Journal for Geometry and Graphics
Volume 11 (2007), No. 1, 127–136.

Chernikhov Revisited

Daniel Lordick

Dresden University of Technology
Institute for Geometry, D-01062 Dresden, Germany
email: Daniel.Lordick@tu-dresden.de

Abstract. In the summer of 2003, the Institute of Geometry at Dresden University of Technology offered a course called "3D-modelling with *MicroStation* for Architecture Students"[1]. (The course had previously been held in 2002.) The aim was to teach students in just twelve tutorials how to use the 3D-tools of the CAD software MicroStation. During the course, the students explored the advantages and disadvantages of various construction strategies. Finally, they were given the opportunity of demonstrating their newly acquired skills by creating architectural fantasies in virtual space. For once they were able to ignore the functional and economic restraints that are an intrinsic part of architectural design, and concentrate on pure composition and the power of visual imagery. The results were so interesting that we have decided to make them available to a broader public.

Key Words: Architectural fantasies, constructivism, linear perspective, three-dimensional reconstruction, 3D-modelling

MSC: 51N05

1. Introduction

The student projects presented here are based on the works of Yakov Chernikhov (1889–1951), a Russian architect and leading exponent of Constructivism. Between 1930 and 1933 Chernikhov published five books, the most famous of which are *The Construction of Architecture and Machine Forms* (1931) and *Architectural Fantasies*. Although the ideology which inspired them has long since fallen into disrepute, the sheer power of Chernikhov's visionary ideas and architectural forms is still fascinating.

Many of Chernikhov's drawings evoke vast industrialised urban landscapes, in which there are no people or other biological factors to detract from the pure beauty of construction and machinery. He often chooses a perspective which makes the viewer feel dwarfed. We gaze up at his buildings in a mixture of shock and awe. Chernikhov's technological wonderlands

[1] Web site of the course: www.math.tu-dresden.de/geo/3D-modelling
MicroStation is CAD-Software by Bentley: www.bentley.com

ISSN 1433-8157/$ 2.50

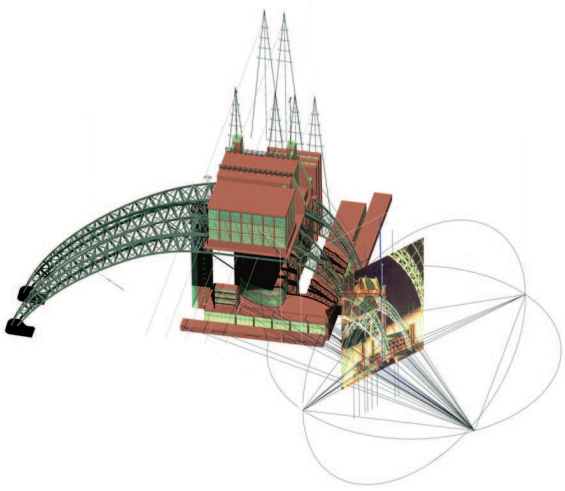

Figure 1: Andreas Schweinert, virtual model of an architectural fantasy, reconstruction of a perspective.
Rendered with MicroStation, Dresden 2003

glow in bright colours and proclaim the power and glory of a new era. However, that era has long since passed; the digital revolution has superseded it. Ironically, in the twenty-first century we are confronted with the problem of having to find new commercial uses for desolate and abandoned industrial sites. In these student projects, we sought to bring those two worlds together — the industrial and the digital — and make them interact.

Chernikhov's visions are the fruit of his extraordinary spatial imagination. However, if you try to construct those spaces and buildings three-dimensionally, huge difficulties and contradictions arise. The first problem results from Chernikhov's favourite perspective, the worm's eye view. In his drawings, the objects often seem to be cut off at the bottom — suspended, as it were, in space. That makes it virtually impossible to establish their exact position in relation to each other. Attempts to construct them three-dimensionally necessarily involve intuition and guesswork. That is one of the reasons why the digitally rendered pictures presented here are rather free interpretations of Chernikhov's original drawings.

