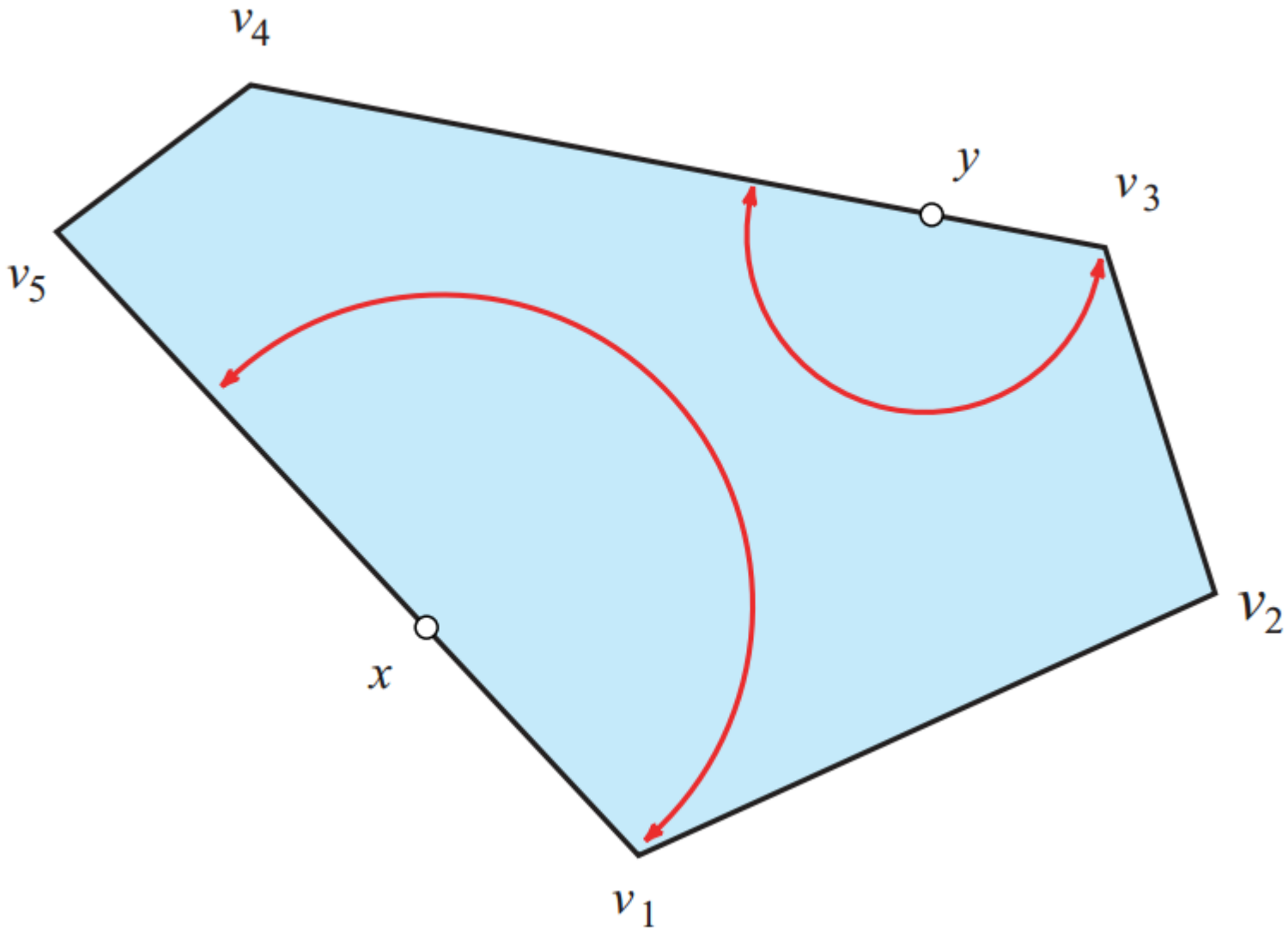
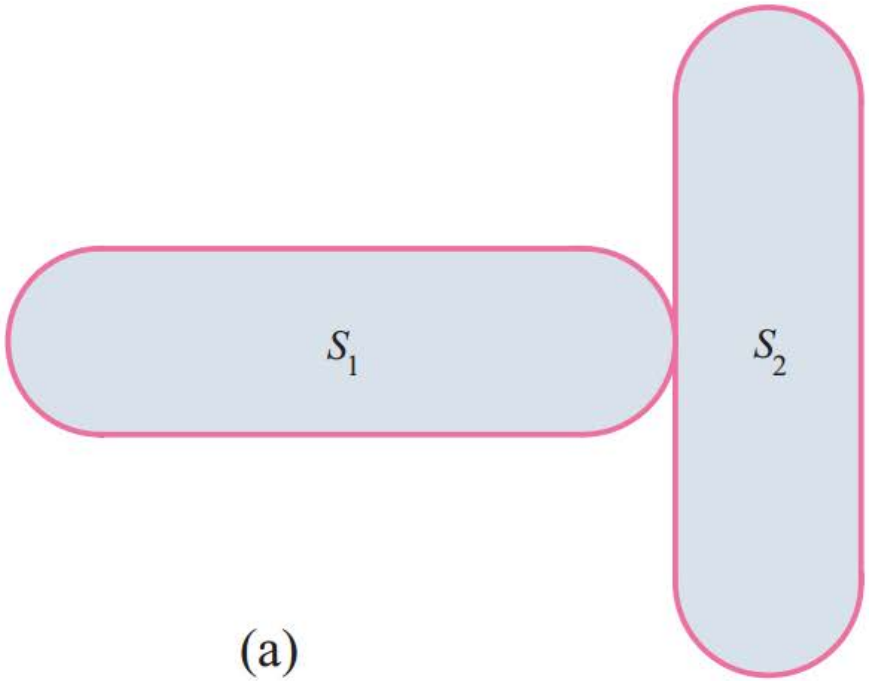
