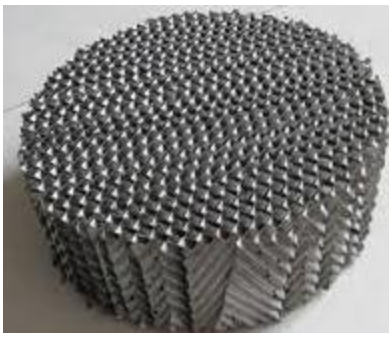
ATTAQUANT

Simplifying Technologies

ISO 9001:2015 CERTIFIED

MASS TRANSFER TECHNOLOGY



Process Equipment Design and Development
With Manufacturing. Installation and Commissioning.
Turnkey Projects.

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

ATTAQUANT PRODUCT RANGE

✓ ZERO LIQUID DISCHARGE SYSTEM	✓ DISTILLATION COLUMNS
✓ SOLVENT RECOVERY SYSTEM	✓ PRE-HEATERS
✓ EVAPORATORS	✓ AUTOCLAVES
✓ DRYERS	✓ EXTRACTORS
✓ CENTRIFUGES	✓ HEAT PUMP
✓ 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.

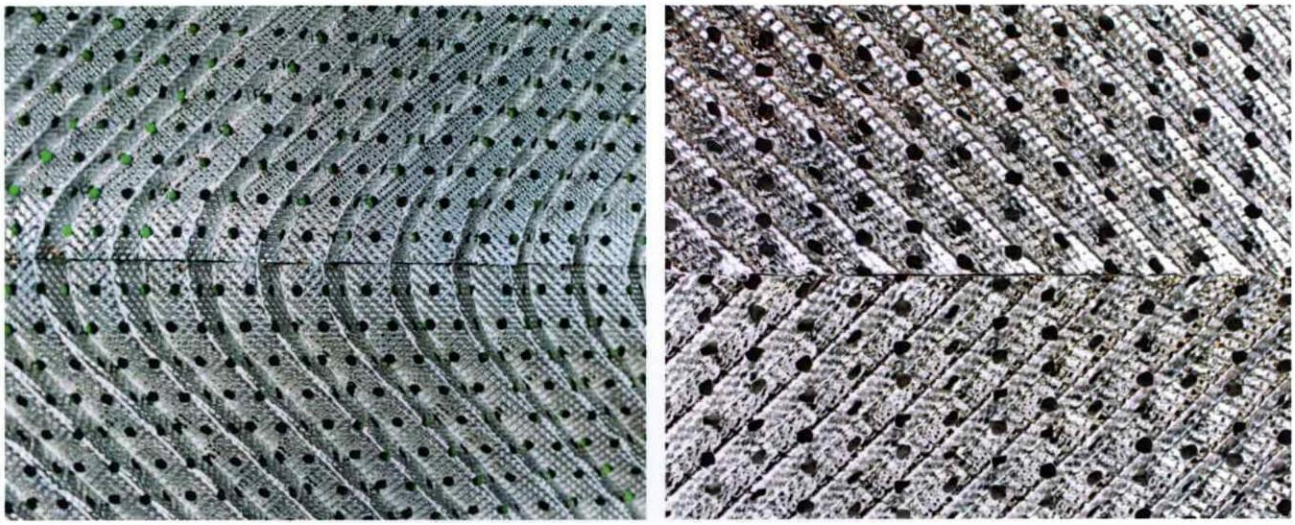
We are one of the leading manufacturers, traders and exporters of a wide range of the premium quality Process plant Equipment. Our product range includes Plate Fin Heat Exchanger Set Up, Static Mixer, Demister pads / Mist eliminators, Low pressure vessels, Distillation column trays and related internals 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 specialty of these panels is that, they are perfectfor 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.

STRUCTURE PACKING

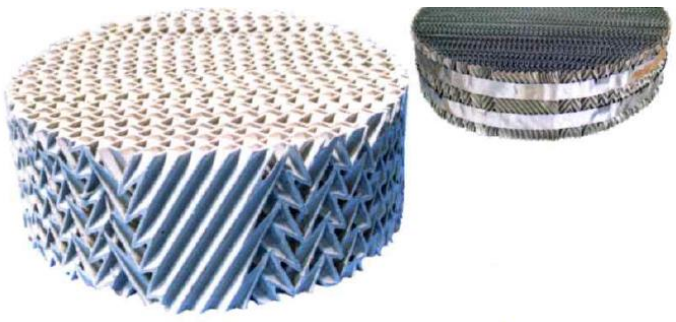
AEPL Mass Transfer structured packings are made up of many layers of metal sheets that have been corrugated and joined in a honeycomb-like pattern. structured packing is supplied in sheet metal thicknesses from 0.1 mm, 0.15mm, and 0.2 mm. This packing has high efficiency, a high throughput, a low-pressure drop, and a wide range of applications. AEPL provides high-performance Structured Packing made of SS 304/304L, SS 316/316L, Duplex, 904L, special alloy like Hastelloy, Nickel 625,825, etc.



