

## EvoluteTools for Rhino PATENTED TECHNOLOGY FOR EVERYONE

### Purpose of this Document

EvoluteTools is a Rhino plugin suite enabling the user to design and optimize panel layouts on freeform surfaces. The plugin suite consists of three modules:

**Base Module:** Layout of panelization seams on a freeform surface, including user-controllable optimization of the panel shapes, the smoothness of the panelization seams, and the closeness of the panels to the original freeform design surface.

**Vertex Fitting Module:** Advanced panelization seam design including the prescription of target design curves and floor planes.

**Planarization Module:** Advanced optimization tools enabling planar panels and single curved (developable) strips.

EvoluteTools provides direct access to patented technology based on state of the art research. This powerful technology enables architects and engineers to design, optimize, and build freeform shapes much easier, requiring no programming skills. EvoluteTools offers a layer of abstraction to this technology and to its comprehensive underlying mathematical theory, and provides an intuitive interface to some of the most exciting research advances in architectural geometry.

EvoluteTools enables a “top-down” design approach, where the user has true freedom in creating a freeform shape under no physical production constraints and simply lets the Plugin do all the optimization for production and aesthetic purposes. Using EvoluteTools already in the early stages of design will not only enable new and fascinating construction-aware designs, but save significant amounts of time and money and prevent unnecessary design changes due to unproductive back and forth communication with third parties. Through the patented technology, EvoluteTools not only allows the optimization of panel seams and panel shapes but at the same time also enables an improved and simpler structure supporting these panels. This support structure is often neglected when designing panel layouts, even though it is a significant cost factor in the construction of a freeform shape.

While EvoluteTools provides access to the patented technology, the patents are completely independent of EvoluteTools. Whether one of the patents described in this document applies or not is completely independent of whether EvoluteTools was used or not. The purpose of this document is to clarify the relations of the different Modules in the EvoluteTools Plugin suite to the patented technology and explain the terms and conditions to access the patented technology.

### The Patents in a Nutshell

Evolute participates in the following patents:

- **SUPPORTING STRUCTURE FOR FREEFORM SURFACES IN BUILDINGS.** In the following referred to as “**PlanarPatent**”  
**International Application No.** PCT/AT2007/000302.  
**Owned by** Helmut Pottmann and RFR.  
**Application domain** includes freeform surfaces (that is surfaces with complex geometry beyond translational or rotational surfaces) in buildings (partially) consisting of planar quadrilateral or hexagonal elements.  
**Patent filed in** Austria, Germany, Italy, France, USA, UAE, UK
- **SUPPORTING STRUCTURE FOR CURVED ENVELOPE GEOMETRIES.** In the following referred to as “**SingleCurvedPatent**”.  
**International Application No.** PCT/EP2009/057805.  
**Owned by** Evolute and RFR.  
**Application domain** includes freeform surfaces (that is surfaces with complex geometry beyond translational or rotational surfaces) in buildings or ships (partially) consisting of single curved elements, as well as mixtures of such elements with planar or double curved elements.  
**Patent filed in** Austria, Germany, Italy, France, USA, UAE, UK

The patents apply to the built supporting structures as well as to the method of determining their geometry.  
For further information on the patents, please visit [www.evolute.at/technology/patents.html](http://www.evolute.at/technology/patents.html).

### Which EvoluteTools Module provides access to patented technology?

	Base Module	Vertex Fitting Module	Planarization Module
PlanarPatent	NO	NO	YES
SingleCurvedPatent	NO	NO	YES

Only the Planarization Module offers direct access to patented technology.

## When does a patent apply?

As a general rule, if ALL of the following three conditions are given (described in EvoluteTools terminology), we recommend you to contact us:

1. (A part of) the mesh follows a true freeform surface, that is, a surface with complex geometry beyond translational or rotational surfaces ( Fig. 1 ).
2. The mesh (partially) consists of planar quadrilateral or hexagonal elements ( Fig. 2, 3, 4 ).  
 -> **PlanarPatent**  
 and/or  
 the mesh (partially) defines single curved (developable) strip elements, as well as mixtures of such elements with planar or double curved elements ( Fig. 5 )  
 -> **SingleCurvedPatent**.

