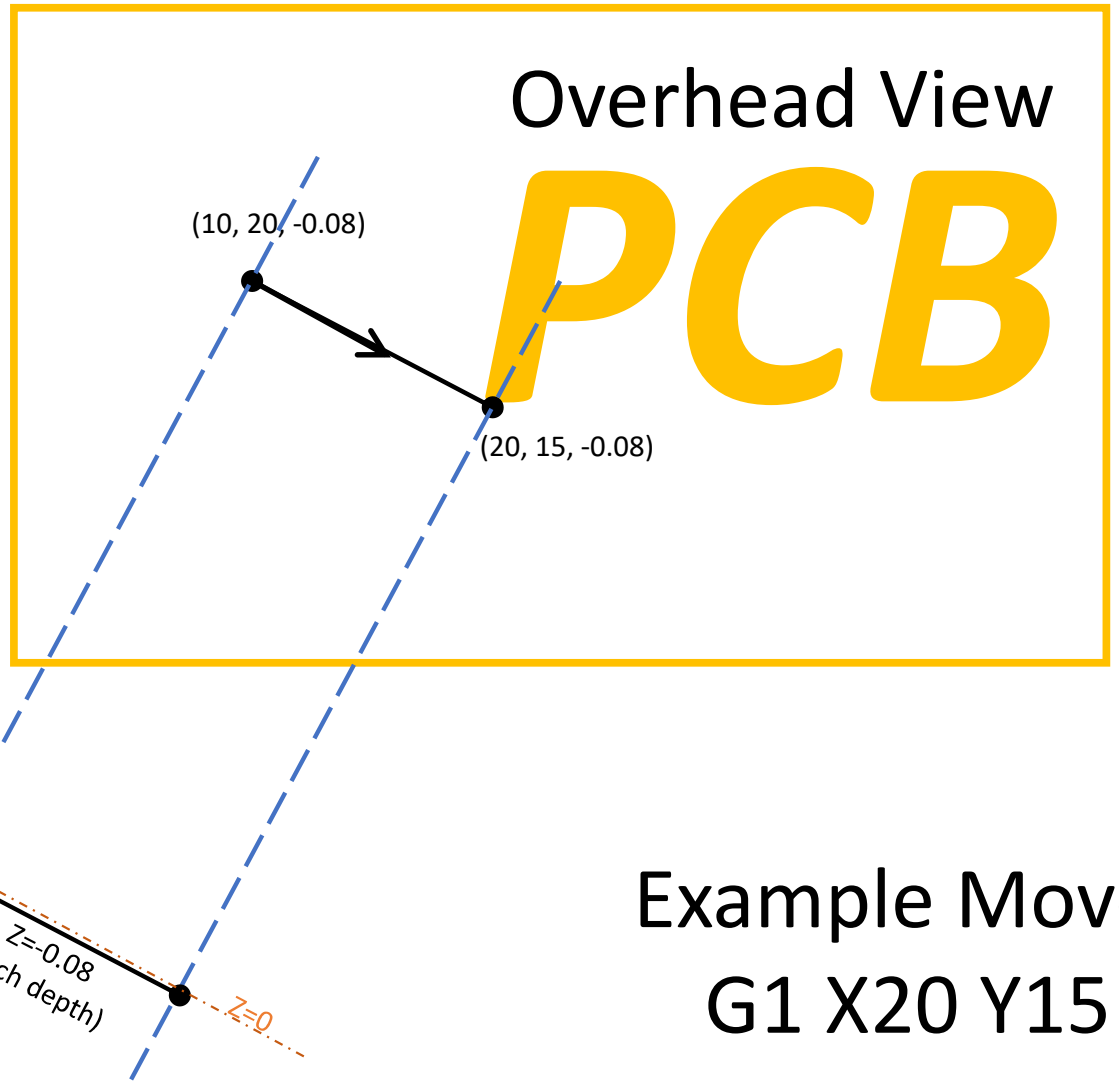
