

# ANSYS COUPLING

Bringing nuclear quality and standards to system simulation.

**FLOWNEX**<sup>®</sup>  
SIMULATION ENVIRONMENT



*Flownex<sup>®</sup> SE can couple to a range of Ansys products opening up a new frontier in co-simulation. This provides the capability of simulating complete and integrated engineering systems fast and accurately.*

## WHY USE FLOWNEX<sup>®</sup> SE WITH ANSYS?

State of the art physics models in Flownex allow accurate prediction of 1D flow. This can be used to replace 1D flow in 3D flow simulations and in doing so mesh sizes are reduced and solving times are decreased dramatically.

Flownex contains component models ideal for modeling large, interconnected systems and can be coupled to 3D simulations to capture changes in components performance to a change in system performance.

## KEY APPLICATION AREAS

- Thermal stresses during equipment startup and dynamic load changes
- Coupled flow simulations for long transient scenarios, with system feedback
- Complex 3D external flow modeling integrated with 1D internal flow

*Flownex<sup>®</sup> is developed within an ISO 9001:2015 quality management system that is ASME NQA-1 compliant.*

## DETAILS & CAPABILITIES

- Flexible coupling between Ansys and Flownex:
  - Directly couple to Fluent/CFX/Mechanical
  - Using workbench integration
  - Exporting Flownex simulations as FMUs
- Import 3D ROMs into Flownex:
  - Understand system performance in long transients
  - Real time system performance monitoring and prediction (Digital Twins).
  - Optimize control strategies on full systems

### WORKS WITH:

- Fluent
- CFX
- Mechanical
- ROM Builder
- Workbench

### SUPPORTS:



WORKBENCH INTEGRATION



www.flownex.com  
enquire@flownex.com

Find us on:

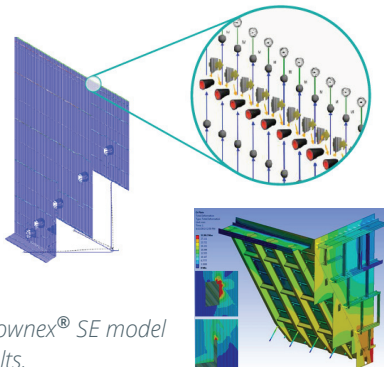


# EXAMPLES

FLUENT | CFX | MECHANICAL

## TRANSIENT THERMAL STRESSES

EFFECT OF START-UP &amp; DYNAMIC LOAD CHANGES



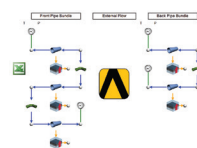
Furnace tube wall Flownex® SE model and FEM model results.

- Simulate the thermal stresses during operational changes of large components (boiler tube or furnace thermal stresses during startup, gas turbine rotor and stator, etc.).
- FEA simulation requires heat transfer and pressure boundary values. Flownex is used to quickly solve these values, eliminating the need for a full 3D CFD simulation of the flow.
- Heat transfer coupled to 3D FEA thermal stress simulation.
- Use Flownex for internal flow to replace computationally expensive 3D CFD.
- Coupled simulation enables the investigation of various scenarios where there is no experimental data available.

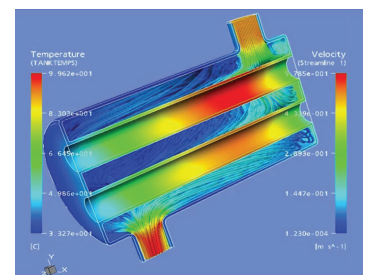
## SIMPLIFIED HEAT EXCHANGER

MODEL COMPLEX EXTERNAL GEOMETRY WITH 3D WHILST MODELLING THE INTERNAL FLOW WITH 1D SIMULATION

- Reduce the overall mesh size and decrease simulation times without compromising on accuracy.
- Investigate performance changes on a system-level as a result of updates in heat exchanger geometry.
- Use Flownex to optimize the control strategies of large systems with integrated component simulations.



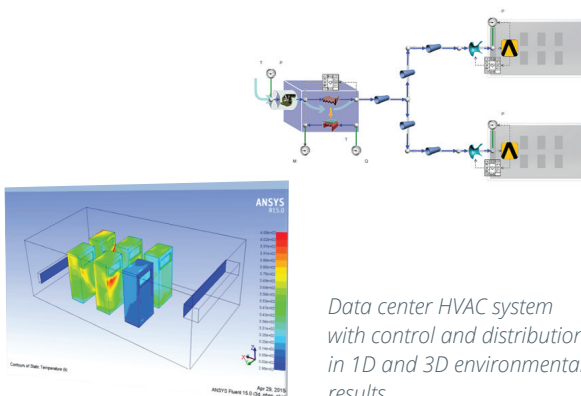
Shell-and-tube heat exchanger internals and tube walls in Flownex® and external shell flow in Fluent.



## LONG TRANSIENTS

COUPLED FLOW SIMULATIONS

- Easily model distributed flow networks, with flowpaths in Flownex coupled to detailed components in Ansys to obtain accurate results for long transient scenarios.
- Quantify the pressure pulsations in compressors or pumps more effectively where pressure wave reflections from the surrounding networks have a significant impact.
- Capture the upstream and downstream influence of larger systems on internal components where their performance is dependant on the integrated system.



Data center HVAC system with control and distribution in 1D and 3D environmental results.