



ATTAQUANT

Simplifying Technologies

ISO 9001 : 2015 CERTIFIED

DISTILLATION COLUMN



Process Equipment Design, Development
With Manufacturing, Installation, Commissioning



www.attaquant.in



VISION

We will be the most valued solutions provider in terms of process development and design to our customers

MISSION

To become leading company in designing and manufacturing of equipment, providing services and becoming one stop reliable hub of technical resources for providing complete solution to the requirements of the industry.

To focus on meeting or exceeding customer expectation in terms of product quality and on time delivery

WHY ATTAQUANT?

- Experienced Staff
- Cutthroat pricing
- Client friendly policies
- Quality packaging
- Timely delivery
- Wide distribution reach
- Huge infrastructure
- Quality Service after Sale
- Technically feasible solutions

ATTAQUANT PRODUCT RANGE

✓ ZERO LIQUID DISCHARGE SYSSYEM	✓ DISTILLATION COLUMNS
✓ SOLVENT RECOVERY SYSTEM	✓ FILTERS
✓ EVAPORATORS	✓ AUTOCLAVES
✓ DRYERS	✓ EXTRACTORS
✓ CENTRIFUGES	✓ POWDER TRANSFER SYSTEM
✓ REACTORS	✓ STORAGE TANKS
✓ HEAT EXCHANGERS	✓ SKIDS



INTRODUCTION

"Attaquant Enterprises Pvt. Ltd.", is a company with the right expertise who have many years of relevant experience in Process Engineering. **Attaquant** is a disciplined, data-driven company who has a right approach and methodology for eliminating defects in any process – from design to manufacturing and from product to good service.

We go out of traditional way not only to offer comprehensive solutions for all your Process; but to also provide you with the information and resources you need to make refined decisions about which solutions are best for you, and your project. We have started doing flawless Engineering in designing & manufacturing of all equipment's required in Chemical, Solvent recovery, Paint industry, Water & Waste water management, Pharmaceutical Industries and in Oil & Gas. We ventured into process engineering market and started offering Energy Saving Solution to various process industries in National & International market.

