Process ➔ Instrumentation ➔ Control
Consultancy ➔ Engineering ➔ Design
Support Services
P & I Design Ltd, a privately owned Company, was established in 1978 to provide a comprehensive consultancy, design and support service to the process industries in the chemical engineering, instrumentation and control fields. The initial primary objective was to provide an integrated approach to process and instrumentation system design and operation. Systems and procedures are approved to ISO 9001.

Located in North East England our multi-disciplined engineering team have implemented projects for multi-national clients worldwide in many industry sectors applying the current technologies.

**Scope of Services**

**Process**
- Concept and detail design
- Process modelling and dynamic simulation
- Integrated control system design
- Emergency relief system design and analysis
- Risk analysis and mitigation

**Instrument • Electrical • Control**
- Concept and detail design
- Hazardous area classification
- Electrical distribution and control panels
- Control system design PLC-SCADA & DCS
- Calibration and testing facilities
- Installation, testing and commissioning services

**Project Management**
- Resource and sub-contract management
- Tender preparation
- Procurement and acceptance
- Cost control
- Installation supervision

**I.T. Services**
- System and network design
- Industrial and business network solutions
- Remote access and mobile solutions
- Server and client applications
- Microsoft Windows Server 2012 R2

**Software**
- CHEMCAD simulation software
- ENVIROKIT proprietary software
- HAZOP reporting software
- ProSysDR IEC61511 Compliance

**Functional Safety**
- Compliance with IEC 61508 and 61511
- Development safety management
- Design of protective systems
- Appropriate risk assessment
- Life cycle compliance support

**Facilities Management**
- Remote access on-line support
- Data repository
- Data management and reporting
- Maintenance support
- Procurement, validation and supply

**Training & Seminars**
- Process Simulation
- Refinery Process Simulation
- Risk Assessment LOPA
- Risk Assessment ATEX

**Publications**
- Chemical Engineering in Practice
- Process Measurement & Control in Practice
- Process Simulation Dynamic Modelling & Control
- Process Simulation Refinery Processes
- Lifecycle Safety Instrument Systems
Process Engineering

A broad range of expertise has been accumulated in successfully completing projects from the concept study phase through detailed design to final commissioning. Process simulation techniques are used extensively for design validation, risk assessment, optimisation and troubleshooting.

Services
Concept Studies
Process Simulation and Modelling
Process Calculations
- Mass & Energy Balances
- Equipment Sizing & rating
Detailed Design
- Process Flow Diagram
- Process & Instrumentation Diagram
- Equipment Specification
Risk Assessment
- HAZID – HAZOP - COMAH
Process Optimisation
Troubleshooting
Regulation compliance

Expertise
Hazardous Material Handling
Batch Reactor Control
Gas Scrubbing and Distillation
Separation and Drying
Combined Heat and Power (CHP) optimisation
Environment technology

Software Tools
CHEMCAD process simulation
CHEMCAD sizing & rating
ENVIROKIT bespoke software
LihouTech HAZID-HAZOP software

Recent Projects
Storage terminal fire system simulation
Stress testing worst case scenarios
CHP facility simulation and change assessment
To study design change economics
Cryogenic batch reactor dynamic modelling
Design of low temperature batch reactor services
Distillation system dynamic modelling
Troubleshoot column operating performance
Emergency relief systems design
Rating of fine chemicals site relief systems
Government Agency on-going consultancy
Extensive expertise has been accumulated in successfully completing projects involving traditional and state of the art technologies. Instrumentation and control systems have been designed and implemented in a wide range of applications and industries.

Services
- Concept Studies
- Functional Specifications
- User Requirement Specifications
- Software Specifications
- Equipment Specifications
- Engineering Calculations
- Detailed Design
- Application Software Coding
- Control Documentation
- System Testing
- Commissioning

Expertise
- LOPA Risk Assessments
- COMPEX Certified Engineer
- DSEAR – Explosive Atmospheres Directive (ATEX)
- Programmable Logic Controllers (PLC)
  - Allen Bradley-ABB-Mitsubishi-Siemens
- Supervisory Control Data Acquisition (SCADA)
  - InTouch-InBatch-RSView-Fix

Software Tools
- CHEMCAD sizing and rating
- LihouTech SIL
- LOPA in house software
- Amtech cable sizing and rating to BS7671

Recent Projects
- High Integrity Power Supply Control Systems
- Waste Site Remote Management
- Telecoms Industry - Essential Supplies Control
- Tank Farm Automation
- Biofuels Plants
- Road & Rail Loading Gantry
- DSEAR surveys
- LPG Storage and Distribution
- Petroleum & Chemicals Storage Terminals
- Pipeline Transfer Systems
- Road & Rail Tanker Loading Facilities
- Terminal Automation
Functional Safety

P&I Design Ltd have extensive expertise with the design and operation of Safety Instrumented Systems. We have assisted and supported the development and understanding of Functional Safety with our involvement in HSE and Industry working groups, such as Buncefield Standards Task Group (BSTG), Process Safety Leadership Group (PSLG) and the Chemical and Downstream Oil Industries Forum (CDOIF).