Another reason is the priority of the graphic element in Chernikhov's designs. His architectural fantasies are not intended to be plans for actual buildings; they are statements of a new vision of architectural forms. For him, the graphic effect was more important than spatial accuracy. Interestingly, this proved to be one of the most exciting aspects of working from Chernikhov's designs. When all the effort of constructing a model was complete, the final result — not only the 3D-model but every perspective — had to be compared to Chernikhov's original drawing. The model had to match Chernikhov's use of light,

Figure 2: Chernikhov, from the volume Architekturnye fantazii [Architectural Fantasies]
Ink and gouache on paper, 24 × 29,7 cm, Leningrad 1933

colour composition and wide variety of forms. The student became involved in a process of arranging and rearranging, checking textures and lighting, and changing the position of the virtual camera. And — lo, and behold! — even without physical brush strokes or conventional shading, a simple computer eventually produced quite remarkable pictures.

2. Lars Nestler

In creating a model based on Chernikhov's drawing in Fig. 2, Lars Nestler has focused on the earthmovers in the foreground — powerful symbols of the mighty proletariat allegorically wielding their shovels to create a "brave new world". Nestler's version translates the heroic

Figure 3: Lars Nestler: Earthmovers
Rendered with 3D-StudioMax, Dresden 2002

design of Chernikhov's original into the harsh reality of the material world. He takes the abstract iconography surrounding the idea of working for the socialist ideal and reveals the depressing material reality underneath — the decay of out-dated industrialisation. At the same time, Nestler conserves an element of stylisation, but the circumstances have changed: the proletarian heroes of the October Revolution are reincarnated in these rusty avengers — attacking, with the sun behind them.

3. Zuzana Zimányová

Figure 4: Chernikhov, composition from the cycle Architekturnye miniatjury [Architectural Miniatures] Ink on paper, 11,1 × 11,1 cm, at the end of the 1920s

Zuzana Zimányová has adapted one of the drawings which Chernikhov called his "architectural miniatures" — small black-and-white ink drawings that remind us, in this computer age, of a bit-map (Fig. 4). A monumental composition fills the tiny square, contained within a solid black frame. Zimányová's sensitive rendering of this small picture as a 3D-model respects every detail of the original — adding nothing, and leaving nothing out. Subtle lighting, represented by soft shades of grey, is reminiscent of other works by Chernikhov. We might be tempted to think that this is how the original drawing would have looked, if Chernikhov

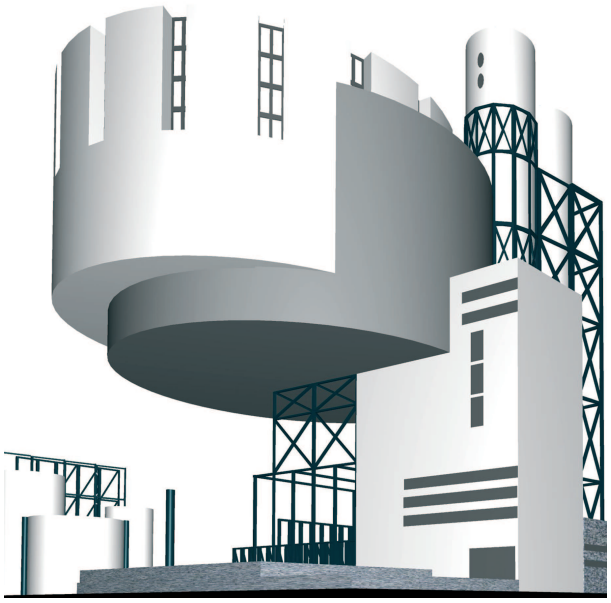

Figure 5: Zuzana Zimányová: Composition Rendered with MicroStation, Dresden 2003

himself had been able to exchange his pen for a mouse. ZIMÁNYOVÁ's perspective and full use of the available space correspond exactly to the original. Yet her construction would never be able to stand! When the blinding black-and-white contrasts of the original are translated into more realistic shading, the defects of the actual design and construction of the building become apparent. ZIMÁNYOVÁ's detailed rendering gives CHERNIKHOV's version the lie — just as a ghost train, if it were brightly illuminated, would lose all credibility.

