

1. Introduction

Buckminster Fuller (1895-1983) is the renowned inventor of:
the geodesic dome
the world game
a new system of mathematics called *synergetics*.

Fuller did not invent the geodesic dome. It was invented by Walter Bauersfeld of the Zeiss Optical Works in Jena, Germany in 1922, and the first use of it was as a planetarium on the roof of Zeiss that year.

However, Fuller was awarded several patents for the dome. Among them are US patent #2682235 (1954), US patent #288171 (1959), US patent #2905113 (1959), US patent #2914074 (1959), etc. Moreover, Fuller was the one who popularized the technology and pointed out the dome's advantages and the reasons for its great strength.

Since Bauersfeld conceived of his structure merely as a planetarium projector (a truly impressive feat) whereas Fuller had a more comprehensive vision of the geometrical and engineering significance of the dome. Which man should win history's designation as "The inventor of the dome"? I'll let the historians and the pundits debate that one.

2. Geodesic Domes

Fuller invented the Geodesic Dome in the late 1940s to demonstrate some ideas about housing and "energetic-synergetic geometry" which he had developed during WWII.

This invention built on his two decade old quest to improve the housing of humanity.

It represents a brilliant demonstration of his synergetics principles; and in the right circumstances it could solve some of the pressing housing problems of today (a housing crisis which Fuller predicted back in 1927).

What is a geodesic dome?

A geodesic dome is a type of structure shaped like a piece of a sphere or a ball. This structure is comprised of a complex network of triangles that form a roughly spherical surface. The more complex the network of triangles, the more closely the dome approximates the shape of a true sphere.

There are many sizes of triangles in a geodesic dome depending on the frequency of subdivision of the underlying sphere.

Do domes really weigh less than their component materials?

Well, the structures weigh less when completed because of the air-mass inside the dome. When it's heated warmer than the outside air, it has a net lifting effect (like a hot-air balloon).

This is almost unnoticeable in smaller structures, like houses, but, as with other things about geodesics, being as they're based upon spheres, the effect increases geometrically with size. So you'd be able to notice it in a sports stadium, and a sphere more than a half mile in diameter would be able to float in the air with only a 1 degree F difference in temperature!

What about underground concrete domes?

Underground concrete domes are rather interesting

- 1) They can use chemical sealing and landscaping to avoid leakage problems associated with wooden domes.
- 2) They are *extremely* strong. Britz [see [Dome References](#) for more on Britz] has obtained extremely low insurance rates on his structures. The insurance company tested one building by driving a D8 Caterpillar tractor on top of the house!
- 3) There's little hassle involved in dealing with materials that were really standardized for use building boxes. The only specialized tools are the forms, everything else can easily be used off the shelf.

4) They can be quite aesthetic. Britz has shown that you can build developments where the houses can't really see each other.

5) They are *cheap* and easy to heat, cheap enough that you can build a much larger structure than you might using conventional housing and use standard room divider technology to split the thing up into room.

Although Fuller predicted that a million domes would be built by the mid-1980's, the number is closer to 50,000. Domes are nonetheless still going up in surprising places. A 265-foot-wide geodesic dome is part of a new pavilion at Walt Disney World's Epcot Center in Florida. A bright blue 360-foot-high dome houses a shopping center in downtown Ankara, Turkey. Stockholm, Sweden, boasts a 280-foot-high dome enclosing a new civic center.

What are the advantages (and disadvantages) of Dome Life?

1. Heating and cooling the home become more efficient due to the fact that there are fewer (even no) corners where heat may be trapped. The overall air flow in a dome is substantially better than in a conventionally constructed home (straight walls and such), and there is less surface area per square foot of living space = less heat loss.

2. For those solar minded people, the placement of the solar collectors on the ``roof" is less critical due to the curved nature of the top of the structure.

4. The inherent strength of the dome makes it suitable for either earth-bermed or even earth covered construction techniques.

The curved walls in a dome require either custom furnishings, 100% prefab design, or an ``open spaces" approach. Each of these would be an advantage or disadvantage in one person's eyes or another's.

Mass producing domes is easy, greatly reduces the cost and could solve many of the housing shortage problems worldwide (especially emergency housing needs).

3. Synergetics

Synergetics: A metaphoric language for communicating experiences using geometric concepts.

He was a polymath whose writings and lectures touched upon every aspect of the human condition.

He was a "new-former" pointing out, exploring and prototyping designs in numerous, previously uncharted areas of science and humanity.

His greatest writings were *Critical Path*, *Synergetics* (2 volumes), and posthumously *Cosmography*.

4. Fuller's Ideas About Human Society: Critical Path

Fuller was interested in all branches of the so-called "social sciences" and he made contributions to several.

Much of this work was in economics.

He advocated the principle of "ephemeralization" or doing "more with less."

He also advocated a design science revolution whereby designers use the principles of science in a well thought out way to accomplish greater and greater functionality with fewer and fewer energy resource investments for the benefit of 100% of humanity.

This, in contradistinction to his "archenemy," Obnoxico Inc., which tries to make money out of thin air (or rocks) with little or no appreciable benefit to humankind. He founded the world game which explores the task of making the world work for 100% of humanity.

Web Sites

www.bfi.org/

www.bucky.org/

www.buildfreedom.com/ft/fuller.htm

www.CJFearnley.com/buckyrefs.html

www.domebuilder.wecre8.com/index.htm

www.wnet.org/archive/bucky.cgi