<u>Collecting Data for F-Numbers</u>

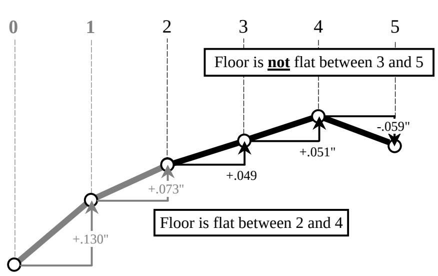
F-Numbers are created from raw data taken from a floor - but how? The Dipstick® collects raw data in the form of the difference in elevation between its two "feet" (contact points). It measures this elevation difference very precisely and accurately - to less than 1/1000 of an inch. But how do we make F-Numbers from this data?

F_F: The raw data used to calculate an F_F number comes from what we call a "Q" reading, which is basically a measure of the change in slope between two adjacent measurements. For example, if the slope is the same at position 23 and 24, then the floor is "flat" in that place. The slope does not need to be zero - just unchanging. The relative degree of change in slope determines how much of a "bump" or "dip" there will be between the two slopes. Because of the way the Dipstick® measures the floor, a "Q" reading is simply the difference between two successive Dipstick® readings. F_F numbers are generated from statistical processing of a large number of "Q" readings.

The drawing to the right represents a cross-section profile of a floor, with the vertical scale *greatly* exaggerated. The Dipstick® readings are shown for the first six steps across the floor.

The picture below shows only the Dipstick® readings, for clarity. Notice how Dipstick® readings #3 and #4 are almost identical. The difference between Dipstick® readings #3 and #4 is (.049) - (.051) = -<u>0.002"</u> The "Q" value for this part of the floor is nearly zero, and the floor is said to be "flat" at this point. Note that although the floor is "flat" here, it is definitely not level at this point on the floor.

In a like manner, you can see that the portion of the floor spanned by Dipstick® readings #4 and #5 is *not at all flat*.

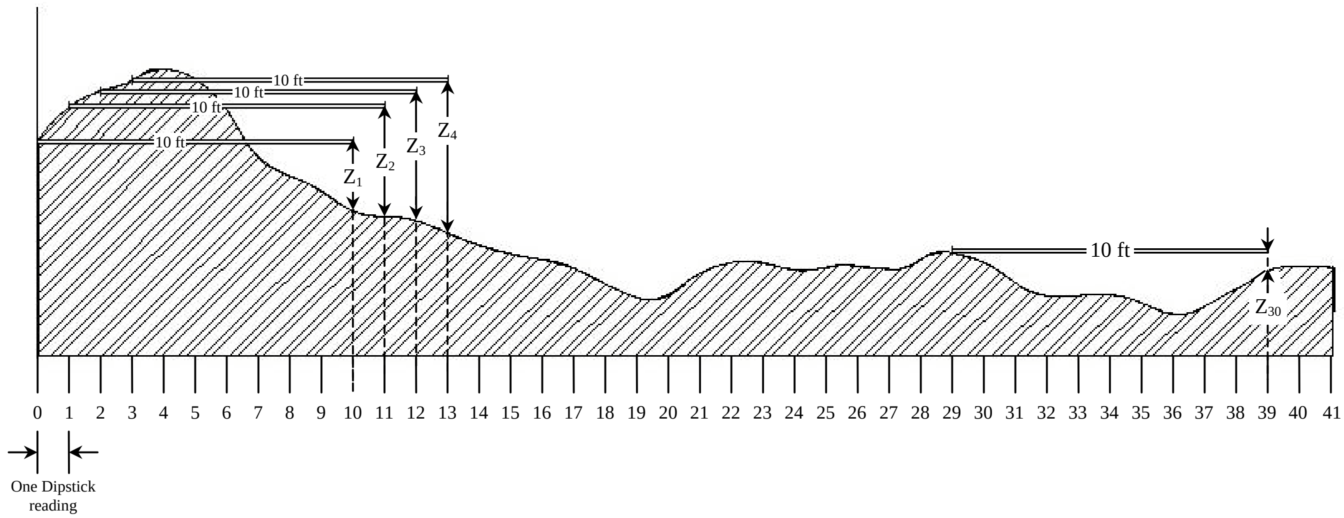


The difference between Dipstick® readings #4 and #5 is

(.051) - (-.059) = <u>0.110"</u>

The "Q" value for this part of the floor is more than 50 times larger than the Q value for steps #3 and #4. All this is interesting, but a floor's flatness is not determined by a single "Q" value alone. You need to take a statistically significant sample and do a little processing on the data you collect in order to generate a useful estimate of the floor's F_F (flatness) value. ASTM E-1155 tells you how to do that, and provides the math for the statistical processing of the raw data (Q's) that you collect.

F_L: OK, that tells me how we get F_F Numbers, but how do we get F_L numbers?
The profile shown below is the same one we used before, but we're showing a longer stretch of floor.



The raw data used to calculate an F_L number is the difference in elevation across 10 feet. Each F_L measurement is called a "Z" reading. The elevation of a point 1-ft away from the start of a line is equal to the start point elevation plus the Dipstick® reading. The elevation of a point that is two steps down the line is equal to the elevation of the first point plus the second Dipstick® reading. To generate a complete profile, a string of Dipstick® readings are obtained and summed. The relative elevation of any point on the line is the sum of all the Dipstick® readings to that point. A large number of these 10-ft elevation differences are obtained, then F_L numbers are generated from an RMS manipulation of a large number of "Z" readings. The table below shows how elevations are generated from Dipstick® readings, and how Z-Readings are generated from elevations. Again, ASTM E-1155 tells you how to do the math for the statistical processing of the raw data (Z's) that you collect. When you collect data with a Dipstick®, the built-in software automatically calculates the elevations from the readings that you collect. As soon as you collect the raw data, it produces a graph of the profile, calculates Q and Z readings, and also calculates the F-Numbers for you.

Point #	**Dipstick Reading**	**Elevation**	**Z- Reading**	**Z-Reading #**
0	N/A	0.000	N/A	
1	+.130"	0.000 + (+.130) = **+.130**	N/A	
2	+.073"	+.130" + (+.073) = **+.203**	N/A	
3	+.049"	+.203 + (+.049) = **+.252**	N/A	
4	+.051"	+.252 + (+.051) = **+.303**	N/A	
5	-.059"	+.303 + (-.059) = **+.244**	N/A	
6	-.169"	+.244 + (-.169) = **+.075**	N/A	
7	-.152"	+.075 + (-.152) = **-.077**	N/A	
8	-.177"	-.077 + (-.077) = **-.154**	N/A	
9	-.162"	-.154 + (-.162) = **-.316**	N/A	
10	-.316"	-.316 + (-.087) = **-.403**	-.403 - (0.000) = **-.403**	Z_1
11	-.009	-.403 + (-.009) = **-.412**	-.412 - (+.130) = **-.542**	Z_2
12	-.006	-.412 + (-.006) = **-.418**	-.418 - (+.203) = **-.621**	Z_3
13	-.019	-.418 + (-.019) = **-.437**	-.437 - (+.252) = **-.689**	Z_4
14	-.015	-.437 + (-.015) = **-.452**	-.452 - (+.303) = **-.755**	Z_5
15	-.013	-.452 + (-.013) = **-.465**	-.465 - (+.244) = **-.709**	Z_6
16	-.007	-.465 + (-.007) = **-.472**	-.472 - (+.075) = **-.547**	Z_7