

GasTurb 14

What's new?

Electric System Simulations and more ...

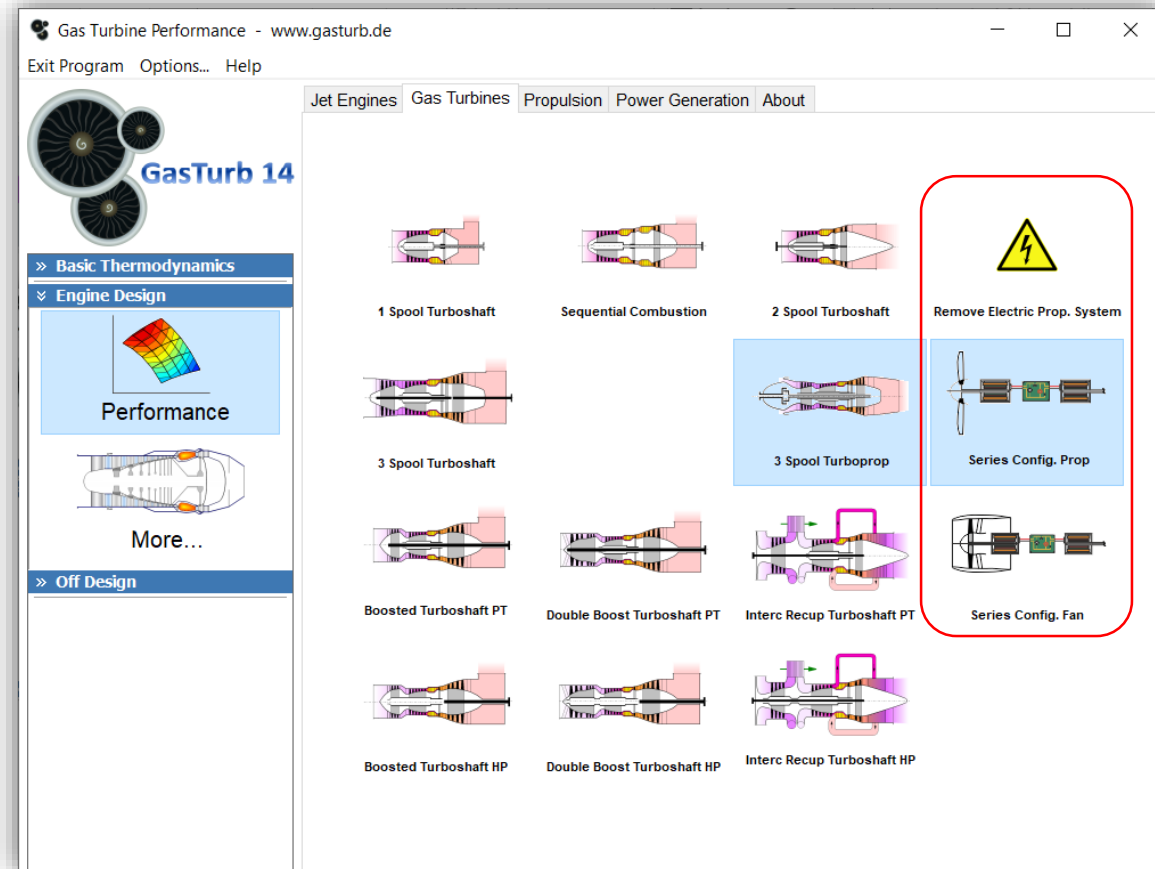


There is a change in the main menu of GasTurb: New electric propulsion systems can be added to the gas turbine configuration and enable the design and evaluation of these novel propulsion systems.

There are two configurations available for electrically driven systems:

- **Series configuration with an electrically driven propeller**
- **Series configuration with an electrically driven ducted fan**

Both can be coupled with any spool of the different gas turbine configurations available in GasTurb.

