



Synergy Process Systems is promoted by well-qualified engineers having vast Industrial experience. During first few years of operations, synergy has proved itself by completing several engineering projects to the satisfaction of the clients.

Our objective is to offer reliable and cost effective Engineering solutions/systems to Chemical and allied industries mainly in the area of **Heat and Mass Transfer/ Separation operations**. We spend enough time to understand specific project requirements and work in close tandem with our customers to address the safety, environmental, energy and automation issues early in the process design to arrive at most effective solution to their problems. Our expertise in process automation then ensures consistent product quality and plant safety. We have the expertise to handle, most of the complex engineering problems in these areas. Towards this we can utilize process simulation studies and/or pilot trials with our business associates.

We offer Services in Basic engineering, and Detailed Engineering in the areas referred above. We supply critical project components like efficient distillation/Absorption column packings, tower internals and other distillation/Absorption accessories. We also supply batch solvent recovery modular units up to 5000 liter on turnkey basis. For plants engineered by us we offer complete automation package from concept to commissioning.

DESIGN AND ENGINEERING SOLUTIONS

Synergy can offer wide range of engineering services under one roof to chemical and allied industries with the help of existing staff and strategic alliances with other service providers.

Our functions/scope could typically be

- ◆ To conceptualize the appropriate separation system
- ◆ Feasibility / Economic analysis.
- ◆ Generate Basic and Detailed engineering Design Documents
- ◆ Procurement assistance/ Supply of critical system components
- ◆ Assistance in Project Management
- ◆ Erection supervision

- ◆ Commissioning of the plants and training of factory personnel.

The Basic Engineering Design includes documents like Process Flow Diagram, Utility requirements, P & ID, and Specifications of equipments and bought out items.

The Detailed engineering documents include Plant/equipment layout with load data (Plan and elevation), Structural designs, Fabrication drawing for equipments, Piping GA and isometrics.

In case our engineers are exposed to proprietary information, secrecy agreement can be signed to protect the same.

Design and Engineering Solutions are offered in the following areas.

SEPARATION SYSTEMS

Distillation systems

- ◆ Batch mode : Flash, Azeotropic, Extractive, Reactive, Vacuum, Steam.
- ◆ Continuous Binary, Multicomponent, Azeotropic, Extractive, Reactive, Vacuum, Steam.
- ◆ Multipurpose to handle different feed materials.



- ◆ Multi- mode for special cases.
- ◆ Column internals can be tray or packed.
- ◆ Compact/Skid mounted system modular designs for small capacities.
- ◆ Energy saving schemes like multi-pressure systems, Heat pumps, Thermal vapor compression.
- ◆ Simulation studies and Pilot trials possible for unknown areas.
- ◆ Complete automation using PLC/DCS.

Absorption systems

- ◆ Physical or Reactive absorption.
- ◆ Desorption can be by means of steam or air.
- ◆ Sensitivity studies to locate the optimum solvent rate.



- ◆ Column internals can be tray or packed.
- ◆ Compact/Skid mounted system designs for small capacities.
- ◆ Complete automation using PLC/DCS

Evaporation Systems

- ◆ Natural Circulation short tube callendria type.
- ◆ Forced circulation compact designs including appropriate flash vessels.
- ◆ Falling film evaporation systems for heat sensitive materials.
- ◆ Energy efficient systems like Multiple Effect, Vapor compression.
- ◆ Kettle type, Thermosiphon, Forced circulation, falling film designs for distillation systems.
- ◆ Required level of instrumentation and control.

Other Separations

- ◆ Melt (Freeze) Crystallization.
- ◆ Liquid-Liquid Extraction
- ◆ Hydro cyclones and Cyclone separators.
- ◆ Decanters (Phase Separators) with very low hold- up



Separation of close boiling isomers by melt crystallization

HEAT TRANSFER

- ◆ Batch heating/ cooling calculations for reactors having external jackets/coils or internal coils.
- ◆ Single utility fluid systems.
- ◆ Finned tube heat exchangers involving low radial or high transverse fins.
- ◆ Air-cooled heat exchangers.
- ◆ Special designs for highly viscous fluids to augment heat transfer using tube inserts like twisted tapes.
- ◆ Networking and pinch analysis to achieve minimum utility requirements.
- ◆ Heat transfer to solids indirect (Melting) or direct using hot air- batch-wise or continuous.

In case of the assignments involving bulk quantities :

- ◆ Thermal and Mechanical Design of tubular heat exchangers as per TEMA and ASME or other relevant codes.
- ◆ Fabrication drawings of tubular heat exchangers .

TECHNOLOGY BASED

- ◆ **Alcohol Distillation** to RS, ENA, Absolute alcohol using appropriate entertainer.
- ◆ **Solvent recovery systems** to reclaim useful solvents from liquid or gaseous streams.
- ◆ Feasibility of recovering.
- ◆ Batch.
- ◆ Continuous.
- ◆ Skid mounted.
- ◆ **Alcohol based chemicals** : like Acetaldehyde, Acetic acid, Ethyl acetate, Ethylene.
- ◆ Fusel oil fractionation to amyl Alcohol and further esterification to useful esters.
- ◆ **Essential oils** and their further fractionation.
- ◆ Caster oil to **Sebacic acid** (Process licensing through a US Company.)
- ◆ Complete designs or Trouble shooting, Revamping or Process Intensification services in these areas.
- ◆ **Biotechnology**: Aerobic fermentors.
- ◆ Fermentation auxiliaries like Sterilization and CIP systems.



Batch Distillation - Pilot Plant Facility

TROUBLE SHOOTING / REVAMPING/ MODERNIZATION AND OTHER SERVICES

In case of problems like excessive Energy/ Heating requirements, Plant not giving desired product purity or capacity. Based on data collected from plant, Optimization/ Simulation exercises are done at our end for the given system under the operating constraints to identify the Bottlenecks. Solution is then provided in the form of revised P&ID, operating sequences, revamping certain equipments. Commissioning assistance is provided then to demonstrate the plant performance.

- ◆ Modernization or automation works.
- ◆ Process development work in association with academic/research institutions.
- ◆ Development of special equipments mainly in the area of heat and mass transfer.