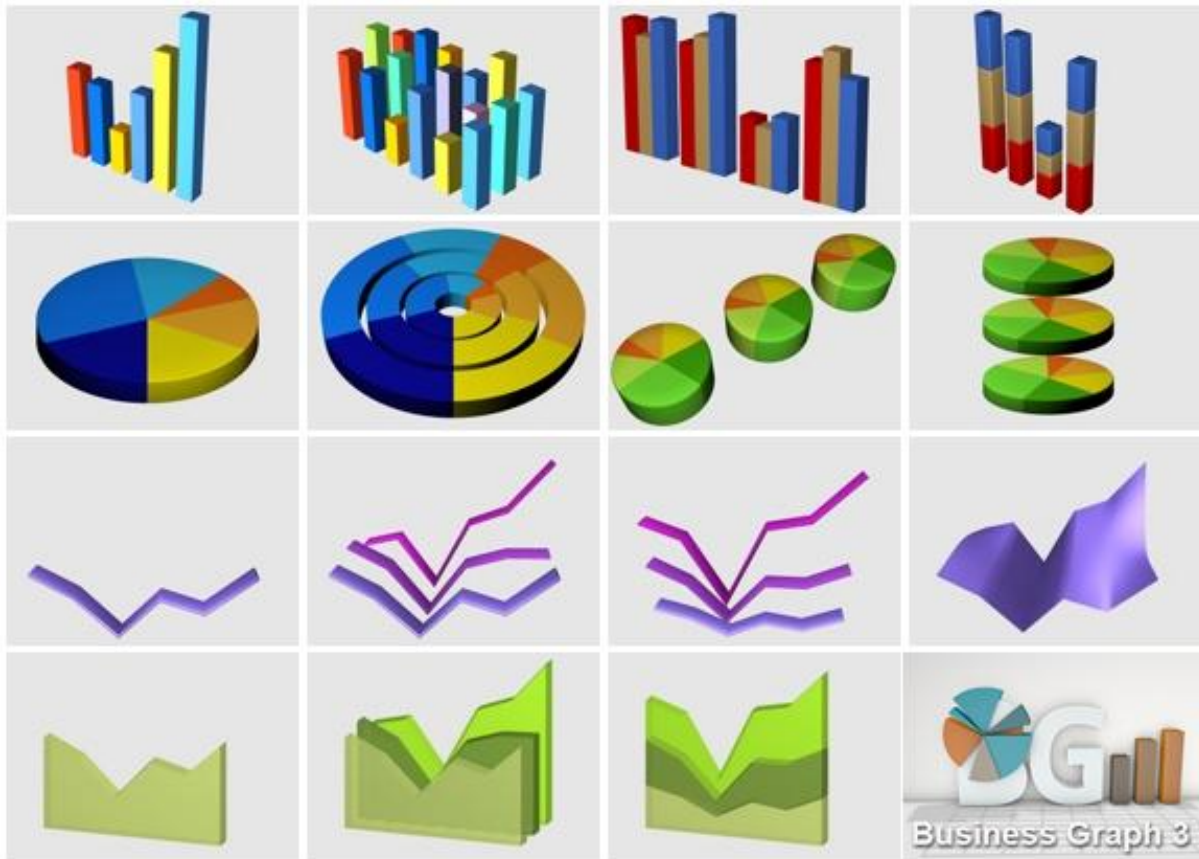# Business Graphs 3 (English)

**Business Graphs 3** is a 3DWeave plug-in for **MAXON Cinema4D.**

**BG3** creates graphs such as bar-graphs, pie charts, area graphs, surface graphs, line graphs, out of numerical values.



## Compatibility

**Business Graphs 3** only runs under **Cinema4D**, starting at version 13. Previous versions of the plug-in ran under older version of the software. However, the internal structure of Cinema4D has changed a lot since then.

The plugin which is programmed in **COFFEE**, one of **Cinema4D**'s script languages, will run similarly on both PC and MAC.

> *Note : this plug-in has not been tested with **Cinema4D LITE** bundled with **AfterEffect CC**.*

## Installing

Installation process is the same for the demo version and complete version.

Unzip the downloaded archive by preserving its directory structure. You will find a folder named "**BusinessGraphs_3**" in which two `.cob` files coexist with several sub-folders as shown below.
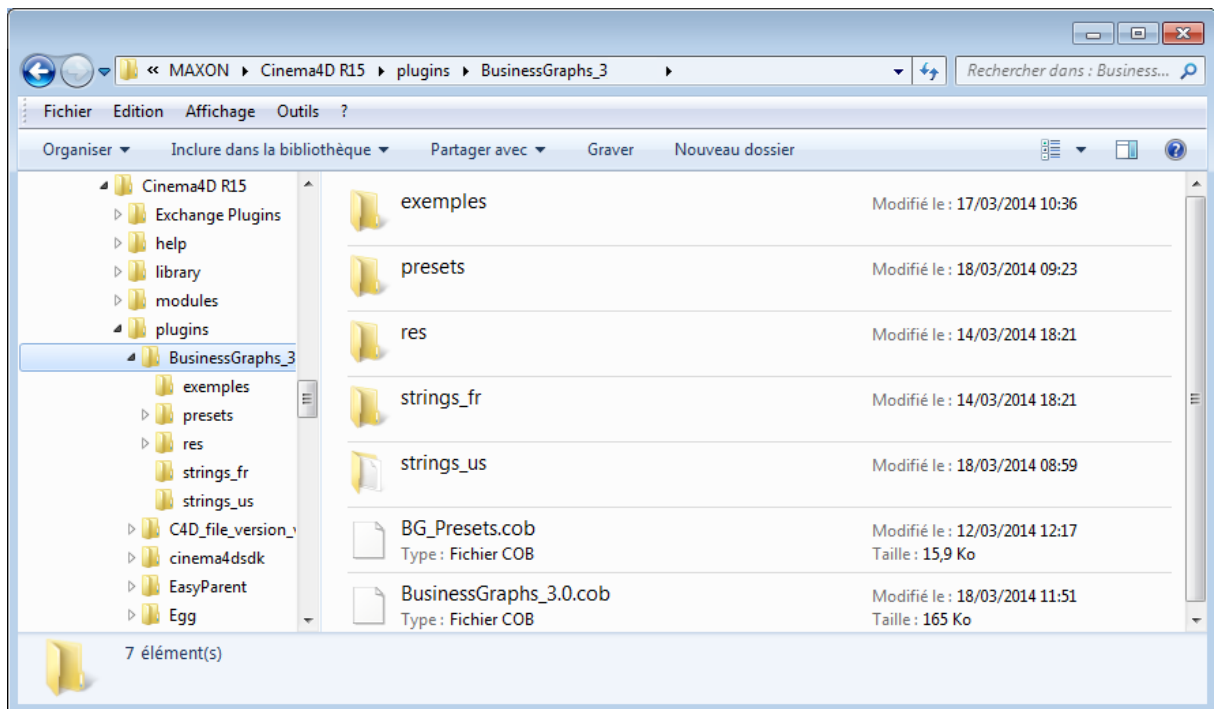
Copy the whole folder into the folder `Maxon/Cinema4D Rxx/Plugins` in your computer. The Rxx number will change and match your C4D version number. If you cannot find the folder, search your hard drive for « Maxon » folder within your application or program directory.

Run **Cinema4D** *(or quit it and start it again !)* for it to take the new plugin into account, which should now appear in the « **Plugins** » menu.
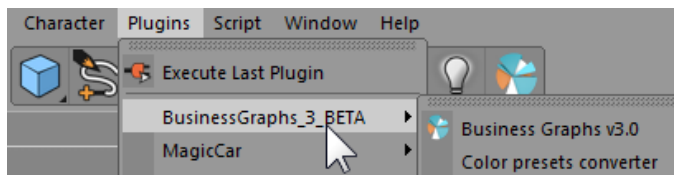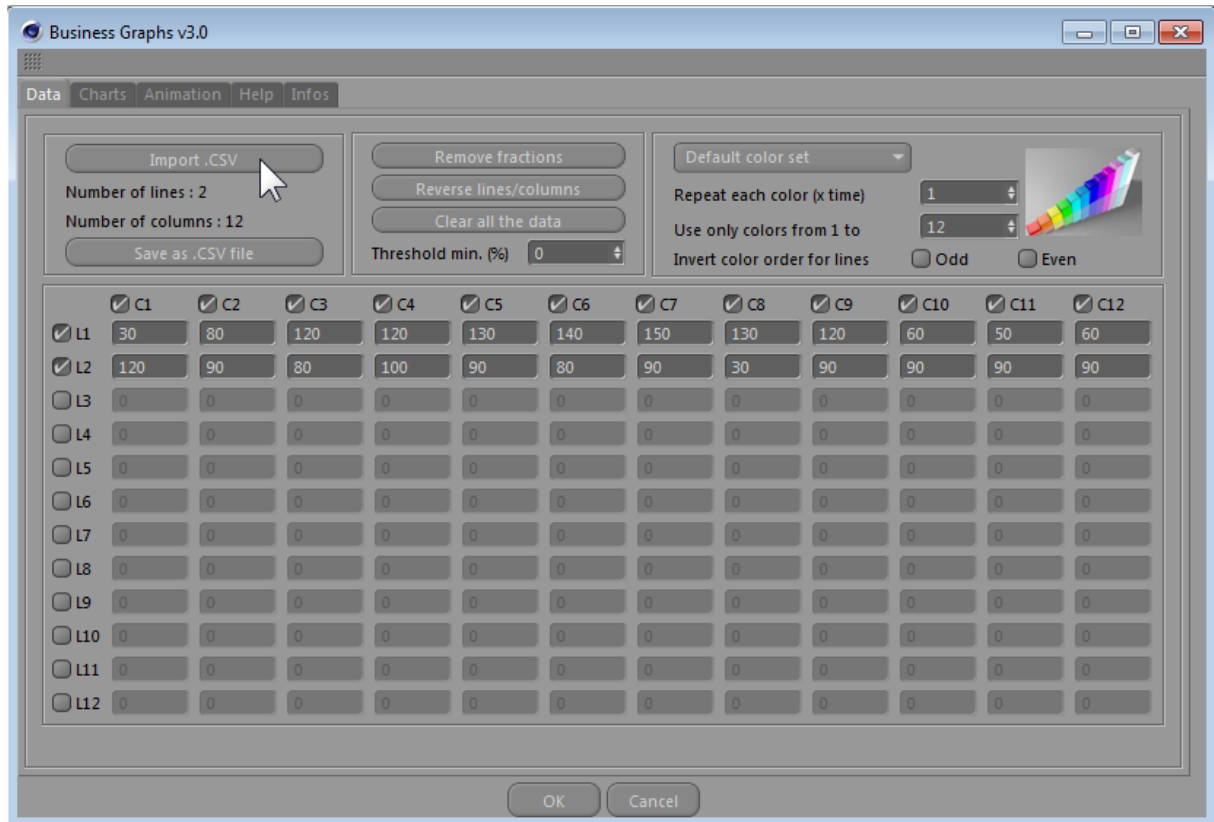


As long as you can see this, so far, so good ! Let's go create our first graph now !

## First steps

Select **Business Graphs v3.0**. but not **Color Presets Converter**. The plugin displays and materials are created by default. Let's start !

## Importing values

We need data for the graph. A faster solution is to click the " **Import .CSV** " button



You will find some ready to use **.CSV files** in the "**examples**" folder of the plug-in: /examples/.