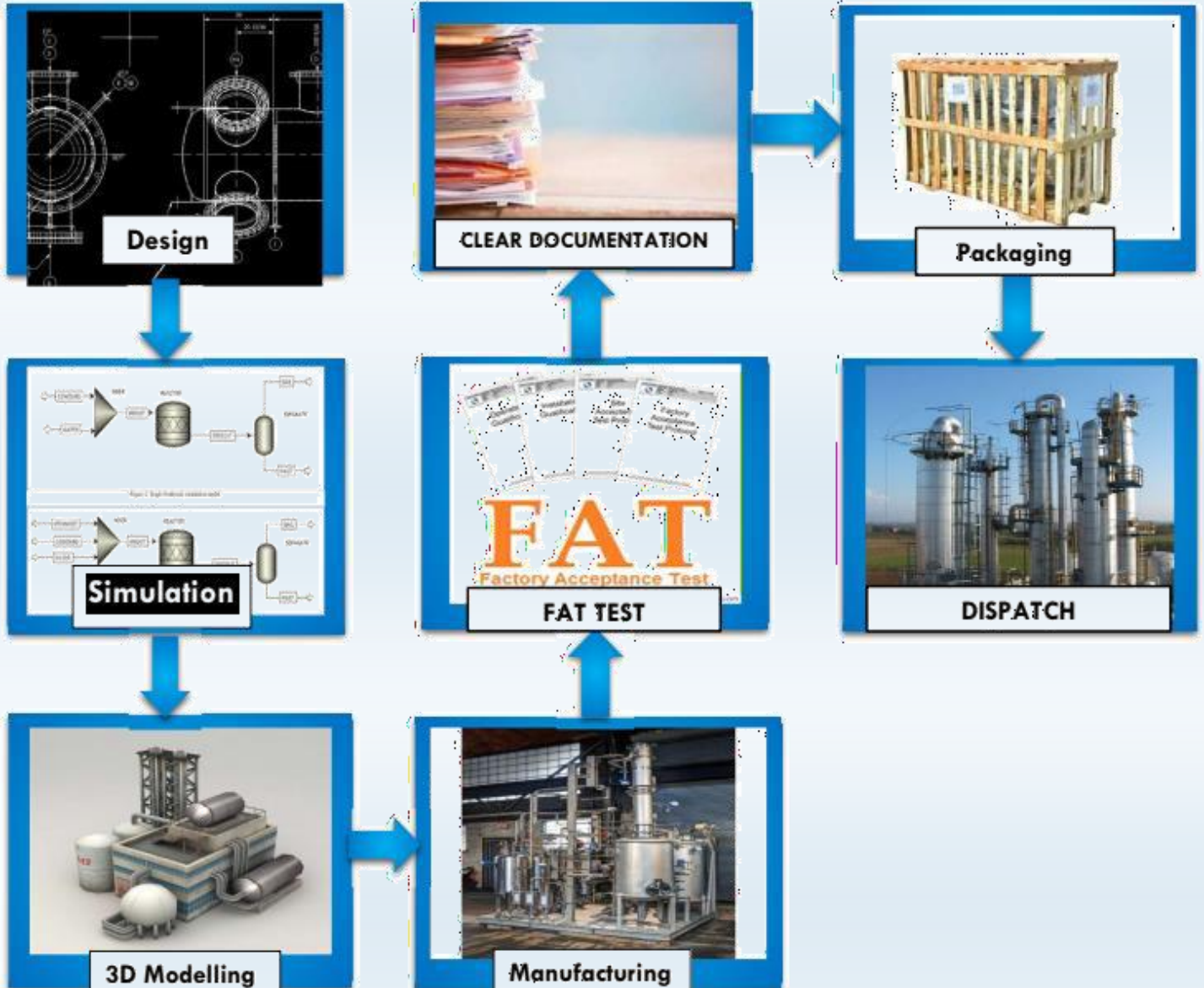
We are one of the leading manufacturers, traders and exporters of a wide range of the premium quality Process plant Equipment. Our product range includes Plate Fin Heat Exchanger Set Up, Static Mixer, Demister pads / Mist eliminators, Low pressure vessels, Distillation column trays and related internals and Hot Water System we offer a wide range of products. For manufacturing the offered range as per the industry set norms and regulations, our professionals make use of latest tools and machinery. Their current stability, strong construction, optimum functionality, low maintenance and high performance, makes our products highly demanded in the market of process industries of all sections.

The company now introduces eco-friendly pre-fabricated insulation panel systems in a range of profiles, thicknesses, and finishes. The speciality of these panels is that, they are perfect for the speedy creation of cold stores of any size at the site due to their precise interlocking design and great insulation properties, and are also eco-friendly both in their material and in their manufacturing process itself. These new eco-friendly panel solutions from Attaquant can be used to create cold storages of any size, from small walk-ins to very large cold rooms.

Large production capacity has helped us in managing the bulk projects in the most efficient manner. To avoid any damage while transportation, we pack the offered range with tamper-proof packaging before dispatch. Timely delivery of the offered range of products is assured, due to our extensive distribution network.



PROCESS PATH AT ATTAQUANT





Distillation Columns:

Distillation technology offers the process of separating the components or substances from a liquid mixture by using selective boiling and condensation.

Attaquant is a leading Distillation Column Manufacturer, offering Distillation Columns that are able to handle a wide range of streams simultaneously. This distillation technology is a great option for manufacturing processes that may expand or change in the future. Many companies that generate industrial wastewater are hauling their water for disposal at a high cost per gallon. Other companies are treating the wastewater, often with labour and chemical intensive processes, and are having to adhere to increasingly strict discharge limits to their local sewer authority.

