



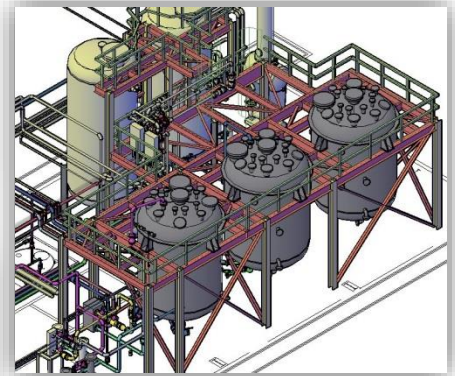
# Frazier, Barnes & Associates, LLC

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Frazier, Barnes & Associates, LLC is a Memphis, TN engineering and consulting firm providing process, industrial and mechanical engineering services for local and national process, specialty chemical, industrial, renewable, and agricultural process clients. With our focus on owner-advocacy and cost-effective energy resourcefulness, we consider not only first cost but long-term life cycle expenditure. We provide personal service enhanced by our communication skills to allow for maximum project success!

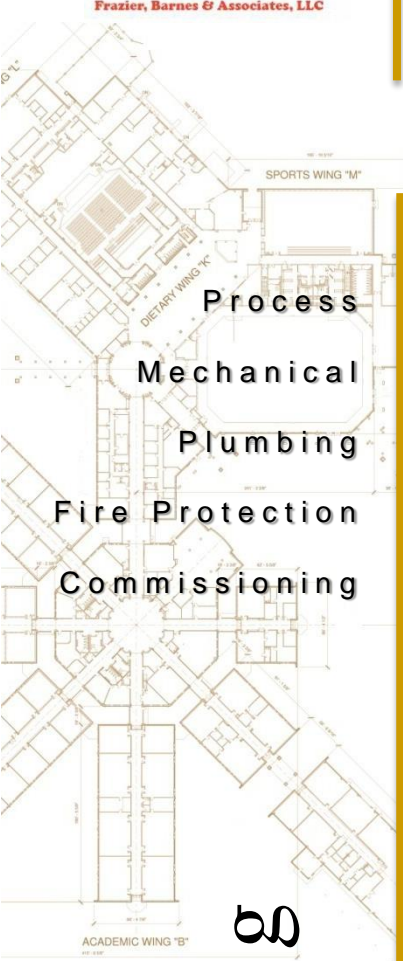
FBA engineering professionals provide engineering design services including: conceptual design, engineering construction documents, cost estimates, financial and economical analysis, industrial equipment appraisals and business enterprise valuations. We also provide construction administration, plant startup, process troubleshooting, owner training and process commissioning. We are a small firm that provides the highest quality engineering services without the unnecessary overhead cost.

