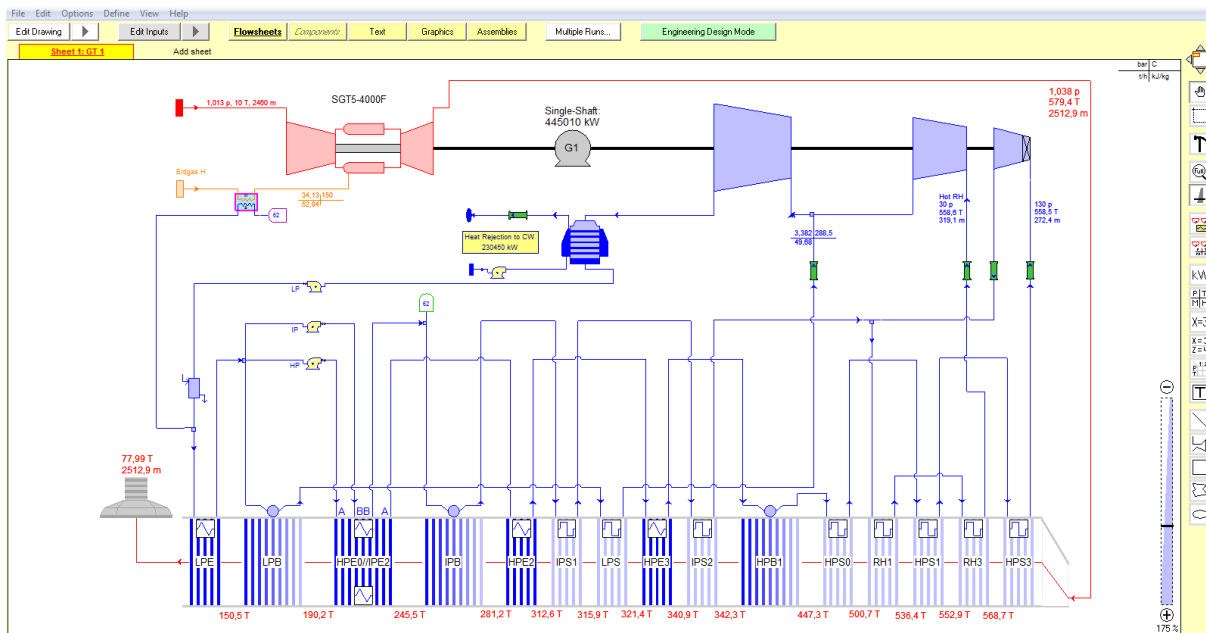


General Purpose Program for Design, Simulation, and Cost Estimation

THERMOFLEX® is a modular **General Purpose Program** with a graphical interface that allows you to assemble models using icons representing **over 200 components**. The program covers both design and off-design modeling. It can model all types of power and heat plants including GT or Reciprocating Engine Combined Cycles, Conventional Coal/Oil/Gas/Biomass/Waste fired Rankine Steam Cycles, Concentrated Solar Thermal Power Plants (CSP), Gasification and CCS Systems, Seawater Desalination Plants, Organic Rankine Cycles (ORC), Kalina Cycles, Allam Cycles, Repowering, Wind Power and Photovoltaic (PV) systems, etc.

In conjunction with the optional **PEACE®** (**Plant Engineering And Cost Estimator**) module, the program incorporates engineering hardware models that provide detailed hardware specifications and cost estimates, including total plant cost estimates.

Flowsheet: GTCC, Single-Shaft, 3p-RH

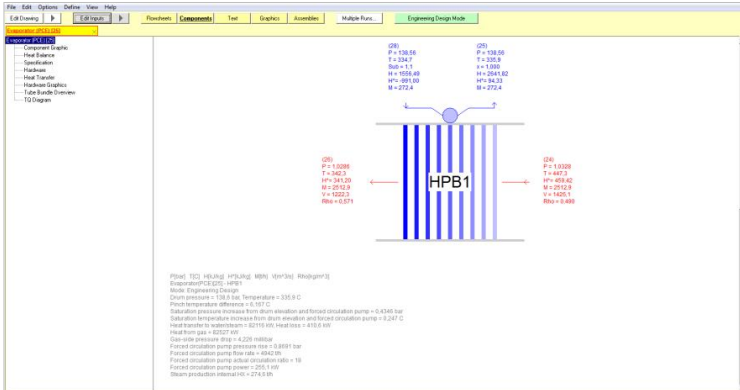


THERMOFLEX provides the **GT PRO®** gas turbine library and a reciprocating gas and diesel engine library which in the 2017 Version include more than **800 gas turbine and 380 gas/diesel engine specifications**. The **Steam Turbine Assembly** feature provides automatic estimation of efficiencies, leakage flows and information about the entire steam turbine such as dimensions, weight and costs.

