Particle Effect Builder

Welcome to Particle Effect Builder

Thank you for downloading Particle Effect Builder (Peb)! Peb is a tool for creating al sorts of particle effects for use in the 3dGamestudio Engine Versions A6, A7 and A8. It offers you many possibilities for making special effect programming easier. Peb is able to generate your particle effects into LiteC or C-Script codes depending with which scripting language you are working. The features of Peb include:

- **Create complex parent/child chains of different independent effects**
- **All common particle functions are customisable**
- **Create several effects for one emitter or arrange different emitters together with their own effects and settings**
- **Load parts of your levels or objects into Peb and place your effects directly into the level Peb will generate the emitters to their correct positions**
- **Create complex Event compositions for your particles to control their behaviour**
- **Randomise your particle values by percentage**
- **All effects are fps synchronised**
- **Save your effects to an own file format and create sample effects for speeding up your work**
- **Apply movement formulas to your effects**
- **Create vertex effects with dummy emitters or import your own emitters**
- **Create effect compositions such as explosions or complex light-beams by using the timetable function**
- **Generate your effects into LiteC or C-Script and choose from many generation options**
- **Completely free to use in any commercial or non-commercial projects, no credits required**

Table of contents:

9. Limitations and Performace
10. Implementing generated Script files

1. Overview

Peb is a dialog based application, you can view your particle effects through the engine window in real-time and control your effects with the selection dialog. By clicking with the mouse into the engine window you can place your effect emitters. Press Esc or close the Effect dialog to switch to selection mode. Now you can select different emitters by clicking on them. Use the right mouse button to rotate the camera and the w-a-s-d-q-e keys to move around. You can zoom with your mouse wheel or the x-y keys. Use the engine window's menu to navigate through the different functions of Peb.

Peb organises groups of effects with their emitters. One single emitter can have a list of several single effects. Each effect can have a new list of child effects that are produced under certain conditions. And the children can have child effects by themselves! This way it's possible to create complex chains of a lot of effects. But that' not all: You can also create effect settings with several emitters each having it's individual effects applied.

- # The Engine window

This section gives you information about all control elements that belong to the engine window. For information abut the menu or the different tool dialogs please go to the correspondent section of this manual.

In the engine window you can view all your effects as they will appear later on in your projects. When an emitter is selected it is surrounded by a red selection box. You are then in movement mode. Clicking with the left mouse somewhere into the screen will move your selected emitter. Below your emitter you can normally see a grid that defines the z0-plane. By clicking onto the grid your emitter will be placed onto the plane. You can also move your emitters by using the direction arrows that are visible when you have an emitter selected. By right-clicking onto the emitter or the direction arrows you can rotate the emitter.

At the top right edge of the engine window you can see a statistics panel. You can see the actual amount of visible particles, the current fps, the number of created base effects and the number of created emitters.\n

Attention: By default normal effect emitters are hidden. You can still select them however by clicking near the particle emission origin. To show all effect emitters use the corresponding option in the view menu.

How to... hide all interface elements: You can hide all interface elements of the engine window by selecting the corresponding options in the view menu.

How to... use the placing feature: If you want to place your emitters directly onto your level geometry you can use the load background function of the file menu. After your specific object is loaded you can place your selected emitter onto it by simply clicking on the position you want it to have on the object.

- Keyboard controls

[w-a-s-d-q-e]: Move the camera around.
[Holding right Mouse button]: Rotates the camera. Use the mouse wheel to zoom
[Esc]: Deselect the currently selected emitter. Switch to selection mode
[F1]: Opens the helpmenu
[F2]: Opens the sample explorer
[F3]: Opens the timetable dialog
[F4]: Opens the options dialog
[F5]: Opens the generate dialog
[Ctrl +N]: New setting
[Ctrl +O]: Open setting
[Ctrl +S]: Save setting
[Ctrl +A]: Add emitter
[Ctrl +C]: Copy
[Ctrl +V]: Copy (to selection if any)
[delete]: Delete the selected emitter

Attention: Please note that the keyboard shortcuts don't work when a dialog's subcontrol such as a list box or a digit box is active and selected.