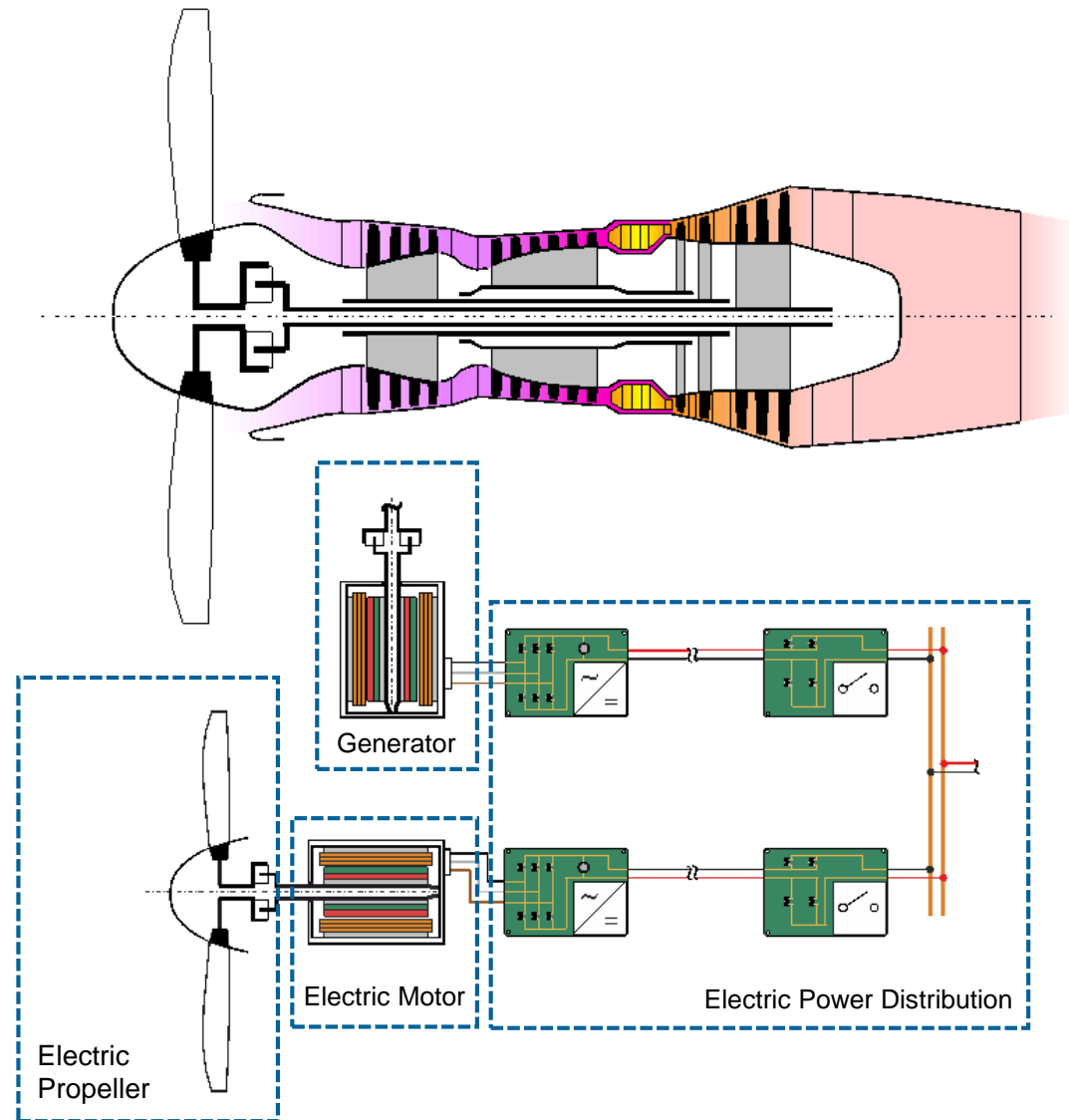


This is a typical series electric propulsion system, as simulated by GasTurb, connected to a 3-spool turboprop:

The electric propulsion system is supplied with power from a gas turbine spool connected to the generator of the electric system. Any gas turbine spool can be selected.

The electric power is converted by power electronic elements.