> *Note : a **.CSV** is a comma-separated values file storing tabular data (numbers and text) in plain-text form. A CSV file consists of any number of records, separated by line breaks of some kind; each record consists of fields, separated by some other character or string, here a semi-colon.*
>
> *All kinds of spreadsheet applications (**Excel**)or databases can export to CSV. This structure is so easy that anybody can edit such a file with a simple text editor (e.g. Notepad).*

For example, select energie solaire 2003.CSV. Click YES to all requests. You can see lines 1 and 2 that are now filled in. BG3 gives you information the **Number of data lines** and **columns** found in the .CSV file. And even though our plug-in allows you to enter and edit a **12 per 12 values grid**, it can actually read up to **1000 values from a CSV** !

## Color selection

Use the **"default color set"** menu to display color presets and pick up one. This feature only concern color aspects.
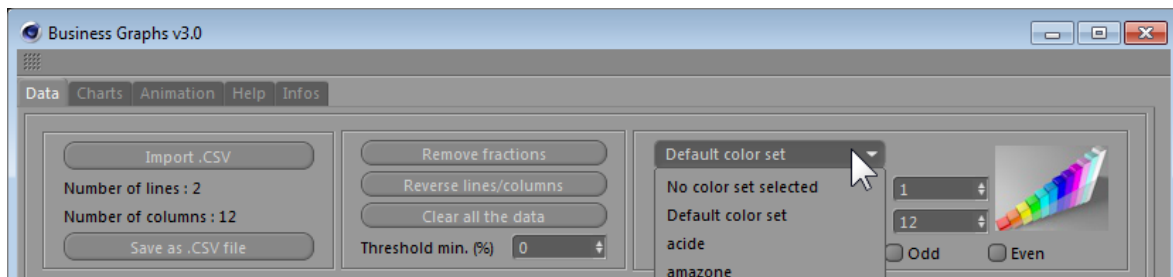
Then, click **OK** and BG3 will already have created you very first 3D graph !

> DO NOT CLOSE THE PLUG-IN WINDOW! DO NOT QUIT Business Graphs 3.

Let's have a look at the hierarchical structure in **Cinema4D**. This bar graph uses basic **Cinema4D** primitives (cubes, planes). Editing these objects in Cinema4D is a piece of cake !
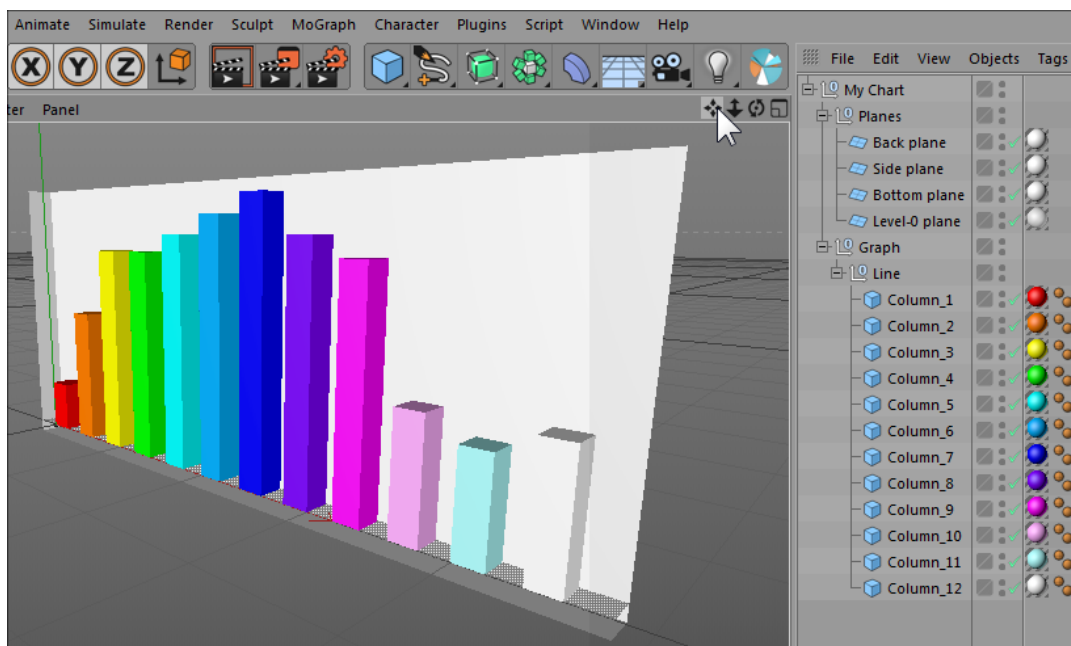


## *Let's display some values and texts !*

Delete the "My Chart" object tree in Cinema4D. Then go back to the Business Graphs window, which should still be open *(if not start this tutorial again !)*

In Chart tab, in **Legend settings**, click on **Generate legend**, then tick **Legend lines/columns** and **Values** *(the whole shebang !)*.
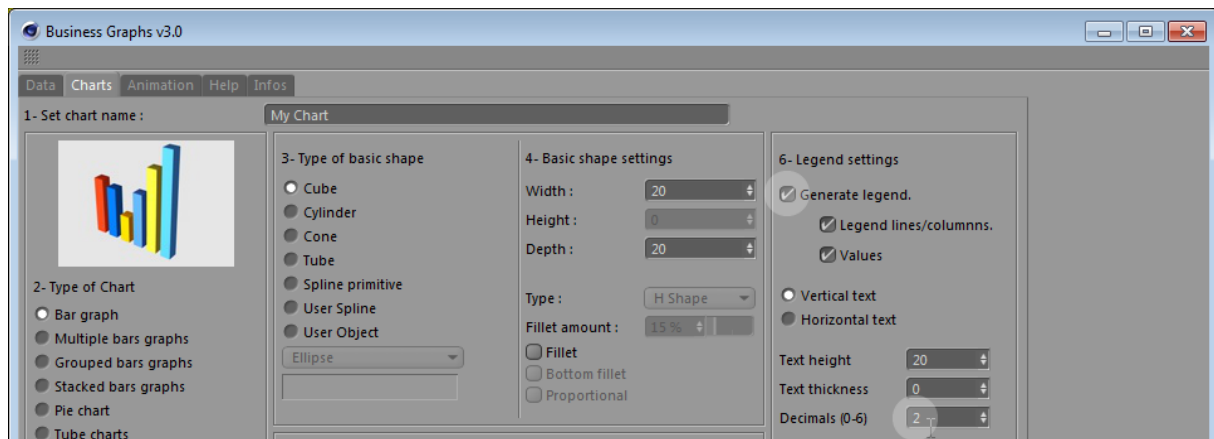
Values are from the **Data** tab, the legends (texts) are read from the .CSV file, in the first row and/or the first column. Both are generated automatically with a simple spline text in a NURBS extrusion and they are completely editable.

These values may contain decimals. In order not to complexify the text with figures such as "10.00", we are going to limit decimals to 0. Replace 2 by 0 in the **Decimals** field.

*Note : BG3 handles decimals up to 6 digits both in the table and in the .CSV file. However, in order to generate a graph, the plugin will only use a 3-digit decimal (0.001).*

## Type of chart

By default, BG3 will generate a simple bar graph. However, in the example, we had two lines of data. With a simple bar graph, only the first row will be use. Let's change that into a "**Multiple bar graph**"
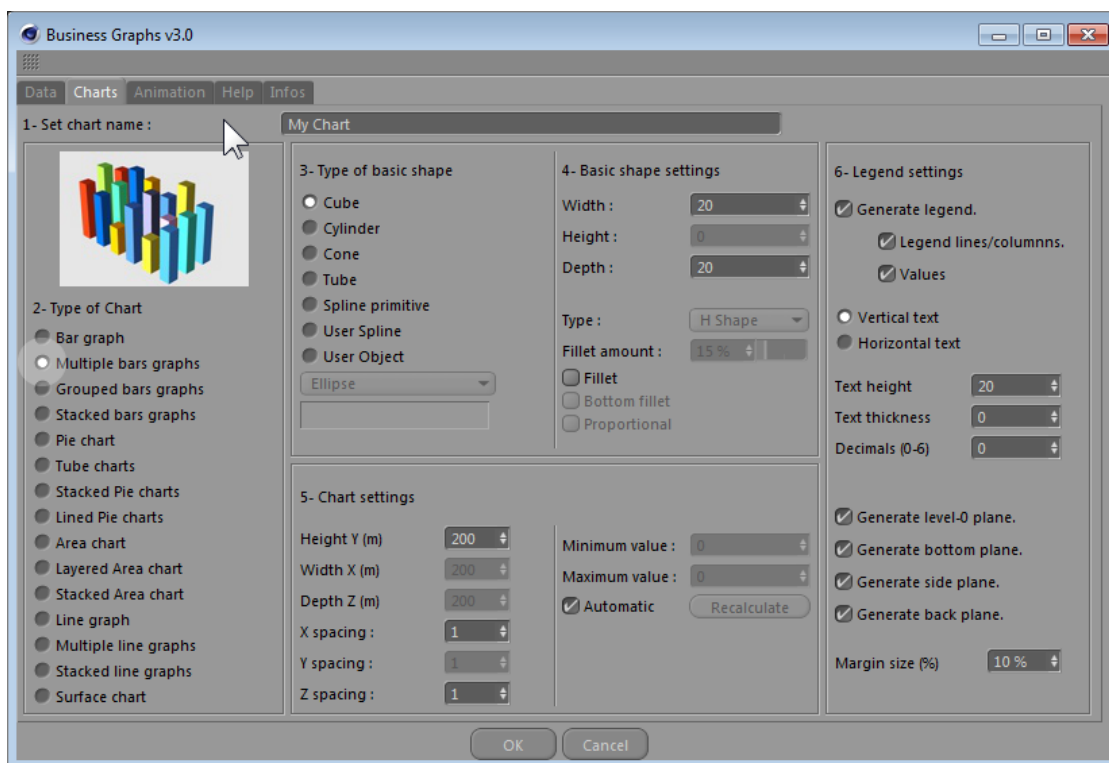


Click on **OK** to generate a new graph and <u>do not close the window</u>.
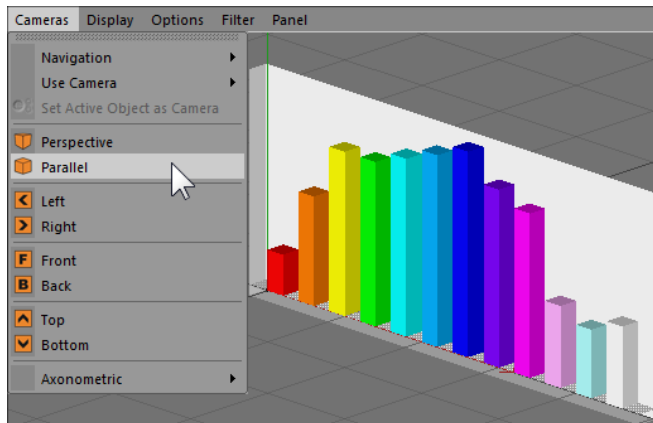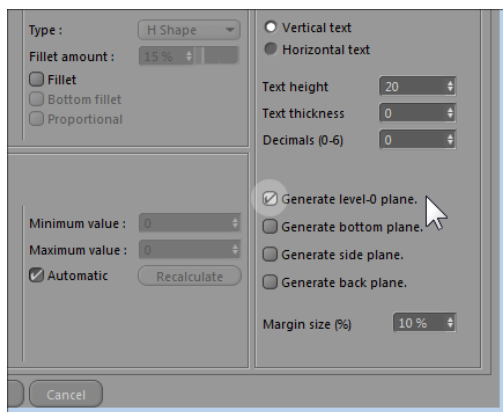
## Some Cinema4D tips

3D graphs can often be confusing because of a "wide-angle" perspective effect.

