

## INGENIOUS PROCESS CONSULTING SERVICES

Process Facilities operate with a demand-driven business model, fluctuating costs, increasing global competition, safety and environmental regulations and a host of other factors that make it more essential than ever to have safe and efficient operations. Our Process Consulting & process Safety Management services provide clients the ability to alleviate safety and efficiency concerns and increase profitability.

### Process Engineering, Design and Simulation

#### Expertise

- Process design, simulation, & basic engineering
- Material and Energy Balance calculations, PFDs, P&IDs, Smart drawings
- Plant walk down and P&ID mark-ups.
- Preliminary Equipment Design
- Hydraulic calculations
- Preliminary estimates and schedule
- Project Execution Plan
- Revamps and Optimization of process facilities
- PSV sizing
- Equipment selection, design & datasheet preparation

#### Sample Experience

- The project was a process optimization and revamp study of a Diesel Hydrotreater unit (DHT) and Deep Hydro Desulphurization Unit (DHDS). **DHT & DHDS Revamp, Valero Memphis Refinery**
- Feasibility study and process design of BTX, PTA facility-**GTC Technology, Houston**
- Dynamic Simulation of Flare relief system-**KBR Halliburton**
- Refinery Configuration study for grassroots refinery-**Indian Institute of Petroleum**
- Process design and simulation of by-product stream for ethylene recovery-**Vinyl Chemicals**
- Design and simulation of absorption refrigeration plant-**Vinyl Chemicals**
- Optimization & simulation of wash water in Ethylene oxide purification plant-**Vinyl Chemicals**
- Process design for separation of Cinnamyl Alcohol and 3-Phenyl 1-Propanol-**Laxmi Organics**
- FEL-1 for HMD (Hexamethylene Diamine)-ACN (Acetonitrile) co-production process- **Confidential Client**
- Hydraulic calculations, PSV calculations and developed P&ID and PFDs for a hydrodesulphurization unit-**Shaw Stone and Webster**
  - Heavy oil upgrading feed#2: Hydraulic calculation, P&ID preparation, Heat and material balance for ARDS, FCC and PRP units-**Hyundai Oil Bank Co. Ltd, Korea**
  - Complete FEED work for Petrobras Steam Cracking Unit- **Shaw Stone and Webster**
  - ExxonMobil Singapore Parallel Train (SPT) Ethylene Project-**Exxon Mobil**
  - Control of Hazardous Air Pollutants from Mobile sources: Complete Feed work-**Marathon refinery**
  - PSPC 800 KTA Ethylene complex project- a process design package for the Ethylene Plant, firewater design, cooling water distribution, PSV sizing, Hydraulics, Pump calculations and line sizing- **Petro-China, Sichuan Petrochemical company**
  - Singapore Parallel Train Olefins Recovery Project: Detailed Engg. for an Ethylene Complex Plant-**ExxonMobil**
  - Grassroots Project for Delayed Coker and Hydrotreating units-Basic package- **Confidential**

### Process Safety Management (PSM)

Ingenious provides consulting services and/or execution on all aspects of PSM programs in accordance with OSHA Standards, API-RP520, API-RP521, API-STD2000 (for atmospheric vents) DIERS method, and ASME codes. Ingenious PSM project execution generally involves two phases. Phase I consists of identification of concerns

which are violating safety standards/regulations. Phase II is a continuation of Phase I in which all of the concerns raised in Phase I are mitigated with proposed minimum modifications.

**PHASE-I:**

- Data Collection
- Overpressure Scenario Identification
- Relief rate calculation
- Column Calculation
- Report Generation
- Discussion List

**PHASE-II**

- New relief device
- Conventional to Balanced Bellows PSV
- Change inlet/outlet piping
- Relief device set pressure change
- Install stand-by relief device identical to existing one

**Sample Experience**

- **EPDM & SBR Plant Revalidation, Lion Copolymer:** Lion Copolymer is one of the leading manufacturers of synthetic rubber in USA. For their two manufacturing units in Louisiana (LA), one in Baton Rouge, LA and the newly acquired (from Uniroyal) in Geismar, LA, the PSM study is being carried out by Ingenious.
- **Tank farm - Marathon refinery:** PSM study of this plant included scenario identification, relief rate quantification and adequacy check of all relief devices per API 521 and API2000 guidelines.
- **Ultrafiner unit- Marathon refinery:** The temperature, pressure, composition, and flow rates from expanded capacity simulation model were used as the basis for the Pressure Relief Analysis for the unit.
- **Sour water stripping unit -Marathon refinery:** Studied adequacy of relief devices. For relief rate, quantification of scenarios on stripper column and process simulation with Petro-SIM engine was carried out.
- **Sulfur recovery and Tail gas treating Unit (ConocoPhillips refinery):** Mitigated the pressure relief documentation of 43 relief devices and their concerned equipment.
- **Sulfur Recovery Unit (SRU) - ConocoPhillips refinery:** Relief valves were studied to check whether it provides adequate capacity to prevent overpressure based on the calculated relief rates.
- **Amine Regeneration Unit - ConocoPhillips refinery:** Based on the existing database, and H&MB the 24 relief valves in the scope were evaluated for adequacy checks.

**Software Used:** Ingenious uses market leading software applications for executing it's consulting projects. These include:

- AutoCAD, CadWorx
- ChemCAD Steady State, Therm, ReACS, Dynamics, Batch, SafetyNet
- Petro-Sim (Hysys), steady state and dynamic
- ProPlan, planning, economics and modeling software
- ANN reactor models, & custom spreadsheets

**VALUE PROPOSITION:** Ingenious strives to build flexibility, low cost and incorporate value engineering principles into all of our Process Consulting projects which allow for a more customized approach that matches all of our Clients' needs.