PRODIM
INTERNATIONAL BV

MEASURING TECHNIQUES

A guide through some useful Proliner 's measuring techniques

UNFOLD SOFTWARE

Your solution for the production of bent glass

Version

2.0

PROFESSIONEL SOLUTION FOR 3D MEASURING AND EDITING

Measuring with the Proliner devices for the Prodim Unfold Software (ver. 2.0)

© PRODIM INTERNATIONAL BV
Lagedijk 26 • 5705 BZ Helmond – Eindhoven
Tel. +31 492 579050 • Fax +31 492 579059

Disclaimer
The quality of the results of the unfolding process is critically dependent on the awareness and experience of the user. The software outcomes' quality level is, obviously, directly dependent to the quality of the sources / input.

Helmond-Eindhoven (The Netherlands), August 2007.

Contents

1 INITIAL CONSIDERATIONS

The Unfold basic working procedure is represented in the figure 1.

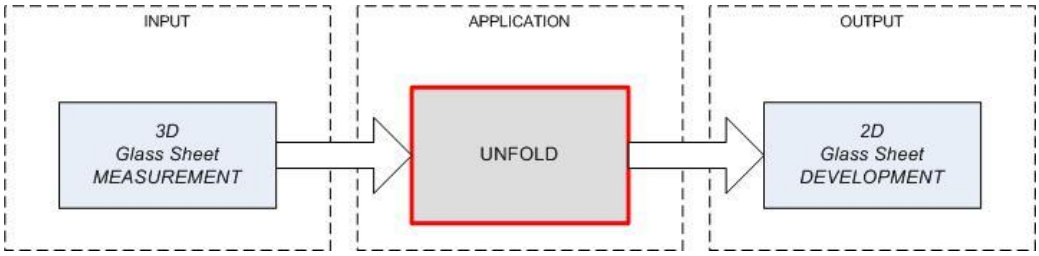


Fig. 1 – Unfold software basics

The Unfold software receives as input a digital drawing (CAD file): it imports it, adjusts it, unfolds it, and then exports it into a DXF file.

2 INPUT FILES

The Unfold software is able to handle the following input files formats:

Format	Details
PRL	The PRL file can only be produced by a Proliner device
DXF	The DXF file can be both generated from the Proliner device as well as produces artificially designing with a CAD software
IGES	The IGES files is usually produced by designing with CAD software

NOTE
There are few characteristics which make a digital drawing optmized to be processed by the Unfold software: not all drawings can be imported or unfolded!

REQUIREMENTS
While not critical with the IGES files or with the DXF produced by CAD software, for all files produced by the Proliner devices (both 5.7 and 8 series), it is instead essential and critical to respect few conditions:

The unfold software needs to have at least 2 levels (layers) :

1. A first layer for the external **CONTOUR**
2. A second layer for all those points usable for generating the **SURFACE** (see next chapter for details)

3 MEASURING PROCEDURE

Please, try to follow this procedure every time you know you are going to use the results of your measurement in the Unfold software.

3.1 2 Steps

The measurement of a glass sample, frame, or window-hole is ALWAYS based on 2 steps:

1. Measurement of the **contour**
2. Measurement of the **surface**

NOTE: It is strongly recommended to store those levels in 2 different layers.

3.2 CONTOUR

In consideration of the requirements described previously in this document, there are few concepts that should be remembered when measuring an object that the user intend, later on, to unfold.

First of all we distinguish 2 basic approach to measuring, from outside and from inside.

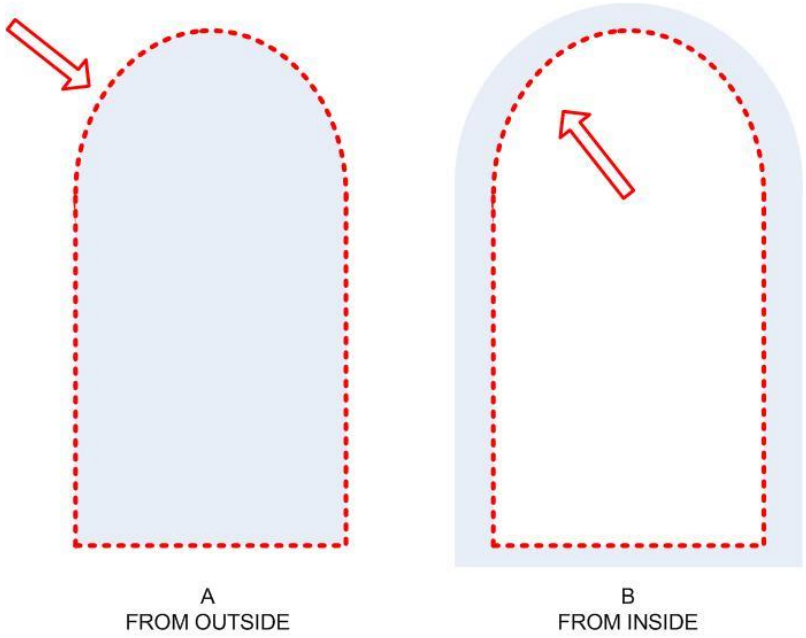


Fig. 2 –Contour measuring

The first (A) is to be done when we have already our full realized template, or a sample curved glass sheet. The second approach (B) is to be done when we have to measure the glass having only the structure which will hold the glass itself (see figure under).

