rhinoreverse™

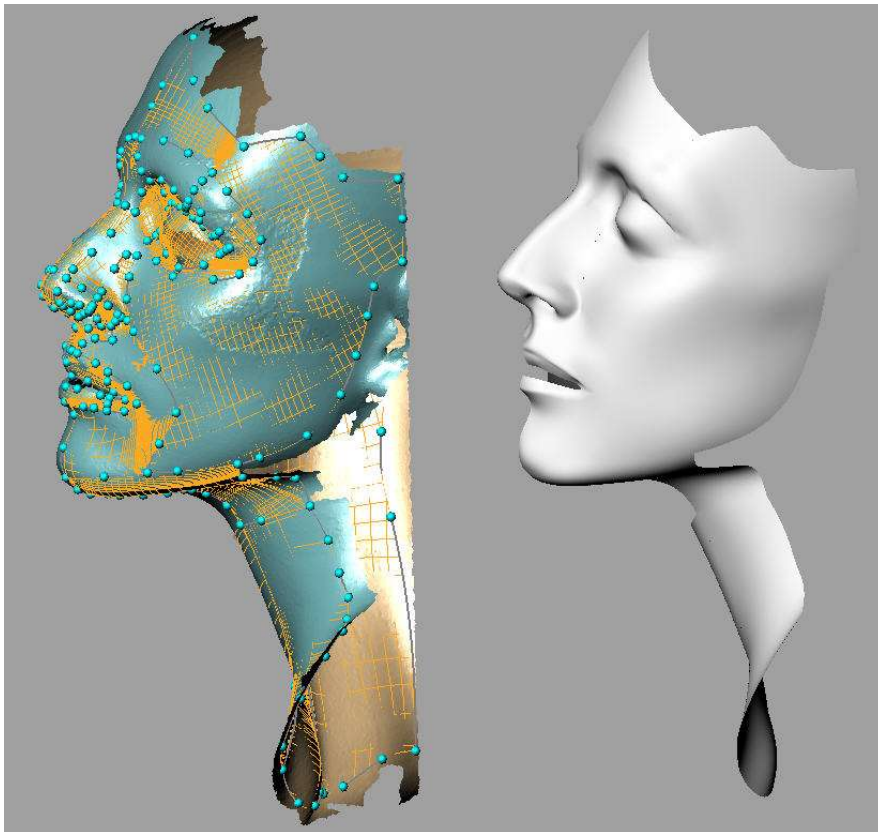## Getting Started

27th April 2007

RhinoReverse™ 2 is plug-in software for the CAD-system Rhinoceros$^{©}$ 4 (www.rhino3d.com). The purpose is to create spline-faces based on a given mesh of point data. The user interactions have been reduced to sketching boundary curves for the new faces. All calculations for approximation and adjustments of transitions will be done automatically. This leads to a very simple and intuitive handling of the software. One big advantage is the option to represent large complex shapes by only a few faces.

Different interfaces to read point data are available:

> **Input:** *.stl, *.pol, *.wrl, *.vrml

RhinoReverse™ 2 is easy to use and it is a cost saving alternative to other reverse engineering solutions. **RhinoReverse™ 2** is a product of iCapp GmbH.

New in Version 2:

- **More design flexibility and high data quality.** N-sided faces with more than four boundary curves can now be sketched by the user. The accordant trimmed faces are created automatically and the seams are adjusted to reach Rhinos stitching tolerance. The resulting faces, ready for any solid modelling operation, show high accuracy (close to the given mesh) and smooth transitions.
- **Ease of use.** RhinoReverse 2 offers to work on the command level of Rhino 4. This makes the use lean and fast.
- **Simplified data management.** All data are now stored within Rhinos´s 3dm-file. Extra files will no longer be needed to store RhinoReverse´s mesh and grid information.

