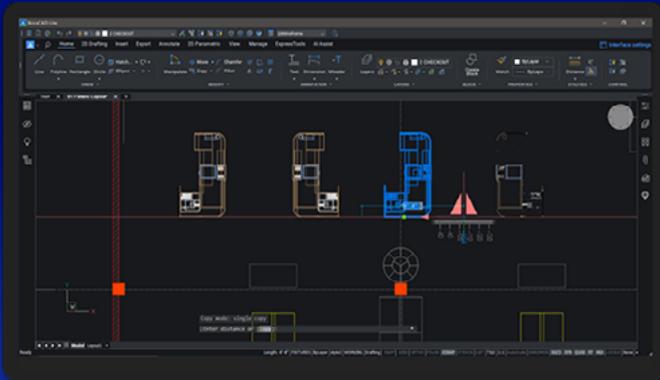


part of Hexagon

Parametric Blocks Explained

Discover how Parametric Blocks can enhance your workflows with this user guide.

March 2024 - BricsCAD V24.2



Introduction

Parametric Blocks are unique to BricsCAD®. They are a better alternative to Dynamic Blocks, offering greater levels of flexibility whilst also improving the efficiency of your drawing.

This guide hopes to answer some of the key questions we've been asked by BricsCAD® users, and explains the incredible power of Parametric Blocks.

- What is a Parametric Block?
- Why should you use Parametric Blocks?
- How do I make a Parametric Block?
- What's the difference between a Parametric Block and a Dynamic Block?
- What's the interoperability between different Blocks and CAD software?
- How to convert your Dynamic Blocks to Parametric Blocks?

What is a Parametric Block?

Parametric Blocks are objects that contain both geometric data (i.e. polylines, arcs, hatches, solids...) and meta data (i.e. descriptive data or behavioral data) that impacts the way the geometry of the block is displayed.

Parametric Blocks act as a “template” enabling you to quickly re-use 2D or 3D geometry that can be defined once and used multiple times. Unlike a normal static block, its defined parameters can quickly and conveniently change its shape and appearance. Each instance of the Parametric Block can be adjusted to display different visibility states, flip states, or dimensional constraints within the properties panel in BricsCAD®.

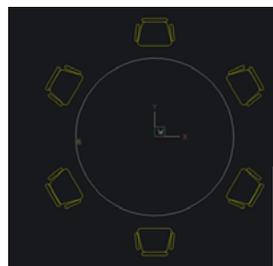


Example

The geometry displayed by this Parametric Block for a table and chairs is driven by the radius of the table and associated meta data. As the table's geometry changes, i.e. the radius increases, so do the number of chairs that can fit around the table. The Parametric Block updates the corresponding geometry to include the additional chairs. This not only follows the constraints of the table, but also the distances set between chairs and the table's edge.



Parameter	
Name	r
Value	40
Geometry-driven	40
Description	50
	60
Exposed	80
Units	100



Parameter	
Name	r
Expression	60
Value	60
Geometry-driven	40
Description	50
	60
Exposed	80
Units	100

A better block

- More flexible than Dynamic Blocks
- Infinitely configurable based on multiple defined parameters
- Allows multiple instances of blocks with different parameters

Why should you use Parametric Blocks?



Save time

Using Parametric Blocks can save you time by making it quicker to change the geometry of a block using highly flexible and precise parameters, instead of creating similar geometry from scratch over and over again.



Reduce file size

Using Blocks helps you reduce the amount of data in your file by reusing geometry. Also, by using BricsCAD®'s unique Blockify functionality, duplicate geometry can be automatically identified - and replaced by block references that point to a single, common block definition, containing the geometry. This will heavily reduce file size (up to 80%) with little to no effort by the user.



Enhance performance

BricsCAD is an incredibly fast and 'light' CAD software, capable of handling large dwg files. By using our efficient Parametric Blocks and reducing your file size, you will notice improved performance on your already fast BricsCAD, in terms of faster loading times, reduced lag during view manipulations, etc.



Improve flexibility and intelligence

Parametric Blocks rely on parameters that can have an infinite number of constraints to the geometry, so you can precisely adapt a Parametric Block to your exact needs. Parametric Blocks smartly link multiple variations of geometry together.

How do I make a Parametric Block?

There are multiple ways which you can create a Parametric Block, from creating a block using the “BLOCK” Command and adding parameters to your geometry, selecting a block from your library or with our enhanced Blockify command “PARAMETRICBLOCKIFY”, that automatically creates a Parametric Block from selected geometry.

PARAMETRICBLOCKIFY

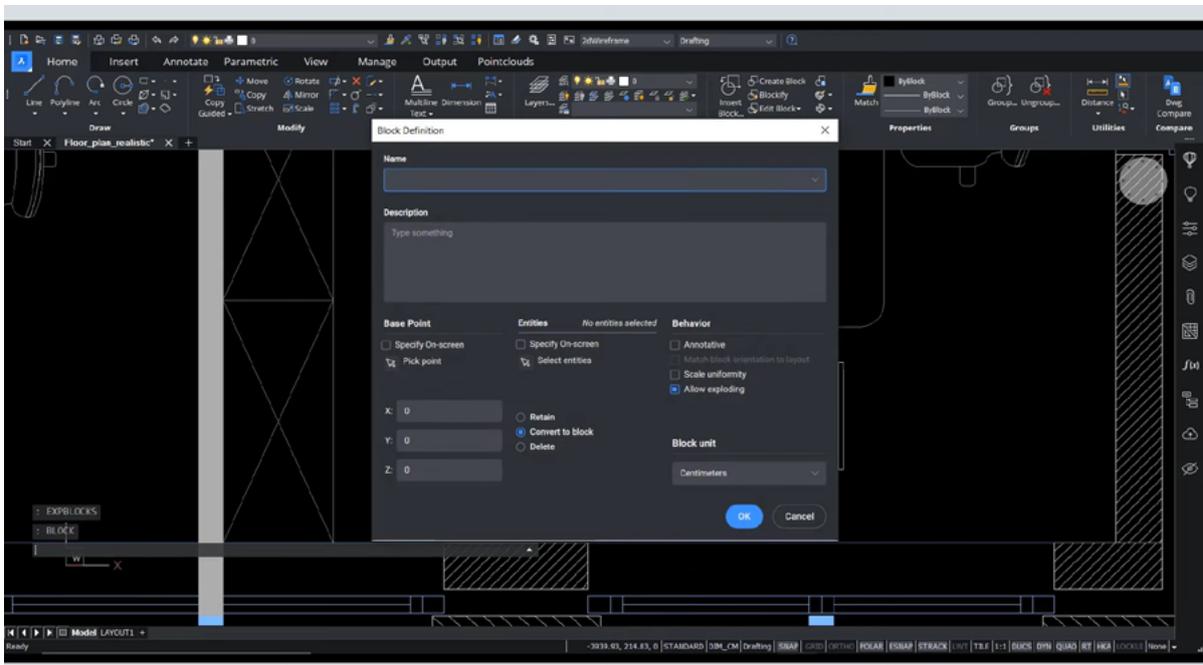
Next to the BLOCKIFY command, there is the even smarter PARAMETRICBLOCKIFY command that identifies plain geometry as being a parametric variant of an input parametric block. The command replaces the plain geometry by a new parametric block instance of that input parametric block, with appropriate parameter values. Select the input geometry (a parametric block insert or a set of parametrized entities) and PARAMETRICBLOCKIFY will analyze the drawing. If matching geometry or block inserts are found, BricsCAD® will automatically convert these into new inserts of the input parametric block definition.

