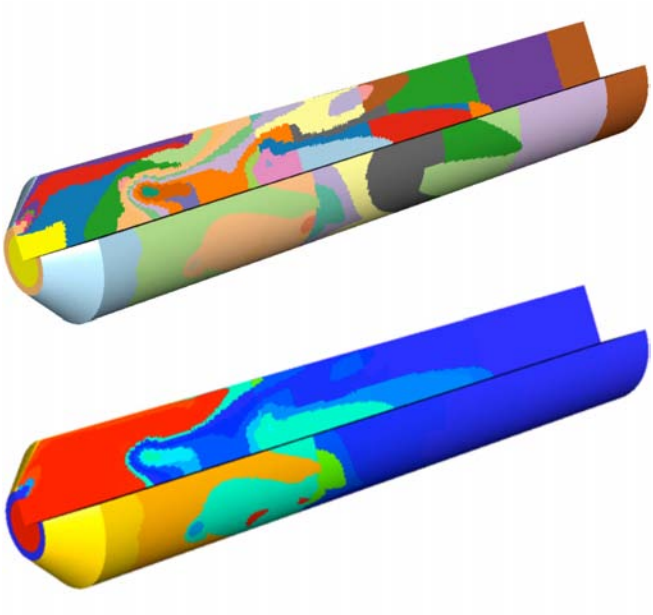
Reactor Network Development and Analysis

Let Reaction Design create a fast, accurate model for your system using reactor networks



Today's leading, clean-combustion designers are leveraging real fuel chemistry to achieve unprecedented levels of accuracy from their combustion simulations.

Manually generated Equivalent Reactor Networks (ERNs) have been used for more than 30 years to provide high fidelity combustion analysis. ERN simulations using detailed chemistry provide fast and accurate emissions and stability predictions. Of course, the prediction of system performance showing real fuel effects has been the elusive goal of combustion simulation.

Compared with modern CFD simulations, using ERNs derived from these same 3D flow fields permits the use of substantially more accurate chemical reaction mechanisms and a faster simulation speed. However, manually constructing accurate ERNs is increasingly impractical. Today's short design cycles and increasingly complex systems simply do not permit careful ERN calibration and construction sensitivity analysis. As a result, manually constructed ERNs compromise accuracy and therefore cannot be trusted as a reliable predictive design tool.

- ***Improve the speed and accuracy of combustion emissions predictions***
- ***Independently validate your CFD analysis and identify areas for improvement***
- ***Accelerate development with expert analysis using real fuel chemistry***
- ***Create accurate emissions prediction tools to support new sales opportunities***

Automatic and uncompromising

Now there is a superior alternative to manually constructed ERNs. Using Reaction Design's ENERGICO™ simulation software, ERNs can be automatically created. The ENERGICO software's speed of operation and algorithmic approach enables today's clean-combustion designers to quickly explore ERN strategies and sensitivities, resulting in FAST, ACCURATE and PREDICTIVE system models.

Some modern uses of ENERGICO-created ERN's include the design and optimization of liquid and gas fueled turbines, prediction of CO, UHC, NOx, LBO and other emissions and effects at a wide range of operating loads. These ERNs are also used during sales campaigns to predict the operational reliability, stability and emissions for systems burning new "opportunity" fuel types. LNG, Syngas and other alternative fuels are often targets of this modeling.

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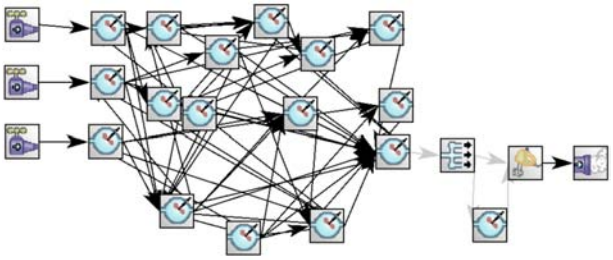
Typical ERN applications:

- Gas turbines (liquid or gaseous fuel)
- Gasifiers and IGCC applications
- Chemical processing
- Burner applications
- Rocket engines

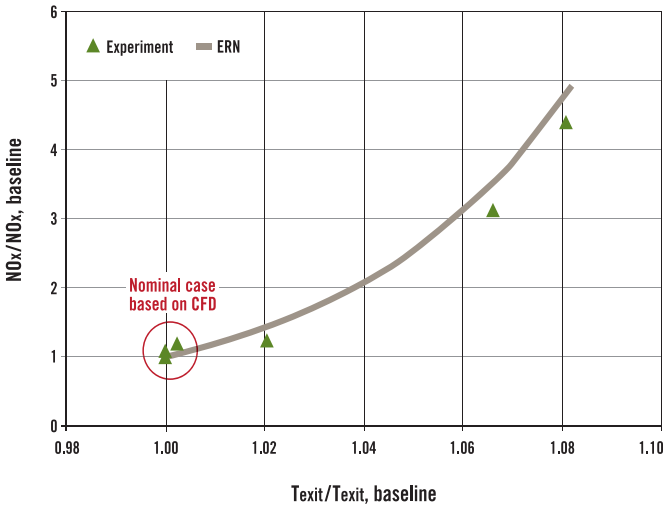


Typical Equivalent Reactor Network (ERN) for a gas turbine combustor

Meeting the needs of your project

Experts in detailed chemistry for clean-combustion design, Reaction Design's engineers will work with you to define the proper project scope to meet your needs. Typical projects include:

- Creating ERN's from customer CFD flow fields and generating emissions predictions for NOx, CO and unburned hydrocarbons
- Creating ERNs directly from design drawings and operating conditions
- Comparing the simulation performance of different detailed chemical mechanisms (fuel models) in an ERN
- Identifying areas where a customer's CFD simulations can be improved
- Running parameter studies to determine the impact of fuel flexibility, combustor and pilot fuel flow splits, and operating conditions
- Creating customer tailored ERNs of existing systems for Customer engineers' combustion analysis of new projects



Fuel-Air Ratio parameter study results showing accuracy of ERN for a GE Energy gas turbine combustor (Drennan, et al., ASME2009-59861)

Reaction Design at your service

Reaction Design's engineers are experts in the use of detailed chemistry for advanced clean technology combustion designs. You can trust that your project will benefit from the expertise and experience our staff has in a variety of combustion applications.

Reaction Design provides software, fuel models and engineering services solutions for a wide range of combustion applications. Call Reaction Design today to get more information on how you can improve the quality of your combustion predictions and CFD analysis.

Let's get started

To learn how Reaction Design can deliver the training, services and software your employees need to enhance their chemistry simulation effectiveness, please contact sales@reactiondesign.com.

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