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Content

The current document should lead the user step by step through the use of RhinoReverse 2. This document refers to the current tutorial of RhinoReverse 2, so please also open this document to get some information. Before starting with RhinoReverse 2, you have to install the software as described below:

    a. Download and install RhinoReverse 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 on the command level

*Type **RR** in the command window of Rhino 4. All available RhinoReverse commands will then be listed.*

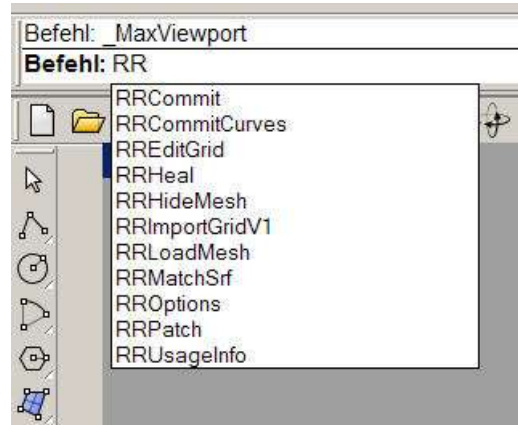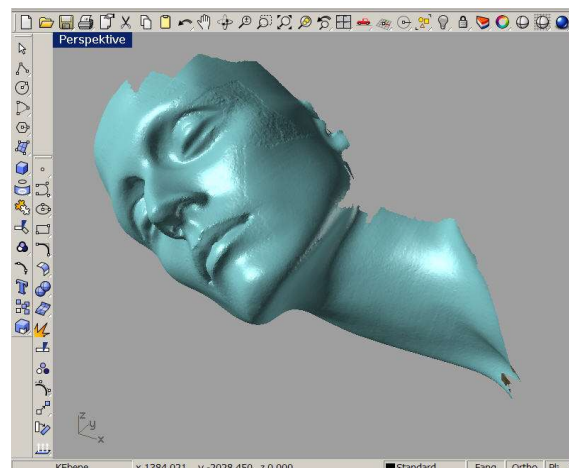*Select the command **RRLoadMesh** by using the **left mouse button**.*

Figure 2:

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").

If you have an English windows operating system on your computer, the view will automatically set to "one window" and the mesh object will be shown automatically (See figure 2).

If your windows system uses another language than English, please press the Rhino button ⊞ to set the viewport on "one window", click then Rhinos "Fit to Window"-button ⌕. You get the same display result as shown in figure 2.

2. Define faces by sketching poly lines

2.1 Sketch poly lines

After reading the mesh 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 enter **RREditGrid** 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 the model).

Figure 3:

All available commands

*Enter command **RRUsageInfo** in the command window of Rhino to get RhinoReverse´s key and mouse commands.*
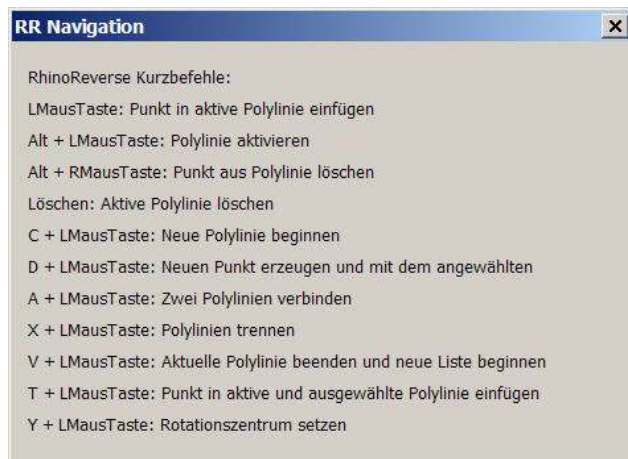

Figure 4:

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.*

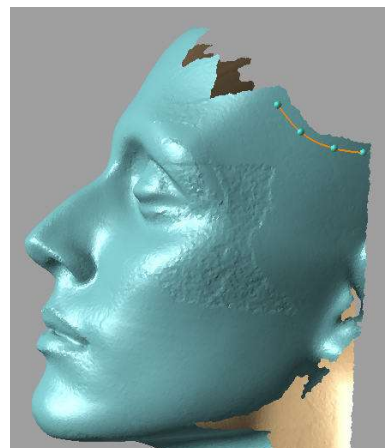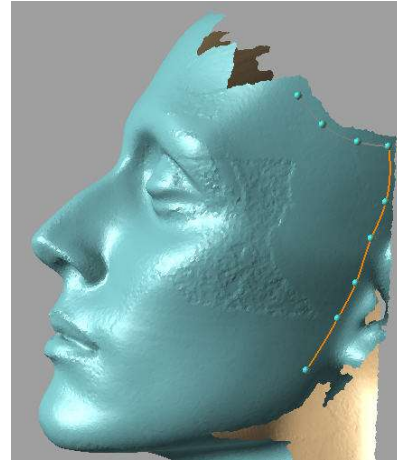*The points of the poly line are displayed as small spheres, the line is coloured orange.*