We advise you to create a camera and to adjust its **Focal length** to 135 (Tele 135 mm preset) in order to avoid distortion. Another tip is to switch to **Parallel** camera.
Last tip, use a **Sky object** or a **Background object** to avoid a dull grey or black background.



In the example below, we used the "Fabrizio" color preset, a blank white background, a parallel camera, a stretched "**level-0 plane**" on Y axis, without the other planes. "Et voila !".



Business Graphs 3.0 rev. 4/4/2014     www.3DWeave.com
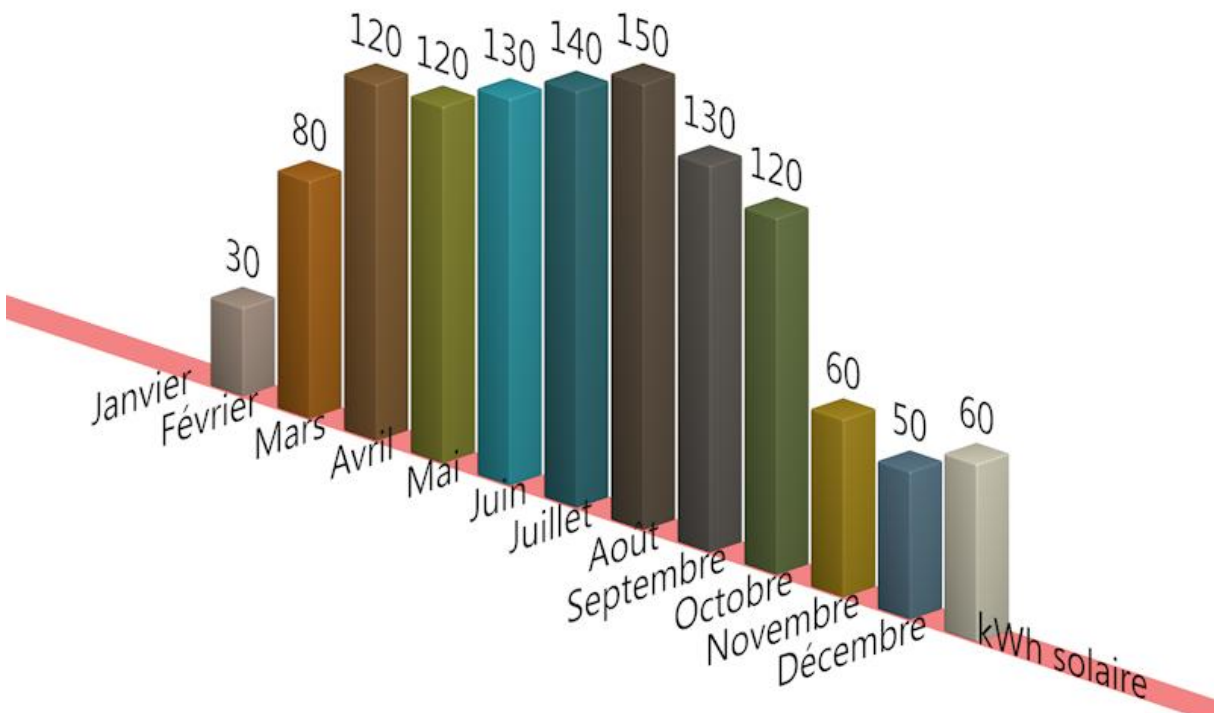
## Animation !

Using animation is very easy ! Everything you need is in the new **Animation** tab.

> Delete the previous graph ! Let's generate it again in order to animate it.

Tick « **Create animated 3D graph** ». We have two rows of 12 values each, which gives 24 items to animate. Select « **Advanced settings** », and enter the number of frames for each value concerning the duration of the animation.

This the time a bar takes to "grow" in **Linear display**.

If you choose 6 frames per value, the total duration time needed for all values is 6 by 2 by 12 which gives 144. Therefore **Projet Time** is adjusted from 0 to 143. Remember to define the frame rate too, according to the video standard in your country (number of frames/sec).
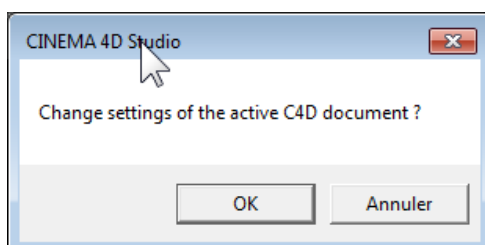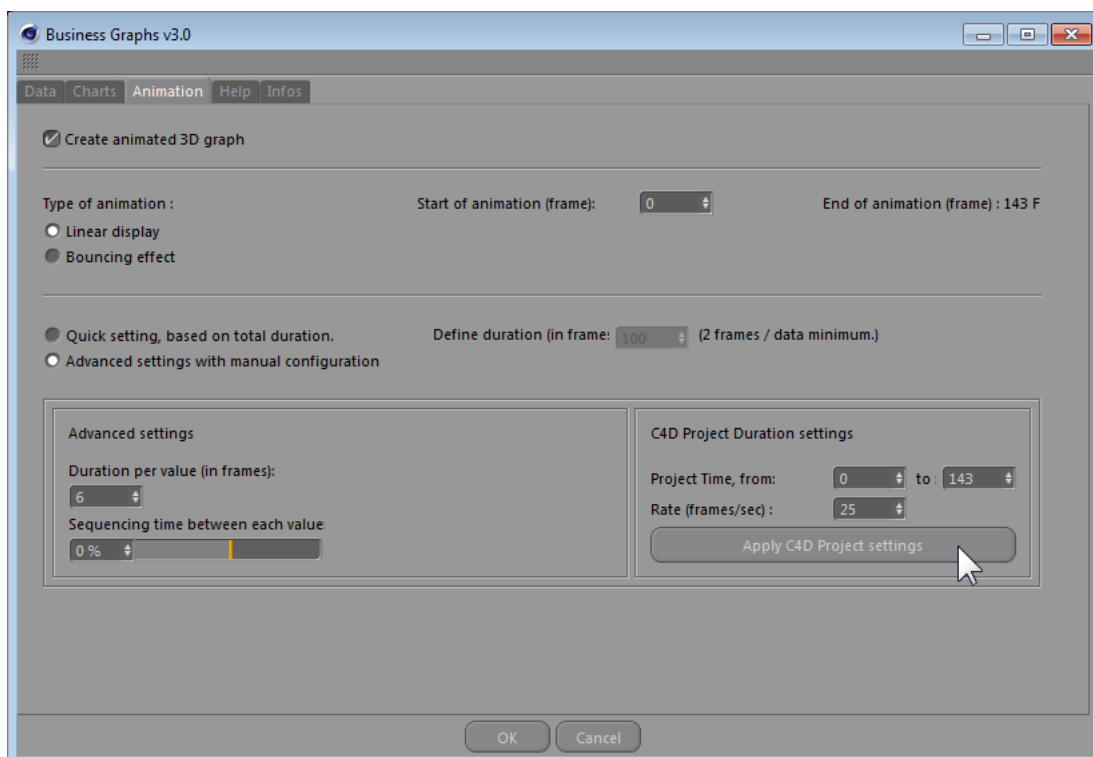




Finally , don't forget to click "**Apply C4D project settings**" for fear of only seeing the beginning of the animation. Actually, the **Cinema4D** default project is set with a 90 frames duration at 30 frames/sec, for a 3-second animation.

You can improve it trying the other type of animation, by selecting  "**Bouncing effect".** In this mode, bars are "bouncing" with a very dynamic visual effect (which may be impossible to do with manual key framing).
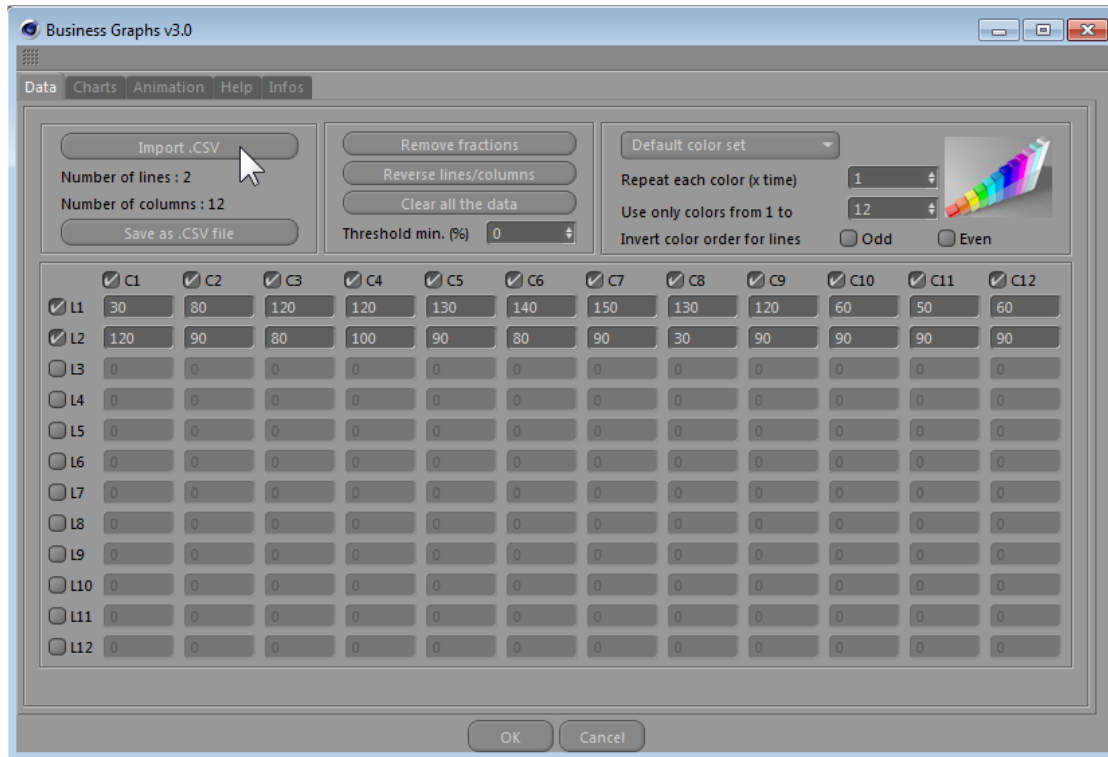
*Now you know how to animate a business graph !*

*Let's review all the parameters in this chapter.*

# Reference Manual

## "Data" tab

Here, you will manage the values and colors of the graph.



New feature ! In BG3, you can import a 1000x1000 cell array (text legends not included). BG3 will only display a 12x12 array. The table values are interpreted within a range from -100 000 000 to +100 000 000 with 3-digit decimals (i.e. 0.001 accuracy). WARNING: commas ',' are read as decimal separators.