Example 1: EXTERNAL (Scanner)

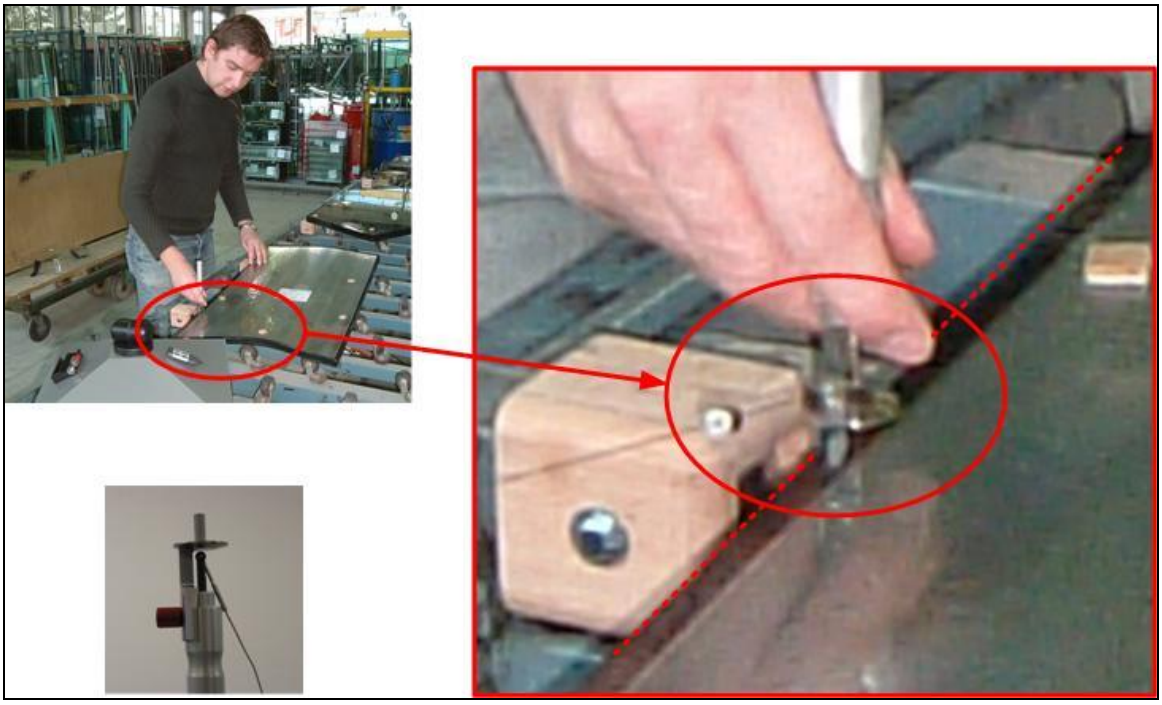


Fig. 3 – External contour measuring

Example 2: INTERNAL (Pointer)