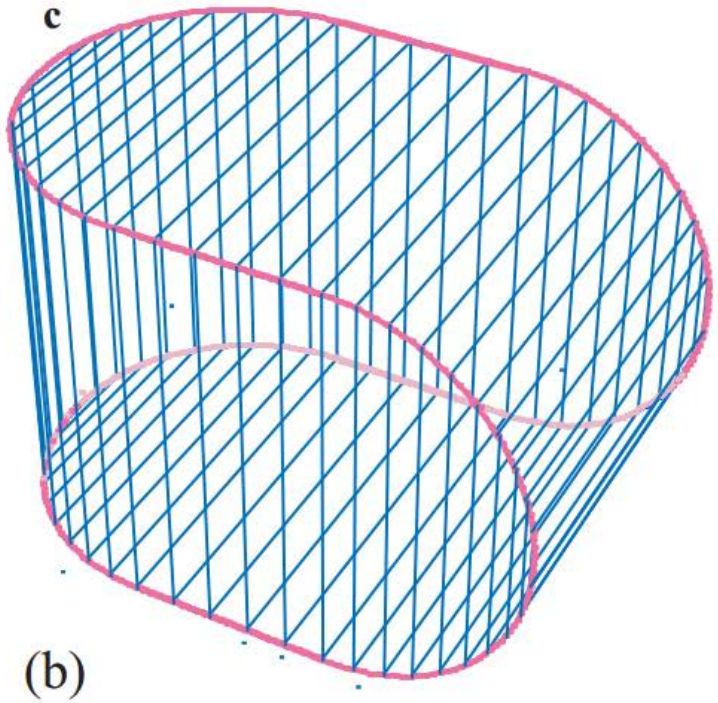