At Attaquant we design, fabricate and install variety of distillation columns according to requirements of clients. We provide different configuration of distillation system such as Batch Distillation Column, Batch Distillation Column, Single and Multi-Stage Distillation Column, Extractive Distillation Column, Azeotropic Distillation Column, Reactive Distillation Column and Vacuum Distillation Column.



BENEFITS

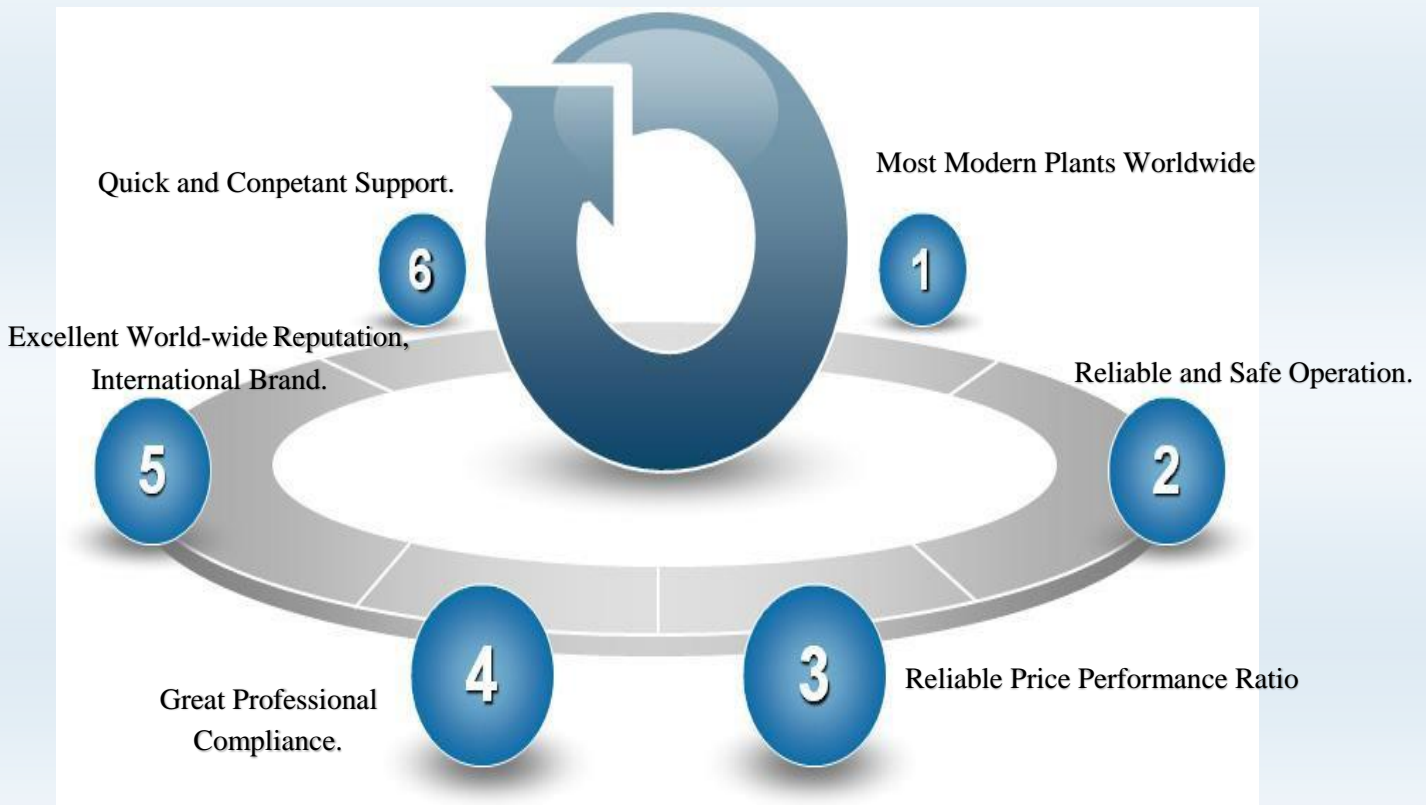
- ✓ Well established technology and competitive supply of equipment
- ✓ Well suited for energy integration into the surrounding process
- ✓ Most customized & highly efficient solution
- ✓ Optimum & well-balanced systems are designed with simulation, programme developed in house.
- ✓ High Purity Production.