- The menu

The file menu

- New setting: Start the creation of a new emitter.
- Open setting: Load a previously saved effect setting for continuing your work
- Open Background: Load a background entity into Peb.
- Save and Save as: Save your effect setting to the .pef format.
- Generate Code: Open the generate code dialog to create script files from your effect setting. Please refer to the code generation section for further details.
- Options: Open the option dialog for adjusting the editor's settings.
- Exit: Leave Peb

The edit menu

- Add: Add new objects to your setting. You can add a new emitter with a base effect applied. You can also load an existing effect setting from file. All emitters of the file will be added to your setting. If you choose the add to selection option the first emitter of the file will be added to the currently selected emitter (all it's effects will be added to the selected emitter's effect list). Other emitters in the file will be added in the normal way.
- Copy: Copy an effect emitter with all it's effects.
- Paste to selection: Doesn't create a new emitter but adds all effects of the copied emitter to the currently selected emitter.
- Delete: Remove the selected emitter from the scene.
- Select next emitter: Selects the next emitter. Useful to find all emitters of the scene

The view menu

- Centre camera: Centres the camera to the origin of the scene.
- Move to object: Brings the currently selected emitter into camera focus
- Hide... With these options you can disable certain elements of the engine window.
- Sample Explorer: Opens the sample dialog (it is opened by default when starting Peb). For details please refer to the sample section
- Timetable effect: Opens the timetable dialog. With this tool you can organise your effects in a play line in order to produce effect shows or effect compositions such as explosions. For details refer to the timetable section.

The help menu

- Help menu: Opens the built in documentation. The documentation automatically switches it's page when a dialog or a tab is opened.
- Tutorial: Opens the tutorial list. Choose a tutorial from the list and click on start to start the tutorial.
- About: Opens the about dialog.

2. The Effect Dialog

With the Effect Dialog you can control all effects that are applied to the current emitter. You can set or change their basic values control their movement or behaviour and you can also create new effects for the emitter or child effects for your existing base effects. The effect Dialog is organised in several tabs that offer you options to more specific topics. In all tabs you can see the effect list on the left side of the dialog. This list shows all effects that are applied to the selected emitter.

Hint: At the beginning the Effect dialog might look very complicated but you'll see that it is very easy to control your effects and produce the results you want to have and the effect dialog gives you power of nearly every aspect of particle effect management. Open some of the samples with the sample explorer to get started and use the predefined base effects (select an item from the combobox below the effects list before clicking to new or new child).

- **Effect List:**

  By clicking on one item in the tree-view you can select the correspondent effect for edition in the effect dialog. All modifications done in the different tabs of the effect dialog will now be applied to the selected effect. Below the tree-view there is a set of buttons. With 'new' you can create a new base effect. 'Copy' copies a base effect with all it's children and adds it to the list. (when you had a child selected in the tree-view it's corresponding base effect will be copied). Using new child will add a child to the currently selected base effect or child effect. Delete will destroy the selected effect and all it's children and remove it from the list. Attention: Deleting an effect can have effects on other emitters as well when effect sharing is enabled! Please refer to the option's section.
  Below the button set there is a name display that shows the name of the selected effect. Please type in a name for each of your effects here.

Important:

Although it's not necessary it's highly recommended that you give all your effects individual names, as they will also be the names of the effect functions in the generated script files. If there are effects with the same name when generating code, Peb will automatically individualise all double named effects, but it might be difficult then to identify single effects in the produced code file!

How to arrange effects in the effects list:

At the first glance there might be no difference between adding new effects as base effects or as children to the existing base effect. As long as 'at generation' is selected for your children they will be created just with your base effect. But be careful:

- A child is created by every particle of the base effect. When your base effect has an amount of more than one the children's amount will be multiplied therefore.
- A child share the offset from it's parent but can also have an own offset which is relative to the parent's offset. This will produce different result compared to having two base effects esp. When offset is randomised.
- A child will be hided as well when the parent is hidden.
- A child will be removed when the parent is deleted.

