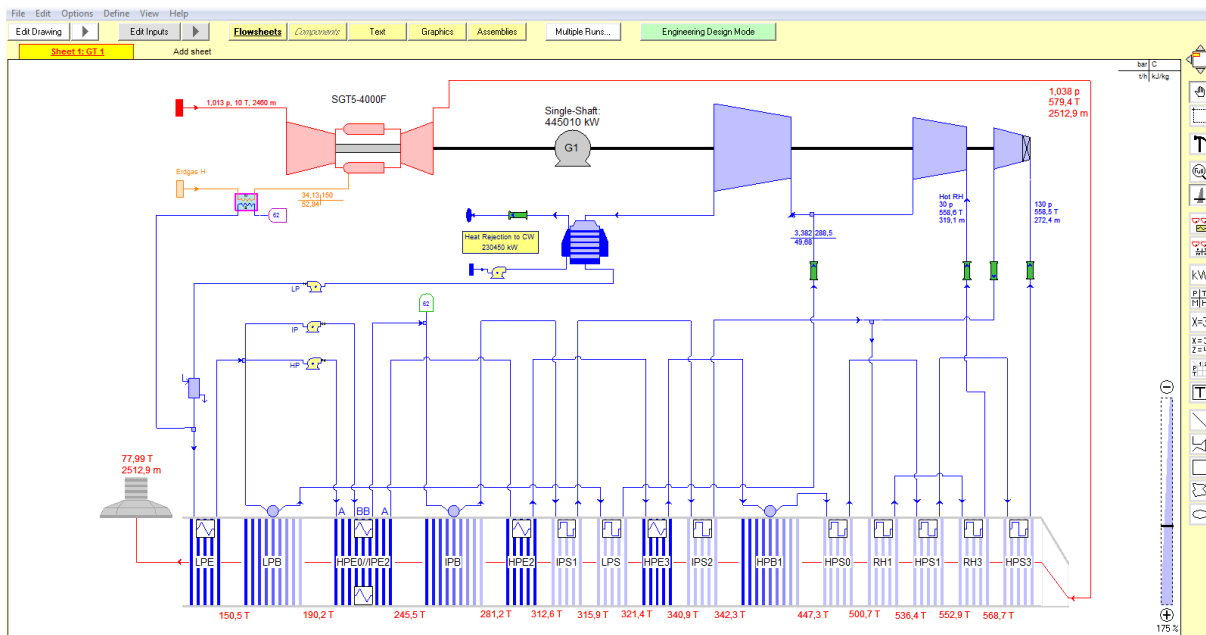


General Purpose Program for Plant Design, Simulation, and Cost Estimation

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 modelling. 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, Repowering, Wind Power and Photovoltaic (PV) systems, Battery and Thermal Storages etc.

In conjunction with the optional **PEACE**[®] (**P**lant **E**ngineering **A**nd **C**ost **E**stimator) 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

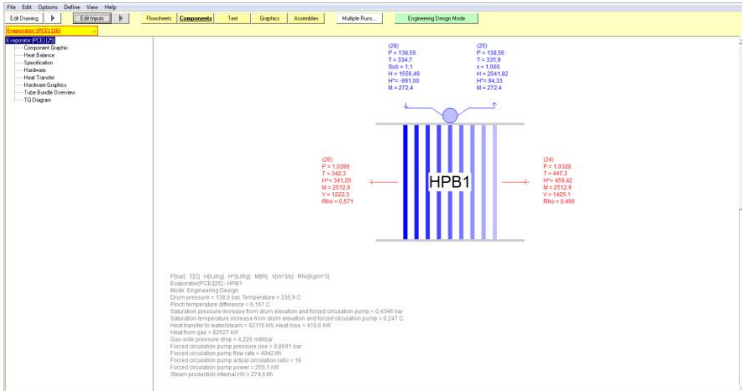


THERMOFLEX provides the **GT PRO**[®] gas turbine library and a reciprocating gas and diesel engine library which in the latest Version includes more than **700 gas turbine and 380 gas/diesel engine specifications**. The **Steam Turbine Assembly** feature provides automatic estimation of efficiencies, 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.

