ShipConstructor Expander – Surface Expansion Plug-In for Rhinoceros 3.0

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In June 2003, Albacore Research Ltd., Canada, will release the new *ShipConstructor* module called **Expander**.

What is Expander?

Expander is a **Rhinoceros 3 Plug-In**, to expand surfaces for production of many types of industrial goods such as ship hulls, shoes, upholstery, clothing, airplanes, and more.

Expander's technology has been developed from **ShipCAM**'s plate expansion routine, which has proven its power and reliability in successfully expanding thousands of ship plates over the past 12 years worldwide!

Expander is capable of expanding even the most complex compound-curvature as well as developable surfaces; trimmed and untrimmed.

What is Expansion?

Expansion is the key step in the solution to the question: "Now that I have designed a 3D model, how do I make it?"

It is the conversion of a 3D surface into a 2D shape as required for the production of many industrial items made from flat material such as sheet metal, fabric, leather, or re-enforced fibers. There are two distinct types of surfaces – developable, which can be expanded without stretching the material, and compound curvature surfaces, which require stretching within limits allowable to material and the forming process that is used.

Expander – Not limited to the Marine Industry

Expander will be a very helpful tool at a very reasonable price for designers and producers of any kind of 3D surface goods that will be produced from any kind of flat raw material, such as sheet metal, leather, fabric, re-enforced fibers and more.

How does Expander work?

Expander's intuitive user interface makes surface expansion simple even for an inexperienced user.

Surface Expansion

Small surfaces that can be produced in one piece can be directly expanded. However, larger surface or surfaces that should be split for design reasons are first divided into individual patches.

Simply define seams on the 3D surface as required by the complexity of the surface, design requirements, the type of material, and the forming process to be used.

Now select the surface patch for expansion, set the desired expansion parameters in the dialog, and click "Expand". The expanded shape is automatically displayed near the 3D surface.
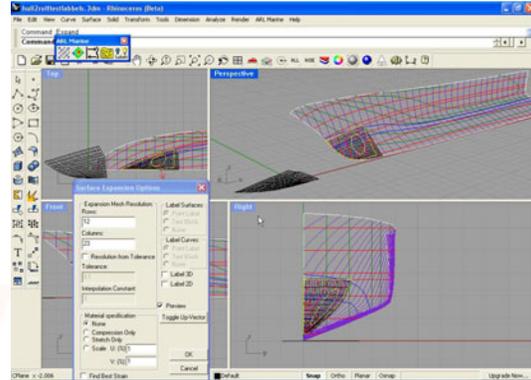

Figure 1: Expanding a small patch of a larger surface - previewing the untrimmed result

Map Curves

To aid production, *Expander* has functionality to map curves (marking lines) from the original 3D surface to the expanded 2D surface. For example, supports inside of a sheet metal surface will first be marked on the 3D surface and are then automatically transferred to the 2D expanded shape.

Additionally, markings can be transferred back from the 2D shape to the 3D surface. This function is for example important should the expanded shape exceed the size of the available material or to visualize anything in 3D that may be printed or otherwise affixed on the 2D shape.
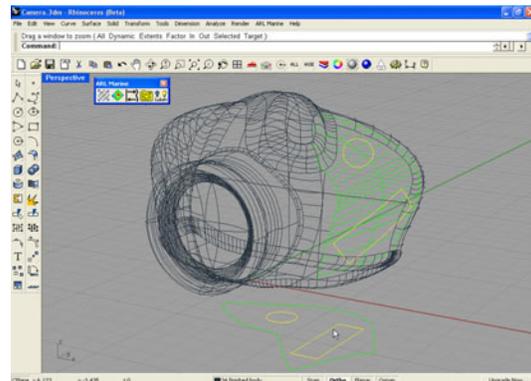

Figure 2: The circle and rectangle are mapped from the 2D expanded back shape to the 3D surface.