v_4
y
v_3
v_5
v_2
x
v_1



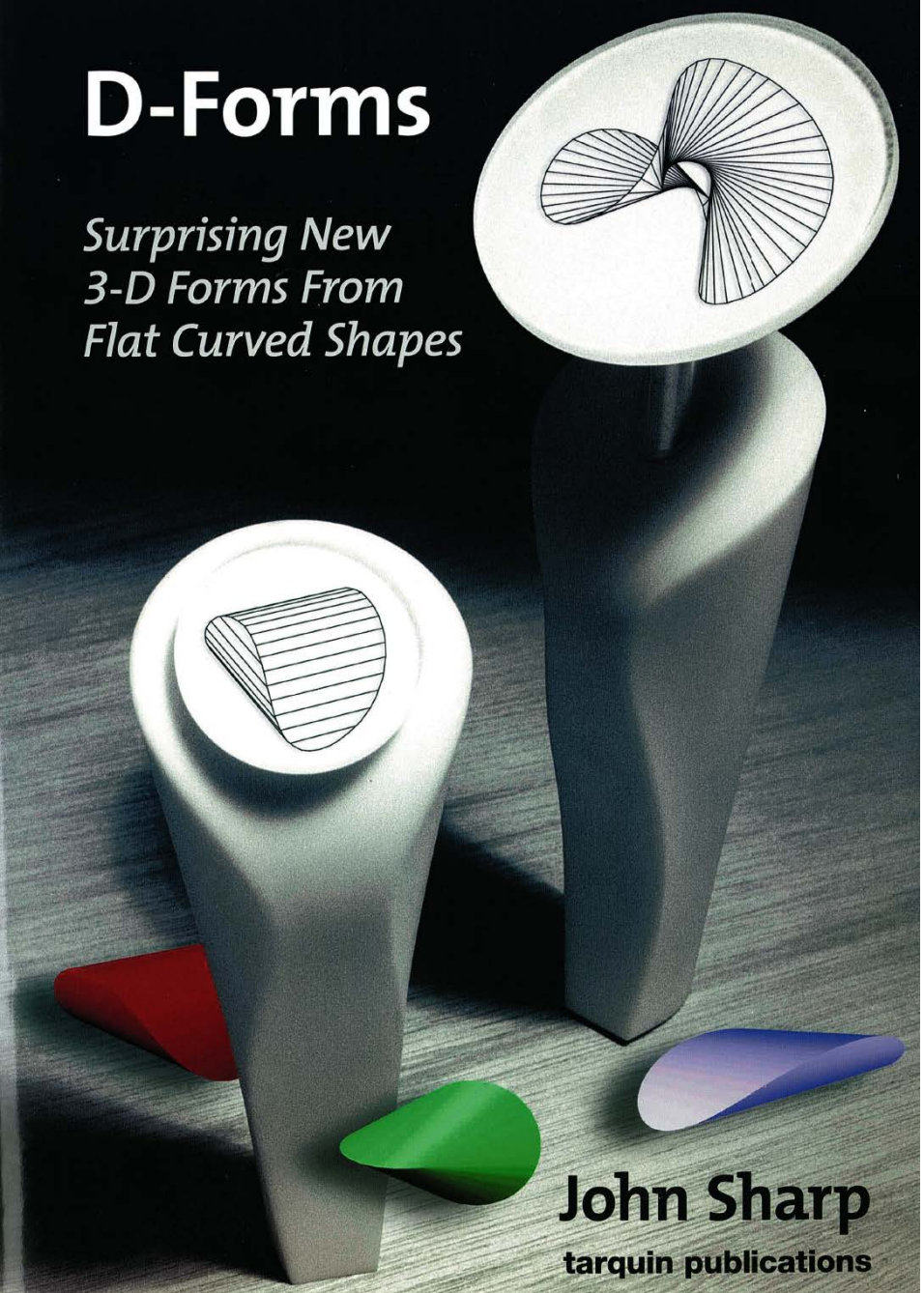
(a)



(b)

D-Forms

Surprising New 3-D Forms From Flat Curved Shapes



John Sharp

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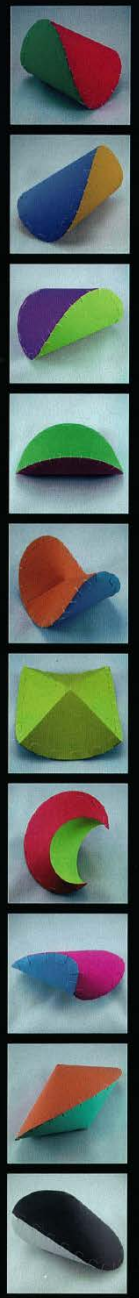

"There is no such thing as an ugly D-Form."—Tony Wills

D-Form |dɪˈfɔrm| *n.*

1. a three-dimensional form created by joining the edges of two flat surfaces having the same perimeter length.
2. a discovery by product designer Tony Wills.
3. cut-and-assemble paper models in this book.

