PGI Dimension – Production Interface (PI)

Traverse unit tilt angle

Lucy Cooper, Applications Engineer

Introduction

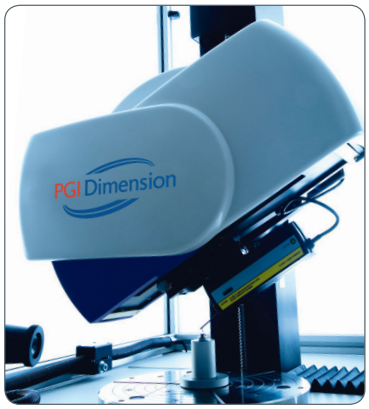

Figure 1: PGI Dimension with the traverse unit tilted

The PGI Dimension is able to measure samples with steep slopes (85 degrees) and big diameters (up to 300 mm). This is achieved by tilting the traverse unit (See Figure 1).

When measuring a sample using the PGI Dimension, it is important to first think about the traverse unit and whether it needs to be tilted to measure the sample. If the sample needs to be measured using a fused trace, then the traverse unit tilt angle needs to be known.

This technical note should aid the user to determine the angle of the traverse unit.

To tilt or not?

Questions that need answering:

1 What is the maximum slope the stylus can measure without flanking?

2 What is the slope of the part?.

If 2 > 1 then the traverse unit will need to be tilted to measure the part. See formula and use the method below.

If 1 > 2 then the traverse unit can remain horizontal and no further action is required.

Formula

The following formula can be used to calculate the correct angle:

TU angle = SLmax – STmax

Where:

TU angle = Traverse unit angle

SLmax = Maximum slope of the part

STmax = Maximum slope that the stylus can measure. I.e. a 60 degree stylus can measure a 45 degree slope.

Example

For example, if the maximum slope on the part being measured is 60 degrees and the maximum angle that can be measured is 45 degrees. Then:

TU angle = 60 – 45 = 15. So the traverse unit needs tilting to 15 degrees.

Methods to find the maximum slope

There are two different methods for finding the maximum slope of the part.

The first method can be used when all the design data is given. The second method is used when this information is unknown

Method 1 – Using design data

If all the data for the part is given, it can be entered into the Aspheric Design section. This is shown in the following steps:

