

QUESTION PAPER REFERENCE: FD2

Claims

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1. An insert for removably attaching a mount supporting a machine tool accessory to the insert comprising :

a body for insertion into and fixing in a position in a slot of a machine tool bed, wherein the insert remains fixed in the position when the mount is attached to an detached from the insert.
2. An insert according to claim 1, wherein the insert is expandable such as to fix the insert in the position in the slot.
3. An insert according to claim 2, wherein the insert is expandable widthways so as to hold the insert against the sides of the slot by friction in use.
4. An insert according to claims 2-3, wherein the unexpanded shape of the insert fits closely in a standard T-shape or U-shape slot in a machine tool bed.
5. An insert according to any of the preceding claims, wherein the top face of the body is flat.
6. An insert according to any of the above claims, wherein the insert is shaped such that in use the insert can be fixed in position such that the insert does not protrude over the top of the slot.
7. An insert according to any of the above claims, wherein the body comprises at least one tapered hole for inserting expansion means.
8. An insert according to any of the above claims further comprising expansion means for expanding the insert.
9. An insert according to claim 8, wherein the expansion means comprise at least one tapered screw.
10. An insert according to claim 9, wherein the slotted end of the at least one screw is accessible from the upper face of the body.
11. An insert according to claim 10 wherein when the insert is in its expanded state the slotted end of the screw lies flush with the upper face of the body.
12. An insert according to any of claims 8 to 11, wherein the expansion means comprise spacers or shims.

13. A mount for removably attaching to an insert, the mount comprising means for securing a machine tool accessory to the mount; and gripping means for gripping the insert to which the mount is attachable.
14. A mount according to claim 13, wherein the gripping means comprise two arms.
15. A mount according to claim 14, wherein the arms are moveable relative to one another.
16. A mount according to claim 15, wherein the arms are moveable between a first position in which the distance between the arms is larger than the length of the insert to which the mount will be attached, and a second position in which the distance between the arms is smaller than the length of the insert to which the mount will be attached.
17. A mount according to claim 16, wherein the arms are biased to the second position.
18. A mount according to and of claims 15 to 17, in which the arms are moveable relative to each other by a handle.
19. A mount according to any of claims 13 to 18 comprising a lower surface for sitting on a machine tool bed when the mount is attached to the insert.
20. A kit of parts comprising an insert according to any one of claims 1 to 12 and a mount according to any one of claims 13 to 19 for removably attaching to the insert.
21. A method of removably attaching a machine tool accessory to a machine tool bed, the method comprising:
 - fixing an insert in a position in a slot in the machine tool bed;
 - attaching a mount comprising the machine tool accessory to the insert; and
 - detaching the mount from the insert;wherein the insert remains fixed in the position during the method and once the mount is detached from it.
22. A method according to claim 21, wherein the step of fixing the insert in a position comprises inserting the insert into the slot and expanding the insert such that friction holds it in place.
23. A method according to claim 21, wherein the expanding is done with screws.

24. A method according to claim 21 to 23, wherein the mount comprises moveable arms for gripping the insert, and wherein attaching and detaching the mount comprise moving the arms to grip and release the insert respectively.
25. An insert substantially as described herein with reference to figures 2, 3 and 5.
26. A mount for removably attaching to an insert, the mount as substantially described herein with reference to figures 4 and 5.
27. A kit of parts comprising an insert and a mount as substantially described herein with reference to figures 2 to 5.
28. A method for removably attaching a machine tool accessory to a machine tool bed as substantially described herein.

MARKS AWARDED 29/60

Introduction & Description

An insert and mount for a machine tool accessory, and a method of use thereof

Field:

The present invention relates to an insert and mount for mounting a machine tool accessory to a machine tool bed.

Background:

A machine tool is used for machining a work piece, for example metal blocks for car engine blocks or aircraft parts. The work piece is typically attached to a flat bed of the machine tool whilst being machined. As high forces are applied to the work piece, it is necessary to hold it securely on the bed. Slots (typically T-shaped or U shaped) are provided in the bed which allow the work piece to be bolted to the bed.