D-Forms are developable surfaces opening up new areas of mathematics, as well as many sculptural and design possibilities. It is surprising, given their simplicity of construction, that they have not been thought of before.

D-Forms surprise us in many ways, and you can only appreciate them by making the models. Creating D-Forms is unlike most forms of model making. A pair of shapes can be joined edge-to-edge in an infinite number of ways.

In this book you can cut and assemble ten fantastic models, and then use the templates included to make countless more.

D-Forms surprise, confuse, and can be addictive. They are an intellectual virus; beware!—Tony Wills, product designer

D–Forms are the most remarkable extensions of surfaces that I have dealt with. It is surprising that such a simple idea produces such extraordinary shapes.—David Singmaster, metagrobologist

They are beautiful in themselves; they remind me of Brancusi's fish. It is a lovely idea.—Michael Kidner, artist

I can't get these shapes out of my mind. The frustrating thing is they don't need my input to be beautiful!.—Malcolm Pollard, sculptor

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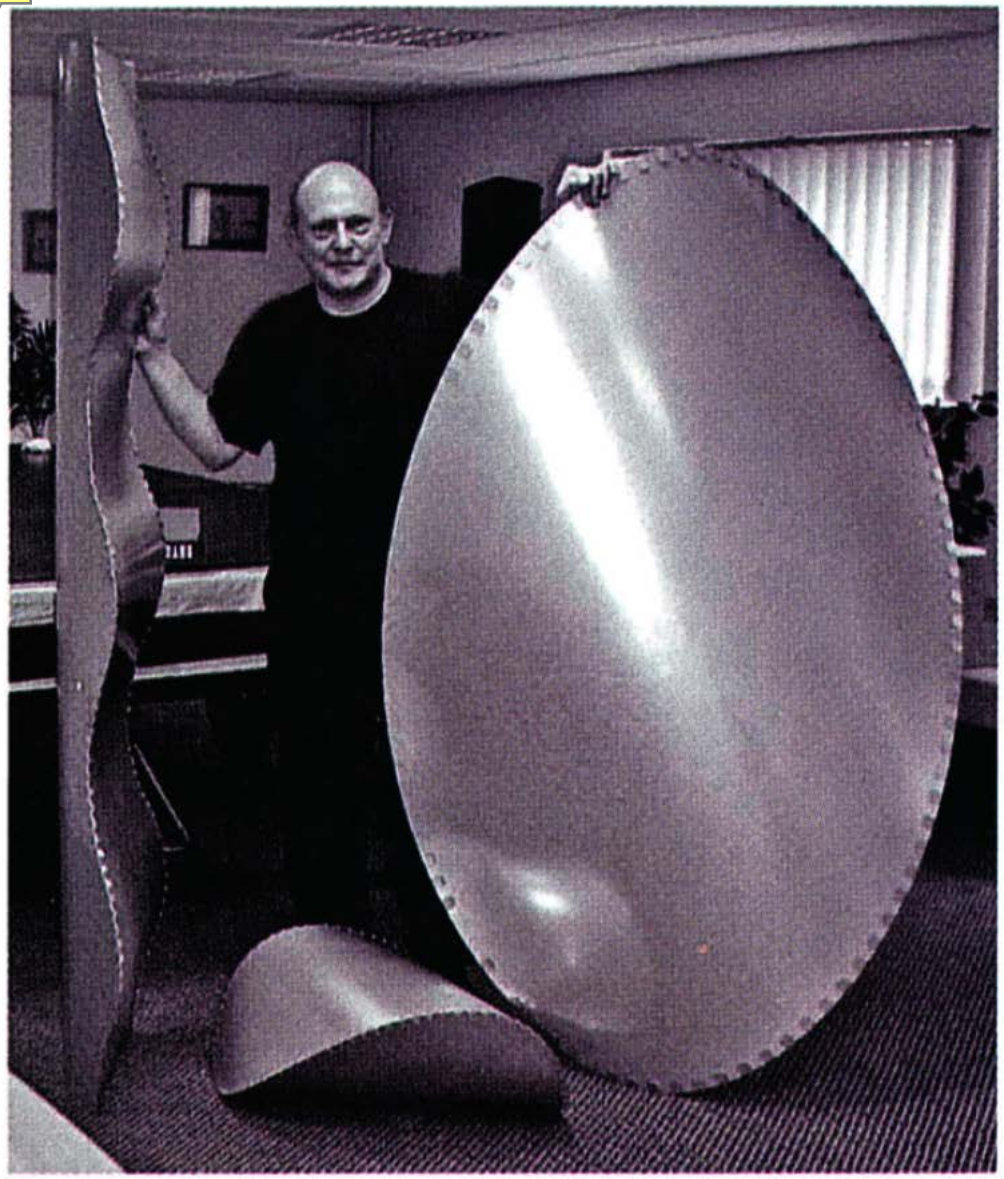
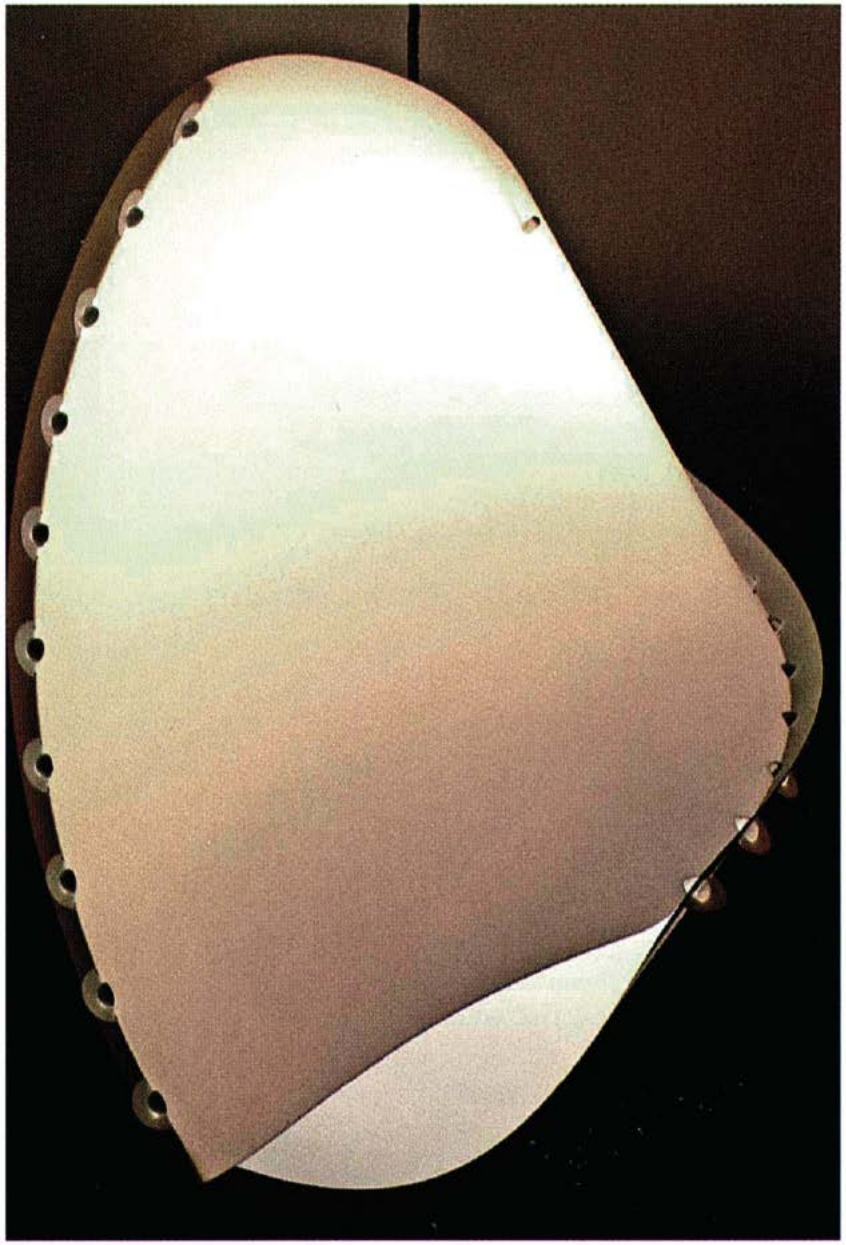


Tony Wills with stainless steel D-Forms.

