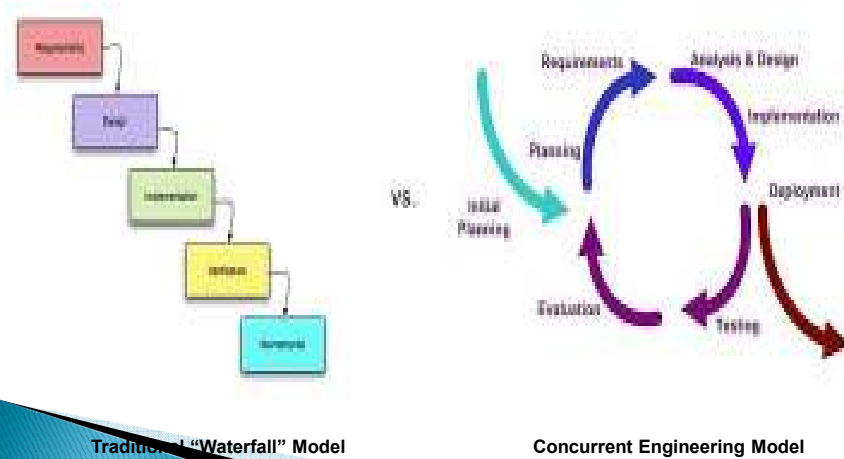


## Definition

- ❖ business strategy to replace traditional product development process with one in which tasks are done in parallel
- ❖ product development in which functions of design engineering, manufacturing, engineering and other functions are integrated to reduce the elapsed time required to bring a new product to the market
- ❖ early consideration for every aspect of a product's development process
- ❖ focuses on the optimization and distribution of a firm's resources in the design and development process

<http://best.berkeley.edu/~pps/pps/concurrent.html>

## Traditional development method vs. iterative development method in CE



## Need for Concurrent Engineering

- ❖ corporations must be able to react to the changing market needs rapidly, effectively, and responsively; decisions must be made quickly and they must be done right the first time out
- ❖ production time should be decreased by eliminating repeated tasks
- ❖ CE is wave of the future for new product development for all companies regardless of their size, sophistication, or product portfolio
- ❖ to be competitive, corporations must alter their product and process development cycle to be able to complete diverse tasks concurrently

<http://best.berkeley.edu/~pps/pps/concurrent.html>

## How to apply concurrent engineering?

### *Commitment, Planning, and Leadership*

- ❖ not a trivial process; first a plan should be devised to create organizational change throughout the company or firm
- ❖ strong commitment from the management is required enforce the organizational changes from the top down

### *Continuous Improvement Process*

- ❖ process must be updated and revised on a regular basis to optimize the effectiveness and benefits

### *Communication and Collaboration*

- ❖ environment that facilitates communication and collaboration between individuals, separate organizations and departments within the firm

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## Basic principles of concurrent engineering

- ❖ committed senior management and involved teams
- ❖ develop a detailed plan early in the process and continually review progress and modify plan accordingly
- ❖ analyze market and know about customers
- ❖ establish and cultivate cross-functional integration and collaboration to facilitate technology transfer between individuals and departments
- ❖ break project into its phases, develop parameters and set milestones
- ❖ Collectively work on all parts of project
- ❖ complete tasks in parallel to reduce costs and time to market

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## When is concurrent engineering used?

- ❖ majority of a product's costs are committed very early in the design and development process
- ❖ CE must be applied at the onset of a project
- ❖ can be implemented early in the conceptual design phase where the majority of the products costs are committed
- ❖ several application in which CE may be used
  - ❖ for example product research, design, development, re-engineering, manufacturing, and redesigning of existing and new products

<http://best.berkeley.edu/~pps/pps/concurrent.html>

## Why do companies use concurrent engineering?

### *Competitive Advantage*

### *Increased Performance*

- ❖ improved quality, development cycle, production cost, and delivery time
- ❖ early detection of design problems
- ❖ elimination of multiple design revisions, prototypes, and re-engineering efforts -> design right in the first attempt

### *Reduced Design and Development Times*

- ❖ ability to introduce more products and bring quicker upgrades to the existing products
- ❖ quick response to customer and market demands

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## How does concurrent engineering benefit corporations ?

- ❖ improved quality with lower manufacturing and production costs
- ❖ accuracy in predicting and meeting project plans, schedules, timelines, and budgets -> increased efficiency and performance
- ❖ reduction or elimination of the number of design changes and re-engineering efforts at later phases in the development process, resulting in shorter development process
- ❖ detection of necessary design changes early in the development process
- ❖ increased innovation by having all players participate in the concept development phase because of improved communication between individuals and departments within the firm

better inventory control, scheduling and customer relations

<http://www.berkeley.edu/~pps/pps/concurrent.html>

## Concurrent Engineering: Characteristics

- ❖ brings together multidisciplinary teams, in which product developers from different functions work together and in parallel from the start of a project with the intention of getting things right as quickly as possible, and as early as possible
- ❖ a cross-functional team might contain representatives of different functions such as systems engineering, mechanical engineering, electrical engineering, fabrication, quality, maintainance, testability, manufacturing, drafting and layout, and program management
- ❖ input is taken from as many functional areas as possible before finalizing the specifications
- ❖ results in the product development team clearly understanding what the product requires in terms of mission performance, environmental conditions during operation, budget, and scheduling

<http://www.johnstark.com/fwce.html>

## Concurrent Engineering: Examples

### *General Electric*

- ❖ used for the development of the engine for the new F/A-18E/F
- ❖ merged the design and manufacturing process
- ❖ teams achieved 20% to 60% reductions in design and procurement cycle times during the full-scale component tests
- ❖ problems surfaced earlier were dealt more efficiently than they would have been with the traditional development process
- ❖ cycle times in the design and fabrication of some components have dropped from an estimated 22 weeks to 3 weeks

### *Boeing*

- ❖ **Boeing's** Ballistic Systems Division where CE was used in 1988 to develop a mobile launcher for the MX missile
- ❖ able to reduce design time by 40% and cost by 10% in building the prototype

<http://www.johnstark.com/fwcce.html>

## Companies using CE

Currently, several companies, agencies and universities use CE. Among them can be mentioned:

- ❖ European Space Agency Concurrent Design Facility
- ❖ NASA Team X – Jet Propulsion Laboratory
- ❖ NASA Integrated Design Center (IDC), Mission Design Lab (MDL), and Instrument Design Lab (IDL) – Goddard Space Flight Center
- ❖ CNES – French Space Agency
- ❖ ASI – Italian Space Agency
- ❖ Boeing
- ❖ EADS Astrium – Satellite Design Office
- ❖ Thales Alenia Space
- ❖ The Aerospace Corporation Concept Design Center
- ❖ STV Incorporated – [1]
- ❖ German Aerospace Center Deutsches Zentrum für Luft- und Raumfahrt
- ❖ JAQAR Concurrent Design Services
- ❖ EPFL Space Center