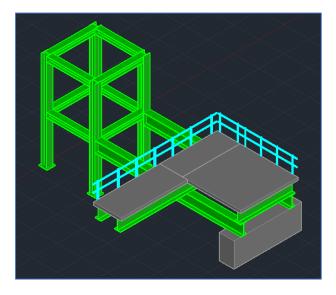
DESCRIPTION

This add-in (CG-testing.DVB, as of December 2019) for AutoCAD (tested on AutoCAD 2018) is used to locate the Center of Gravity of a 3D model, composed of a single or mixture of material elements.



Note that this add-in only works with 3D solid elements (not 3D surfaces), as defined by AutoCAD.

And note that the VBA includes very limited error handling, right now.

SETUP

Copy the *.DVB file from the office server to some location on your local drive:

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Also, this add-in was written in VBA. Autodesk no longer includes a VBA module with their standard AutoCAD distributions. To be able to use this add-in, go to the AutoCAD website and download the Microsoft VBA Module for AutoCAD:

https://knowledge.autodesk.com/support/autocad/downloads/caas/downloads/content/download-the-microsoft-vba-module-for-autocad.html

Produ	cts and versions covered •
Aug 08	2019 Download
	SHARE ≼ ADD TO COLLECTION •
To ins	tall the Microsoft Visual Basic for Applications Module (VBA) for Autocad, do the following:
1. Se	lect the appropriate download from the list below.
2. Cl	ose all programs.
3. In	Windows Explorer, double-click the downloaded self-extracting EXE file.
4. Ur	zip the file to the location of your choice, or use the default location.
5. Fo	llow the on-screen instructions.
For OE	M Developers:
The Vi	sual Basic for Applications (VBA) engine is no longer provided with your AutoCAD OEM installation media. Please contact your
Autod	esk ISV partner representative for more information.
2021	Downloads
	AutoCAD 2021 VBA module 64-bit
2020	Downloads
-	AutoCAD 2020 VBA module 64-bit

One the module is installed in AutoCAD, type the command <u>VBALOAD</u> and locate the DVB file on your local machine. Similar to LISP routines, this command just lets AutoCAD know where to find this add-in. This step may need to be repeated in each AutoCAD session (every time you restart AutoCAD).

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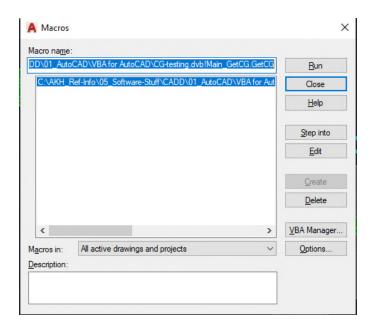
DRAWING SETUP – BEFORE RUNNING ADD-IN

The basic premise that this add-in works on is that each different material type is on a different layer. Actual layer / material names do not matter. As of right now, the material densities will be input by the user.

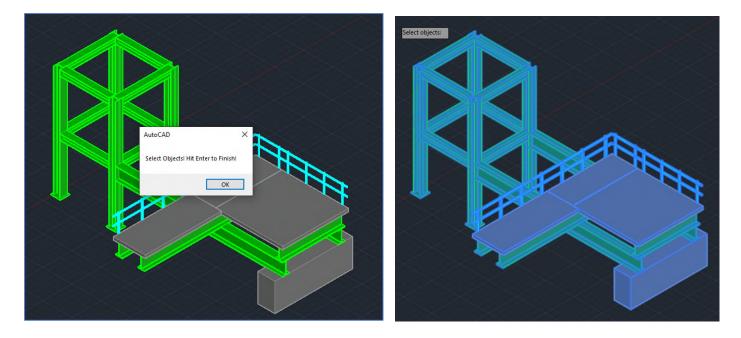
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ADD-IN USE

Once the model / drawing is complete, with each 3D solid member on the layer that represents it's material type, enter the command **VBARUN**. Select the previously loaded VBA routine. And select "Run".



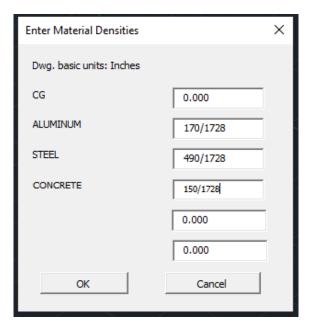
Select all of the 3D solid objects, of all different materials under consideration, and press "Enter".



Next, an input box will appear, listing all of the layers of the selected objects, as well as noting what the basic drawing units are (inches or feet, for instance). Now the user must enter the material densities that are to be assigned to each layer.

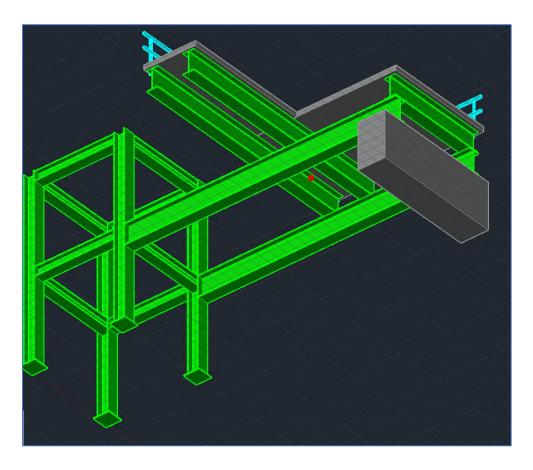
Right now, the add-in is only capable of handling 5 different layers / materials. If there are any layers that are of no interest, the unit density can just be entered as ZERO, so it will have no effect on the calculations.

