Dynamic Cloth Tutorial Part 1

by Stephan Koch aka Nemesis Interactiv

In this Tutorial i will descibe the basics of a dynamic cloth engine like the ones in Poser 5+, Cinema4D and other Programs.

A 3D Mesh is build by Polygons, these Polys are defined by Points and Edges.
The Points are connected by using Edges to form a Polygon.
Polygons can have 3 or 4 Sites.
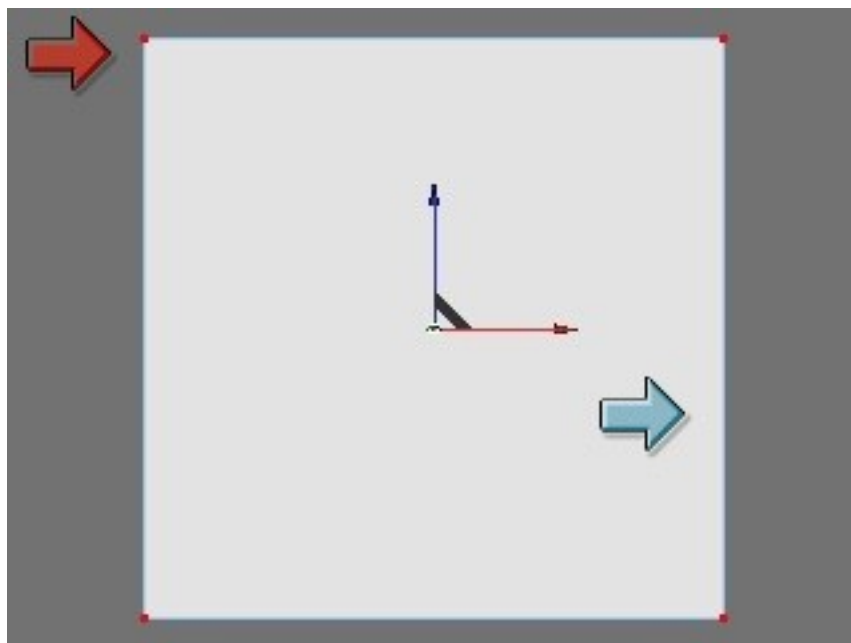Pic1 showes a 4 sided Polygon

Abbildung 1: red=point. blue=edge, white=polygon

if we move the Points around we can alter the shape of the polygon
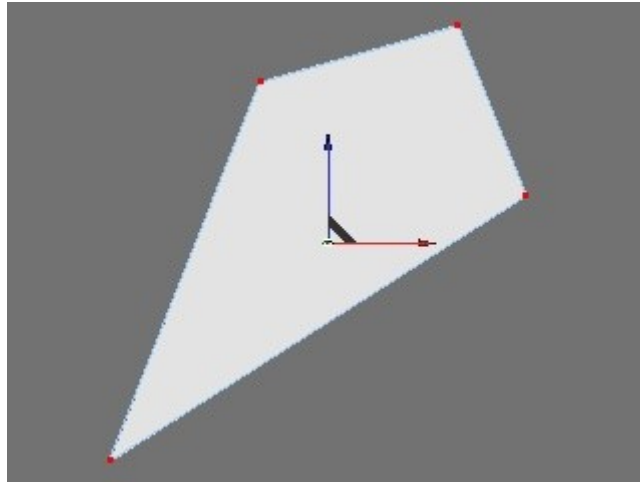
see pic2

Abbildung 2:

if we give the points some weight, they can interact with gravity or wind. When we have a geometrie the points can collide with, we can do some dynamics....but:
when one point of a polygon hits an object, it will stay on it's position....but the other points of the ploygon can still fall down, stretching the polygon into infinity....

not very useful ;)

As i told you before, the points are connected via edges. so when i move a point away from another, the edge that connects them will get longer. And this can be noticed by the engine.......
when we limit the length of the edges, we have a very simple basic dynamics clothengine.....
it's just that easy :)

ok, there are a lot more things to handle, but these are the basics:
the complete dynamics are made with the points of the mesh. The edges are feathers, and they make sure that all points are limited in their movements.

The feathers have a inbuild energie that can be altered by the user.
To make this a bit easier for us, this energie can be split into 5 settings:

- Bend resistance
- Stretch- Fold resistance
- Shear resistance
- Air damping
- and Friction

Bend resistance:

pic3 shows bending.
You can see a cylinder with a hmmmm....wooden plank an top. The plank, of course, wouldn't bend.
If the Force (white arrows) is to high, the plank would break....
a wooden plank has a high amount of Bend resistance.
A piece of fabric cloth would have a much lesser bendresistance and could easy cover the cylinder.
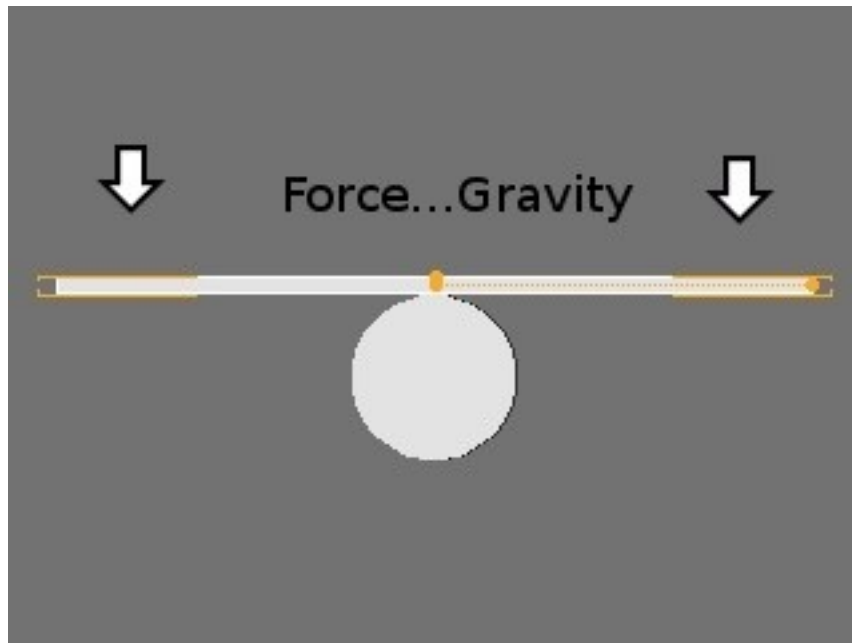
Abbildung 3: Bend resistance

Strech – Fold resistance:

pic 4 and 5 shows stretching – and folding

i think i don't need to explain what stretching means....but for the cloth engine it's the same like folding....strech is the opposite of fold

if we have a high amound of stretchresistance, our material is not really flexible (pic 5)
with a lower amound of stretchresistance, our material is much more flexible.
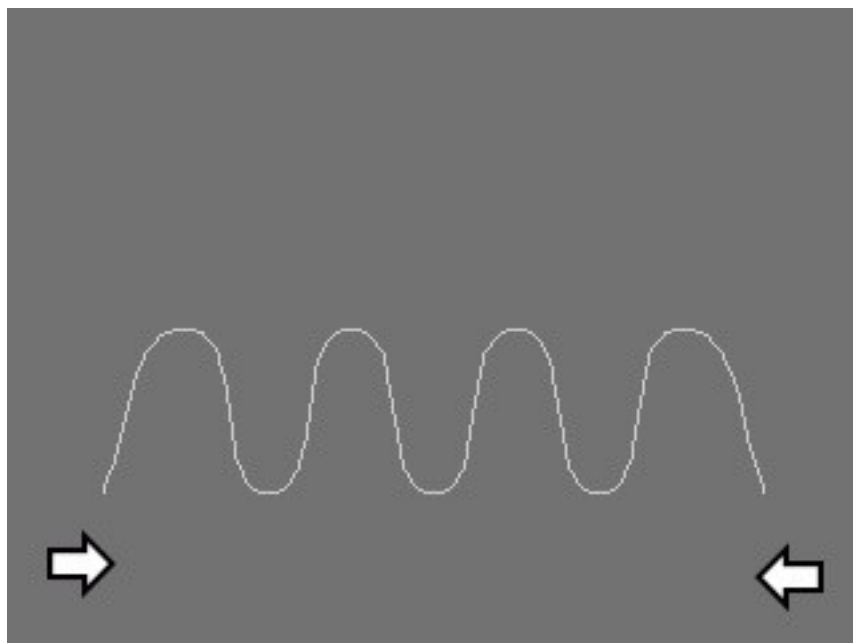

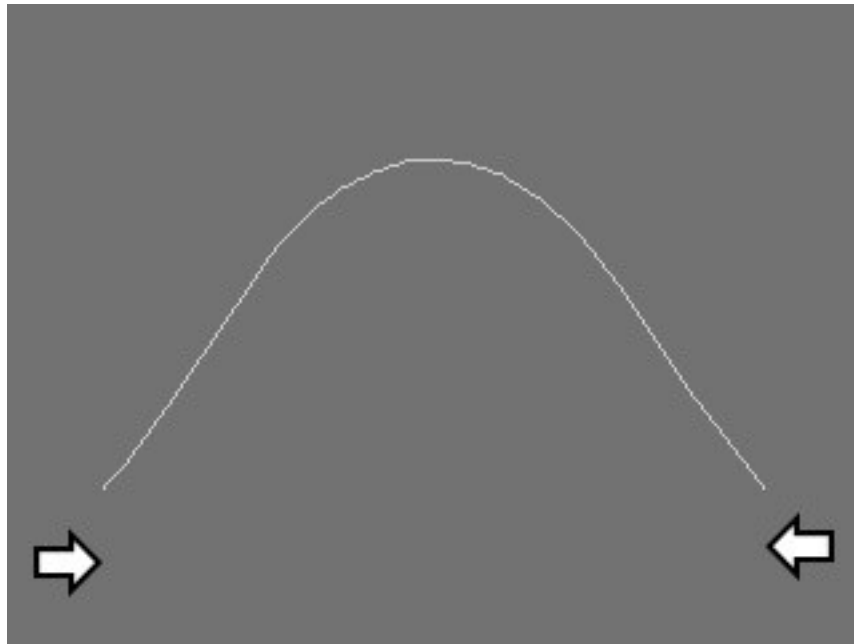
Abbildung 4: low stretchresistance

Abbildung 5: high stretchresistance

Shear resistance:

pic 6

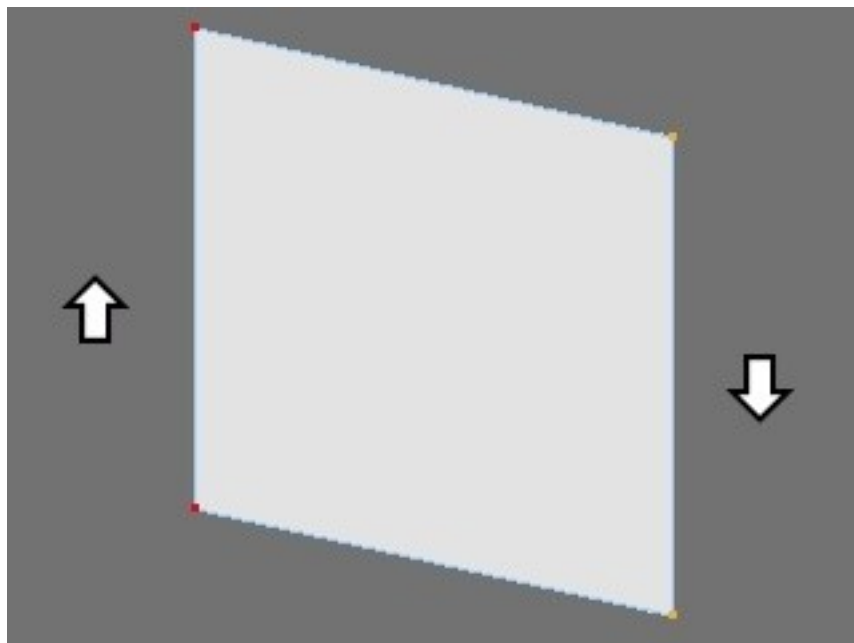shear means the movement in two different directions of two edges of the same polygon......

Abbildung 6: shear resistance

Air damping:

ok, this is a bit of a problem.......
air damping can be used to define the overal weight of a material, but for this there is an own setting
available....sometimes there are much more possibilities in 3D than in the real world.

Ok, let us take a sheet of leather. It will fall down very quick and the edges of the sheet would bend
up.
Now a sheet of silk would act like
…….. brown leaves blowed by the wind.......(Manowar....got carried away here a bit....sorry.)

Air damping defines the abilaty of a material to float....so we can make a leather shade float like
a feather in the wind..

Friction:

there are two different types of Friction:
static and dynamic.

The static friction defines how much energy is needed to move a still point.
In pic7 you'll see a point in a position where it will slide away when the simulation starts.
Static friction defines the energie that is needed to start the point sliding down.

Dynamic friction is the loss of energie when a cloth collides with an object or slide down a surface.
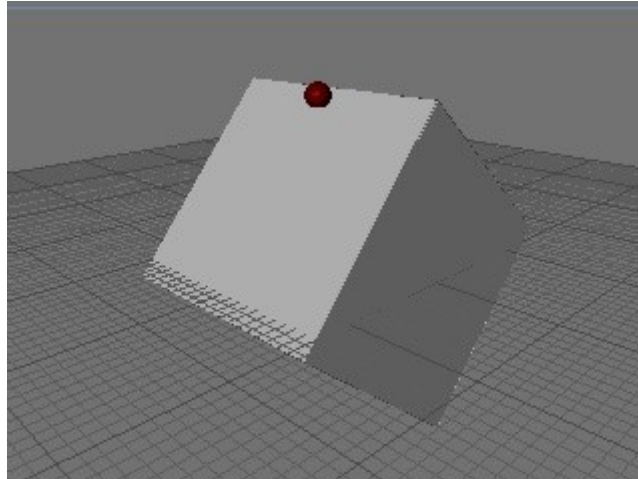

Abbildung 7: static and dynamic friction

These are the settings and parameters that are needed to do a dynamic cloth simulation.
This is the end of Part one,
you should now know a bit about the technics that are behind a cloth simulation
and that is really important when you want to mess with Posers Clothroom
and to push Posers engine to it's limits.

Sadly, Posers engine is meant to do only cloth simulations.

A while back on a Cinema4D Forum, there was a discussion on how to simulate a real

car accident. One of the members mentioned the Mokka Module and it's clothile engine.....

the trick was that he converted the car body into a dynamic cloth item with a terrible high amound of bendresistance............

the result: the carbody was deformed as it was made of real metal.....

well, Poser is limited to the amound of bendresistance and so you cannot create such a simulation.

And this is also the death of the fourth part of this Tutorial serie where i've wanted to show you some funky stuff....think around the edge.

I could make this Part but then it would be a Cinema4D Tutorial......

if you do have any questions, contact me at the forums....

now on to Part 2 where i'll show you the Poser Clothroom and how to work with a premade dynamic cloth item

see ya
Stephan