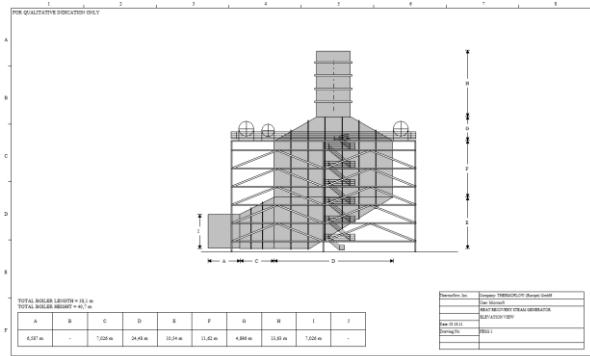
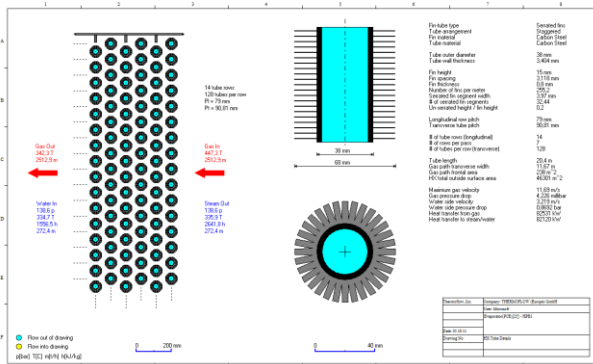
THERMOFLEX Outputs



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/PEACE, where they can be modified in the 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 within 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.



Cost Breakdown	Unit Cost	Cost Adj. Factor	Ref. Cost	Est. Cost
Sum of Costs of PEACE Components & Linked Files				
HRSIG 1		1	37,567,040	40,896,270 EUR
Duct(1)				
Economiser(PCE [27] - HPE3)				
Economiser(PCE [30] - HPE2)				
Economiser(PCE [34] - LPE)				
Evaporator(PCE [25] - HPE1)				
Evaporator(PCE [31] - IPB)				
Evaporator(PCE [33] - LPB)				
Parallel Economiser(PCE [32] - HPE3)/HPE2				
Stack(3)				
Superheater(PCE [20] - HPS3)				
Superheater(PCE [21] - HPS)				
Superheater(PCE [22] - HPS1)				
Superheater(PCE [23] - RH1)				
Superheater(PCE [24] - HPS0)				
Superheater(PCE [25] - HPS2)				
Superheater(PCE [26] - LPS)				
Superheater(PCE [29] - HPS1)				
ST 1		1	38,007,140	40,281,770 EUR
Steam Turbine(6)				
Steam Turbine(7)				
Steam Turbine(8)				
Gas Turbine(ET PRO1)				
Gas Turbine(ET PRO2)	54,269,200	1	54,269,200	57,076,110 EUR
Pump(PCE 1)				
Pump(PCE 15)	514,438	1	2,183,097	2,358,020 EUR
Pump(PCE 119)	208,424	1		
Pump(PCE 137)	1,114,116	1		
Pump(PCE 139)	346,118	1		
Water-cooled Condenser(PCE)				
Water-cooled Condenser(PCE [13])	1,889,394	1	1,889,394	2,096,192 EUR
Pipe(PCE)				
Pipe(PCE [5])	573,204	1	4,886,303	5,458,193 EUR
Pipe(PCE [9])	169,962	1		
Pipe(PCE [10])	549,549	1		
Pipe(PCE [12])	223,906	1		
Pipe(PCE [14])	3,370,763	1		
Makeup/Blowdown				
Makeup/Blowdown(41)	not included			