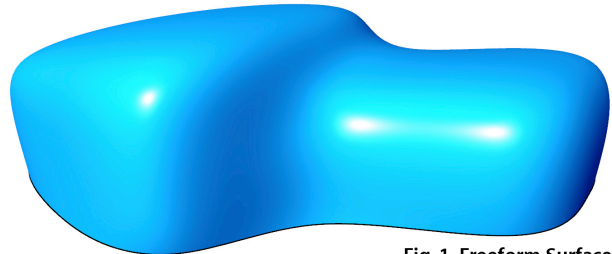


Fig. 1 Freeform Surface

3. The output data from the Planarization Module is used for the production of buildings (-> **PlanarPatent** and/or **SingleCurvedPatent** ) or ships (-> **SingleCurvedPatent** ).

Note that these three conditions only serve as a guideline with no guarantee of completeness. If you are in doubt, we will assist you in determining whether and when one of the patents applies to your project.

Fig. 2 Planar Quad Mesh

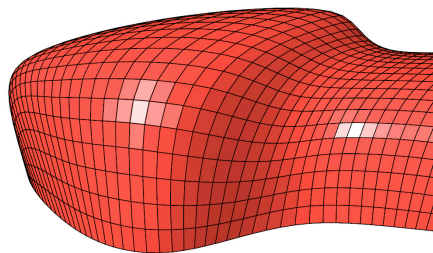
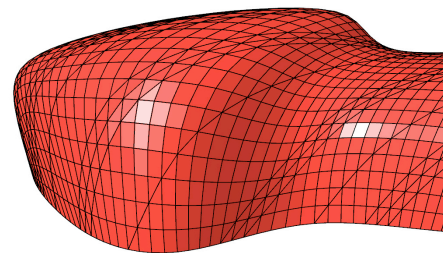


Fig. 3 Mesh partially covered with Planar Quads



## What are the conditions to use the patented technology?

Every technology has its price. When you purchase a license of the Planarization Module of EvoluteTools, you obtain the right to explore the patented technology and use it for virtual design studies and renderings. If you want to build your design in the real world, you will have to acquire a patent license.

Fig. 4 Planar Tri-Hex or Hexagonal Mesh

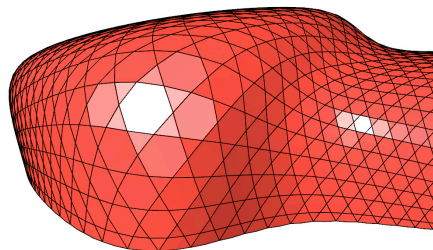
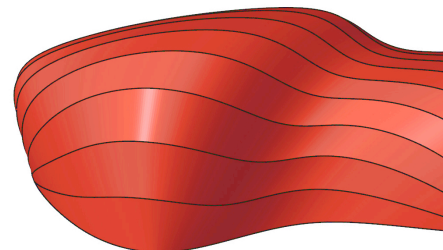


Fig. 5 Developable strips



We are dedicated to putting our technology into use to enable great architecture. The goal of our patented technology is not to prevent, but to enable exciting yet affordable freeform geometries for buildings and ships. The goal of our patented technology is that you save time and money by using it.

So whether you have a great idea in mind and you are not sure whether the patent applies, you have a client that would love to use our technology and you would like to learn more about it, or you already optimized an intriguing freeform design using the Planarization Module of EvoluteTools and now you would like to acquire a patent license for production: simply contact us and we will happily assist you in finding out how our patented technology can make your project something special.

## What if I use other software instead of EvoluteTools to produce the same results, do the patents still apply?

Yes. The patents are independent of EvoluteTools. The patents apply no matter how the results were achieved.

## How can I access more advanced optimization technology and services specific to my project?

Contact us, if you encounter challenges beyond the scope of EvoluteTools, e.g. generating optimized node axes or support elements for your freeform design, or any other challenge related to geometry, and together we will develop a solution fully customized to your specific needs.