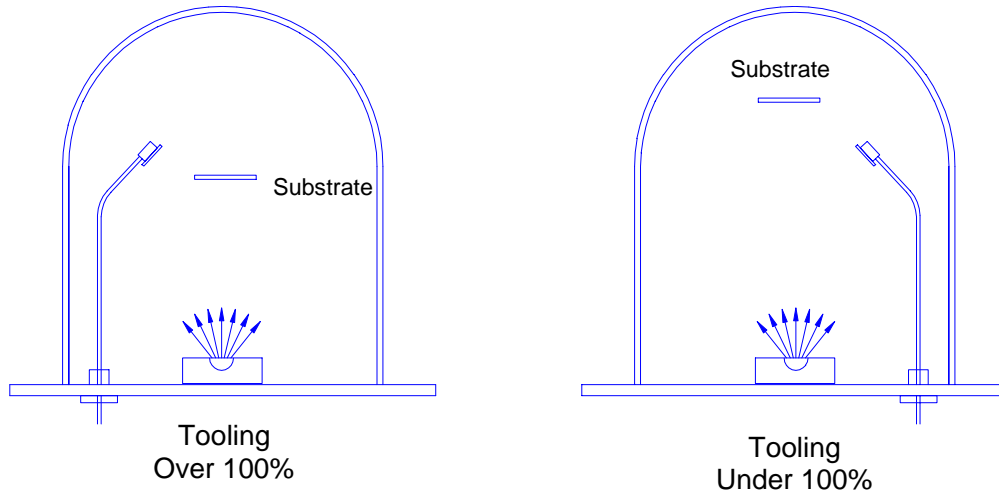


**FAQ01-04      What is Tooling Factor?  
How do I determine Tooling Factor?**

Tooling Factor adjusts for the difference in material deposited on the quartz sensor versus the substrate. Tooling may be less than or greater than 100% as shown below:



1. Place your substrate and a new quartz sensor in their normal position.
2. Set Tooling to an approximate value; Set Density and Z-Factor for your material.
3. Deposit approximately 1000 to 5000 Å of material.
4. Use a profilometer or interferometer to measure the substrate's film thickness.
5. The correct Tooling Factor is calculated by:

$$\text{Tooling}_{\text{ACTUAL}} = \text{Tooling}_{\text{APPROX}} \times \frac{\text{Thickness}_{\text{ACTUAL}}}{\text{Thickness}_{\text{QCM}}}$$

In Sigma Instruments controllers, a Tooling Factor is provided for each sensor, since the location and adjustment is different for each one.

In addition, a System Tooling Factor is also available. This is used to adjust for differences from one deposition system to another, which are running the same product/process.