THERMOFLEX also includes a fuel database with more than **180 pre-defined fuels** such as coal, biomass, RDF, LNG, and other fuels. The US NIST (REFPROP) fluid database is included besides a Heat Transfer Fluids/Molten Salts/Thermal Oils database to provide properties for over 120 refrigerants, heat transfer fluids, hydrocarbons, and other pure substances such as CO₂. These fluids are used in modeling Concentrated Solar Power (CSP), closed cooling and heating systems, desalination systems, Organic Rankine and Kalina Cycles, closed CO₂ cycles, CO₂ capture and sequestration (CCS) plants, etc. Water properties based on IFC-67 and IAPWS-IF97 are available covering the subcooled liquid, wet steam, superheated steam, and supercritical states. Properties of gaseous mixtures are included covering a wide range of conditions including compressibility effects.

THERMOFLEX includes a bi-directional Link to MS-EXCEL (**ELINK™**) which allows running plant models 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, Maximum Capacity Curves, etc. A built-in **scripting language** allows to add own logical blocks, or to call an external DLL/EXE, so THERMOFLEX models can run together with external programs.

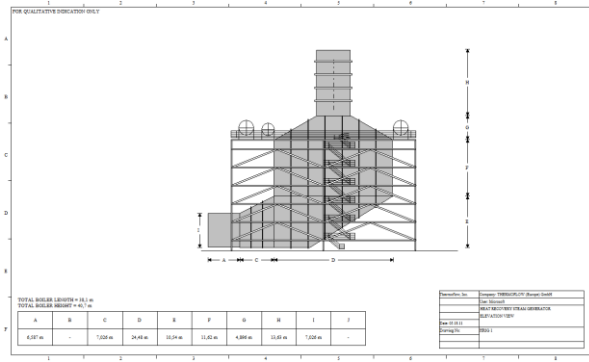
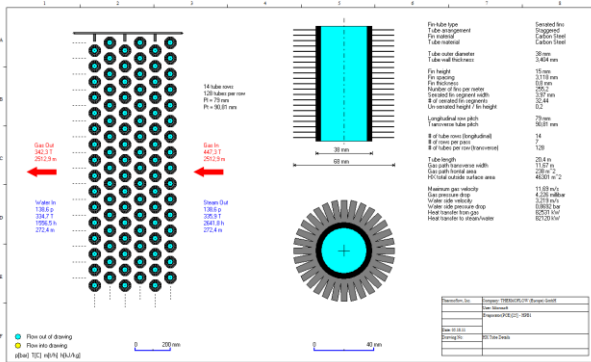
THERMOFLEX Outputs



In addition to being a comprehensive standalone tool, THERMOFLEX becomes more powerful when used together with Thermoflow's dedicated expert programs **GT PRO** and **STEAM PRO**.

GT PRO, GT MASTER, and STEAM PRO models can be directly loaded into THERMOFLEX (provided PEACE is also licensed), where they can be modified in its fully-flexible environment, and/or run in off-design mode. THERMOFLEX can subsume, within its network, models built and run in a dedicated expert program. For example, a district heating system can be built and run in THERMOFLEX, with the heating

steam coming from, and its condensate returning to, a GT MASTER combined cycle running as a sub-model within THERMOFLEX. Basically, the entire GT MASTER combined cycle in this example is treated by THERMOFLEX as one massive icon within its network.



Component	Unit Cost	Cost Adj. Factor	Ref. Cost	Est. Cost
Sum of Costs of PEACE Components & Linked Files				
HTSG T		1	1,380,931,200	1,480,028,500
HTSG T				
Duct[1]				
Economiser[PCE][27]-HPE1				
Economiser[PCE][30]-HPE2				
Economiser[PCE][34]-LPE				
Evaporator[PCE][25]-HPE1				
Evaporator[PCE][31]-IPB				
Evaporator[PCE][23]-LPE				
Parallel Economiser[PCE][32]-HPE3/IRE2				
Stack[36]				
Superheater[PCE][20]-HPS3				
Superheater[PCE][21]-RHS				
Superheater[PCE][22]-HPS1				
Superheater[PCE][23]-RH1				
Superheater[PCE][24]-HPS0				
Superheater[PCE][25]-HPS2				
Superheater[PCE][26]-LPS				
Superheater[PCE][25]-HPS1				
ST 1		1	38,007,140	40,281,770
Steam Turbine[8]				
Steam Turbine[7]				
Steam Turbine[9]				
Gas Turbine[GT PRG][1]			54,358,200	57,076,110
Gas Turbine[GT PRG][2]	54,358,200	1		
Pump[PCE]				
Pump[PCE][15]	514,438	1		
Pump[PCE][18]	208,424	1		
Pump[PCE][37]	1,114,116	1		
Pump[PCE][39]	386,118	1		
Water-cooled Condenser[PCE]				
Water-cooled Condenser[PCE][3]	1,889,394	1	1,889,394	2,056,192
Pipe[PCE]				
Pipe[PCE][5]	572,204	1		
Pipe[PCE][9]	168,982	1		
Pipe[PCE][10]	549,549	1		
Pipe[PCE][12]	223,906	1		
Pipe[PCE][14]	3,370,763	1		
Makeup/Blowdown				
Makeup/Blowdown[47]	not included			