Other accessories are use with the machining tools such as temperature sensors, cameras, which are sometimes needed to be attached to the bed. One accessory is a tool setter, which has a sensor for detecting contact of the machining tip. The position of the sensor is calibrated, and the tip is moved against the sensor such that the length of the tool, and other tool properties, can be calculated by a controller. Accordingly it is important for the controller to know the position of the sensor to know where it is in relation to the tool to accurately make a measurement.

One way of attaching accessories to the bed is to use bolts, upward facing with their heads in the T-slot, still along the T-slots via an open end of the slot. The heads of the bolts are sized and shaped such that they cannot be turned in the slots. Two bolts are provided in a slot, and a mount holding the accessory is positioned between them. The mount has holes which the shaft of the bolts run through, and

nuts are screwed over the end of the bolt to attach the mount in place. This requires a spanner.

When the accessory needn't be used any more, the nuts are undone and the mount is removed from the bolts. The bolts move from their fixed position when the mount is removed.

Further, the bolts protrude above the bed of the machine which is undesirable so the bolts may be completely removed from the slots. If the accessory needs to be reattached, its position must be recalibrated before taking any measurements, as the bolts do not remain in their original position.

An attachment means solving the above problems is required.

Summary

According to a first aspect of the present invention, there is provided an insert according to claim 1. The insert remains in a fixed position when the mount is attached to it, and once the mount has been detached from it. Therefore the mount can be reattached and the insert and mount will be in the same position. This means the exact position of the accessory on the mount is known and does not need to be recalibrated between uses. This reduces 'machine time' and in turn reduces the cost of machining a work piece.

Optionally, the machine tool accessory is a tool setter, as knowing the position of the setter is essential to its function such that recalibration provides particular time and cost saving.

Optionally, the insert has the features of claim 2. The expansion of the insert within the slot holds it in place by function against any part of the slot so it cannot move when the mount is attached to or detached from it.

Optionally, the insert has the features of claim 3. The sides of the insert provide force against the sides of the slot holding the insert in place by friction.

Optionally, [claim 4]. The insert can be used on any standard machine bed slot so is versatile, and the expansion does not require additional features or alterations to the bed – it just works by friction so can be used on any bed.

Optionally, [claim 5]. The top face is flat so can lie flush with the flat bed, meaning that metal debris (swarf) generated during machining does not build up, providing a cleaner process reducing the need for later cleaning.

Optionally [claim 6]. In use no part of the insert protrudes above the flat bed, meaning that the insert can remain in place when no mount is attached to it and does not interfere with the work piece or machining. Therefore at a later stage the mount can be reattached to the insert w/o the need for recalibration.

Optionally [claim 7], [claim 8], [claim 9]. The insert may further be provided with tapered screws to effect expansion of the insert. Tapered screws are effective at expanding the insert using tapered holes to expand the right amount to give the insert in place. Tapered screws are inexpensive. Further, the insert can be repositioned requiring only a screw driver, which is easy and straightforward.

Optionally, [claim 10] such that the screw can be easily accessed from the machine bed side by the user for moving and fixing the insert in place.

Optionally, [claim 11] to further reduce the build up of metal debris in the insert as there are no gaps for it to get caught in.

Optionally [claim 12] which can expand the insert to a variety of sizes to allow for it to be fixed in a variety of slots or apertures.

According to a second aspect of the present invention, there is provided [claim 13]. The mount has gripping means for gripping to an insert such that the insert can be fixed and non moveable. The insert does not need to provide the attachment means, and the mount can be readily attached and removed from any fixed object.

Optionally, [claim 14-16]. The arms in the first position allow the mount to fit over the insert, and in the second position grip onto the insert to attach the two.

The arms can return to the first position to release the insert and remove the mount.

