

STATISTICAL ANALYSIS OF VARIATION BETWEEN NEBRASKA BLADES AND THE SHOP CLIPPER MACHINES

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This study was done to understand the variation, if any, between sharpening a clipper blade comb on machines using a manual method, and an automated method.

SET UP

The blade used will be the comb blade of Andis #10 clipper blades only with the big numbers on the back of the blade. Why we use this sample is because it's a very popular blade and we see 100's of them in our shop weekly and monthly. No other brand of #10 blade is used, and no other version of the Andis #10 blade was used.

MEASUREMENT

To measure, each blade will be measured before and after a sharpening cycle on each machine type. Since three Andis # 10 blades are manufactured the same, only one blade will be measured from each machine. The same blade will not be sharpened and measured on each machine. The manual machine will use a laser to follow to help with consistency.

The idea of the study is to measure the before and after measurements of the blade, at four specific points on the blade: The front rail on both ends, and the rear rail on both ends. We are looking to calculate how much metal is taken off the blade at these points by difference.

Only one blade per grit charge will be made, this will be the second blade in line

The measuring tool will be a digital caliper that can measure up to 0.0001 of an inch.

Sample Size. The study requires a sample size of three, and the average of this sample size will be entered on the chart. Three different blades will be measured from three different grit charges done on the same day as close as possible to each other. This keeps the integrity of the grit, the machine (person holding the magnet) identical as possible, the environment of the area, and possibly the environment of the clipper blade machine its self.

Calculation: Measurement blade one + measurement blade two + measurement blade three divided by three = X-Bar. The X-bar of these measurements will be charted. Standard deviation will also be calculated. This is variation between data points and the basis of the percent variation difference between both machine types.

VARIATION OF EACH MACHINE

MANUAL MACHINE

When a blade is held on a magnet in a person's hand, there are multiple forms of variation moving that blade back and forth across a circulating plate that produces "pull" on the blade. None of these factors are consistent; they change from blade to blade.

Tipping of the blade – front to back

Tipping of blade – side to side

Yoke (twisting) of the blade - $\uparrow\downarrow$

Timing of blade on the plate going across and back

Timing of blade actually on the plate during this sharpening cycle

Pressure of the blade down on the plate

Arm fatigue time – length of day

Wrist fatigue time – length of day

Amount of grit charge on the plate

AUTOMATIC MACHINE

Front to back tipping – Consistent, held by solid magnet on automated arm.

Side to side tipping - Consistent, held by solid magnet on automated arm.

Yoke (twist) $\uparrow\downarrow$ - Consistent, held by solid magnet on automated arm.

Timing of blade across the plate - Consistent, automation is timed

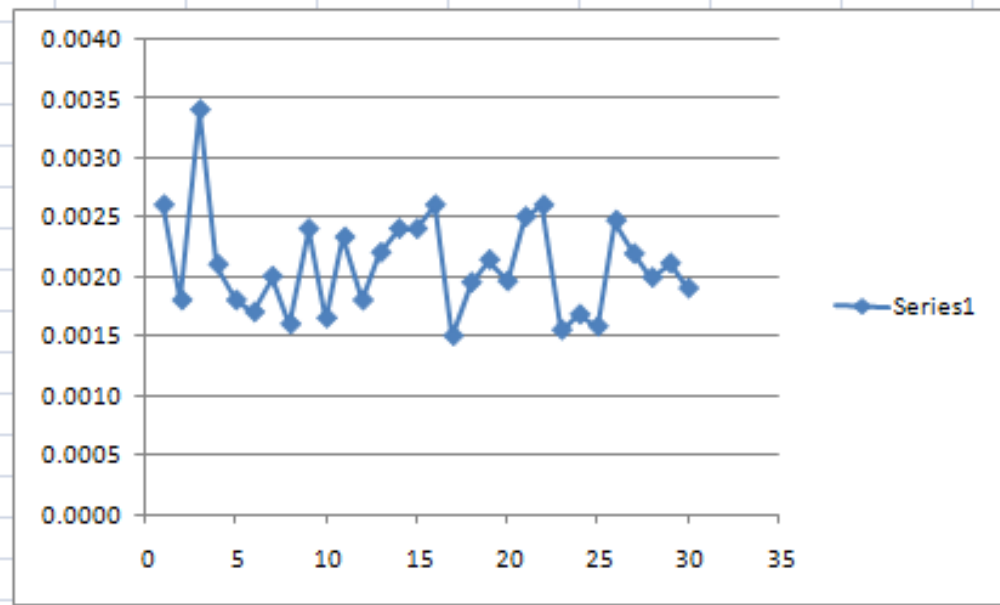
Timing of blade actually on plate – Consistent, automation is timed

Pressure of blade down on the plate – arms are consistent in weight, but variation can be determined in this variable by the grit charge and depth of charge.

