THE CENTRIFUGE BRAIN PROJECT

„Incredible, all the stuff you can do with computers today, isn't it?" Ever since I first started with digital graphics in the 90s, this is one of the sentences I heard most often. And whoever said it was usually someone outside the computer graphics field. This 'revelation' almost always comes from someone who has not yet become used to what is the accepted norm for us, digital artists: Everything is possible.

So if today the visualization of every thinkable idea is possible and the technical aspects of creation does not present enough of challenges any more, then it comes back to the classic challenge: The idea. The right idea often comes unexpected, like in 2008, when I was standing in front of a huge amusement ride and spontaneously took out my camera. I was on the lookout for motifs that were suitable for digital match-move extensions and manipulation. So I recorded this huge carousel and while doing this I repeatedly panned the camera towards the empty sky above, seeing in my mind's eye the digital extensions that I would fill it with. The trigger for this idea was a mix of fascination, thrill and confusion - about the fact that we humans build giant robots, adorn them with pretty blinking lights and then install them and use them as toys in amusement parks. I've been fascinated by this phenomenon ever since I was a child. Then, by the age of thirty, I had the digital tools and know-how to build my own crazy amusement park. I wanted to explore this territory by using over the top exaggeration while at the same time maintaining an unassailable eyewitness appearance. Over the next three years I collected video footage from different amusement parks and, between other projects, created one new ride after another, with month long breaks in between.

At first, this resulted in a series of seven shaky, realistically cheap looking carousel clips, a video project without a narrative context.
This art project was entitled „The Experience of Fliehkraft" and was later expanded upon with seven fictitious construction blueprints of the amusement rides as fine art prints, which today are presented in art exhibitions in different countries. The style of the video sequences was similar to found archive footage, so it led me to the idea of creating a faux documentary in which an alleged scientist explains the bizarre back-story of the surreal rides. By the way, it really was „secret" material, because up to that time I had kept the existence of my experimental video sequences strictly confidential.

Just about the same time, in the beginning of 2011, when all seven amusement ride clips were finished, I was working on a collaborative project with Leslie Barany, the agent of HR Giger. While Les has never acted before, he is an incredible mix of freethinker and naughty boy; perfect for the character I had in mind. Convincing

Writer, director and digital artist Till Nowak (middle) with actor Leslie Barany (right) and cinematographer Ivan Robles Mendoza (left)
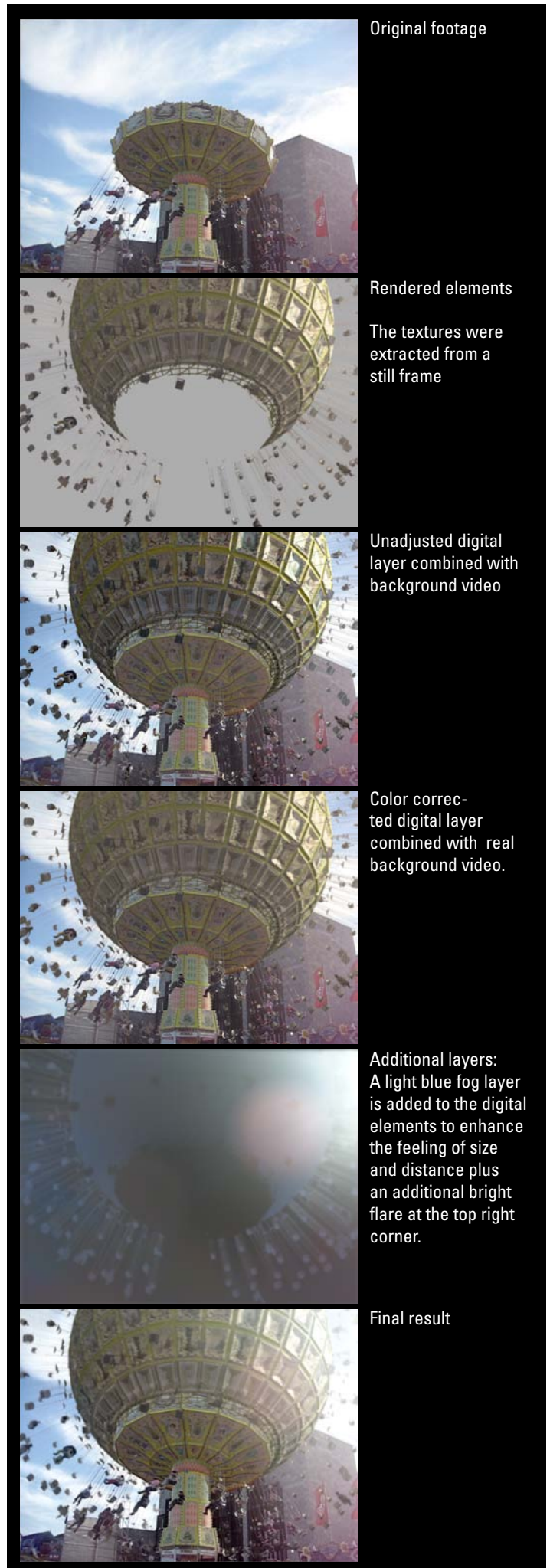
Original footage

Rendered elements

The textures were extracted from a still frame

Unadjusted digital layer combined with background video

Color corrected digital layer combined with real background video.

Additional layers: A light blue fog layer is added to the digital elements to enhance the feeling of size and distance plus an additional bright flare at the top right corner.

Final result

him to play the role of the scientist Dr. Laslowicz was no easy task, but once he accepted he threw himself into the role wholeheartedly. Together with cinematographer Ivan Robles Mendoza, we shot Les' scenes in the science lab and at the amusement park. Then I edited this mockumentary interview footage into the equally fake archive material. HD-Video and shaky hand-held camera footage meet in typical documentary style. The final result now exists on 35mm with a high quality Dolby Digital soundtrack created by Klangbezirk in Wiesbaden.

The scientist: Leslie Barany als Dr. Nick Laslowicz

THE „VIRAL" HANDCAMERA

The most obvious characteristic of the digitally extended sequences is the „archive material look". Films like „The Blair With Project", „Cloverfield", „District 9" or the series „24" as well as countless, seemingly real, YouTube videos have proven the power of this „shaky look". It consists of a maximum of subjectivity - the audiences feeling that they are eye-witnessing the action. Some people refer to it as the „viral style", shorthand for the intersection of virally successful videos and this specific look. In fact „viral" does not really describe the style of a film, but its ability to self-distribute itself through the Internet by being engaging enough for people to forward it to more and more new viewers.