4. Christian LOOS and Christian BRIMMER

Figure 6: CHERNIKHOV, composition from the cycle Architekturnye miniatjury [Architectural Miniatures]. Ink on paper, 11,1 × 11,1 cm, at the end of the 1920s

Christian LOOS and Christian BRIMMER have also adapted an "architectural miniature" (Fig. 6). LOOS translates the original drawing, which has all the austerity of a woodcut, into an elaborate rendering with the richness of a painting (Fig. 7). While preserving the original perspective and main compositional elements, he painstakingly renders certain details and creates surface textures so that CHERNIKHOV's machine-like vision shines like new! If it weren't for that stork's nest perched on four upended steel girders, the building could almost pass for a piece of contemporary architecture — or, at least, a conglomerate of modern styles. As it stands, it is reminiscent of a film set. That aspect is accentuated by the lighting, which comes from various sources and highlights the factory dramatically. The brightly-lit windows glowing against the sinister night sky could be something out of a James Bond movie. We have the feeling that, at any moment, the garage doors could open and lethal machines could roll out into the night — to the final showdown. However, the remarkable background negates that interpretation. LOOS could easily have used the possibilities of photo-realism to underscore the first impression; instead, he introduces the shadowy outline of cranes against the night sky. It is an evocative juxtaposition of virtual reality and photographic imaging. He deliberately sacrifices the rules of perspective to achieve a tightly concentrated image.

BRIMMER creates something completely different, working from the same miniature (Fig. 8). For him, CHERNIKHOV's vision is reality. The idealism and monumentality of the original drawing are replaced by a feeling of apparent spontaneity. As in a casual snapshot taken perhaps from a passing train, the vertical lines have fallen prey to parallax error and the motif seems to be positioned arbitrarily. Paradoxically, this invests the picture with an increased feeling of reality. However, the setting is anything but naturalistic. And as if the gaudy sunset were not enough to astonish us, BRIMMER imposes a picturesque quality on the factory building. The viewer is transported into another world, in which everything glows more brightly and bangs more loudly. BRIMMER's turbulent world of bold textures and lurid colours transposes CHERNIKHOV's original vision into the parallel universe of comic books and computer games.