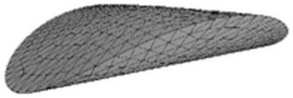


Applied D-Form by Tony Wills. Luminaire lamp made from Melinex polycarbonate with glass spheres.

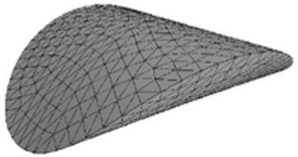
Two ellipses

The dForm of two circles is always unexciting no matter where the initial connection is made. The next simplest shape might be considered to be two ellipses. If they are initially joined at the same position on each perimeter then the result is just a flat sheet. However if one ellipse is rotated with respect to the other before the initial join then more interesting solids result. Some computer generated examples are given below for 3 different rotation angles and two different ellipse radius ratios.

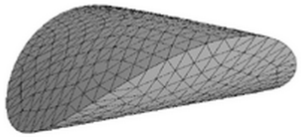
Rotation by 22.5 degrees
Ellipse radii are 0.8 and 1.0
[DXF file]



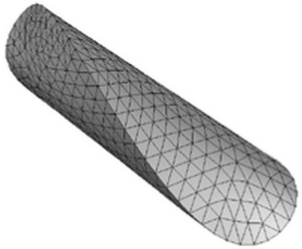
Rotation by 45 degrees
Ellipse radii: 0.8 and 1.0
[DXF file]



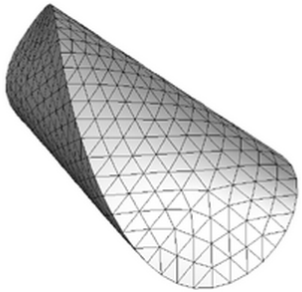
Rotation by 90 degrees
Ellipse radii: 0.8 and 1.0
[DXF file]



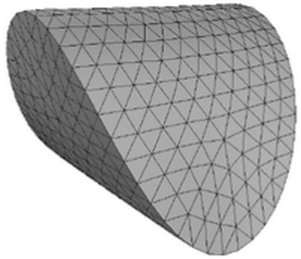
Rotation by 22.5 degrees
Ellipse radii: 2.0 and 1.0
[DXF file]



Rotation by 45 degrees
Ellipse radii: 2.0 and 1.0
[DXF file]

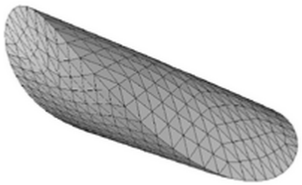


Rotation by 90 degrees
Ellipse radii: 2.0 and 1.0
[DXF file]

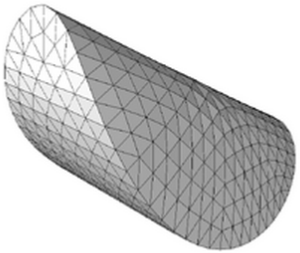


Ellipse and circle

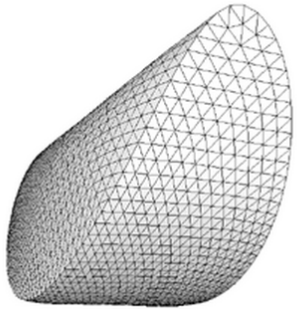
Ellipse radii ratio: 1.5 to 1
[DXF file]



Ellipse radii ratio: 2.5 to 1
[DXF file]