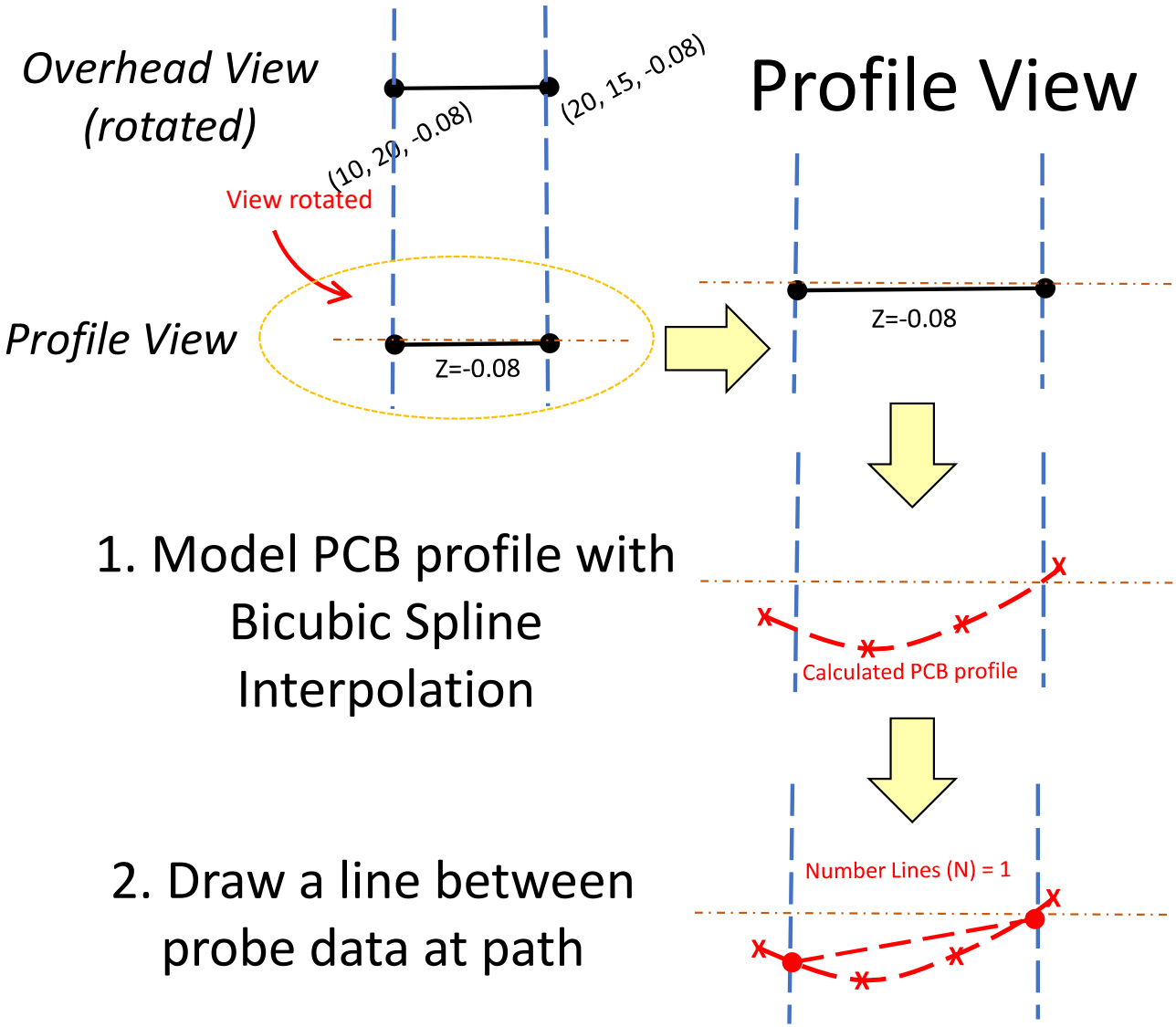
td0g's PCB Gcode Toolkit