DELIBERATELY FLAWED

Instead of producing the scenes in high quality and adding the ‚amateur' look afterwards, I deliberately shot the basic footage that way including all the realistic touches I wanted in the end result. Besides the blurry low-resolution, this was the automatic aperture adjustment, noise, lens flares, lens distortion, and of course the shakiness of a hand-held camera.

Fantasy ride "Dandelion"


"Expander" - a childrens dream

The automatic aperture of the camera caused frequent changes of brightness and contrast during the recording. This typical feature of amateur videos was a deliberate part of the authentic look and had to be transferred also to the computer generated elements.

It was difficult to do a matchmoving of frames that only contained clouds. To solve this some exhausting manual tracking was needed and it was very helpful to rotate the camera from a fixed position, so that the software only needed to care about rotation, but not about position changes.
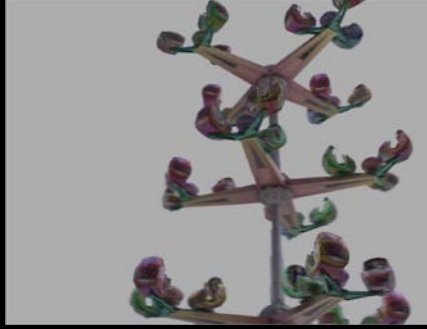
Above: unadjusted digital extensions. Cabins and metal structures were hierarchically linked without additional rigging in 3ds max. First they were animated all together, parallel and in sync, before the keyframes were shifted individually to create the impression of complexity.

The final result: Purple blooming of light from the background had to be transferred on the digitally extended foreground. Additional motion blur on top of the overall image helped to blend the borders between reality and artificial extensions.

It's a principal rule of my productions to allow any and all authentic flourishes and flaws of reality to occur in my raw material. This, by the way, is something I do not only with background video footage but, for example, sometimes I use photos as textures with high resolution and subtle irregularities instead of small tiles, and sometimes these even include the light direction, which must appear wrong to texture professionals. I guess this approach is more artistic than technically perfect. The goal is to embrace coincidence and to utilize the realism that is already present instead of synthesizing it. This way I am „sampling" an authentic look. This approach makes me a little less flexible, but it enables me to create photo realistic scenes with little effort. Some people think it's more difficult to integrate digital extensions into blurry, shaky, low res footage, but to me it always seemed much easier than integrating CGI into steady, sharp, high res footage, and at the same time it looks a lot more convincing. You just have to simulate all the aspects of the original on the CGI layers, and then every shake, every blur and every flare helps to integrate even low poly models in a believable way.

MATCHMOVING

The first step towards a set extension is the detection of the original hand camera motion, which I solved with the matchmoving software SynthEyes. The background videos were shot without special preparation with a handheld camera and no other equipment. However, there are two basic principles to make the footage easy extendable: The camera was just rotated around its own pivot, roughly, but it was not moved away from its location. By standing still instead of walking while rotating the camera I could use the „tripod" option in SynthEyes, which makes it much easier to matchmove even very shaky and unclean footage. With this option the software does not need to calculate the three dimensional position of each tracked point, it just assumes that every point is located on one surrounding sphere. The second important aspect is that there always have to be
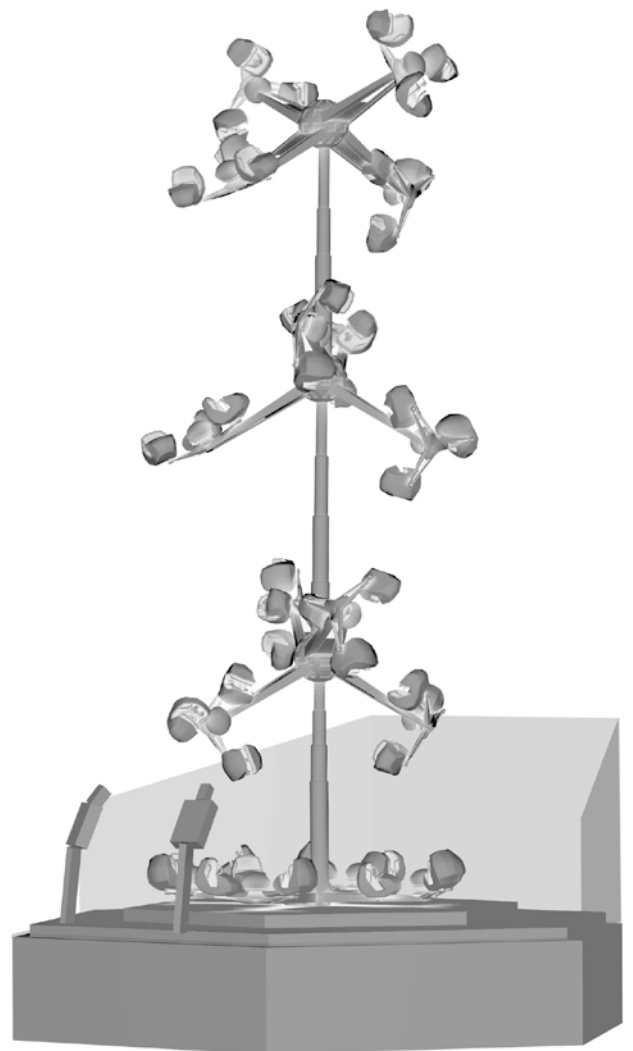

3D-Model "Wedding Cake Centrifuge"

enough trackable objects in the frame, which have no independent motion. Therefore I had to make sure there were always elements of buildings, trees or other objects somewhere in the frame. Sometimes I had pointed the camera too high and only had blurry clouds in the frame, which was only solvable by manual frame-by-frame tracking.

