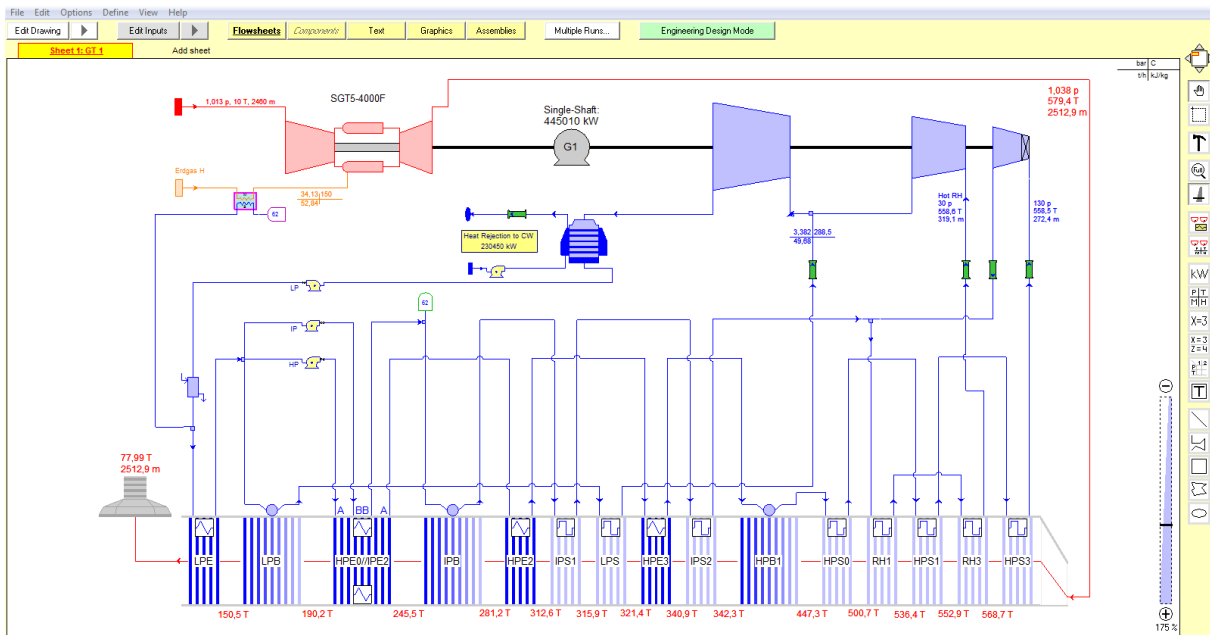


## **General Purpose Program for Plant Design, Simulation, and Cost Estimation**

**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, Storage 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**

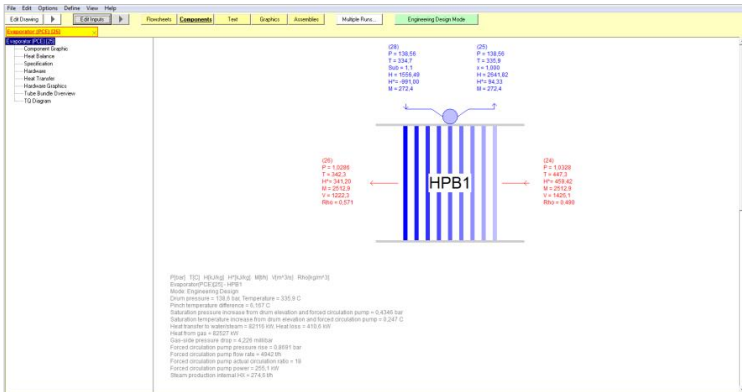


**THERMOFLEX** provides the **GT PRO®** gas turbine library and a reciprocating gas and diesel engine library which in the latest Version include more than **750 gas turbine and 400 gas/diesel engine specifications**. The **Steam Turbine Assembly** feature provides automatic estimation of efficiencies, 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 CO<sub>2</sub>. These fluids are used in modeling Concentrated Solar Power (CSP), closed cooling and heating systems, desalination systems, Organic Rankine and Kalina Cycles, closed CO<sub>2</sub> cycles, CO<sub>2</sub> 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