Finally, the electric power is converted to mechanical power by the electric motor and thrust is generated by the electric propeller (or alternatively electric fan)

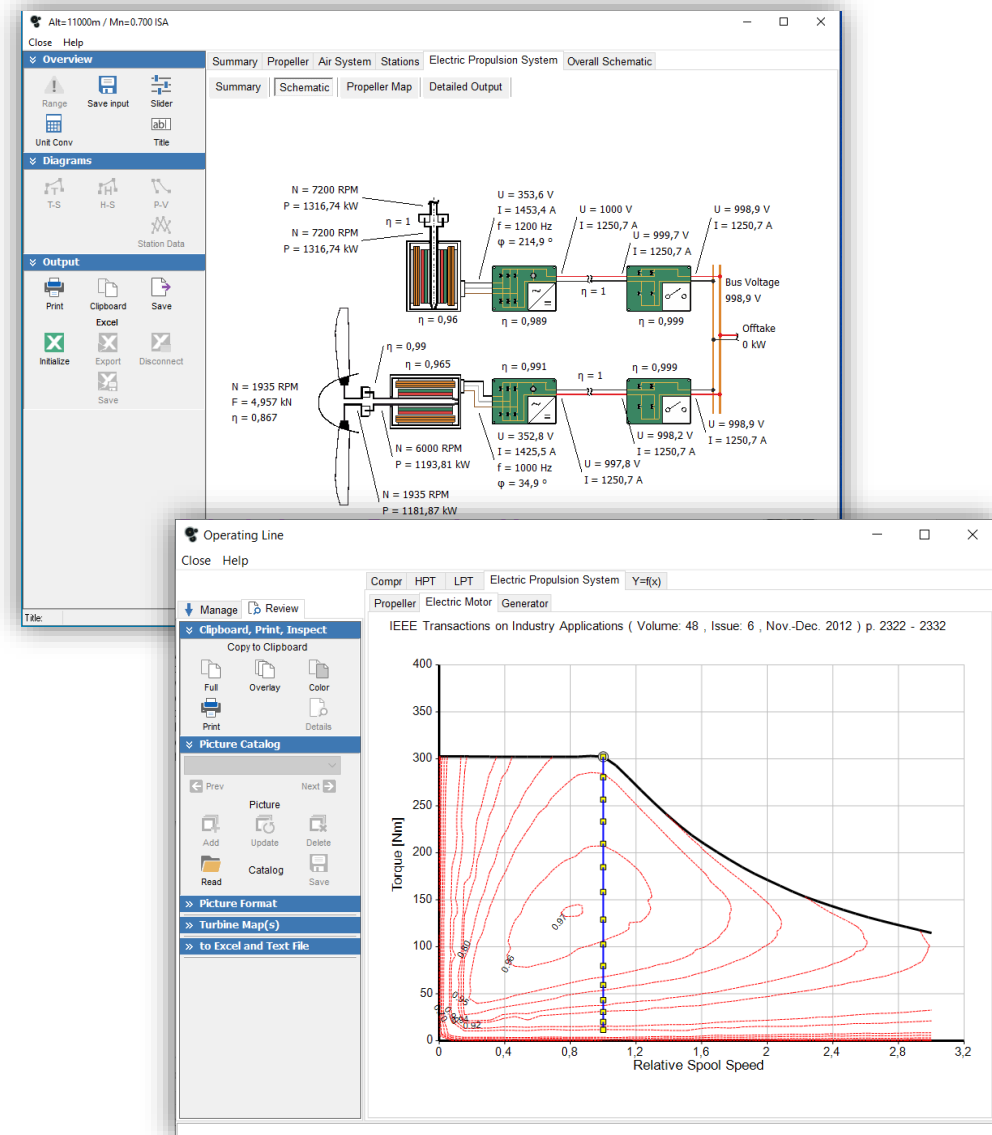


GasTurb 14 allows a detailed design of the electric system with sophisticated models for the electric machine, rectifier and inverter as well as the power controller.