CAMERA MAPPING

However, if it wasn't clouds, it usually took less than an hour until the shaky camera was virtually available in 3ds max to work with. This is where the actual manipulation took place. My standard workflow to manipulate objects in a real video is to recreate them via camera mapping from a still frame. I just look for a frame that offers a clear look on the object; retouch any occlusions and separate foreground and background of the object in this one frame in Photo-

shop. The resulting images of rotoscoped objects, for example the passenger cabin of an amusement ride, are then put in the viewport background of 3ds max as a kind of perspective blueprint to start rebuilding the object via camera mapping. The resulting 3D object usually is geometrically very rough and messy, but it blends perfectly with the background. The reason for this nice blending of a bad model is that the texture was extracted from the video itself, so the color, contrast and lighting already perfectly match the background video. Also, when using camera mapping, the modeling and texturing are done in one step and with this method the object already appears at the exact right location and rotation in relation to the background video. With some practice it is possible to build a nicely integrated set extension based on existing elements in the original video within a few hours. However, from the idea to the final result, including animation, compositing, rendering and fine-tuning each of the amusement ride sequences, took about two weeks of work.
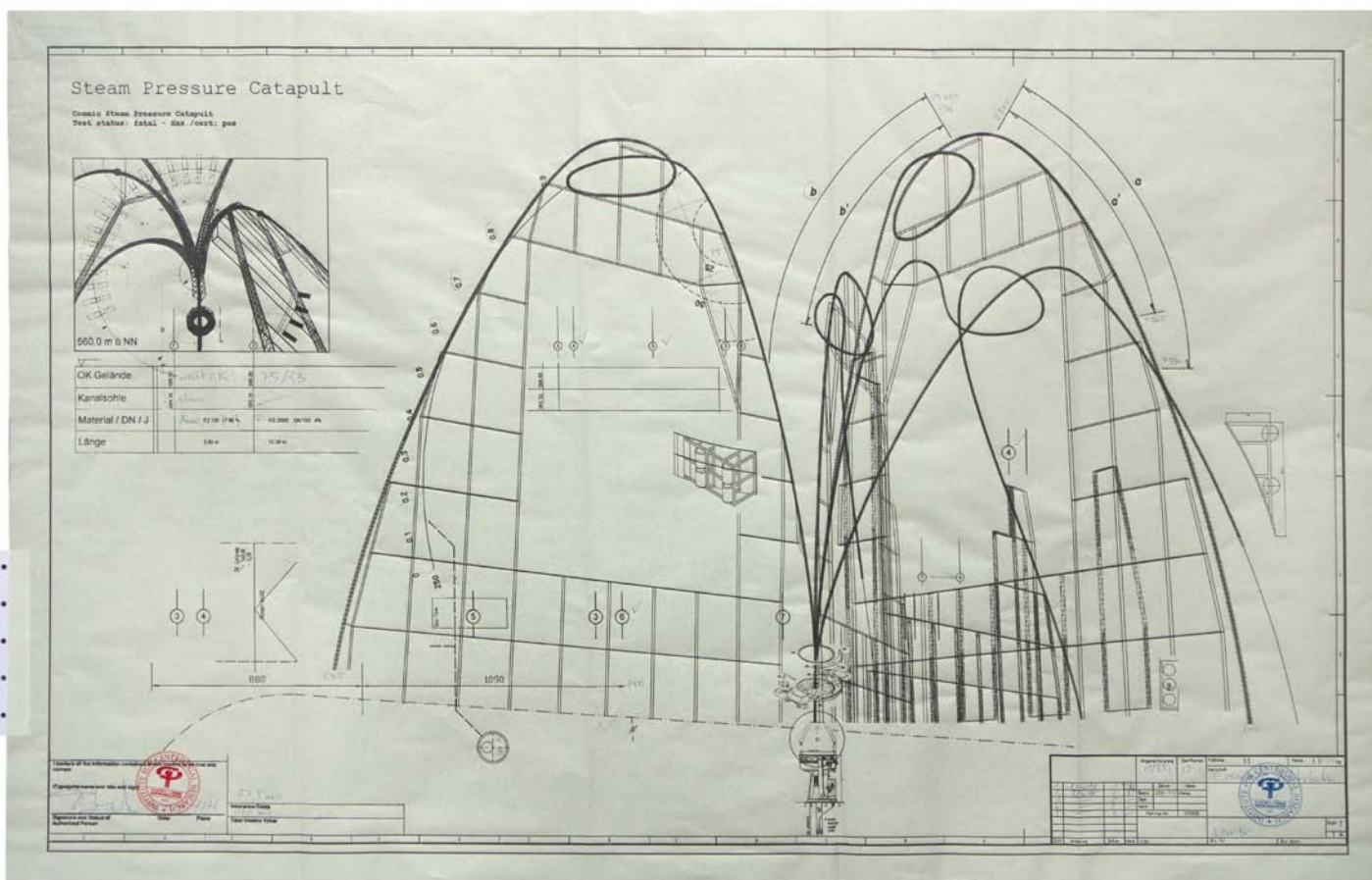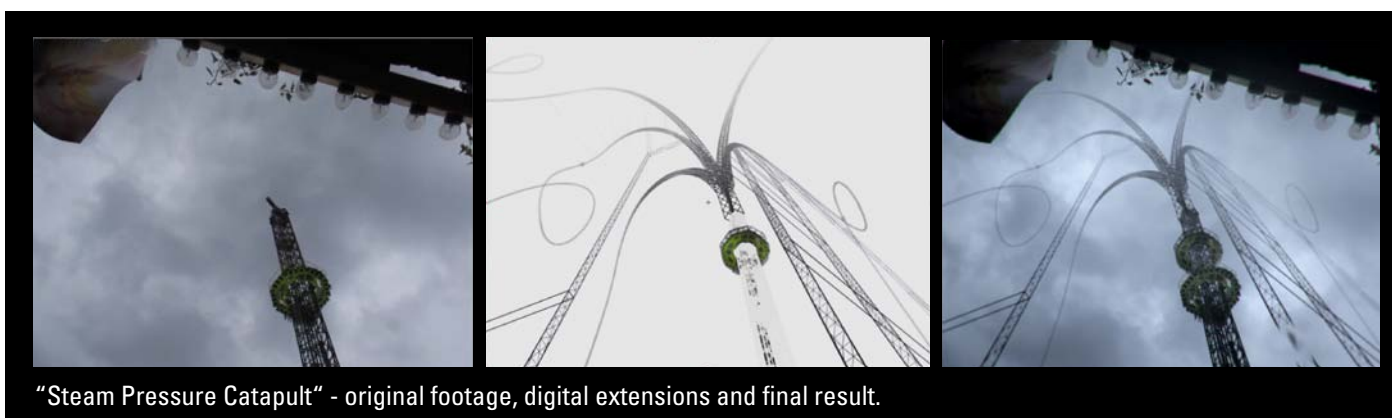
"Steam Pressure Catapult" - original footage, digital extensions and final result.

