

Particle Systems and 3ds Max

procedural animation tool that enables users to animate large groups of objects (either set or user configured) by a series of rules and procedures (such as birth, life, death, rotation, position, spawning, etc.) Procedural animation is not created by key framing but by setting a start time end time and amount of objects to be created. They can also be further influenced with gravity, wind, and drag to enhance the overall effect (these are called forces).

Types:

Simple (originated in early versions of Max):

Spray -no rotation parameters

Snow -rotation parameters

Super (originated in later versions of Max): allows for different types of particles including metaparticles and instanced geometry metaparticles are used to create liquid shapes (blobby style).

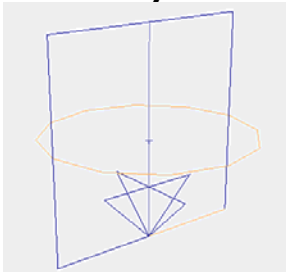
Blizzard-nothing special/ basic

Super Spray-includes an offaxis and spread amount that control the angle of the emission from a point. Off plane controls the angle of emission rotated around the plane of the emitter and spread controls the conical spread angle along the axis of emission.

PCloud -emits from within a geometric volume and is therefore contained within that volume (the volume can be a sphere, cylinder, box or object)

PArray -uses objects as emitters and can explode geometry. includes a 4th particle type called object fragments which uses the objects facets to create a particle explosion

Anatomy of a Particle System:



Emitter: when a particle system is added to the scene an emitter viewable only in the viewport but not rendered is drawn. It represents the direction the particles will initially flow, the containment size of the particle system etc.



Space Warps: used to affect the particle motion

Forces: motor, push, vortex, drag, path follow, pbomb, displace, gravity, wind

Deflectors: deflector, dynaflect, omniflect

General Particle Settings:

Basic Parameters

Dots, Mesh, Ticks, Bbox – viewport display of particles. Bbox is bounding box and is fast. Dots depends on whether you use Open GL or Heidi driver to viewport render which is based on whether your graphics board supports Heidi / Open GL. Percentage of Particles – displayable particles in VIEWPORT

Particle Generation

Use Rate – variable # of particles that are emitted each frame
Use Total-total # that are emitted over time (Start and stop time)
Speed-emission velocity (use variation to break up uniformity of speed)
Emit start / stop – set frame #s at which particles start and stop
Display until – determine when particle dies. On a specific frame all will die
Life-relative value determining # of frames a particle will be present after emitted
Size-multiplier of scale and is random
Grow for/fade for – causes particles to grow from a scale of zero to full size and then fade to a zero over a given # of frames
Seed-random value to determine uniqueness of particle system

Particle types – determines how it renders. Standard (triangles, cube facing and sphere), metaparticles (blobbies), and instanced geometry (imagine instanced geometry)

Rotation & collision

Spin time and phase – # of frames it takes to fully rotate (low values = faster spinning) phase = starting angle of rotation
Random, direction of travel, user defined-random rotates the particles on varied axes, direction of travel forces the particle to orient itself in the direction they are traveling with an option to stretch the geometry based on velocity, user defined sets an absolute rotation axis.
Interparticle collision-calc intervals per frame;for controlling the rate at which the particle collisions are tested. Bounce is the percentage of force applied (do not use – high computation required)

Object motion inheritance: velocity passed from the emitter to particle; particle already has velocity too.

Influence - % of particles effected
Multiplier – how much velocity is inherited from the emitter. 0=no inheritance and only object velocity involved; 1= 100% inheritance and added to the overall object speed.

Bubble motion: wobbling effect on particles

Amplitude-controls distance at which particle will wobble from original direction
Period-controls cycle time of particle oscillation
Phase-initial wobble offset

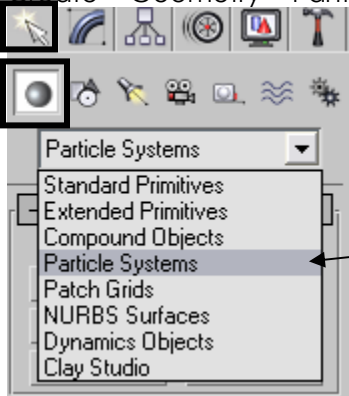
Particle spawn: emission of particles from particles