PARAMETRICBLOCKIFY recognizes geometry matching with one of the parametric possibilities (different visibility states, lengths, or widths), and converts it to a parametric block reference.

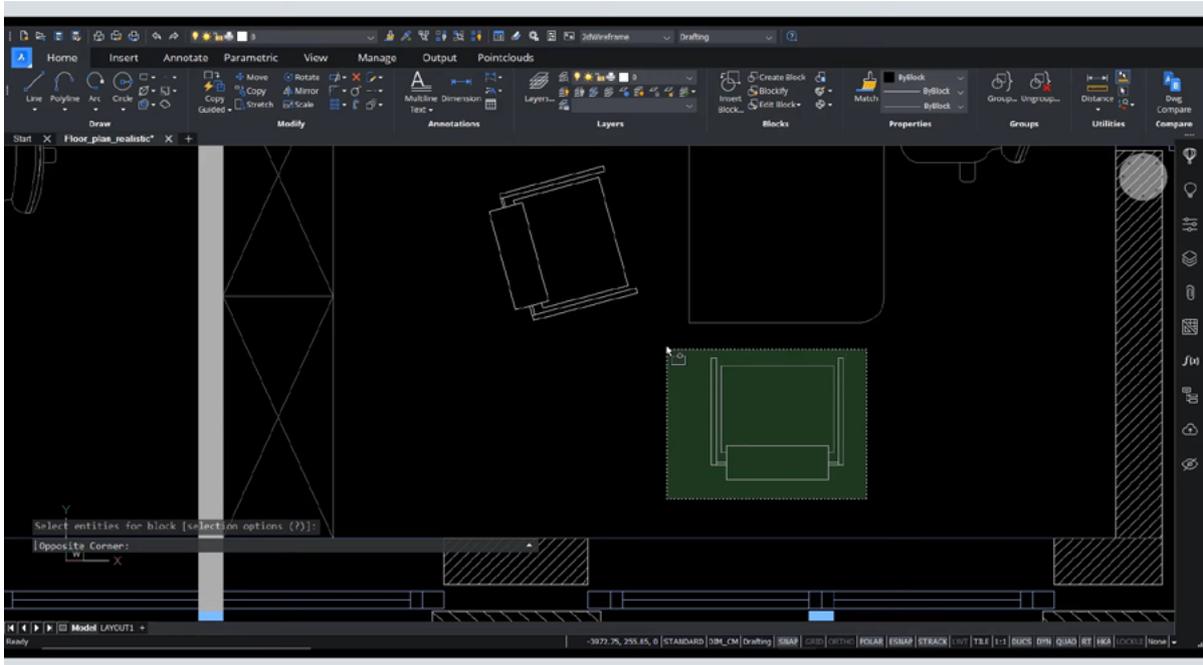
Creating a Parametric Block

Here is a quick example of turning a chair’s geometry into a Parametric Block. To create a Parametric Block, you can turn your geometry into a regular block first. This can be done using the BLOCK command, or adding it to your library using “+”. However, unlike AutoCAD®’s Dynamic Blocks, you can also work with your geometry and add meta-data simply in model space, and decide to put the geometry and meta data into a block (using BLOCK command or the Library Panel).

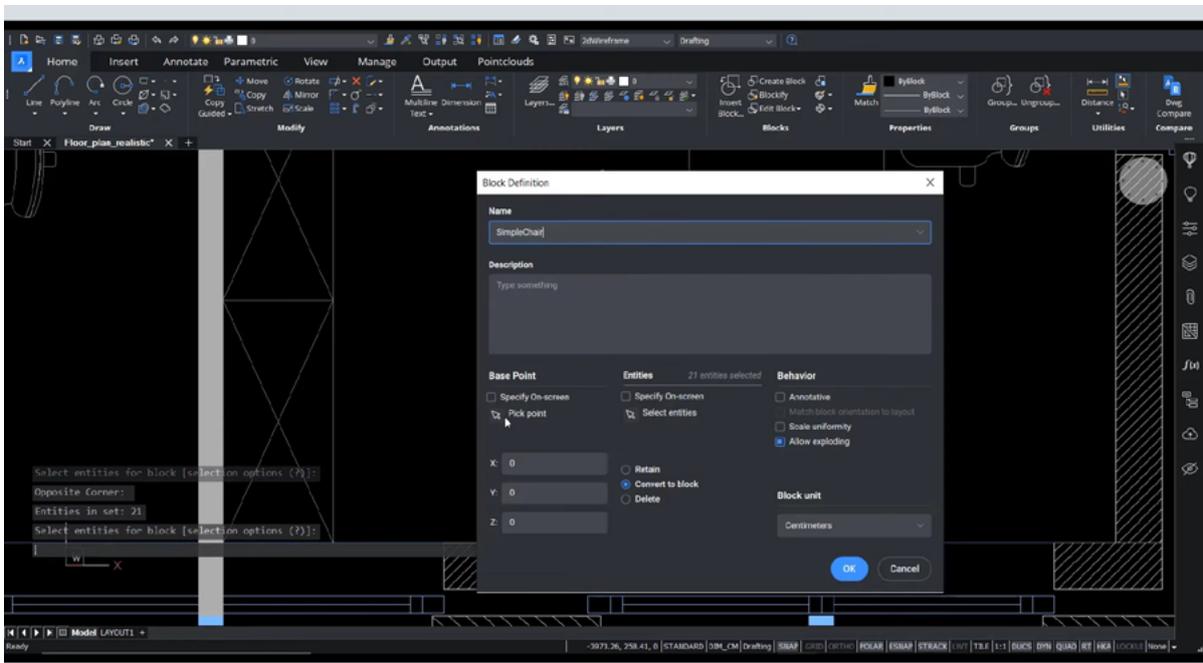
Step one: Create a Block using the “BLOCK” command