For each of the fantastic amusement rides Till Nowak created an absurd construction plan on paper. The seven plans are exhibited as an art project in exhibitions such as the International Media Art Biennale in Seoul, Korea, Transmediale or Ars Electronica.

MOTION

The most important aspect of an amusement ride is its motion: Some are swinging like heavy pendulums, others move evenly, like a Ferris Wheel, or suddenly, for example with hydraulically expendable parts. There were two main steps to create the animation: First the actual motion of the real ride had to be detected and recreated, because the digital elements always connect to real moving parts of the filmed rides. Since the axis of the machines are fixed and they move mechanically it was possible to match the original motion manually, based on the background videos.

The second step was the animation of the purely digital, extended parts of the machines. No individual rig was created, but simply rigid geometry was parented hierarchically and animated in groups. Often a number of similar elements were animated together, so that they moved parallel, before splitting them up in groups and shifting key frames on the timeline. This way I easily created an organic and complex look without animating each little part on its own, for example when it came to the expandable gondolas of the „Dandelion".
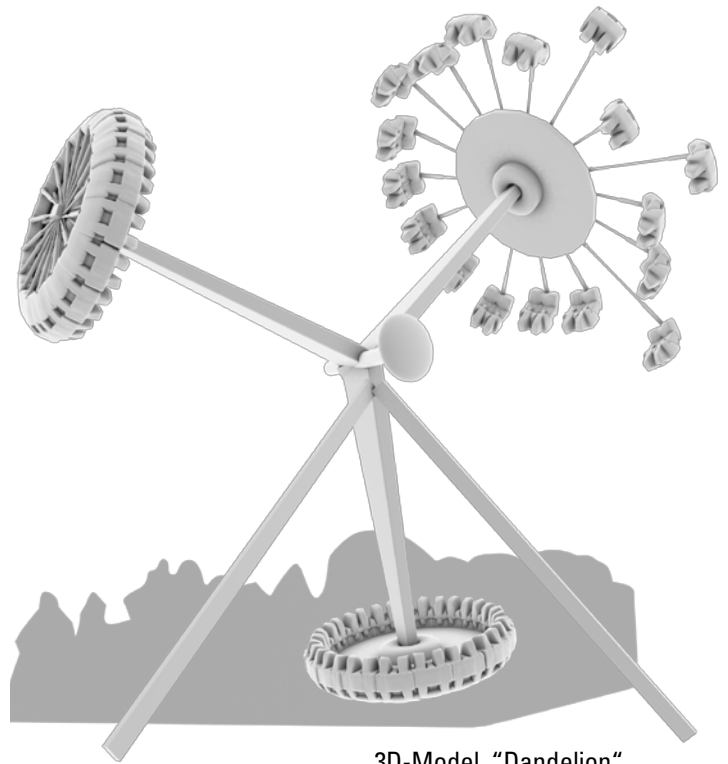

3D-Model "Dandelion"

RENDERING

I used V-Ray to render, which is the standard for me because of its performance and usability. The output format was PNG with integrated alpha channel and only very few additional passes, because many of the material characteristics were already integrated and fixed within the camera mapping textures. It was lit in a very simple way, mostly with diffused basic lighting and an area light for the cloudy sky. Additionally I used VrayDirtMap to create plasticity