None-no particle spawning
Die after collision-causes particles to die after colliding with deflector space warp
Spawn after collision-particles born after collision
Spawn on death-firework effect
Spawn trails-spawn trails after the original

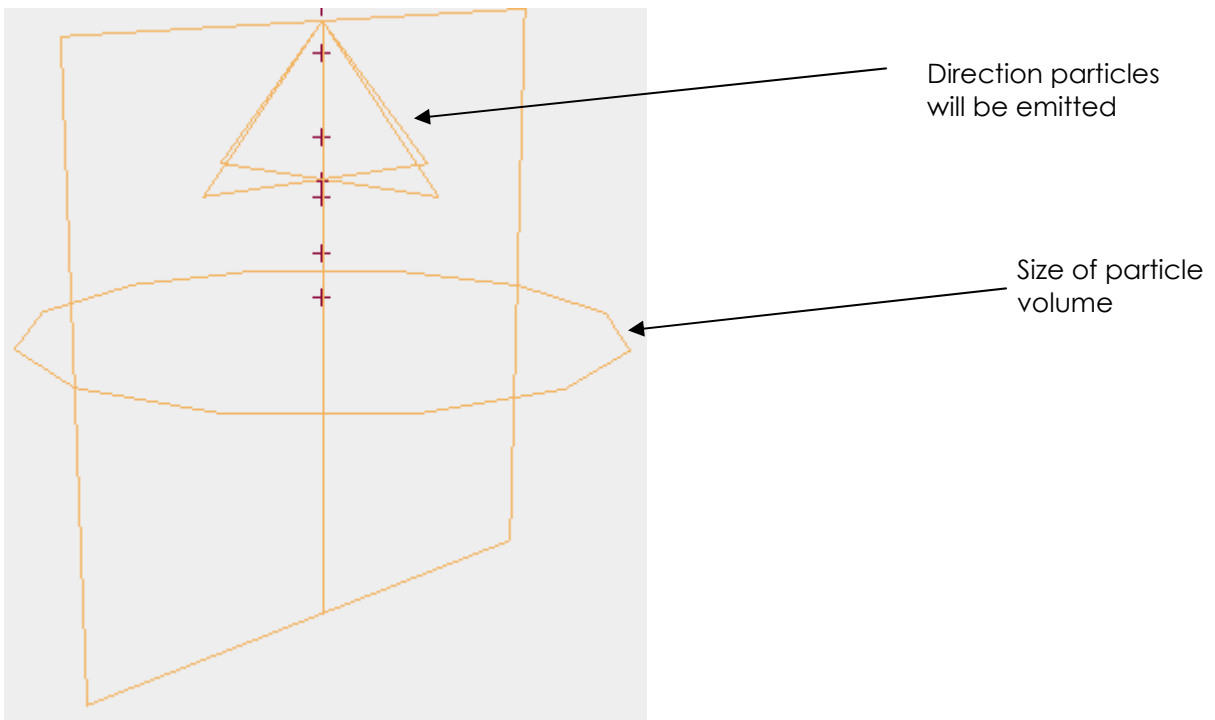
Spawns –control # of spawns
Affects- % of particles affected
Multiplier-value that multiplies the # of particles at a given event
Directional chaos-vary direction of which particles spawned
Speed chaos-varies speed
Scale chaos-varies scale

Create a Particle System

Create > Geometry > Particle Systems



1. Toggle one of the choices and Drag in viewport

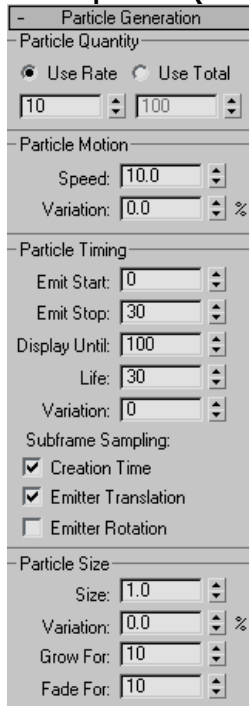


2. Draw. It is drawn best in perspective or Top view – arrow pointing out represents the direction particles will be emitted; size of emitter represents the area the particles will be contained to generally

3. Go into Modifier tab to set up the Particle System Preferences (refer to descriptions above)



Most important (Particle Generation):