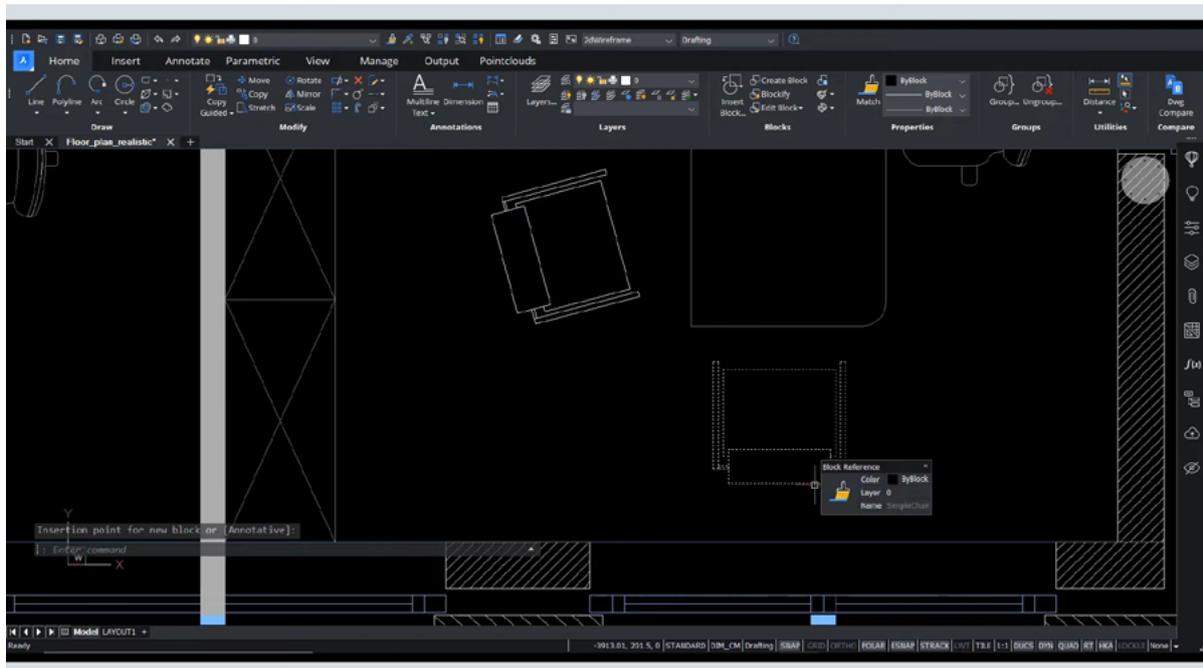
Step two: Select your entities



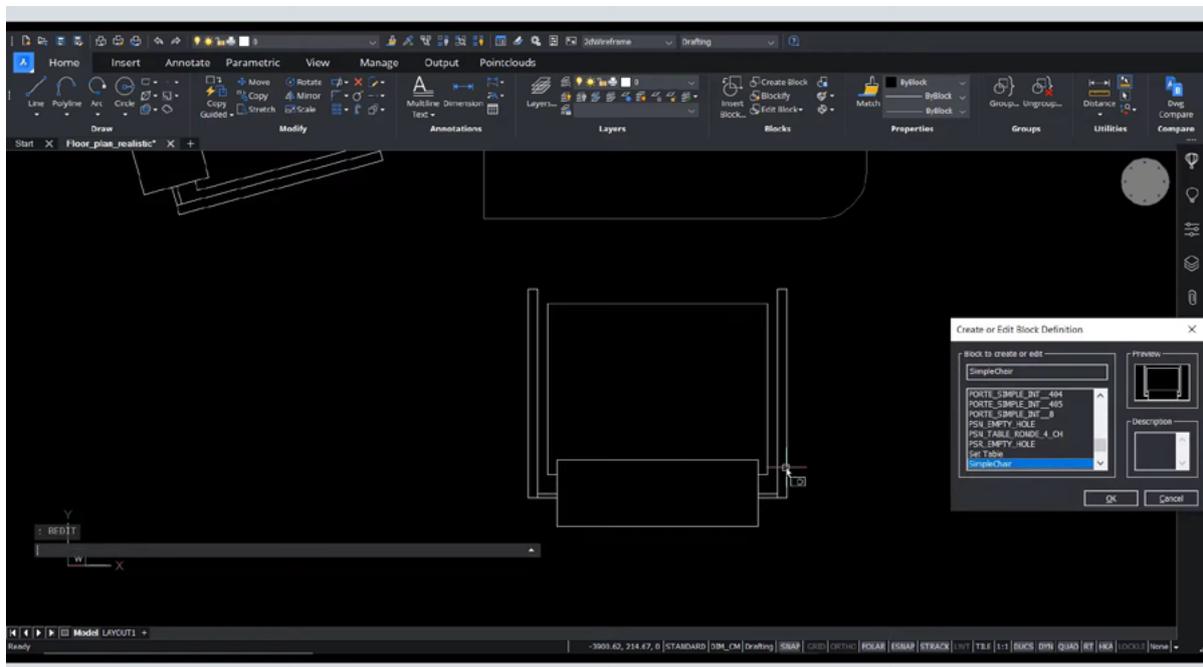
Step three: Specify a base point of the block