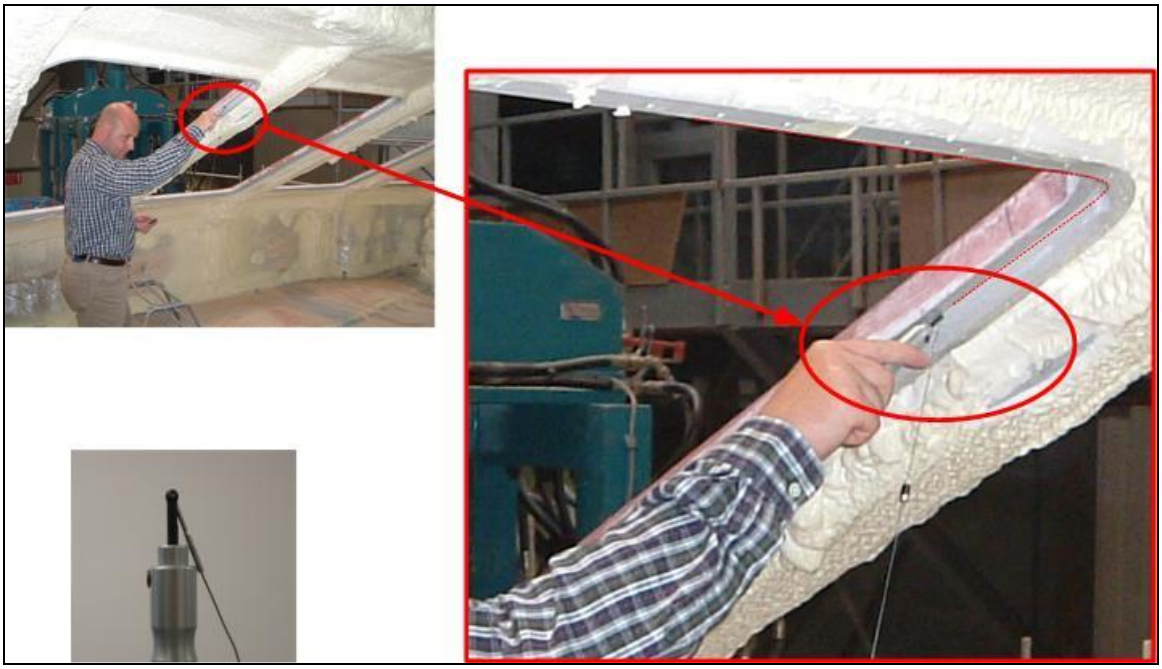


Fig. 4 – Internal contour measuring

3.3 SURFACE

The external contour of our object is not enough: it is also necessary to store some points indicating the surface.

This manual consider the 3 most probable scenarios:

1. A full, internal surface (ex: windshield sample)
2. A frame with no surface
3. A hole in a bent structure

Never less, there are only 2 basic ways to measure a surface.

1. **Inside** : if the object itself (the glass sample, or its template) is present
2. **Outside** : if the object is missing, and we are measuring the to-be-holding structure (ex: the frame of the car or a boat in case of windshields and windscreens).

SURFACE MEASURED ***INTERNALLY*** THE OBJECT (probably external contour measured from outside)

SURFACE MEASURED ***EXTERNALLY*** THE OBJECT (probably external contour measured from inside)

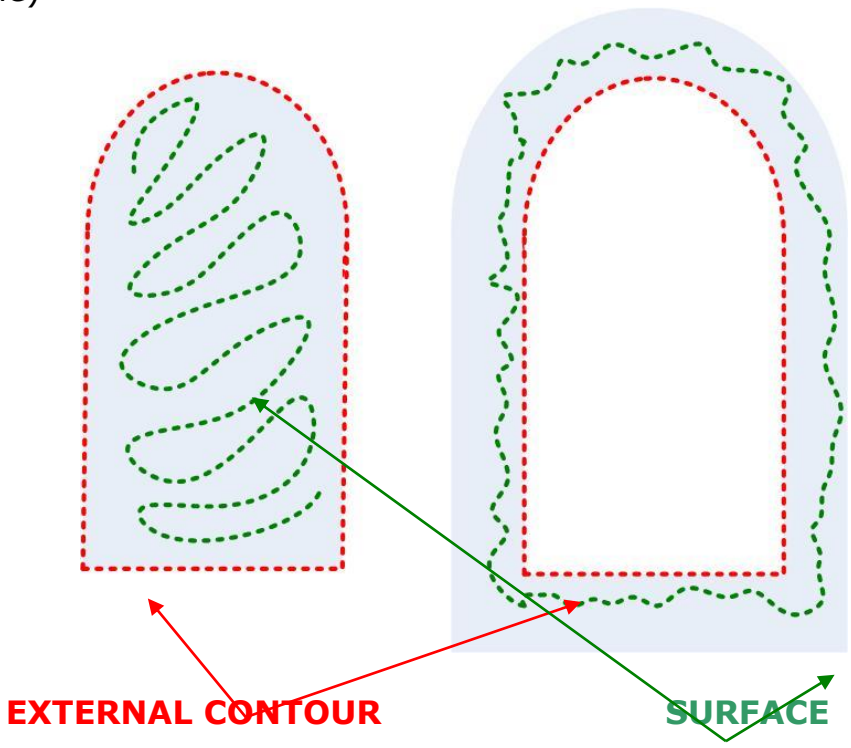


Fig. 5 – Internal VS External surface measuring

In the second case (surface measured outside), it is often enough to collect points laying just few CENTIMETERS outside the external contour itself (for instance when measuring a frame) (see fig. 8 in the next page).

It is always recommended to collect the points for the surface, scanning broadly, to increase the accuracy of the of Unfold's outcomes.

The use of difference tools does not comprise the correctness of the unfolding process. It is anyway important that the person who measured records somewhere / somehow the tools used and the measure approach, for a perfect configuration during the import procedure.