CERAMIC STRUCTURED PACKING

A thin liquid layer can be formed on a ceramic surface. Our ceramic structured packings have the same mass transfer efficiency as metal packings because of these factors.

Meanwhile, they are far more corrosion and temperature resistant than metal packings. Ceramic packing's surface structure can encourage wetting and help keep liquid hold-up to a minimum.



Random Packing

We Attaquant Design and Manufacture Random Packing for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

Random packing is used in separation columns, such as a distillation column, to increase surface area for vapor/liquid contact so that chemical separation is more efficient. The small pieces of random packing in a distillation column are designed to form a large surface area where the reactants can interact while minimizing complexity within the column. Random packing is designed to maximize the surface-to-volume ratio and minimize pressure drop.

To install random packing, materials are dumped into a column and allowed to settle. The materials are collected randomly in the packaging bed inside the collection container. Then the liquid to be separated flows through the materials.

The major advantage of random packing is that it is much less expensive to implement than structured packing. Other benefits of random packing, such as improved contact area, mass transfer and efficiency over older technologies such as tray technology, come without high costs.

PTFE STRUCTURED PACKING

PTFE structured are much more resistant to corrosion and low temperature than metal packing's. PTFE Structured Packing is used for a corrosive application like absorption and distillation columns and chemical reactions. PTFE Structured Packing typically consists of a thin corrugated sheet.

MIST ELIMINATORS – MESH PAD AND VANE TYPE

Mist Eliminators for high efficiency mist elimination

Mesh pad mist eliminators remove droplets by impingement on the wire surface. The liquid collected on the filaments drains off under gravity. They provide almost complete removal of droplets down to about 3-5 microns. They provide a turndown range of vapour rate of around 3:1.

At excessively high velocity the liquid droplets that impinge on the wire surface are sheared off by the vapour and entrained before they are able to drain. At very low vapour velocities all but the larger droplets are able to follow the vapour path through the mesh and thus avoid impingement.

Mist Eliminators for Low Pressure Drop and Fouling application

Vane type mist eliminators consist of a series of vane modules appropriately spaced to provide passage for vapour flow. They consist of an angled profile to provide sufficient change of direction for liquid droplets to impact, coalesce and drain of the vanes.

STATIC MIXERS

A static mixer is a precision engineered device for continuous mixing of fluids. They consist of an arrangement of mixing elements installed in a pipe or duct. They function without moving parts and are used to achieve specific dispersion and mixing in a continuous process. They are capable of mixing materials with equal or different viscosities and volume flow rates. The fluid flow is provided by pumping.

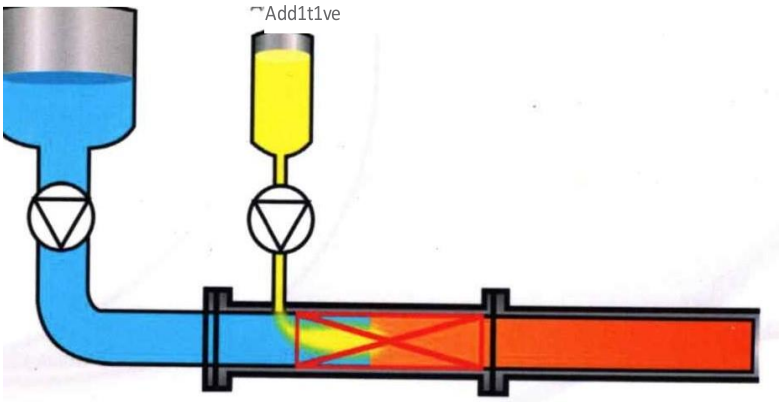
It's are widely used in the following operations

Gas-liquid contacting

- Seawater deoxygenation
- Homogenization of products
- Aeration of water
- Contacting multipurpose mixers
- Mixing of bitumen or heavy crude oils

Pasteurization

- Seawater desalination
- Natural gas blending with other gases
- Production of organic acids
- Dilution of heavy oil with gas oil