1 In the production Interface click on the Configure Measure icon (see Figure 2).

2 Enter sample design data (see figure 3).

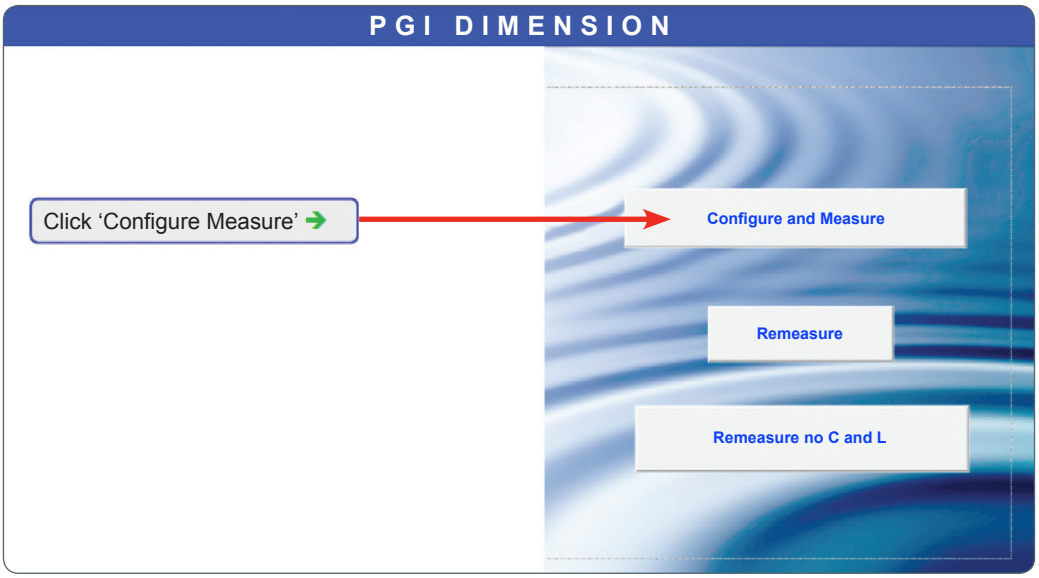

Figure 2: 'Configure and Measure' button in the production interface

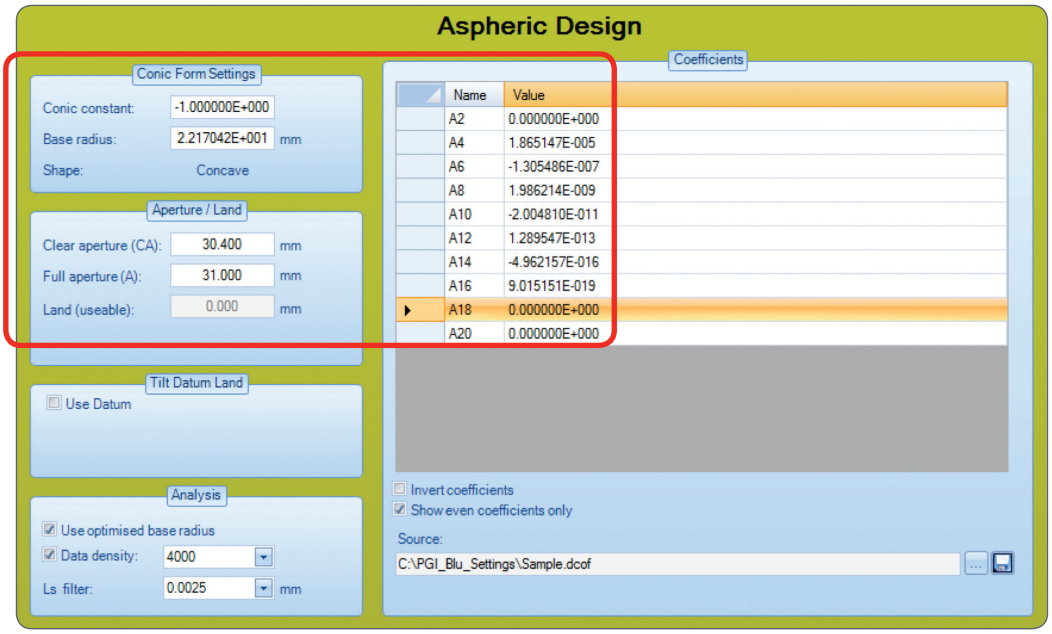

Figure 3: Enter the conic constant, base radius, clear and full aperture and coefficients

After entering all the data about the design of the part in the sections in the top half, a diagram will appear in the bottom half showing a schematic of the part.

Next to the graph in the box labelled clear aperture details about the gradient and sag are shown. (See Figure 4)

In this case the maximum slope of the part is 59.801 degrees. If a stylus is used that can measure up to 45 degrees, then using the formula on page 1…

TU angle = 59.801 – 45 = 14.801 so the traverse unit will need to be tilted to 15 degrees.

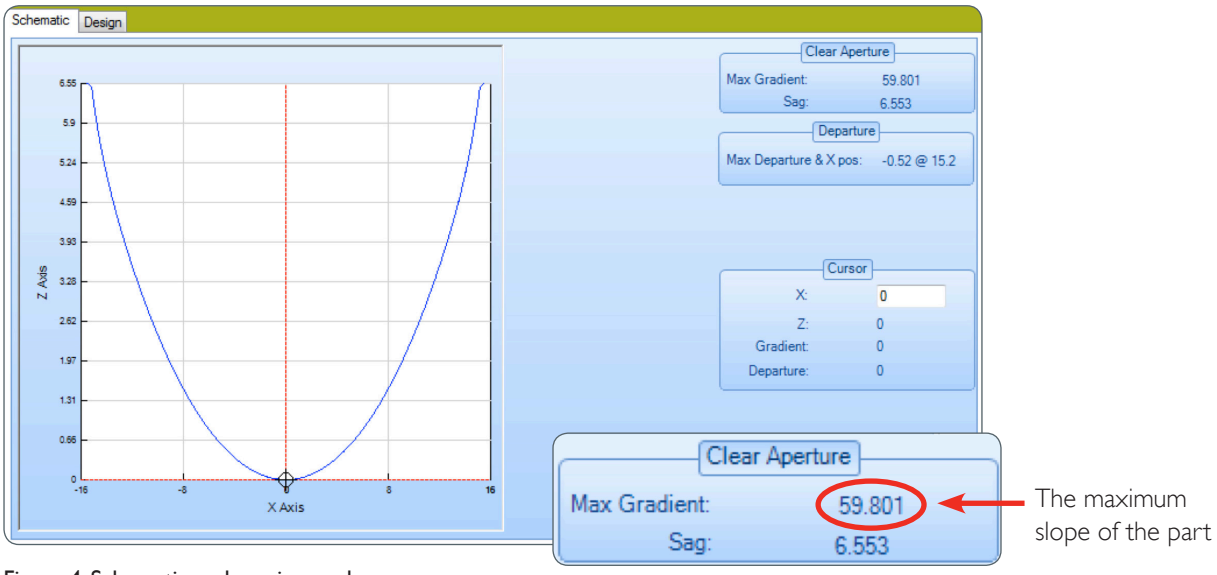

Figure 4: Schematic and maximum slope

Method 2 – When design data not available

If the maximum slope of the part is not known then it is possible to work it out using Ultra. The information below shows how this can be done.

1 The sample should be placed on the spindle and centred and levelled correctly. Looking at the part it should be possible to estimate where the slope is at its steepest. (See Figure 5).

A measurement needs to be done over a small area where the slope is at its steepest..

