rhinoreverse™

Version 2 (for Rhinoceros© 4)

Getting Started

21. May 2008

rhino**reverse**™ is a plug-in application for use within the Rhinoceros© CAD-system (www.rhino3d.com). It has been designed to enable the user to create clean efficient surfaces (NURBS) based on available mesh data. Input from the user has been reduced to a minimum. Boundary curves are sketched onto the mesh. The program then automatically calculates the surfaces, transitions and curvature matching. This leads to very simple and intuitive handling of the software and offers the user the substantial advantage of being able to represent large complex shapes by only a few surfaces. rhino**reverse** will handle the following input formats:

*.stl, *.pol, *.wrl, *.vrml, *.af, *.nas

rhino**reverse** is easy to use and represents favourable cost savings compared to alternative reverse engineering applications. rhino**reverse** is a product of iCapp GmbH.

New in Version 2

Version 1 has been significantly developed to provide improvements incorporated in to Version 2:

- **Greater design flexibility and higher data quality.** Surfaces are no longer restricted to a maximum of 4 boundary curves The user is free to sketch up to 25 boundary curves for a single surface. The resulting trimmed surfaces are created automatically and the seams are adjusted to Rhinos stitching tolerance. The resulting surfaces show close conformity to the mesh. They are highly accurate and display smooth transitions between adjacent surfaces. You will be able to modify the surfaces with normal Rhino commands.

- **Ease of use.** rhino**reverse** works completely inside Rhino 4 enabling the same ease and speed of use. You can use the command line and mouse controls just as you would in Rhino 4.

- **Simplified data management.** All data is now stored within Rhinos' 3dm-file. Extra files are not needed to store rhino**reverse**´s mesh and grid information.

iCapp GmbH, Technoparkstrasse 1, 8005 Zürich
www.rhinoreverse.icapp.ch, rhinoreverse@icapp.ch

Content

The current document should lead you step by step through the use of rhino**reverse**. Please also open the tutorial of rhino**reverse** to get some more information.

Before starting with rhino**reverse**, you have to install the software as described below:

a. Download and install rhino**reverse** 2 (see tutorial, chapter 1 "Download").

b. Start Rhino 4 (see tutorial, chapter 2 "Start Rhino 4").

c. Install the plug-in (see tutorial, chapter 3 "Install the plug-in").

1. Read mesh data

Figure 1:

Working with the toolbar

Click on the ⬇ to load the mesh. (You can choose yourself: Working with the toolbar, on the command level or with the menu.)

Figure 2:

Working on the command level

Type **RR** in the command window of Rhino 4. All available rhino**reverse** commands will then be listed.
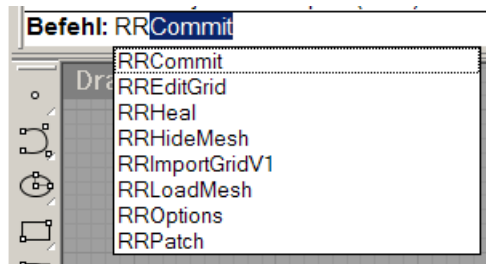
Select the command **RRLoadMesh** to load the mesh.

Figure 3:

Working with the menu

Select **LoadMesh** from the menu to load the mesh.
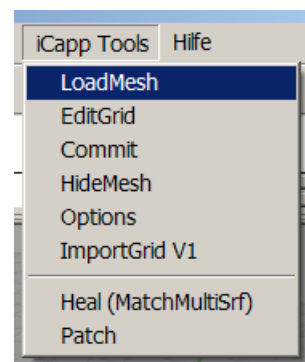
Figure 4:

Load mesh data

The installation process copied some example data on your computer. Please open file "head start.pol" in your example directory. (Default: "C:\Programme\Rhinoceros 4.0\Plug-ins\RhinoReverse\Example_Data"). The result of LoadMesh is shown in the picture.
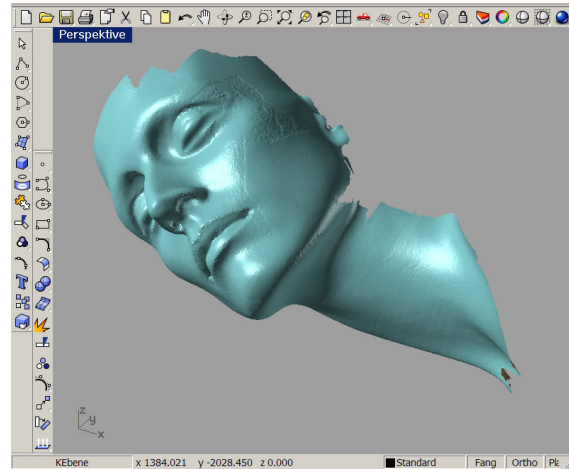
The view will automatically be set to "one window" and the mesh object will be shown (See figure 4).

