Calibration of Simple Vernier Caliper Using Slip Gauge Made by Nano Material

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***Abstract*- Latest situation the number of automobile industries set up the standard room for the calibration purpose. Without calibration the company can not run. All the instruments are internally calibrated. In this investigation, the completion of calibration processes the master calibration schedule should be prepared. Granite plate is also called as surface plate is an essential for the calibration processes. Calibration should be done on this plate. The aim of this paper is to present experimental and theoretical study of Simple Vernier Caliper by using with standard instrument Slip Gauge with different standard values. Objective of calibration is all the measuring instrument calibrated properly and fully conformity and minimize the rejection of the automobile parts.**

Key word – Calibration, Master Gauge block set, Granite Surface Plate.

IINRODUCTION

The automobile industries the calibration is required. Digital vernier caliper is used, this caliper should be make a hardened stainless steel material. Some other instruments are used for the master gauge block set and granite surface plate. The range of digital vernier caliper is 0-200 mm. Using Calipers Proper calibration can not help in obtaining accurate readings. It also largely depends upon the way we use our calipers. To use your digital caliper properly first open the caliper jaws. Then slide it over the object to be measured. Now turn the knob and close the jaws according to the initial contact made. Remember not to over tighten the adjustment knob, only slight pressure is required. Take the reading now, closest to the most accurate reading. Application of the micrometer is to measure the external diameter, internal diameter and depth of the object.

LITERATURE REVIEW

Kaushal Mukherjee et.al [1], Analysis magnetic flow meter can be used to measure dirty, corrosive and abrasive liquid flow but it does not suitable for nonconductive liquid. In this subtract the value of actual flow rate from the meters flow rate, and change the resistance of same amount by varying the range changing pot. There may be a chances of sucked into the pipeline in vacuum which may damaging the magnetic flow meters.

Acko, B et.al [2], This paper resulting the calibrated the special tasks using special calibration procedure and standard or a laser interferometer. The second approach of these paper for simple measurands like internal and external diameters and linear distances.

Sheetal Dewangan, et.al [3], This paper summarizes some of the major aspects of precision ultrasonic thickness gauging. Ultrasonic nondestructive testing (NDT) characterizing material thickness, integrity, or other physical properties by means of high-frequency sound waves has become a widely used technique for quality control. This paper looks at the root causes of poor performance with ultrasonic and suggests some methods to improve the situation.

J. Caja, E. Gomez, et.al [4], This paper presents the problem of optical measuring machine calibration, emphasizing the calibration of the optical system omitting the calibration of the machine system. Using this camera model, a calibration procedure has been developed using a grid distortion pattern. Finally, a procedure for calculating the uncertainty of the camera and geometric distortion parameters based on the Monte Carlo method has been developed.

Mohamed F. Abbas, et.al [5], This paper describes a series of calibration performed on suction controlled modified oedometer and triaxial equipment used for testing expansive soil. The modified oedometer, developed by the authors, comprises of thin-wall oedometer ring instrumented with strain gauges to measure the lateral stresses evolving during the test. The first part of this paper introduces the errors that arise during osmotic suction testing, concerning the device flexibility and PEG solution losses.

METHODOLOGY

Step 1: Measure the ambient temperature and record it. If the temperature is <18 C^o or >24 C^o,
and set a temp. ± 21 C^o.

Step 2: Inspect the inside and Outside Jaws and Depth blade for smooth movement.

Step 3: Using gauge blocks, measure and record 3 different lengths in three different position of the digital vernier caliper of respective jaws.

Step 4: Use a calibrated vernier caliper to measure gauge blocks of appropriate length, lock vernier at that length then measure between jaws distance of the instrument and record the data.

Acceptable Limit: ± 0.05 mm

Specification

vervier caliper:

Range: 0 – 200 mm,

Material: Stainless Steel, Least count: - 0.02 mm

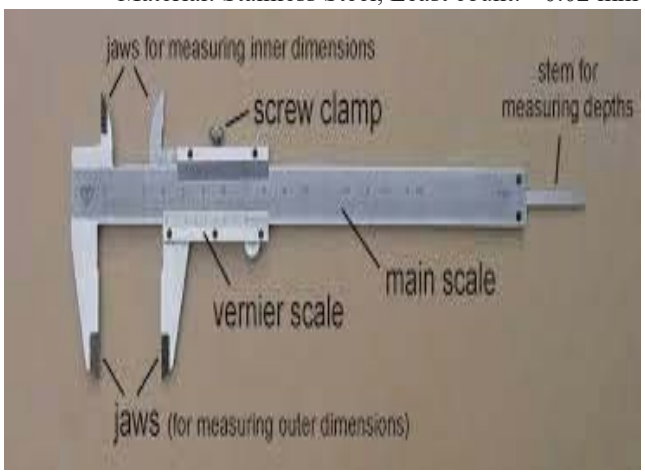

Fig.1 Simple Vernier Caliper

Slip gauge: Material- Stainless steel .