Ellipse radii ratio: 4.0 to 1
[DXF file]



concept by
Tony Wills

surface modeling
using Evolver
by Kenneth Brakke

Discrete Comput Geom (2010) 43: 179–186
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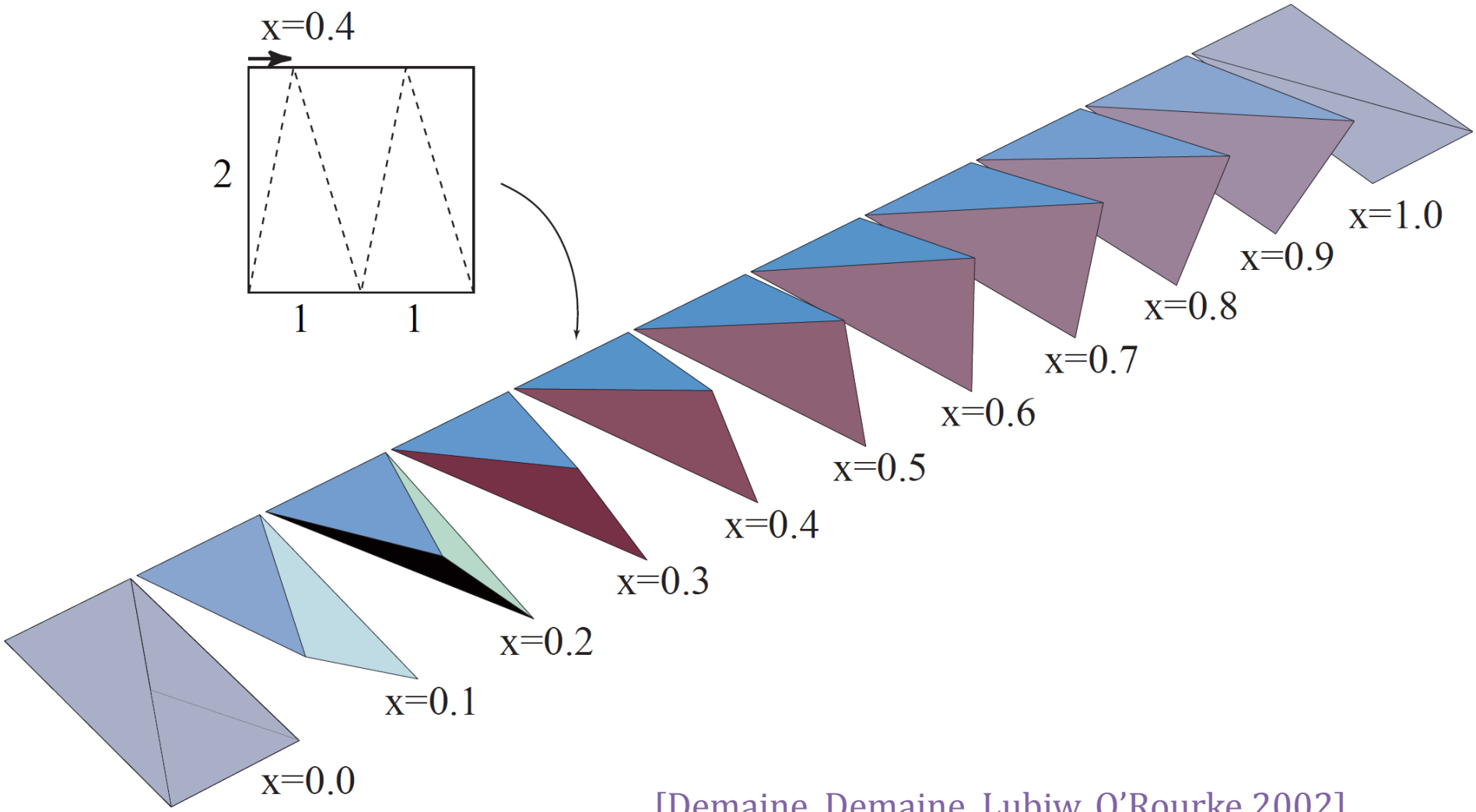
Generalized D-Forms Have No Spurious Creases

Erik D. Demaine · Gregory N. Price

Received: 21 December 2007 / Revised: 28 July 2009 / Accepted: 28 July 2009 /
Published online: 16 September 2009

