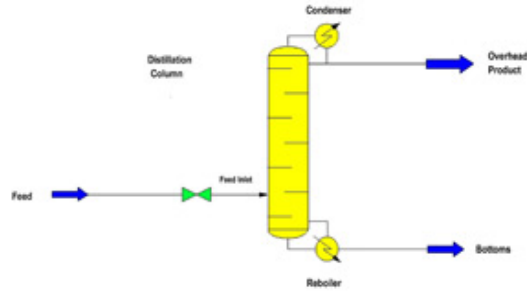


# Overview of Services - Process Engineering Associates, LLC

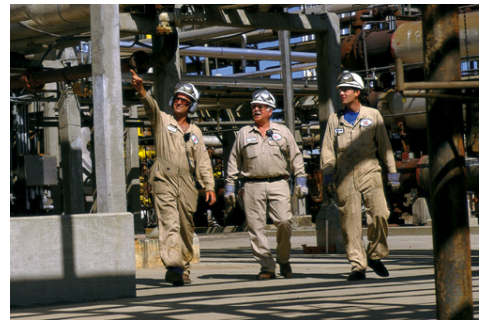
Process Engineering Associates, LLC ([www.ProcessEngr.com](http://www.ProcessEngr.com)) specializes in process chemical engineering and process design only. As such we provide the following types of services. Phone +1 (865) 220-8722

- Process Design
  - Conceptual/Preliminary process design studies
  - Front End Engineering Design – FEED packages and FEED verifications
  - Process design packages (Basic Engineering Design)
  - Design basis development
  - Alternatives evaluations or feasibility studies
  - Capacity evaluations/revamp studies
  - Relief valve studies
  - Evaluation of 3rd party process designs
  - Utility evaluations
  - Complete process design packages
  - Control scheme development
  - Creation of PFDs and P&IDs
  - Equipment plot plans
  - Equipment specifications
  - Preliminary cost estimates
- Process Modeling/Simulations
  - Detailed mass & energy balance
  - Unit operations design
  - Piping system hydraulics
  - Relief or flare system design/evaluation
  - User friendly simulation interface development



- Process Modification/Construction Oversight
  - Green field construction oversight
  - Equipment installation plans/coordination
  - Vendor fabrication inspections
  - Coordination of process tie-ins
  - Piping oversight
  - Vessel placement oversight
  - Vessel internal assembly oversight

- Operations Support
  - Commissioning and startup
  - Troubleshooting and optimization
  - Bottlenecking
  - Control systems startup/tuning
  - On-site process installation and modification oversight
  - Operating procedures
  - Process documentation
  - Operator and engineering staff training
  - Short term staff augmentation
- Process Safety Management
  - Conducting Process Hazard Analyses (PHAs)
  - Conducting Safety Integrity Level (SIL) selection analyses for Safety Instrumented Systems (SISs)
  - Conducting Layer of Protection Analysis (LOPA)
  - Conducting compliance Audits
  - Performing hazard assessments (including HAZOPs)
  - Developing Risk Management Plans
  - Resolving/implementing PHA recommendations
  - Developing PSM/RMP programs
  - Developing process safety information
  - Cause & Effect Diagrams
  - Alarm Rationalization and Abnormal Situation Management
  - PHA facilitation training
  - Incident investigation training



- Additional Capabilities
  - Plant investment due diligence evaluation
  - Process/equipment bid package preparation
  - Vendor bid evaluations and recommendations
  - Expert witness/legal team technical assistance