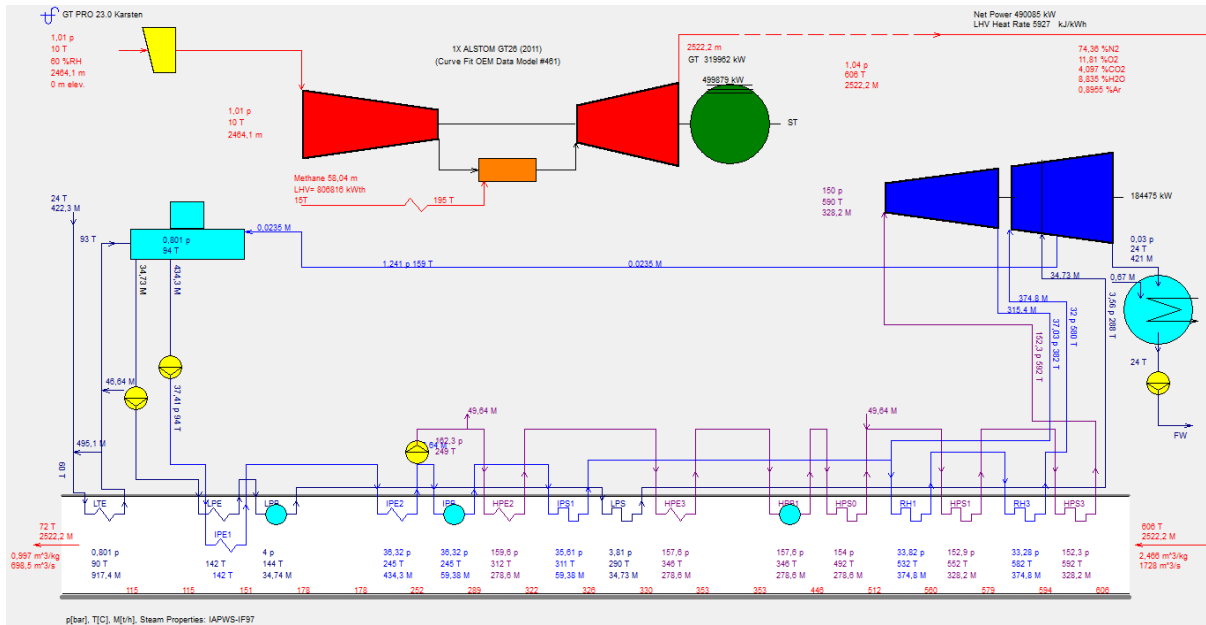


GT & Recip. Engine Combined Cycle Design, Simulation, and Cost Estimation

GT PRO® automates the process of designing a gas-turbine or reciprocating engine based power or cogeneration plant. GT PRO is particularly effective for creating new designs and finding their optimal configuration and design parameters considering technical performance and total plant cost (**techno-economic optimization**).



Cycle Flow Schematic: GTCC, Single-Shaft, 3p-RH



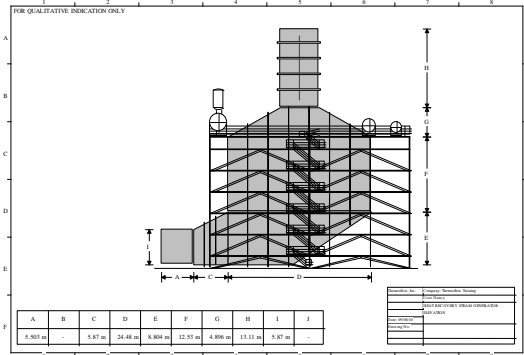
PEACE Output: Site 3D View

Most key inputs are automatically created by intelligent design procedures that help the user identify the best design with minimal time and effort, while allowing the flexibility to make any changes or user-adjustments.

GT PRO is truly easy to use, typically requiring only a few minutes to create a new plant design. It computes a heat balance and simultaneously designs the required equipment and site infrastructure.

GT MASTER® is the Off-Design Simulation companion to GT PRO. GT MASTER computes (steady-state and **transient**) performance for varying ambient conditions, fuel selection, equipment loading, process steam/water flows, hardware degradation levels, etc. The TIME feature (Time Integrated Modeling Economics) computes the project's NPV considering cold/warm starts and shutdowns, various loads and ambient conditions throughout the year.

The user inputs design criteria and assumptions and the program computes heat and mass balance, system performance, and equipment sizing. The scope and level of detail in GT PRO has been continuously growing since 1988, to the point that the latest Version has over 4,000 user-adjustable inputs.



