PC-DMIS & BONUS TOLERANCE

In PC-DMIS, bonus tolerance, also known as [virtual condition](https://www.google.com/search?sca_esv=7bf8a2f3baef1f90&cs=0&sxsrf=AE3TifOlcotNl4HEqfYoW5tFBRBBCxLP0A%3A1752230526026&q=virtual+condition&sa=X&ved=2ahUKEwirz7Kwz7SOAxVLmIkEHbzCK7QQxccNegQIAhAB&mstk=AUtExfBxbl4GCpLe6QfPlIPjY5M5JbTMY1-1FFcvFIhHZx_6dGn_M-2-pfcA33-jMUch86pFBO39NMvO1wuHHE6BoHsiVSHjCbRNNW2ZytIf6mLeo91MBTR_tV57AfPJH0-t4CBuu6N7DXXHTdPZkv5rGpQSsjUGIBfZGAAEBGKeynZNyLQ&csui=3), is calculated based on the difference between the actual feature size and its MMC (Maximum Material Condition) or LMC (Least Material Condition). For example, if a hole is specified with an MMC of 10mm and a tolerance of +/- 0.1mm, its MMC will be 10.1mm and its LMC will be 9.9mm. If the measured size of the hole is 10.05mm, the bonus tolerance would be 0.05mm (10.05mm - 10.0mm).

Here's a more detailed breakdown:

1. MMC and LMC:

* **MMC (Maximum Material Condition):**

The feature's size at its largest permissible size (e.g., smallest hole diameter or largest shaft diameter).

* **LMC (Least Material Condition):**

The feature's size at its smallest permissible size (e.g., largest hole diameter or smallest shaft diameter).

2. Calculating Bonus Tolerance:

* **For MMC features:**

The bonus tolerance is the difference between the MMC size and the actual measured size of the feature.

* **For LMC features:**

The bonus tolerance is the difference between the actual measured size of the feature and the LMC size.

3. How PC-DMIS handles Bonus Tolerance:

* PC-DMIS uses a [least squares fit algorithm](https://www.google.com/search?sca_esv=7bf8a2f3baef1f90&cs=0&sxsrf=AE3TifOlcotNl4HEqfYoW5tFBRBBCxLP0A%3A1752230526026&q=least+squares+fit+algorithm&sa=X&ved=2ahUKEwirz7Kwz7SOAxVLmIkEHbzCK7QQxccNegQIKxAB&mstk=AUtExfBxbl4GCpLe6QfPlIPjY5M5JbTMY1-1FFcvFIhHZx_6dGn_M-2-pfcA33-jMUch86pFBO39NMvO1wuHHE6BoHsiVSHjCbRNNW2ZytIf6mLeo91MBTR_tV57AfPJH0-t4CBuu6N7DXXHTdPZkv5rGpQSsjUGIBfZGAAEBGKeynZNyLQ&csui=3) to determine the size of the feature, regardless of whether it's an inner or outer feature.
* It then compares this calculated size to the MMC or LMC to determine the bonus tolerance.
* This bonus tolerance is then added to the positional tolerance, effectively increasing the allowable variation in the feature's position.

Example:

Let's say you have a hole with a diameter tolerance of 10 +/- 0.1mm. The MMC is 10.1mm, and the LMC is 9.9mm. If the measured size of the hole is 10.05mm, then:

* For an MMC specification, the bonus tolerance would be 10.1mm - 10.05mm = 0.05mm.
* For an LMC specification, the bonus tolerance would be 10.05mm - 9.9mm = 0.15mm.

In essence, bonus tolerance provides extra positional tolerance when the feature deviates from its MMC or LMC, allowing for greater manufacturing flexibility while still maintaining functionality.