

A fast Geometry Test for machine tool based on laser

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Abstract. This text introduced a kind of Geometry Test for machine tool, mainly make use of the stick and laser to measure the tool system, pass plait distance to complete machine tool automatically part several accuracy measure, and the automatic record is bad value. Pass the engineering application, can attain the accuracy with 0.02 mm.

1. Introduction

The CNC Geometry Test is changed because of the development of the machine tool accompanies with the machine tool accuracy, Be counting to control to process realm, the laser useds for packing to clip with the fixed position[1~2], Along with the machine tool usage the accuracy loses gradually, the machine tool accuracy needs to periodically carry on an measure, Urak Sencer Etc. put forward a kind of new outline error margin to set up a mold method[3~5],how can be several to the machine tool quickly the accuracy carry on measure to deserve technical personnel's consideration.

2. The existing accuracy measure method

Currently aim at the machine tool principal axis and Z stalk a stalk degree, the principal axis path together to jump about etc. the accuracy measure, mainly is pass an measure stick and thousand cent form of the form carry on, need to maintain a personnel to install an measure stick, moves an operation the hand round ambulation to sit a mark, make thousand cent the form Be examining good circumference or straight line the direction move such as once the figure show[6], can acquire the machine tool principal axis various accuracy. This technique is counting to control the machine tool accuracy measure realm to begin from a mature technique.

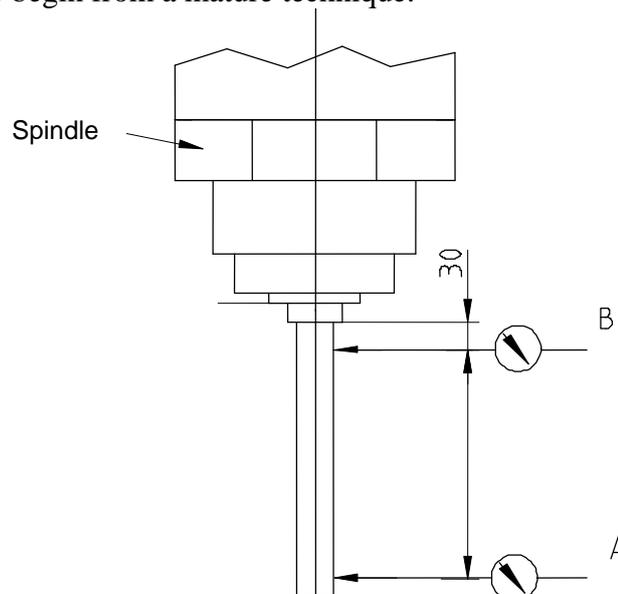


Fig. 1 old way to measure

Insert and clamp test mandrel in milling spindle. Position dial indicators stylus on test mandrel (position A), reset indicator to zero. Rotate spindle slowly, read and record indicator reading.

The number controls the laser of the machine tool to equip to mainly used for the length or knife that the knife have to have damaged of measure, main is been a lord by the NC4 type product of the

British RENISHAW company.

3. Laser carries on machine tool several accuracy an measure

3.1 The laser measure method a-Center offset

Make use of the basic principle that the laser measures knife, move the machine tool principal axis measure stick to the laser to examine position, be the measure stick to cut off laser, record machine tool to order P1 to sit the mark value, in the procedure automatically be partial to move P1 to sit a mark to is worth a 0.01 mms(can establish freely) to sit the mark position stop, revolve a principal axis, if again trigger the measure stick to cut off laser, then machine tool together the stalk degree several accuracy bad value big in 0.01 mms, if trigger, then machine tool together the stalk degree accuracy small in 0.01 mms.

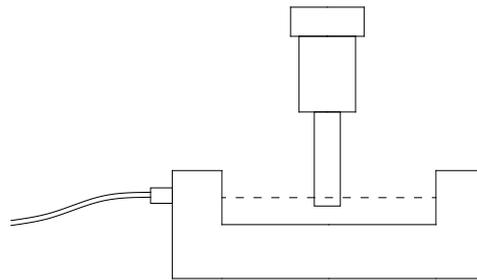


Fig. 2 laser check for Center offset

3.2The laser measure method two-parallelism

Same, make use of the principle of that laser, measure the stick install on the principal axis, moving machine tool respectively, making the P close to laser beam with P 2:001:00, being to trigger laser, record to order P1 and order the value of the P2, sit mark to be worth through two points of bad, acquire machine tool Be should be directional of parallelism error margin.

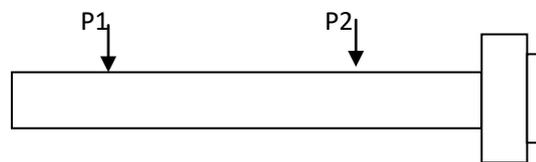


Fig.3 od three-RTCP

With together the stalk degree the accuracy measure principle is similar, making use of the ball head apogee to record to sit the mark value at present while cut off laser, moving to sit a mark to be worth a 0.05 mm, at all point the movement machine tool RCTP function, if again the error margin scope inside, then will not appear laser is cut off of circumstance, can the with all speed degree promote an measure efficiency.

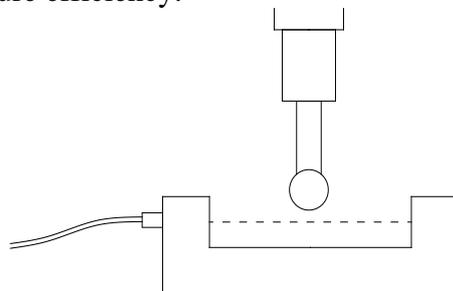


Fig. 4 laser check for RTCP

4. Result

Pass artificial operation, spread the feeling machine measure and laser accuracy measure to carry on contrast, such as table a show. Mainly include each item several accuracy. Pass time covariance also, can see, take up absolute advantage in the laser measure efficiency, but examine item little in other items.

Table 1 time for check

	Center offset		parallelism		RTCP	
	Time	Tolerance	Time	Tolerance	Time	Tolerance
Manual	8min	0.01mm	10min	0.03 mm	46min	0.04 mm
Sensor	20min	0.004 mm	25min	0.021 mm	65min	0.027 mm
Laser	2min	0.01 mm	2.5min	0.025 mm	5min	0.05mm

5. Conclusion

Pass the actual result contrasts to discover, laser the measure is from time better than other measure means, but accuracy measure the error margin is slightly big in other measure way. Should examine a method can used for whether the normal regulations accuracy check or the instruction machine tool of repeated need to carry on a further precise measure or not, can't used for machine tool to check before acceptance to wait the precise accuracy measure.

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