

# Industrial Engineering and Management

Adapted by  
Dr. Mohd. Asif Gandhi



# What Do Industrial Engineers Do?

- Industrial Engineers work to make things better, be they processes, products or systems
- Typical focus areas include:
  - Project Management
  - Manufacturing, Production and Distribution
  - Supply Chain Management
  - Productivity, Methods and Process Engineering
  - Quality Measurement and Improvement
  - Program Management
  - Ergonomics/Human Factors
  - Technology Development and Transfer
  - Strategic Planning
  - Financial Engineering

# Project Management

- ❧ Develop the detailed work breakdown structure of complex activities and form them into an integrated plan
- ❧ Provide time based schedules and resource allocations for complex plans or implementations
- ❧ Use project management techniques to perform Industrial Engineering analyses and investigations
- ❧ Conduct facility planning and facility layout development of new and revised production plants and office buildings
- ❧ Form and direct both small and large teams that work towards a defined objective, scope & deliverables
- ❧ Perform risk analysis of various project options and outcomes

# Manufacturing, Production and Distribution

- ❧ Participate in design reviews to ensure manufacturability of the product
- ❧ Determine methods and procedures for production distribution activity
- ❧ Create documentation and work instructions for production and distribution
- ❧ Manage resources and maintain schedule requirements to meet required production and distribution schedules
- ❧ Process Optimization utilizing Simulation tools (Arena, etc)
- ❧ Facilitate and Lead process improvement teams

# Supply Chain Management

- ❧ Manage Supplier relationships
- ❧ Managing and report on company Supplier Cost / Performance Indices to management
- ❧ Audit Suppliers and ensure supplier processes and procedures are being followed
- ❧ Travel to suppliers to resolve issues Coordinate first article Inspections
- ❧ Work with Outsource Manufacturers to ensure product quality, delivery and cost, is maintained

# Productivity, Methods and Process Engineering

- ✧ Define proper work methods for tasks
- ✧ Define appropriate processes for work flow activities
- ✧ Define key production measures
- ✧ Define goals and data capture/analysis for key measures
- ✧ Perform root cause analysis to improve poor performing processes
- ✧ Develop appropriate incentive plans for work tasks
- ✧ Determine capacity requirements and subsequent investment options

# Quality Measurement and Improvement

- ❧ Determine quality-related issues in all aspects of the business
- ❧ Work with design and production teams and outsource manufacturers to ensure product quality is maintained during the design and production phases
- ❧ Audit defined processes and procedures to ensure that they are being followed
- ❧ Coordinate and Facilitate 3rd Party Quality Audits
- ❧ Provide refresher training on procedures for company personnel on Quality and process-related issues, including the use of analytical tools and techniques
- ❧ Manage and determine issues with incoming material through the Receiving process

# Program Management

- ❧ Develop proposals for new programs
- ❧ Manage program/project teams to ensure program stays on schedule, on budget, and meets performance expectations
- ❧ Coordinate a matrix of team member across departments within an organization to ensure completion of project tasks



# Ergonomics/Human Factors

- ❧ Ensure Human Factors Engineering is utilized in New Product Design
- ❧ Ensure Human Factors Engineering disciplines are utilized in production setup and configuration
- ❧ Ensure company Ergonomics policies are defined to minimize causes of employee injury and discomfort

# Technology Development and Transfer

- ❧ Identify basic business problems requiring analysis
- ❧ Determine if technology or process based solution best
- ❧ Characterize problem, identify prospective providers/bidders and submit requests for proposals
- ❧ Evaluate bid responses, select successful bidder and establish technical feasibility
- ❧ Conduct small scale/medium scale tests to determine operational feasibility, implementation methods and training requirements
- ❧ Conduct enterprise wide implementation

# Strategic Planning

- ❧ Develop long range planning models, typically 5-10 years in scope
- ❧ Model all areas affected by operation
- ❧ Identify anticipated investment in plant, capacity, network, etc
- ❧ Tie to preliminary production cost, operational cost, sales forecasts
- ❧ Develop preliminary financial impacts, including profitability and ROI

# Financial Engineering

- ❧ Determine production costs using specific cost based methodology
- ❧ Develop budgets, forecasts for operating cost centers
- ❧ Measure actual performance versus budget goals and investigate difference
- ❧ Develop capital and expense budgets for capacity expansion
- ❧ Perform cost analysis/justification for capital and expense expenditures
- ❧ Perform make versus buy versus lease analyses

# Industrial Engineers Work in Many Types of Industries

- ✧ Aerospace & Airplanes
- ✧ Aluminum & Steel
- ✧ Banking
- ✧ Ceramics
- ✧ Construction
- ✧ Consulting
- ✧ Electronics Assembly
- ✧ Energy
- ✧ Entertainment
- ✧ Forestry & Logging
- ✧ Insurance
- ✧ Materials Testing
- ✧ Medical Services
- ✧ Military
- ✧ Mining
- ✧ Oil & Gas
- ✧ Plastics & Forming
- ✧ Retail
- ✧ Shipbuilding
- ✧ State & Federal
- ✧ Government
- ✧ Transportation

# Some Techniques Utilized by Industrial Engineers

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- ✧ Benchmarking
  - ✧ Design of Experiments
  - ✧ Employee Involvement
  - ✧ Equipment Utilization
  - ✧ Flow Diagramming
  - ✧ Information & Data Flow
  - ✧ Diagramming
  - ✧ Interviewing for Information
  - ✧ Lean Manufacturing
  - ✧ Modeling & Testing
  - ✧ Operations Auditing
  - ✧ Organizational Analysis
  - ✧ Pilot Programs
  - ✧ Plant & Equipment
  - ✧ Layout
  - ✧ Project Management
  - ✧ Simulation
  - ✧ Six Sigma projects
  - ✧ Statistical Analysis
  - ✧ Strategic Planning
  - ✧ Theory of Constraints
  - ✧ Time Studies
  - ✧ Work Sampling