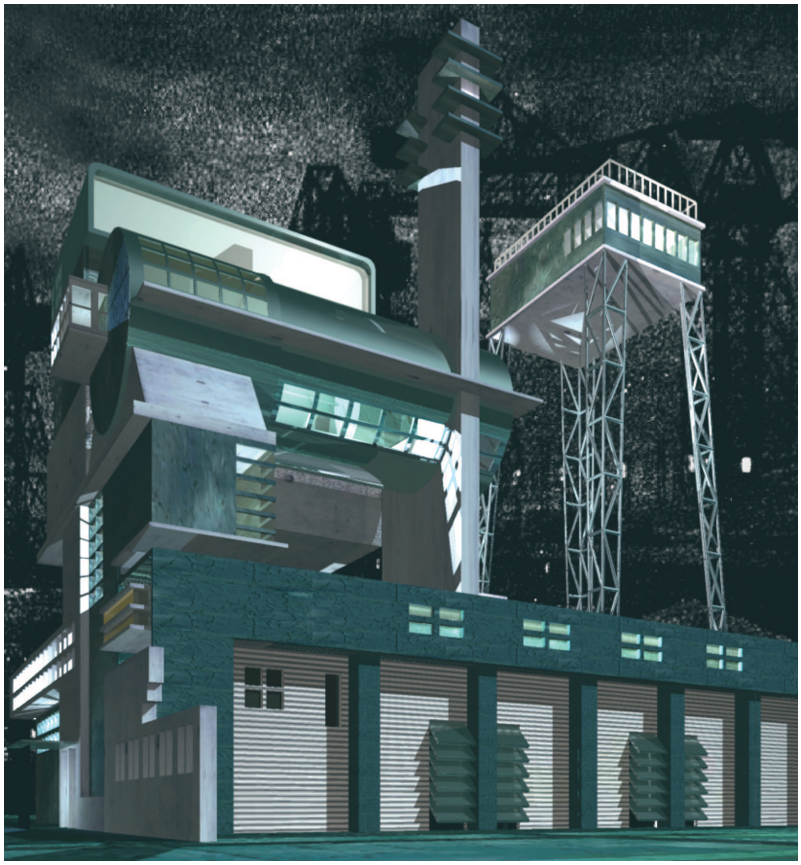

Figure 7: Christian Loos: Composition
Rendered with MicroStation, Dresden 2003

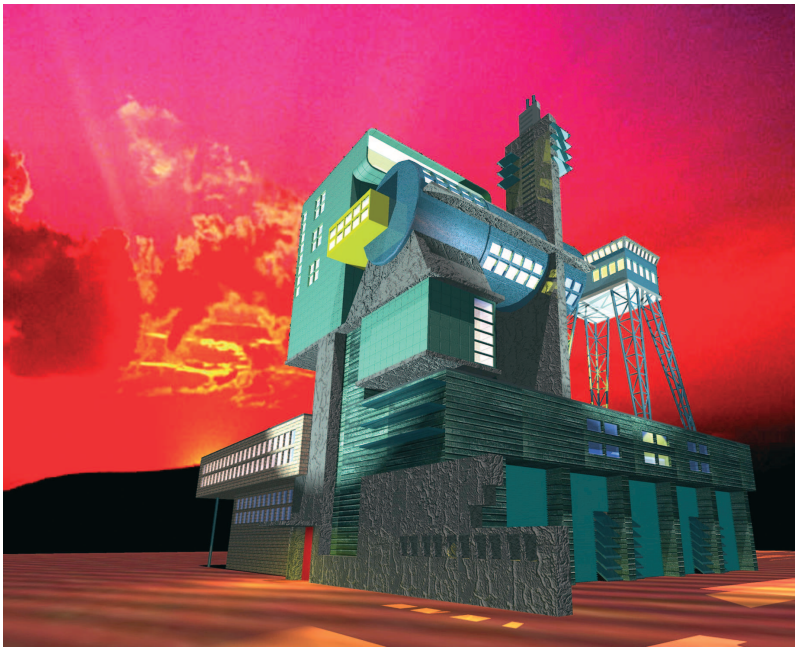

Figure 8: Christian Brimmer: Composition
Rendered with MicroStation, Dresden 2003

5. Marco Melasch

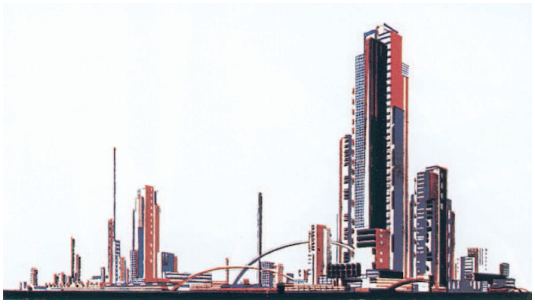

Figure 9: Chernikhov, from the volume Architekturnye fantazii [Architectural Fantasies]. Leningrad 1933

Marco Melasch approaches Chernikhov's vision indirectly. He interprets Chernikhov's architectural fantasy as a visualisation of Fedora, the futuristic city described by Italo Calvino in his novel, *The Invisible Cities*:
"*In the centre of Fedora . . . stands a metal palace with a crystal ball in each room. Looking into each ball one sees a blue city, the model for a different Fedora. They are forms which the city could have assumed, had it not for one reason or another become what we see today.*"

In Melasch's picture (Fig. 10), Fedora with its metal palace has long since fallen into decay. Encased in a kind of amniotic sac, the forgotten vision drifts through space. Nevertheless it could fall on fertile soil at any time. Someone might discover it by chance and turn the idea into reality — perhaps on another planet. Meanwhile, colourful skyscrapers continue to spring up like toys on artificial islands, and bridges span the special medium that keeps the vision alive. In constructing a 3D-model, one can proceed in the same way as a traditional graphic artist: simple cubes and box forms can be individualised by giving them various textures, prepared in a graphic application. Without getting involved in rendering complicated spatial details, the 3D-modeller can make buildings rise and fall. The interesting thing here is not the individual buildings themselves but the urban skyline they form.