**Engineering • Feasibility • Economics • Renovation • Greenfield**



Process  
Mechanical  
Plumbing  
Fire Protection  
Commissioning

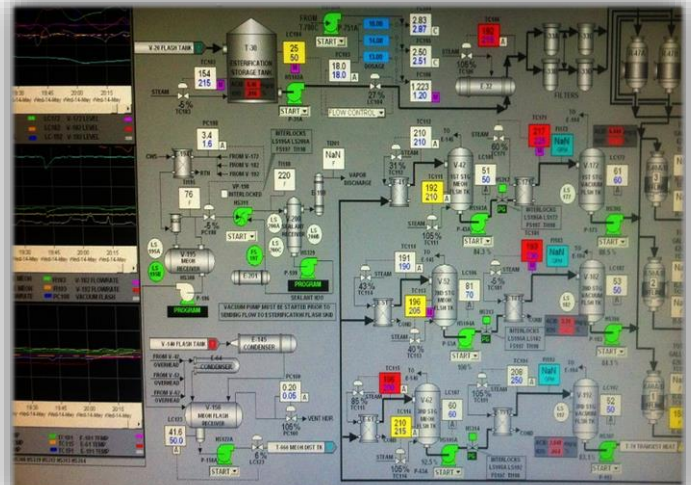
Engineering



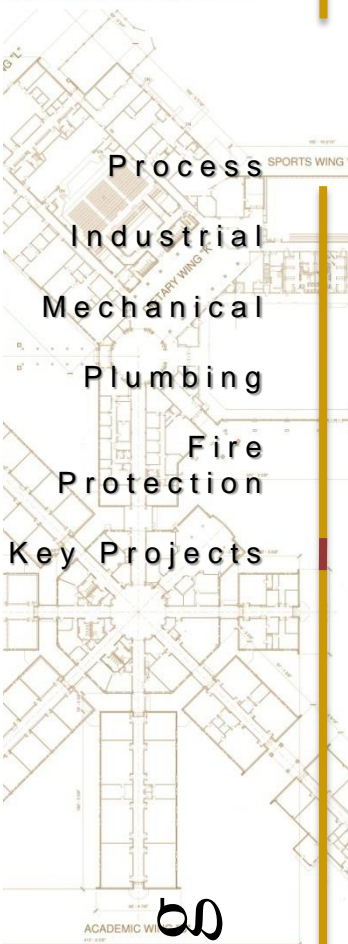
# Process Engineering

- Preliminary Engineering
- Detailed Engineering
- Technical and economic feasibility analysis
- AutoCAD 3D
  - 3D Piping, Isometrics, Bill of Materials
- ChemCAD
- Design flow diagrams
  - Piping & Instrumentation Diagrams
  - Process Flow Diagrams
- Prepare mass and energy balance
- Process optimization evaluation, strategies and implementation
- Plant and equipment troubleshooting
- Process & equipment design and selection
  - Process pumps, blowers, reactors, dryers and centrifuge
- Design PRV - Pressure Relief Valves, Rupture disk failure analysis
- Write RFQ for equipment purchase
- Construction management & administration
- Operator training for process, industrial and chemical facilities
- Develop in-process lab testing procedures
- Permitting criteria and data calculations
- Leak-rate estimation for vessels subjected to vacuum

Engineering



## Key Engineering Projects



Engineering

### Process Industrial Mechanical Plumbing Fire Protection Key Projects

#### **Project Engineering for Upgrade to 12 mmgpy Process Plant**

Performed process engineering upgrades to increase plant capacity 50%, upgrade esterification capacity, refurbish methanol column and increase plant flexibility to operate using multiple feedstocks – \$8M project.

#### **Project Engineering for 40 mmgpy Biodiesel Plant Retrofit**

Detailed piping and engineering package using AutoCAD 3D, converting a water wash plant into dry wash and other process improvements. Identified construction firm, programming and other related subcontractors. Provided Construction Management oversight and assisted with plant startup. After mechanical completion, plant started up immediately and produced in-spec biodiesel. Project was on-time and on-budget.

#### **Design and Engineering of New Industrial Steam Plant**

Provided detailed engineering, design and construction administration of steam system for an agricultural processing plant located in the North West. Provided design, engineering and construction oversight of new 1,200 Hp steam system. Provided feasibility, financial analysis and engineering to upgrade and or construct new processing and extraction facilities.

#### **Start-up Services for 35,000 PPH Process Plant**

Once the technology provider left and the plant was not functioning after a year of trials, the client called in the FBA team to troubleshoot the process, glycerin and methanol distillation units. Within a month, FBA had identified the problems and the plant was able to produce in-spec products.

#### **Troubleshooting and Optimization for Smaller Scale Biodiesel Plant**

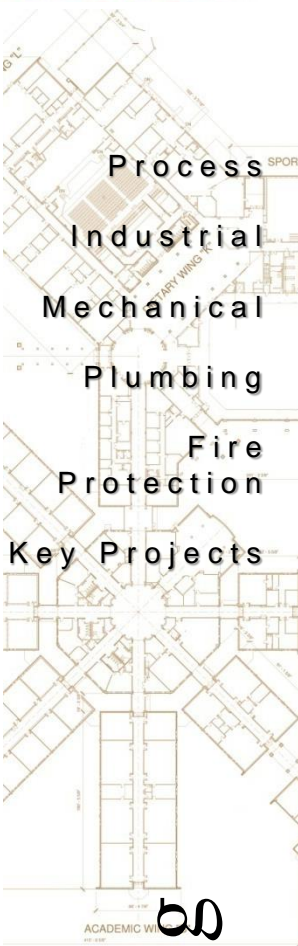
Plant was experiencing severe bottlenecks and failing to achieve expected capacity for an extended period of time. FBA diagnosed the problem and offered a low-cost fix to significantly improve the process.

#### **Extraction and Process Plant Process Improvements**

FBA provided process improvements and detailed engineering design for canola oil crush facility, install crush cooler, relocate and install methanol distillation column, and provide upgrades to process plant. Apply for government grant, provided process improvements, troubleshooting, design, engineering, to install, commission and start-up of systems and utilities.



## Key Engineering Projects



# Engineering

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