INSIDE SURFACE MEASUREMENT

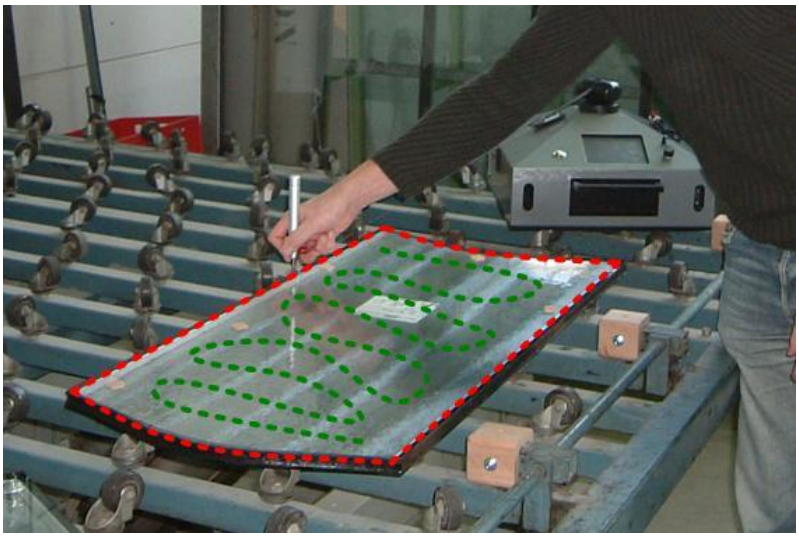


Fig. 6 - Examples of surface measured internally

Fig. 7 - Examples of surface measured internally

Fig. 8 - Example of surface measured externally: FRAME

Fig. 9 - Example of surface measured externally: SHIP BUILDING

4 MEASURING TECHNIQUES

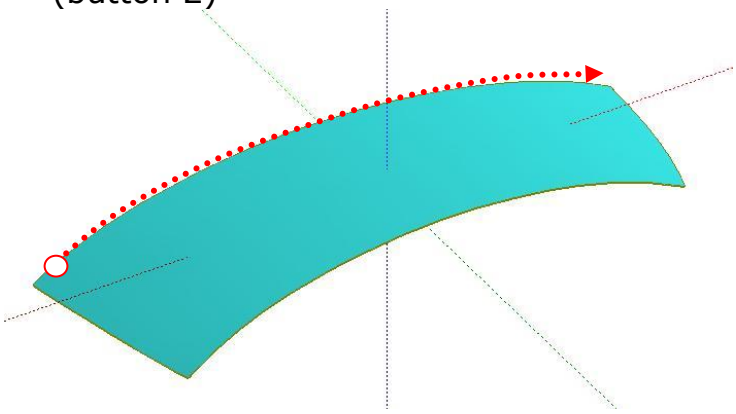
4.1 CONTOUR

Start the device and set-up a new measurement following the standard instructions.

TOOLS:
Scanner (sometimes Pointer)
The scanner is the ideal tool to be used.

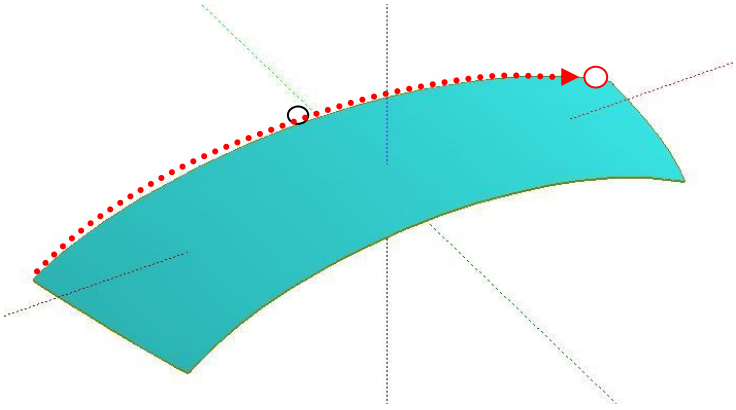
MODE:
It is possible to measure the contour using different techniques. Never less, 1 technique in particular has to be recommended.

A. Start from the point indicated by the white-red spot on the figure below and proceed along the side, using the Scanning function (button 2)

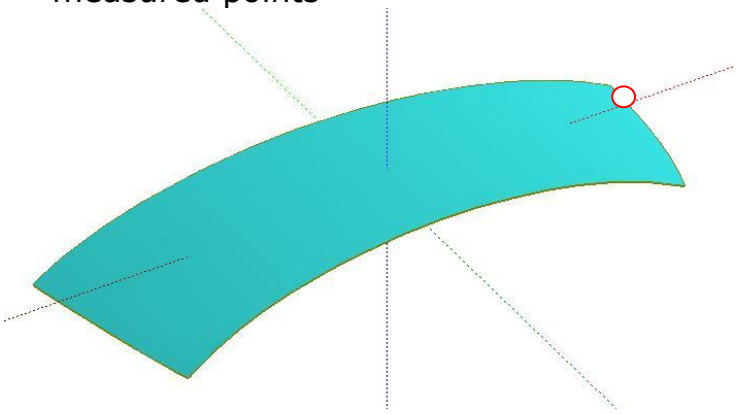


Ensure to have a good grip on the measuring pen and move slowly, smoothly but at regular speed along the contour.