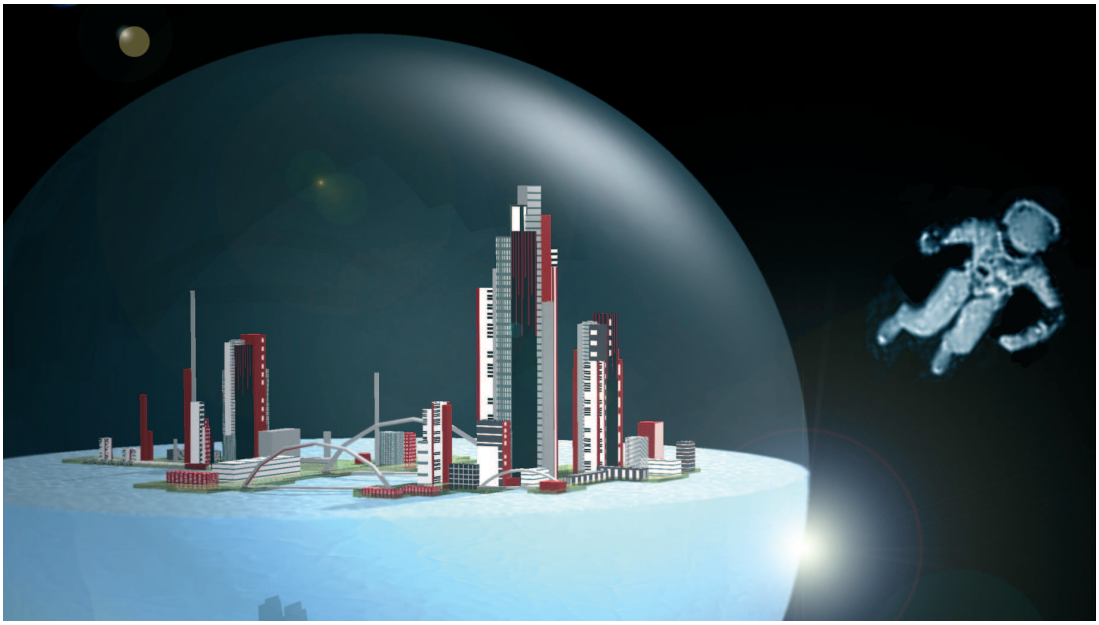

Figure 10: Marco Melasch: Vision of a city
Rendered with MicroStation, Dresden 2003

6. Andreas Schweinert

Figure 11: Chernikhov, from the volume Architekturnye fantazii [Architectural Fantasies]
Ink and gouache on paper, 24 × 29,7 cm, Leningrad 1933

Andreas Schweinert brings an architectural fantasy to life. In Chernikhov's original drawing, an ordinary-looking power station is docked onto a much more powerful steel construction, which dominates it (Fig. 11). Like a blood-sucking insect with its legs apart, huge sections of the building hover at a dizzy height above trusses of steel latticework. Part of another huge truss is visible in the foreground, so that the viewer is drawn into the scene and feels like a modern Damocles threatened by a huge weight suspended above his head.

In Schweinert's version (Figs. 12 and 13), the emotional attack is played down. Instead, he analyses the construction objectively. Focussing on the design aspects, he makes some

Figure 12: Andreas Schweinert, virtual model of an architectural fantasy, reconstruction of a perspective. Rendered with MicroStation, Dresden 2003

