



180 degree Adhesiveness Testing Device

¹M.V.Borse , ²VrushaliA.Patel , ³Rohan V.Patil ,

⁴SujitR.Gunjaj , ⁵Abhishek B.Gunjaj

¹Lecturer in Mechanical Engineering Department GGSP, Nashik

²⁾³⁾⁴⁾⁵⁾Students of Third year Mechanical Engineering

Abstract:

Adhesive strength refers to the ability of an adhesive to stick to a surface and bond two surfaces together. It is measured by assessing the maximum tensile stress needed to detach or unstick the adhesive perpendicular to the substrate. To measure this adhesiveness there is a device called Adhesive Peel Tester. Peeling tests are the practice of testing adhesion properties of film bonded to substrate, usually by tensile. The peel strength determines the adhesive strength also called the adhesive fracture toughness. Physical testing of packaging products by peeling can tell us a lot about its properties and manufacturing process such as sealing consistency, bonding strength, adherence ability, cohesive properties of the interface, bond durability and other parameters. This device covers the measurement of the peel adhesion of pressure sensitive tapes. Peel adhesion is the force required to remove a pressure sensitive tape from a test panel or its own backing at a controlled angle and at a standard rate and condition. A peel test is performed between two substances bonded together with an adhesive. The substrates may be both flexible or one may be flexible while other is rigid.

(**Keywords:** adhesive peel test, wide angle measurement, adhesiveness measuring, magnetism testing)

Introduction:

Peel testing of adhesive and pressure sensitive tapes is used for quality assurance, and provides a means of assessing uniformity of the adhesion of a given type of tape. The assessment may be within a roll of tape, between rolls, or between production lots. Generally the goal of a peel test is to determine the adhesive strength of the material or the strength of adhesive bond between two materials. This adhesive strength may be referred to as the “stickiness” of a material as it is a measure of the samples resistance to separation from one another after the adhesive has been applied. This measured value may then be used to determine if the adhesive bond is strong enough or too strong for the application and whether a different adhesive or bonding process is needed. A peel test is performed between two substances bonded together with an adhesive and they may be both flexible or one may be flexible while other is rigid as mentioned above, so this flexible substrate often consists tape, film, thin plastic material, rubber or other polymers, whereas the rigid substrate is commonly but not limited to a type of metal, rigid plastic or composite.

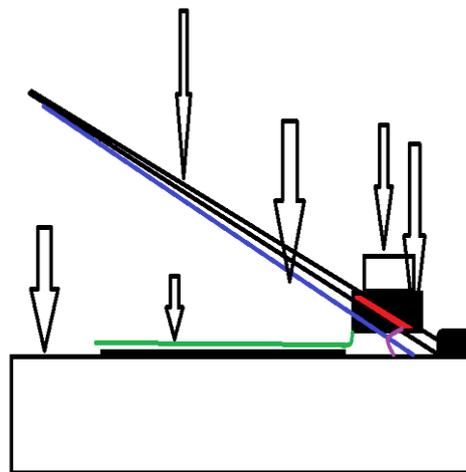
CONSTRUCTION

It consist of wooden base. Movable and adjustable joint (0-180)

Leadscrew fixed on bearing which conected to motor (230 AC)

Wooden block with inside thread is mounted on lead screw.

