



# Virtual Work

November 2006

iesweb.com Newsletter

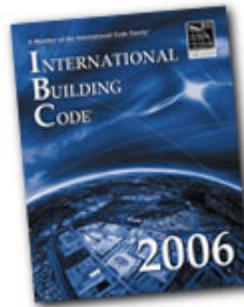
Volume 12.11

## VisualAnalysis 6.0 and IBC 2006

*Making the world a safer place!*

Designing structures is a nontrivial task, fraught with all sorts of complications, requirements, and especially frequent changes in these requirements. We are reminded of this every day at IES as we look at the "Big Picture" of structural engineering and try to create general-purpose solutions that help you in your work, while not preventing other engineers from doing dramatically different types of models. As the [IBC](#) becomes a more consistently adopted throughout the US, we at IES have been slowly adding more support for it and the standards it references. VisualAnalysis 6.0 will represent a giant leap forward in this respect, especially with support.

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respect to [ASCE 7-05](#)



But at the same time, not everyone is according to IBC 2003 or 2006. VisualAnalysis excellent tool for those out-of-the-ordinary working hard to make supporting the building code more automatic **without forcing you into a very small black box** solution that only works for certain types of jobs.

designing an office building has always been an structures and we are

Here is a preview of some of the engineering enhancements that are coming soon, most of which are designed to help you meet the requirements in IBC 2006. Others are just to help you work more efficiently.

### New Reports: Drift, Connection Forces, Stability

We are working on reports to help with the additional design needs you have for connections, and seismic analysis. Reports include building drift calculations, and diaphragm drift and stability calculations.

One highly requested feature is a connection-forces report. There has been a lot of discussion about how to create this report, and we have decided on a report that is both detailed and concise. This report includes up to twelve lines for each member in your model, but it summarizes the extreme force ranges as well as the actual force combinations that exist.

For example, the report below shows a few lines from this report (still in development). The first two lines show the extreme Mz moments plus the 'associated' other direction forces on the connection in the same result case.

### Member Connection Force Results

Member	Result	Extreme	Fx	Vy	Vz	Mx	My	Mz
	Case	Value	K	K	K	K-in	K-in	K-in
BM1	Example 10	+Mz	0.00	40.40	0.01	5.53	5.53	9.53
BM2	Floor Load	-Mz	0.00	-200.55	0.00	0.02	0.02	-3.02
BM1	Example 10	+Mx	0.00	40.40	0.01	<b>5.03</b>	<b>5.53</b>	<b>5.53</b>
BM1	Example 10	-Mx	0.00	40.40	0.01	<b>1.03</b>	<b>5.53</b>	<b>5.53</b>
BM1	Floor Load	+Vy	0.00	<b>193.94</b>	0.00	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>
<i>etc...</i>								

This report will help you design connections for the "controlling" conditions. For example, a wind load combination may result in the highest moment in a connection, but the axial force may be relatively small. Conversely, a seismic

load combination may result in a large axial force in the connection, but the moment is only an intermediate value. The connection design report lets you size the connections for both conditions.

For larger projects this report could quickly grow unwieldy, so a condensed version will also be available listing absolute extreme values of forces on a single line per member, providing a crude envelope for your connection design work. In the previous example this would mean conservatively designing the connection for both the maximum moment and the maximum axial force, even though they do not occur simultaneously.

### Rigid Diaphragm Loading

You will be able to add in-plane loads to a rigid diaphragm and locate those loads at any point on the diaphragm. This could be a "quick & dirty" way to apply statically equivalent seismic loads, or take care of other in-plane loads that are distributed by a floor diaphragm.

### ASCE 7 Seismic Load Combinations

ASCE 7 has introduced some very nice complexity into the building code load combinations whereby the innocent-looking equation:

$$1.2D + 1.0E + L + 0.2S$$

really works out to something like the following, when you consider loads from two seismic directions, and the +/- nature of the vertical seismic components, as well as the overstrength combinations:

$$\begin{aligned} &1.2D + \rho_x Q_{ex} - 0.2S_{ds}D + L + 0.2S \\ &1.2D + \rho_x Q_{ex} + 0.2S_{ds}D + L + 0.2S \\ &1.2D + \rho_z Q_{ez} - 0.2S_{ds}D + L + 0.2S \\ &1.2D + \rho_z Q_{ez} + 0.2S_{ds}D + L + 0.2S \\ &1.2D + \Omega_x Q_{ex} - 0.2S_{ds}D + L + 0.2S \\ &1.2D + \Omega_x Q_{ex} + 0.2S_{ds}D + L + 0.2S \\ &1.2D + \Omega_z Q_{ez} - 0.2S_{ds}D + L + 0.2S \\ &1.2D + \Omega_z Q_{ez} + 0.2S_{ds}D + L + 0.2S \end{aligned}$$

VisualAnalysis 6.0 will make this easy by allowing you to define the structure-wide parameters and then generating the appropriate combinations automatically.

## Batch VisualAnalysis: Beta Test

*A command-line feature is added for testing purposes.*

[VisualAnalysis 5.5](#) just got a little bit more flexible, more UNIX-like, and can now play "old school" software games. We are referring to a command-line feature that allows direct "behind the scenes" processing: input, analysis, and output from a batch script, or from calls in other software products. We have implemented this feature as a [beta test](#) to allow customers to play with it, check for problems, and offer suggestions.

### November 15 - December 30, 2006

This test is currently open to anyone with a VisualAnalysis 5.5 standard or advanced license, or running a free-trial. The full extent of the documentation for this feature follows.

