Development And Study Of New Leveling Head (WEDGE) To Replace Three Foot screw Leveling Head in surveying instruments

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Abstract- The planning and design of Civil Engineering project such as construction of highway, bridge, tunnel, dam etc. are based upon surveying measurements. For surveying we needs to level the instrument with three foot screw for every change point which make surveying a long process. In this context, the present paper reports an overview of advanced leveling head which works on principal of wedge leveling. This instrument reduces time consumed for leveling surveying instrument

Keywords- Advanced leveling, Leveling head, Survey instrument, Wedge leveling.commerce

I. INTRODUCTION

Surveying is the first and essential most stage for any construction project. Surveying has to do with the determination of the relative spatial location of points on the surface of earth. Surveying instruments needs to be level that means to make axis of telescope perfectly horizontal. That is achieved with the help of leveling head, it is generally a conical socket attached with the triangular base called as tribrach having three or four screws. Two level tubes are provided over it. The screws are adjusted by turning them until the bubble remains in center of the tube for complete revolution of telescope. The process of performing this needs skills and repetitive adjustments which makes surveying a time consuming process.

II. PROBLEM STATEMENT

Conventional three screw leveling head needs a repetitive turning of screw to insure the bubble on center of the spirit level. For every change point in surveying we again need leveling of instrument which makes surveying a long process. In case of road and canal survey change points needs to take frequently. To make surveying easy and quick we have designed two wedges and three wedges leveling head.

III. STUDIES AND FINDINGS

Objectives

1) To design and develop wedge leveling head and replace it by ordinary three-foot screw leveling head in to avoid repetitive trials.

2) To minimize time required for leveling procedure in three-foot screw leveling head.

IV. ADVANCED LEVELING HEAD

We have developed advanced leveling head having two types

1. Two wedges
2. Three wedges leveling head.

Wedge inclination of leveling head is of 5-6 with horizontal.

A. TWO WEDGE LEVELING HEAD

It consists of two wedges namely upper and lower wedge made from aluminum. Two wedge leveling head is simplest form of head can be used for the nominal tilt of tripod stand. Two wedge leveling head shown in figure 1.

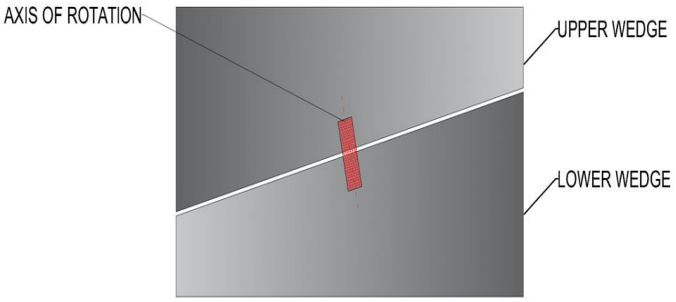

Figure 1. Two wedges leveling head

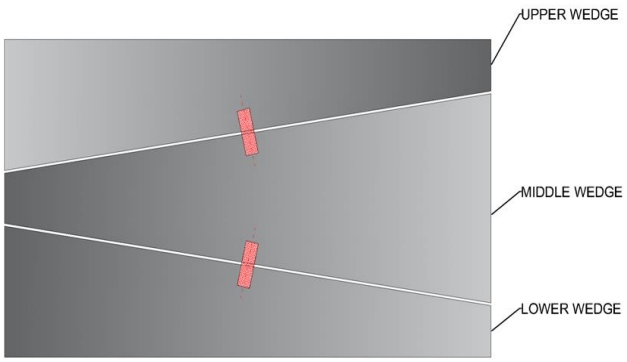

Figure 2. Three wedges leveling head

B. THREE WEDGE LEVELING HEAD

It consists of three wedges namely upper wedge, middle wedge and lower wedge. Three wedges leveling head as shown in figure2.

V. PRINCIPAL OF OPERATION OF INSTRUMENT

This instrument works on the principal of change in elevation of wedge surface at every rotation of the wedge. This makes upper surface horizontal at particular rotation.