Optionally, [claim 17]. When the outside force is applied the arms are in the second position such that the mount can grip and securely attach to the insert for the duration of the attachment coil requiring e.g. screwing, tightening or constantly applied user force.

Optionally, [claim 18]. The arms can be simply moved and released by a user's hand such that no tools (eg spanner) are needed to attach / detach the mount from the insert.

Optionally, [19]. The mount sits flush with the bed in use such that the accessory attached to the mount is well supported, and the bed supports the weight of the accessory (rather than the insert supporting the weight – so the insert needn't be in place with supporting force).

According to a third aspect of the present invention, there is provided [claim 20]. The mount and insert together can attach an accessory to the bed.

According to a fourth aspect of the present invention, there is provided [claim 21]. The insert remains in place after detachment of the mount such that the mount can be reattached at the same location w/o the need for recalibration.

Optionally [22] and [23] fixing the insert is therefore easy and straightforward for the user, requiring only a typical screw driver and no modification to the bed.

Optionally [24]. The mount itself grips the insert for easy attachment and detachment.

Figures

The present invention will be described, by way of example only, with reference to the accompanying figures, in which :

Figure 1 shows a perspective view of a machining tool;

Figure 2 shows a perspective view of an embodiment of an insert according to one aspect of the present invention;

Figure 3a and 3b show a sectional view of the insert of figure 2;

Figure 4 shows a perspective view of an embodiment of a mount according to one aspect of the present invention, with a machine tool accessory; and

Figure 5 shows a perspective view of an insert and a mount according to an embodiment of the present invention in use.

Like reference numerals correspond to like parts throughout the figures.

Detailed Description

A known machining tool 100 is illustrated in Figure 1, and has a machine bed 102. A work piece 104 is positioned on the bed. The tool has a cutting tool 106 for machining the work piece 104.

A tool setter 108 is positioned on the bed. The tool setter for calculating the length and other properties of the cutting tool 106. The machine tool has T-slots 110 in the machine bed 102.

An insert 200 according to an embodiment of the present invention is illustrated in Fig. 2. The insert has an upside down U shaped slit 204 running along the length of an elongate body 202. The insert has tapered holes 206 through the top surface of the body 208. The tapered holes 206 flare out in diameter from the top surface 208, and are threaded along their length. The body 202 is rectangular and has dimensions 1 cm x 1 cm x 5 cm. The shape corresponds to the shape of a tail of a standard T slot.

A cross section along line I-T of the insert 200 is shown in figures 3a and 3b. figure 3a shows the insert in unexpanded form.

A tapered screw 220 is positioned in the slot 204. The head of the screw sits in the hole 206 of the insert. The screw flares out corresponding to the taper of the hole. The insert here has width W_1 . The largest diameter of the screw is positioned in the flare of the tapered hole.

The screw 220 is screwed upwards along the threading of the hole 206. Correspondingly, the flared end of the screw 220 moves upwards out of the flare of the tapered hole 206 and into the narrower part of the tapered hole. This forces the sides of the body 202 of the insert outwards, such that the insert now has a larger width W_2 .

A mount 300 with a tool setter 302 is shown in Fig. 3. The mount has two downward protruding arms 304 and 306. One arm 304 is fixed relative to the body of the mount. The other arm 306 is moveable about a pivot 308, wherein above the pivot a handle 310 is provided effecting movement of the arm as shown by the arrows. The mount includes a spring 312, which biases the arm towards the body of the mount (the 'closed position'). In the closed position, the distance between arms 304 and 306 is slightly less than the length of the insert the mount will be attached to. When the handle 310 is moved and the arm 306 moves outward, the distance between the arms increases to be greater than the length of the insert.

In use the insert 200 is positioned in a slot 110 of the machine tool as shown in Fig. 5.

The insert can be slid up the length of the slot, and the screws 220 tightened to expand the insert and provide force against the sides of the slot 110 to hold the insert 200 in place by friction.