Services
Hazard & Risk Assessments
Development of safety management systems
Safety Lifecycle Management
Safety Requirement Specification
Safety Instrumented System design & engineering
Functional Safety Assessments
Installation Commissioning Validation
Proven in Use Assessments
Verification
Training
Support

Expertise
HAZOP
LOPA Risk Assessments
Compliance with IEC 61508 and IEC 61511
Compliance with API 2350
Certified Engineers CFSE & ISA

Software Tools
LihouTech HAZOP & SIL
LOPA in house software
SIL Verification in house software
ProSys DR IEC 61511 Compliant Database

Recent Projects
Road & Rail Loading Gantries
Overfill Protection Systems
Alarm & Annunciation
Emergency Shutdown System
Jetty Crane Safety Study
Legacy System review
Reactor Safety System
Safety Instrumented System Awareness
Training
Gas Detection
Butanisation Safety Instrumented System
Blending System
P&I Design Ltd use software to support the main engineering activities. Work on environmental legislation resulted in the development of ENVIROKIT. For safety studies LihouTech HAZOP reporting software is used and is available from us. In 1998 CHEMCAD was selected for process engineering resulting in our appointment as the UK representative. In 2012 IEC 61511 Compliant Database ProSysDR by Mangan was introduced which we market in the UK.

**CHEMCAD Simulation Software**
The process is modelled using a graphical user interface. A library of Unit Operations is provided to represent most applications. Over 2000 components are available with phase behaviour being determined by the thermodynamic model selected. For detailed information visit www.chemcad.co.uk

**CHEMCAD Steady State**
Mass and energy balances Distillation-absorption-reactions-electrolytes Piping systems design and rating Emergency relief systems design and rating

**CHEMCAD Dynamic**
Batch and continuous process Control system design and evaluation Batch reactor design and performance Emergency Relief system behaviour Abnormal operations behaviour

**CHEMCAD On-Line**
Process optimisation Equipment diagnostics Soft Sensors and un-measurable parameter

**ENVIROKIT**
Designed for environmental studies Scrubber with fast chemical reaction Dispersion to atmosphere Vent stack height Carbon Adsorption Dispersion from spillage Emissions from process or fugitive

**LihouTech**
HAZOP Reporting Software SIL Reporting Software

**Mangan - ProSys DR**
IEC 61511 Compliant Database Cloud based data repository Independent Protection Layer (IPL) readiness tool One-click Safety Requirement Specification (SRS) Real-time IPL assessment status Evergreen LOPA, IPL and SRS Management of Change (OC) control Create and store compliant SIS documents in database
Training & Workshops

We provide training courses and workshops worldwide in the fields of process simulation, risk assessment and safety system engineering. The client can choose the course location to suit the specific needs of convenience and economics with Webinars being offered as an alternative.

The course content can follow a subject specific format or can be adapted to meet specific requirements. The course can be extended into a workshop where specific problems are studied using the course techniques.

CHEMCAD Process Simulation

Our simulation specialist has presented courses worldwide for Chemstations over many years.

**Steady State**
- Thermodynamics
- Mass and Energy Balances
- Design and rating
  - Piping system
  - Emergency relief system
  - Heat exchanger
- Client selection
  - Unit Operations
  - Applications

**Dynamics**
- Basic principles
- Process control fundamentals
- Design and rating
  - Orifice plates
  - Control valves
- Client selection
  - Simulation cases
  - Applications
- Process fault analysis

**Process Control**
- Process control fundamentals
- Process variable behaviour
- Control loop design
- Advanced control loop design
- Control loop tuning

**Refinery Operation Simulation**
- Thermodynamics
- Crude Column
- Vacuum Still
- Splitting and Product Purification
- Hydrotreater
- Catalytic Reformer
- Amine Treatment

**Safety System Engineering**

Our safety specialist is involved with trade associations and the regulator in the development of guidance for Layer of Protection Analysis and Safety Instrumented Systems.

**Hazard and Risk Assessment**
- Layer of Protection Analysis (LOPA)

**Safety Instrumented Systems**
- Safety Instrumented Function (SIF)
- Safety Integrity Level (SIL)
  - Safety Requirement Specification (SRS)
The engineers of P&I Design Ltd have experienced an immense transformation in technology as applied in the process industries. This experience has been gained across a wide range of industry sectors including steel, refining and storage, pharmaceuticals, fine and speciality chemicals, food and plant utilities. P&I Design have published a series of engineering practice books and articles which provide an extensive source of information based on many years of experience and to support our training activities.