Text Labeling

Furthermore, **Expander** also makes matching reference curves a snap with its text labeling of

ShipConstructor
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marking lines on the 3D surface and its 2D expanded counterpart. NC cutting equipment can mark these text labels automatically on the cut material for ease of identification.

Strain Analysis

Compound curvature surfaces always require stretching or compressing the material to obtain the shape, which causes strain in the material.

Strains are displayed in colors on the 2D and 3D surface allowing identification of areas, which exceed the maximum allowable strain. This is an invaluable tool to optimize seam placement before problems occur in the production process.
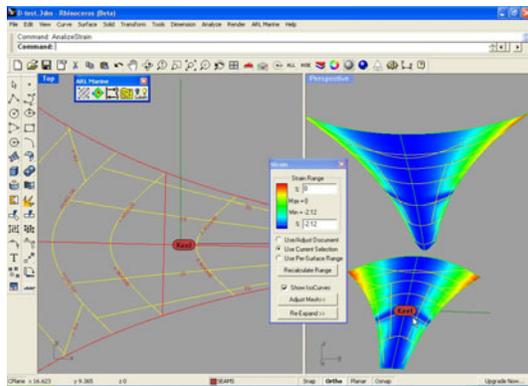
Strain analysis for a ship surface…

Figure 3: Strain analysis for a ship surface
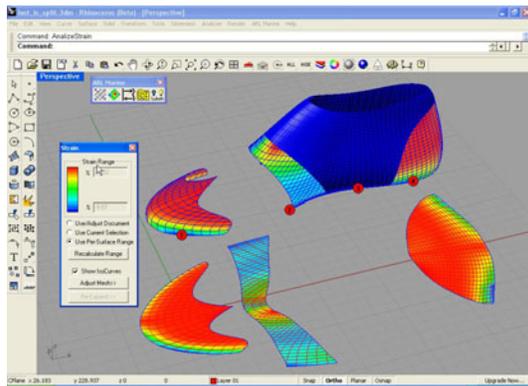
…and for a shoe surface:

Figure 4: Strain analysis for a shoe surface

Exporting Expanded Shapes

Finally, **Expander** provides a function to export expanded shapes with all markings to the DXF file format, which is the basis for most nesting and NC cutting programs. For ease of processing shape outlines, markings and text labels can be placed on user configurable layers.
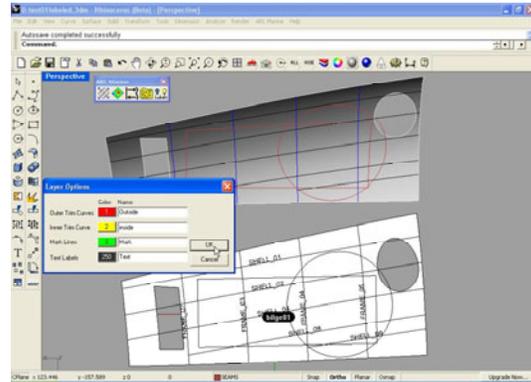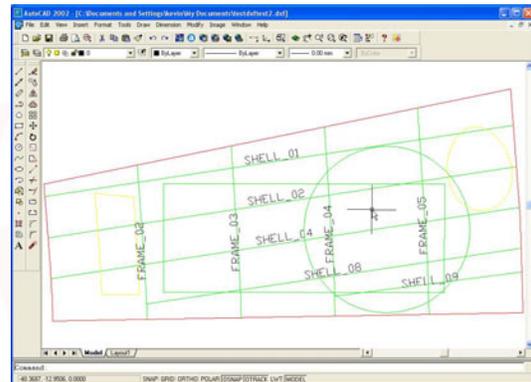

Figure 5: Layer creation options for Export to DXF

Figure 6: Same surface in AutoCAD transferred via DFX

Expander Release

The release of **Expander** is planned for the end of June 2003. The price for one seat will be US$495 until August 31, 2003, after that it will be US$895.

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