- **The Main tab:**

  In this tab you can modify all basic options of the selected effect.
  - Amount: Amount of created particles per effect() call.
  - Wait: Time in frames between two effect calls. Size: Size of the particle at generation in quants.
  - Life: Lifespan of the particles in ticks
  - Alpha: Transparency factor of the particles
  - Color: Basic colour of the particle.
  - Bitmap: Particle Graphic that is used for the particles. Clicking to the cross will reset the particle bitmap to 0.
  - Flags: Different Particle flags: For details refer to the 3dGs manual. Play around with different combination to see their effects in action.
  - Emit: Here you can set the emission condition for child effects. At generation will produce all children to emit just with it's parent. Each parent effect will only have one effect call. Setting the emit value to alpha or life will produce the child particles when parent's life or alpha is below the selected value. Each parent will have several effect calls in this case so take care of the particle count!
  - Hide: With this option you can deactivate an effect and all it's children. Please note that the effect will still be generated to code, the option is only thought for hiding effects within the editor.

  Hints:
  - Amount: Please note that the real effect amount can diver because of fps synchronisation. You can also insert a fractional value here! The emitter will then produce the - in average – correct amount of particles.
  - Wait: Play around with amount and wait to tweak the final particle amount.
  - Transparency: When you use the sample particle bitmaps please note that some are made for use with the overlay flag and some are looking better with the translucent flag. Try out which transparency setting you like more for each bitmap.

- You may raise the wait value of the children to reduce the amount of child particles.

- **The movement tab:**

With this tab you can control all aspects of particle's movement.

- Velocity: Start velocity and gravity values. For inserting fractional values use the decimal point just as within LiteC or C-Script. Negative values are also possible. Velocity will be directional. For having particles that move in all directions use the random sliders in the next tab.
- Offset: Here you can add an offset position for any effect from it's emitters origin. This way you can place single effects around the emitter or – in combination with the random sliders - create lines or fields.
- Adjust offset: This option will make the particles offset position dependent from the emitters angle
- Adjust velocity: This option will make the particles velocity to be oriented by the emitters angles.
- Formula: Here you can choose from a list of movement formulas that are used for more special movement or for special effects such as spirals or explosions. Please refer to the formula section for a detailed description of all movement formulas. With the speed value you can speed up the animation of the formula.

- **The random tab:**

Using this tab you can randomise certain values of your effects. The sliders represent the amount of random that will be applied to the value. Setting the random sliders of velocity and offset to more than 50% will let the value be randomised also in his negative range. This way particles can get random velocity that spreads in both directions.

- Fixed velocity length: With this option you can give all particles with random velocity a fixed length that matches the length of their basic velocity. This way only the velocity direction will be actually randomised.
- Individual velocity and offset: This value will force each particle to calculate it's starting position and base velocity on it's own, rather than receiving position and speed by the effect call.

Hints:

Individual velocity and offset will only have visible effects when the amount value in the main tab is set to a value greater than 1 and random is applied to velocity or offset. Fixed velocity length will only have visible effects when random is applied to a velocity direction.

- **The events tab:**

With this tab you can create events that control effects while they are alive.

- The event list: Here are all events listed that are set to the current effect. Click to new to create a new event or delete them by clicking onto the delete button or double-clicking to an item in the list. You can also give every event a name, but it's not necessary.
- Starting: Select a condition that will enable the event. The event will be enabled everytime the condition is fulfilled. In the digit control you can specify the value for your chosen condition.
- Doing: Select the action that should be done by the event. The action will be proceeded every frame as long as the ending condition isn't reached. In the first

combo field you can choose from a list of possible action groups. In the second control you can specify which value should be edited. The set groups will set a property to a certain value. Be careful esp. with setting lifespan! It will be set as long as the ending condition doesn't quit the event! The loose and win groups are thought for constantly changing certain abilities such as alpha to produce alpha fading.