Bicubic Spline Levelling Algorithm



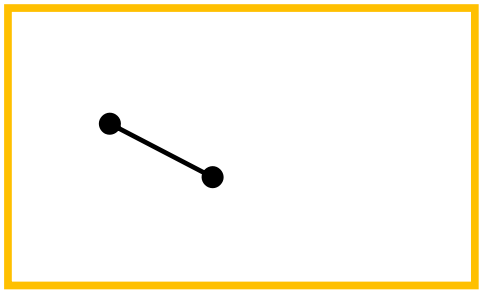
Example Move:
G1 X20 Y15

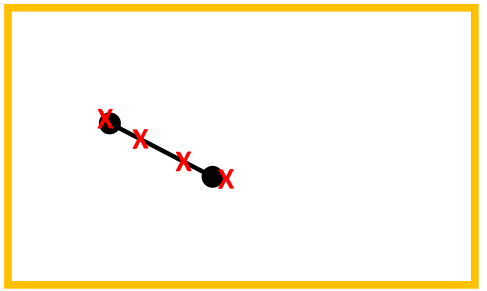


1. Model PCB profile with Bicubic Spline Interpolation

2. Draw a line between probe data at path

Overhead view





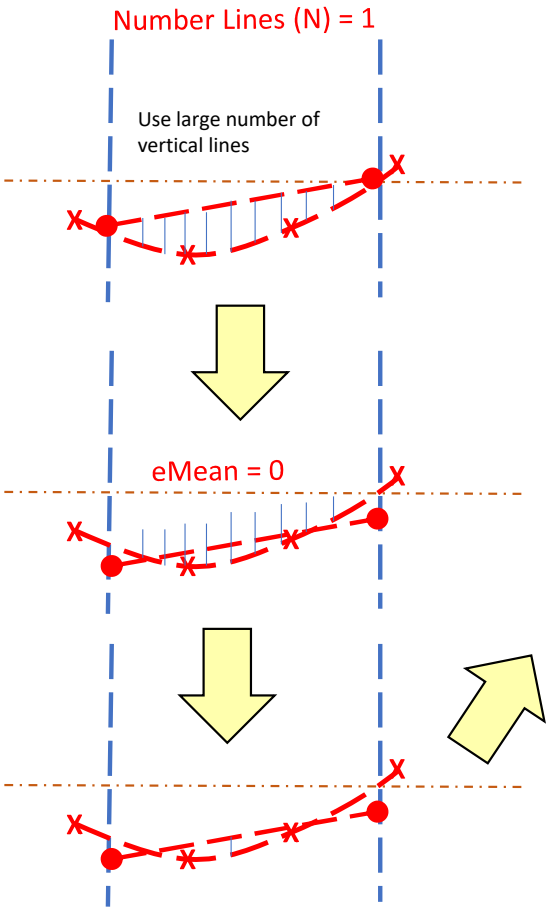
Example Move:
G1 X20 Y15

3. Estimate average error (eMean)

4. Shift straight line down by eMean / 2

5. Calculate Max Error (eMax)

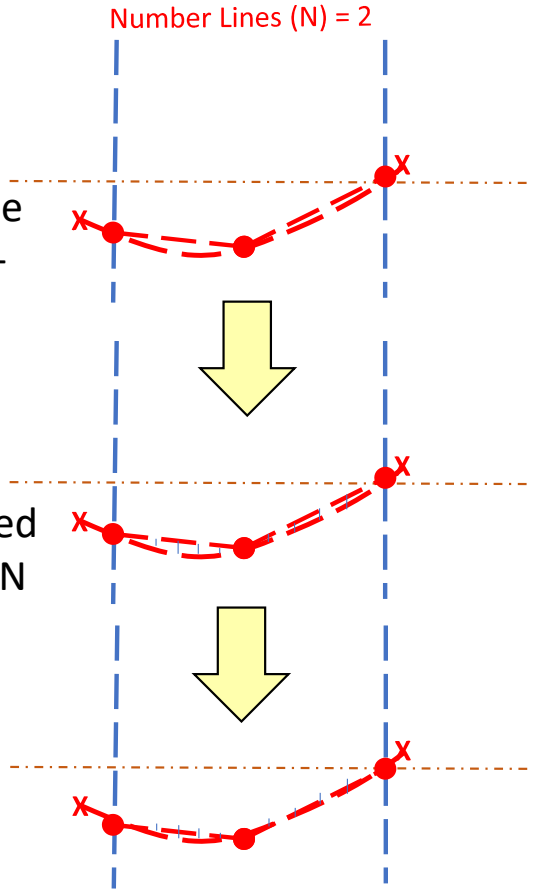
Profile View



6a. If eMax > cCrit, double number of lines to model spline and repeat steps 2 - 6.

This may be repeated multiple times and N may be 4, 8, 16, or more.

