

# Tribute to the Atomium

Samuel Verbiese  
Artist  
Terholstdreef 46  
B – 3090 Overijse  
Belgium  
E-mail: verbiese@alum.mit.edu

## Abstract

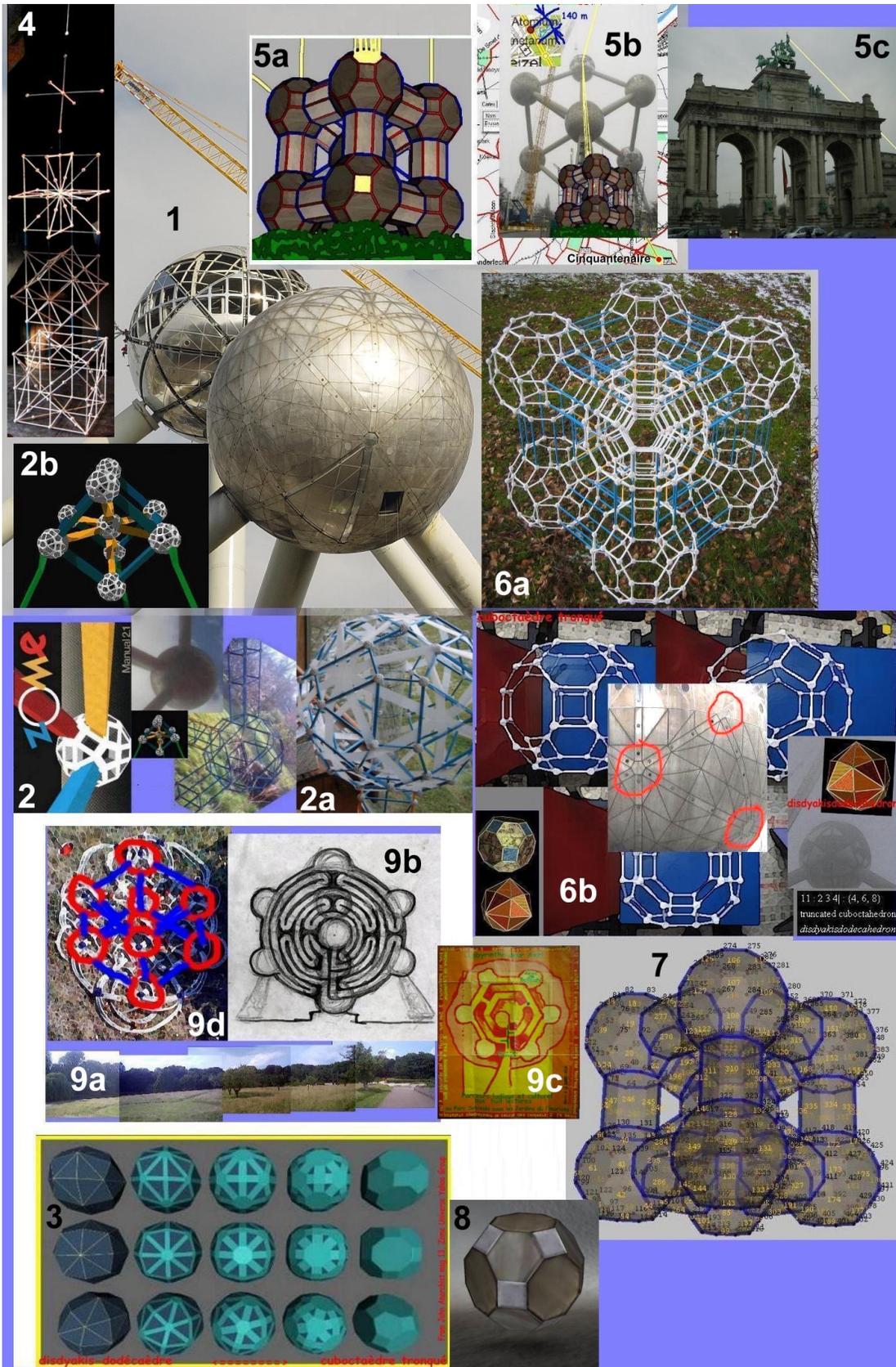
This paper describes the project of a sculpture stemming from the pattern of the outside skin layout of the Brussels' Atomium spheres. Two dual polyhedra are considered, the Catalan disdyakis dodecahedron and the Archimedean knotted cuboctahedron. The special projected location and setup of this sculpture makes it a good candidate for celebrating the upcoming 50th anniversary of the Atomium in Brussels built for the World Fair 1958.