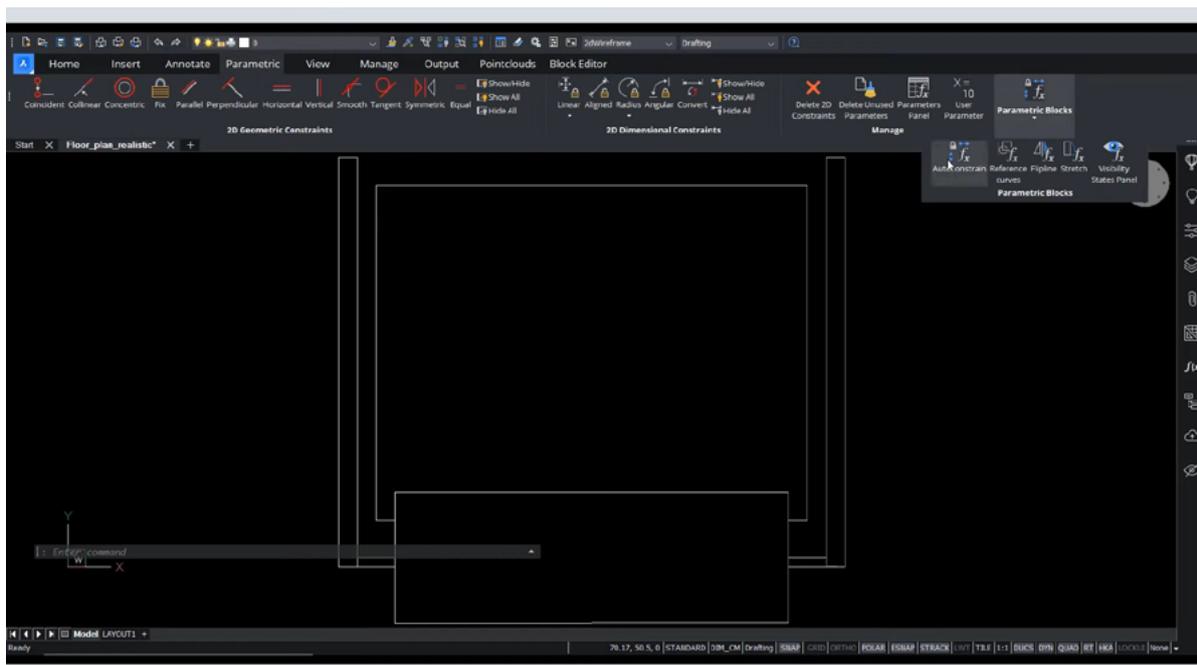
The Polylines are now inside a new Block definition and the original polylines are replaced by a block reference to the new Block definition.



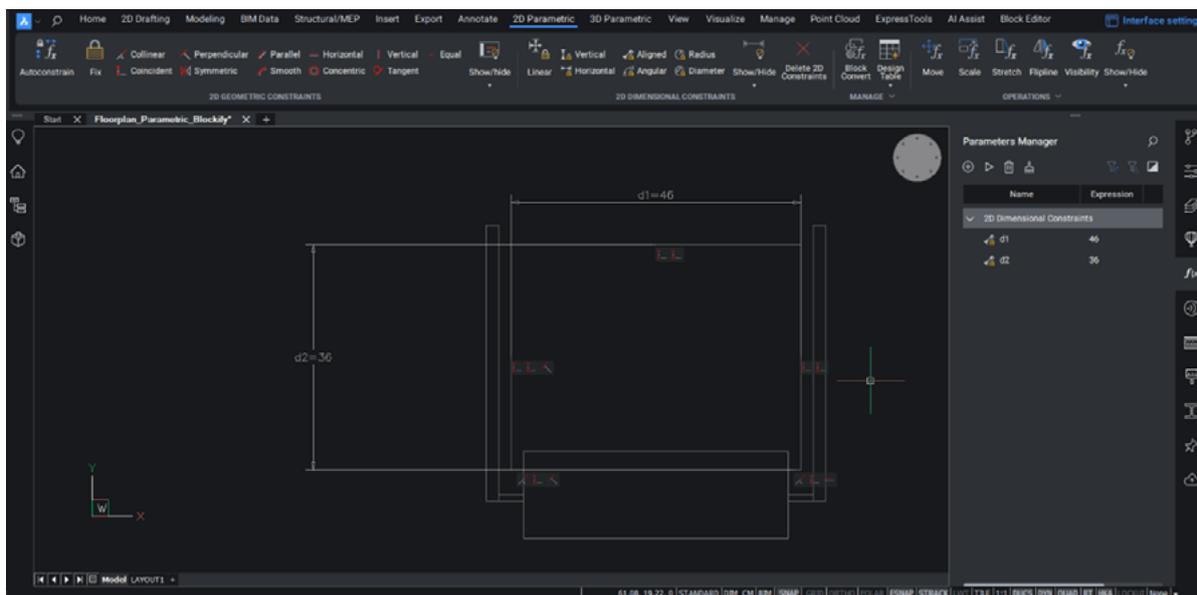
Step four: Enter the block definition to add Parameters using the block edit command "BEDIT"



Step five: In the Parametric Tab or in the Parameters Manager, you can automatically add constraints



Step six: You can view, rename, turn off and edit Parameters in the Parameters Manager



Step seven: Once you are happy with the changes, you can save the block in the block editor tab.

It's that easy to create a Parametric Block! Next you can create a design table for your Parametric Block to make it easy to have predefined options.



Need more support?

We have detailed tutorials, as well as hints and tips on using Parametric Blocks, that can be found online.

Bricsys® Help Centre

<https://help.bricsys.com>

The Bricsys® Blog

<https://www.bricsys.com/blog>

Bricsys® YouTube Channel

<https://www.youtube.com/bricsys>

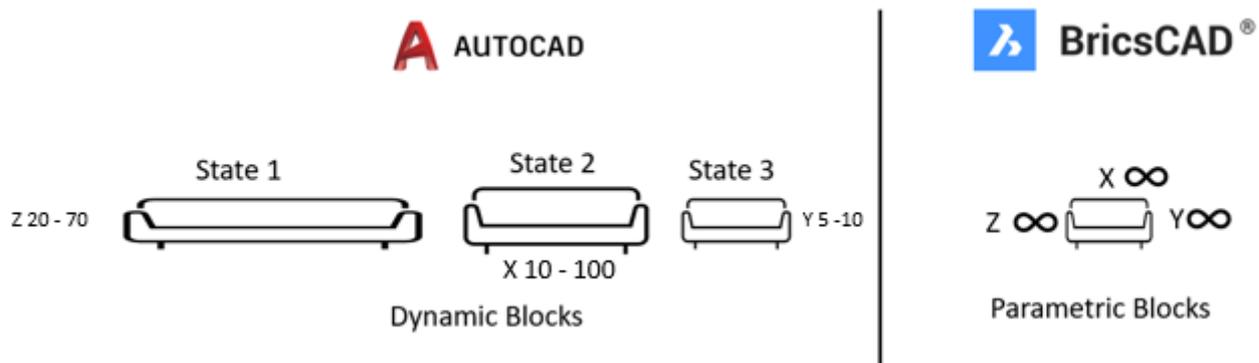
What's the difference between a Parametric Block and a Dynamic Block?