The "Expander"
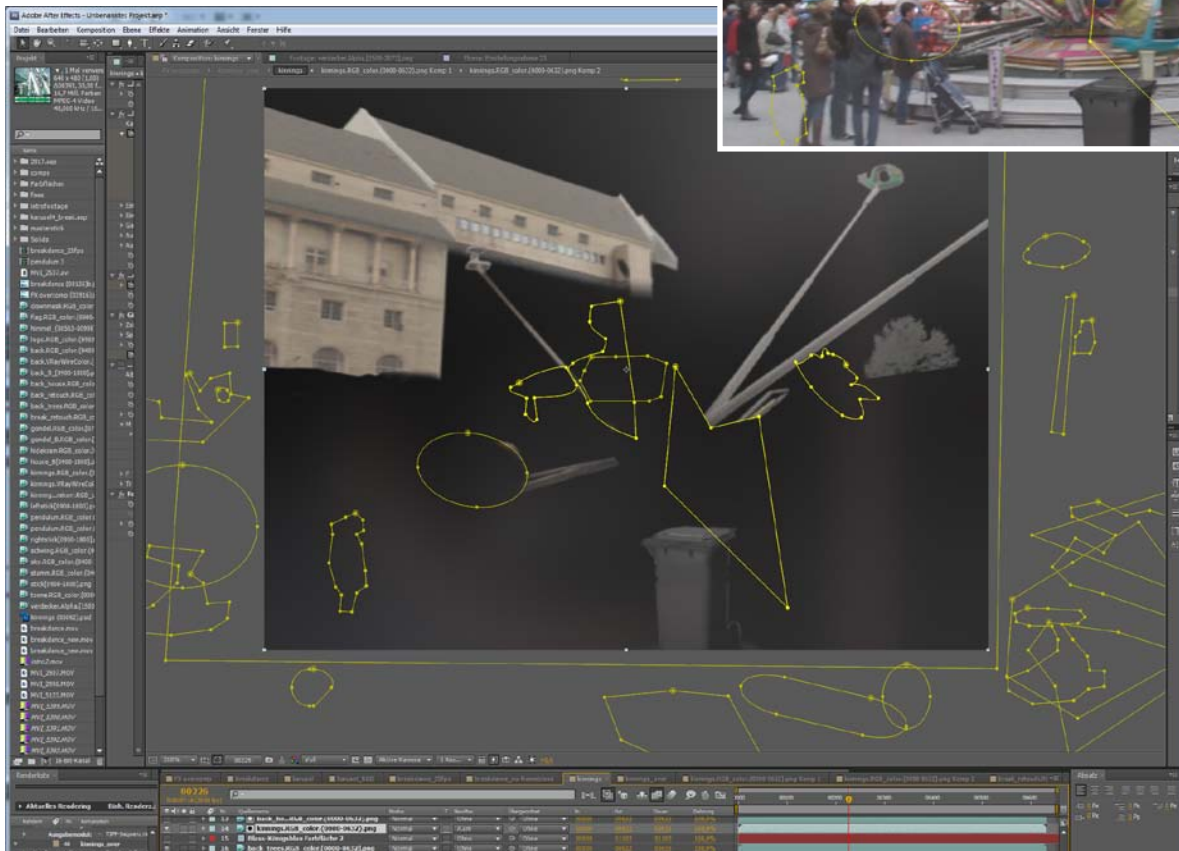
Rotoscoping in Adobe After Effects: Many animated masks are waiting outside the visible to pop in just for a few frames to solve individual overlappings.
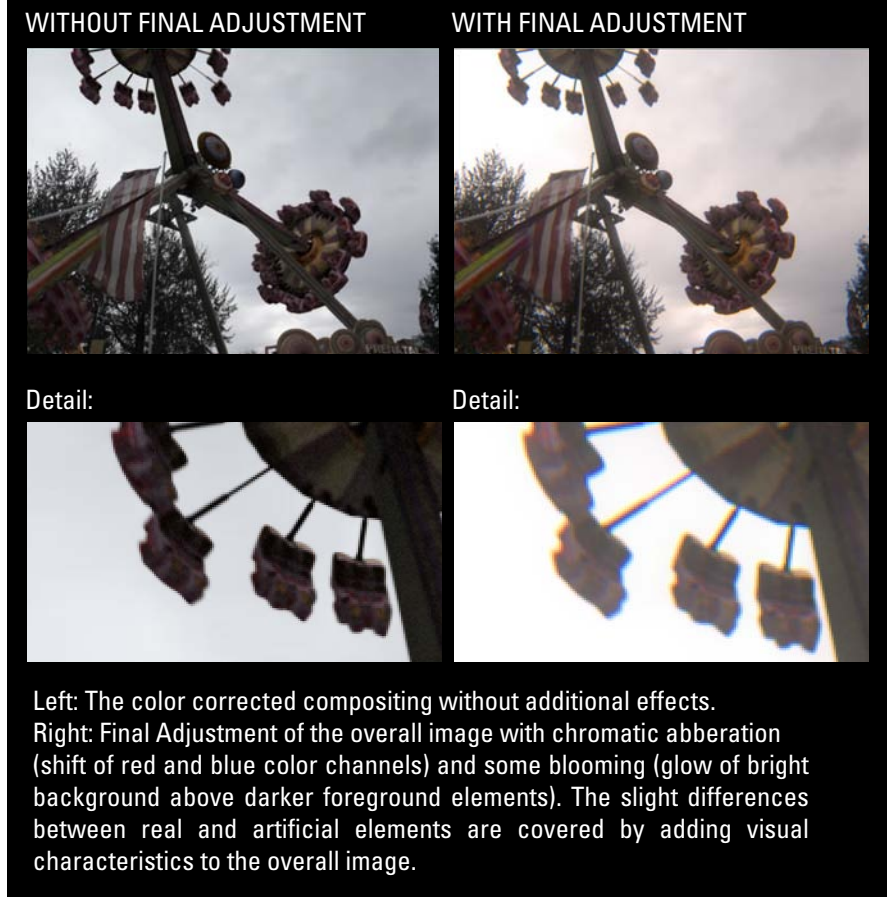
through ambient occlusion. Matte objects were used as placeholders for real objects to catch shadows that were drawn by CG objects on real objects.

MASKS

The hardest part during the compositing was the occlusion of moving objects, which meant the frame-by-frame rotoscoping of obscured objects, especially of one specific ride: The Expander. This fantasy version of a children's ride contained a lot of metal bars, which, because of the rotation of the ride, constantly changed between foreground and background. This means that an object which blocked the view of another object was itself occluded by the other object just a few seconds later. This required a lot of changing masks (see image on the next page).

FINAL IMAGE ADJUSTMENT

Finally the rendered passes were matched to the background videos with a number of subtle filters in Adobe After Effects. This final step is crucial to make the border between real and artificial elements invisible. Since the background videos were shot using an automatic aperture it was necessary to first animate brightness and contrast of the artificial elements to match the „pumping" brightness of the background. Like in a good old home video the whole frame gets darker as soon as the camera is pointed towards the sky and a bright area, or does the reverse, lightens up, as soon as the frame is filled by unlit objects. Afterwards I added a noise and blur according the background video.

After these steps the digital material was usually well integrated, but to even further disguise the impression of separate layers I added a few more effects on the whole composite image. This makes the layers really become one. Therefore I shifted the hue of the whole image, ad-

WITHOUT FINAL ADJUSTMENT WITH FINAL ADJUSTMENT

Detail: Detail:

Left: The color corrected compositing without additional effects.
Right: Final Adjustment of the overall image with chromatic abberation (shift of red and blue color channels) and some blooming (glow of bright background above darker foreground elements). The slight differences between real and artificial elements are covered by adding visual characteristics to the overall image.

ded a subtle glow and flares, some chromatic aberration and some additional motion blur, using ReelSmart Motion Blur.

