

# Basic instructions on how to use the Surface Conversion Tool

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## Definitions:

**Monomial** – this option refers to the standard aspheric conic + polynomial equation, of the form (note this includes even and odd orders):

$$Z = \frac{CX^2}{1 + \sqrt{1 - (K+1)C^2X^2}} + A_1|X| + A_2|X|^2 + A_3|X|^3 + A_4|X|^4 + \dots \quad C = \frac{1}{R}$$

**Qcon** – this option refers to the standard the new **conic-based** Forbes representation:

**Qbfs** – this option refers to the standard the new **best-fits-sphere-based** Forbes representation:

## Instructions:

1. Under Source Surface (top) section:
  - a. Choose the representation your asphere is currently in (Type field).
  - b. Enter the parameters defining the aspheric surface **in mm**
2. Under Convert To:
  - a. Choose the representation to convert to and the # of aspheric coefficients the converted surface should have
  - b. Click Convert
3. The aspheric surface parameters in the new representation will be shown in the bottom section, along with a plot of the residual error (**in nm**) between the two representations
4. If you want to save the aspheric parameters in either format, you can **Export** either the **Source Surface** or **Converted surface** as an XML-based QODIF file (this can then be loaded into QED's polishing or metrology products) using the commands in the **File** menu
5. You can also then reload these into the conversion tool at a later time, using the **Import** function from the **File** menu.

## Tips:

1. When entering or editing an aspheric coefficient, you cannot "leave" the edit field without entering a value. So, for example, if you are trying to delete a coefficient, you must enter in "0" (you cannot simply delete it)

## Example:

The following is a simple example of entering in an asphere in the “**standard**” representation and converting it to **Qbfs**:

The following asphere is a parabola with 2 additional (even) coefficients (the  $x^4$  and  $x^6$  terms)

- $R = 20$  mm
- Clear aperture = 20 mm
- $K = -1$
- $A4 = 6.3105e-6$
- $A6 = -2.34205e-7$

This asphere converted converted into the Qbfs format has the following properties:

- **Best Fit Sphere Radius**  $\approx 22.634$  mm
- **$a_0$  term**  $\approx 451$   $\mu\text{m}$ , implying a departure from BFS of  $\approx a_0/4 = 100$   $\mu\text{m}$
- **Increasingly smaller higher-order terms:**
  - **$a_1$  term**  $\approx -50$   $\mu\text{m}$
  - **$a_2$  term**  $\approx -2$   $\mu\text{m}$
  - **$a_3$  term**  $\approx +45$  nm
  - **$a_4$  term**  $\approx -2$  nm