## Import .CSV

The structure of a CSV file is so simple that anybody can create one in a text-editor. Values are separated by a semi-colon ' ;". Each line ends with a carriage return (RETURN). Save your text as a ".CSV" file and that's it !
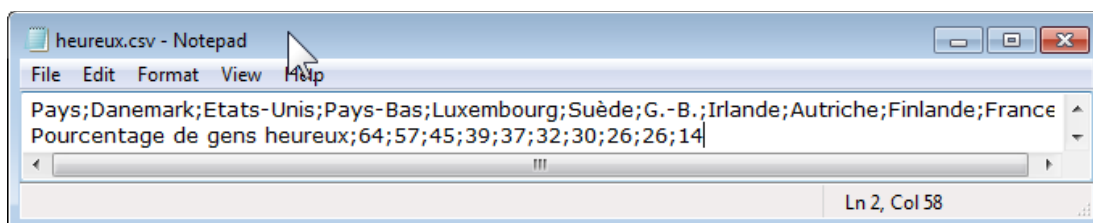


The legends are to be typed in the FIRST row and/or the FIRST column.

In **MSExcel**, you need to clean your spreadsheet to only export the data relevant to BG3. Do not leave any empty cells, any empty rows, and do not keep any unused cells. Do not generate graphs under **Excel**. The justification and text formatting of cells will be ignored when the .CSV file is exporting.

> Warning : keep in mind that BG3 cannot read your .CSV file while it is still opened under **Excel**. Remember to close your document first.

You can find an example of an appropriate spreadsheet below.

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | Console | Q3 2013 | AN 2013 | Total | | |
| 2 | Nintendo 3DS | 2490000 | 5130000 | 34970000 | | |
| 3 | PlayStation 3 | 2000000 | 0 | 80000000 | | |
| 4 | Xbox 360 | 1200000 | 3500000 | 80000000 | | |
| 5 | PSP/PS Vita | 800000 | 2700000 | 86500000 | | |
| 6 | Wii U | 300000 | 850000 | 3910000 | | |
| 7 | Wii | 260000 | 920000 | 100300000 | | |
| 8 | NintendoDS | 40000 | 300000 | 153970000 | | |
| 9 | | | | | | |

Under **MSEXCEL**, you can save .CSV files by selecting "**Other formats"** at the bottom of the "**Save As"** menu.
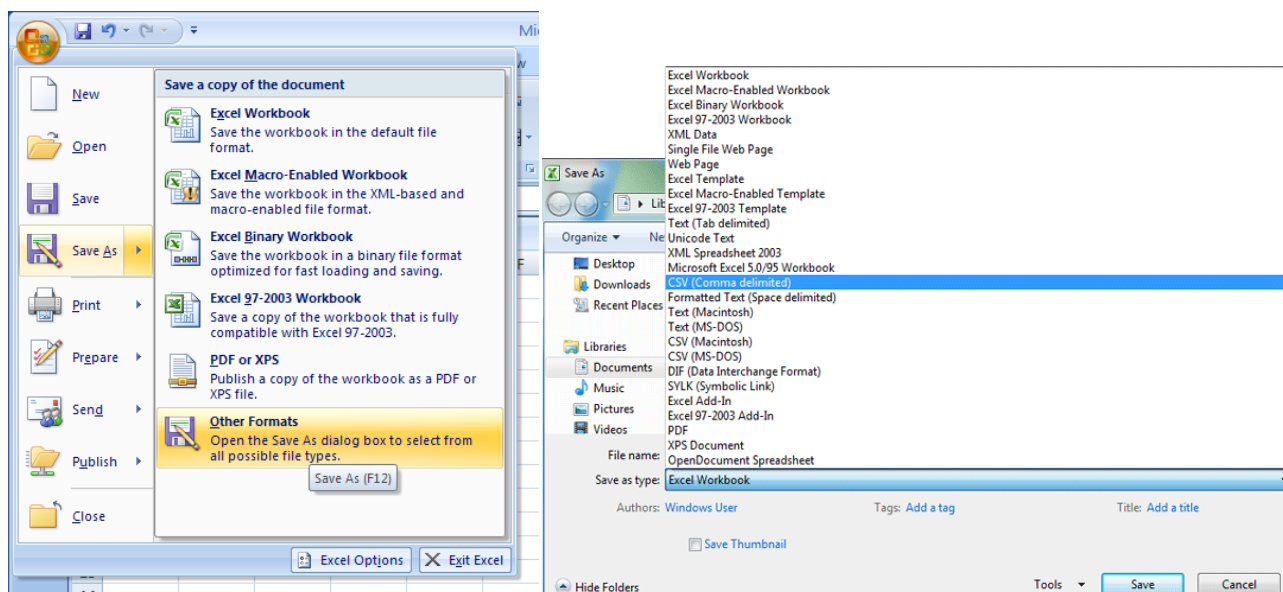


Stressfull windows will pop up and warn you against losing data.
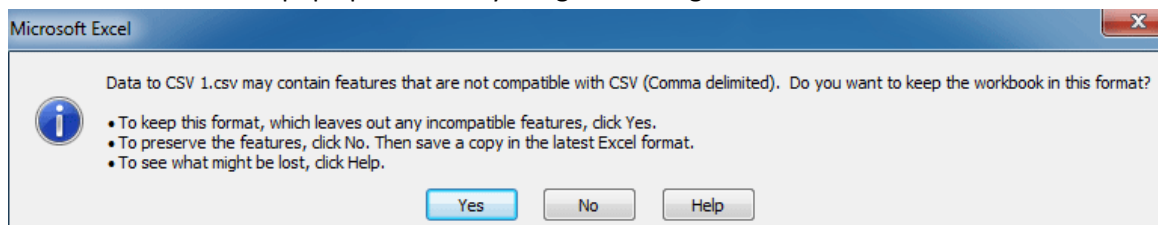


Just ignore it. Click "Yes" and close your Excel file.

## Text legends imported from the CSV file.

The automatic detection system has been removed from version 2, in order to allow dates (e.g. years like 2012) to be read as text legends, not values. We now have user requests:

First, BG3 will ask you **"Does this file contain legend lines/columns ?"**

If your reply is "**OK**", two other messages will follow to request whether these are first line and/or first columns.

If your reply is "**No**", click "**Cancel**" to go directly to the plugin.
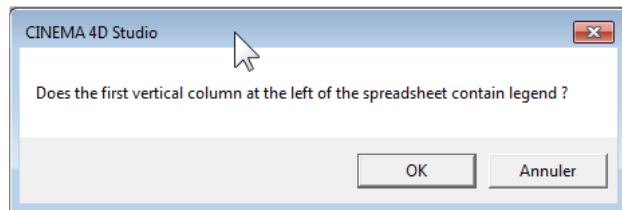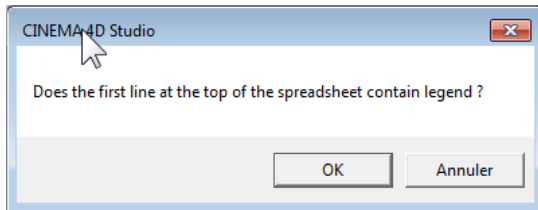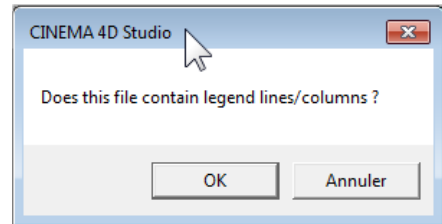
There are 4 possibilities of text legends:

1- Spreadsheet without legends,
2- Spreadsheet with line legends (column titles),
3- Spreadsheet with column legends (line titles),
4- Spreadsheet with both line and column legends.

We fix the text legend issue, which occurred particularly in case 4. The very first line 0 column 0 value doesn't need to be interpreted anymore, especially when left empty, contrary to case 2 and 3 where texts legends starts at 0.

*Note : the issue of blank cells like ";;" are now taken into account. If a legend row contains blank cells, they will be replaced by a space " ". If it occurs in a value row, they will be set to zero.*

## Save as .CSV file

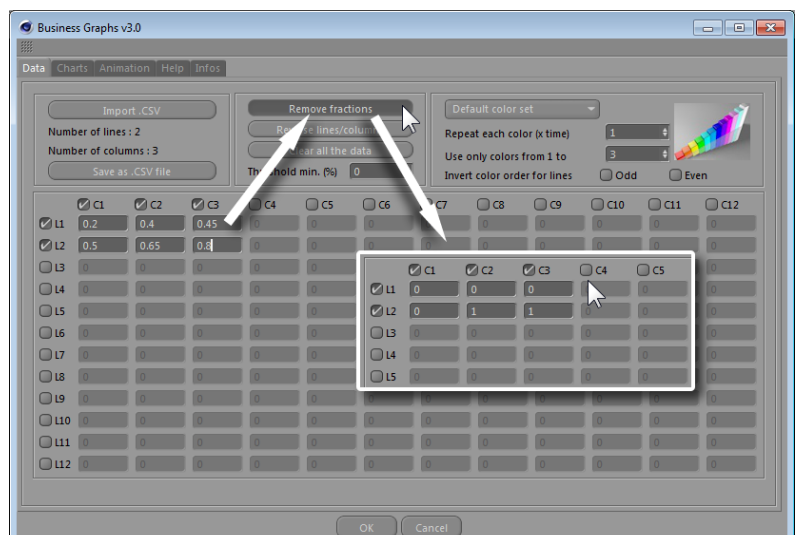.CSV files can also be used to save BG3 **Data** tables *(but nothing else !)*. This is not a project backup.

Did you input all your data manually ? Now, you can save them to work on it again later.

### "Remove fraction" button

This is a feature enabling you to remove decimals. If your decimal value is inferior or equal to 0.5, it will be rounded down.. Above 0.5, the value will be rounded up.