- Ending: Here you can choose a ending condition similar to the starting condition to disable the event. If you don't choose an item here (or if you choose never from the list), the event will last till removement of the particle. As long as the ending condition is fulfilled the event won't start.

How to understand this tab best:
The events tab might look confusing at the first glance, but it's a very important tool to create good looking effects! Have a look at some of the sample effects when you have problems to understand the functionality of this tool.
Hint: 'Generation' will enable the event when the particle is created. The ending option 'Immediately' will end the event once it was executed the first time and prevent it from being started again.

- **The emitter tab**
  In this tab you can edit position angle and scale of the effect emitter. Changes made to those emitter specific properties affect all effects of the emitter of course!
  Emitter object: Load an own emitter object or choose from the samples in the emitter folder. Custom emitters can also be used for vertex effects. Therefore you can choose an emission option (this option is individual for every effect of the emitter), that will either let the effect emit from the emitter's centre or from a certain vertex or from every ... vertex of the emitter model. These settings will only affect base effects or direct children of base effects with the 'emit at generation' option.

3. The Sample Explorer

With the sample explorer you can preview and quickly load sample effects or particles to your existing effects. The sample explorer is organised in two tabs: Particle and Sample

The Particle Tab
In this tab a list of all sample particles is shown. You can preview a particle file by selecting it in the list box. To assign a sample particle to one of your effects, select the effect in the effect dialog and then double-click on the particle's list entry or press the add button below the listbox. All particle loaded by you for the first time into Peb will automatically being added to the samples list when you start Peb the next time.

How to add particles to the sample list
Open the Peb directory and go to the subfolder 'particle'. Insert all particle files that you want to be shown in the Peb sample's list into this directory.

The Sample Tab
Here you can preview and load existing sample effects. When clicking on the preview button after select one of the effects, a new engine window will be opened showing the effect. Double-clicking an effect will add this effect with all it's emitters to the current setting. The same will happen when pressing the add button below the list

box. The new button will open a new setting with the selected sample effect and add to will add the first emitter of the sample to the currently selected emitter.

How to add own effects to the sample list
Open the Peb directory and go to the subfolder ‘Sample’. Insert all .pef files that you want to be shown in the Peb sample’s list into this directory.

4. The timetable tool

The timetable tool gives you the power to make timed compositions from your effects. This way you can realise complex effects such as explosions or generate an effect animation. The timetable window is organised in three columns. The listbox on the left side is the effect pool, all base effects of all of your emitters are shown. Double-Click on a list item to add the effect to the timetable. On the right side of the control you can set a starting time and a duration of the timetable event. This is at which time after starting of the effect the specified item will become active and how long it will stay active. The time values are measured in seconds. The length of the complete composition is automatically set. You can add the same base effects many times to the timetable list. Double-clicking to an item in the timetable list will remove the effect from the timetable. Before you can view your timetable effect check the active check-box at the bottom of the control. Now you can play the effect composition or switch to a certain position on the time-line by tracking the slider.

Hint:
When generating code you can choose whether your timetable effect should be performed once, or cycle endlessly.

5. Options

At the options dialog you can select options for the editor's appearance and functionality. All options are easy to understand for further explanation please read the editor's documentation entry.

6. Code generation

When you have finished edition of your effect setting you can generate a script file out of your scene. At first type in a name for the generated script file. After generation you can find the generated file in the ‘generated’ sub-folder of the Peb directory.

- Language: Choose the code language for the generated script file. LiteC will generate .c file that is used by A7/A8. C-Script create a .wdl file that is used by A6/A7. The C-Script code file requires at least A6.4 to be used.
- Create: Hole file will include all effects and all emitters into the script. Selection only will only generate the effect list of the currently selected emitter.
- Advanced options: These options specify what the generated script file will include. If you don’t know which options to choose use the default settings. They will create suitable script files for most common situations.
- Header: If checked a file header will be written that includes the bitmap and vector definitions used by the effect script. This option is required for a working effect unless you want to define the header on your own.
- Predefinition: If checked the header will use predefinitions to avoid double-definitions when you use more than one Peb Script in your project.

