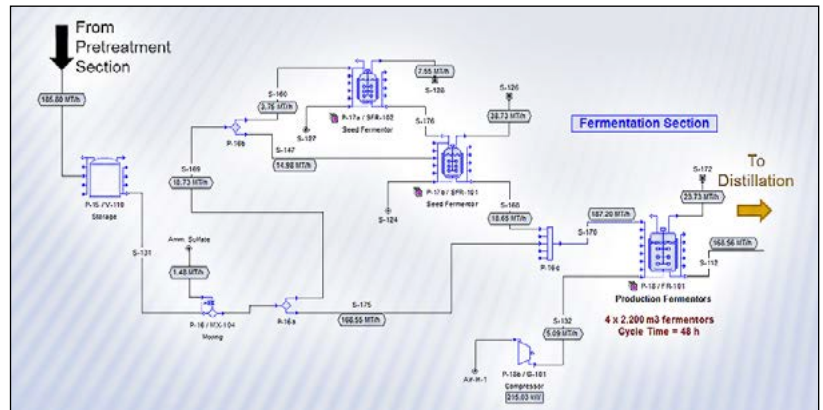


Process Simulation and Technology Development

Southwest Research Institute® (SwRI®) has extensive experience using process simulation software to develop and evaluate chemical, biochemical and petroleum processes. SwRI utilizes process simulation software and cost estimation software to help our clients design, develop, optimize and evaluate economic feasibility of innovative technologies. In addition to theoretical models, SwRI has supporting capabilities in-house to generate empirical data for semi-empirical models.

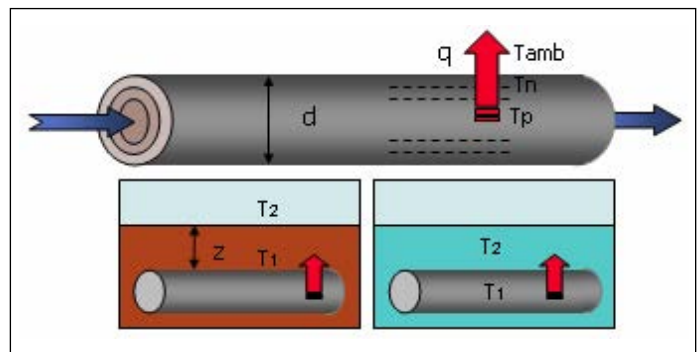


Simulating the corn stover to ethanol process

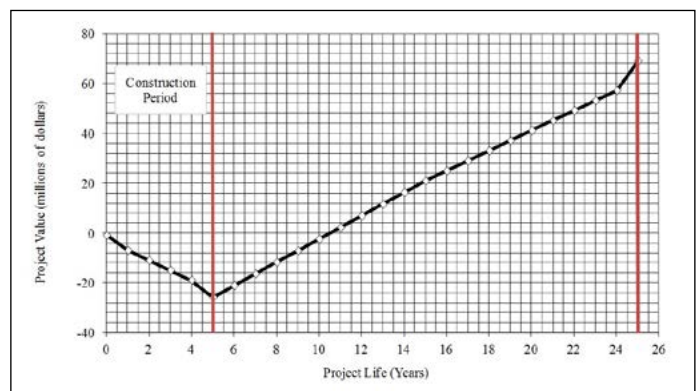
Applications

Examples of applications include:

- Process scale-up design from lab to pilot and pilot to commercial production
- Techno-economic evaluation of process technologies
- Process optimization
- Class 5 and Class 4 capital cost estimates for commercial units
- Concept screening
- Distillation column simulation
- Reaction engineering
- Coal-to-liquid (CTL) process development
- Gas-to-liquid (GTL) process development
- Heavy oil upgrading
- Oil blending property characterization
 - Precipitation
 - Fouling propensity
- Plasma gasification
- Biomass, biofuels and bio-specialty chemicals
- Enzyme-driven processes
- Solids processes and handling



Evaluation of heat loss across a pipe and plug flow reactor

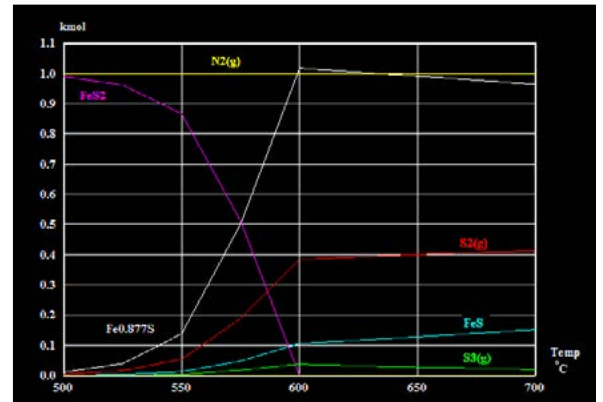


Scale-up of a pilot plant and economic feasibility analysis of a commercial unit

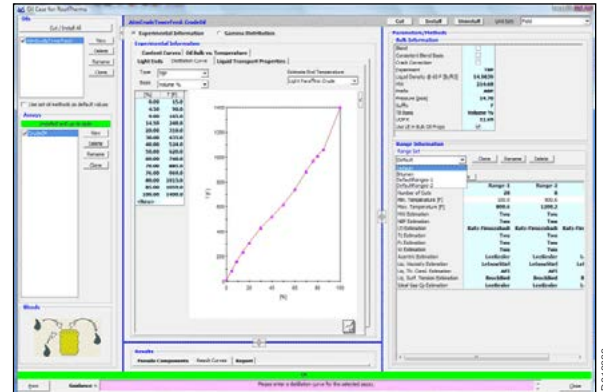
Capabilities

Examples of capabilities include:

- Process design and troubleshooting
- Process scale-up
- Equipment sizing and design
- Heat and material balance reporting
- Vapor liquid equilibrium determination
- Blending simulation
- Bubble and dew point calculations
- Advanced crude oil characterization
- Dynamic simulations
- Calculation of equilibrium concentrations
- Control strategies to optimize operation, economics and equipment life
- Heat capacity, enthalpy, entropy, Gibbs energy and equilibrium constants prediction based on reaction equations



Thermal decomposition of FeS_2 at 10 bar



Advanced crude oil characterization



Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops, and offices for nearly 3,000 employees who perform contract work for industry and government clients.

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Designed & printed by SwRI MPS 08-0914 249841 p