## Reverse lines /columns

If you want to reverse the rows in you graph, click on "**Reverse Lines/columns**", as in the example below.
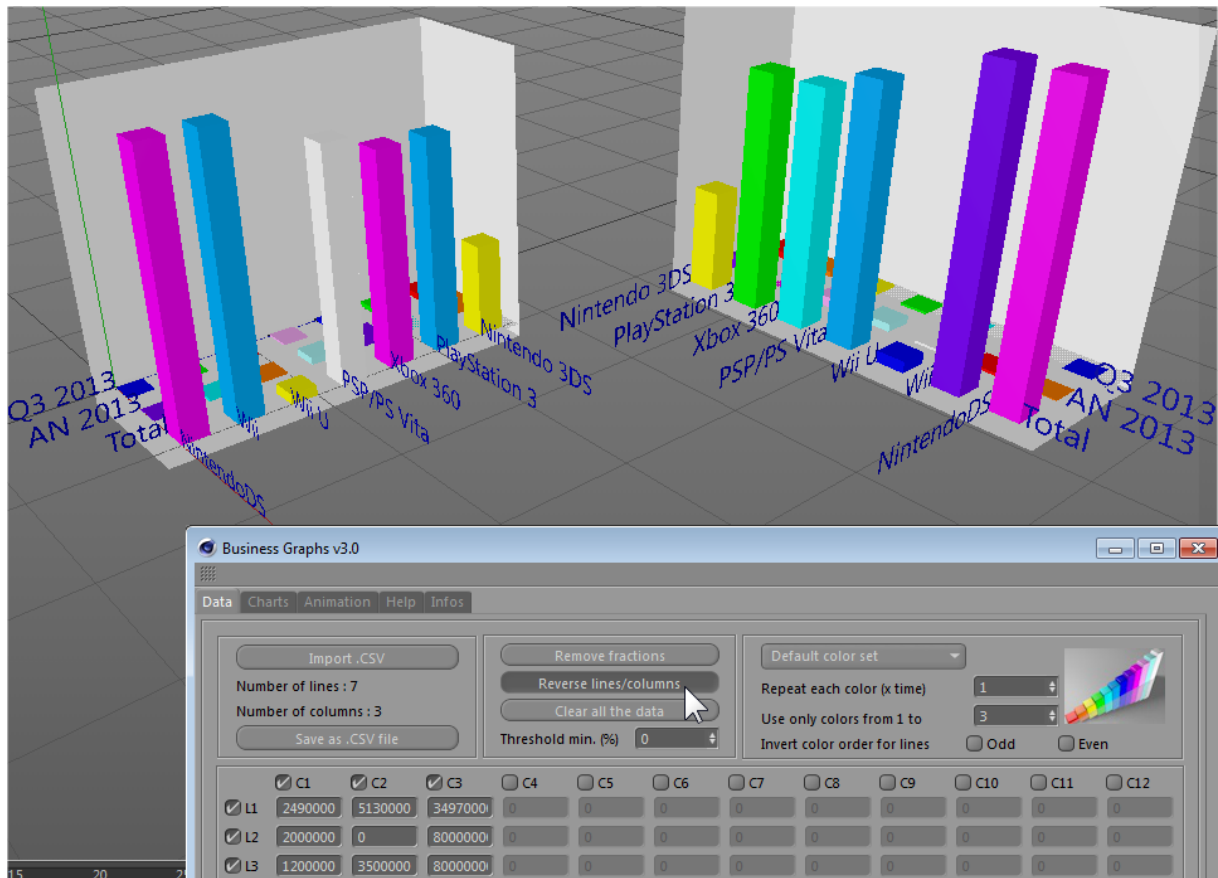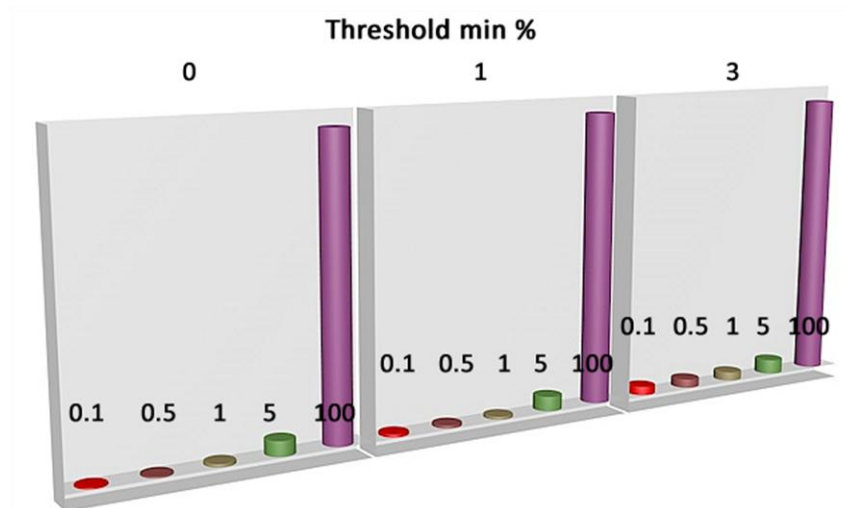


This is NOT an inversion of your data values !

## Clear all the data

Reset all data values (values and legends) only.

## Threshold min (%)

An issue that always occurs when viewing your actual data, is that some are too small to be graphically relevant.

For example, an overwhelming '100' is displayed next to values inferior to 5. On the left graph above, we can see that the default **Threshold** set at 0 give the impression that all the values inferior to 1 are crushed. **Threshold** enables you to "correct" this visually *(we are actually cheating)* by setting these lowest values to the value of your choice.

In the middle example, they are set to 1 and to 3 in the right-hand side example.

This example may be exaggerated but is representative of an issue with graphs in general, especially with pie charts, where small values can even disappear visually because the slice is too thin.

## Colors

A choice of color presets especially designed to personalize your graphs is offered. **Quarters Colors** is organized in quarters (4 groups of 3 colors) whereas **Serious_bi** works in pairs ;-).

BG3 will generate new Materials at each change of color presets, it may delete them. Keep in mind that C4D contains two features in the **Function** menu : **Remove unused material and Remove duplicate material**, in the **Material manager**.
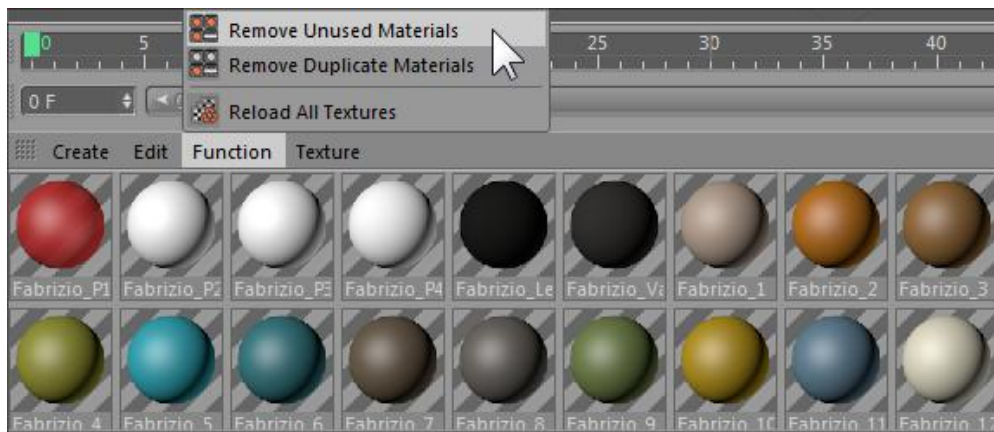


You will find some useful textures in the `Presets/TEX` folder of BG3 installation folder. Add this folder path to your C4D **Texture Paths Preferences** settings such as in the example below.
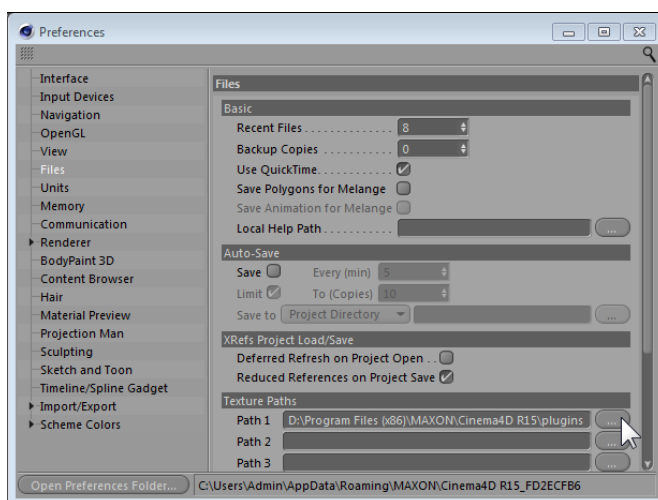
## Color Preset Converter

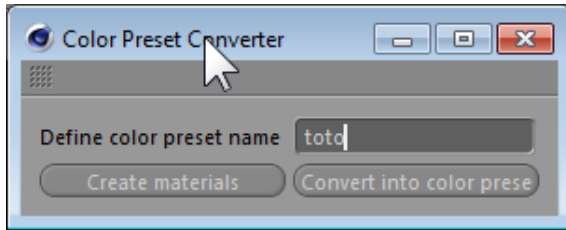You can generate your own presets with the **Color Preset Converter.**



Type a name, then click on **"Create materials"** and <mark>click outside the windows to refresh C4D</mark>. BG3 generates all the Materials with the names it needs.
Change their colors and materials up to first level of each setting that fits your tastes.

Then, when you're happy with them, click on **"Convert into color preset"** to save your preset. Your preset is now part of the color preset menu list.

> Because of the lack of full COFFEE support to access all Materials parameters, all settings exceeding the first screen will not be saved – e.g. percentages of reflection, colors and first texture/shader are OK. Following shaders parameters or sub-settings will not be saved.

To illustrate your preset into BG3, you will need a thumbnail made of a JPG picture of a 80 per 60 pixels size, named like your preset, but with a "tn_" before the name.
Store that file into the /presets folder in the BG3 installation folder. Presets have a ".bgp" extension.

*Example : tn_toto.jpg is the thumbnail for toto.bgp preset.*

> *Tips : Turn on luminance to light up graphs luminosity and avoid dark areas. Just copy the same color in the luminance channel and adjust color to a lighter one. The same if you use it for transparency.*
> *Untick specularity in all text legends materials to avoid bright halos on texts.*

# Color order.

## Repeat each color (x times)

This number allows you to repeat a color x times.

What is it for ? It's useful if your columns present data that make sense by pairs, by triples, by quarters, etc. If you want to accentuate the visual impact of lines, set this value to match your columns number. This number is displayed under the **"Import .CSV"** button.
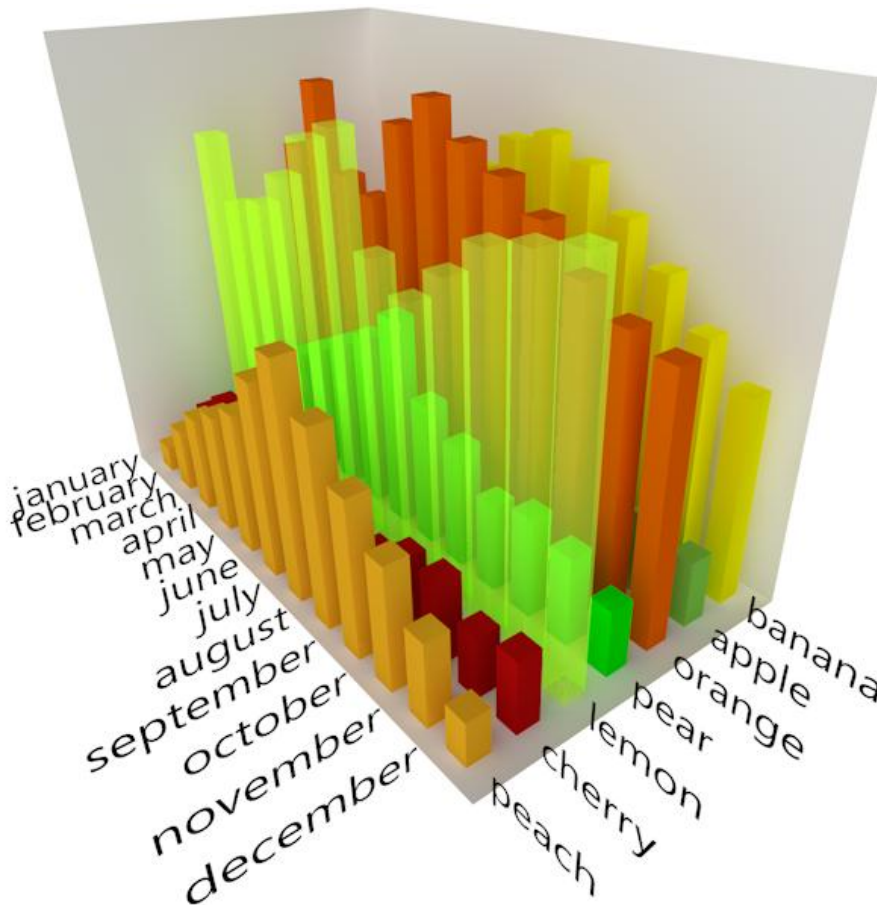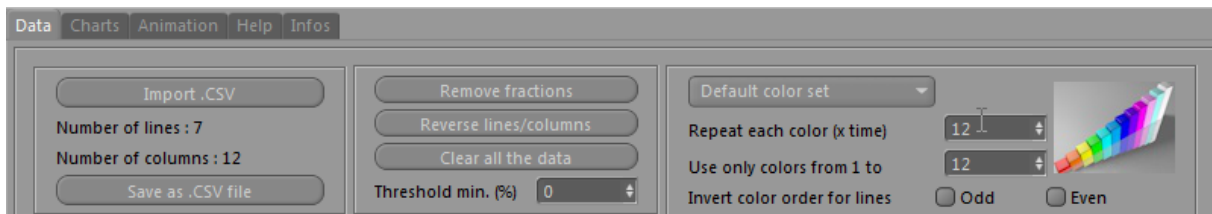


**On this graph, we want to focus more on fruit comparison than per month details. To achieve this, colors are repeated 12 times, equal to row number, so that each line has its own unique color. Rendered with "Interior High" GI preset into Cinema4D R15.**

## Use only color 1 to…

Color presets contain 12 colors, but you don't have to use all of them. Keep in mind that at each new line BG3 will reset its color cycle to color 1 for the first value. This will allow to associate data or bar graphs visually, especially with grouped or stacked bars graphs.

