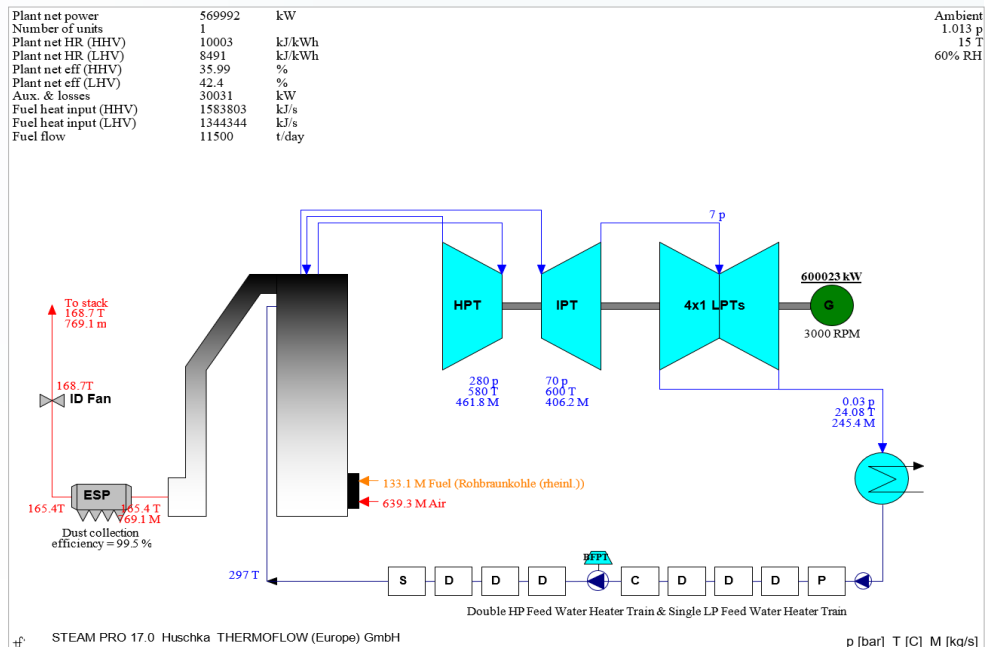# Thermoflow

STEAM PRO, STEAM MASTER & PEACE®

CONVENTIONAL STEAM CYCLE DESIGN, SIMULATION, AND COST ESTIMATION

STEAM PRO is an EXPERT PROGRAM and automates the process of designing a conventional (Rankine Cycle) steam power plant. It is particularly effective for creating new plant designs and finding their optimal configuration and design parameters considering the plant performance and total plant cost **(techno-economic optimization).**

The user inputs design criteria and assumptions and the program computes heat and mass balance, system performance, and component sizing. The scope and level of detail in STEAM PRO has been continuously growing since 1990, to the point that the latest Version has over 3,500 user-adjustable inputs.

Plant net power	569992	kW
Number of units	1	
Plant net HR (HHV)	10003	kJ/kWh
Plant net HR (LHV)	8491	kJ/kWh
Plant net eff (HHV)	35.99	%
Plant net eff (LHV)	42.4	%
Aux. & losses	30031	kW
Fuel heat input (HHV)	1583803	kJ/s
Fuel heat input (LHV)	1344344	kJ/s
Fuel flow	11500	t/day

Ambient
1.013 p
15 T
60% RH

STEAM PRO 17.0 Huschka THERMOFLOW (Europe) GmbH   p [bar] T [C] M [kg/s]

Double HP Feed Water Heater Train & Single LP Feed Water Heater Train

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

STEAM PRO is truly easy to use, typically requiring only a few minutes to create and optimize a new plant design.

When run in conjunction with the optional *PEACE* (**P**lant **E**ngineering **A**nd **C**ost **E**stimator) module, the programs provide extensive engineering and cost estimation details.

STEAM PRO allows you to quickly create steam plant design point heat balances, complete with outputs for plant hardware description, preliminary engineering and hardware details, and cost estimate with PEACE. The variety of steam plant configurations is virtually endless. From back pressure units with gas fired boilers feeding desalination plants, to oil-fired boilers feeding straight condensing turbines, to coal fired PC boilers, or CFBs feeding single reheat turbines with 10 feedwater-heaters, to supercritical double-reheat plants, or even biomass plants and waste incineration plants using grate fired boilers or BFB.

Project Cost Summary	Reference Cost	Estimated Cost	
Power Plant:			
I Specialized Equipment	462.900.640	486.045.632	USD
II Other Equipment	57.167.616	60.025.996	USD
III Civil	87.862.928	100.143.088	USD
IV Mechanical	262.055.088	308.718.720	USD
V Electrical Assembly & Wiring	22.534.082	27.079.672	USD
VI Buildings Structures	29.805.120	34.276.888	USD
VII Engineering & Plant Startup	88.692.976	88.969.440	USD
CO2 Capture Plant	N/A	N/A	
Desalination Plant	N/A	N/A	
Subtotal - Contractor's Internal Cost	1.010.918.400	1.105.258.496	USD
VII Contractor's Soft & Miscellaneous Costs	314.052.448	375.606.272	USD
Contractor's Price	1.324.970.880	1.480.864.768	USD
IX Owner's Soft & Miscellaneous Costs	264.994.192	296.172.960	USD
Total - Owner's Cost (1 USD per US Dollar)	1.589.965.056	1.777.037.696	USD
Nameplate Net Plant Output	575,2	575,2	MW
Cost per kW - Contractor's	2303,5	2574,6	USD per kW
Cost per kW - Owner's	2764,2	3089	USD per kW

COST BREAKDOWN & 2D EQUIPMENT LAYOUT

STEAM PRO models can be exported to the fully-flexible modelling environment of Thermoflow´s **THERMOFLEX®** module.

STEAM PRO includes a fuel database with more than 180 pre-defined coals, biomass, waste materials, and other fuels. STEAM PRO, in conjunction with PEACE, has an option to automatically include/exclude FGD, ESP or baghouse filter, and SCR using current fuel characteristics and plant size for guidance. It also allows inclusion of a chemical/physical **CO₂ Capture Plant**.

STEAM MASTER is the companion to STEAM PRO and is used for Off-Design simulation. It computes plant performance for varying ambient conditions, fuel characteristics and fuel blends, equipment loading, process steam/water flows, hardware degradation levels, etc.