

SPC Tool for Bike Pedal - Quality Control

1- Important note:

- Quality Control will be analyzed in terms of two parameters, Cp and Cpk.
- It is necessary to develop analysis for holding a closer Cpk on a dimension that proves to be more reliable and more accurate for the final products (pedal).

- 2- Students working in teams will study the quality based on different Cpk values (higher or lower) and different data sets with different materials. For this purpose, every team will define which tolerances will be used for every dimension of the bike pedal as designed in Autocad. For example a 2% tolerance may be assigned to one of the dimensions. After that, and based on the measurements collected from Activity 2, the team should complete fields and tables, as shown below.

DIMENSION TYPE	Lower Value (as tolerance) in mm	Upper Value (as tolerance) in mm		
A				
B				
C				
D				

PEDAL#	DIMENSION TYPE A DIFFERENCE FROM DESIGN (mm)	DIMENSION TYPE B DIFFERENCE FROM DESIGN (mm)	DIMENSION TYPE C DIFFERENCE FROM DESIGN (mm)	DIMENSION TYPE D DIFFERENCE FROM DESIGN (mm)
1				
2				
3				
	Average=	Average=	Average=	Average=
	SD=	SD=	SD=	SD=

$$Average = \frac{\sum_{i=1}^4 Difference_i}{4} \quad (1)$$

$$Standard\ Deviation\ (SD) = \quad (2)$$

$$Cp = \frac{Upper\ Value - Lower\ Value}{6 * SD} \quad (3)$$

$$Cpk = Minimum \left(\frac{Upper\ Value - Average}{3 * SD}, \frac{Average - Lower\ Value}{3 * SD} \right) \quad (4)$$

Calculations should be done for each dimension of the pedal (A, B, C, D). Show all calculations here:

- 3- Teams will also look at the cost of the different types of materials and note the impact of this when compared to the functionality of the part.