White Paper – Product Re-engineering

Godwin Sonnoe S, Sudesh M. Naik

***Abstract*—** Re-engineering a product is needed for various reasons, and one main reason is to recreate a product for which the original designer/ manufacturer, is no longer available to provide a required replacement/support needed for business continuity. In many of the instances these products also lack the design documentation.

***Keywords*—** Product Re-engineering, Business continuity, Product documentation.

I. Introduction

One of the macro reason to re-engineer a product is for business continuity. And mostly, when there is a need to re-engineer a product, all that may be available is a black box with the input and outputs known. Each of these products is unique, and the approach for re-engineering for of each of these products will be different. This document is indented to be as a guide for some of the major activities, which are needed for a re-engineering program

II. Documentation

Documentation is the one of the most important part of the Re-engineering process. The documentation involves two steps. The first is to document the product as received for any future reference. This documentation is needed for verification that all the requirements of the product are met once the reengineering program is complete. The second is a documentation of the re-engineered product. This will be a deliverable for the activity.

III. Disassembly

In a re-engineering program, the product to be re-engineered mostly consists of more than one PCB or components. There will also be interconnects between the components in the product. These interconnects can be wire, bus bars, flex cables, etc. Apart from the electrical component, there may also be many mechanical components to the system. The assembly of the system should be studied, analyzed and documented before disassembling, so the system can be reassemble. This will help in understanding the assembly procedure the re-engineered product. This will be a critical activity to ensure that the product is not destroyed/ product information is lost during the disassembly process.

Godwin Sonnoe S. Sr. Lead, ASM Technologies Limited Bangalore

Sudesh M. Naik, Sr. Technical Manager, ASM Technologies Limited, Bangalore

IV. Wire Drawing and Tagging

A system to be re-engineered can have many hundreds of wire in the unit. These wires are probably screwed to terminals, connectors. Unlike the PCB which can be traces, the wire unless tagged and documented can be a hard to reassemble. It it thus a requirement to tag and document the connecting points of all wires in the system. Taking photos of the wiring will also help in correlating any missing information during assembly.

V. Circuit tracing and analysis/simulation

Once documentation and disassembly of the system is complete, each PCB in the system needs to be traces. This includes tracing circuit connections, verifying it with the various component reference circuits, and simulating the circuit. At the end of this exercise there should be a having a schematic that will meet every functional requirements of the system. Tracing of multilayer board can be a challenge, and the tracing time will increase significantly with increase in layer count. If destructive analysis of the board is allowed in the program, a complete documentation of the PCB's required before a destructive analysis.

VI. Testing plan

A test plan is as important as the circuit tracing, to completely test the re-engineered product. The plan for the testing will have to be made with the details of the traced circuit and the initial inputs received along with the product to be re-engineered. If the product to be re-engineered is a subsystem, the knowledge of working of the system which the subsystem is a part of will necessary. This test setup can be one of the significant cost factors in re-engineering programs.

VII. Risk assessment and mitigation

The product re-engineering will have many risks parameters unique to each product. It is important to identify these risks at the early stages of the program, and arrive at corresponding mitigation plans to ensure success for the program. It would be necessary to keep all the stake holders updated with the risk status.

VIII. Obselesance Management

The product to be re-engineered can be decades old design, and support for the original parts used in the design may no longer be available. This calls for the need to identify and

manage the obsolete parts in the program. This can be a challenge if unique or custom made parts are used in the original product

IX. Conclusion

Each re-engineering program is unique and will have its own set of challenges. The program will have to be approached with fresh view to analyze the requirements and the program plan should be made accordingly. A strong project plan with the entire risk and mitigation plan will help the re-engineering program.

Godwin Sonnoe S. has over 14 years of experience in product design.

Sudesh M. Naik has over 18 years of experience in product design,

Both the authors have worked for leading OEM/EMS Company across geographies and associated with product, in consumer, network and enterprises storage, medical and automation domains which are volume manufactured