Introduction parts in the process of surface

IntroductionThis report with be a comparison of the benefits anddrawbacks of both through hole and surface mount technology and I will look toestablish which one is more effective as a method for producing printed Circuitboards.

1. Manual assembly andmanual component repair is more difficult and requires highly skilled operatorsand more expensive tools, this is due to the small component sizes and leadspacing’s of many SMDs. Handling of small surface mount technologycomponents can be difficult, requiring tweezers, unlike nearly all through-holecomponents. through-hole components willstay in place (by gravity) once in place and can be mechanically secured priorto soldering by bending out two leads on the solder size of the board, SMDs areeasily moved out of place by a touch of a soldering iron. Without expert skill, when manually soldering or de-soldering a component, it is easy to reflow thesolder of a nearby component and unintentionally move it by accident, somethingthat is very difficult to do with through-hole components.

2. Within the PCB assembly facilities board are often workedon in an assembly line. This process allows them to be moves from one sectionto another whilst something is added at each stage.

The boards can be moved onconveyor belts passing the boards from one state to the next. This process allowsthe board to be worked on quickly as at each section there is something beingworked on and there is never an idle stage. The disadvantages of this are thatit can often take a while to notice something is wrong and by the time that ithas been noticed a considerable number of units may also be defected. 3. One of the most crucial parts in the process of surfacemount assembly is applying the solder paste to the printed

circuit board(PCB). The aim of this process is to deposit the correct amount of solderpaste on to each pad in order to be soldered with great accuracy.

This isdone by using a stencil to print the paste through. The same procedure can alsobe applied by jet printing. It is this procedure that it usuallyaccountable for the most defects within assembly, however if controlledproperly there can be very few mistakes. The most frequently used way of applying solder paste to aPCB using a stencil is a special squeegee blade. The squeegees are thetools used to apply the solder paste across the stencil and on to thePCB. They can sometimes be made from polyurethane however they are usuallymade from metal. During the print cycle it is important to apply the rightamount of pressure across the entire length of the blade to ensure a clean wipeof the stencil.

Too little pressure can cause the paste to smear on thestencil and can cause an incomplete transfer of the paste to the PCB. Toomuch pressure can scrape up too much paste from the board causing excess wearon the stencil and squeegees, and may cause the paste to seep out between thePCB and the stencil. To verify the process, automatic inspection can be used toaccurately check solder paste deposits. There are two types of solderpaste inspection available which are 2D inspection which checks the area of thepaste deposit and 3D inspection which checks the volume of the paste deposit. 4.

Pick-and-place machines are robots that are used toplace surface mount devices on a printed circuit board. These robotsare used for high speed and precision placing of a wide variety of electroniccomponents,

like resistors, capacitors and integrated circuits ontothe PCBs which then in turn can be used in computers, consumer electronicsas well as medical, automotive, militaryand telecommunications equipment. The robots are programmed with theinformation of where to place certain components and can work in groups pacingmultiple components together or in an assembly line fashion where one piece is placedand is then moved along to the next machine. 5.

Reflow soldering is a process in which multiplecomponents are temporarily secured to a PCB before a controlled temperature isapplied and fixes the components in place on the board. There are 5 basicstages to this process. Stage 1: preheating. This should get rid of any solventsand activate the flux.

Stage 2: bring allcomponents to the same temperature. Thesoak zone brings the temperature of all components and board areas to an equallevel. Components do not heat up at the same speed. This is especially the casewith infra-red heating, due to uneven absorption of infra-red energy bycomponents. Stage 3: Heating. In the reflow zone the temperature is increasedto above the melting points of the solder tis causes it to fuse with the copperand wets the pads and component pins better when it is hotter, this creates better joints. Stage 4: Cooling. The components need to cool fastbut also at a rate which does not cause thermal stress.

Room temperature coolingis usually fine6. Solder needs flux to help with the fusing between metalsat high temperatures. For example tin and copper fuse well together but at hightemperatures, like those that occur during soldering

the oxides of copper donot fuse well with tin. The flux helps to reduce the oxides and help bond thetwo metals.

In order for the boards to be produced at a high standardthe stencils and equipment has to be cleaned regularly. Boards are oftencleaned with a cleaning chemical such as IPA (Isopropyl Alcohol). This rubbing alcohol is used to remove the flux fromthe stencil to allow for it to be clean ready for it to be used again. 7. Lead forming is used in through hole technology caneither be done manually or by a machine. Lead forming is the cutting, forming andbending of axial components to get them into the desired shapeManual lead forming requires special tools and requiresquite a bit of precision.

Machine lead forming requires specialist machines butis more accurate and quicker than manual lead forming. 8. The basic equipment used during the process is a conveyorthat moves the PCB through the different zones, a pan of solder used in thesoldering process, a pump that produces the actual wave, the sprayer for theflux and the preheating pad.

The solder is usually a mixture of metals. Atypical leaded solder has the chemical makeup of 50% tin, 49. 5% lead, and 0. 5%antimony.

In conclusion both through hole and surface mount technologyare both effective ways of producing PCBs; however they are more effective fordifferent things. Surface mount technology is accountable for a higher andquicker manufacture whereas through hole technology caters for small andprecise projects where a large number of units are not required.