

The practice of concurrent engineering and all necessary means to rapidly design and produce new products that delight customers.

Team-based methods of concurrent engineering and mass customization that ensure product concepts are translated swiftly and efficiently into robust designs that can be executed flawlessly.

Level 1 Plan	Level 2 Pilot	Level 3 Deploy	Level 4 Integrate	Level 5 Excel
<ul style="list-style-type: none"> ▪ No formal development process in place and no information on how development tasks are to be done; engineers and specialists work through design process steps sequentially ▪ Product requirements are captured by Marketing and interpreted for Engineering with no customer involvement ▪ Concept of risk is not treated in a disciplined fashion ▪ Company does not utilize value engineering to achieve target cost, and does not practice design for manufacturability, reliability, or serviceability; time to market >> average ▪ Large number of physical prototypes included in all work plans; tests used to determine performance and safety ▪ Evolution of a product is not planned or managed, leading to reinvention of many "wheels" ▪ Running design changes to standard products, minor design changes, as well as full design changes are always made in the design department 	<ul style="list-style-type: none"> ▪ Reengineered, waste-free development process is piloted on one or two new products; the first experimental cross-functional development teams are formed ▪ Efforts begun to enrich and rationalize the product definition process through QFD, process mapping, and VA; target costs are established, but not in detail ▪ Risk management treated as a business process, but the process is applied only to technical issues ▪ VE is used to achieve target cost; FMEA, DFMA, etc. are also used to achieve selected goals; time to market > ave. ▪ Moderate number of prototypes used to discover mistakes; tests used to determine performance, safety, durability ▪ Product evolution plans piloted, but represent limited cross-functional thinking ▪ Model design production line piloted to cut design lead times and the number of required drawings 	<ul style="list-style-type: none"> ▪ New development process is formalized and continuously reviewed to identify and eliminate delays and the forms of waste; multifunctional teams are used routinely for product development and most teams include customers and suppliers ▪ Product definition is now well defined and focused on the customer; target costs are established for most new products with sufficient detail ▪ Disciplined risk management process is usually followed ▪ Cost, reliability, serviceability engineering, and technology deployment are extended to major new designs; time to market is average ▪ Tests primarily used to determine performance, safety, durability, reliability, and cost ▪ Product evolution plans are prepared by cross-functional teams and communicated to design process stakeholders ▪ Standard design schedule is created; but, many running changes are still handled by the design department 	<ul style="list-style-type: none"> ▪ Design process continues to be refined to improve quality, cost, and lead time; multifunctional teams are co-located physically or "virtually" ▪ Timely product definition, with significant customer participation; marketing leads with cross-functional participation; key suppliers are involved early in the process ▪ A disciplined process is used to assess and classify technical, schedule, and cost risk according to standard criteria for all projects ▪ Firm uses cost, reliability, and serviceability engineering for all new designs; time to market < average ▪ Extensive computer-based analytical prototyping is done, resulting in a minimum of physical prototypes; testing validates both product and process design ▪ Product evolution plans cover all product generations ▪ Running change requests are handled in <i>gemba</i>, not the design department 	<ul style="list-style-type: none"> ▪ Team managers are "heavyweights" who report directly to chief executive of the strategic business unit, not to department managers ▪ Company is capable of anticipating customers' latent requirements in new products ▪ New design methods and tools are developed as needed; time to market leads the industry ▪ Product evolution plans are strongly linked to the company's profit plan and reflect aggressive time-to-market goals ▪ Stretch goals and metrics are used to drive continuous improvement in speed, elimination of defects, and customer satisfaction