High Performance Tray Tower Solutions
Engineered to Innovate

GTC Technology is a global licensor of process technologies and mass transfer solutions with the core mission of creating value for our clients. Refining, petrochemical and chemical companies around the world rely on our advanced technology to optimize production capacity and efficiency. Widely known for our innovation, technical knowledge and relentless commitment to quality, we’ve built a reputation of excellence through the consistent delivery of proprietary technologies and customized solutions.

World-renowned experts in mass transfer technology

Since 1994, GTC has provided specialized process equipment technology solutions that cover a broad spectrum of conventional and proprietary mass transfer equipment designs for trays, packing and other tower internals. All of our trays are designed to achieve optimum capacity and efficiency and our technology applies fundamental principles such as liquid gradient elimination, static head control, plug flow optimization, vapor dispersion injectors, optimum vapor-liquid distribution, liquid flux management and anti-fouling capabilities.

At GTC, we work with each client to customize our extensive line of mass transfer technology trays for different process conditions from high pressure to vacuum conditions, fouling, polymerization, and chemical reaction. We offer a wide variety of active devices including floating or fixed valves, rectangular or round, sieve, bubble caps, and shed decks among others. Our world-recognized process engineers combine process solution with extensive equipment knowledge to maximize revamp opportunities, increase column efficiency and reduce energy consumption.

GTC Technology's Process Equipment Technology division offers an extensive line of equipment and services that can be customized to provide complete mass transfer solutions to our clients and to the market.
Advanced distillation column design

Revamping distillation columns requires a solid process design background, particularly when conducting evaluations of existing equipment and data. GTC advises clients to understand where they are on the reflux to theoretical stage curve prior to setting the design strategy for a column. The lower the stage count, the higher the reflux rate required. However, the exact sensitivity will affect considerations in the revamp and design of your distillation tower. For each distillation column revamp design, GTC conducts dedicated sensitivity analysis to optimize the column performance among capacity, efficiency and energy consumption requirements. This analysis quantifies product yield/purity improvement at the same energy consumption and energy efficiency improvement at the same product yield/purity.

“After debottlenecking with GTC’s high performance trays, our column’s pressure drop and efficiency improved, which led to a lower heater coil outlet temperature. As a result, GTC has helped us reduce energy consumption and we are very satisfied with the high performance equipment and high-quality installation service.”

– GTC Client
GTC is committed to energy conservation, whether through a crude distillation unit furnace duty reduction or optimizing the balance between the preheat exchanger and reboiler of a conventional distillation column. This may involve using alternate heat sources, setting a higher preheat temperature or improving the design of the internals.

Typical Energy Optimization Opportunity (Conventional Distillation Column)

Typical Energy Optimization Opportunity (Crude Distillation Unit)
The success of a revamp is largely dependent on the process design of complex crude units. In this crude unit revamp, GTC developed an innovative design that shifts the product recovery to handle greater kerosene yield, avoiding the need for an additional kerosene stripper.
- **GTC Fractionation Trays**
  GTC offers a full line of proprietary high performance trays and conventional tray products with the following design features and benefits:
  
  - High performance valves, sieve holes, bubble caps and other types of tray active elements to meet mass transfer solution requirements
  - Straight, sloped, stepped, swept-back, truncated and other various downcomer designs
  - Standard and exotic materials available for tray construction
  - Single-pass and multi-pass designs
  - Extra strong tray panels, with integral truss, is GTC’s standard design

- **GT-OPTIM™ High Performance Trays**
  GT-OPTIM is a state-of-the-art high performance tray that has been commercially proven to achieve efficiency and capacity improvements over conventional trays, providing a faster return on investment. GT-OPTIM cross-flow trays are customized to our clients’ needs to achieve the highest efficiency in refinery, petrochemical and chemical applications. A combination of patented and proprietary devices make up each tray design, specific to each application. Our trays deliver performance improvement through:
  
  - Lower entrainment
  - Less weepage
  - Higher efficiency
  - Greater through-put
  - Higher turndown
  - Wide range of operating regimes
  - Low fouling, anti-fouling
GT-OPTIM™ High Performance Trays

Most conventional trays will not perform a plug flow operation, resulting in variable liquid residence time and decreased tray efficiency. In addition, high residence time on selected areas of the active panel can encourage fouling. GT-OPTIM trays are designed to achieve a plug flow effect across the active panel, increasing efficiency and fouling resistance.

"We have successfully revamped our columns with the help of GTC’s technical service team and high performance trays. The optimum steam and azeotropic agent consumption has been reached, resulting in an improved performance of the dehydration system."