**Invert color for line...**

Change the reading order of the color palette, for even lines (2,4, ...), odd lines (1,3, ...) or both. Contrary to what we have seen above, this clearly dissociates lines.
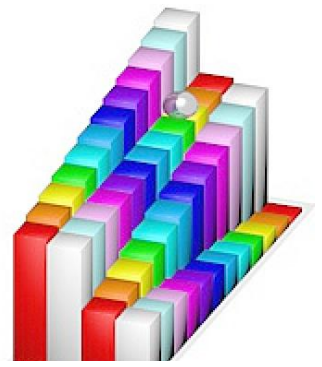
## OK (Return Key)

Generate a new graph from your parameters **without exiting the BG3 window**. In the C4D object manager, the name of the new graph is incremental (My Chart.1, etc.). Remember to delete your previous tries if you don't want mix them up. The chart name can be entered at the top of the "**Charts**" tab.

Do not hit **RETURN** each time you type a data in the table, as it will generate a new graph each time ! Use the Tab key instead to move to the next field and SHIFT-Tab to go back to the previous one.

*Note : In a color preset, the first 6 materials are used to texture :*

- - *Level-0 plane*
  - *Bottom plane*
  - *Side plane*
  - *Back plane*
  - *Text legends*
  - *Value legends*

*And then colors 7 to 18 to color the graph.*

*If your Material manager exceed 18 materials, only the first 18 ones will be use in the presets.*
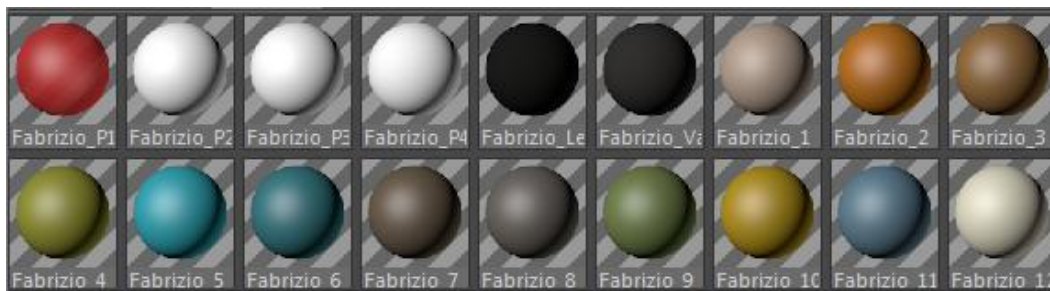
## Charts tab

This tab allows to define the look of your graph: type, basic shape and its settings, chart settings, and now legend settings.
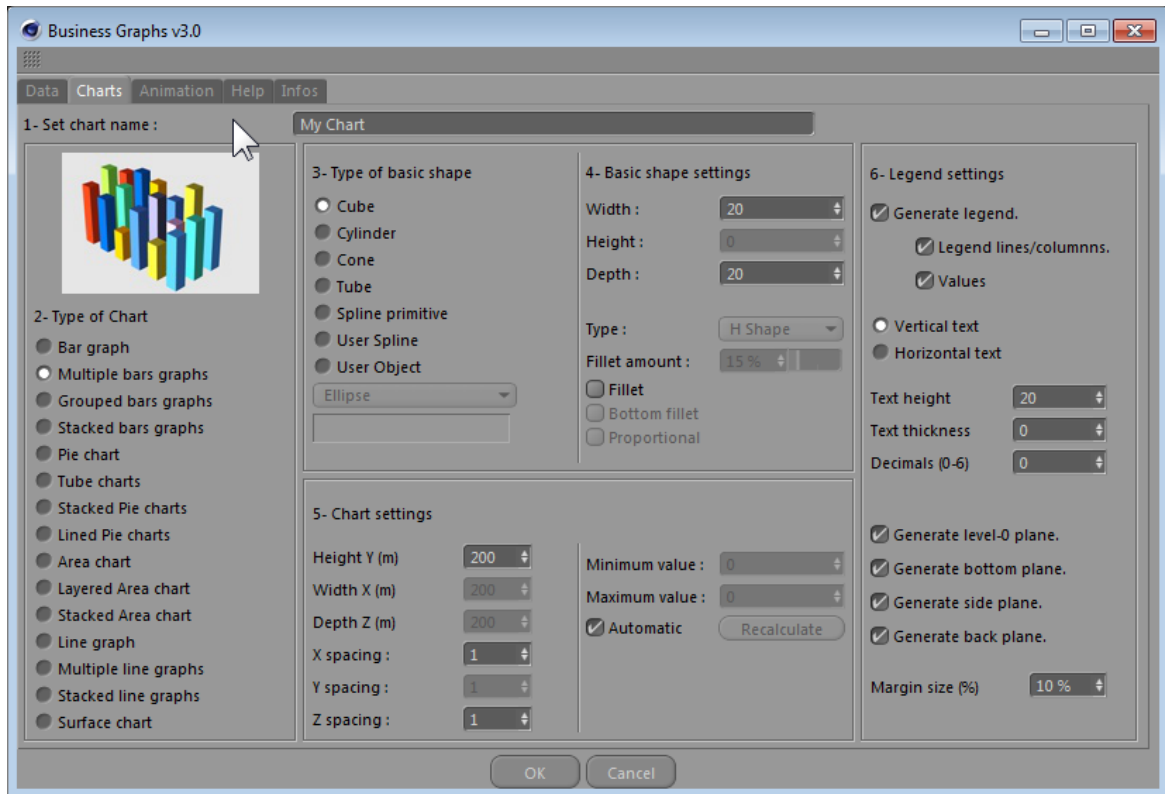


## Type of chart

15 chart choices are available. There are 5 main types of chart : bar graph, pie chart, area chart, line chart, and surface chart. A picture illustrates each chart type with an example. Depending on your choice of graph type, the basic shape/object list available and their settings change.

*Note :*

*Pie charts are automatically calculated on a percentage base out of the sum of each data line. Each negative value in the table will be convertible into a positive one.*

*For bar graphs, negative values will change the orientation of the selected shape. Moreover, the orientation of cone bar graphs will go downward or upward depending on negative or positive values.*
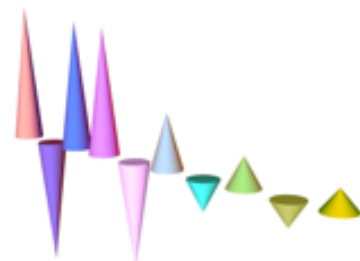
## Type of basic shape

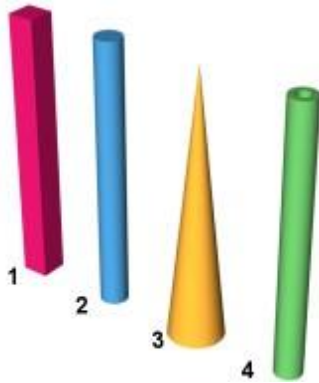Basic objects and shapes are graph elements that represent each value in the table. Each type has its own parameters
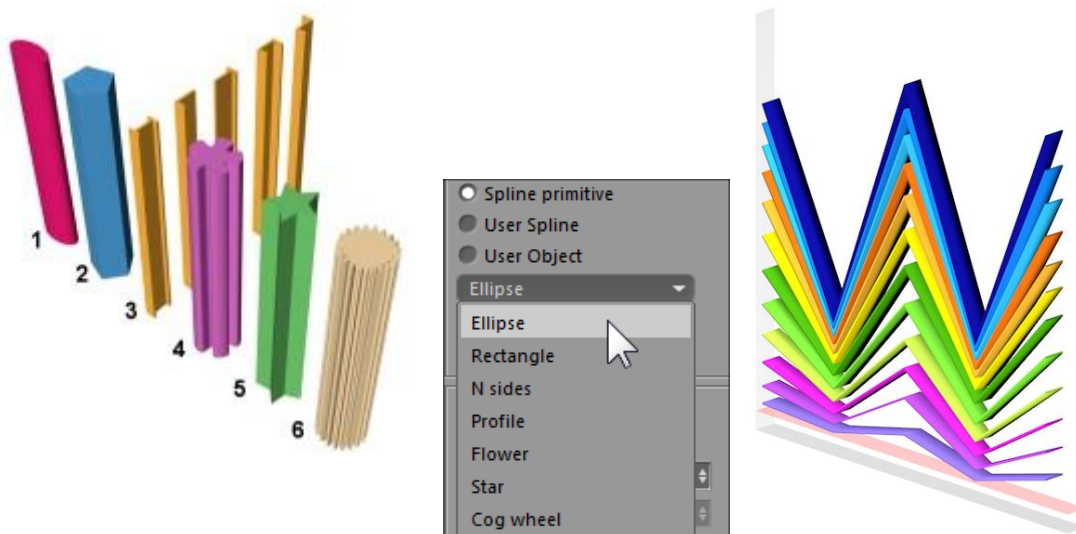
### Primitives objects :

**Cube** (1), **Cylinder** (2), **Cone** (3) and **Tube** (4).

### Extruded basic splines :

**Ellipse** (1), **N-sided** (2), **Profile** (3), **Flower** (4), **Star** (5), **Cog wheel** (6) and (New feature!) **Rectangle**.
The latter is used with line graphs to draw lines with the simplest profile (see below).

### User Spline and user objet:

New feature ! In order to use **User spline** or User **Object**, drag and drop the desired shape or object from the C4D object manager into the corresponding field.

User splines must be drawn in the XZ viewport *(as if you were drawing on the floor)*.
User objects must be a single one polygonal object *(no groups)*.

> **Attention ! The BG3 plugin uses the C4D object name as a reference for a User spline or a User object.** That means that the exact name in the drag and drop field is the way for BG3 to locate the object in the C4D project. If this name changes, BG3 will be lost ! If there are several objects or splines with the same name into the Cinema4D Object Manager, BG3 will take the first one, right from the list.

To avoid this, try to name your user's spline and object with a unique name. Uppercase and lowercase are considered different : « Dollar » is different from «dollar».

