

## Asymmetric Bending

### Bending Members: Surprises with Izy Not Zero

We recently made significant fixes in [VisualAnalysis 10.0](#) to improve accuracy and modeling behavior. We changed the default orientation of single-angles, zees and spandrel members. With Asymmetrical shapes, the bending stress equation includes Izy terms that are not zero. This bending "behavior" was not fully accounted for in prior versions of VisualAnalysis. We were transforming stresses **after** analysis, in the design checks, to get reasonable design-check results. However, analysis deflections and stresses were just not accurate enough. See the picture below for an idea of how much out-of-plane deflection you can get for a cantilever that is rotated off it's principal axis. (This ruler is very weak in the horizontal direction to illustrate the point.) Real structures will often have other constraints to prevent this kind of motion and the result may be just a slight twist in the member.

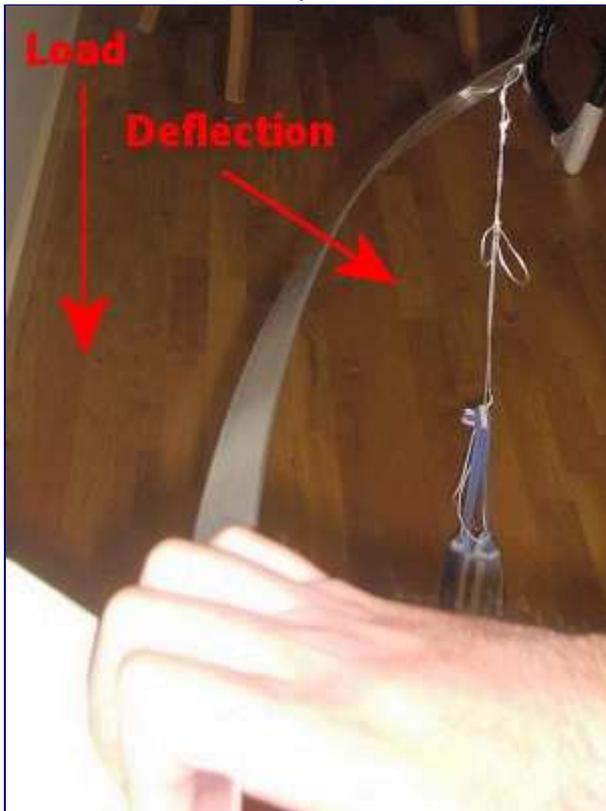
Here is the complex bending expression that we often see in a simplified form.

$$\sigma_x(y, z) = -\frac{(M_z I_y + M_y I_{yz})}{I_y I_z - I_{yz}^2}y + \frac{(M_y I_z + M_z I_{yz})}{I_y I_z - I_{yz}^2}z$$

(Izy == Iyz. For a bending-theory refresher: [en.wikipedia.org/wiki/Bending](http://en.wikipedia.org/wiki/Bending))

We commonly ignore the Izy terms for symmetric shapes or where Iz and Iy are Principal properties. The essence of the problem is that the local y-z axes on the members in VisualAnalysis are **presumed** to be the Principal Axes throughout the system, and the shapes with Izy != 0 were not handled consistently with this assumption, reporting geometric properties, instead.

### A Metal Ruler Cantilver, when Rotated:



In other words, as convenient as the old member orientation was, it was also wrong. By definition in VisualAnalysis, the y-z local member system are Principal Axes. So while the "cost" of including this change is high, the cost of not including the proper calculations for the bending stress could be catastrophic. We have tried to make it easy to set the beta angle = -alpha, by displaying alpha in the **Modify** tab. For your existing saved "Space Frame" projects, we will automatically adjust beta so that the member orientations remain the same when read into the new version. Unfortunately "Plane Frame" projects are artificial simplifications of reality, so don't have a beta angle available and therefore do not get this automatic fix-up when reading into the new version. (We do not recommend plane frame models, even for essentially 2D problems, because of their limitations for member orientations and out-of-plane bracing and behavior that are just not realistic.)

VA 10.00.004 and newer are calculating the correct bending stresses for the angles. The AISC design checks are also more accurate for single angles (and Zees) with this change, and they are faster as they no longer need stress transformations between local and principal axes. We recommend that everyone use the latest build.

We intend to improve the situation by automatically rotating single-angles to a more 'normal' orientation, somehow, but we cannot re-define the z-y axes definition. We haven't yet done this as it involves significant code changes and testing that are best done during an "upgrade" cycle vs. an "update".

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## Top Support Answers

### Answers to Questions You May Have

#### **Q. Members disappear, or the screen goes black. Is this normal?**

A. This is not normal. VisualAnalysis should look great and behave properly. If you see any of these things or other 'weird' behavior in the graphics, the chances are great that you need to update your video-card-driver. This is software created by the video card manufacturer and is often not part of Windows update. Even brand-new machines might have a driver that is obsolete. For more detailed help on updating your video card driver or fixing weird VA graphics, please visit our [FAQ Answers](#).