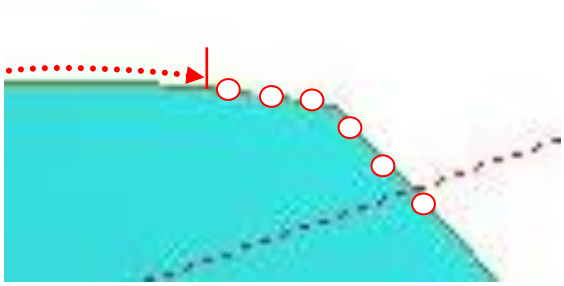
B. When you have reached almost the corner at the end of the curve line you are scanning, stop the measuring pressing again button 2

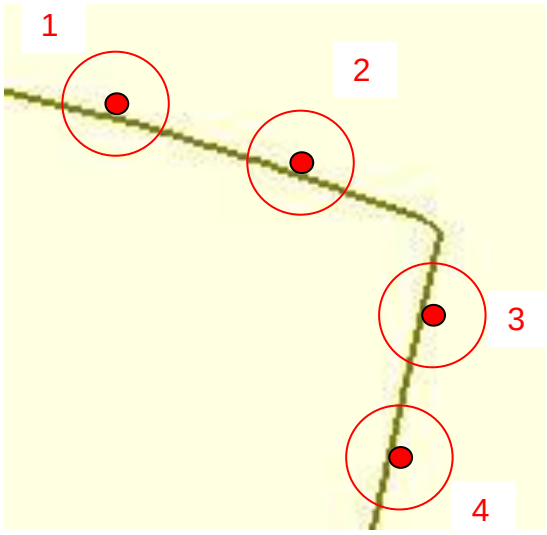


C. Close the contour (button 3) to temporarly save the just measured points



D. Measure few single points (button 1) moving closer and closer to the corner, till almost

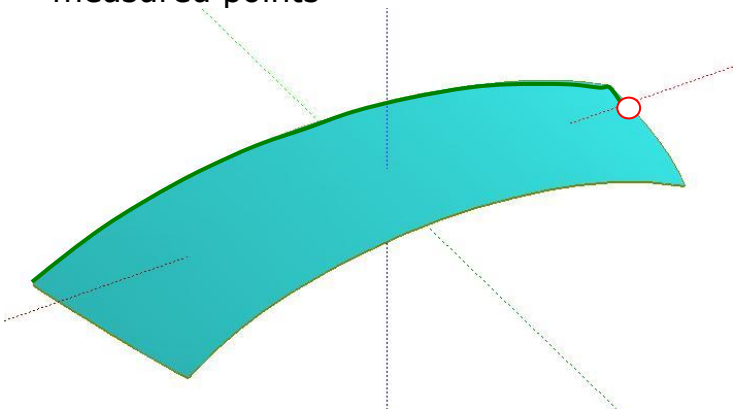




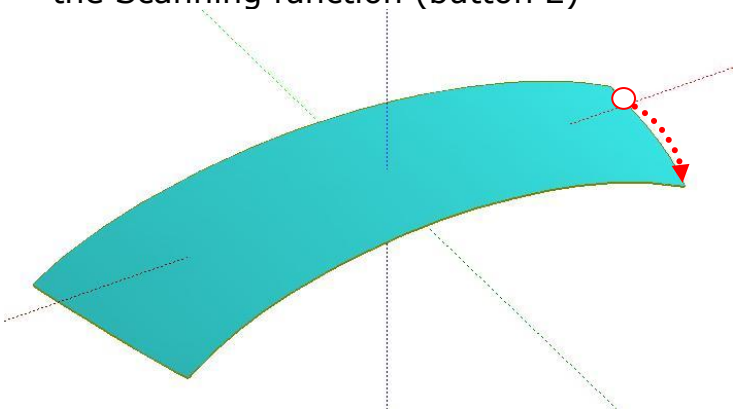
Try to avoid going exactly on the corner! But at the same time, attempt to reach a straight point as close as possible.

2 points for each side should be enough in most cases.

