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# Poser Dynamics

## Part I - At the Doorstep

Actually, this tutorial has no real Beginners level. But instead I'll give you some Cases Studies on the basics of Hair Room as well as Cloth Room, plus some Checklists for the virtual hairdressers (Hair Room users and stylists), the virtual fashionata (Cloth Room users) and the virtual tailors (Dynamic Cloth makers) amongst you.

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# Contents

|                                 |    |
|---------------------------------|----|
| Introduction.....               | 3  |
| Case Studies.....               | 8  |
| Checklists.....                 | 9  |
| Hair Room users Checklist.....  | 9  |
| Cloth Room users Checklist..... | 10 |
| Garment makers Checklist.....   | 12 |

## Introduction

Poser presents Dynamic Hair (Hair Room) as well as Dynamic Clothes (Cloth Room). They nicely respond to gravity, atmosphere and wind, collide to bodies and objects, and stretch and fold according to various material definitions.

In this tutorial, my assumption is that you have visited those rooms a few times, peeked into the Poser Reference Manual about them and tried some basic tutorials. If not, I suggest that you first check out my practical mini-tutorials:

- Case Study: Hair Room basics – furry friends
- Case Study: Hair Room basics – photoshoot
- Case Study: Cloth Room basics – covering up
- Case Study: Cloth Room basics – dressing up

For lots of people, these Poser Rooms are more like a Wizards Den, or an Alien spaceship cockpit. Don't be ashamed: especially cloth and fiber simulations are a serious billion dollar science business. With a lot of universities and commercial innovators involved and a shipload of patents pending. And it does closely relate to the real world, which might bring some high school physics onto the desk as an aid in describing that world. And it does relate to the fine details of 3D software like Poser itself, like the structure of object meshes and the way animation works. And everything hangs together. And everyone uses it under different conditions, with different meshes, for different purposes, and so on. It's not you.



It's really a different piece of cake than just loading a dress or a hairdo from the Poser Lib, and clicking Conform To...

Next to that, in lots of situations, using these functions present operational problems. Simulations going wild, extreme poke-throughs, collapsing results and frantic folds and crumbles are just some examples from Cloth Room alone. Don't be ashamed here either, advanced simulations for fluid dynamics, for weather forecasts, for building structure behavior under wind and seismic events, for economic forecasting, and for any other form of scientific or industrial research do suffer from these effects in their own way too. Again, it's not you.

I can't solve all those issues in every case. But the least I can do is present you some guided tours around, considering the global lines as well as the fine details, and present you some rules of thumb on the way. This will at least turn the Wizards Dens into some organized ones.

### I - Beginners level

Well, to be frank, I'm not sure there is any. This is because there are so many sources of information on this level, that I see not much value adding more to it. From the Reference Manual that comes with the package, Books (up till PoserPro 2010 a Tutorial Manual was supplied, from now on Smith Micro sells some good books for practical or artistic Poser usage), and tutorials, videos and forum threads all over the net, free and sometimes for sale. Renderosity supplies a wealth of all that.

But I'll give you some **Cases Studies** on the basics of Hair Room as well as Cloth Room, see the next chapter. Plus some **Checklists** for the virtual hairdressers (Hair Room users and stylists), the virtual fashionata (Cloth Room users) and the virtual tailors (Dynamic Cloth makers) amongst you.

## II - Intermediate level

That's supported, by various **Case Studies**, and by part II of this tutorial offering a **Quick Tour around Hair Room**, a **Quick Tour around Cloth Room** and a **Quick Clues and Recipes** chapter on resolving the most common Cloth Room issues, like sims going wild and meshes breaking up.

As Hair Room is relatively simple—as far as theory is concerned, you just need to build experience by practicing it—everything beyond the Quick Tour chapter about it will be concerning Cloth Room. This is like the real world: digital clothing is a high end worldwide industry, digital hairstyling is not.