EPILOG

„Incredible, all the stuff you can do with computers today, isn't it?" – nowadays, I don't hear this comment quite as often anymore. Maybe because others, not only we computer freaks, have gotten used to it. Anyway, computers still can't simulate the kick of real centrifugal force - you still need a real amusement ride in a real amusement park for that. So what are you waiting for... let's go for another ride ;-)
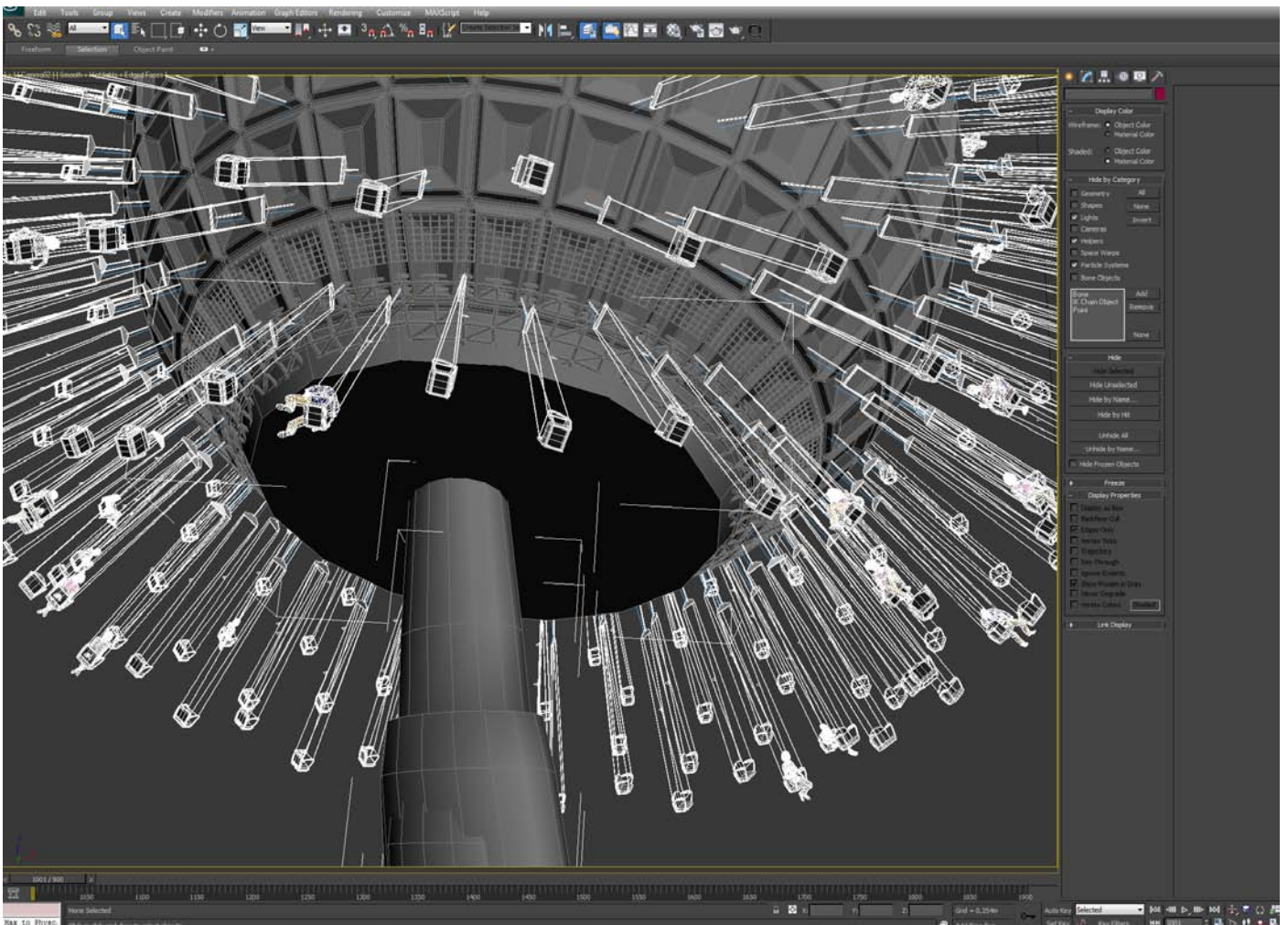
Original footage
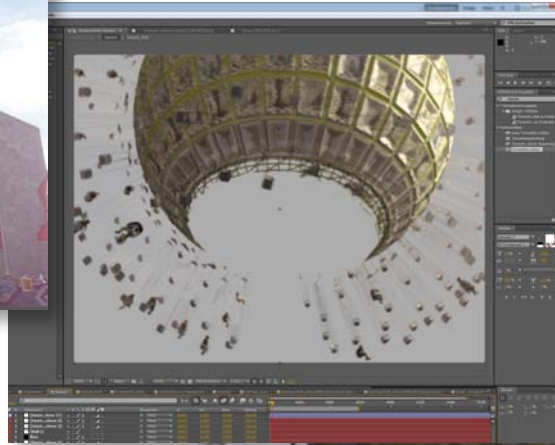
Screenshot from Adobe After Effects: Digital layers
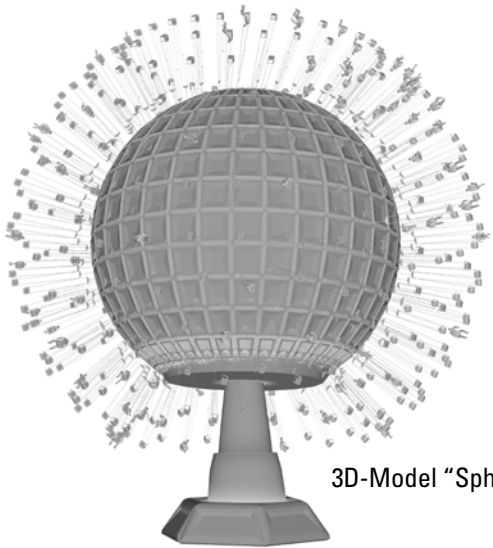
Final result: The spherical carousel „Spheroton"

3D-Model "Spheroton"