Figure 13: Andreas Schweinert, virtual model of an architectural fantasy, reconstruction of a perspective — rendered with MicroStation, Dresden 2003

surprising discoveries. At first glance, those two steel latticed trusses at the centre of the picture, which are rooted in boot-shaped plinths, would appear to be identical and to be exactly matched by trusses on the other side. However, closer examination reveals that this is not the case. Schweinert discovers that Chernikhov has bent the two steel legs at the base to achieve the desired perspective, so that they seem to lunge forward. In his digital rendering, Schweinert uses the same metal girder twice and forces us to wonder how we could possible have thought that the trusses in Chernikhov's picture were identical. Once our suspicions have been aroused, it is easy to discover a number of other discrepancies in Chernikhov's design. Yet despite those problems, Schweinert is able to achieve a remarkable similarity to the original. The mind-bending effort involved is evident when we compare the 3D-model in top view and in elevation. All those elements which make Chernikhov's perspective seem harmonious are exposed as grotesquely distorted in the elevation

7. Martin Böttcher

Martin Böttcher's project (Fig. 14) is not based on any particular drawing by Chernikhov. Instead, he seeks to penetrate the intellectual ideas behind Chernikhov's architectural fantasies and redefine them with uncompromising clarity. His fantasy depicts an oil platform, where human existence is subject to hostile machinery and a harsh climate. A rocket flare wrenches the platform out of the eternal night. The curious visitor approaches the eerie wasteland in a helicopter. From a safe distance, we see a cluster of huge oil containers, constructed according to the logic of large-scale production and storage. There are no windows, doors or levels, so we have no way of knowing just how large they really are. A mysterious steel skeleton — a kind of crane — towers above them. In the steel latticework, two luminous objects have nestled like amoebae covered by membranes. New steel trusses thrust up in all directions out of this monster. Presumably we are observing a technological parasite which has been able to grow and grow unhindered.

Böttcher's vision does not achieve the concentration of Chernikhov's perspectives and his composition actually flouts some of the rules of Constructivism that Chernikhov derived from extensive research and expressed in his books. Nevertheless, Böttcher's rendering is intriguing. It represents the point at which the student breaks with a role model, to strike out on his own.

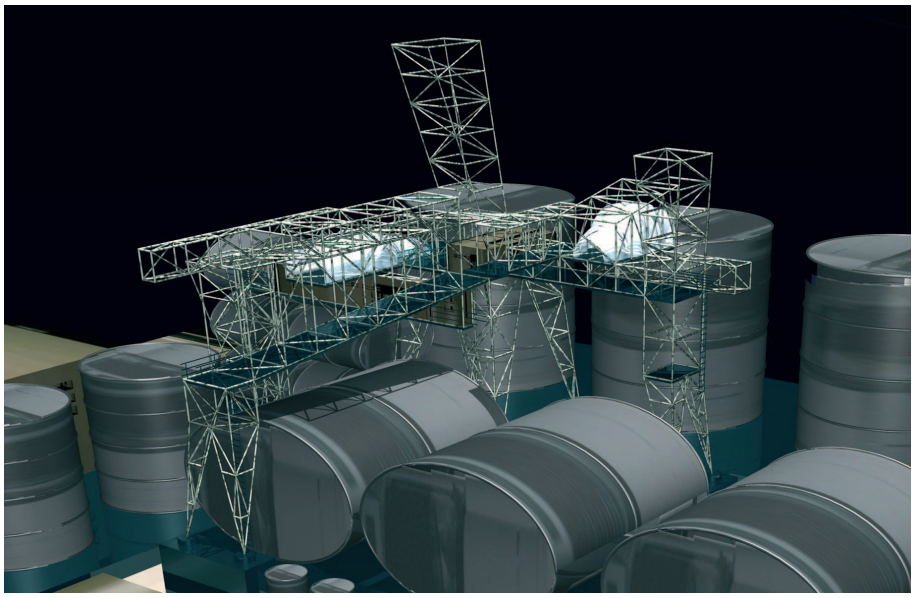

Figure 14: Martin Böttcher: Artificial island
Rendered with MicroStation, Dresden 2003

References

[1] J. Tschernichow: *Konstruktion der Architektur und Maschinenformen*. Basel 1991.

[2] J.G. Černichov: *Jakov Černichov: sowjetischer Architekt der Avantgarde*. Stuttgart 1995.

[3] I. Calvino: *Invisible Cities*. London 1979.

Received November 30, 2006; final form June 25, 2007