PEACE Output: HRSG Elevation 2D View

Preliminary Engineering				Financial		Heat Balance	
Schematics		Equipment Data		Cost Report		Cash Flow	
Soft & Miscellaneous Costs		Gasification Plant		Desalination Plant		CO2 Capture Plant	
Mechanical		Electrical Assembly & Wiring		Buildings		Engineering & Plant Startup	
Project Cost Summary		Specialized Equipment		Other Equipment		Civil	
Project Cost Summary				Reference Cost	Estimated Cost		
Power Plant:							
I	Specialized Equipment		285,374,000	299,643,000	USD		
II	Other Equipment		15,026,000	15,777,000	USD		
III	Civil		28,620,000	33,182,000	USD		
IV	Mechanical		37,273,000	43,811,000	USD		
V	Electrical Assembly & Wiring		7,806,000	9,136,000	USD		
VI	Buildings & Structures		11,821,000	13,595,000	USD		
VII	Engineering & Plant Startup		18,638,000	18,638,000	USD		
Gasification Plant				NA	NA		
Desalination Plant				NA	NA		
CO2 Capture Plant				NA	NA		
Subtotal - Contractor's Internal Cost				404,558,000	433,739,000 USD		
VIII Contractor's Soft & Miscellaneous Costs				84,511,000	93,694,000 USD		
Contractor's Price				489,069,000	527,433,000 USD		
IX Owner's Soft & Miscellaneous Costs				44,016,000	47,469,000 USD		
Total - Owner's Cost (1 USD per US Dollar)				533,085,000	574,902,000 USD		
Nameplate Net Plant Output				804	804 MW		
Cost per kW - Contractor's				668.3	656 USD per kW		
Cost per kW - Owner's				663.1	715.1 USD per kW		
* Cost estimates as of August 2010.							

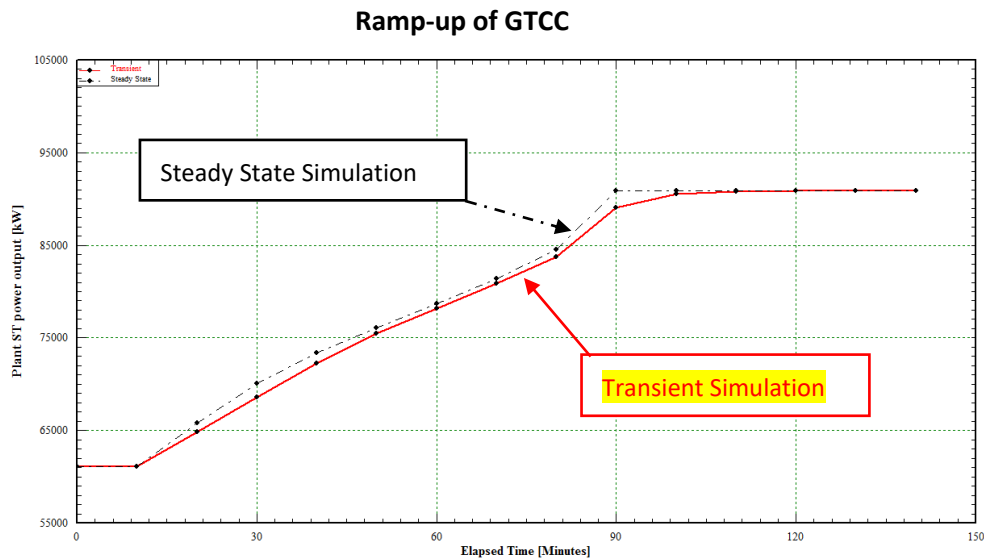
PEACE Output: HRSG Elevation 2D View

When run in conjunction with the optional **PEACE[®]** (Plant Engineering And Cost Estimator) module, the programs provide extensive engineering and **hardware specifications** such as weight and dimensions, plant and equipment **cost estimation**, and site details.

GT PRO and **GT MASTER** include a built-in library of **over 700 gas turbine and reciprocating engine specifications**, Integrated Gasification Combined Cycles (**IGCC**), Desalination Plants (**RO, MSF, MED**), and chemical / physical **CO₂ Capture and Sequestration (CCS)** plants.

A bi-directional Link to MS-EXCEL (**ELINK**) is available, which allows plant models to be run from within MS EXCEL by specifying inputs and receiving outputs in EXCEL cells. ELINK makes it easy to produce Thermal Heat Rate curves, integrated Annual Simulation results, etc.

A built-in scripting language in GT PRO and GT MASTER allows to add own logical blocks to models, or to call an external DLL/EXE, so GT PRO and GT MASTER models can run together with other programs.



GT MASTER: Transient Simulation of GTCC Ramp-Up and comparison to Steady-State Simulation