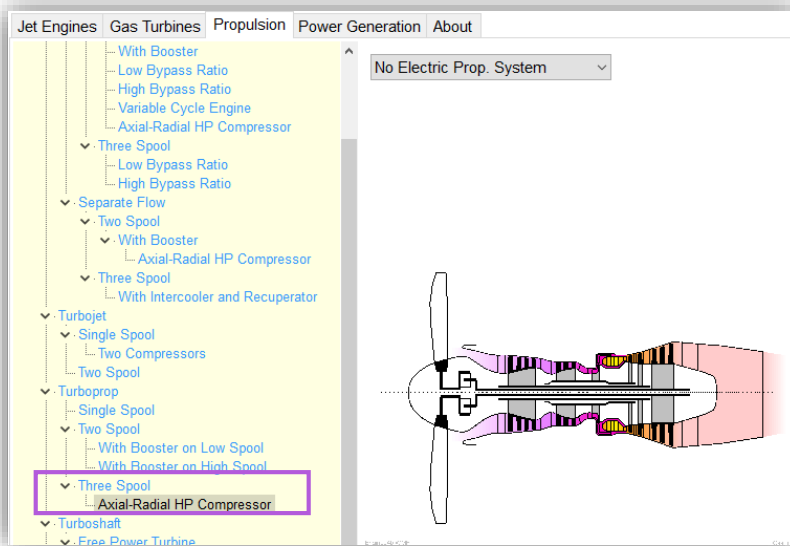
The already known GasTurb tools *Parametric Study*, *Optimization*, *Iteration*, etc. can be used to optimize the design of both the electric propulsion system and the gas turbine.

Off-design models allow accurate prediction of the electric propulsion systems performance for each mission point.

For the off-design calculation efficiency-maps for the electric machines are included.



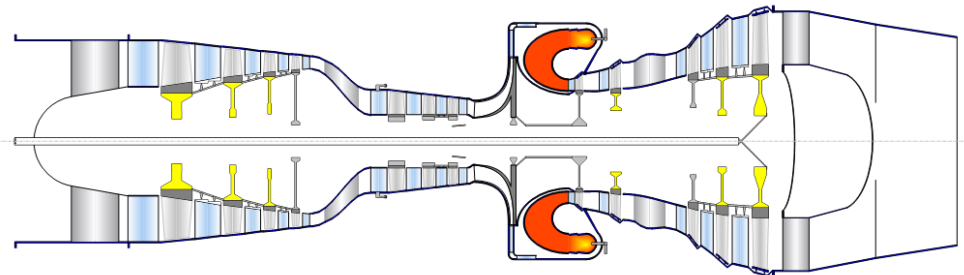
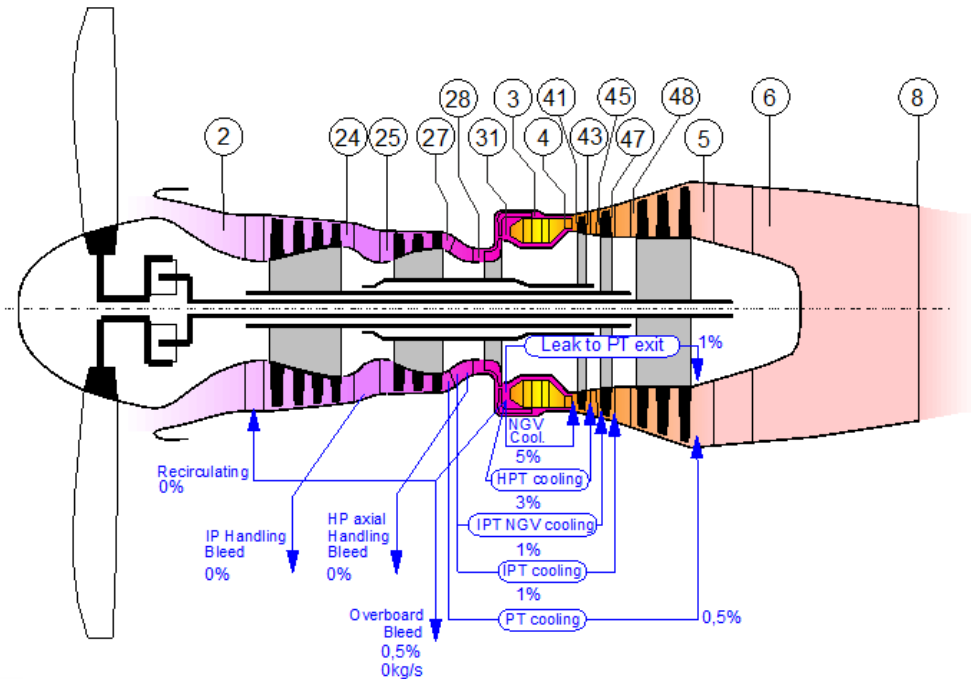
3 Spool Turboprop with axial-radial compressor