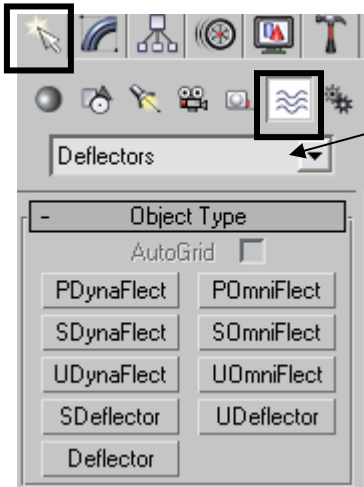
- Particle Quantity
- Particle Motion (Speed)
- Particle Timing - Emit Start/ Stop
- Life
- Particle Size
- Particle Type

4. **Create Preview Animation.** Be careful. Play back and check results before rendering out!

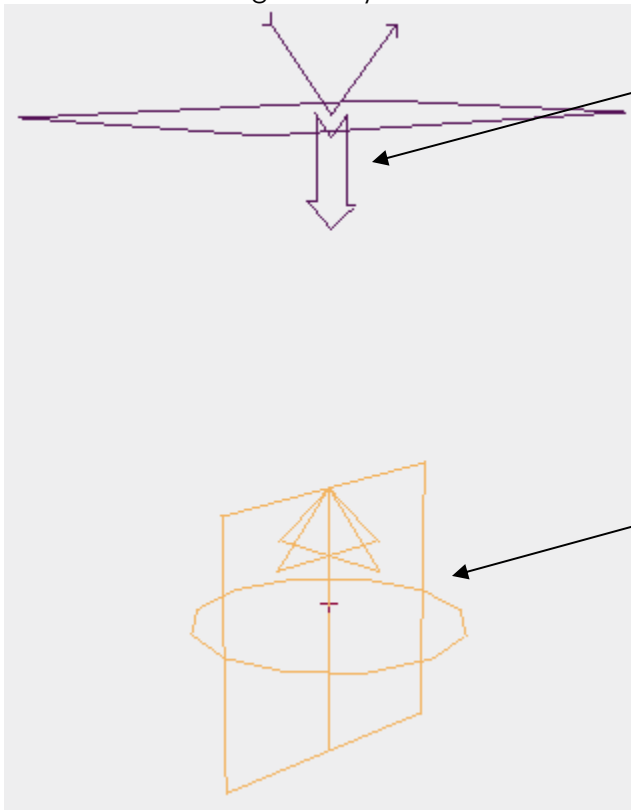
Animation > Create Preview

Create a Deflection for a Particle System: If you want your particles to bounce off of a surface use a Deflector.

