

Chemical Engineering for Entrepreneurs

Tactics for Entrepreneurial Engineering

- A. The War Room
 - a. Walls of wipe boards
 - b. Walls of poster paper
 - c. Pilot systems adjacent
- B. Idea Feasibility and Possible Solution Definition
 - a. Organized brainstorming and paper studies to vet various ideas and solutions to the challenges required to be overcome to meet the business objectives.
- C. Early Engineering and Development Studies
 - a. Take the ideas into the lab based upon the paper studies and validate the approach by generating early small scale data.
 - b. These small, fast paced experiments will lead to more organized designed experiments that will be applied to each of the critical technical bases that when integrated will make up the system
- D. Design Basis Development
 - a. The design basis directs the detailed engineering and system design effort
 - b. Make common and use off the shelf building blocks where you can
 - i. Pumps and instrument trees
 - ii. Tank valving and automation
 - iii. Reactor temperature control
 - iv. Column sizing criteria
 - v. Environmental abatement systems
- E. PFDs, Mass Balance and Option Analysis
 - a. The process flow diagram graphically displays the interdependency of each unit operation and component of the system.
 - b. The mass balance accounts for the disposition of all constituents of the feedstocks, products and by-products of the system.
 - c. These are initially based upon the early engineering studies and then are refined as detail design progresses.
 - d. The PFD and mass balance become the working tool for the financial commitments and performance analysis of the completed system.
 - e. The operating metrics are derived and reduced to practice as the last step in the PFD and mass balance evolution through the life of the project.
 - f. Operations ultimately manages to the mass balance.
- F. Intellectual Property Reduction to Practice and Data Generation for Claim Support

- a. Claims are strengthened by data that is presented supporting the reduction to practice of the invention.
 - b. Most intellectual property development data capture is completed on the lab or pilot scale and the focus on the needed data enables faster and strengthened claims to be crafted in the patent development and prosecution legal work flow
- G. Intrapreneurial Coaching
- a. Many entrepreneurs exist inside large corporate organizations.
 - b. Many times all that is needed to unleash the power of this internal innovation engine is the coaching and guidance from an experienced intrapreneur.
- H. Process Development
- a. Unit Operation Definition
 - b. Chemical Systems Integration
 - c. Pilot System Design, Build and Operation
 - i. Show it don't just talk about it
 - d. Designed Experiments for Data Based System Evaluation
 - i. Capture the space with data
- I. Process Engineering
- a. Equipment Specification for Procurement
 - b. Engineered System Procurement Technical Iteration
 - c. P&IDs
 - d. General Arrangements
- J. Automation and Controls Engineering
- a. Instrumentation Application, Installation, Configuration and Commissioning
 - b. Off line Measurement Method Validation and Application
 - c. Functional Requirement Definition
 - d. System Architecture and Component Equipment Specification
 - e. Component Configuration and System Programming