

What's new in RT Editor 0.6.0

New hierarchy generation algorithm

A new algorithm for hierarchy generation can be used. It is called "median", while "fasthier" is the older (better quality hierarchy but greater time for building); "hier" is the first one, you should not use it. Now "median" is the same that "auto" for brep objects. You can modify it in this way:

- 1) Execute "Edit|Param" command.
- 2) Click on "Raytracing" button.
- 3) Click on "Optimiz" button.
- 4) Change "_brep_optimiz" or/and "_general_optimiz".

Library directory

The library directory contains some usefull .rt files. You should not open this files, you must include them int your scene with "Insert|File RT" command. They are organized in subdirectory:

field standard field objects (described below)
material common materials
param common sets of rendering variables

In material subdirectory:

glass green glass

In material subdirectory:

fast faster raytracing rendering
hquality high quality rendering

New pointlamp object

Lamp like object. Lamp becomes obsolete. Instead you can use objects which have the same behaviour of a lamp.

If you execute command Edit|Object|Create you should see the list of object type. You can also see pointlamp type (like if you are using Edit|Lamp|Create). A pointlamp object shows like a sphere in a editor view, but in rendering it is equal to a lamp.

Because it is an object, it will not be present in all layer; you can also include it in a group or animate it.

Brep special commands

Use command "Edit|Object|Special". You will see the special menu for brep object.

Info give information on the status of the brep object. This can tell you if the model is an inline model or if it is an external model (in this case you will see also the file name).

Include In Scene if the brep object is external, include a copy inside the .rt file. Files with inline models can became very large.

External Model if the model is internal, you can save the model in a brep file.

Save refresh the brep file (only for external models).

Editing brep

You can move the vertices of a brep object. You should edit only inline brep objects .

Follow this steps:

- 1) Select a brep object.
- 2) Click on a vertex. A red square will appear.
- 3) Move the mouse in the new position and press m' key.

Field object

How to use Field Object

Field object are used to deform brep objects. You should not try to render it. Field objects are completely programmable, you can write you own field.

A field is a vector field. It exists only inside a volume. In the editor you will se a solid object (like a box) and inside two curves, each of a different color. One is the curve before to apply the field on it, the other the same curve after to apply it. You can move a field object like any other object, you can translate, rotate, scale it. To apply it, select a brep object (click on it with left button of the mouse) the press 'f' key. You must choose which field object apply (you may have more that one in your layer).

Field will be applied only to control points that are inside the field volume, so you can change only a portion of an object. It is better that you use brep object with inline models.

In directory "Library\field" you can find some predefinite fields:

hammer
lhammer
bend
taper

Every field can be customized with same specific parameters (different from field to field), which modify its behaviour. You can change them with Edit|Object|Modify command.

If you want to modify a field variable, choose it in the listbox, then click the "update" button to see the value of the variable and the range (from,to). To change a variable value use "change" button.

How to write a Field object

You can write your own field. You must write your own .rt file using a text editor.

Look at this example (equal to "library\field\lhammer.rt") :

```
{ material
  name _field1;
  model { phong
    Ks 0.2;
    Kt 0;
    ni 1;
    Ka 0.2;
    Kd 0.6;
    n 10;
    Od (0,0,1);
    Os (0.5,0.5,0.5);
  }
}
```

```
{ material
  name _field2;
  model { phong
    Ks 0.2;
    Kt 0;
    ni 1;
    Ka 0.2;
    Kd 0.6;
    n 10;
    Od (1,0,0);
    Os (0.5,0.5,0.5);
  }
}
```

```

}
{ object
  name lhammer;
  model { field

    { object
      name obj000001;
      material standard;
      model { box
        xmin -2;
        xmax 2;
        ymin -1;
        ymax 1;
        zmin -1;
        zmax 1;
      }
    }

    decoration { object
      name decoration;
      material _field1;
      model { polyline
        open 1;
        p ( 0 , 0 , -0.45 );
        p ( 0 , 0 , -0.4 );
        p ( 0 , 0 , -0.35 );
        p ( 0 , 0 , -0.3 );
        p ( 0 , 0 , -0.25 );
        p ( 0 , 0 , -0.2 );
        p ( 0 , 0 , -0.15 );
        p ( 0 , 0 , -0.1 );
        p ( 0 , 0 , -0.05 );
        p ( 0 , 0 , 0 );
        p ( 0 , 0 , 0.05 );
        p ( 0 , 0 , 0.1 );
        p ( 0 , 0 , 0.15 );
        p ( 0 , 0 , 0.2 );
        p ( 0 , 0 , 0.25 );
        p ( 0 , 0 , 0.3 );
        p ( 0 , 0 , 0.35 );
        p ( 0 , 0 , 0.4 );
        p ( 0 , 0 , 0.45 );
      }
    }

    dfmat _field2;

    param {
      strenght value 1 from 0 to 5;
    }
    mat {
      strenght "1;";
      rx "strenght - abs(z)";
      ry "0;";
    }
  }
}

```

```

        rz "0";
    }
}
.

```

The definition of the two material are outside the field object declaration, but them are used to define the color of the two curve which describe the field behavior.