Firstly, Parametric Blocks can only be made in BricsCAD®, while Dynamic Blocks can only be made in AutoCAD®. However, the way CAD users apply them to their workflows is identical.

Most users migrating from AutoCAD® to BricsCAD will find using Parametric Blocks a familiar experience. However, Parametric Blocks include additional features and functionality that improve accuracy, productivity, and performance.

A better alternative to Dynamic Blocks

Parametric Blocks are more flexible than Dynamic Blocks, as the geometry is driven by unlimited compounding of parameters on a single definition of the geometry rather than multiple definitions of the geometry and limitations on parameters found in a Dynamic Block. Users can define an infinite number of parameters, as tightly or loosely as they want, linked to other parameters, different parts of the design, along an infinite range – all without the block structure breaking down. We also have additional functionality, including the ability to create multiple visibility parameters inside one parametric block. This flexibility saves time, improves performance, and provides complete versatility to the user.



BricsCAD is also more flexible in how we create Parametric Blocks. In AutoCAD®, you can only access the Dynamic Block parameters and actions from within the BEDIT mode. In BricsCAD, you can do that as well, but you can also just create your Parametric Block in modelspace.

By basing our Block technology on Parameters, BricsCAD has some tricks up its sleeves that will reduce file size and speed up performance. Our PARAMETRICBLOCKIFY command will search your drawing for all versions of your selected geometry, even if there is a difference in geometry lengths, replacing the geometry with a Parametric Block with the correct parameter values.

AutoCAD®'s Dynamic Blocks do offer some parametric constraints, however, these cannot be defined in AutoCAD® LT, while full Parametric Blocks are available in both BricsCAD® Lite and BricsCAD® Pro.

Do BricsCAD® Parametric Blocks have the parameters I use in Dynamic Blocks?

Comparing Apples and Pears.

When comparing Parametric Blocks and Dynamic Blocks it's important to note that the same functional outcome can be achieved by the user in both Block technologies but with a different approach. In some cases, there are direct interchangeable parameters between the two different kinds of blocks, while in others an alternative method is needed.

This different method is based on differences between the functionality of the two blocks, AutoCAD®'s Dynamic Blocks have separated parameters from actions, with the user applying a specific action to a specific parameter, this results in a rather complex matrix.

	Stretch action
Point Parameter	Stretch point action

As found in AutoCAD®

In BricsCAD, we simply have parameters.

To create the same outcome as a "Stretch Point Action" as found in a Dynamic Block, simply apply two Parametric Stretches to your geometry, one for the X direction and the other the Y.

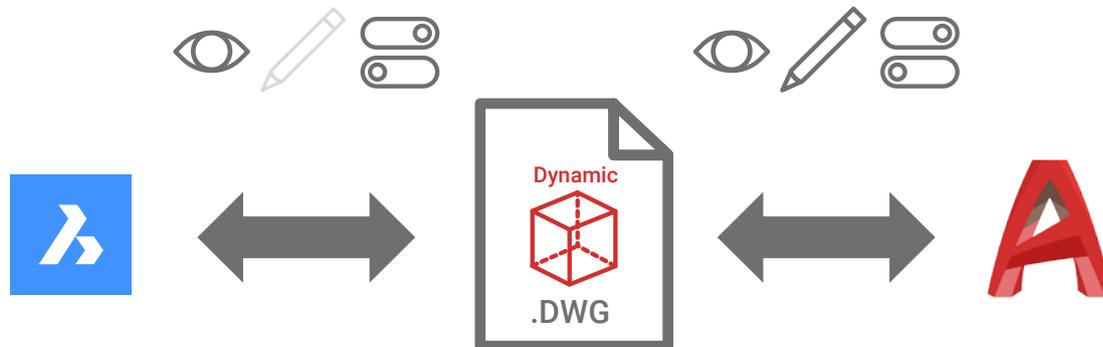
Dynamic Block Action	Linked Dynamic Block Parameter(s)	Supported in BricsCAD?
Visibility Controls the visibility of affected entities in the block.	Visibility Parameter.	YES – even multiple parameters while DBLOCKS can only contain one parameter.
Scale Controls the scale of affected entities in the block w.r.t. a base point.	Point, Linear, Polar, XY Parameters.	YES – BricsCAD® Parametric Blocks can contain a "parametric scale" – this corresponds with the Scale Action attached to a Linear Parameter. This operation is available since V24.2.
Array Controls the repetition of the specified (array source) entities in the block.	Linear Parameter, Polar Parameter, XY Parameter.	YES – arrays are native .dwg entities, so also supported when used in the context of a parametric block. By using other parameters in the expression of the array parameters, arrays can be made parametric.