This part intends to help you making the steps from a Beginning to an Intermediate user of the Hair and Cloth Rooms.

## III - Advanced level

This is the in-depth section on Cloth Room details, presenting some real understanding of cloth simulation and cloth parameters, related to the real world as well. Understanding clothes means understanding the real world, which sometimes implicates using some basic high school physics (mechanics, geometry) too. Sorry for that.

The main complexity of Cloth Room is that Dynamic parameters, mesh characteristics, real world physics and computer simulation peculiarities all



interact to mimic cloth behavior to a believable level. **The Sim Side** kicks off this part of the tutorial by looking at things from a Cloth Room user perspective: which dials, what values, etc. The next **Meshes and Sims** chapter comes from the other side: what can be expected when meshes of different geometries are used in simulations with various parameter settings, for the cloth as well as for the simulation itself? What are the causes of the artifacts and problems, and what to do about them? In my opinion, high end garment makers as well as artists pursuing high quality results can benefit from raising their awareness to this level.

The last **Real World** chapter of this part tries to find real world values for the various cloth behavior settings (dynamic parameters), tells how I did it and how you can find some yourself. And all limitations thereof. This is the physics and math heavy one. When you feel uncomfortable with that, just skip it, or scan over it, or pick the tables with results only.

#### **IV - Background level**

Cloth simulation is not just a Room in Poser, it's an industry, really. And since Smith Micro is not the first owner – let alone the creator – of Poser, and since the cloth simulation module already existed before it was brought into Poser, addressing Cloth Room issues to Smith Micro is a well advised but not a guaranteed route to the final answers on all issues. Yet.

As a decent mutual understanding is key in maintaining good relationships, I wrote **Poser Features in Perspective** to give you some historic background on various Poser functions that receive a lot of debate. Cloth Room, FireFly rendering and the evolution of the Vicky and Mike characters, for instance. Especially users thinking about the future of Poser might be interested in a small blast from the past.

For those curious about the peculiarities of cloth simulation in general, I added **Cloth Simulation in Perspective**. It's mainly about the behavior of 3D meshes for cloth, so especially Dynamic Garment Makers (virtual tailors) might be interested.

Understanding cloth and having a mental model of the physics involved is necessary but not sufficient to make effective and efficient simulating systems. Creating those systems is a world in its own right.

Especially those with an engineer's way of looking at things might be interested in this mini tour through the deep down dungeons. **Crash Course on Math, Physics and Sims** really is the math and physics loaded chapter.

Any use of the underground escape tunnel brings you into Muppets Lab 'where the future is made today'. You have been warned.



## Case Studies

The Case Studies on Cloth Room and Hair Room are not included as chapters in this document, but are provided as separate mini-tutorials. Inevitably, each Case Study will address multiple topics, at various levels of experience.

|          |                 |          |                                |          |                  |
|----------|-----------------|----------|--------------------------------|----------|------------------|
| <b>A</b> | Hair or Cloth   | <b>B</b> | Novice, Intermediate, Advanced | <b>C</b> | Using wind force |
| <b>D</b> | Using animation | <b>E</b> | Fixing issues                  | <b>F</b> |                  |
| <b>G</b> |                 | <b>H</b> |                                | <b>I</b> |                  |

The matrix below gives some cross reference, supporting you to find the cases of your specific interest.

|   | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> | <b>E</b> | <b>F</b> | <b>G</b> | <b>H</b> | <b>I</b> |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Hair Room basics – furry friends (put fur on an object)   | H        | N        |          |          |          |          |          |          |          |
| Hair Room basics – photo shoot (get hair on a figure)     | H        | N        | x        |          |          |          |          |          |          |
| Cloth Room basics – covering up (put cloth on an object)  | C        | N        | x        | x        |          |          |          |          |          |
| Cloth Room basics – dressing up (get clothes on a figure) | C        | N        | x        |          |          |          |          |          |          |
| Cloth Room – using animation                              | C        | I        |          | x        |          |          |          |          |          |
| Cloth Room – clothes in animation                         | C        | I        |          | x        |          |          |          |          |          |
| Cloth Room – fixing conforming clothes                    | C        | I        |          |          | x        |          |          |          |          |
| Cloth Room – fixing pits and bends                        | C        | I        |          |          | x        |          |          |          |          |
|   |          |          |          |          |          |          |          |          |          |
|   |          |          |          |          |          |          |          |          |          |
|   |          |          |          |          |          |          |          |          |          |
|   |          |          |          |          |          |          |          |          |          |
|   |          |          |          |          |          |          |          |          |          |