Digital weight meter is fixed on wooden block



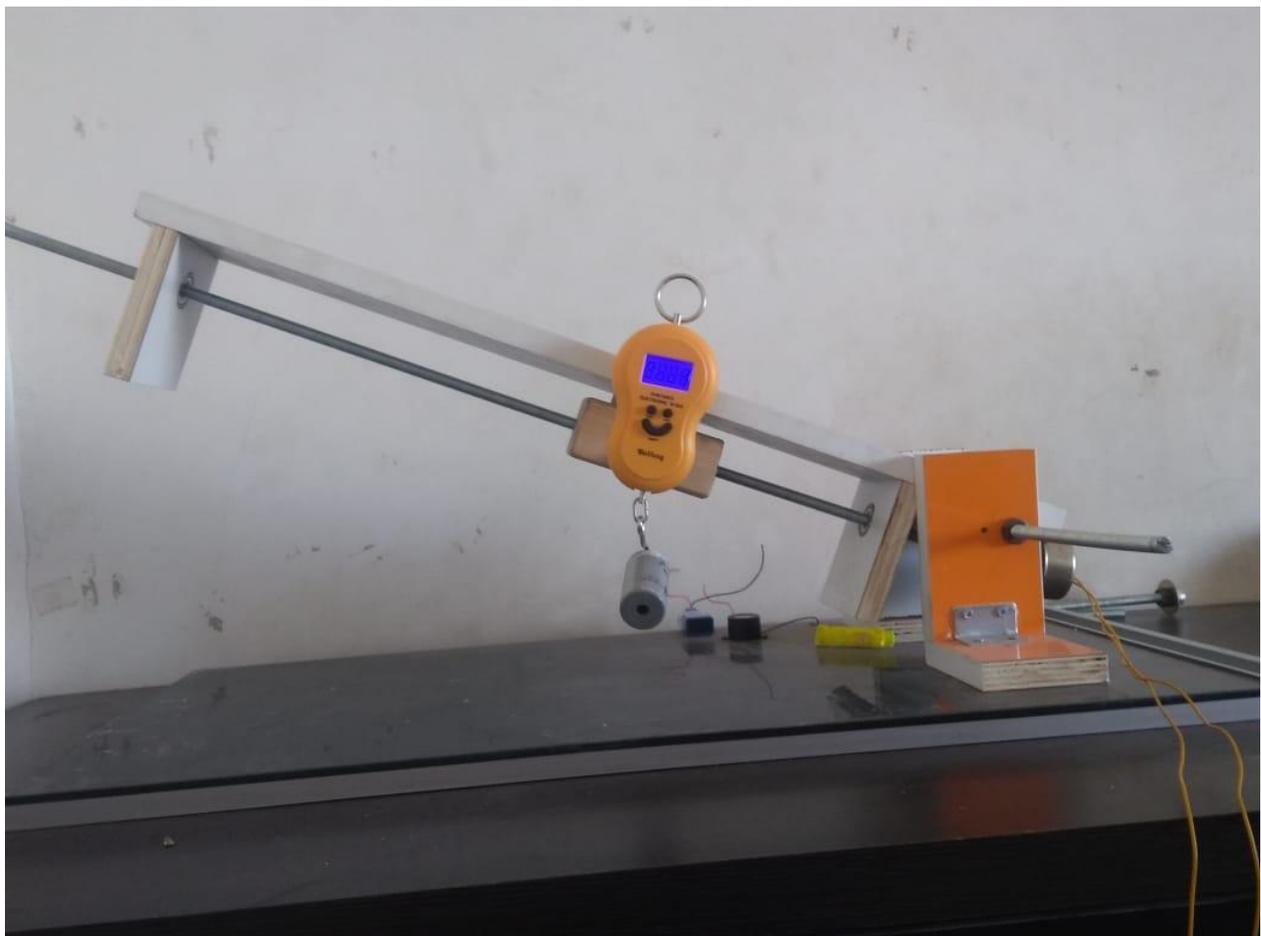
WORKING

When motor start rotate at same time lead screw start rotate since block connected over leadscrew start for moving .

Digital weight meter is fixed on block

Tape or object to be measure is adjusted on weight meter , since physical distance between two surface increases and we got reading on digital weight meter .

This operation continuous till start (0) to (75cm) which gives average reading 150 readings over single tape (approx.)



Applications:

- To measure the adhesiveness at 180 degree angle
- Also to measure the magnetism of given or any specific substrate
- 180 degree peel test of metal foil
- Adhesive tape peel testing
- Adhesion strength of rubber to textile fabric
- Package seal peel testing
- Peel adhesion bond strength of labels
- For T-Peel test
- In manufacturing company of cello-tape or adhesive tape

Advantages:

- Can measure adhesiveness even at 180 degree
- High accuracy
- Faster in working
- Cheaper in cost
- Can measure adhesiveness of tape applied on any surface
- Multipurpose device to measure adhesiveness with magnetism
- Average value on the single operation can be performed

MAINTAINANCE

- It contains zero lubrication so maintenance cost is too low
- Bearing of connecting rod needs to clean in every 2 month
- Motor of device needs should not be work 8hours without break
- Digital weight meter need to be tare after changing heads and battery needs to be replaced after 110hours of working
- Buzzer and indicators battery should be replace after its dead

FUTURE USE

- For educational purpose.
- For industrial point of view.
- For 180 degree adhesiveness testing.
- Magnetism can be also check.
- Adhesiveness check over the different surface which is future's need.
- Average reading over a single operation.
- Environmental condition does not effect on it.

- Multipurpose(Tape, Magnet)

CONCLUSION

From output of device we will get 100% accurate reading of adhesiveness & average reading of same operation gives highest accuracy on same conditions

REFERENCE

1. L H Sharpe, 'Wettability and "adhesion" revisited', Proceedings of Adhesion '99, Institute of Materials, 1999.
2. J JBikerman, 'The Science of Adhesive Joints', Academic Press, 1968.
3. J R Huntsberger, Surface energy, wetting and adhesion, J Adhesion 12, pp3-12, 1981.
4. A A Roche and J Bouchet, 'Formation of epoxy/metal interphases', Proceedings of Structural Adhesives in Engineering VI, Institute of Materials, 2001.
5. L H Sharpe, The interphase in adhesion, Proceedings of Aspects of Adhesion 9, Transcripta Books, ed. D Alner and K Allen, 1973.
6. G C Knollman, Variation of shear modulus through the interfacial bond zone of an adhesive, Int. J. of Adhesion and Adhesives, vol 5(3), 1985.
7. G C Knollman and J JHartog, Experimental determination of the variation in shear modulus through the interfacial zone of an adhesive, , J Adhesion vol 17 pp251-272, 1985.
8. H Botter, A van den Berg, F Soetens, IJ J Straalen and A Volt, 'Influence of surface pre-treatment on the shear stress-strain relationships of structural adhesives', Proceedings of Structural Adhesives in Engineering VI, Institute of Materials, 2001.