Figure 5:

Define 2nd poly line

*Please press **key C** and click with **the left mouse button** on the end point of the 1st poly line to define the start point of the 2nd poly line. Leave **key C** and click again on the mesh to define the following points for the line.*

Figure 6:

Define 3rd and 4th poly line

Do the same to define the 3rd and the 4th poly line.
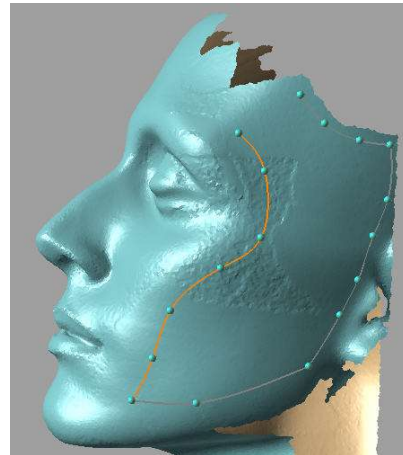
Figure 7:

Close the loop by defining the 5th poly line

*Press again **key C** and click with the **left mouse button** on the end point of the 4th poly line in order to define the start point of the 5th line. Leave **key C** and click again on the mesh to define additional points. Press **key D** and click with the **left mouse button** on the start point of the 1st line to connect the poly lines.*
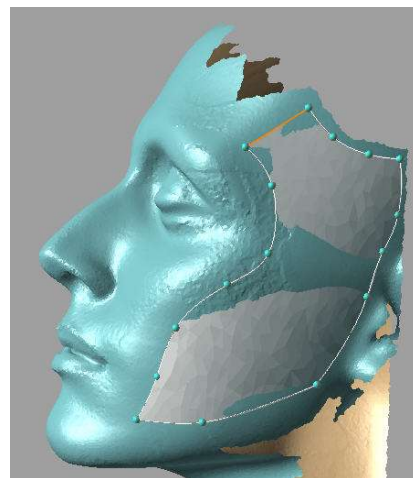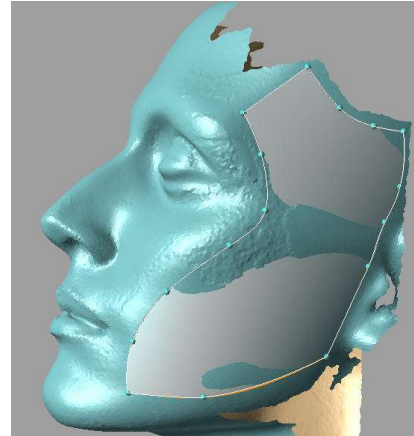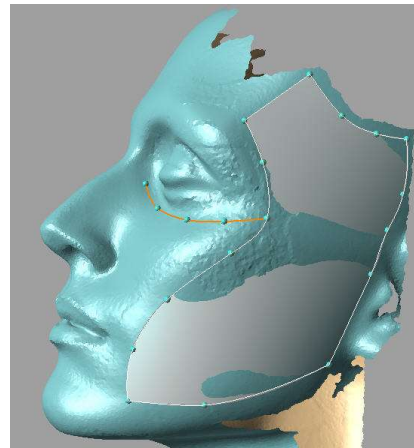
Figure 8:

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. All dependent faces will be updated automatically. If you meet another point of any other poly line, both points will be merged.

Figure 9:

Define poly lines for the 2nd face

Press again **key C** and click with the **left mouse button** on any existing point to define the start point for the next poly line. Leave **key C** and click again with the **left mouse button** on the mesh to define more points.