As this document will be frozen at some moment in time, and Case Studies will emerge continuously, please refer to the website for the most actual overview.



# Checklists

## Hair Room users Checklist

- **Beginners:** consult the Case Studies on Hair Room first. This tutorial has no real, detailed Beginners section.
- **Watch your units.**

Poser units can be set in menu Edit > Global Preferences > Interface tab. Internally, Poser works in Poser Native Units (PNU), the translation is done in the user interface. Scripts, which circumvent the user interface, should adhere to PNU.

Hair length and Variance are expressed in user units. Your 1.0 (inch) is the same as my 0.00254 (meter).

Hair Density is expressed in square user units. Your 3.0 (hairs per square inch) is the same as the default 32,000 (hairs per square PNU).
- **Watch your counts.**

Hair Density tells the amount of generated hairs by the number in parentheses. Multiplied by the amount of vertices per hair (panel 3, bottom parameter) make the amount of vertices of the hair element at hand. Adding up over all hair elements make the total amount of hair vertices in your scene. Multiplied by say 1kb make the amount of memory required to render.

For instance: the Toon Puppy has about 37 object parts to be furrified. Using the value from nature; 1,000,000 hairs per square meter generates 1,4 million hairs. At 16 verts / hair make  $1,4M * 16 * 1Kb = 20Gb$  of RAM required for rendering, and might make your system fall over. Bringing down the Hair Density a tenfold, and



halving the verts per hair make a requirement of 1Gb for rendering, which can be met by any system. So before you start any styling: set the population and other mentioned dials as required for the final result and make a test run, before you've got to rework everything from the start in order to get your render out.

- **Watch your Pull.**

These three parameters define an angle between two adjacent edges of a hair. The more verts per hair you set, the more edges a hair is made of, and the more the hair will bend for the same Pull values.

- **Watch your Bend Resistance.**

Because for the result of the simulation, this appears to be the most influential parameter of all.

- **Time your Styling.**

Clicking anything in panel 2, even without changing, nullifies the results from the Hair Editor (the one behind [Style Hairs...] in panel 3). The Hair Editor has no Reset button, but the [Grow Guide Hairs...] one serves a good alternative. And any edit of the Growth Group itself requires the [Grow Guide Hairs] button to be clicked anyway. The styling holds after alterations in panels 3 (styling) or 4 (dynamics), but of course the Verts per hair will affect the ease of styling and the result as well.

## Cloth Room users Checklist

- **Beginners:** consult the Case Studies on Cloth Room first. This tutorial has no real, detailed Beginners section.

- **Watch your steps, and your Garment.**

Just ensure you understand Constraint Groups at least enough to fixate a piece of clothing in space, and then just hang it out for 30 or 60 frames with all default settings. Inspect the simulation.

Do things fall off? That are candidates for the Soft and Rigid Decorated Groups.

Check one piece at a time, and check all of them. Anything you know before, saves time later.

- **Does it bounce and wiggle?**

Or just the opposite? Does it stretch too much? Can you define the kind of cloth you want to mimic in terms of the Dynamic parameters? It's hard to mimic something you don't understand enough. The same holds for the physics of nature. Cloth Room mimics physics. Understanding cloth and understanding physics help a lot in managing Cloth Room. In many cases, the simulation is wrecked by the default settings from the start (e.g. long dresses stretch far too much).