The insert fits exactly in the slot 110 in unexpanded form. The insert 220 is fixed in position to be flush with the bed 102 so no debris from the work piece builds up, and so the insert 110 does not protrude and get in the way of the work piece when the mount is not attached. Further, when tightened the screws 220 lie flush with the upper surface 208 of the insert. The insert is fixed in position and will not move upon attachment / detachment of the mount 300.

The handle 310 of the mount is squeezed such that the distance between the arms 304 and 306 is larger than the length of the insert 200. The mount 300 is placed over the insert 200 and the arm 310 is released. The spring 312 (not visible in Fig. 5) brings the arms 306 back towards the mount to the closed position such that the distance between the arms is less than the length of the insert 200 and the mount 300 grips the insert and holds the tool setter 302 in place.

The tool setter can then be used to determine properties of the tool.

When the tool setter is no longer needed it can be removed. The insert 200 will remain in place in the slot 110. The tool setter 302 and mount 300 can be

reattached at a later time, into the same position such that no recalibration is needed.

Thus there is provided a mount and insert for attaching a machine accessory to a bed, wherein the insert remains in position after detachment of the mount such that recalibration is not needed on reattachment. The above description relates to a specific embodiment alone and the skilled person will appreciate modifications of detail can be made without departing from the present invention.

For example the insert can be shaped to be used in a U slot. The input can be expandable using spacers or thin trips of material (known as shims) and the mount can be used to attach to different machine tool accessories, such as camera, calibration tools or temperature sensors.

MARKS AWARDED 31/36

Abstract

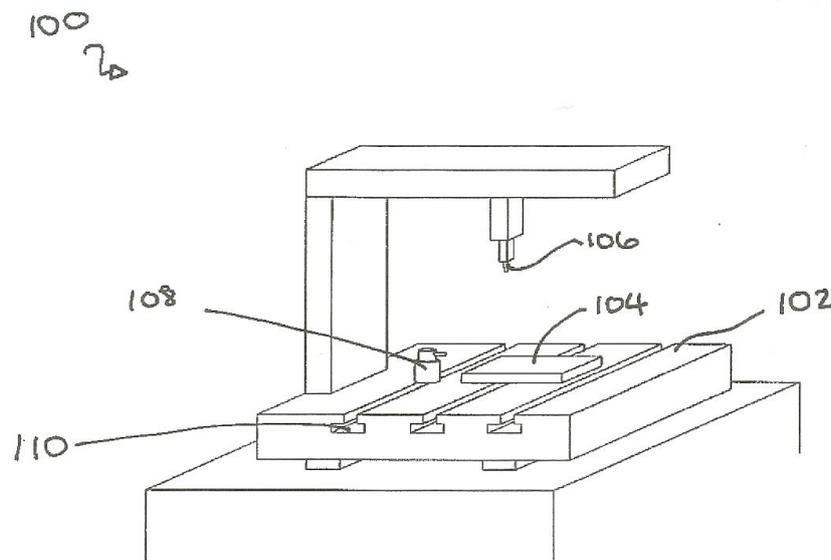
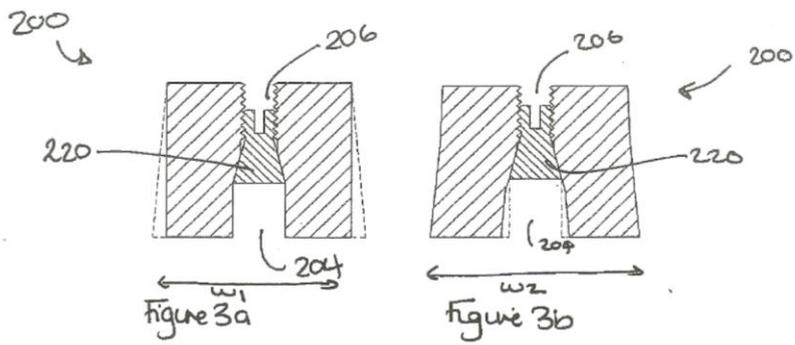
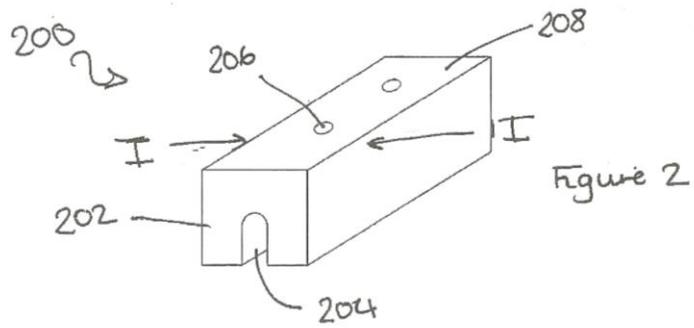
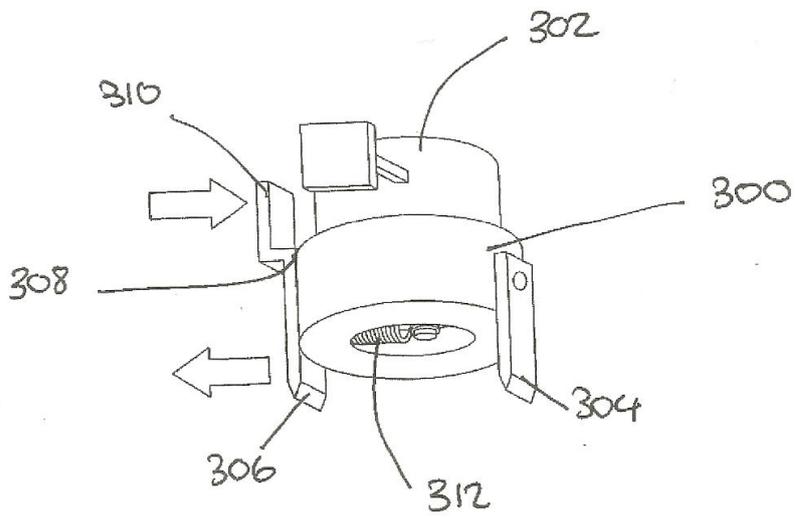