- GTC Client

The capacity chart above shows a typical comparison between GT-OPTIM trays and conventional cross-flow trays. The chart indicates that there is an approximately 20-40 percent average increase in capacity, with similar or improved contact characteristics and maintained or improved efficiency, with a high performance tray as compared to a well-designed conventional tray.
GT-OPTIM™ Process Improvement

<table>
<thead>
<tr>
<th>GT-OPTIM Tray Design Philosophy</th>
<th>Process Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid gradient elimination</td>
<td>Constant froth across the tray to eliminate cross-flow potential and maximize capacity</td>
</tr>
<tr>
<td>Static head control</td>
<td>Optimized pressure drop with maximum efficiency</td>
</tr>
<tr>
<td>Plug flow optimization</td>
<td>Increased efficiency</td>
</tr>
<tr>
<td>Vapor dispersion contactors</td>
<td>Maximized vapor handling capacity</td>
</tr>
<tr>
<td>Optim V/L distribution</td>
<td>Maximized efficiency and capacity for multi-pass trays</td>
</tr>
<tr>
<td>Liquid flux management</td>
<td>Optimized downcomer to active area ratio to maximize application capacity</td>
</tr>
<tr>
<td>Anti-fouling</td>
<td>Extended run length</td>
</tr>
</tbody>
</table>

GTC Proprietary Trays

The advanced features of GTC’s proprietary trays deliver increased capacity, high efficiency and low maintenance, resulting in unparalleled reliability and performance in critical applications.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| GT-EXT™ Enhanced Performance Valve | Directional floating valve with proprietary features | Advanced applications  
High performance  
High lift valve  
Durable construction | Excellent efficiency  
High capacity  
Anti-fouling  
Resists operational upsets  
Best turndown  
Low maintenance |
| GT-TEK™ Rectangular Valve     | Equivalent to industry standard              | Better vapor-liquid contact  
Better valve geometry and orientation  
Standard 64mm slot opening | High efficiency  
High turndown  
Minimizes weepage |
| GT-FIX™ Fixed Valve           | Equivalent to industry standard              | Better vapor-liquid contact  
Better valve geometry and orientation  
Standard 64mm slot opening | High efficiency  
Anti-fouling  
Normal turndown  
Suitable for many alloys |
### GTC Conventional Trays

GTC's conventional tray solutions include industry standard valve trays with floating valves, fixed valves, sieve holes (orifices) and bubble caps. Our complete line of conventional trays also includes custom tray designs.

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<th>Type</th>
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<th>Features</th>
<th>Benefits</th>
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</thead>
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<tr>
<td>GT-RV1™</td>
<td>Round valve with standard tray deck opening</td>
<td>Industry standard 39mm deck holes</td>
<td>Normal efficiency Normal turndown</td>
</tr>
<tr>
<td>GT-CV1™</td>
<td>Round ballast cap and cage with standard tray deck opening</td>
<td>Industry standard 39mm deck holes</td>
<td>Normal efficiency Normal turndown</td>
</tr>
<tr>
<td>Bubble cap</td>
<td>GTC has standardized on the three most common sizes of round riser/cap assemblies:</td>
<td>All types of caps, all types of downcomers, wash trays</td>
<td>Best for leakage-free application, ultra-low liquid rates, high residence time reactions</td>
</tr>
<tr>
<td></td>
<td>75mm round</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100mm round</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>150mm round</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Custom round and rectangular are available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baffle Type Tray</td>
<td>Miscellaneous trays (Shed Row, Side-Side, Disc-Donut, Bar, Partition, etc.)</td>
<td>Simple design and construction</td>
<td>Handles sticky, gummy solids and polymers, easy cleaning</td>
</tr>
<tr>
<td>Sieve Tray</td>
<td>Consists of orifices: 12mm standard, 3mm - 50mm custom</td>
<td>Classic choice, unobstructed deck, no moving parts, wide range of applications</td>
<td>Standard efficiency, resists corrosion/erosion, handles light solids, suitable for exotic materials fabrication</td>
</tr>
<tr>
<td>Customer Designed Tray</td>
<td>Non-standard trays</td>
<td>Custom fabrication as required</td>
<td>Specialty applications</td>
</tr>
</tbody>
</table>
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GTC Technology is a global licensor of process technologies and mass transfer solutions. Refining and petrochemical companies around the world rely on our advanced technology to improve capacity and efficiency, as well as maximize production. We combine unparalleled industry expertise, powerful research capabilities and innovative thinking to solve some of the most complex processing problems. GTC has earned a reputation of excellence by designing and delivering high-quality, strategic solutions for clients worldwide. We’re engineered to innovate.