TURBINES

FLOWNEX®
SIMULATION ENVIRONMENT

Flownex® SE determines pressure drop [flow] and heat transfer [temperature] for the connected components of a complete system in steady state and transient, e.g. pumps or compressors, pipes, valves, tanks and heat exchangers.

TYPICAL USES:

ANALYSIS

- Simulation.
- Performance assessment.
- Modification assessment.
- Fault root cause assessment.

DESIGN

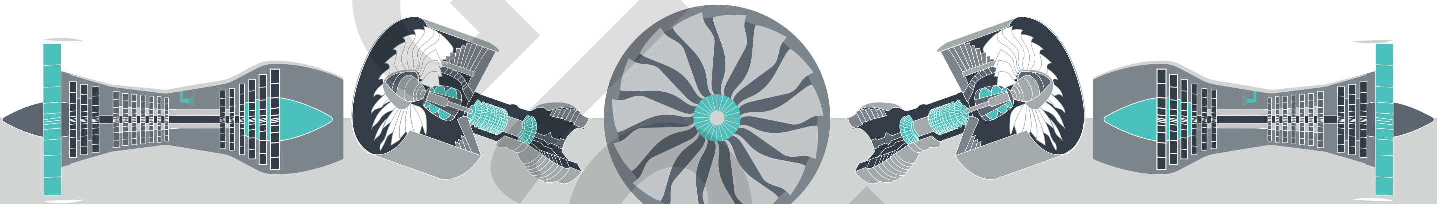
- System sizing.
- Component sizing.
- Determining operating ranges.
- Flow, temperature, pressure, power consumption, etc.
- Testing of control philosophy.

TRAINING

- System behavior examination.
- Performing basic flow and heat transfer calculations.
- Thermohydraulic principles and properties referencing.

BRINGING NUCLEAR QUALITY AND STANDARDS TO SYSTEM SIMULATION

Flownex is developed in an ISO 9001:2008 and NQA1 quality assurance system environment.



"Flownex® enabled engineers to analyze the complete fuel system and its components in an efficient and accurate way, providing them with peace of mind that the final system design is safe, reliable and conforms to customer requirements."

Jaco Gouws
Aerosud

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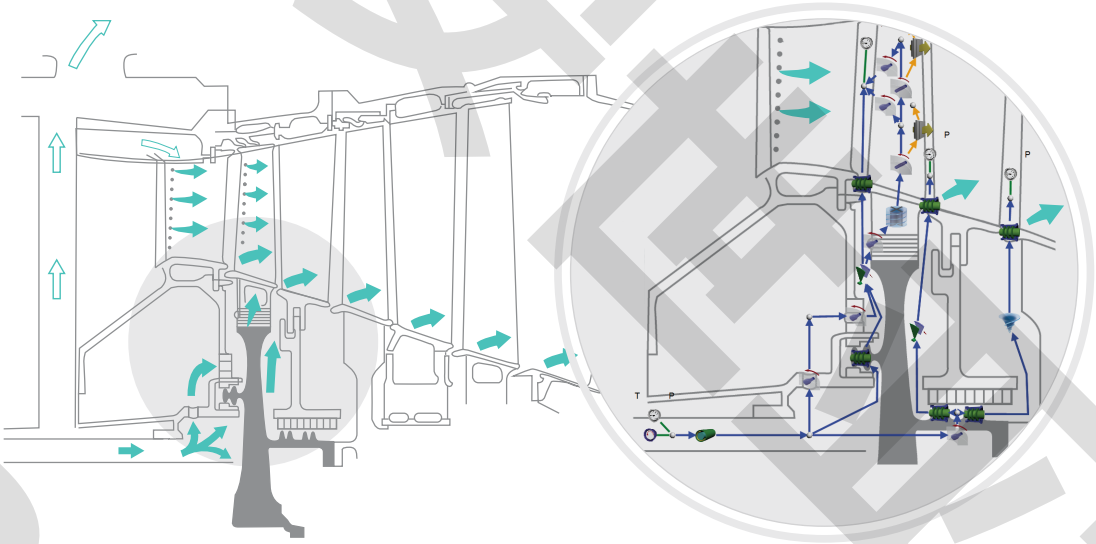
COMBUSTION CHAMBER:

Integrated combustion chamber design & optimization including coolant flow.

- Combustion product gas composition calculation.
- Combustion process adiabatic flame temperature calculation.
- Flow distribution between cooling slots and main flow path.
- Thermal capacitance in solids for transient modeling.
- Linear and solid conduction heat transfer.
- Axial (2D) conduction.
- Jet impingement cooling.
- Film convection heat transfer.
- Solid-Solid radiation heat transfer.
- Gas-Solid radiation heat transfer.
- Convection heat transfer.



SECONDARY & COOLANT FLOW:

Internal cooling system pressure, flow rate, power and heat transfer distribution for ensuring effective film cooling on hot surfaces.

- Swirl calculation through integrated swirl solver.
- Labyrinth seal pressure drop calculation.
- Rotor-Rotor pressure differential and power transfer calculation.
- Rotor-Stator pressure differential and power transfer calculation.
- Free Vortex pressure differential and power transfer calculation.
- Forced Vortex pressure differential and power transfer calculation.
- Rotating nozzle pressure differential and power transfer calculation.
- Rotating channel pressure differential and power transfer calculation.
- Convection heat transfer between solids and cooling air.

FLOWNEX® LICENSE HOLDERS

BLADON JETS

Solar Turbines
A Caterpillar Company

CASE STUDY

GAS TURBINE ENGINE
COMBUSTION CHAMBER

Challenge: Determine flow distribution in gas turbine combustion chambers at the preliminary design phase, taking into account various mechanisms of heat transfer.

ROLLS ROYCE

By utilizing Flownex®'s swift execution ability, engineers could quickly and easily perform design modifications and parametric studies on the combustion chamber. Convection, conduction and radiation heat transfer was taken into account as well as the effect of fuel ratio on the combustion temperature. Studies performed in Flownex® allowed engineers to determine optimum boundary conditions for further detailed 3D CFD simulations.