Dynamic Block Action	Linked Dynamic Block Parameter(s)	Supported in BricsCAD®?
<p>Stretch Moves specific entities in the block (specified by a stretch frame) and stretches the entities of the block crossing the stretch frame.</p>	Point Parameter, Linear Parameter, Polar Parameter, XY Parameter.	YES – BricsCAD® Parametric Blocks can contain a “parametric move” – this corresponds with the Dynamic Block Stretch Action attached to a Linear Parameter. Polar Moves are not supported (yet). Moves attached to Point or XY Parameters can be represented in BricsCAD Parametric Blocks by two orthogonal Parametric Moves (one along the X-direction, the other along the Y-direction).
<p>Move Moves specific entities in the block.</p>	Point Parameter, Linear Parameter, Polar Parameter, XY Parameter.	YES – BricsCAD® Parametric Blocks can contain a “parametric move” – this corresponds with the Dynamic Block Move Action attached to a linear parameter. Moves attached to Point or XY Parameters can be represented in BricsCAD Parametric Blocks by two orthogonal parametric moves (one along the X-direction, the other along the Y-direction). Polar Moves are represented by two operations as well, where the X and Y Parameters are used in the expressions of auxiliary Polar Coordinate Parameters.
<p>Rotate Rotates specific entities in the block.</p>	Rotate Parameter.	YES – BricsCAD® Parametric Blocks can contain a “parametric rotate” – this corresponds with the Rotate Action attached to a Rotate Parameter.
<p>Flip Flips specified entities in the block w.r.t. a flip line.</p>	Flip Parameter.	YES – flip lines in BricsCAD.
<p>Alignment Applies to the entire dynamic block and is used during e.g. inserting; to align the dblock with other, existing geometry in the drawing.</p>	Alignment Parameter.	YES – the concept of reference curves in BricsCAD, used in the “Guided” option of the INSERT command and in smart tools like COPYGUIDED and MOVEGUIDED.
<p>Lookup Defines a custom property that you can set to evaluate a value from a list or table you define.</p>	Lookup Parameter.	YES – design tables in BricsCAD.

In V24, BricsCAD introduced Linked Operations; a feature similar to AutoCAD®’s Chained Actions, allowing users to link multiple parameters of a Parametric Block together.

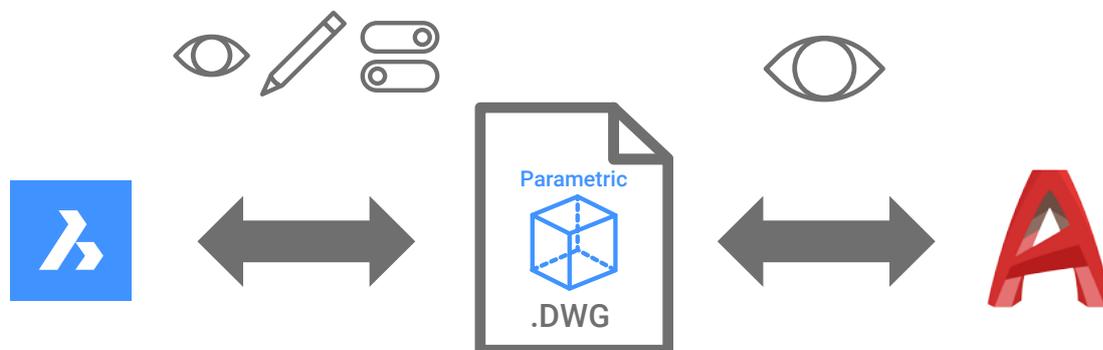
What's the interoperability between different Blocks and CAD software?

Using Parametric Blocks across CAD software



AutoCAD® does not support our innovative Parametric Blocks as they lack the functionality in their software to create and modify the parameters that we use to create Parametric Blocks. Files created in BricsCAD® containing Parametric Blocks can still be viewed in AutoCAD®, with the Parametric Block being displayed in its last defined state as a static block. You can continue to make changes to the rest of the .dwg file (excluding the Parametric Block object), this can then be saved and reopened back in BricsCAD.

Using Dynamic Blocks across CAD software



BricsCAD can change the states and parameters of Dynamic Blocks, selecting pre-existing options already defined in the Dynamic Block, however, you will not be able to edit the underlying block definition within BricsCAD. You can change the state and parameters of a Dynamic Block within BricsCAD which can then be saved within the .DWG file and can then be re-opened back in AutoCAD®. You may also notice that some of the user interface is a little different to what is found in AutoCAD®, but the ability to change between states and use grips is all there. All other .dwg based functionality is unaffected, with BricsCAD offering high levels of interoperability with the .dwg file format.

Why can't I fully use the Dynamic Blocks that I've created in AutoCAD® within BricsCAD®?

Dynamic Block are AutoCAD®-native objects This restricts all other CAD software, including BricsCAD, from being able to edit Dynamic Blocks in their CAD Software.

As Dynamic Blocks sit inside the .dwg file format which is a design file standard supported by the Open Design Alliance (ODA), this allows all compatible .dwg design software to be able to read and view Dynamic Blocks in their last visible state as well as make changes between pre-defined states. This means that you can use the existing parameters of a Dynamic Block in BricsCAD in the same way as you would do it in AutoCAD®.

Using Dynamic Blocks in BricsCAD

While you may not be able to edit your Dynamic Block definitions in BricsCAD, you can certainly use them and select different states of the block or use their existing parameters as part of your workflow.

All Dynamic Block Parameters are supported in BricsCAD*: Point Parameter, Linear Parameter, Polar Parameter, XY Parameter, Rotation Parameter, Flip Parameter, Alignment Parameter, Visibility Parameter, Lookup Parameter.

All Dynamic Block Actions, possibly attached to these parameters, are supported correctly in BricsCAD*: Move Action, Stretch Action, Scale Action, Array Action, Polar Stretch Action, Rotate Action, Flip Action, Lookup Action.

Parameter Type	Description	Supported Actions
Point	Defines an X and Y location in the drawing. In the Block Editor, looks similar to an ordinate dimension.	Move, Stretch.
Linear	Shows the distance between two anchor points. Constrains grip movement along a preset angle. In the Block Editor, looks similar to an aligned dimension.	Move, Scale, Stretch, Array.
Polar	Shows the distance between two anchor points and displays an angle value. You can use both grips and the Properties palette to change both the distance value and the angle. In the Block Editor, looks similar to an aligned dimension.	Move, Scale, Stretch, Polar Stretch, Array.
XY	Shows the X and Y distances from the base point of the parameter. In the Block Editor, displays as a pair of dimensions (horizontal and vertical).	Move, Scale, Stretch, Array.
Rotation	Defines an angle. In the Block Editor, displays as a circle.	Rotate.