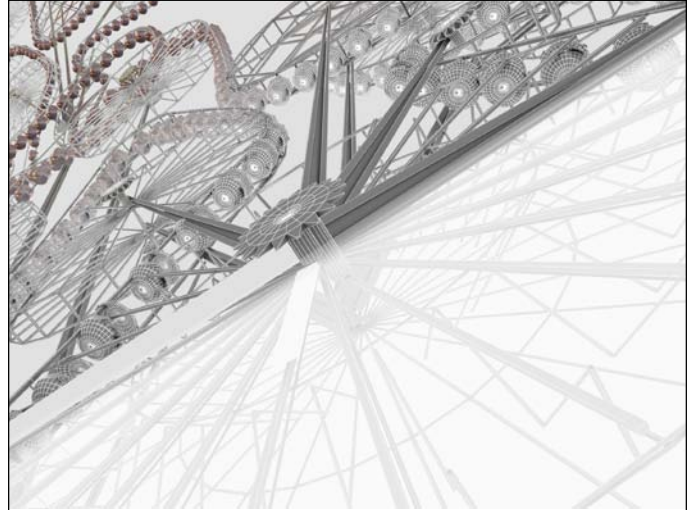

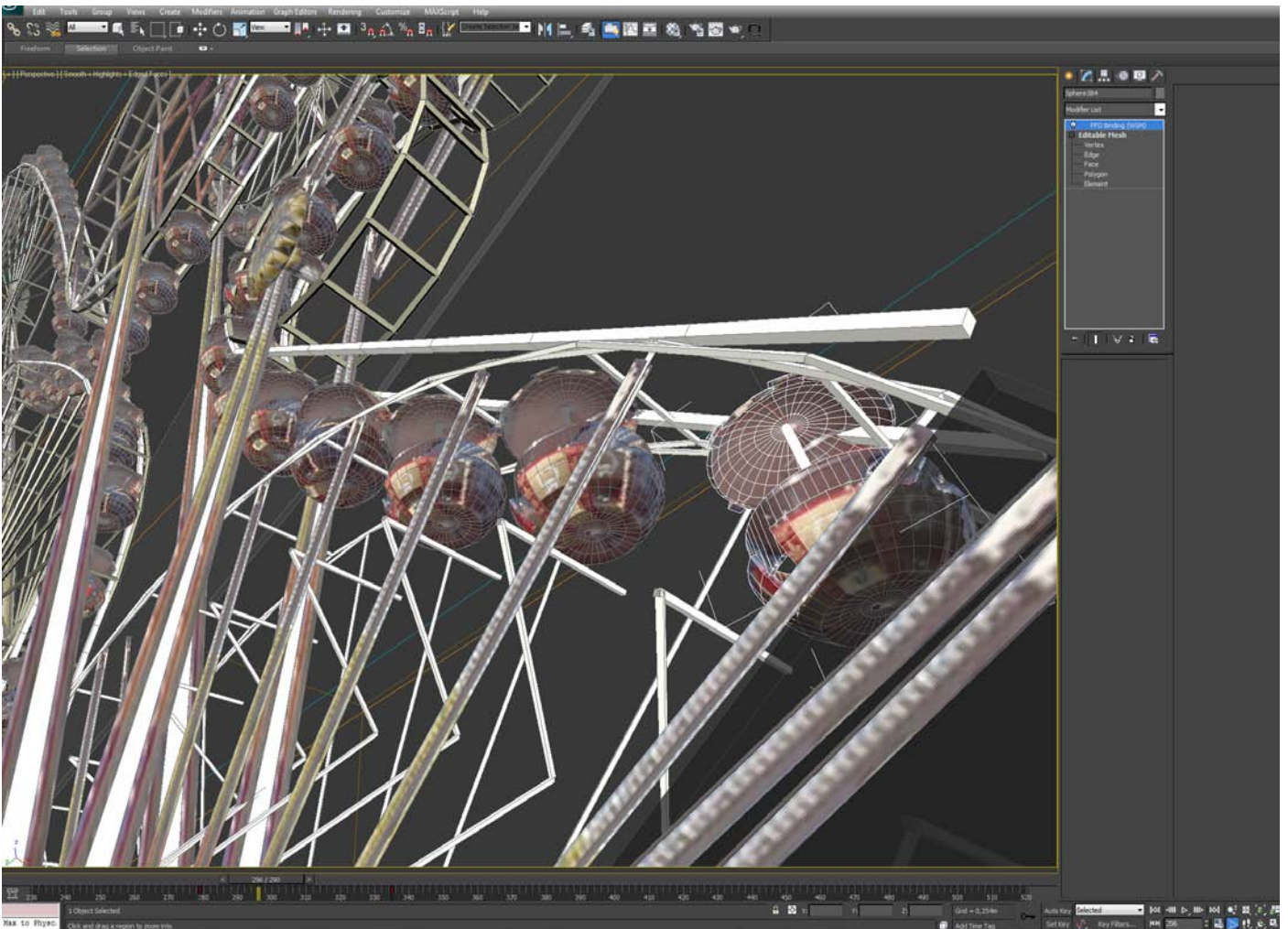The wavelike motion of the seats was controlled with a helper dummy in the middle of the sphere and a look-at-controller.
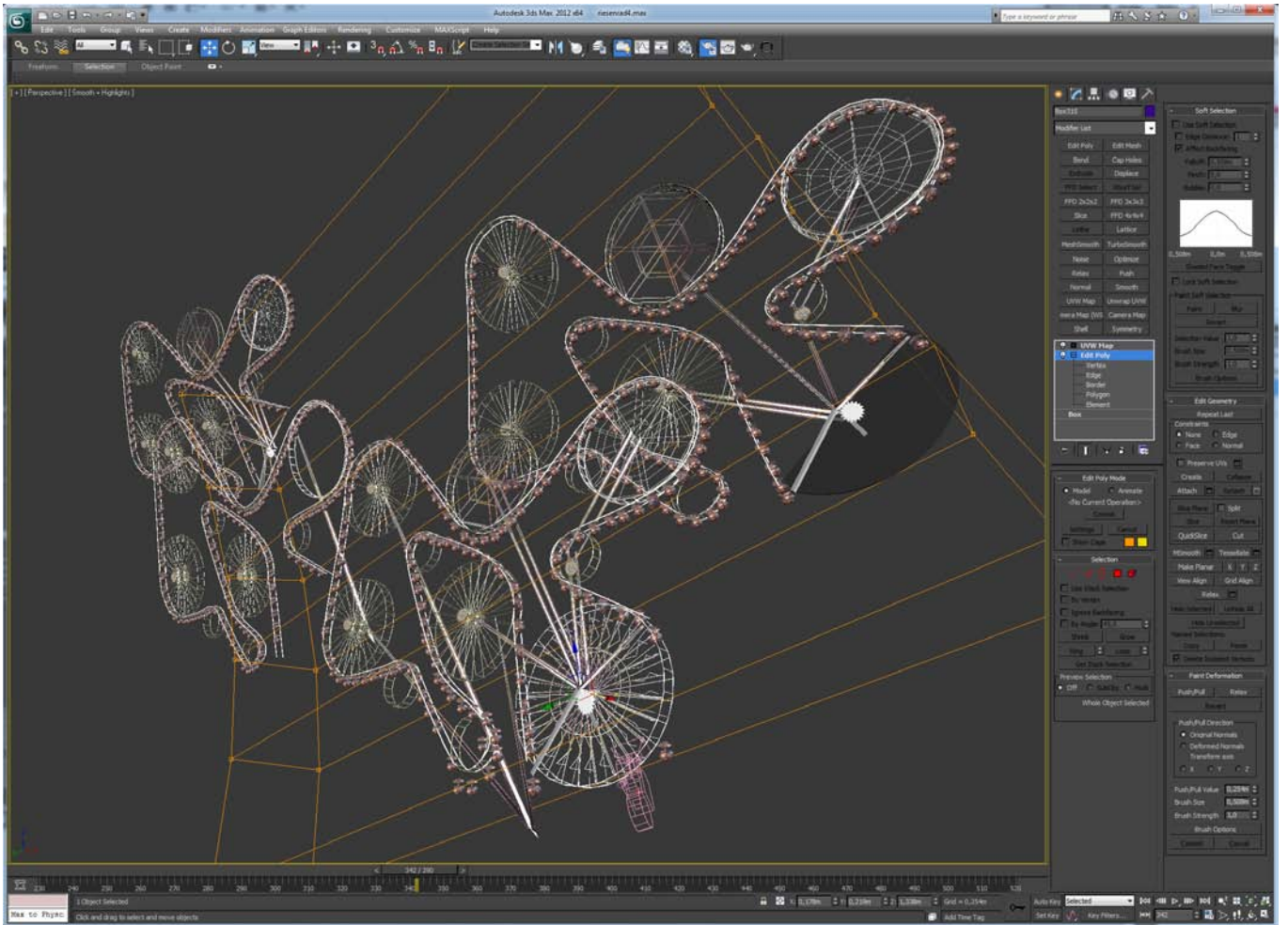
"High Altitude Conveyance System" - the endless ferris wheel. The exact border between reality and digital extensions is marked by the dotted line.