## 1. The pattern of the outside skin layout of the Atomium spheres

The Atomium monument [1] built in 1957 in Brussels, Belgium, for the 1958 World Fair represents a magnification of 165 billion times of the nine atoms defining the cubic centered symmetry of an iron crystal. The sheet metal pieces covering the spheres feature nine large circles, metaphors of the electron orbits, and partition the spheres in 48 equal spherical triangles with a right angle (Fig.1), this layout bearing kind of a triangulated “spherical cube” symmetry naturally aligned in the same orientation of the whole structure.

With the recent replacement of the severely weathered original mirror-hand-polished 1.2 mm thick aluminum skin, with a new chemically polished stainless steel sandwich, and in the framework of my artistic interest in the Zome System [2] already related to the Atomium (Fig. 2), I happened to have my attention drawn on a drawing (Fig. 3) [3] showing the morphing from the Catalan polyhedron called the “disdyakis dodecahedron” to its dual, the Archimedean polyhedron called the “knotted cuboctahedron”. The particular symmetry materialised by the triangular facets of the Catalan solid immediately appeared to be closely linked to the symmetry displayed by the spherical triangles on the skin of the Atomium spheres mentioned above. And I could build the Zome model (see Fig. 4) representing possible successive stages of the building of that particular symmetry.

The (magician) story goes as follows : I take a Zome connector from my pocket, and holding it with both hands, I pull out an original “long blue” (white here !) strut ended by two connectors, and use that “antenna” to form the upper part of the tower-shaped model. Then, peeling it like a banana, I generate the 3-D cross representing the unit axes of the Cartesian co-ordinates. Pulling out eight times a central connector along the axis equidistant of the planes in each of the eight three-planes up to the length of a “long blue”, itself linked by a triplet of struts to the vertices on the co-ordinate axes, the obtained hollow solid does no longer contain any connector at the center. Next I further pull out these eight connectors to form a cube, which is represented on the lower part of the model. Finally, taking that cube, I just pretend blowing in it to inflate it into a sphere, and there you get precisely the symmetric pattern of the outside skin layout of the Atomium spheres !



Figures : Assembly of characteristic pictures and images describing the project (see Figure captions in text)

## 2. A new sculpture made of a special set of the original Atomium skin pieces.

Now, look at the way the Atomium spheres were originally built. The nine 40 cm wide circular belts, containing series of lights whose firing pattern at night suggests electron movements, cross each other in three different ways : 2 by 2 on spherical squares, 3 by 3 on spherical hexagons and 4 by 4 on spherical octagons each of sides 40 cm (Figs. 1, 6b). If you now imagine yourself placed successively in the center of each of the nine spheres, at 9 meters from the skin, visible from the inside, and asking those little original aluminum squares, hexagons and octagons to virtually migrate towards you, they would have ended-up connecting precisely in nine times a “knotted cuboctahedron” of about 1.4 meter in diameter, and so constituting sort of the essence of the Atomium symmetry ! Bear in mind that the pipes connecting the Atomium spheres do so precisely on the locations of octagons (for the outside pipes forming the large cube) and of hexagons (for the inside pipes connecting the central sphere to the outside ones) : those octagons and hexagons are thus missing facets in the nine new small polyhedral “spheres”. Then, you join these nine small polyhedra into the cubic centered disposition of the Atomium, not with long slender cylindrical pipes, like in the Atomium itself, but with short prisms, made of the original plexiglass window panels, which fit in the missing octagons and hexagons. You just realized a 4x4x4 meter sculpture that, instead of standing upright on a corner like the real Atomium, you would set to rest (aren't they tired, those original, “patrimonial” pieces almost 50 years old ?) on one side of the cube. That precious structure could have been positioned some 140 meters away from the Atomium, on the axial lawn down the avenue du Centenaire, its diagonal shooting (Fig. 5a) a laser beam towards the shiny renewed upper sphere of the Atomium to be reflected horizontally, on the precise axis of this avenue (Fig. 2b), over the Brussels' skyline towards impacting a flag (Fig. 2c) on the bronze horses standing on the huge arches of the "Cinquantenaire" built to remember the 50th anniversary of Belgium born in 1830 (see map included, Fig. 5b). As in less than two years the Atomium will have its own 50th anniversary, I called this "active" sculpture, "D'un Cinquantenaire à l'Autre" (from one 50th anniversary to another). Unfortunately, the original elements were destroyed and lost during the refurbishing process despite due alarming of the pertaining authorities, so if ever built, this sculpture would be made of new material, probably flat aluminum and plexiglass panels, as metaphors of the original skin, and could include original panels if any still in existence could surface.