The newly integrated 3 Spool Turboprop with axial-radial compressor configuration can be selected in the main menu via "Propulsion".

The configuration is especially useful to design small engines with high pressure ratios.

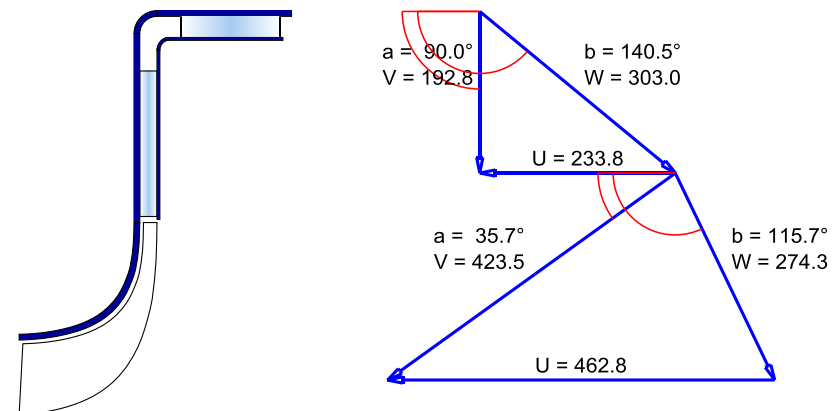
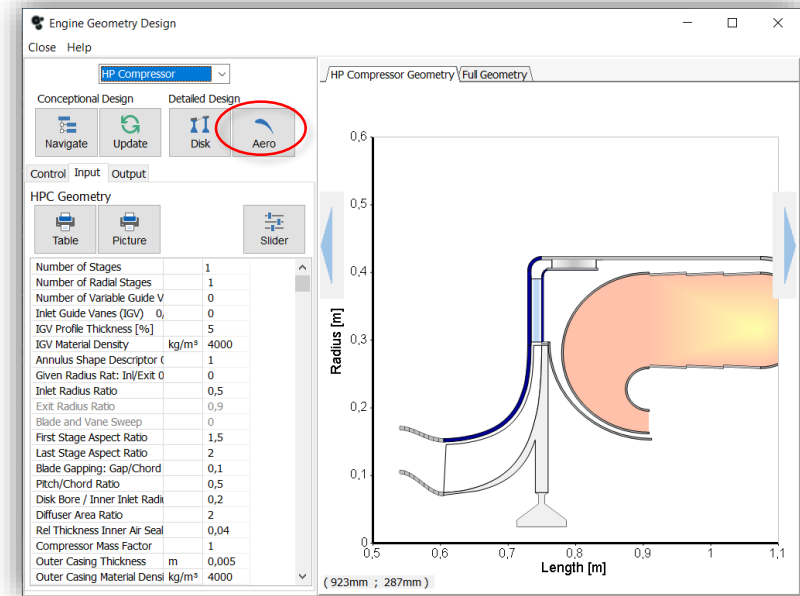
A demo file is included in GasTurb14.



GasTurb 14 features a mean line design of radial compressor stages that are part of the overall gas turbine.

Two different loss calculation modes are offered, the analytical and the prescribed calculation of losses:

- **Prescribed loss calculation:** loss coefficients can be prescribed for the individual compressor sections, allowing the incorporation of individual loss correlations.
- **Analytical loss calculation:** basic loss correlations are implemented in GasTurb 14, allowing the estimation of compressor efficiency as a function of the geometry and friction factors.