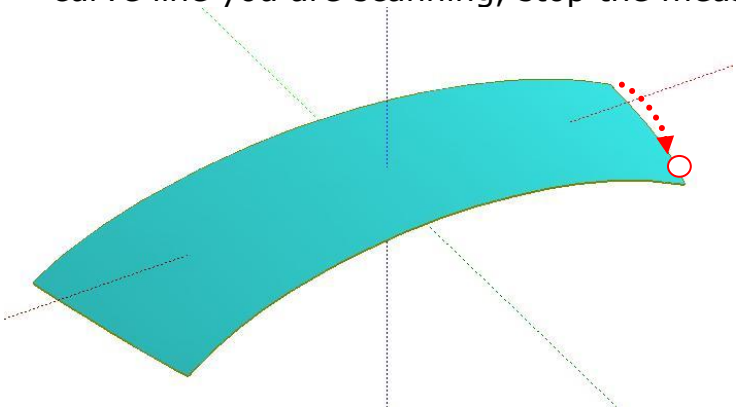
E. Close the contour (button 3) to temporarly save the just measured points



F. Start from the last point you measured (indicated by the white-red spot on the figure below) and proceed along the side, using the Scanning function (button 2)

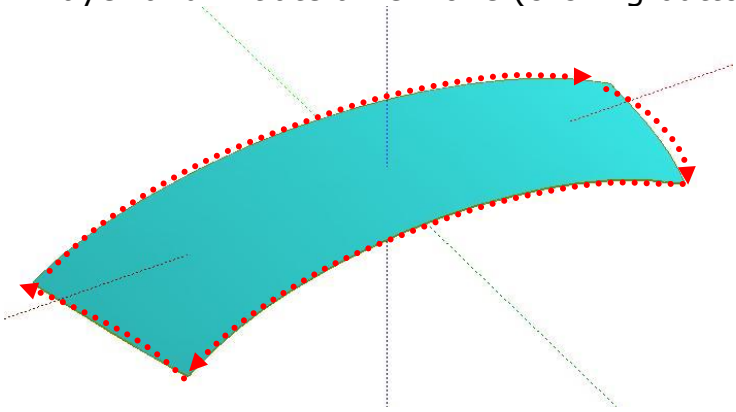


G. When you have reached almost the corner at the end of the curve line you are scanning, stop the measuring (button 2)



H. Proceed in similar way till you have completed the measurement of the whole contour.

I. When the contour measurement is finished, close the current layer and initiate a new one (clicking button 4).



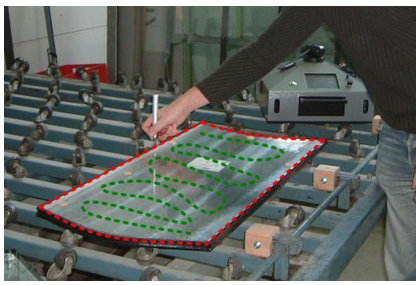
TIP: When measuring a sample curved glass sheet, if the glass contour is not well finished, you can place some tape around it, to smooth it, and avoid tool's slipping or blocking.

NOTE: Measure the external contour with extreme care!
Take your time! … in order to be sure that the output will not present too many imperfections.

4.2 SURFACE

Once you have opened the second layer, within the current drawing, you can start measuring the points which will determine the surface of the glass sheet.

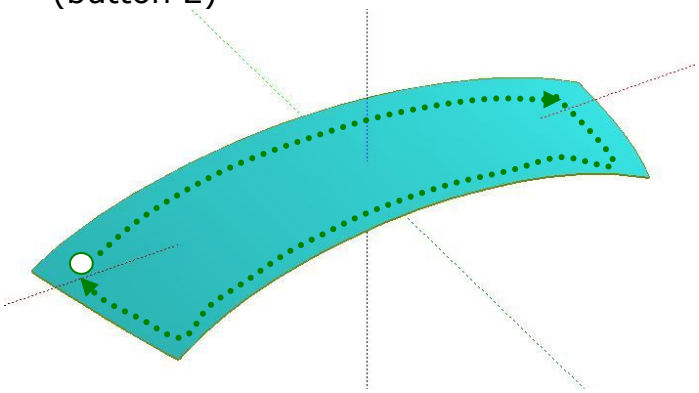
Scenario 1: Full Surface



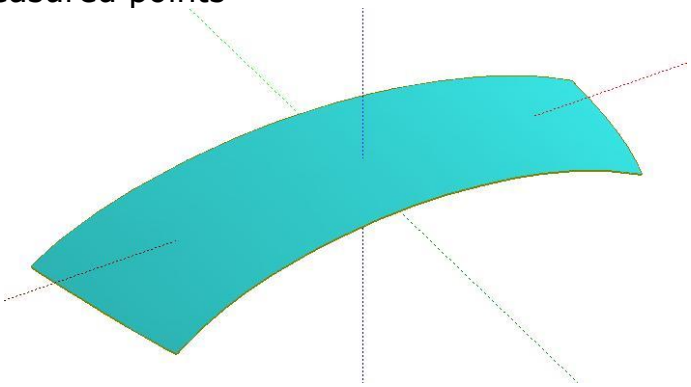
TOOL
While for measuring the contour it is possible to use any of the tools, for measuring the surface, you need to use the pointer. Changing the tool on-fly is not a problem. It will be compensated automatically by the Unfold software.