Figure 1

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2/4



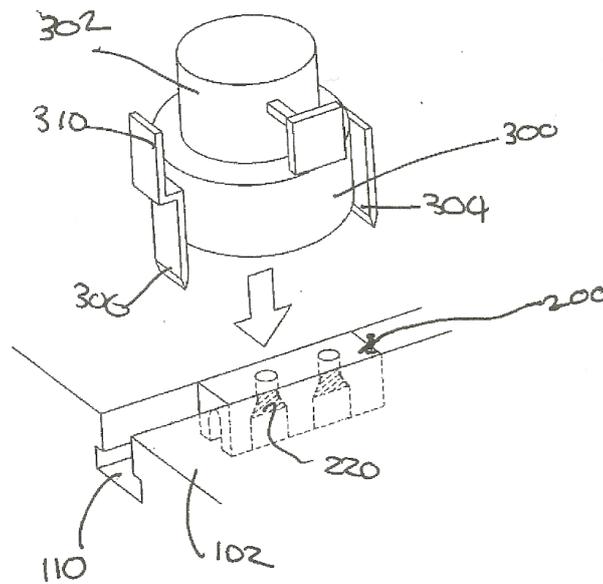


Figure 5

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Abstract

An insert and mount for a machine tool accessory, and a method of use thereof

A mount 300 and an insert 200 for attaching a machine tool accessory 302 to a machine tool bed 102. The insert 200 can be fixedly positioned in a slot 110 of the bed 102 and the mount 300 can be attached to and removed from the insert 200. The insert 200 remains in the fixed position when the mount 300 is attached to and detached from the insert 200.

Fig. 5 to accompany abstract.

MARKS AWARDED 4/4