## 2. Define faces by sketching poly lines

Sketch poly lines

After reading the mesh data the internal mode to sketch poly lines will be set to active. If you open any *.3dm file in order to continue with an older session, you have to press or enter **RREditGrid** or click on EditGrid in the menu to activate the edit mode.

Please adjust the model view by using Rhinos navigation methods (for example: key SHIFT, key STRG and right mouse button to rotate, zoom and pan the model).

Figure 5:

Define 1st poly line

Please click with the **left mouse button** on the mesh-object to define the start point of any poly line. Click again on the mesh to define a sequence of points for the poly line. A preview of the position of any new point is shown at the mouse cursor.

The points of the poly line are displayed as small spheres, the active line is coloured orange.
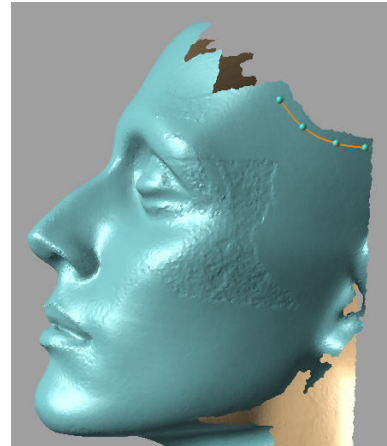
Figure 6:

Define 2nd poly line

Please click on any point of the first line. The preview then shows, what will happen: Move the mouse around this point. An angle criteria decides if you start a new line or if you will continue the old one. You can move every point of the grid by drag and drop.
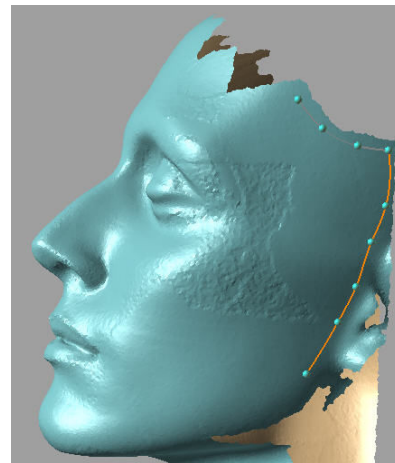
Figure 7:

Define 3rd and 4th poly line

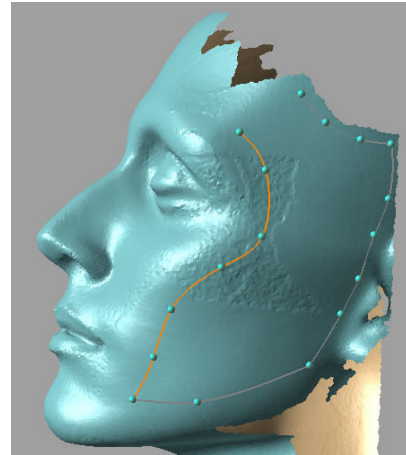Do the same to define the 3rd and 4th poly line.

Figure 8:

Close the loop by defining the 5th poly line

Move the end point of line 5 onto the start point of line 1 to connect the poly lines and get a closed loop. A first face will then be displayed in grey preview mode.
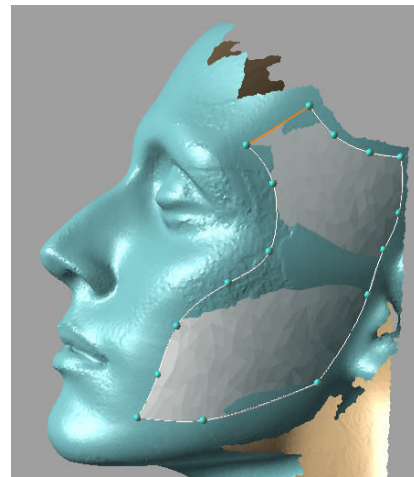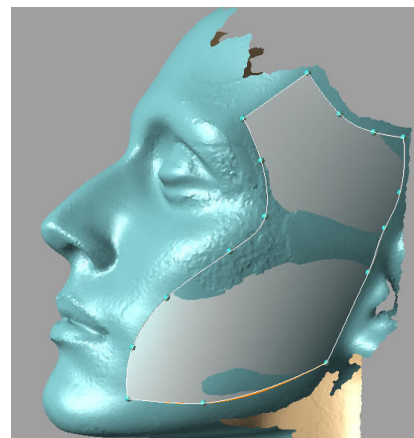
Figure 9:

Modify the poly lines to adjust the face to any desired target area

Pick existing points with the **left mouse button** and **drag** them on the mesh-object to any new position. The dependent face will be updated automatically. If you meet another point of any other poly line - while dragging by mouse - both points

will be merged.

