

# Simulation



Claes Ryttoft

## Dear Reader,

Computer simulation plays a crucial and growing role in product development. With every product generation surpassing its predecessor in terms of complexity and optimization, it is increasingly important for engineers to gain deeper understanding of the physical effects that limit performance. Such detailed understanding cannot be gained by testing alone, especially not within the time and economic constraints that the market allows. Furthermore, by permitting the comparison of additional design variants and the exploration of what-if scenarios, confidence in the selected configuration is strengthened and the customer is assured of an optimal solution.

The most sophisticated of simulations is of little value if its margin of accuracy is not correctly understood by the recipient of the information (we have all experienced the frustration that can result from placing too much trust in an over-optimistic weather forecast). Besides drawing on a broad range of scientific fields, simulation has evolved into a discipline in its own right. Simulation engineers must be able to answer such questions as: Does the underlying model adequately describe the phenomenon being simulated? How fine must the mesh and time resolution be for the results to be sufficiently accurate? Which simplifications are acceptable and which are not? It is remarkable to note that the reliability of simulations has now reached the point that standards committees such as the IEC accept simulations as an alternative to testing for certain criteria.

One important challenge in simulation is the interaction between different physical phenomena in what simulation engineers call multiphysics. In a current breaker for example, electromagnetics, thermodynamics, fluid dynamics and mechanics all affect one another. Simulation must thus deal with all these effects and their interactions.

This issue of *ABB Review* unites a remarkable spread of simulation applications ranging from large transformers to integrated electronics. The simulations discussed deal with timescales ranging from ultrafast switching actions to lifetime wear and tear, and even to the casting and curing of materials during manufacture.

In an issue on simulation, it is appropriate to also advance the virtualization of *ABB Review*. The previous issue announced the launch of an email alert to keep readers informed of new issues. Going one step further, we are now also launching a tablet version. Information on both of these can be found on page 83.

Enjoy your reading.

A handwritten signature in blue ink that reads "Claes Ryttoft". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Claes Ryttoft  
Chief Technology Officer and  
Group Senior Vice President  
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