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Quality improvement programme in a Just-in-Time manufacturing environment

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VENDOR PERFORMANCE RATING

Product	Period Covered	
	From:	To:

Rating Factors Established by Purchasing

a. Quality 40	b. Price 30	c. Delivery 30

Category and Analysis	Supplier			
	A	B	C	D
d. Lots accepted (%)				
e. Unit price (Rands)				
f. Promises fulfilled (%)				
g. Quality rating (axd)/100				
h. Ratio of lowest price in e				
i. Price rating (hxb)				
j. Delivery rating (fxc)/100				
k. Total rating (j+i+g)				
l. Best				

Recommendations:

Prepared by:

Figure 20. Specimen Of Vendor Performance Rating Sheet

VENDOR APPRAISAL CHECKLIST

1. Incoming Material Control
   - Is adequate incoming materials inspection performed?
   - Is material certification required?
   - Are materials certified by the supplier ?
   - Are periodic, independent tests of material made ?
   - Is incoming material tagged and identified immediately ?
   - Is material identification good enough to provide for traceability to supplier ?
   - Are nonconforming materials tagged and stored separately ?
   - Are acceptable materials stored in areas that provide adequate protection from environmental action ?

2. Station Control
   - Is there adequate supervision at each station ?
   - Are working specifications and drawings provided for all stations handling the job ?
   - Does each station have all the required tools and equipment necessary for the job ?
   - In critical process areas, is there sufficient testing facilities available ?

3. House Keeping and Work Environment
   - Do machines and the work environment indicate good housekeeping practices ?
   - Are work areas well lighted ?
   - Do work areas have sufficient working space ?

4. Quality Plans
   - Is design review performed on new customer orders ?
   - Are customer purchase orders and specs screened carefully ?
   - Does methods of handling customer purchase orders indicate a clear understanding of customer's specifications ?
   - Are procedures in effect to assure current blueprints and specifications of each customer ?
   - Are checks made to determine that specifications can be met ?
   - Is an up-to-date system maintained on customer specifications and prints ?

5. Final Inspection and Testing
   - Are parts thoroughly cleaned before testing ?
   - Does final inspection conduct all tests necessary to assure that all specified requirements are met ?
   - Does final inspection include life, mechanical and environmental testing ?
   - Are non-conforming goods kept in a clearly identified area ?

6. Analysis, Feedback and Reports
   - Are written procedures defining quality control operations established and followed ?
   - Are facilities adequate for accurate failure analysis ?
   - Is a file of inspection and test records maintained ?
   - Do job records give complete case history of job ?
   - Are master records kept of each gage and test instrument ?

- Do personnel records indicate that machine operators have experience and training to perform the work ?
- Are workers informed of non-conformities they produce ?

7. Packed Stock Control
   - Is a standard system established to verify count of stock ?
   - Are standards established for packing of parts ?
   - Do shipping instructions include packing specifications ?
   - Are packing cases labelled to permit easy identification ?
   - Is packing tested to assure that parts are properly protected ?
   - Are packing cases strong enough not to break open in shipment ?
   - Are defective parts packed separately from non-defective parts ?

8. Manufacturing Equipment Condition
   - Do machine records indicate good maintenance practice ?
   - Do maintenance charts indicate regular maintenance ?
   - Are tight tolerance machines available and tested frequently ?
   - Are gage and test instruments stored in a protected area ?
   - Are gage and test instruments calibrated regularly ?
   - Are instruments calibrated by an independent testing service ?
   - Are calibration standards traceable to SABS ?

9. Personnel
   - Do employees engage in continuing education programs ?
   - Do operators exhibit care in handling component parts ?
   - Do supervisory and operating personnel have a wide background of experience ?
   - Are there qualified people to perform special tasks ?
   - Is there cooperation and communication between departments ?

13.0 APPENDIX 3

MSN PRODUCTS - THE COMPANY

MSN Products was founded during the late 1940's as a small private company with manufacturing resources to produce a variety of products using both photo and screen printing, and acid etching process.

During the early 1960's, these principles were expanded to produce single-sided printed circuit boards for the radio industry and were further extended in 1966 to produce double-sided boards. Through-hole plated printed circuit manufacture commenced in 1969 and in 1977, in the light of ever-increasing electronic technology, MSN established the first South African manufacturing facility for the production of hybrid thick film microelectronic modules.

The company has developed a sophisticated Q.A. infrastructure which is constantly engaged in ensuring that output is maintained at a level required by international specifications. Over the past few years MSN has expended many million rands on highly sophisticated plant and buildings in both the hybrid and printed circuit divisions. Fully automated plating lines, computer controlled multi-spindle drilling machines, laser trimming equipment, together with fully computerised testing installations have put the company right at the forefront of this high technology industry in South Africa.

PRINTED CIRCUIT (PC) BOARDS - THE PRODUCT

The best method of constructing any circuit in quantity is to use a printed circuit, a stable insulating sheet of material with thin plated copper lines bonded to the sheet forming the circuit paths (Horowitz et al., 1983). Although early printed circuits were associated with poor reliability, the process of manufacturing board material and producing finished boards has been perfected to the point that printed circuit boards now have the most reliable fabrication techniques. They are routinely used in computers, spacecraft, and military electronics where high reliability is essential.

Manufacturing- For the purpose of this study, it is important to identify the different processes that go into manufacturing a PC board.

The board material comes clad on both sides with copper. The first step is to drill the holes, using a template or automated drilling machine keyed to the full-size circuit pattern. The holes are then 'plated through' by a tricky multistep copper plated process, creating continuous conducting paths from one side of the board to the other. Then a tough 'resist' material is silk-screened onto both sides of the board, everywhere except where the foil for the circuit is to remain. The screen is generated photographically from the circuit pattern. Following this, the board is immersed into a solder-plating bath, plating solder (a tin/lead alloy) everywhere the foil pattern is to remain, including the inside of the holes.

Next the resist is removed chemically exposing the copper that is to be removed, and the board is treated with a copper-etching compound. That

leaves the desired pattern of solder plated copper, complete with plated-through holes. At this point it is important to carry out a step known as 'reflow soldering', which consists of heating the boards to make the thin solder plating flow. This prevents the formation of tiny slivers of metal (from the undercutting action of the etching bath) that could otherwise cause conductive bridges. Reflow soldering also improves the solderability of the finished board. The final step in board manufacture is to electro-plate the edge-connector fingers with gold.

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