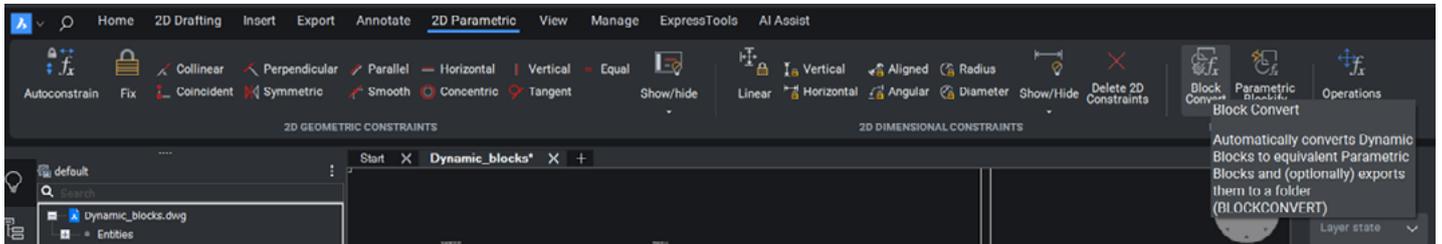
Parameter Type	Description	Supported Actions
Flip	Flips objects. In the Block Editor, displays as a reflection line. Objects can be flipped about this reflection line. Displays a value that shows if the block reference has been flipped or not.	Flip.
Alignment	Defines an X and Y location and an angle. An alignment parameter always applies to the entire block and needs no action associated with it. An alignment parameter allows the block reference to automatically rotate around a point to align with another object in the drawing. An alignment parameter affects the rotation property of the block reference. In the Block Editor, looks like an alignment line.	None (The action is implied and contained within parameter).
Visibility	Controls the visibility of objects in the block. A visibility parameter always applies to the entire block and needs no action associated with it. In a drawing, you click the grip to display a list of visibility states available for the block reference. In the Block Editor, displays as text with an associated grip.	None (The action is implied and controlled by visibility states).
Lookup	Defines a custom property that you can specify or set to evaluate a value from a list or table you define. It can be associated with a single lookup grip. In the block reference, you click the grip to display a list of available values. In the Block Editor, displays as text with an associated grip.	Lookup
Base	Defines a base point for the dynamic block reference relative to the geometry in the block. Cannot be associated with any actions, but can belong to an action's selection set. In the Block Editor, displays as a circle with crosshairs.	None

*While we have undertaken extensive testing to ensure interoperability and are confident in a user's ability to use Dynamic Blocks in BricsCAD, we have found rare instances (<1%) where a block is unusable. After investigating, we found that some Dynamic Blocks can be created in many ways, some of which can result in an unstable block which limits its use in BricsCAD.

How to convert your Dynamic Blocks to Parametric Blocks?

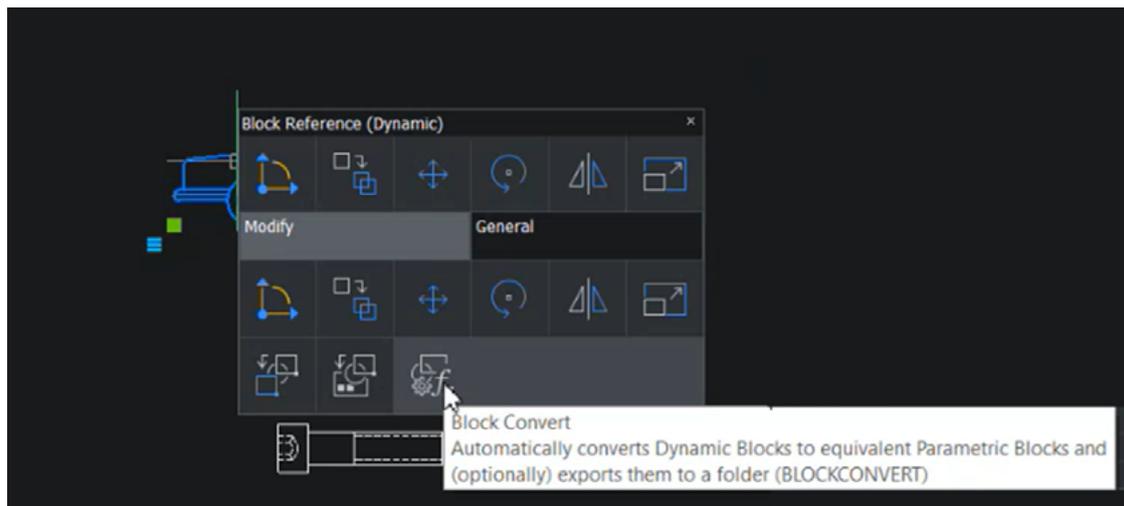
As explained in this guide, we are unable to edit the underlying geometry of Dynamic Blocks, however, we have introduced new functionality to support the automated conversion of Dynamic Blocks to Parametric Blocks in three easy steps.