1. Create a particle system.
2. Create a deflector object (I created a PDynaFlect)



3. Drag out a deflector object and line it up under your particle system (or over as the case might be...)



Deflector object
Pointing toward
particle system

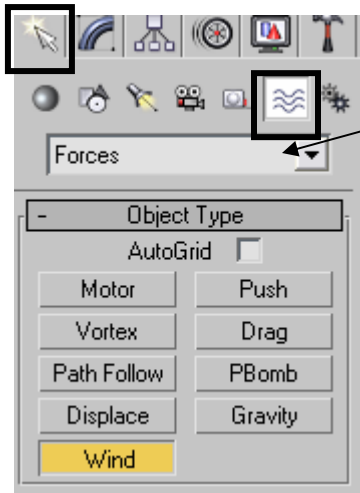
Particle system
pointing up

4. Select **Bind to Space Warp** tool

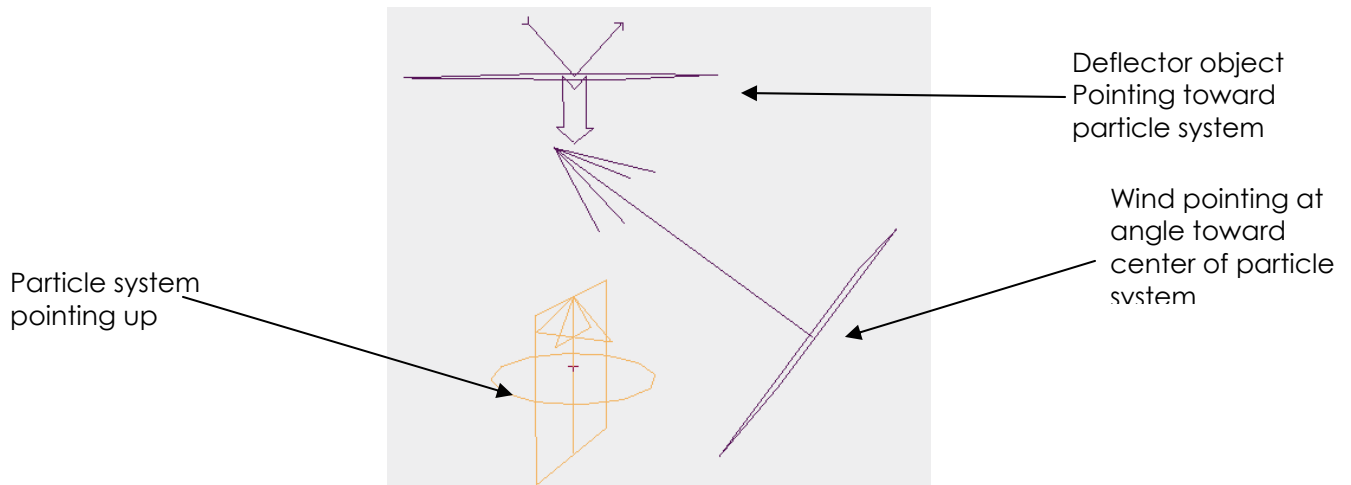


5. Bind the deflector to the particle system by clicking on the deflector and dragging to the particle emitter
6. Play back. Particles should bounce off of the deflector

Create a wind for a particle system: if you want to affect the path or direction of your particle system use a force



1. Drag out a wind emitter in viewport; arrow represents direction of wind



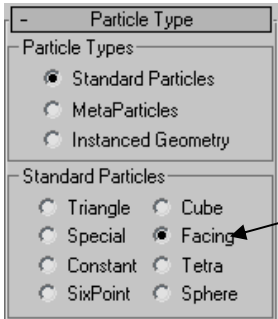
2. Bind the force to particle system by clicking on the deflector and dragging to the particle emitter
3. Preview (Animation > Make Preview) or scrub in timeline

Smoke? Water?

Its all about the textures that you choose for the particle system...

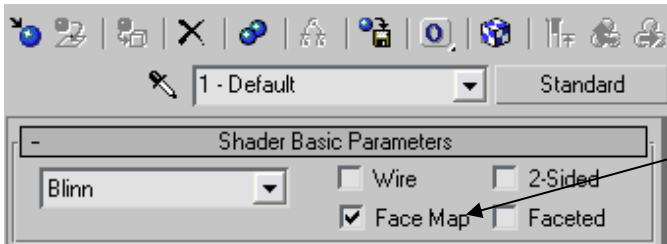
Main Settings!

1. Use a Super Particle System (one that supports 'Facing' particle type)



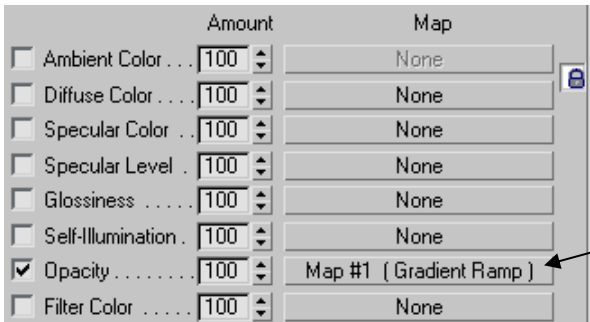
Facing particle type

2. Create a Material set to 'face map' (check it!)



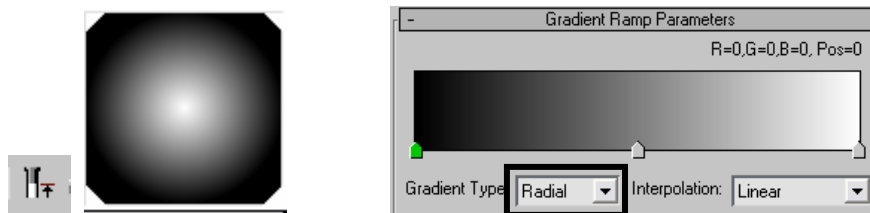
Face map material type

3. Add a gradient map to the transparency Slot



Gradient map added to opacity map

4. Set the gradient to radial with white on the inside and black on the outside



show end result turned off to see just gradient ramp.

5. Drag and Drop the material onto the particle system. Render