PRODUCT RANGE

- ✓ Continuous Distillation Column
- ✓ Batch Distillation Column.
- ✓ Single and Multi-Stage Distillation Column.
- ✓ Extractive Distillation Column.
- ✓ Azeotropic Distillation Column.
- ✓ Reactive Distillation Column.
- ✓ Vacuum Distillation Column.

CORE COMPETENCE





DISTILLATION COLUMN PRODUCT

Continuous Distillation Column

Continuous Distillation is an ongoing separation process in which a liquid mixture of two or more miscible components is continuously fed into the process and physically separated into two or more products by preferentially boiling the more volatile components out of the mixture.

When a liquid mixture is heated so that it boils, the evolved vapor will have a higher concentration of the more volatile components than the liquid mixture from which it evolved. Conversely, when a vapor mixture is cooled, the less volatile components tend to condense in a greater proportion than the more volatile components.

APPLICATION

- ✓ This process is used where large quantities of liquids have to be distilled.
- ✓ In Petroleum Refining.
- ✓ Natural Gas Processing.
- ✓ Petrochemical Production, Hydrocarbon Solvents
- ✓ Coal tar Processing
- ✓ Liquefaction of Gases such as Hydrogen, Oxygen, Nitrogen and Helium.





Batch Distillation Column

Batch distillation refers to the use of distillation in batches, meaning that a mixture is distilled to separate it into its component fractions before the distillation still is again charged with more mixture and the process is repeated.

A batch distillation system might contain a heating vessel or still, a distillation column that can be as simple as an empty pipe or a complex column with trays or packing, a liquid condenser that uses water or air cooling and final product collection lines and storage. The still heats the liquid mixture, which then travels up through the riser or column to the condenser. Water typically is used to cool the condenser, and some or all of the liquid condensate is permitted to fall back through the column, a technique known as reflux. Batch systems that return all of the condensed liquid to the column are referred to as total reflux systems.



FIELDS OF APPLICATION

- ✓ Batch distillations are frequent in the pharmaceutical industry for small scale solvent recovery applications.
- ✓ Purification of High Valuable Oils.
- ✓ In wastewater treatment of small capacities.



Single and Multi-Stage Distillation Column



Distillation processes are typically done in single or multiple stages. Single-stage thermal distillation is a continuous operation where a liquid mixture is fully or partially vaporized in one single phase. The solution is heated to its boiling point, causing the more volatile components to evaporate, where it is subsequently cooled and condensed.

In multi-stage distillation, portions of the liquid are vaporized and cooled/condensed in successive stages, usually with decreasing pressure and temperature.





Extractive Distillation Column

Extractive distillation is defined as distillation in the presence of a miscible, high boiling point, relatively nonvolatile component, the solvent, that forms no azeotrope with the other components in the mixture. The method of extractive distillation uses a separation solvent, which is generally non-volatile, has a high boiling point and is miscible with the mixture, but doesn't form an azeotropic mixture. The solvent interacts differently with the components of the mixture thereby causing their relative volatilities to change. This enables the new three-part mixture to be separated by normal distillation. The original component with the greatest volatility separates out as the top product. The bottom product consists of a mixture of the solvent and the other component, which can again be separated easily because the solvent does not form an azeotrope with it. The bottom product can be separated by any of the methods available.

