



BOSCO Printed Circuits (Pty) Ltd.

(Reg No: 66/03723/07)

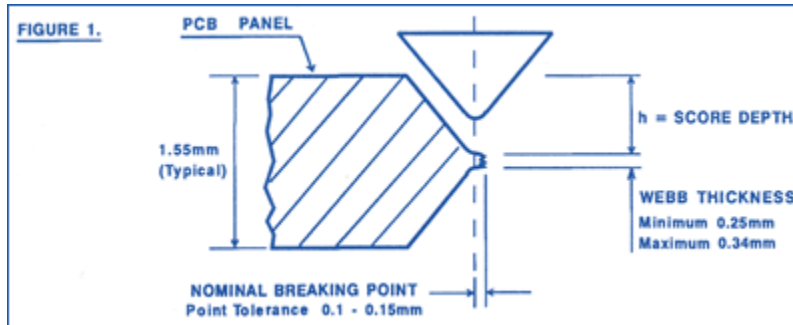
BOSCO V-SCORE SPECIFICATION REV 0.1993

INTRODUCTION

- The V-scoring process allows for the panelising of Pc boards, to facilitate for the convenient handling, assembly, and soldering operations. V-scoring is especially appropriate, and in most cases mandatory for SMD (surface mounted device) type Pc boards, where automated pick and place assembly methods are employed.
- Several important rules and criteria must be considered by the design engineer, when designing the Pc board layout. Failure or negligence in considering the details laid out in this specification, may result in various problems, some of which may not be able to be rectified after Pcb manufacture, and thus result in costly scrap. We therefore emphasize, and urge that the design engineer acquires a sound understanding of the contents of this specification.
- The Pcb panel to be V-scored, consists of several Pc boards which have been stepped and repeated several times on either, or both, the X-axis and, or the Y-axis. The panel is indexed on the 4-axis CNC scoring machine by means of external tooling pins. (External, meaning seven millimetres outside of the perimeter of the stepped and repeated Pc boards.) The X-axis positions the panel at the exact profile position; and the Y-axis produces the forward and backward movement of the panel through two circular type cutting blades, one on top of the panel, and the other on the bottom of the panel. Movement of the top blade is controlled by the CNC Z'1-axis, and the bottom blade by the Z'2-axis. Both the Z'1-axis and the Z'2-axis are individually offset, and controlled. The panel is then rotated ninety degrees, to produce the cuts in the perpendicular direction. Resolution of the controller is plus/minus 0.01mm. Tolerance of the score position, Z'1-axis and Z'2-axis is plus/minus 0.05mm.

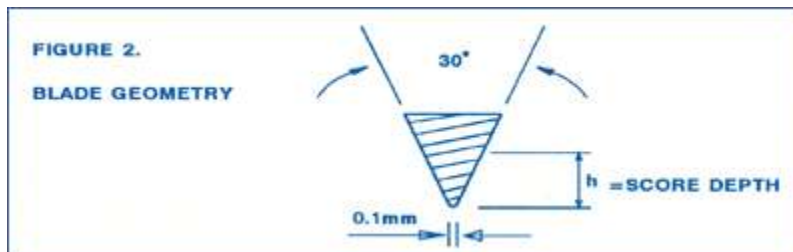
TOLERANCE OF THE NOMINAL BREAKING POINT (AT THE WEBB)

- When the scored panel is broken up, an enlargement of the profile occurs, which is determined by the nominal breaking point and the geometry of the cutting blade. (see figure 1.) Values of 1.55mm for the material thickness, and a webb thickness of 0.3mm are typical. The profile enlargement is between 0.2 and 0.3mm. Example: The Pcb size by design is 60mm. After breaking up the scored panel, the size of the Pcb will be between 60.2 and 60.3mm. (see figure 1.)



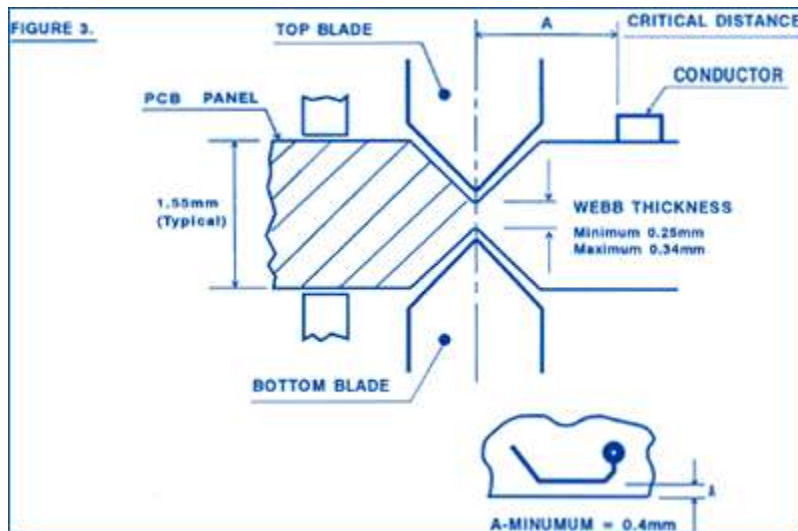
WIDTH OF THE SCORE AT THE PC BOARD SURFACE

- The width of the score generally varies between 0.3mm and 0.55mm, for 1.55mm thick material, depending on the variations of the material thickness. The angle of the V-score is thirty degrees. (see figure 2.) The dimension 'h' in figure 2, as well as the width of the score will obviously depend upon the thickness of the material.



CONDUCTOR CLEARANCE FROM THE PC BOARD EDGE PROFILE.

- Conductors, pads, and holes may not be placed closer than 0.4mm from the Pcb edge profile. This is a critical distance (see figure 3 - dimension A). Where this requirement has been breached, Bosco will not be responsible for damage done to conductors, holes, legend print, or solder mask on a conductor. It is the responsibility of the design engineer to ensure that this specific requirement is not breached. (Note that where the blade scores a conductor coated with solder mask, the mask will flake.)



PCB DIMENSION.

- The Pcb dimension will be derived in the following manner. A co-ordinate (center of the Pcb profile border line) will be placed exactly in each corner of the Pcb. The XY co-ordinates of these holes thus defines the Pcb size, and the route-path of the scoring blades.

STEPPING AND REPEATING.

- Pc boards will be stepped and repeated without a gap between each Pcb. Where gaps are required by the design engineer, the Pcb will incur extra costs due to the scrap and also to the additional scoring required.

PANEL SIZE.

- Bosco requests the customer/design engineer to consult them prior to panelising (stepping and repeating). The reason for this request is to achieve better economy on panel sizes, and also to cater for production handling criteria. The design engineer should also give consideration to the rigidity of the scored panel, where heavy components are mounted, during wave soldering operations, etc.

FIXTURE STRIPS.

Where the scored panel requires a clear area surrounding the perimeter of the panelised Pc boards, (i.e. to facilitate handling/assembly fixture, usually at wave soldering, or SMD pick & place assembly techniques) this area should typically be a dimension of between 5.0 and 10.0mm. The engineer may require certain tooling holes or fiducial marks in this area, which he or she should include and specify at the time of artwork layout. Please note that fiducial marks can be either (HAL) tin coated or mask over bare copper only.

ENGINEERING DRAWINGS AND INSTRUCTIONS.

- It is the responsibility of the design engineer to provide Bosco with clear, and concise instructions and drawings with regard to his panelising and scoring requirements. We encourage and invite the engineer to consult Bosco regarding this specification if necessary.