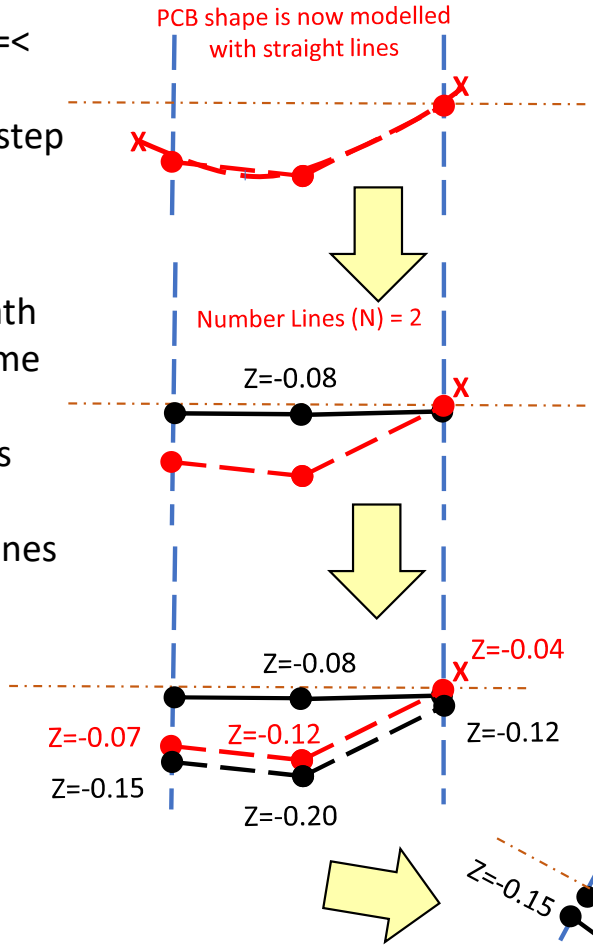
Profile View



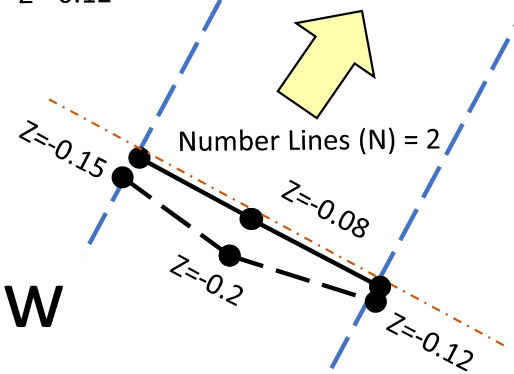
6b. If eMax =< eCrit then continue to step 7

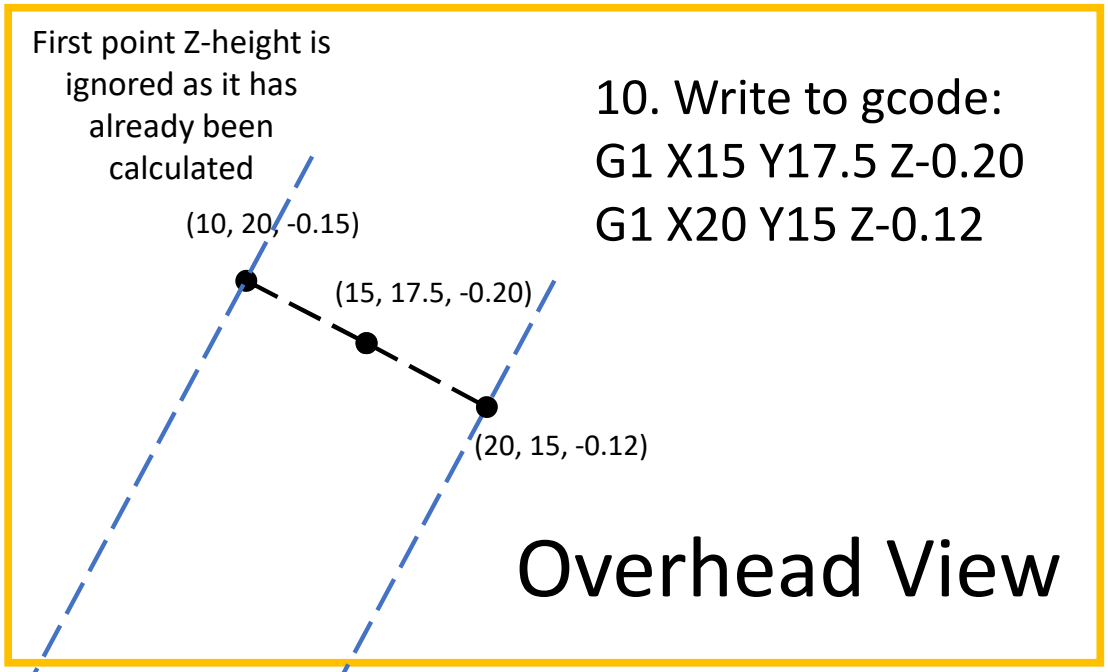
7. Divide path line into same number of segments as spline-modelling lines

8. Add lines together to find Z heights



Profile View





Overhead View

9. Divide path into number of segments. Use the calculated Z heights.

10. Write to gcode:
G1 X15 Y17.5 Z-0.20
G1 X20 Y15 Z-0.12

Example Move:
G1 X20 Y15