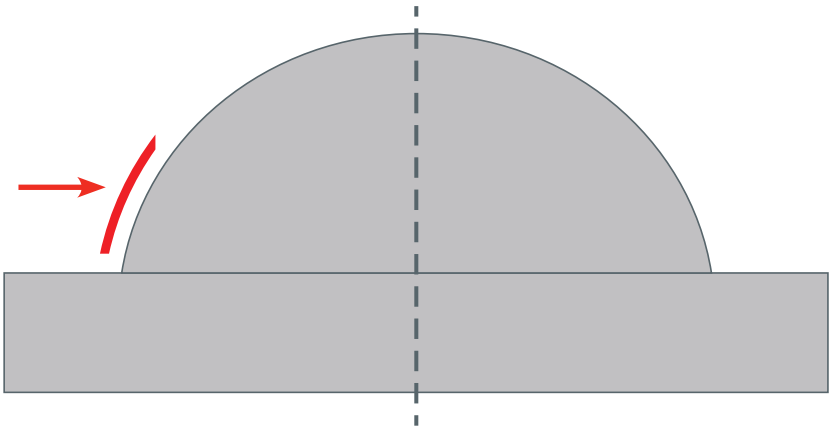

Figure 5: Estimation of where the slope is at the steepest for measurement

2 Contact the part just before the steepest point, select 'Surface Finish' in Ultra and click 'go' (see Figure 6).

3 Fill in the 'Measure' box that opens up. Decide on a measurement length that includes the steepest part (see Figure 7).

4 When the raw data is shown, bring in the edges so only the steepest part gets analysed (see Figure 8).

5 Using the mouse, right click
→ New Analysis
→ Choose **LS Line** and make sure **Slope** is selected
→ Click **ok**.

This will show the value of the slope (see Figure 9).

Figure 6: Manual measurement to work out the slope value

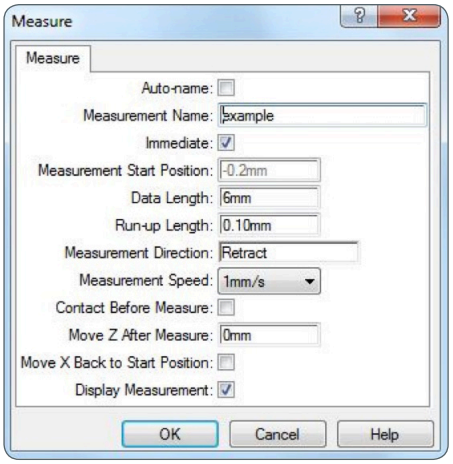

Figure 7: Fill in the data in the 'Measure' box

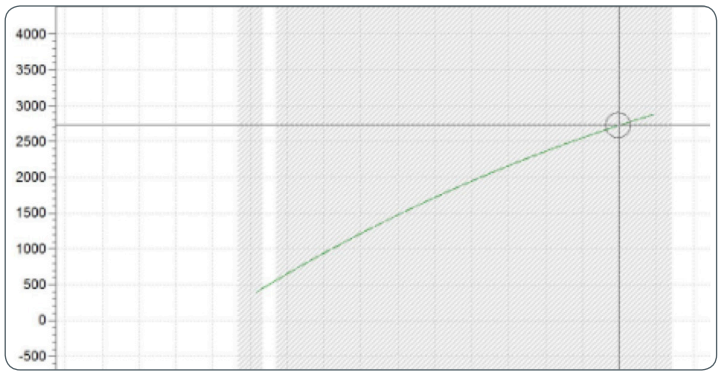

Figure 8: Grey out the less steep part leaving the steepest part white for analysis:

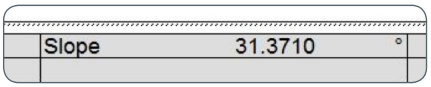

Figure 9: Maximum slope value

Taylor Hobson UK
(Global Headquarters)
PO Box 36, 2 New Star Road
Leicester, LE4 9JD, England
Tel: +44 116 276 3771
taylor-hobson.sales@ametek.com

Taylor Hobson France
Tel: +33 130 68 89 30
taylor-hobson.france@ametek.com

Taylor Hobson Germany
Tel: +49 611 973040
taylor-hobson.germany@ametek.com

Taylor Hobson India
Tel: +91 80 67823200
taylor-hobson.india@ametek.com

Taylor Hobson Italy
Tel: +39 02 946 93401
taylor-hobson.italy@ametek.com

Taylor Hobson Japan
Tel: +81 36809 2406
taylor-hobson.japan@ametek.com

Taylor Hobson Korea
Tel: +82 31 888 5255
taylor-hobson.korea@ametek.com

Taylor Hobson China Beijing Office
Tel: +86 10 8526 2111
taylor-hobson.beijing@ametek.com

Taylor Hobson China Shanghai Office
Tel: +86 21 58685111-110
taylor-hobson.shanghai@ametek.com

Taylor Hobson Singapore
Tel: +65 6484 2388 Ext 120
taylor-hobson.singapore@ametek.com

Taylor Hobson USA
Tel: +1 630 621 3099
taylor-hobson.usa@ametek.com