APPLICATION

- ✓ Acetate salts to produce absolute ethanol
- ✓ Production of nitric acid as an alternative to sulphuric acid solvent process
- ✓ Concentration of dilute solution such as plant extract
- ✓ As a reboiler to distillation column
- ✓ Economical alternative to falling film evaporator for moderate vacuum

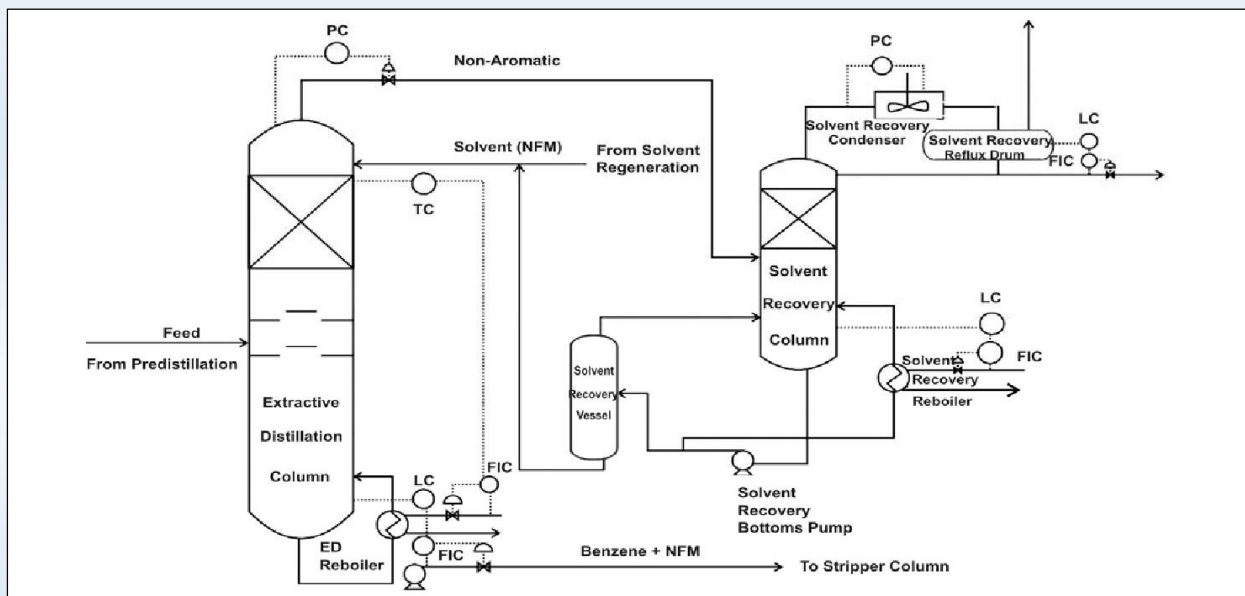


Fig: Process Flow Diagram for Extractive Distillation



Azeotropic Distillation

Azeotropic distillation (AD) is a process to break azeotrope where another volatile component, called the entrainer, the solvent, or the mass separating agent (MSA), is added to form a new lower-boiling azeotrope that is heterogeneous. The azeotrope is then removed as a distillate. AD processes benefits from distinct advantages, such as energy savings, increased recovery, and ability to separate mixtures hindered by close boiling points, pinch points and azeotropes. It involves methods like Material Separation Agent, Pressure-Swing Distillation, Breaking an Azeotrope, Dehydration Reactions etc. Azeotropic Distillation is accomplished by adding to the liquid phase a volatile third component which changes the volatility of one of the two components more than the other so that the components are separated by distillation.

APPLICATION

- ✓ Alcohol Dehydration
- ✓ Acetic Acid Dehydration
- ✓ Production of esters
- ✓ Acetic acid recovery or purification