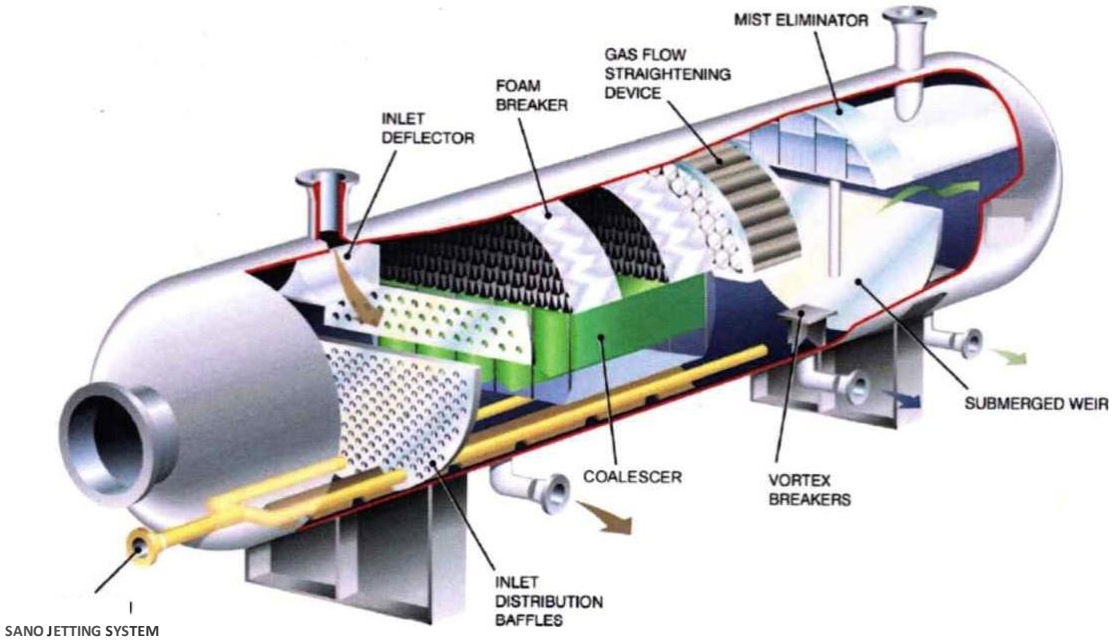
OIL & GAS AND PETROCHEMICALS PHASE SEPARATOR

The purpose of the Separator is to divide the 3 phase inlet oil-water-gas stream into 3 separate phases. A gas phase free of liquid carry-over droplets, an oil phase free of gas carry-under and water droplets, and a water phase free of gas carry-under and oil droplets. Test Separator units

usually provide metering of the gas, oil and water phases to measure the production from individual wells.

The effectiveness of gas/liquid and liquid/liquid separation in Separators is a function of many factors. Physical properties such as individual phase density and viscosity are directly related to separation efficiency

Various design features and internal devices are employed to enhance, accelerate or otherwise improve the efficiency of the separation process from knowledge of the above factors.



Inlet Devices	Distributors	Coalescers	Mist Eliminators	Others
Deflectors	Perforated Baffles	Plate Packs	Wire Mesh	
Bifurcators	Slotted Baffles	Corrugated Packs	Vane Mesh	Sand Jets
Multi-Vane	Pipe Distributors	Matrix Packs	Axial Cyclones	Vortex Breakers
Cyclone Defoamers	Wave Breakers	Mesh Coalescers	Multicyclones	

MASS TRANSFER INTERNALS

Sieve Trays

We Attaquant Design and Manufacture Sieve Trays for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

Sieve trays are simple perforated plates with small holes about 5 to 6 mm (0.2 to 0.25 inch) in diameter. Valve trays are similar, except the perforations are covered by small metal disks that restrict the flow through the perforations under certain process conditions.

In sieve trays, vapour flowing up through the tower contacts the liquid by passing through small perforations in the tray floor.
The vapor energy keeps the liquid from flowing down through the holes. The latter moves across the tray and travels to tray below through down-comer. The sieve tray has good capacity and moderate efficiency compared to the valve tray and bubble cap tray, but has limited flexibility in the operating Range.

Bubble Cap Trays

We Attaquant Design and Manufacture Bubble Cap Trays for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

Bubble cap tray is a flat perforated plate with risers (like pipes) around the perforations, and caps in the form of inverted cups over the risers. The caps are usually equipped with slots or holes through which vapor comes out.

The caps are usually equipped with slots or holes through which vapor comes out. The cap is mounted so that there is a space between riser and cap to allow the passage of vapor. Vapor rises through the riser and is directed downward by the cap passing through slots in the cap, and finally bubbling through the liquid on the tray. As vapor has to pass through many passages this lead to higher pressure drop and lower capacity than other conventional trays.

A bubble cap tray has riser or chimney fitted over each hole, and a cap that covers the riser. The cap is mounted so that there is a space between riser and cap to allow the passage of vapor. Vapor rises through the chimney and is directed downward by the cap, finally discharging through slots in the cap, and finally bubbling through the liquid on the tray.