## 3. Figure captions

- 1: Picture of the Atomium [1] during refurbishing, featuring the old and new skins and part of the supporting structures. The details of the geometry described in the text are apparent.
- 2: How the Zome System manual [4] inspired me working on the Atomium with Zome : (a) Metazome [5] model, and (b) virtual Zome model developed with Scott Vorthmann's “vZome” software [6].
- 3: Morphing from the disdyakis dodecahedron to the knotted cuboctahedron [3], inspiring this work.
- 4: Zome model depicting possible phases of the generation of the symmetry of the Atomium sphere.
- 5: Setup of the sculpture with a laser beam (a) reflecting on the Atomium upper sphere over Brussels (b) toward the flag on the Cinquantenaire Monument (c). See map “under” picture (b).
- 6: (a) Zome model of the sculpture, (b) How the new “spheres” came to life.
- 7: Javaview [7] model of the sculpture.
- 8: Javaview model rendering of the sculpture, courtesy by Konrad Polthier [8].
- 9: Other works of mine featuring the Atomium : (a) Looks of Sobieski Park 1 km away from the Atomium, kind of its “shadow” mowed in the prairie by IBGE-BIM, Brussels' Parks authority, which inspired me associating the Atomium (kind of a 3-D labyrinth !) with labyrinths (another theme of interest to me [9]) , (b) early project and (c) realised project; (d) composite knot (yet another theme) based on the Tibetan “infinite loop” [10] morphing into the Atomium (all is within all and vice versa...).

## Acknowledgements

I like to dedicate this work both to the late father of the Atomium, ir. André Waterkeyn, due to an aspect of the exceptional beauty of his design that has come to light with this study, and to my own father Jérôme Verbiese who brought me in front of the monument in an early stage of its construction in fall 1957, which certainly helped me becoming an engineer, and now an artist partly engaged in geometric work.

I like to thank my sister ir. Ruth Verbiese, who, knowing the importance of the Atomium in my life, generously offered me which would end up to become the original aluminum triangular plate #823 that sat on the equator and against the west of the main meridian of the central sphere, looking most happily towards the home of my parents, situated at the other side of Brussels, 823 decameters away, aligned on the very axis of the monument and its avenue, past the Cinquanteenaire arches ! This gift triggered the study leading to this presentation.

I like also to thank, without naming them, the number of technical individuals in charge of the rehabilitation of the Atomium, now reopened to the public, who supported this project.

Konrad Polthier, the always helpful father of Javaview, provided a nice rendering of the resulting “spheres” and, last but not least, Paul Hildebrandt, co-author and President of Zometool, kindly acknowledges my work (see my Metazome Atomium in his paper on this conference) and contributed material.

## References

- [1] <http://www.atomium.be> , official site of the Atomium
- [2] <http://www.zometool.com> , official site of the Zome System
- [3] “John” [johnarchist@yahoo.com](mailto:johnarchist@yahoo.com), “*etrunc 2triangulated cube great rhombicuboctastweb*”, [Actually a morphing from a “disdyakis dodecahedron” to a “knotted cuboctahedron”],  
Posted: Dec 20, 2004 on <http://ph.groups.yahoo.com/group/ZomeUniverse/photos/view/71b3?b=10>.
- [4] <http://www.zometool.com/products-zomemanual21.html> : Zome Manual 2.1
- [5] <http://www.vorthmann.org/zome> , official site of Scott Vorthmann’s vZome (“Virtual Zome”) SW
- [6] <http://www.eecs.berkeley.edu/~mihal/zome/metazome.htm> , detailed description of Metazome
- [7] <http://www.javaview.de> , official site of “Javaview “ imaging SW by Konrad Polthier et al.
- [8] Konrad Polthier, personal communication
- [9] Samuel Verbiese, “*Amazing Labyrinths*”, poster presented, a.o. at the ISAMA-Bridges 2003 Conference, University of Granada, Granada (Spain), July 23-26, 2003
- [10] Samuel Verbiese, “*Merging a Tibetan Endless Loop xith an Ocean Plat*”, poster presented, a.o. at the ISAMA-Bridges 2003 Conference, University of Granada, Granada (Spain), July 23-26, 2003

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