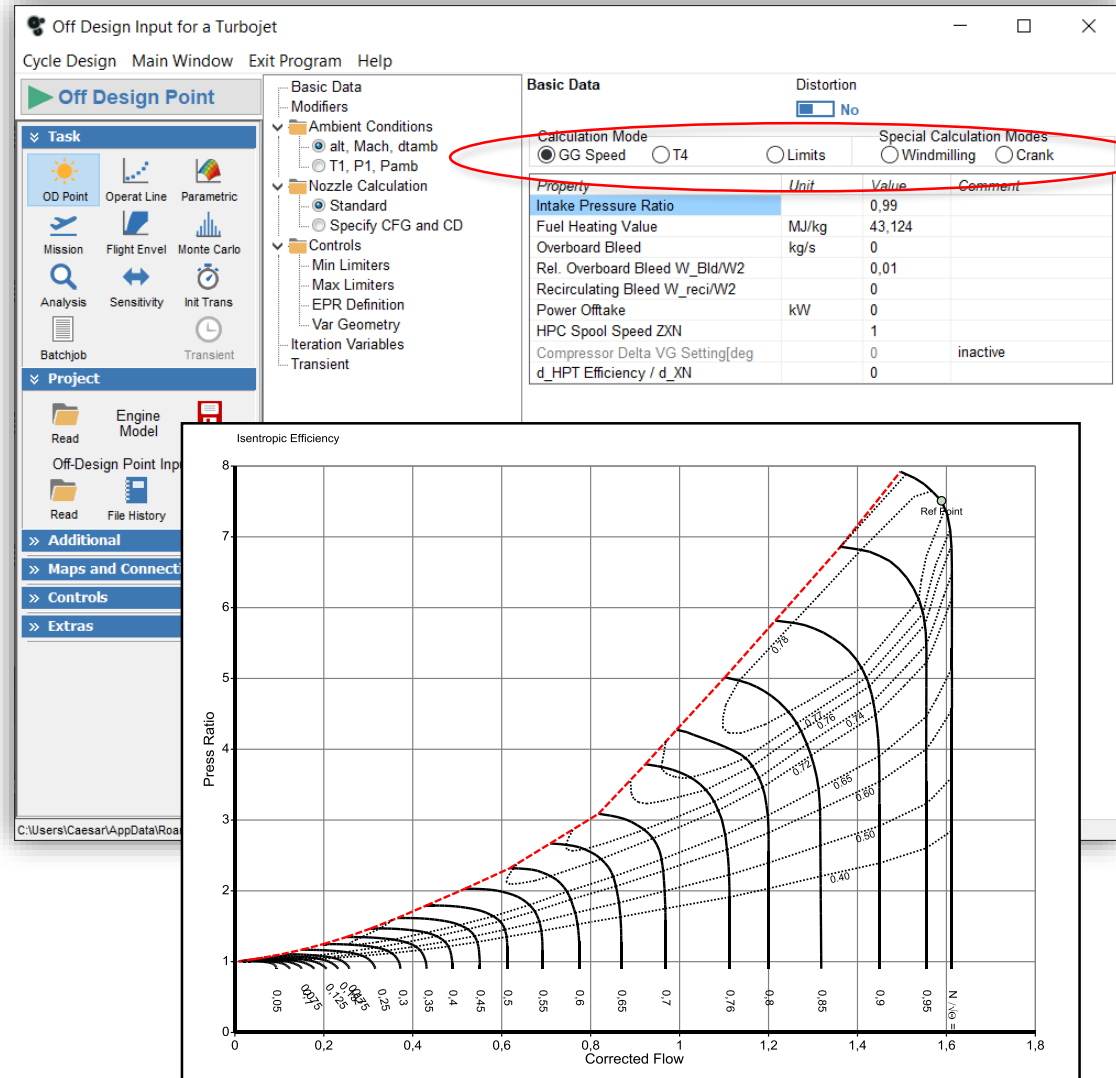
Starting and Windmilling

New off-design calculation options in GasTurb 14 enable the simulation of **starting** (crank) and **windmilling** of an engine.