Cartridge Trays

We Attaquant Design and Manufacture Cartridge Trays for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

Cartridge trays, defined below, can be the perfect hardware solution for distillation columns that are less than 3 feet (0.9m) in diameter and have a unique need for trays. Packing is usually the preferred choice for small-diameter columns.

Cartridge trays consist of eight to ten trays preassembled in a bundle. The trays themselves can be of any type: sieve, valve, bubble cap or other. The tray decks are connected together by at least five tie-rods that run the length of the bundle. Spacer rods are inserted over the tie-rods to ensure the correct tray spacing. The bundle is bolted at the ends to make a complete unit, which is inserted into the column through a body flange. The bundles are bolted together as they are installed, so that all the trays in a section of column are connected together.

Fixed Valve Trays

We Attaquant Design and Manufacture Fixed Valve Trays for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

The fixed valve trays with V- shaped grids combines the attributes of sieve holes and float valves. These valves provide large vapor passages and operate at low pressure drops with high capacities. The rectangular valves extruded from tray decks are oriented parallel to the liquid flow.

It has large opening size provided for improved fouling resistance. High efficiency over a wide range through improved vapor- liquid contact. It is Durable construction for long tray life.

Floating Valve Trays

We Attaquant Design and Manufacture Floating Valve Trays for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

Floating Valve trays are provided with either round or rectangular floating valves. Valves are floating due to vapor flow from the underneath. This maintains a near constant pressure drop with respect to variation in vapor flow rate. Due to this characteristic valve tray sustains higher tray efficiency. They are generally used in applications involving high turndown ratio.

Float valves are productive to work when stream rates are evolving. The legs are given to keep up the launch of the valve to avoid weeping and to improve mass exchange even at low stream conditions.

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COLUMN INTERNALS

Liquid Distributors

We Attaquant Design and Manufacture Liquid Distributer for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

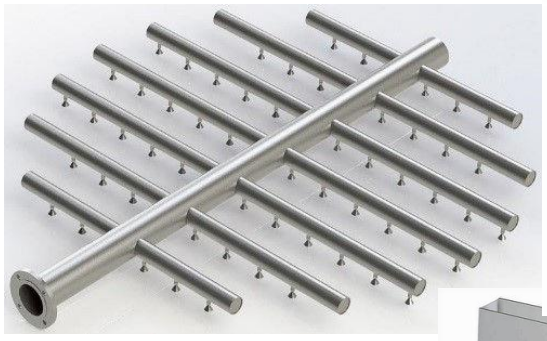
Liquid distributors are an important component of column internals. They provide adequate distribution of the liquid onto the packed bed and structured packing. To achieve an intensive mass transfer between the phases, the liquid should be distributed equally across the packed column area.

Distributors are internals installed above a packed bed, which perform the job of providing a finite liquid distribution over the packed bed. A distributor allows the liquid to be distributed over the packed bed in discrete streams.

Liquid distributors are a key element of the packed column and its packing efficiency depends on good liquid distribution provided by the distributor. It is internally installed above the packed bed, which performs the function of providing a finite liquid distribution over the packed bed.

CHARACTERISTICS:

- Mixing capability for redistribution to the next bed
- Low vapor phase pressure drop
- Resistance to plugging or fouling
- Uniform liquid distribution
- Minimum liquid resistance time
- Proper operation through its turndown range



Bed Limiter

We Attaquant Design and Manufacture Bed Limiters for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

Bed limiters are designed so that they do not disturb the steady-state of the liquid distribution. Depending on the model, bed limiters either sit directly on the top of the packed bed or are mechanically attached to the vessel wall. It is also possible to hang them directly from the liquid distributor or re-distributor. They usually provide high open-area and reduce interference to liquid flow.

This bed limiter is normally recommended for towers using structured packings. Fluidization does not occur with structured packings, but for large diameter columns, sections of packings may be dislodged during upset conditions. Bed limiters for structured packings are designed to reduce interference with liquid distribution.

Packing Support

We Attaquant Design and Manufacture Packing Support for all types of Distillation Columns. We manufacture in following MOC SS 316L, SS 304, Monel, Inconel, Hastelloy, Titanium, Zirconium etc.

Packing support plate, also called packing support grid, is some important tower internals in the packing tower. As its name says, packing support plate is designed for supporting the tower packing bed, including random packing and structured packing.

Packing Support Plates are an integral part of a packing tower, supporting the tower packing bed and contributing to the performance of the mass transfer operation.

A random packed bed is held on a Packing Support Plate. This allows the unrestricted counter-current flow of both liquid and vapor through it.

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

A 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 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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