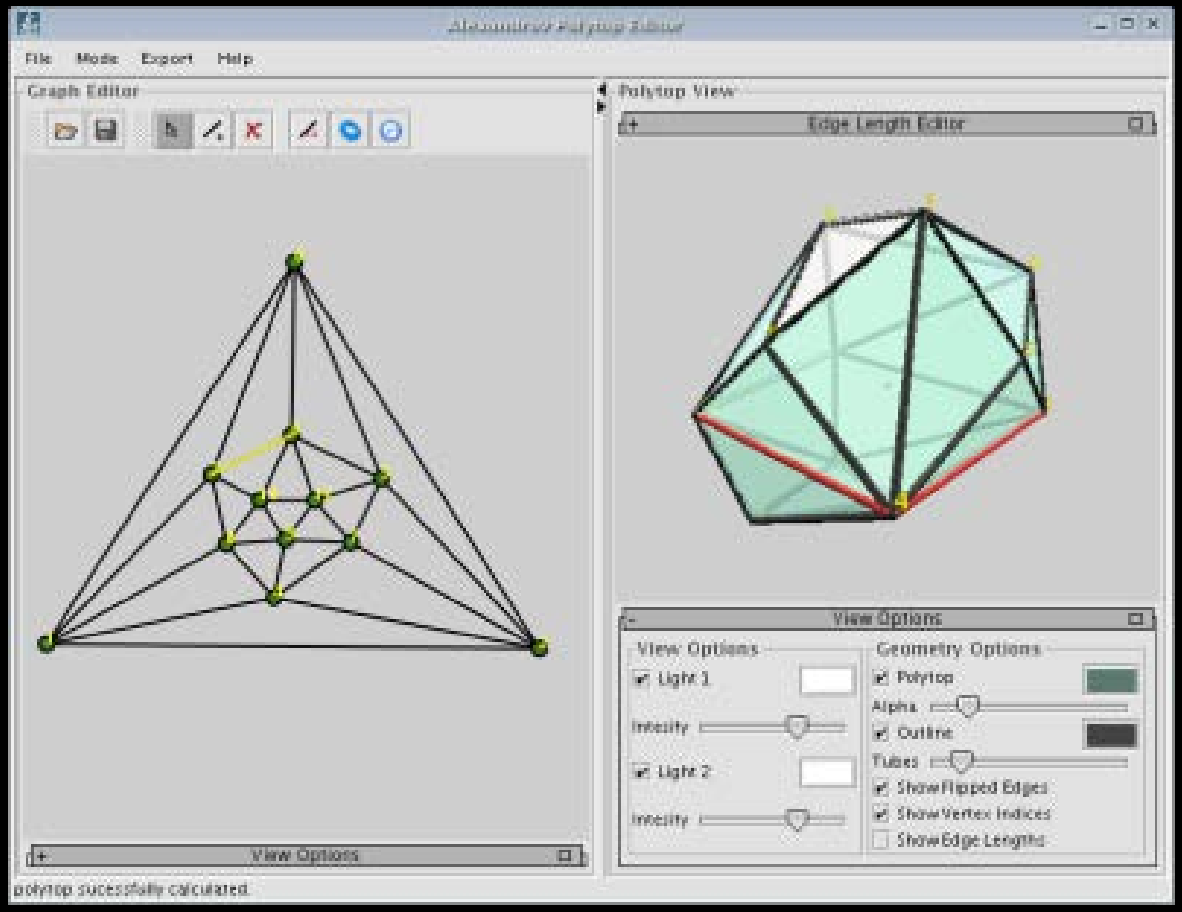
Abstract A convex surface that is flat everywhere but on finitely many smooth curves (or *seams*) and points is a *seam form*. We show that the only creases through the flat components of a seam form are either between vertices or tangent to the seams. As corollaries we resolve open problems about certain special seam forms: the flat components of a D-form have no creases at all, and the flat component of a pita-form has at most one crease, between the seam's endpoints.

Can you explain rolling belts again? I am still confused about what exactly they are.



[Demaine, Demaine, Lubiw, O'Rourke 2002]

Does that broken applet work now?


File
Mode
Export
Help
Graph Editor
Polytop View
Edge Length Editor
View Options
View Options
Light 1
Intensity
Light 2
Intensity
Geometry Options
Polytop
Alpha
Outline
Tubes
Show Flipped Edges
Show Vertex Indices
Show Edge Lengths
polytop sucessfully calculated.

Wait, is the convex case actually *harder* here? Can we hear about why the nonconvex case is solved?