Figure 10:

Define poly lines for the 2nd face

Click with the **left mouse button** on any existing point to define the start point for the next poly line. Click again with the **left mouse button** on the mesh to define more points.
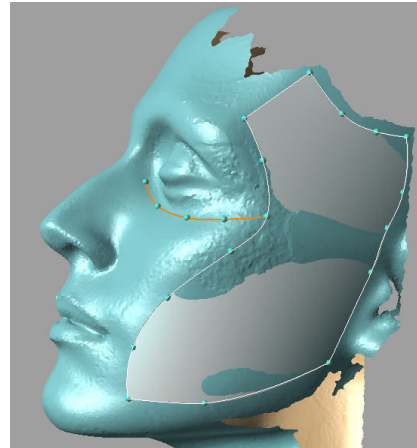

Figure 10:

Define poly lines for the 2nd face

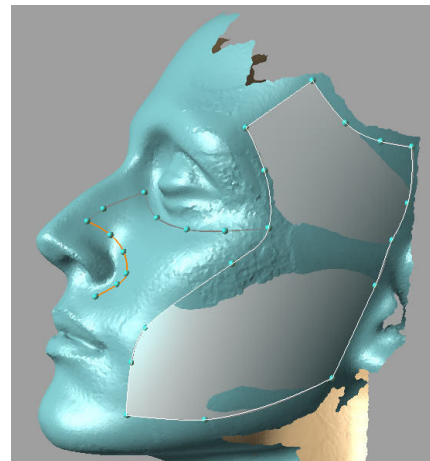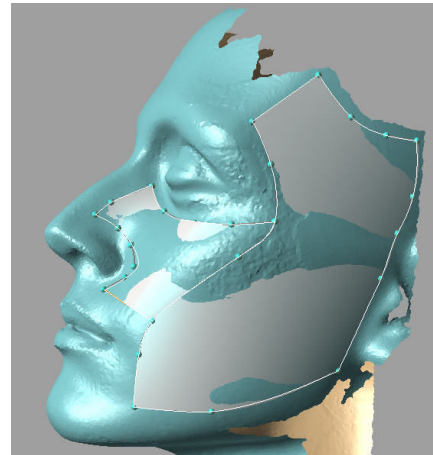Go on like described in figure 7 and define the new poly lines, shown in the right picture.

Figure 11:

Close the loop for the 2nd face

Go on like already described in figure 8.

Edit poly lines

Figure 12:

Add a new point into an existing poly line

Click with the left mouse button on any linear segment of the poly line. A context menu will appear. Chose the option "activate". The line will be activated and shown in orange.

*Click with the **left mouse button** somewhere on the curve to define an additional point.*

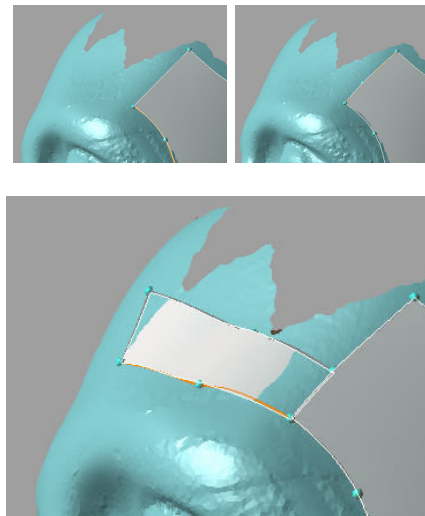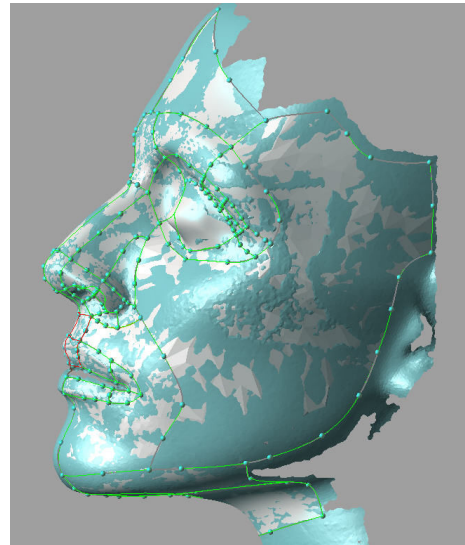*The goal could be to start with another face.*

Figure 13:

Complete the grid

Use all explained functions to complete the grid. One possible grid result for the given mesh is shown on the right side.

3. Calculate faces

When closing any loop, a start face will be calculated automatically and displayed. When transferring these intermediate face data to Rhino, using the icon or the menu entry **Commit** (command: **RRCommit**) an automatic healing (optional) will adjust the transitions (positions and tangents) between the faces.

Figure 14:

Calculate faces

Press ▣ *or the menu entry* **Commit** *or enter command* **RRCommit** *to complete the face calculation and to add the faces to Rhinos database.*

After having transferred the faces you are able to use Rhinos face evaluation tools to check the output. If some problems occur, please try to modify the poly lines by moving the points or adding new poly lines.