#### **Q. VisualAnalysis toolbars have disappeared! How can I get them back?**

A. If you cannot find the buttons or the load-case drop-down, or the Project Manager you need to reset the toolbar locations. Exit VisualAnalysis and restart it while holding down the Shift key on the keyboard. The toolbars will return to their default locations.

#### **Q. I have a new machine, how can I install my IES software on it?**

A. Easy. Find your license key email (from your last purchase or maintenance renewal) and save it in a text file and get it to your new machine. Follow those instructions on your new machine. If you cannot track down your latest key email, please email 'sales@iesweb.com' to request a replacement license key.

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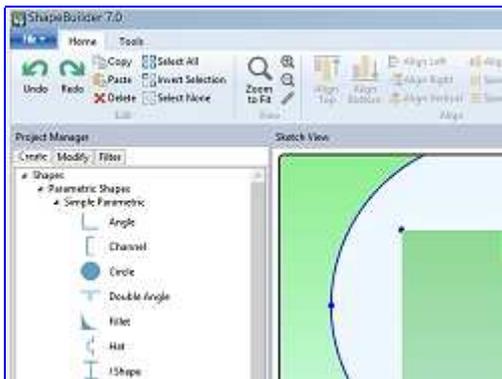
## ShapeBuilder 7.0

## Big Improvements on the Way

IES Engineers have been hard at work for months preparing a completely revamped version of [ShapeBuilder](#) to make the job of calculating section properties for unusual shapes all that much faster and easier. The entire code-base is being rewritten with modern technologies and testing methods for the ultimate in stability and performance. We should have a beta-test version available this summer, until then, here are some of the things you can expect in the forthcoming release:

### Multi-Threaded Operations

The new version leverages your multiple-core processor and also uses multiple 'threads' to perform tasks in parallel and in the background for superior processing performance.



### Streamlined Workflow

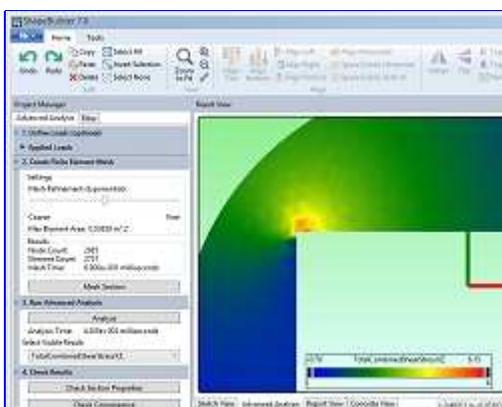
Holes and embedded shapes (such as rebar in concrete) are far easier and more flexible to work with. You can move and resize these parts of a shape without any special procedures or "merging". Holes can partially overlap other parts to create notches or cut-outs and the 'remainder' of the hole is ignored automatically.

### Advanced FEA Mesher

We are using a much more sophisticated mesher for advanced analysis with nearly instantaneous results and finer control over how many elements you get. This makes the process of mesh refinement far easier and more robust than it was in version 6 and prior, where it was guess and a long wait.

### Updated Shapes & Materials Data

We are updating all of the IES databases with the latest published shape and material data available for structural engineers. This is data from AISC, NDS, AISI, etc.



### Cleaner User-Interface

We are trying to simplify and modernize the way our applications present themselves to first-time users as well as for seasoned experts. Rather than small, mysterious toolbar buttons, we are following Microsoft's lead with the 'Ribbon' style buttons that are easier to find and use.

Watch for more details regarding what's new and a beta-test, coming soon. By the way if you have ideas or complaints about ShapeBuilder 6.0, you should let us

## VA Tips & Tricks

### Improve Your Productivity!

Over the years, IES has offered a number of free [training webinars](#) to help customers get up to speed with our products.

### VisualAnalysis Training

There are many videos on VisualAnalysis features and techniques. All of these short (20-45 minute) training videos are available online for your viewing and learning pleasure. If you have a slow day, take a minute to learn how to better leverage your favorite analysis and design tool by watching one or two of these. You can quickly master things like:

- Selection & Filtering
- Modeling in 3D
- Model Generation & Copy
- Plate Element Theory
- Using Areas Effectively
- Managing Load Cases
- How Design Groups Work
- Customizing Reports

A few minutes with these videos might save you hours on your next project and help you to better impress your clients with your accuracy and efficiency.

We have a [VisualAnalysis Training](#) page on our web site that lists the training videos by various categories. The videos are also hosted at [youtube.com/ieswebdotcom](https://youtube.com/ieswebdotcom) if you prefer browsing and searching in that environment.

### Training for All IES Products

There are also videos available for other IES products, just not so many. Find them as a tab on the main product's page.