For the extreme operating conditions during starting and windmilling **extrapolated maps** are needed

- They have to contain data for very low corrected spool speeds and pressure ratios below 1.
- Such maps can be generated with the new Smooth C9 & T9 versions

The **burner light up speed** is an additional input for starting simulation



Afterburner Transient

GasTurb 14 enables transient simulations of jet engines with a switched on afterburner.

The user can define the limits $A8_{min,Reheat}$ and $A8_{max,Reheat}$, in which the afterburner is operated for the transient simulation.

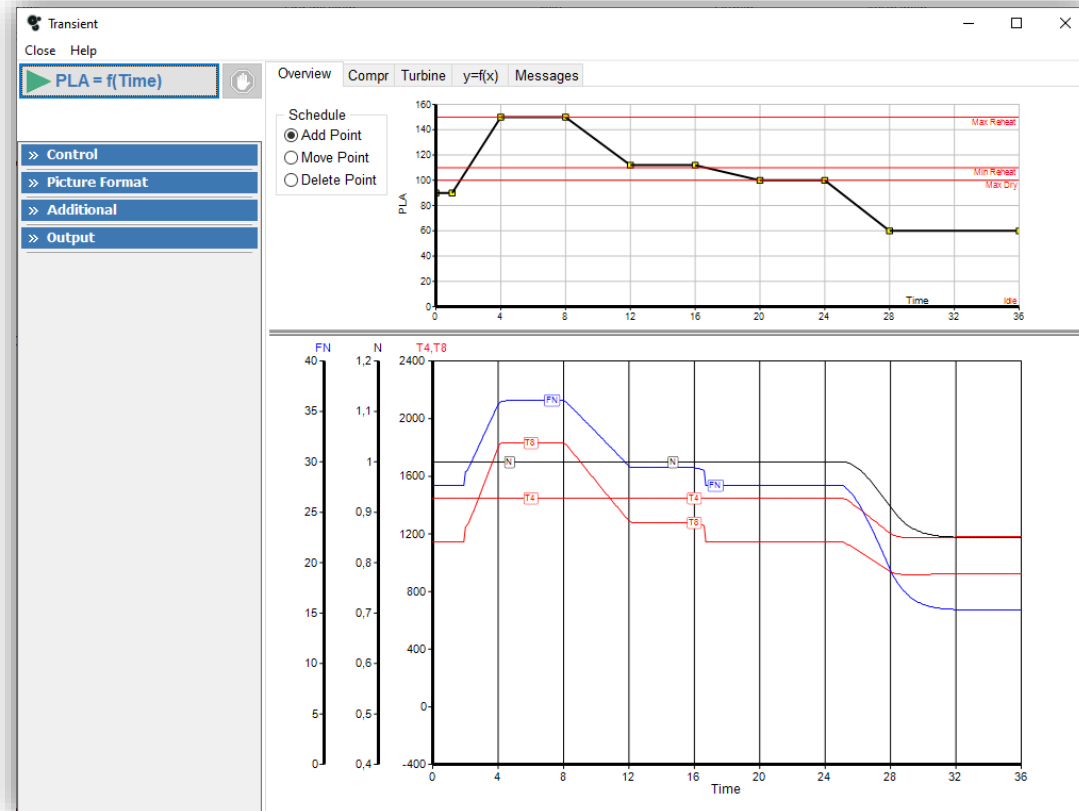
Below $A8_{min,Reheat}$ the afterburner is switched off and a transient simulation of the turbomachinery is performed.

Reheat: Input Degree of Reheat

Calculation Mode
☐ GG Speed ☐ T4 ☒ Limits

Special Calculation Modes
☐ Windmilling ☐ Crank

Property	Unit	Value	Comment
Delta Reheat Efficiency		0	
A8 min Reheat [%]		70	
A8 max Reheat [%]		100	
Degree of Reheat (0..1)		1	



... and many more small improvements of physical modeling, graphical interface, performance and stability.

?!

Any questions?
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