Figure 10:

Define poly lines for the 2nd face

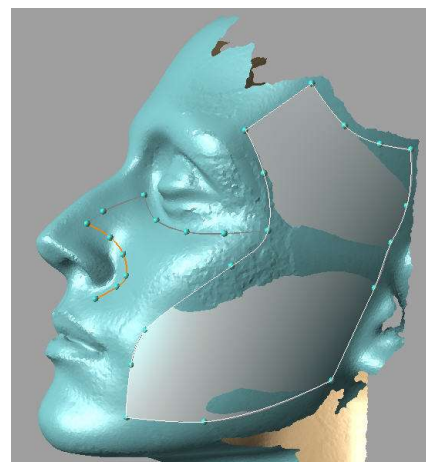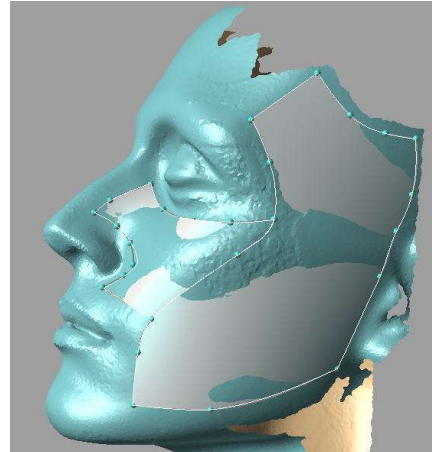Go on like described in figure 5 and define the new poly lines, shown in the right picture.

Figure 11:

Close the loop for the 2ⁿᵈ face

Go on like described in figure 7.

2.2   Edit poly lines

Figure 12:

Add a new point into an existing poly line

*Press **key ALT** and click with the **middle mouse button** on the poly line. The line will be activated and shown in orange.*

*Click with the **left mouse button** somewhere on the curve to define an additional point.*
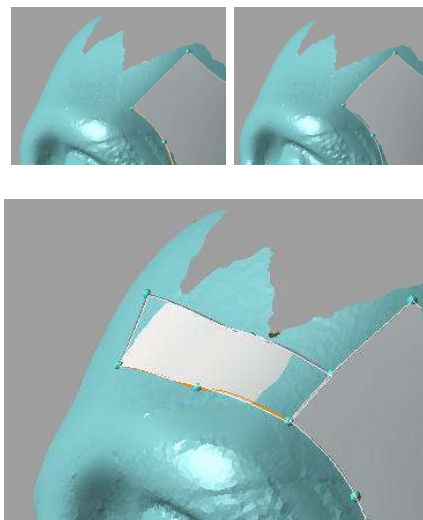
The reason could be to start here with another face...

Figure 13:

Complete the grid

*Use all explained functions to complete the grid. Please check the resulting face quality by calling **RRCommit** from time to time.*

You then 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 a poly line. One possible grid result for the given mesh is shown on the right side.
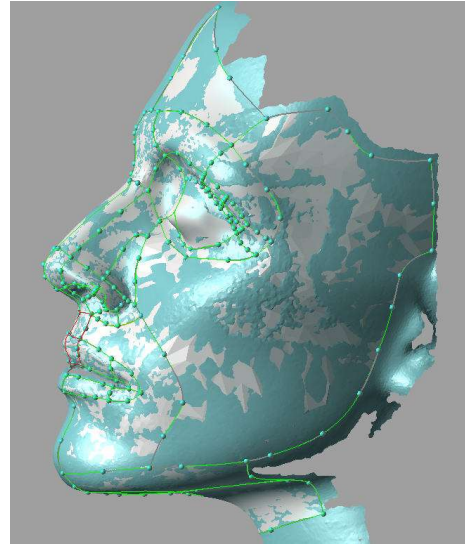
3. Calculate faces

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

Figure 14:

Calculate faces

*Enter command **RRCommit** to complete the face calculation and to add the faces to Rhinos database.*

You will be requested for any healing operation: Healing means that the transitions between the faces will automatically be adjusted to Rhinos tolerances.