Step one: Launch the BLOCKCONVERT Dialog

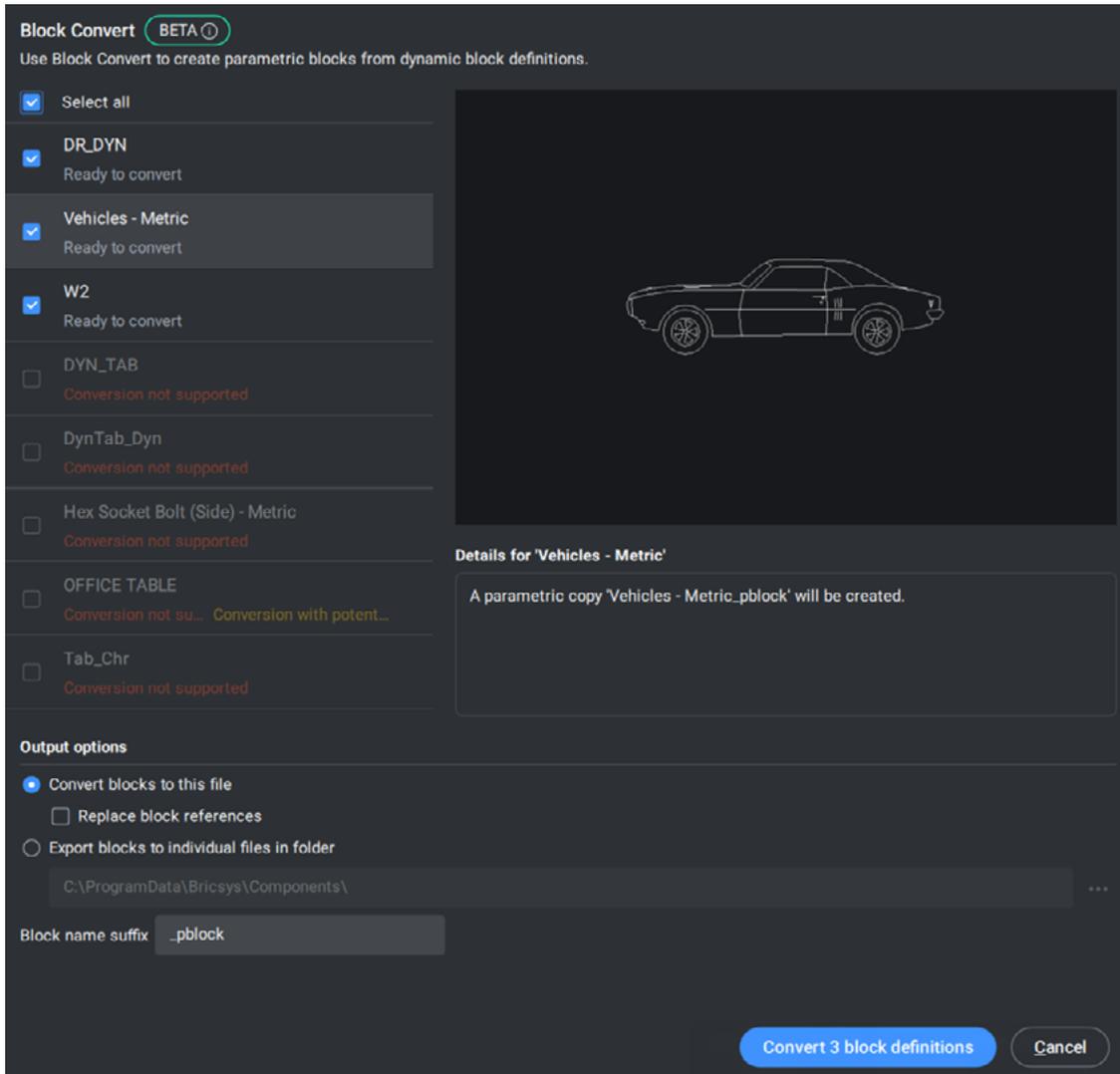


You can launch the BLOCKCONVERT dialog either through the command BLOCKCONVERT or by clicking on the parametric tab in the ribbon followed by clicking on BLOCKCONVERT in the Parametric Blocks ribbon panel.

The command can also be accessed from the Quad when selecting one or multiple dynamic block references.



Step two: Select which blocks you want to convert

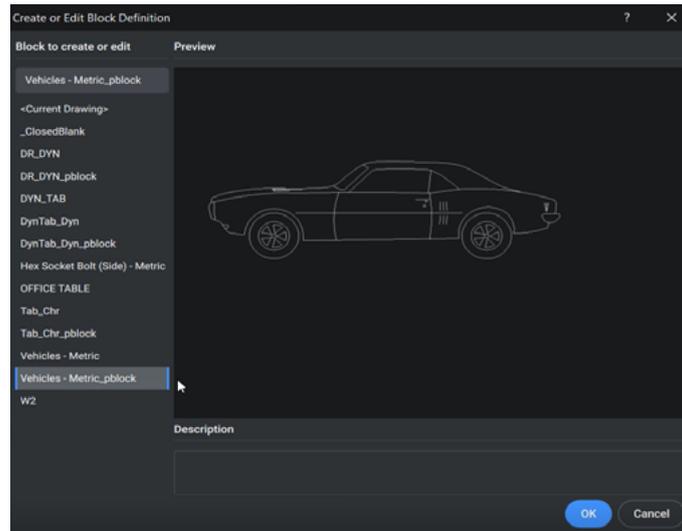


The tool will search for all Dynamic Blocks definitions in your drawing, listing them in the BLOCKCONVERT Dialog. In the dialog, you will see a preview of one specific block on the right-hand side, with a list view of all existing Dynamic Blocks in the drawing on the left. You can then select the Dynamic Blocks you wish to convert to Parametric Blocks.

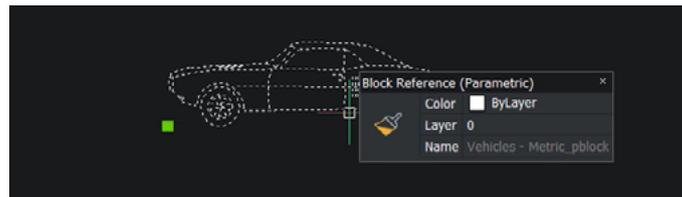
The tool will indicate which Dynamic Blocks can be fully converted into Parametric Blocks, fully replicating their original functionality. Some dynamic blocks may not be supported for conversion (yet), while others might be partially supported for conversion. The partially supported blocks may yield some unexpected results, but not enough to block the conversion. An advisory message will notify you of this.

Within the dialog box, you can also choose to replace all references to the original Dynamic Blocks in model space, with references to the new Parametric Blocks.

Step three: Click convert



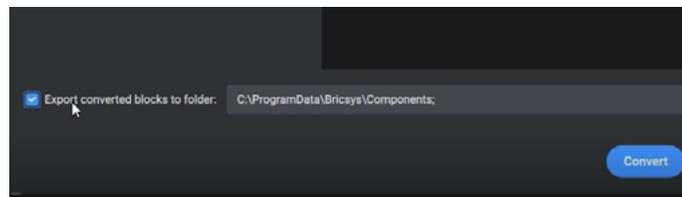
Then, it's as simple as clicking convert, and all your selected Dynamic Blocks are instantly recreated as new Parametric Block entities. This leaves the original Dynamic Blocks unchanged. Using the BEDIT Command or the Drawing Explorer, you can then see all the new blocks with the “_pblock” extension on the original block name.



These blocks can then be inserted into your drawing and edited like any other Parametric Block.

Automatically add your blocks to your library

As another output alternative, you can click the check box at the bottom of the Parametric Block Assist Dialog before clicking convert. This will export all your new Parametric Blocks to a folder location of your choice.



And that's it. Simply convert all your Dynamic Blocks, fully and automatically to Parametric Blocks.