- Creation Function: If checked the script will include a creation function that will create all emitters and place them just as they are arranged in the editor.
- Executable: Checking this flag will include a main function to the script. The script is executable by itself. Do not use this option when you want to include the script file into an existing project with it's own main function.
- Timetable effect: If you have created a timetable for your effect it will be included into the script when this option is active. All emitters will be removed when the timetable reaches it's end.
- Cycling prevent the emitters from being removed. Instead the timetable effect composition will cycle endlessly.
- Create Folder: Creates a new folder and copies all needed particle and emitter files into this folder.

7. Movement Formulas

Attention: When using a movement formula no changes to the velocity values should be performed by effect events.

- Normal: No movement modifications are proceeded for the effect.
- Circle: The effect gets a circle function. The velocity values of the effect define the circle's radius. Be careful with setting random velocity to the effect, it will disturb the circles.
- Expansion: Accelerates the effect velocity in steps defined by it's base velocity. The effect will be repeated in certain distances defined by the speed value so don't wonder if the particles stop moving after a while.
- Spiral: Same as circle but doesn't suppress z-Velocity.
- Cone: Creates a spiral effect that is expanding. Use velocity and speed to adjust the appearance of the cone.
- Parabolic: Creates parabolic waves into z-Direction. Velocity x and y define the direction of the emitted stream.
- Exponential: Accelerates the effect velocity with an exponential function.
- Camera Effect: The effect follows the camera similar to a view entity.

8. Fps synchronisation

All effects generated with Peb are frame rate synchronised. That means that the effect will look the same no matter at which frame rate it is performed (the quality still suffers from frame rate drops and extreme low fps). The effect will always contain the same number of particles, as the creation function of the particles is aligned to the frame rate. That means that different amounts of particles are created every frame. When the frame rate is low more particles are created in one frame and when it's high less are created. Therefore the particle amount per second is always constant. Peb works with a Particle amount of 100 Particles per second when you choose a amount value of 1 and a wait value of 1. Therefore a fps synchronised Peb effect looks exactly like a non fps synchronised effect would look like at a frame rate of 100.

9. Limitations

Peb is a tool that offers great possibilities for creating particles, but it has also limitations in some functionalities:

- You can't create more than 100 base effects per emitter.
- You can't have more than 10 direct children for one effect.

- You can’t place more than 1000 emitters in one effect setting.
- You can’t have more than 1000 base effects in all your emitters within one setting.
- You can’t create more than 40 events for one effect
- When compiling to C-script only the first 8 events of every effect will be included. In LiteC you can have up to 40 events per effect generated.
- You can’t place more than 100 items in one timeline

These limitations are theoretical. Practically your system’s performance will limit the amount of effects and events that can be performed at reasonable fps.

- Performance

  The more effects and particles you have the more performance is needed to show your particle effect. Esp. The amount and wait values have great influence on the frame rate. Creating a lot of child particles will consume much performance. Many effect events will have their effect on the frame rate. Movement formulas also consume performance.
  In general the generated particle script file should run at a slightly higher fps than in the editor, as the editor’s particle code is more complicated. Peb does NOT use instancing for the particles so if you own the pro Edition of A7/A8 your effects should run much faster than within the editor.

10. Implementing generated Scripts

Integrating your generated script files into your own projects is easy. You simply have to copy the script file and all relevant data (particle bitmaps, emitter models) to your project's folder or a path. Then open your main script and type in the following line at the beginning or at the bottom of an include list:

C-Script:

include <your script name.wdl>;

LiteC:

#include “your script name.c”

After that you can use the effect in your project. If you have chosen 'creation function' in the generation dialogue, you can show your effect by simply calling:

effect_name_create(position);

//in LiteC position is a vector in C-script it's a &var (pointer to an array)

Set position to the position vector where the effect should be created. If you have created a timetable effect the function will be named

effect_name_timetable(position)

You can also directly create the effect emitters yourself or assign the emitter actions to your level objects.