

# Design & Simulation of Complex Low Volume Electronics Production

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The aim of the DISCOVER project is to deliver a component-based representation of the lifecycle of electronics manufacture, applicable to low volume, innovative and / or high-value-added products. Such representations will assist industry to optimise design for manufacture and manufacturing operations in order to improve yield, improve quality and reduce costs (figure 1).

The main objective is to enable simulation of designs and the impact of design, manufacturing and business strategies on enterprise capabilities i.e. product reliability, cost, time to market. This is achieved through knowledge elicitation, mapping of processes (i.e. Design and Manufacturing) and the development of a software tool that enable the evaluation of simulation (what-if) scenarios to visualise, evaluate and predict both product and process quality metrics (figure 2).

The development of this tool is a collaborative project between General Electric (GE) Aviation (formerly Smiths Aerospace), Goodrich Engine Control Systems, Surface Technology International (STI) Ltd, Accelonix, Custom Interconnect Ltd, Datalink Electronics Ltd.

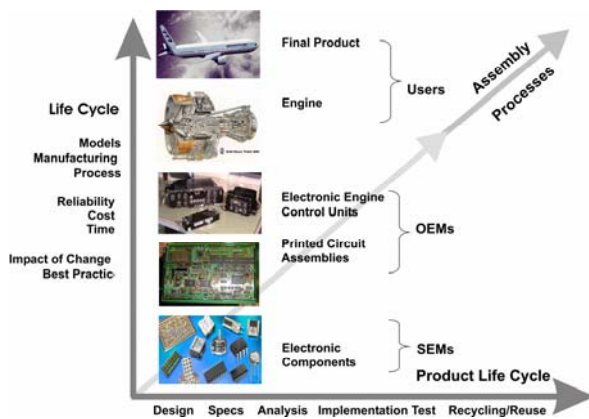


Figure 1. Application context of the DISCOVER (Design and Simulation of Complex Low Volume Electronics Production)

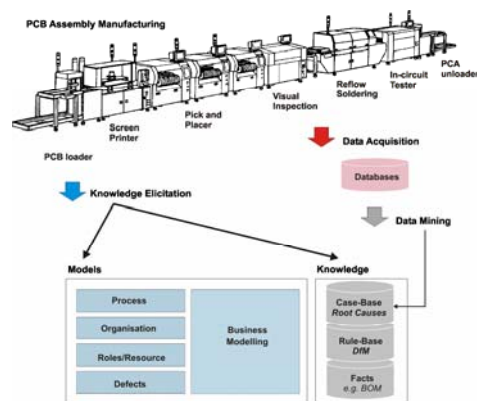


Figure 2. Data analysis, enterprise modelling and case-based reasoning from a PCB assembly manufacturing line

In order to design and implement the information and knowledge-based modules that comprise the component-based tool, links to shop floor systems containing production data and PCA customer information (e.g. bill of materials (BOM), CAD drawings) were required. In addition, conventional enterprise modelling techniques were employed to support formalised requirements definitions as well as the development of a rule-base and case-base that contains information about PCA design for manufacturing best practice and root cause analysis of each of the failed cases respectively.

At present time, historical data, expert knowledge and enterprise modelling have been used as input for simulations that aim to predict: (i) first time rates yield, (ii) defect opportunities of PCA designs and (iii) the impact measured as reliability and cost on the manufacturing and business strategies. These scenarios are being validated by the industrial partners. The modular system is being refined to generate more accurate calculations and predictions from the engineering “rules” and heuristic knowledge concentrating on products that have been identified as having quality (specifically component defect) issues.