*If you use a user polygonal which includes its own textures, BG3 will preserve them. Your choice of a color preset, in "**Data**" tab, only applies if your object is not textured.*

*Our plugin possesses an automatic axis repositioning feature. It automatically repositions the Y-axis at the bottom of duplicated objects and centered on their width and depth.*

## Basic shape settings

In this part, you will learn how to customize your graph by selecting and setting their basic shape.

The first 3 fields are dedicated to object dimensions. According to the type of object you select and the type of graph you choose, these settings may change. These settings can define the Width, Height, Depth, Radius (Top/Bottom/Inner/Outer ones). **Spline primitive**s like **N-sides**, **Star, Flower** and **Cog Wheel** use the third field to define parameters like the number of **sides**, the number of branches, or the  number of **teeth** accordingly. See integrated C4D **Help** manual for more information.

### Type (Profile spline shapes)
Limited to **"Profile"** spline, this setting allows you to choose the **shape.** As for the C4D profile spline object, available shapes are H, L, T, U et Z.

### Fillet amount (chamfer or bevel)

This feature is enabled for the basic shape objects -  **Cube, Cylinder, Cone** – and also the spline objects – **N-sided** and **Cog Wheel**.
This bevel setting is enabled by ticking the **Fillet** box.
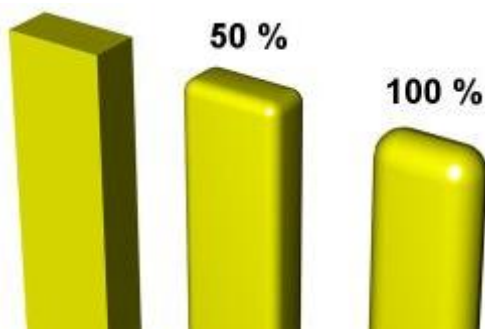


The **"Fillet amount"** setting is displayed in percentages, which is calculated from half the lowest dimension entered. For instance, if you choose a **Cube** shape with a width of 0 and a **Depth** of 20, then a 100% bevel will correspond to 10 – half the **Depth**. A 50% bevel will correspond to a bevel of 5.

If you select the **Spline primitive Star**,  the **Fillet** setting is replaced by a **Twist** value, allowing to bend the branches of your **Star**.

### Proportional
This box is enabled when you choose an user object as a basic shape.

Is left unticked, the object will be stretched or crunched vertically, according to the data value *(see the green and red dollar signs on your right)*.

If ticked, the object will be resized homothetically – i.e. the object will keep its proportions and its global size will be calculated according to the data value it represents.

## Chart settings
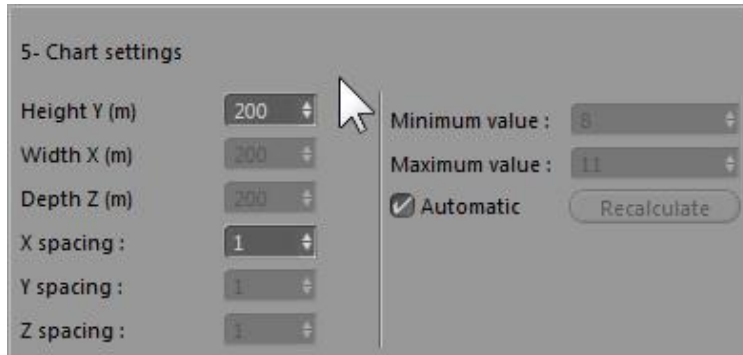


### Height Y, Width X, Depth Z
These fields enable to define the size for the whole chart. This could be compared to a big cube containing your chart.

For most chart types, only the **Height Y** value is required. The **Width X** value is enabled for Area, Line and Surface charts. The **Depth Z** value will only be enabled for Surface charts.

### X, Y and Z spacing
These spacing values are actually a convenient way to calculate the spacing between each basic shape generated in your graph. A spacing is a multiple of one of the entered basic shape dimensions. For instance, a **Y spacing** of 1 means that between two shapes, there is the distance of a 1x the **Height** of your selected shape.

> *Example: In a bar graph with cube shapes of a Width of 20m, a X spacing value of 1 means that your cubes are spaced from one another by 20m. If you want a shorter chart, decrease the X spacing value. Conversely, if your shapes seem to touch one another because of the camera point-of-view or the complexity of your basic shape, increase the X-spacing value.*

The **Y spacing** value is particularly useful for stacked charts. The **Z spacing** value is particularly useful to manage the overlaying of multiple line graphs.

## Accentuating values manually
This graph setting will allow you to visually accentuate the difference between your values.

If the **"Automatic"** default feature is left ticked, the whole set of values will be generated at their maximum amplitude.

If you untick this feature, BG3 will then automatically calculate and display their minimum and maximum values.
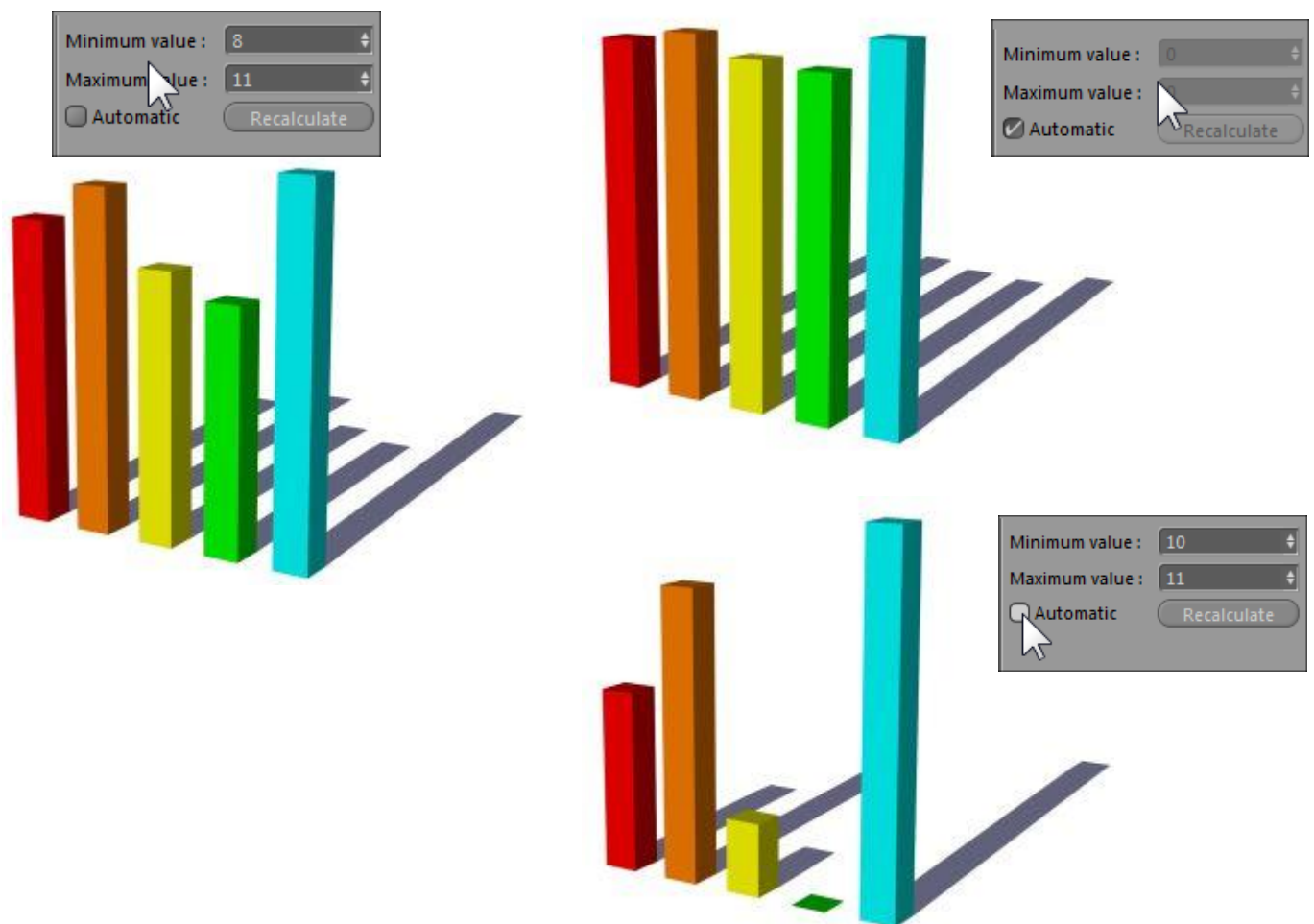
This accentuation is then at its maximum, which enables to exaggerate charts in which the differences between values are insignificant.

The **"Minimum value"** must be equal or inferior to the smallest value in your Data. The **"Maximum value"** must be equal or superior to the highest value in your Data.

The **"Recalculate"** button enables to reset the minimum and maxim values in order to come back as close as possible to the set of values entered before unticking the **"Automatic"** feature.

Below is an example of data with a low amplitude and views of different Min/Max values settings :
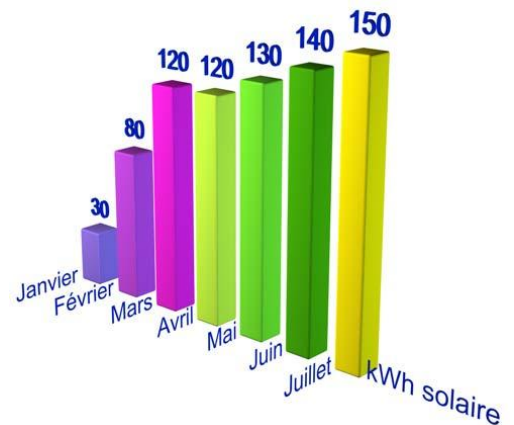
## Legend settings

Keep in mind that text legends are only taken into account after having clicked on "Yes" during the import procedure of the .CSV file. If not, the **"Legend lines/columns"** is left disabled. However, a new feature allows you to display Data values as texts even if no legends has been detected in the imported .CSV file.

The text legends can be generated either horizontally or vertically. This setting is particularly useful depending on your point-of-view. You can also set the **"Text height"** and **"Text thickness"**, the latter setting being the depth of the extrusion. Even if set at 0, BG3 will still use the extrusion to generate your text in your 3D space. Keep in mind that text splines alone do not "render".

*Remember that all text legends are editable C4D text objects.*

### Vertical text

### Horizontal text
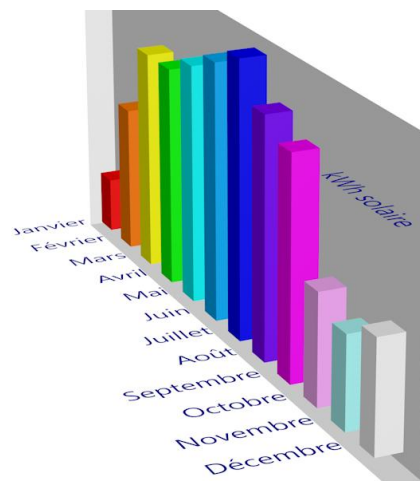
### Decimals (Data values legends)

In order to make your chart clearer, you can limit the number of decimals with the '**Decimals**' parameter. For example, set '**Decimals**' to 1 to display 12.65 as 12.6.

Value legends are processed as texts – i.e. differently from charts values, which are calculated with a limit of 3 decimals.