Fig. 2 Master slip gauge block.

Table 1.Experimental reading (Calibration data)

		Reading of measuring jaws at position (mm)				Limit (mm)	
Sr. no	Standard length in (mm)	Upper	Central	Lower	Average reading (mm)	Min.	Max.
1.	10	10.00	10.00	10.02	10.006	9.95	10.05
2.	20	20.00	20.02	20.00	20.006	19.95	20.05
3.	30	30.00	30.02	30.00	30.006	29.95	30.05
4.	40	40.02	40.00	40.00	40.006	39.95	40.05
5.	50	50.00	50.02	50.00	50.000	49.95	50.05
6.	60	60.04	60.00	60.00	60.013	59.95	60.05
7.	70	70.00	70.02	70.02	70.013	69.95	70.05
8.	80	80.00	80.00	80.03	80.010	79.95	80.05
9.	90	90.04	90.00	90.00	90.013	89.95	90.05
10.	100	100.02	100.00	100.02	100.013	99.95	100.05
11.	110	110.02	110.02	110.00	110.013	109.95	110.05
12.	120	120.02	120.00	120.04	120.020	119.95	120.05
13.	130	130.00	130.00	130.04	130.013	129.95	130.05
14.	140	140.00	140.02	140.02	140.013	139.95	140.05
15.	150	150.02	150.02	150.00	140.013	149.95	150.05

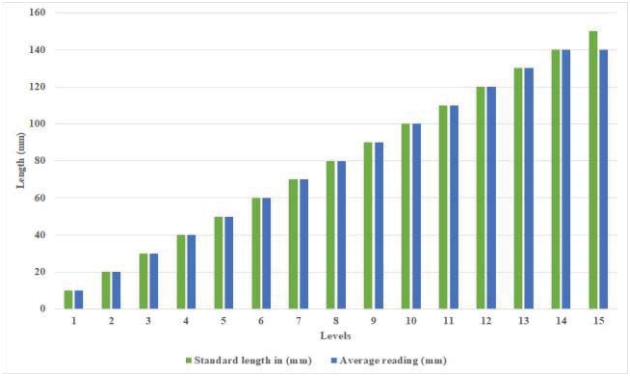

Fig. 3 Calibration graph for Standard Length Vs Average Reading in mm.

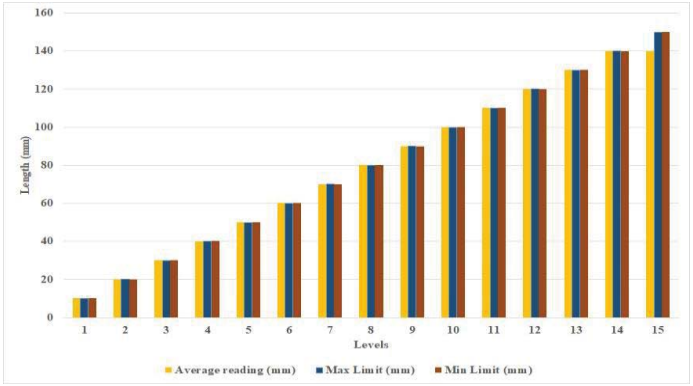

Fig. 4 Calibration Graph for Standard length Vs Average reading with respect to max. limit and min. limit

RESULTS AND DISCUSSION

- The above experiment completed, all the average reading of standard values is accept limit.
- The digital vernier caliper used in production line to check the dimension of automobile parts.
- For fastener division industries calibration essential within one week
- After complete calibration prepared master calibration scheduled only one year.
- The color code is required after calibration process.

CONCLUSION

From this investigation when the accuracy of the instrument is based on operating of the instrument at the calibration condition. The least count of the digital vernier caliper is indicated to the precision of the instrument. As compared to micrometer, vernier caliper used mostly times in manufacturing processes. Future work should be focus on further the standard value should be taken minimum values and calibrated the instruments. Range of the digital vernier calliper like 0-150, 0-200, 0-300 which is satisfied the minimum rejection of the product. Some organization do the calibration is perfect quality will increases with reduced the cost.

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