The first object is the volume field. It can be any raytracing object, but it must be closed (like a box, a sphere or a cylinder).

The decoration must be a curve, it is the curve before apply the field.

dfmat is the material for the transformed curve.

param section list all the variables that you can modify from editor (using Edit|Object|Modify). A variable in param section can be any identifier different from “x”, ”y”, ”z”, ”rx”, ”ry”, ”rz”. The definition follow the form :

variable value defvalue from minvalue to maxvalue;

where variable is the variable name, defvalue if the default value, minvalue and maxvalue the minimum and maximum value for the variable. You must also define the variable in the next mat section at the default value.

mat section describes the field in all the space. You must write a list of variable definitions, using mathematic expressions.

Some variables are special :

x,y,z are predefefinite variables. They are a point in the space in the form P(x,y,z).

rx,ry,rz are the return variables. You must always define them. They are the three components of the field vector at point P(x,y,z).

In mat section you may use x,y,z and any variable defined in mat section before the first use. You can define new variables following this expression:

```
var "vardef;"
```

var is the name of the new variable (case sensitive).

vardef is an expression.

In expression you can use (and)' (for precedence in evaluation) and the following functions:

```

+, - , * , /
abs
sqrt
exp,log
sin, cos, tan
asin,acos,atan
zero

```

zero is usefull if you must write expression like x/y. Sometimes y can be equal to 0 and you will get an error computing x/0. You can rewrite the expression like x/(y+zero(y)).

Blob object

Now you can create blob objects.

You need an external program to do it :Winblob. You can find it at:

<ftp://ftp.povray.org/pub/povray/utilities/general/winblobs.zip>

Create a blob object and save it in .blb file format, then use command “Edit|Object|Create” and choose “blob”.

Creating brep object from truetype font

You must follow this steps:

- 1) the option ConvertText must be on, in Option|General
- 2) Create a layer (es. new_text') and select it.
- 3) Choose Insert|Text' command, then select the font and the character dimension (greater than 100 for better resolution).
- 4) insert you text string

At this time you should see the text on the top view (if not, try to press o' key sometimes on top view). Each letter of the string is composed by one or more polyline. Now you can create a brep object using sweep.

- 5) Use layer|group command
- 6) Execute Edit|Object|Special' then choose sweep.

Bezier and NURBS curve

Now you may use bezier curve and NURBS curve in your scene.

NURBS mesh

A NURBS mesh is a series of NURBS patches. The NURBS mesh is described in a .nrp file. following this format.

Look at the definition of a .nrp file:

```
{ NURBS
  { patch
    orderx 4;
    ordery 4;
    dimx 4;
    dimy 4;
    { 0; 1; 2; 3; 4; 5; 6; 7; }
    { 0; 1; 2; 3; 4; 5; 6; 7; }

    (1.40000, 0.00000, 2.40000),1;
    (1.40000, -0.78400, 2.40000),1;
    (0.78400, -1.40000, 2.40000),1;
    (0.00000, -1.40000, 2.40000),1;

    (1.33750, 0.00000, 2.53125),1;
    (1.33750, -0.74900, 2.53125),1;
    (0.74900, -1.33750, 2.53125),1;
    (0.00000, -1.33750, 2.53125),1;

    (1.43750, 0.00000, 2.53125),1;
    (1.43750, -0.80500, 2.53125),1;
    (0.80500, -1.43750, 2.53125),1;
    (0.00000, -1.43750, 2.53125),1;

    (1.50000, 0.00000, 2.40000),1;
    (1.50000, -0.84000, 2.40000),1;
    (0.84000, -1.50000, 2.40000),1;
    (0.00000, -1.50000, 2.40000),1;
  }
}
```

This file contains only a patch, but you can have .nrp files with more patches.
orderx and ordery are the order of the surface for x and y parameters.
dimx and dimy are the dimension of the array of control points.
The two sections without names are the knot section for x and y parameter; the follows a the list of control points, in the form:

$$(x, y, z), w;$$

where w is the weight.

If you have .nrp file you can add it to a .rt file in the same way that a .brp file.

Preview rendering

You can preview the selected layer. For some objects preview can be very approximated.

- 1) Use "Edit|Param" Command, then change "render" listbox to "preview".
- 2) Execute "Action|Create Image".

Export DXF file

You must choose DXF rendering type. It will generate only triangle mesh. For some objects it can generate very approximated or any triangle mesh, like for preview and vrml rendering.

Flip object

Try to render inside a sphere or a box. You should see a darker image that you render outside the same object. This is the standard behaviour, but if you want you can invert the "inside" of an object with the "outside". You must create a flip object, which inverts all the surface normals of an object. You may use on any object that you can render.

- 1) Execute command "Edit|Object|Create"
- 2) Choose "flip"
- 3) Choose the object that you want to flip.

You cannot modify a flipped object.

Bump mapping

You can use a texture to perturb the surface normals of an object, (look at example bump1.rtp). You can use any 24bit bitmap, but only the monochromatic intensity of the bitmap will be used. To use bump mapping with a object, command Edit|Object|Modify Comm.