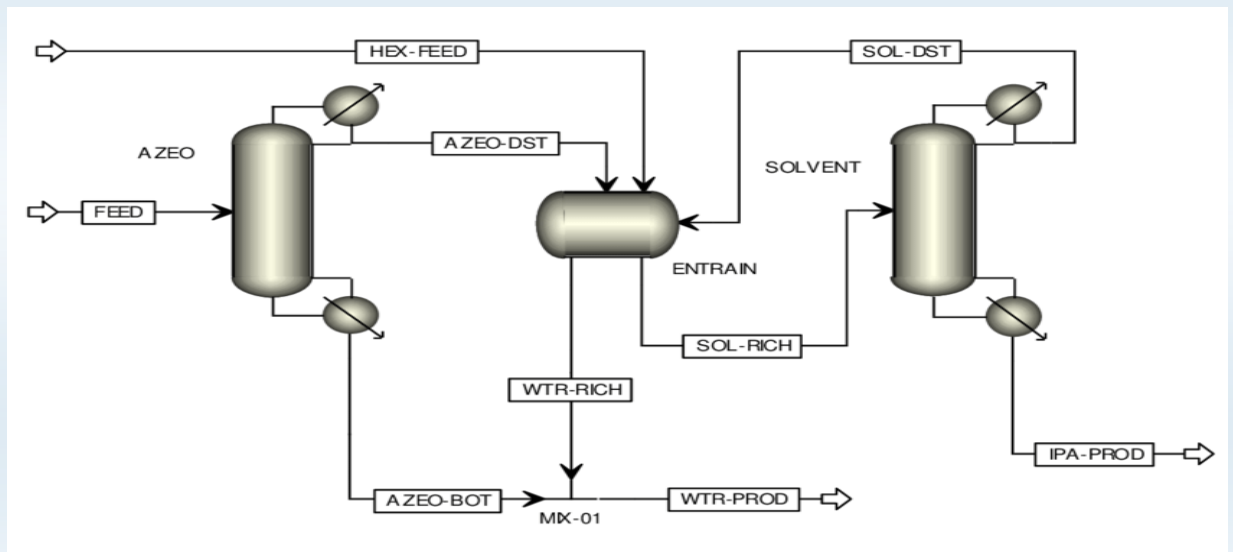


Fig: Process Flow Diagram for Azeotropic Distillation



Reactive Distillation Column

Reactive distillation (RD) is an efficient process intensification technique that integrates chemical reaction and distillation in a single apparatus. The process is also known as catalytic distillation when a solid catalyst is used. Reactive distillation is ideal for reactions that are difficult to drive to completion without separation of one of the products. Such reactions are called 'equilibrium limited'. RD technology has many key advantages such as reduced capital investment and significant energy savings, as it can surpass equilibrium limitations, simplify complex processes, increase product selectivity, and improve separation efficiency.

APPLICATIONS

- ✓ Manufacturing of ethyl acetate from ethanol
- ✓ Manufacturing of butyl acetate from butanol
- ✓ Manufacturing of MTBE & ETBE
- ✓ Manufacturing of benzyl chloride from toluene
- ✓ Recovery of lactic acid
- ✓ Esterification of acetic acid with ethanol

ADVANTAGES

- ✓ Shifting of equilibrium
- ✓ Possibility to set catalyst & reactive distillation between the trays
- ✓ Ability to control the reaction time
- ✓ Reduction in plant cost
- ✓ Improved selectivity
- ✓ Increase in performance of the distillation column by minimizing the flow resistance in the cross flow of liquid from tray on a tray



VACUUM DISTILLATION:

Vacuum Distillation is a method of distillation whereby the pressure above the liquid is to be distilled is reduced to less than its vapour pressure (usually less than atmospheric pressure) causing evaporation of the most volatile liquids (those with the lowest boiling points). This distillation method works on the principle that boiling occurs when the vapour pressure of a liquid exceeds the ambient pressure. Vacuum distillation helps in effective processing of higher boiling point solvents without igniting them or causing thermal breakdown.

APPLICATIONS:

- ✓ Vacuum distillation is used to gently separate temperature sensitive substances.
- ✓ Thin film vaporization works best within a pressure range from 1 to 100 hPa.
- ✓ Their high accuracy and resolution allow precise separation of chemicals with similar boiling points.
- ✓ They are able to handle liquids, gasses, and mixtures equally well.