For value legends, you can choose to display up to 6 decimals.

> *For example :* *in the imported data, there is value of 12.356487.*
> *Internally for calculations and value processing, the 12.356 value will be used (because C4D internal calculation only use up to 3 decimals maximum).*
> *However, if you set '*Decimals*' to 6, the legend value will be written with all its 6 decimals – i.e. 12.356487.*

### Planes

You can add a "background" to your chart as planes that frame the chart volume. The "Level-0" plane is a small horizontal measurement marks which helps to visualize the 0 values as a plane.

The three other planes – bottom, side and back – help to draw lines in the directions of the 3 axes.



The '**Margin size**' percentage defines the whole planes size in regard with the global graph size.

> *For example : if the total chart size is 300, and the Margin size is set to 10%, then the width of the planes will be 330. They will exceed each side of the graph by 15 units ! 15+300+15 = 330.*

# New feature: "ANIMATION" tab

Tick '**Create animated 3D graph'** to generate an animated graph as soon as you click **'OK'** at the bottom of the window.
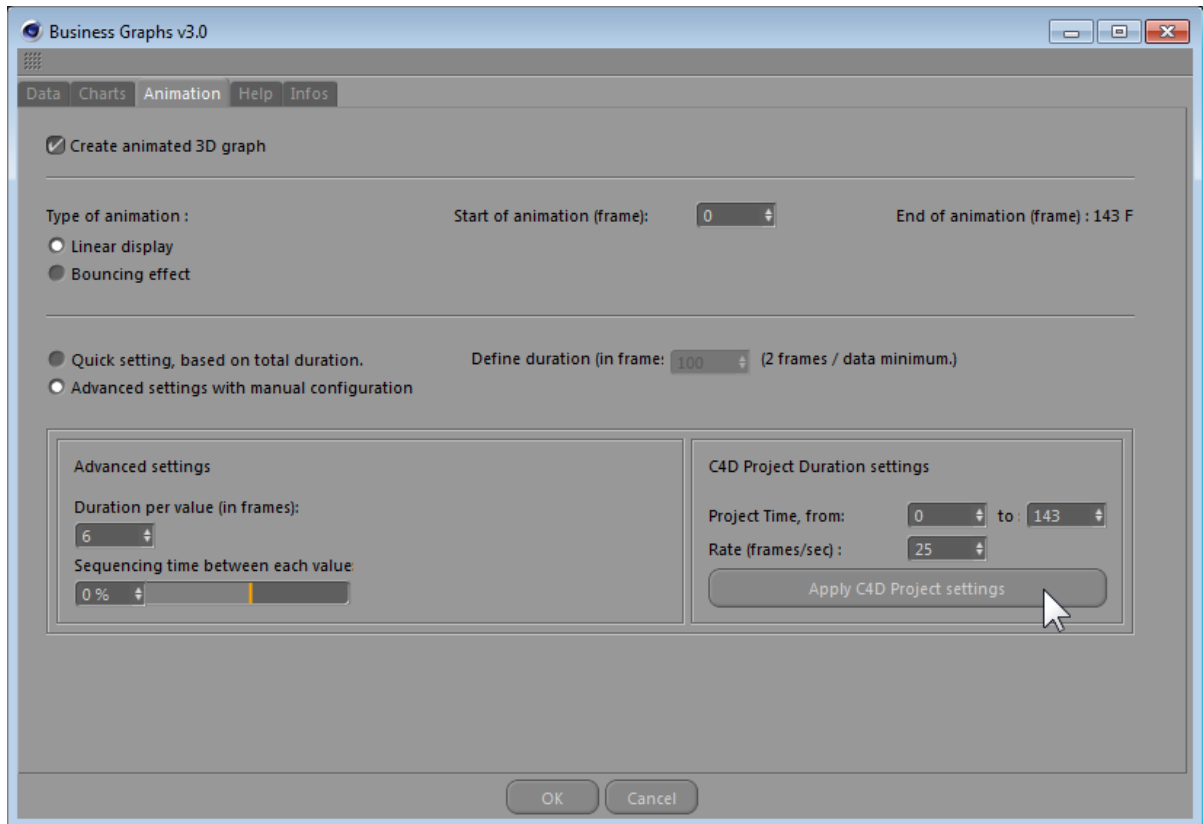


## Type of animation

- **Linear display**: the animation is generated like a uniform and continuous growth.
- **Bouncing effect**: the animation is generated with an additional dynamic "bouncing effect" which may require more frames to be noticeable.

**Start of animation (frame)**: sets at which frame the graph animation starts, in case you do not want to start the animation immediately, but for example 2 seconds later, i.e. at frame 50.

**End of animation (frame)**:
This is just an indicator that automatically estimates the total duration of your animation, based on your settings and all the data values that need to be displayed.

**Quick settings, based on total duration :**
In case of time constraints for the complete display of your graph – e.g. 5 secs, which gives 125 frames – just enter this duration (125)  in the '**Define duration in frame**' field. Each graph value will then be automatically generated to be animated on several frames, depending on the following formula:

*Total animation duration / total number of data values = duration for one value*
A minimum threshold of 2 frames is needed for each value.
*Example: for a chart with 5 rows of 4 values (i.e. a 20 values total), the minimum duration for the animation will be 20x2= 40 frames.*

*But, if you* **'Define Duration Time'** *to 200 frames, then each value will be animated for a duration of 10 frames.*

**Advanced settings with manual configuration:**

**Duration per value (in frames):** This setting allows you to set the duration for animating each value – not the total duration time. So, depending of the number of values to display in the chart, the estimated duration of the animation will be calculated and displayed in the top right corner of the plugin window.
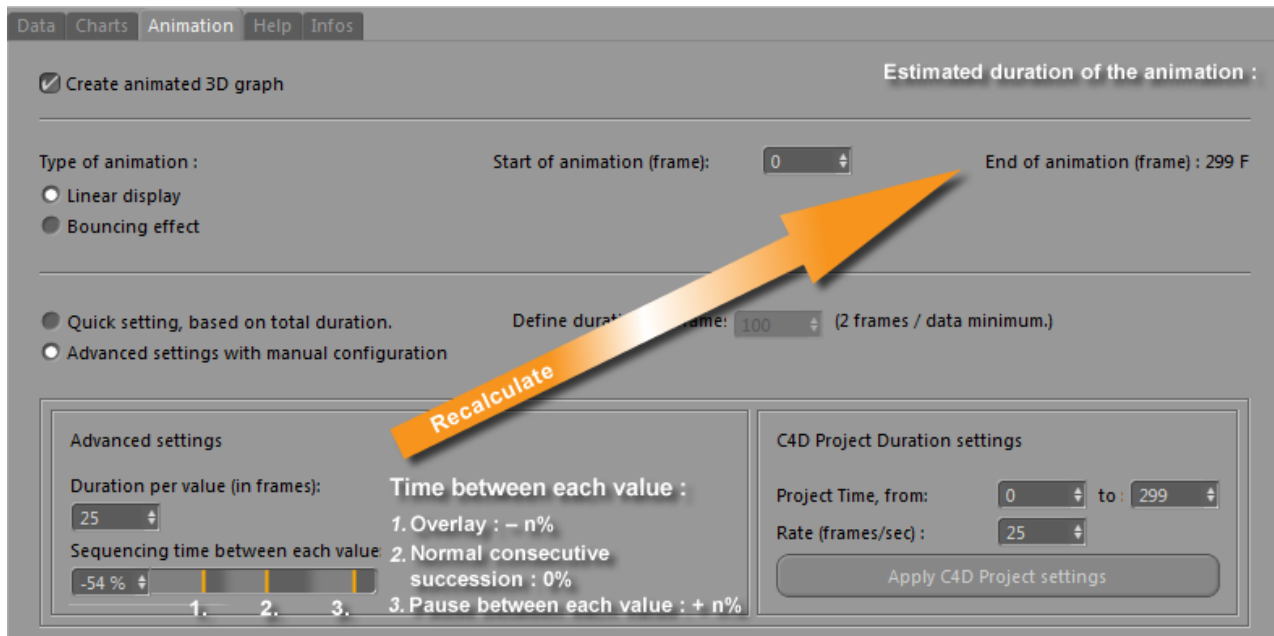


**Sequencing time between each value:** This setting allows you to start the animation for the next value before the previous one ends its animation. For such an overlay, enter a negative value (i.e. - 50%). Conversely, you can force a pause between the animation of two consecutive values. If you want this, try a value superior to 0%.

> ***Example***: set a **'Duration per value'** at 30 frames.
> *1. With a -50% overlay sequencing time, the next value will begin its animation at the point where the previous one reach the half of this growth (i.e. after 15 frames).*
>
> *2. With a 0% sequencing time, the next value will begin its animation as soon as the previous one is done with its animation.*
>
> *3- With a positive sequencing time, like +50%, a pause of 50% (half) of the duration per value will occur and "stop" the animation before starting to animate the next value.*

Explicative diagram:



Business C
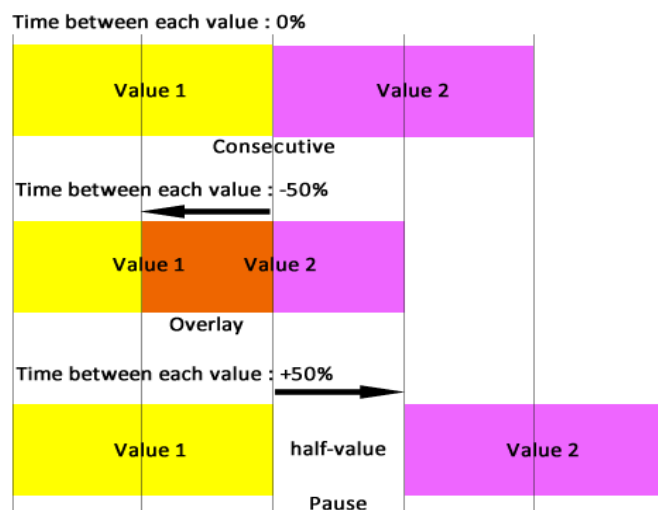
**C4D Project Duration settings**

Depending on your previous settings, you can set the total duration time for the Cinema4D project, as well as the frame rate (frames per second). The big "**Apply C4D Project settings**" button allows you to apply optimized settings to the appropriate C4D **Project Time** and Frame **Rate** without exiting the plugin windows.
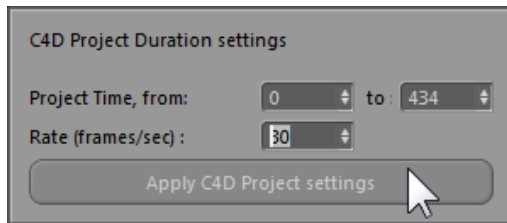


> **Reminder:** Cinema4D default project counts 90 frames at 30 frames/second, giving a 3-second animation. It may be too short! So if you can't see the end of your graph animation, click on this button! ;-)

## Last tips
If things go wrong and start to act up strangely, close and restart the plugin. It will restart it from scratch, correctly reset … It can happen when you successively create different charts consecutively without closing the plugin. Some variables might not have been updated correctly and bugs may appear.

## Video tutorials
A YouTube Playlist with tutorials can be found here *(in French for now, but with animated pictures!)*.
www.youtube.com/watch?v=LyDJTiAFFI8&list=PLMaqXYMBhNpBt1A2cAoNCFy-puDcswI2c

## 3DWeave Team
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