Be aware of the units when entering. For instance Aluminum is typically $170 \text{ lb} / \text{ft}^3$, but the basic drawing units are in inches. So we have to divide $170 / (12^3 \text{ or } 1728)$ to enter the aluminum weight as lb / in^3.



After the unit densities are entered and "OK" is pressed, you will be asked for a location to save the calculated output as a *.CSV (comma separated values) file that can later be used by Excel or other software. And then you are asked to indicate a file name for the CSV.

Then the VBA routine runs, a **RED** sphere is placed at the calculated Center of Gravity of your model, and the CSV file is created. Note that the **RED** sphere is placed at the calculated GLOBAL coordinates of the CG.



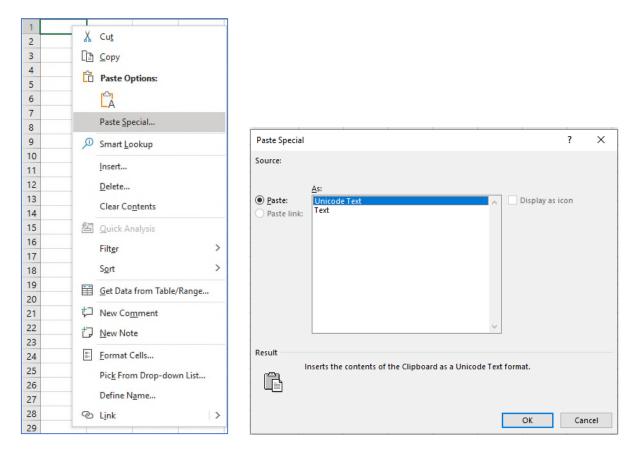
POST-PROCESSING - CSV

At present, the calculated data is saved as a *.CSV file, using a TAB delimiter between data fields. One way of viewing the data is to "manually" create an Excel table.

To do this, open the CSV file in a simple text editor like **<u>Notepad</u>** or **<u>Notepad++</u>**. Select all of the text and copy (Ctrl+C) it to the windows clipboard.

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6	2339707388336 AcDb3dsolid ALUMINUM 167.124516408949	
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	2877.55119570731	
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Then open a new **Excel** spreadsheet (or wherever you want to put the data). Right-click in a blank area and select "Unicode Text".



This will paste the raw data into Excel, but it is easily formatted and manipulated for your use.

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5	2242683369904	AcDb3dSolid	ALUMINUM	167.1	679.5	298.8	175.0	16.4	11,172.1	4,912.5	2,877.6	
7	2242683369840	AcDb3dSolid	ALUMINUM	49.1	589.6	327.5	175.0	4.8	2,847.9	1,581.7	845.4	
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9	2242683403216	AcDb3dSolid	ALUMINUM	43.4	588,4	406.8	170.6	4.3	2,514.3	1,738.2	729.0	
0	2242683403152	AcDb3dSolid	ALUMINUM	43.4	588,4	445.8	170.6	4.3	2,514.3	1,904.8	729.0	
11	2242683403088	AcDb3dSolid	ALUMINUM	43.4	588.4	367.3	170.6	4.3	2,514.3	1,569.4	729.0	
12	2242683403024	AcDb3dSolid	ALUMINUM	43.4	588,4	348.5	170.6	4.3	2,514.3	1,489.3	729.0	
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Included in the CSV are the following fields for each 3D solid element, as well as the calculated sums, are as follows:

- AutoCAD's ObjectID
- AutoCAD's ObjectName (type)
- Object's Layer
- Object's Volume
- Object's Center of Gravity (CG) in the Global X,Y, and Z axes.
- Object's Weight (based on user entered unit density)
- Object's Weight * CG in each axes

ALTERNATIVE POST-PROCESSING - CSV

Another way of viewing the data is to use an automated Excel data table. Open a new Excel workbook. From the <u>Data</u> tab, select **Get Data** \rightarrow **From File** \rightarrow **From Text/CSV** and select the CSV file that was just created by AutoCAD.

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Make sure that Tab is selected as the delimiter and that the data columns appear to be correct. And select "Load".

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2242683369776	AcDb3dSolid	4	LUMINUM	133.605192496247	589.58401674226	425.45000000001	175.01598325774	13.	
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2242683402768	AcDb3dSolid	F		43.4334901401817	588.415983257853	304.784016742313	170.60000000016	4.2	
2242683402704	AcDb3dSolid	4	LUMINUM	43.4334901401221	588.415983257738	484,784016742263	170.6	4.2	
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This will create a query table in Excel, which (in my opinion) can be difficult to format and work with.

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0 2242683403216		AcDb3dSolid	ALUMINUM	43.4334901401471	588.415983257756	406.784016742279	170.60000000006	4.27297067350984	2514.28424028485	1738.1761739923	728.968796900804
1 2242683403152		AcDb3dSolid	ALUMINUM	43.4334901401353	588.415983257741	445.784016742273	170.60000000003	4.27297067350868	2514.2842402841	1904.82203025864	728.96879690059
2 2242683403088		AcDb3dSolid	ALUMINUM	43.4334901401598	588.41598325778	367.284016742295	170.6000000001	4.2729706735111	2514.28424028569	1569.39383238918	728.96879690103
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4 2242683402768		AcDb3dSolid	ALUMINUM	43.4334901401817	588.415983257853	304.784016742313	170.60000000016	4.27297067351324	2514.28424028727	1302.33316529547	728.96879690142
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7 2242683403616		AcDb3dSolid	ALUMINUM	133.605192496247	589.58401674226	425.450000000001	193.01598325774	13.1440293543761	7749.50962293125	5592.12728881934	2537.0077498035
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