



# INTEGRATED ENGINEERING SOFTWARE

## Defining the next generation of intelligent defense systems

BAE Systems is a global company engaged in the development, delivery and support of advanced defence, security and aerospace systems in the air, on land and at sea. The company designs, manufactures and supports military aircraft, combat vehicles, surface ships, submarines, radar, avionics, communications, electronics and guided weapon systems. It is a pioneer in this technology with a heritage stretching back hundreds of years. It is at the forefront of innovation, working to develop the next generation of intelligent defence systems. BAE Systems has major operations across five continents, with customers and partners in more than 100 countries.

The Electromagnetic Technology Group is based in Bristol at the BAE Systems Advanced Technology Centre, which is renowned for its cutting edge research in a variety of technology areas. The EM Tech group specialises in designing high voltage systems for pulsed power technology – where energy is accumulated relatively slowly and then released very quickly.

Dr. Peter Leask, a Principal Scientist at BAE Systems, has been using INTEGRATED Engineering Software for over five years, especially ELECTRO (2D/RS). This is an easy-to-use electric field solver for applications such as arresters, cables, transformers, high voltage shielding, insulators and bushings. It is fast and accurate at calculating electric field strength, force, torque, transmission line parameters and capacitance. With ELECTRO designers can automatically vary and experiment with geometry, materials and sources cutting out some of the tedious and repetitive tasks that comes with the fine-tuning of multiple design parameters.

“In terms of IES’s software library, we use ELECTRO 95 percent of the time and we have found it a very easy program to get to grips with. It is quick to model and cost effective. Typically the devices that we model using ELECTRO are high voltage electronic components such as switches and transformers. Because of the cutting edge nature of our work it is essential to use modelling software at the beginning of the design process. From time to time we also use INTEGRATED’s COULOMB for 3D modelling, though this is a minor part of our operation.”

Particularly useful to BAE Systems has been the option to solve electrical rotationally symmetric (RS) problems, which give a realistic solution at an early stage, eliminating the need for many costly rounds of prototyping. ELECTRO’s links to major CAD packages also prove useful, true representation of complex geometric shapes means that files are directly transferable, eliminating the need to re-draw designs for CAD. Using the program it is easy to draw a concept for a new piece, analyse field stresses or capacitance on an iterative basis and then modify the design within the program.

[Read more →](#)

INTEGRATED  
Engineering Software

Hybrid Simulation Tools  
for Electromagnetic &  
Particle Trajectory  
Design Analysis

- > High Voltage & Electric Field
- > Magnetics
- > RF, Microwave & Antennas
- > Particle Trajectory



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Cont'd

COULOMB is a 3D electric field solver that can be used for designing applications like high voltage shielding, cables, transmission lines and printed circuit boards. Its calculations include electric field strength, transmission line parameters and capacitance.

As with all design processing, the use of INTEGRATED's software varies, one week it may not be used at all and the next week every day. At BAE Systems it is primarily used in the early developmental stages of a product, enabling the designer to prove the concept before physical prototyping begins. "This helps alleviate any issues before we get to the, usually expensive, prototype stage" continues Leask. "The measurement functions help us to monitor the electrical stress in the designs and keep it below critical levels. The software allows us to keep iterating until we are happy with the level reached in all the regions of the model. Then we build the prototype. We have six people trained to use this modelling software and most weeks there is someone working with it for at least four or five hours."

The designs that Leask's team work on often involve metal components that have very different applied voltages. They use ELECTRO to ensure that these parts are kept the correct distance apart so that the intervening insulating material does not breakdown during use. Given the nature of the product under design, the team is often working with strange shapes and find ELECTRO useful in assessing the capacitance in these situations. "Before using this modelling software it was very much 'back of envelope' calculations and ELECTRO has really speeded up the process and increased accuracy at an early stage," Leask added.

"The major benefit to BAE Systems of using INTEGRATED Engineering Software for our modelling is that we are able to test the design in ELECTRO and then export that information directly to CAD. From there we can create the final model without having to do any redrawing at all. This gives us great time and cost savings at every stage of the process," concludes Leask.

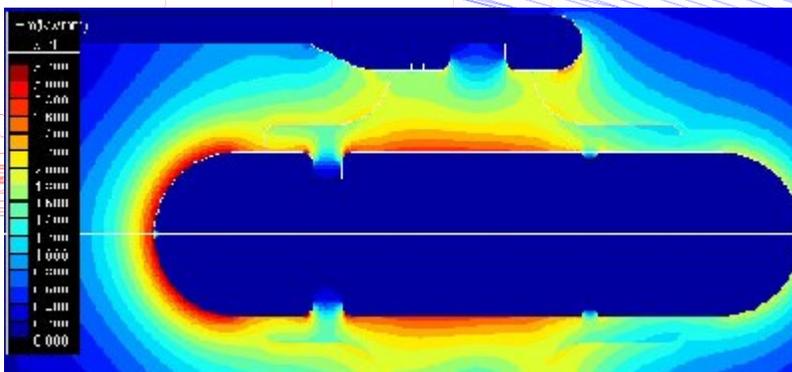


Figure Electro a test

1: An model of fixture

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