RESEARCH & DEVELOPMENT:

✓ Continuous Distillation Column	✓ Azeotropic Distillation Column
✓ Batch Distillation Column	✓ Extractive Distillation Column
✓ Single and Multi-Stage Distillation Column	✓ Vacuum Distillation Column
✓ Reactive Distillation Column	✓ Short Path Distillation Column



AEPL PROCESS PLANT SOLUTION

AEPL is excellent in developing a process concept into an installed plant solution operating with a guaranteed plant performance

AEPL is a full-service provider for key equipment and process plant solutions. Our excellent position comprises an extensive know-how and long-standing experience in developing process concepts into installed plant solutions operating with a guaranteed performance.

Basic Engineering

As soon as the customer has agreed upon the conceptual design it can be further developed into a basic engineering package for a commercial size plant. At this stage we bring in our expertise and capabilities in scaling-up pilot and demonstration plants into commercial size process units. A basic engineering package typically consists of:

- ✓ Process Flow Diagrams (PFD)
- ✓ Heat & Mass Balance
- ✓ Piping & Instrumentation Diagrams (P&ID's)
- ✓ Equipment specifications
- ✓ Instrument specifications
- ✓ Functional design specifications for plant control and safeguarding
- ✓ Preliminary equipment layout
- ✓ Capital cost calculation for skid mounted units
- ✓ Capital cost estimate based on factors when the total project scope consists of a basic engineering package plus key equipment only

Detail Engineering

For skid mounted units, upon approval of the basic engineering package, the project moves into the detail engineering phase, resulting in:

- ✓ P&ID's final for construction
- ✓ Equipment and instrument specifications final for construction
- ✓ Mechanical drawings for key equipment
- ✓ 3-D plant model
- ✓ Piping isometrics
- ✓ Plant automation concept

Project Management

All of the above activities are performed by highly qualified and experienced in-house staff. We rely upon our people and strive for business excellence. Project teams work under the guidance of the project manager who has overall responsibility for the project budget, schedule and quality. Throughout the entire project, the project manager remains in close contact with the customer.

In all its activities our company employs an efficient Quality Assurance System which is accredited in accordance with the latest standards of ISO9001 for Quality, Safety, Health and Environment. Standard procedures, protocols and test documentation are used from initial design to the final plant performance test and ensure a continued high-quality result



Proprietary Equipment

All proprietary and key process equipment is produced either in our modern workshop or sourced from approved and certified sub-suppliers. Our in-house fabrication fulfils all applicable requirements and design codes. The range of construction materials includes stainless steel, special alloys as well as titanium, zirconium and tantalum.

Skid Mounted Plants

Skids are assembled in our modern, purpose-built workshop or at selected, certified sub-contractors. Larger plants consist of more than one module.

The modular assembly includes the installation of:

- Steel structure Equipment
- Piping and valves
- Instrumentation
- Cabling and junction boxes
- Insulation

Advantages of skid mounted; turn-key plants are:

- Short delivery time through an integrated fast track execution
- Low overall investment costs
- Reduced on-site erection and hook-up time and thus minimal site disruption Manufacture of the complete plant under workshop conditions ensuring the highest quality
- Completion of the Factory Acceptance Test (FAT) prior to delivery
- Qualification tests prior to plant delivery

Transport and Installation

AEPL has a team of highly experienced installation supervisors, who provide construction support services for site-built plants, and for the off-loading and installation of skid mounted plants. These supervisors liaise closely with the customer's construction manager, safety officer and mechanical contractor, to ensure a safe and trouble-free installation.

Commissioning and Start-up

Following completion of all mechanical and electrical tie-ins to the plant, process engineers are mobilized to undertake plant commissioning. The commissioning team is usually headed by the process engineer responsible for the plant design. Plant commissioning follows a structured plan and ends with the start-up of the process unit followed by a Site Acceptance Test (SAT). Training of customer's operators often takes place in parallel.



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