VisualAnalysis 5.50.0020 now has the ability to operate in a command-line, or batch mode. You can run VisualAnalysis directly from the command line, or through some other program in a batch-processing mode to import a STAAD file, run a static linear analysis on the model, and output a report of some kind.

#### EXAMPLE

```
C:\>VisualAnalysis55.exe -i:c:\path\myfile.std -o:c:\path\results.txt -r:3
```

#### PARAMETERS

```
-i:input (.std or .pol) file name (a full path is required)  
-o:output file name (a full path is required)  
[-r:#] (optional, where # = 1..9 representing a 'report style' index)
```

The executable file must be in your PATH environment variable, or you must specify the path to the .exe file on the command line.

## INPUT FILES

Valid input files currently consist of .POL or .STD files.

You can create one of these files interactively in VisualAnalysis by creating or opening a project. To create a POL file, use File | Save As..., change the file type to POL and change the file extension from .vap to .pol. To create a STAAD file, you can use the Tools | File Transfer menu item, export and choose the .std file type.

**Note:** When VisualAnalysis exports to a .POL and .STD there is a chance that VisualAnalysis will not directly read that file! That is, we support writing more information than we support reading, in some cases. You may need to manually edit or remove features from the file before it can be successfully read back. Also, information will be lost when you save a project to the old script formats as not all features are supported! For example, smart member names are converted to numbers.

## OUTPUT FILES

The default output from a batch processing run is simply a tab-delimited text report, with certain hard-coded tables. This may change during or after the test, based on customer feedback! The report style option uses the report styles you have defined on your machine. You can edit report styles using the interactive mode of VisualAnalysis using Report | Manage Report Styles. Only the first nine styles listed in this box are available for batch processing.

## NOTES

It is best to test STAAD file import interactively to get the best diagnostics for errors in parsing, etc. Once you are comfortable with how it works, you can try the batch approach with your files.

There is currently NO design support, just analysis.

IES is not making any guaranteed 'incentives' available for this beta test program, though your participation could help determine what options are available. Please report problems and feature ideas directly to IES technical support.

## A Tale of Two Footings

*Why two tools? Which to use?*

IES currently has two spread footing design tools. There is one built in to [VisualAnalysis 5.5 Package](#) (as part of the [VisualTools](#) add-on) and there is also [QuickRFooting](#), a stand-alone product that can also be used in conjunction with VisualAnalysis.

### The Old Footing Report

The reasons for the two tools are numerous, but don't really matter much. The footing tool inside VisualAnalysis is the old, and QuickRFooting is the new.

Given a choice, you should always choose QuickRFooting. The only reason the old tool still exists is because some customers may depend on it and we didn't want to force anyone to upgrade.

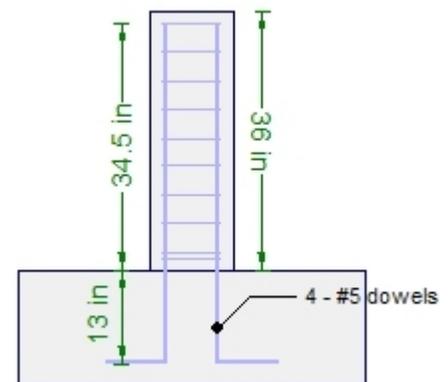
### New Codes, New Options

QuickRFooting 1.0 is up to date with current building codes, ACI and also supports Canadian design checks. Beyond that, it is significantly easier to work with, saves its results, creates stunning reports, and provides **Transparent Reporting™**.

### Translation Issues

QuickRFooting can import results from VisualAnalysis as loading data to use for a footing design. This is a fairly straightforward process, but not completely automatic. QuickRFooting currently does not have built-in support for 'directional' wind or seismic loads. And VisualAnalysis 5.5 does not automatically organize the loads properly for QuickRFooting, so you will end up with both +X and -X loads in the same load set in QuickRFooting.

We intend to improve this, in one way or another in the near future, but until then you can use QuickRFooting's ability to copy a load set to "split" the two directions into two distinct loadings.



## VA 5.5 Update

### New Features & Fixes

Murphy's law for computer science may be stated thus:

*"The day after you release a software update, a major defect will be discovered by your customers."*

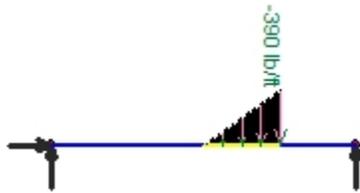
So [VisualAnalysis 5.50.0020](#), published on November 15th, is no exception. This update offers a couple nice features, a batch-file option, and some really nice fixes (this implies unpleasant defects, eh?)

### DAD Award

Our thanks go out to Mr. Steve Brackman at *Beaudette Consulting Engineers*, for winning this month's

### *"Day After Defect Award"*

for which he earns absolutely nothing beyond his allotted 15 minutes of fame. He discovered some strange behavior in a model that contained a load that looked innocent enough:



This causes some rather goofy looking results in VisualAnalysis. (Steve's model was significantly more complex than this, by the way, we had to dig a little to uncover where the problem was exactly.)

### Add Another Test Case!

Turns out that VisualAnalysis chokes on this load if the following conditions are met:

- Linear Load
- Partial Member Length
- Triangular Load
- Starts at Zero Magnitude

Any variation on this and the load is handled properly. If you apply a load like this you will know immediately when you see the results, as the member goes *to infinity and beyond!* The easy workaround is to use a small, nonzero magnitude at the start of the load, say 1 lb/ft.

We have fixed our "divide by zero" problem and the correction will appear in our **next** update.

## Happy Thanksgiving

### From the engineers at IES