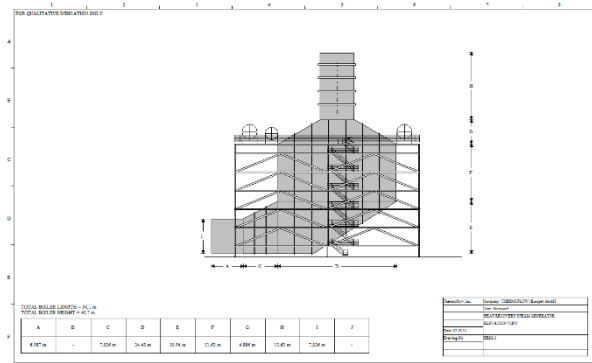
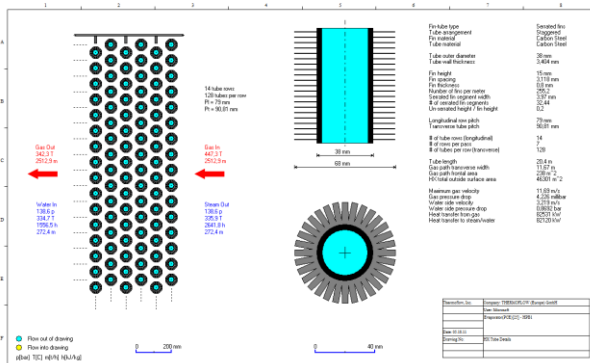


In addition to being a comprehensive standalone tool, THERMOFLEX becomes more powerful when used together with Thermoflow's dedicated expert programs **GT PRO** and **STEAM PRO**.

**GT PRO**, **GT MASTER**, and **STEAM PRO** models can be directly loaded into THERMOFLEX, 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.

Thermoflow's new **NOVO PRO** software can import THERMOFLEX plant model(s) for **hourly grid simulation** in combination with renewables (Wind, PV) and/or storages and / or Hydrogen Production Plants. This allows the user to create an optimized base load, peaker or backup plant for an individual electrical grid.



Edit Drawing					Engineering Design Mode				
Reports					Unit Cost	Cost Adj. Factor	Ref. Cost	Eat. Cost	EUR
<b>Cost Breakdown</b>									
<b>Sum of Costs of PEACE Components &amp; Linked Files</b>									
<b>HRSG 1</b>									
EconomicPCE [27] - HPE3									
EconomicPCE [30] - HPE2									
EconomicPCE [34] - LPS									
EvaporatorPCE [25] - HPB1									
EvaporatorPCE [31] - IPB									
EvaporatorPCE [32] - LPS									
Parallel EconomicPCE [20] - HPE0/HPE2									
Stack [36]									
SuperheaterPCE [20] - HPS3									
SuperheaterPCE [21] - RH2									
SuperheaterPCE [22] - HPS1									
SuperheaterPCE [23] - RH1									
SuperheaterPCE [24] - HPS0									
SuperheaterPCE [26] - IPS2									
SuperheaterPCE [28] - LPS									
SuperheaterPCE [29] - IPS1									
<b>ST 1</b>									
Steam Turbine [5]									
Steam Turbine [7]									
Steam Turbine [8]									
<b>Gas Turbine (GT PRO)</b>									
Gas Turbine (GT PRO) [2]									
<b>Pumps (PCE)</b>									
PumpPCE [15]									
PumpPCE [16]									
PumpPCE [37]									
PumpPCE [39]									
<b>Water-cooled Condenser (PCE)</b>									
Water-cooled CondenserPCE [13]									
<b>Pipes (PCE)</b>									
PipePCE [8]									
PipePCE [9]									
PipePCE [10]									
PipePCE [12]									
PipePCE [14]									
<b>Makeup/Blowdown</b>									
Makeup/Blowdown [41]									