

THE ORIGAMI REVOLUTION

Intro, Art, Nature

I. Origami is the Ancient Art of Japanese paper folding. The word, Origami, means folded paper. It is still taught in the traditional manner with patterns having less than 30 steps; for example, a crane would be a traditional pattern. However, over the last couple of decades patterns have designed with hundreds of steps that pose complex geometrical problems.

THE ORIGAMI REVOLUTION

- II. First, I wish to highlight the artistic side, as well as, showing that Origami is found in
 - nature.
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- Tomoko Fuse is a Japanese female master who is going beyond the traditional nature of a simple crane to create from a SINGLE sheet of paper 3-dimensional sculptures, thus showing the infinite possibilities of how a single piece of paper can be stretched, pulled and manipulated into various, and beautiful, forms. The videos will show some of her work , plus video of the Tokyo International Conference on Origami.
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- Tomoko Fuse & Tokyo International Conference on Origami:
- 02:03 – 05:00 (@3 min)

THE ORIGAMI REVOLUTION

- Robert Lang is an American who has been doing Origami since grade school. He holds degrees in physics and engineering, but no longer works full time in those areas. He is now an Origami artist who travels to give demonstrations and teach Origami, but still consults in the engineering industry. He likes to create bugs. This video shows how he breaks with tradition in the design area of Origami.
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- VIDEO: 05:00 – 08:14 (just over 3 min)
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- Vincent Floderer, who lives in the southwest of France, is an accomplished Origami artist who carefully studies nature - flowers, plants, grass, bugs. He's observed how flowers unfold as they bloom or grass unfolds as it grows. He takes Origami some steps further. He crumbles his paper before he actually folds his paper.
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- Vincent Floderer: 13:00 – 15:32 (2 min, 32 sec)

THE ORIGAMI REVOLUTION

- Robert Lang is not the only engineer or scientist who loves Origami there are others, notably Erik Demaine, a Mathematics Professor at MIT and Tomohiro Tachi a Professor at Tokyo University. They both enjoy the artistic side of Origami as well as the functional, useful side of Origami. Together they have been collaborating for about 10 years on creating a computer application called "The Orgamizer". The goal is to make it an invaluable design tool to be used by scientists, mathematicians, engineers, artists, etc.
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- VIDEO: 08:15 – 12:59 (just over 5 min)

THE ORIGAMI REVOLUTION

- Medicine, Science, Engineering, Technology
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- V. Other areas that Origami design may be proven useful is in the medical industry. A group of scientists at the University of Washington (Spokane, WA) are studying proteins on the surface of the flu virus. Interestingly the proteins are a series of folds. When folded correctly and can easily be attached to a cell, the protein can render the flu virus inoperable. I have a video segment that is @ 8 minutes long. If there's time I'll show it at the end. (20:44 – 28:21 “...proof of concept”)
- Across the Pacific in Japan a group of scientists have collaborated on improving a surgical implant technique used to treat heart disease, the STENT. They created an Origami designed stent that remains folded until it is placed in the artery at the intended location, via less invasive surgery. The video explains how it's done, and my personal impression is that this technique would cut down on recovery time post surgery.
- VIDEO: 28:50 – 30:23 (1 min, 33 sec)

THE ORIGAMI REVOLUTION

- VI. Engineering, too, has embraced the Origami world. Back in the US, in the Harvard University Microrobotics Lab, professors and students are designing tiny drones and microrobots created by various folding methods to develop devices as small as insects. They also break with tradition. Their methods involves folding PLUS cutting allowing them to create/develop a pop-up 3-D object, starting from a flat design, to unfold automatically at certain temperatures (similar in function to the Origami stent for heart disease).
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- VIDEO: 30:24 – 33:57 (3 min, 33 sec)

THE ORIGAMI REVOLUTION

- VII. Origami design is being tested in the aircraft, auto, and building structure industries. Engineers in Germany are testing material strength using a layer of Origami sandwiched between 2 flat surfaces. They want to produce lightweight, structurally safe and fuel/energy efficient products.
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- VIDEO: 34:45 – 37:00 (2 min, 15 sec)
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- VIII. Development and testing is going on in the Aerospace industry, as well as law enforcement and security.
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- In the Brigham Young University Engineering Lab They're working with NASA to create a Solar Array, plus law enforcement. They developed a new field called "Thick Origami" – which uses cuts, layers and hinges on a rigid or dense material.
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- VIDEO: 39:36 – 45:28 (@ 6 min)
- (Brigham Young University professor explains; plus Robert Lang – explains further the uses in aerospace and other areas)

THE ORIGAMI REVOLUTION

- IX. My final thoughts. What I found most fascinating while watching this NOVA episode was how mathematicians, engineers, and scientists are working with an art form and our education system seems to be turning its back on the art world when the art world can be of great benefit to the science and industrial world. Look at these scientists that are extremely artist!!! Robert Lang originally worked full-time in physics and engineering, and now is a "full-time" artist but remains involved in the engineering field as a consultant utilizing Origami techniques to help solve engineering, medical and scientific problems. So this goes to show us that Origami touches all of our lives. What we didn't know yesterday, we know, or are aware of, today.

THE ORIGAMI REVOLUTION

THANK YOU!