Books can be purchased from our websites
www.pidesign.co.uk
www.chemcad.co.uk

Publications produced by www.billinghampress.co.uk

Chemical Engineering in Practice
ISBN 978-0-9568169-1-7
2nd Edition, July 2011
Also available in Kindle format from Amazon

Process Measurement & Control in Practice
ISBN 978-0-9568169-2-4
November 2013

Process Simulation Dynamic Modelling & Control
ISBN 978-0-9568169-3-1
1st Edition November 2013

Lifecycle Safety Instrument Systems
August 2013

Chemical Processing Articles
www.chemicalprocessing.com
Keep cool when designing Batch reactors
September 2005
Select the Right Level sensor
December 2010
Optimize Batch Distillation
May 2013
Our business and engineering activities use the latest Information Technology products and services which has resulted in the development of in-house expertise applicable to the S.M.E. and engineering design environments. Our computer systems are fully integrated and undergo continued development using cloud-based technology so that data is accessible anywhere in the world with an internet connection.

**Services**

Cloud Services
- ExchangeDefender Anti-spam & Anti-spyware email filtering
- Exchange 2010 Essentials – Cloud based Exchange Mail System
- Connectivity to Outlook, Microsoft, Android and Apple phones and tablets
- Cloud Storage and file sharing for multiple team environments
- Cloud based Anti-Virus solutions
- Web Hosting

**Virtual Machines**

Microsoft 2012 R2 Hyper-V Virtual Servers
VMWare Workstation Solutions

**Backup Services**

Backup solutions using Synology Network Attached Storage
Cloud Backup Systems.

**Network Systems**

Network solutions using wired and wireless network technology.

**Hardware**

HP Desktop, Laptop and Servers
Cisco network equipment
BenQ monitors
Synology Network Attached Storage.
Logitech Mice and Keyboards

**Expertise**

Cloud solutions
- Hyper-V & VMWare Virtual Computer Solutions
- Network systems
- Windows Server and Desktop Operating Systems:
  - Windows Server 2012r2 and Windows 8.1
- Desktops, Laptops, Tablets, Mobile Phone systems
- Application Software
  - Microsoft, Adobe, Macrium, Nitro PDF Synology,
  - ExchangeDefender, Cubby and Malwarebyte

**Recent Projects**

Servers converted to Hyper-V Virtual Machines reducing physical servers
Migration of Exchange Server to Cloud based Exchange Server
Migration of Server storage system to Cloud based file sharing
Backup of Cloud based file sharing to Synology Network Attached Storage
Cloud based Anti-Virus Solution running on multiple devices
Cloud based Anti-spam Solution
Project Management

In house capability has the expertise to manage process plant and storage facility projects from initial inception through to final commissioning and handover. All aspects of project implementation are controlled including programme, costing, documentation, change control, appointment and supervision of sub-contractors, installation supervision, testing and commissioning.

Feed Studies
Tender preparation
Resource and sub-contract management
Procurement and acceptance
Cost control
Design change control
Programme control
Scope of works for installation
Installation supervision
Acceptance testing and handover

Recent Projects
Fuel additive systems for major fuel suppliers
Butane blending facilities
Methyl ester ratio blender
Storage tank heating systems
Vinyl chloride monomer automation upgrade
Facilities Management

The latest technology now allows for the remote access to SCADA, HMI and PLC systems for configuration, monitoring, fault diagnosis and maintenance purposes. This service is available on a planned maintenance and support contract basis. In the case of unmanned facilities scheduled site visits and maintenance can be carried out.

The development of Cloud based I.T. allows us to provide clients with a complete documentation storage and control facility accessible at their office and site locations.

24/7 Support

We offer industrial automation support 24 hours a day 7 days a week. Unlike many companies we offer end to end support i.e. from field sensor to SCADA and onwards to management systems.

We have a dedicated call centre to receive your calls and pass them on to our engineer, ensuring your call is responded to in a guaranteed timeframe. Site attendance will be provided if the problem cannot be rectified through remote access facilities.

Unmanned site supervision can be provided with remote monitoring.

Data & Documentation Management

Successful management of engineering documentation is paramount to efficient and safe site operations. This is a difficult task to achieve with site based engineering personnel reduced to the minimum and often being migratory. Our In-House systems have stood the test of time and provide the essential tools for our everyday design and consultancy services. We can roll these services out to provide the stability and consistency required to manage your documentation coupled with a fully managed service with formal transmittal of documentation between parties. We can also provide secure access to cloud based viewing of documentation ensuring your personnel are always working with the latest revision. Using our expertise in automation and I.T. we can implement on site facilities to provide information, at the point of use, in safe and hazardous areas including switchrooms, field mounted PCs, tablets and other mobile devices.

Calibration & Inspection Services

Our team of highly qualified technicians can provide routine calibration and testing services, additional support for planned shutdowns and extension of your engineering capacity.

Services include:
Instrument calibrations and functional testing
Safety Instrument System lifecycle testing to BS EN 61511
CompEx inspections