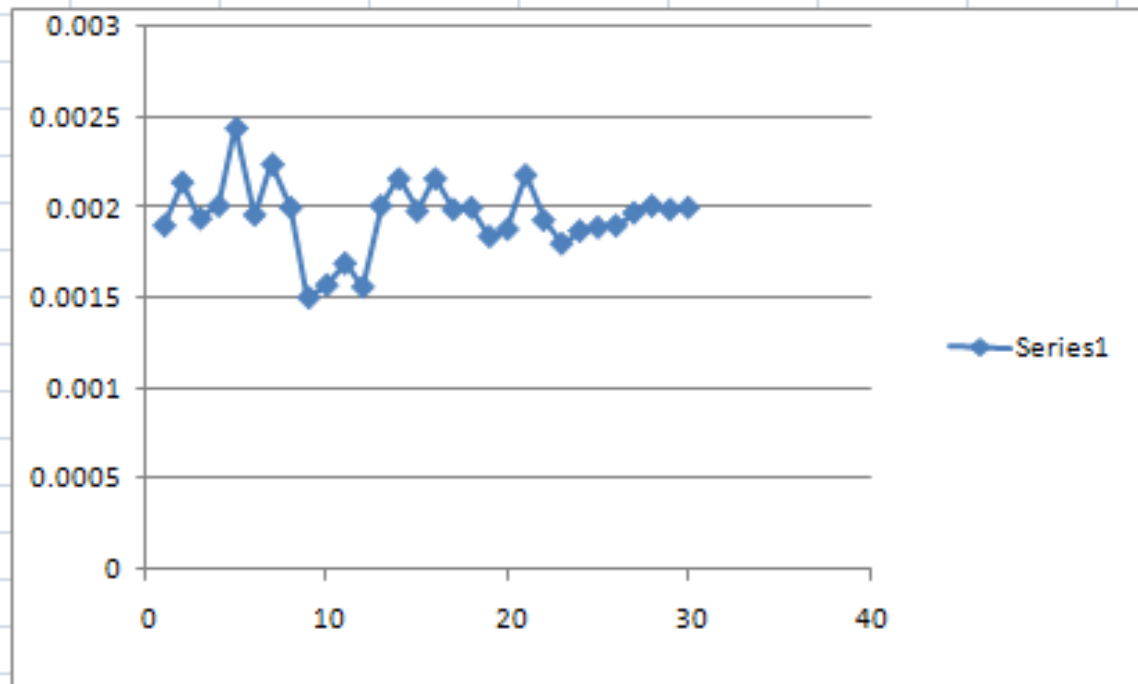
Arm fatigue – Not Applicable

Wrist fatigue – Not Applicable

Amount of grit charge on the plate – this does play a major factor in the variation of any automated machine. So charging the plate as consistent as possible is most important.



Manual Averages Chart



Automatic Averages Chart

CALCULATION

Here is the raw data off the charts. It includes the X-Bar of the data, the Standard Deviation of the data. and the percent variation between the manual and automatic machines.

Manual		Auto		
0.0026		0.0019		
0.0018		0.00214		
0.0034		0.00194		
0.0021		0.00201		
0.0018		0.00244		
0.0017		0.00196		
0.002		0.00224		
0.0016		0.002		
0.0024		0.0015		
0.00165		0.00157		
0.00233		0.00169		
0.0018		0.00156		
0.0022		0.00201		
0.0024		0.00216		
0.0024		0.00198		
0.0026		0.00216		
0.0015		0.00199		
0.00195		0.002		
0.00214		0.00184		
0.00196		0.00188		
0.0025		0.00218		
0.0026		0.00193		
0.00155		0.0018		
0.00168		0.00187		
0.00158		0.00189		
0.00247		0.0019		
0.00219		0.00197		
0.00199		0.00201		
0.00211		0.00199		
0.0019		0.002		
0.002097	AVERAGE	0.00195		
0.000422	STD DEV	0.000199	52.94494	
High		Low		% Difference

CONCLUSION

This statistical analysis shows the manual machine has 52% more variation than the automatic machine sharpening the same type of clipper blades.