MODE
It is recommended to use the scanning function (button 2). It does not matter if more than one contour is stored in this layer.

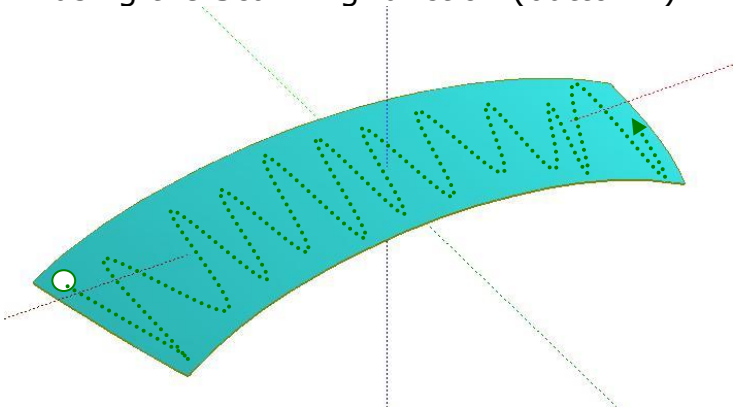
A. Start from the point indicated by the white-red spot on the figure below and proceed along the side, using the Scanning function (button 2)



B. Close the contour (button 3) to temporarly save the just measured points



C. Start from the point indicated by the white-red spot on the figure below and move up and down on the glass surface, using the Scanning function (button 2)



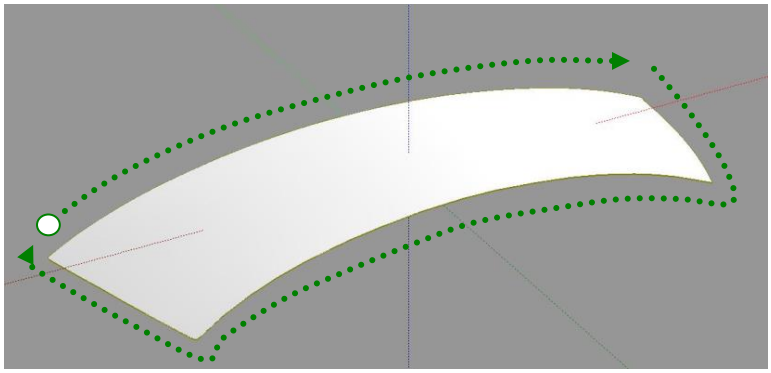
D. Stop the measuring clicking button 2. Close the drawing, saving it. The drawing is not ready to be exported onto your USB stick and finally on your pc to be opened by the Unfold software. *For details on the saving and exporting procedure, please refer to the Proliner 8 manual.*

Scenario 2: External Surface

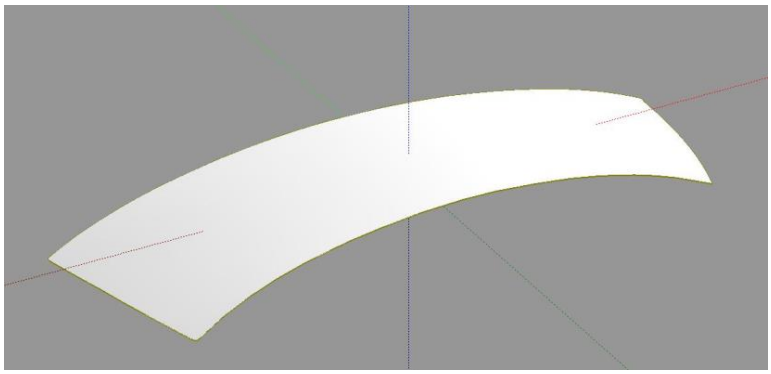
TOOL
While for measuring the contour it is possible to use any of the tools, for measuring the surface, almost always you will use just the pointer. Changing the tool on-fly is not a problem. It will be compensated automatically by the Unfold software.

MODE
It is recommended to use the scanning function (button 2). It does not matter if more than one contour is stored in this layer.

