

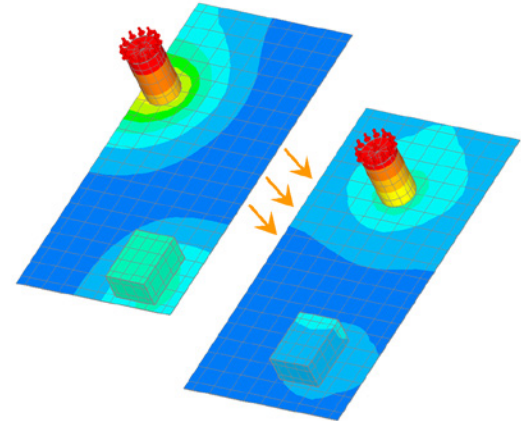
## ADVANCED DESIGN TOOLS

Not just better answers ... better design productivity and better end-products.

### / STEADY STATE PREDICTIONS / TRANSIENT SIMULATION

Necessities to be sure, but is that all you are getting from your thermal/fluid modeling software? Are you restricted to modeling a single point design with no allowance for uncertainties and unknowns, under a deterministic set of boundary conditions and operational scenarios? If so, there is more to designing robust products than point design evaluation. You should expect more decision support from your software, not just bigger models and more detailed phenomena.

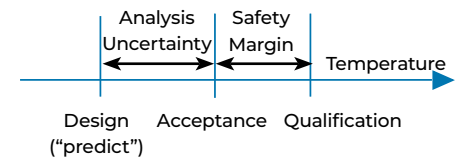
Ansys is dedicated to producing software tools that not only help thermal/fluid engineers produce analytical answers but also product solutions. Apply advanced techniques that transcend traditional steady state and transient simulations!



Size, Select, Locate, Optimize

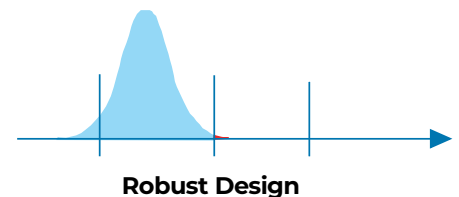
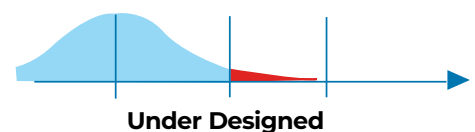
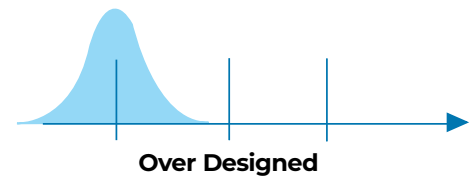
### / PARAMETRIC MODELING: RAPID CHANGES, SENSITIVITIES

- Use algebraic expressions and spreadsheet-like variables instead of hard-wired numbers as inputs
- Make rapid and consistent model changes not only between runs, but also during a simulation run
- Find out how easy and important it is to make parametric variations, to perform sensitivity analyses, and to answer what-if questions



### / OPTIMIZATION: DESIGN SYNTHESIS

- Size dimensions, select and locate components, and find an optimal design solution
- Designate variables to be sized or selected, objectives to be met, constraints and limits to be obeyed, and an arbitrarily complex solution procedure with which to evaluate candidate designs. The software automatically searches for the best viable design.



Avoid Costly Overdesign and Risky Underdesign

### / AUTOMATED MODEL CALIBRATION TO TEST DATA

- Adjust uncertainties in a model automatically, correlating to available test data
- Define measurement locations with associated test data
- Designate uncertain inputs, limits on their range, when and where to compare to test data, and how to define a "good fit"... the rest is automatic

## / CRITICAL DESIGN CASE DEFINITION

- Find the combination of input values that yields the worst-case design scenario
- Determine the hot case and the cold case given ranges of possible dimensions, environments, properties, component efficiencies, etc.

## / RELIABILITY ENGINEERING: UNCERTAINTY ANALYSIS

- Check margins and safety factors for adequacy
- Given variations in inputs, find the chances that failure criteria will be exceeded
- Evaluate uncertainties statistically

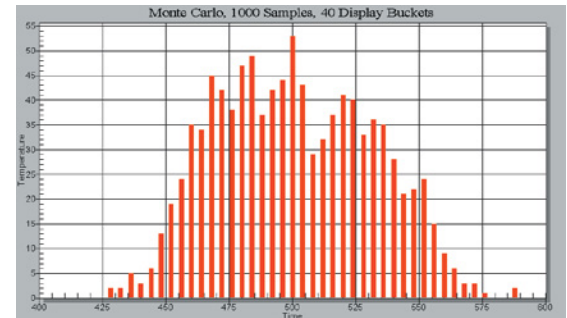
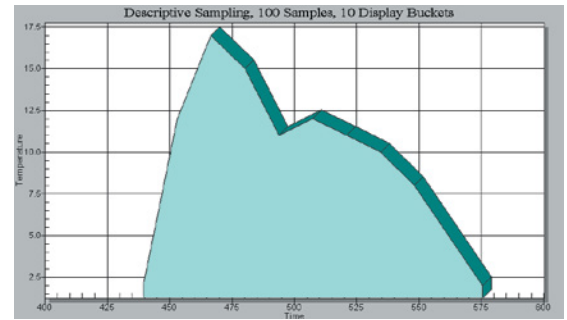
## / ROBUST DESIGN: DESIGNING FOR RELIABILITY

- Synthesize designs based on reliability
- Determine allowable tolerances and acceptance criteria

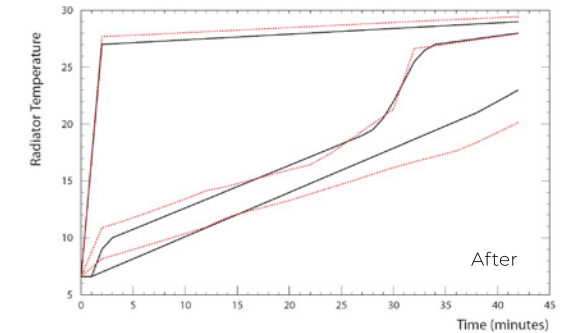
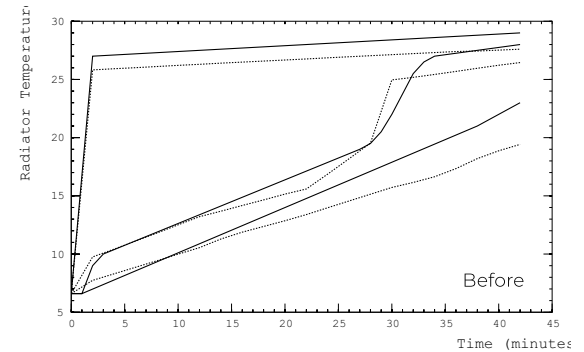
## / MULTIDISCIPLINARY DESIGN INTEGRATION

CRTech provides the most comprehensive set of thermal/fluid design and modeling tools available to the heat transfer and fluid flow professional. However, designing reliable products in the shortest possible design cycle time demands inclusion of other engineering specialties such as structures, electric, optics, and cost.

CRTech goes beyond intimate interconnections to other software design tools. Our tools are also designed to allow integration into large-scale multidisciplinary design systems and analysis management tools. Contact CRTech for more information on supported interconnections.



Reliability Engineering Histograms in Ansys' EZ-XY®



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