- **Can it be done?**

As cloth simulations relate to real world physics, things that are hard to do in life are almost impossible to bring to an end easily in Cloth Room. 30 frames of simulation represent 1 second. Some poses or moves cannot be taken or made within 1 second in life. Some moves cannot be made at all, while wearing specific clothes. Tight thick leather pants hamper bending, in life, and in Cloth Room. Long dresses hamper wild dancing or taking hurdles. In Cloth Room too.

- **Do you need All Dynamics?**

As Cloth Room is a nice place to be but conforming clothes have value too. You might need to clothify only a few portions instead of the whole lot. You can put portions of a piece into choreographed or constraint groups, or un-clothify them as a whole.



- **Do you need All Sims?**

When there are more cloth pieces in the scene, some can be combined in one simulation. Others can be combined through multiple simulations, when run (and created) in the right order. Planning ahead might be worth the trouble.

- **Do sims crash or take forever?**

Check and avoid poke-throughs at the start, adjust the collision objects at the start and animate them to the required settings and poses at the end (or sooner).

Then increase collision depth.

Then check the collision options (vertex against poly etc)

Then increase the Steps per Frame

Check the **Quick Clues and Recipes** chapter (in part II) for more.

## Garment makers Checklist

- **Tailors don't go naked.**

We do know the tale of the emperors (lack of) clothes, but there never was a tale about tailors going naked. So, make sure you master some basic user skills too, to understand the behavior of your garments.

- **Do the Draping Test.**

Just hang out the garment for 30 or 60 frames and ensure nothing comes off, and all extras are put in the appropriate Soft and Rigid Decoration groups.

- **Be aware**

The Poser manual explicitly states that the Cloth Room prefers single sided, well welded meshes for cloth. You do

adhere to that, do you?

- **Understand your Risks and Chances.**

Pockets, buttons, zippers, belt-loops, stitches and pads, all other sorts of accessories place a challenge onto dynamic cloth. Make them Soft or Rigid Decoration items, use Morphs or Displacement maps, model them into or onto the garment but in all cases: know what you're doing, why, and what the effects are for the use of them.

- **Understand your Mesh Geometry.**

X-tris are to be preferred over ZigZags and Quads (can be compensated for in parameter values), Diagonal tris are worst in simulation behavior.

Quads make good non-woven cloth (leather, fleece, rubber, ...), tris make good woven cloth, hexes make good home knit sweaters.

Small structures with small polys behave like thinner cloth than structures with large polys, opposite to what most people expect. So varied meshes will show a varied behavior within the same piece of cloth, which will seem unnatural to the user.

Finer structures reduce crumbling artifacts, especially in quads.

- **Deliver at appropriate detail.**

Clothes wear better when they match the vertex-density / poly size of the figure wearing them. Vicky measures about 20,000 cm<sup>2</sup> for 80,000 vertices, that's an average vertex-distance of 0.5cm (square root of 20,000 / 80,000).

Weight mapping is introduced to improve even on that.

Marvelous Designer states that distances of 20 to 40mm are nice for rough testing (dresses, shirts, figures standing



up) but final results require 5 to 10mm.

- **Mind your licensing.**

You will deliver a decent OBJ mesh file, you are the rights owner. Just do one OBJ for each piece of garment, there is no added value in having a quad and a tri version. All Poser specifics, Cloth Room groupings and parameter values included, are in the CR2 file. You may supply multiple of them. Preferably in ways that match material settings, so when a skirt has stripes made of leather, they look like leather and behave as such. And when they are transparent or lace, they behave as such (which is rather different from leather).

Grant or even encourage people the rights to distribute CR2's, so they can enrich your product.

- **Document your product.**

Which groupings and parameter settings are delivered with the garments? What have you done to ensure proper dynamic behavior? What do people have to do to handle your products as intended?

You are not selling to click-and-drag users only, but some of them are. Serve them all.