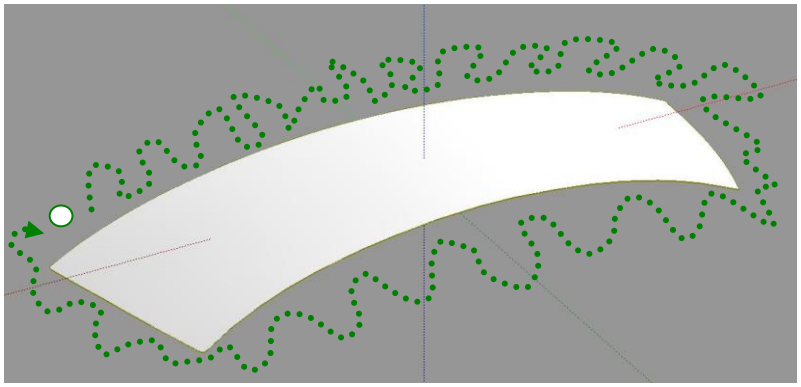
E. Start from the point indicated by the white-green spot on the figure below and proceed along the side scanning (button 2)



F. Close the contour (button 3) to temporarly save the just measured points



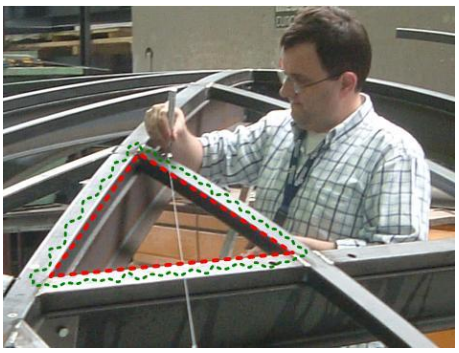
G. Start from the point indicated by the green-red spot on the figure below and move up and down around the hole, using the Scanning function (button 2)



H. Stop the measuring clicking button 2. Close the drawing, saving it. The drawing is not ready to be exported onto your USB stick and finally on your pc to be opened by the Unfold software. *For details on the saving and exporting procedure, please refer to the Proliner 8 manual.*

Scenario 3: Frame

Measuring a frame is comparable to Scenario 2. The difference that you will have to scan on a limited area (the frame itself), instead of



5 WHY WE NEED THE SURFACE?

IMPORT
After having measured the object (for example a sample glass sheet), the Proliner file can be opened by the Unfold software, which will visualize it as described in figure 10.

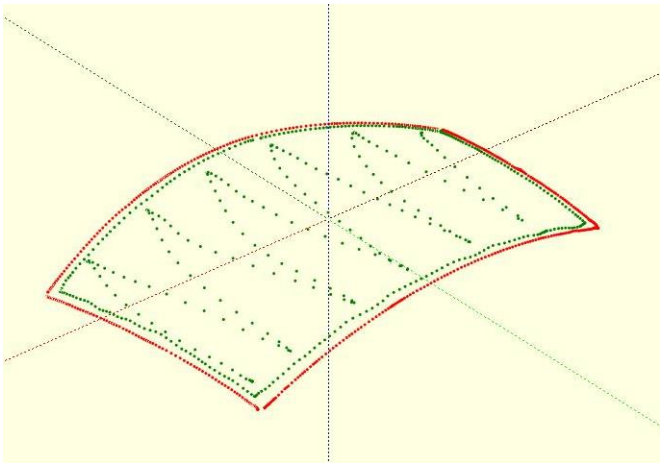


Fig. 10 – Proliner measurement once imported in the Unfold Software

The 2 different set of points (one for the external contour and one for the surface) are clearly distinct and marked using colors.

TRANSFORMATION
The Unfold software will use this second set of points (surface) to create a 3D mesh over the object which will be limited by the first set of point (external contour). In this way we get the object's surface within the given perimeter.

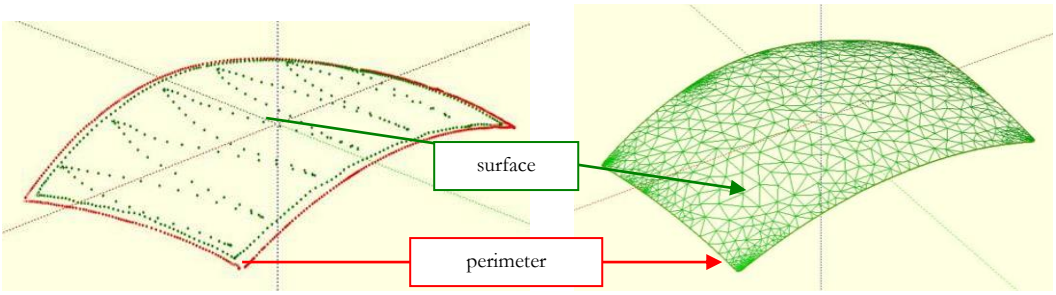


Fig. 11 – Proliner measurement transformed by the Unfold Software

11.A – a Proliner's measurement
11.B – the same measurement as edited by the Unfold Software