"High Altitude Conveyance System" - Wireframe view

Screenshot from 3ds max. The individual cabins are duplicates of one 3d model which was extracted from a still frame using the camera mapping technique, as well as the metal bars full of light bulbs.

Screenshot from 3ds max: Structure of the "High Altitude Conveyance System". The cabins were animated along a spline. On the bottom in the middle you can see the matchmoving camera.
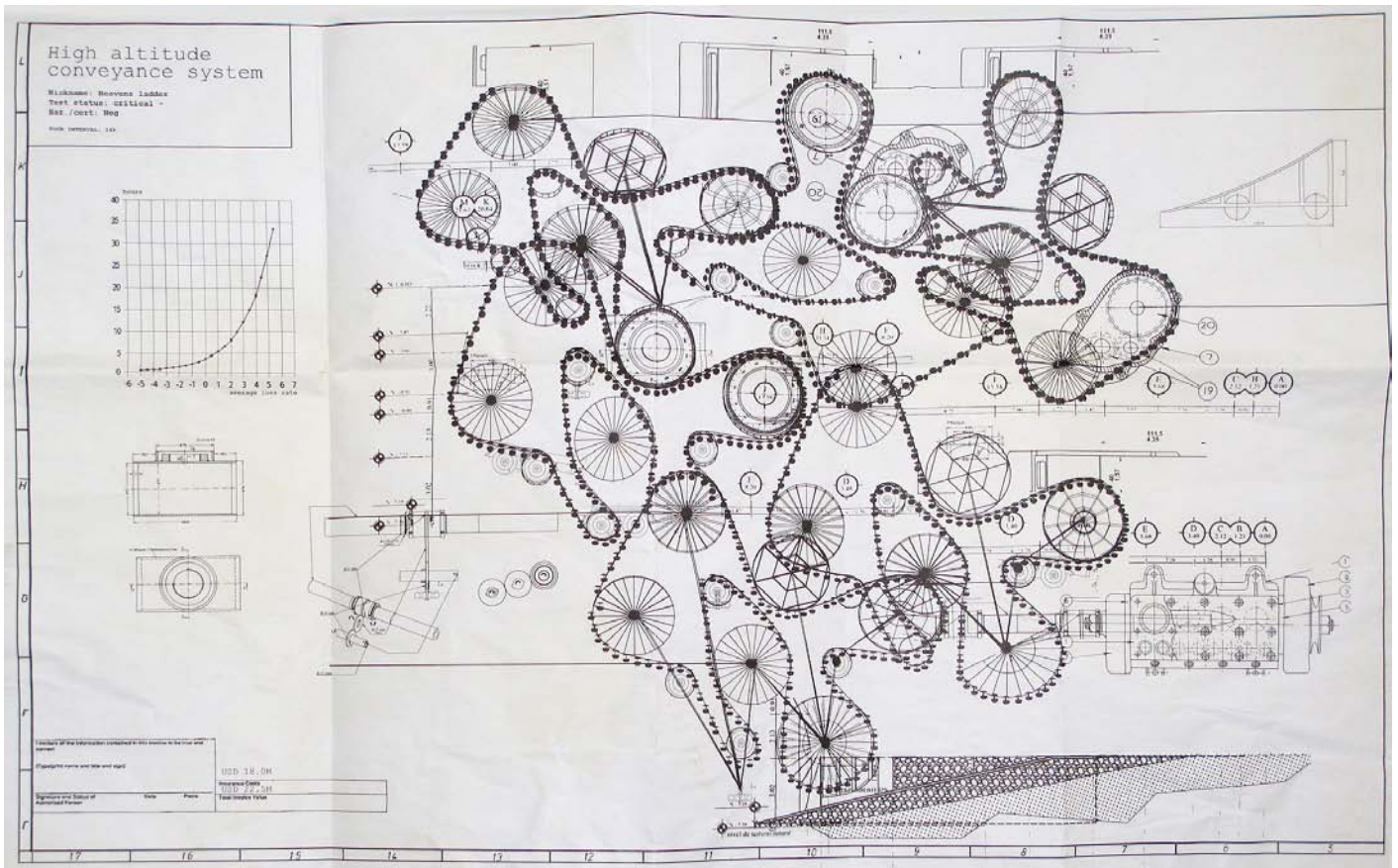
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OTHER WORKS BY TILL NOWAK:

"Dishes" (2007)

"Salad" (2006)

"Delivery" (Shortfilm, 2005)

...and more on www.framebox.com

"The Shaved Bumblebee" (2007)