A typical field condition of two wedge leveling head is shown in figure 3. When the instrument is placed on its base, as due to the field condition line of sight of instrument is inclined to the certain degree with 'Y' angle. To make instrument level upper surface of wedge should be horizontal which can be achieved by rotation the wedges relatively to each other.

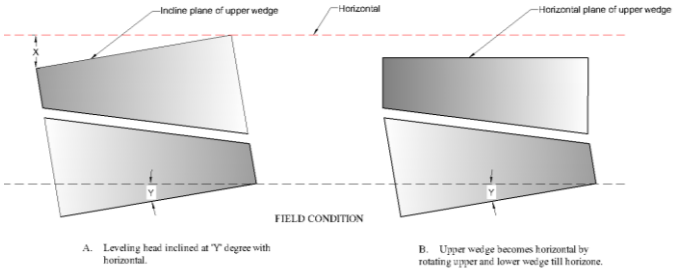

Figure 3. Two wedges leveling head in field condition

VI. EXPERIMENT CONDUCTED

Experiment was conducted to compare the time required for leveling by three-foot screw leveling head and wedge leveling head. Three persons named as A, B, C performed the leveling by using both the leveling head by each person and following table is formed showing time required to level in seconds.

Table -1. Time comparison between wedge levelling and three-foot screw levelling.

Leveling Time (sec)	Person A	Person B	Person C
Three-foot screw	90	82	85
Wedge leveling head	60	40	45

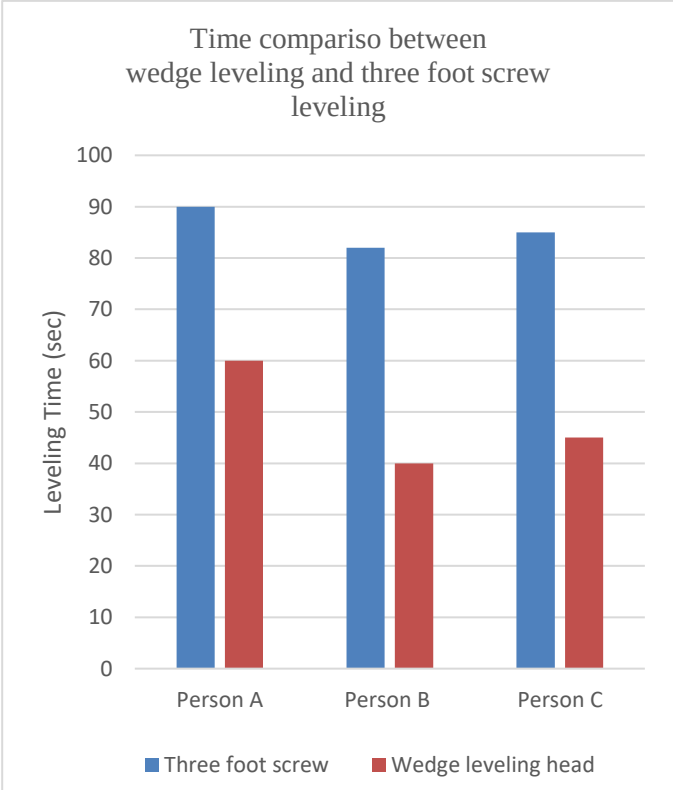

Figure 4. Time Comparison

VII. CONCLUSION

By the study of this design of leveling head and experiment conducted we can conclude that

1) As time required for leveling by wedge leveling head is found to be less than that of three foot screw leveling head, by replacing wedge leveling head with the ordinary three foot screw leveling head will help for quick leveling of instrument.

2) By experiment we have found that Repitative trial for leveling not required in wedge leveling head.

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REFERENCES

[1] S. K. Duggal, Surveying, Vol. II, Tata McGrew Hill, India.

[2] W. N. Thomas, Surveying, Fourth Ed., Edword Arnold, London.

[3] T. P. Kanetkar & S. V. Kulkarni, Surveying and leveling, part-2, 24th Ed. Pune Vidyarthi Griha Prakashan, Pune.

[4] William Gravatt, craig-telescope.co.uk Retrived 2012-05-31