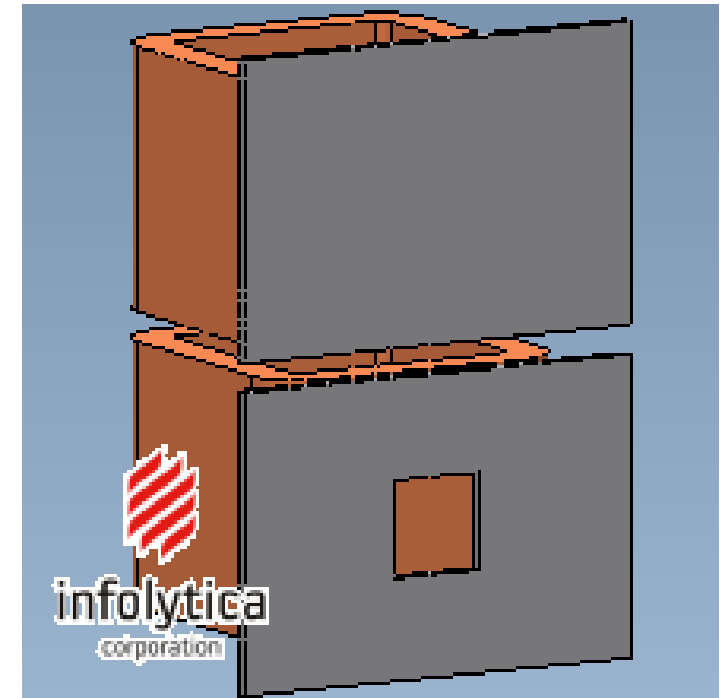


Field Loss in Power Transformer

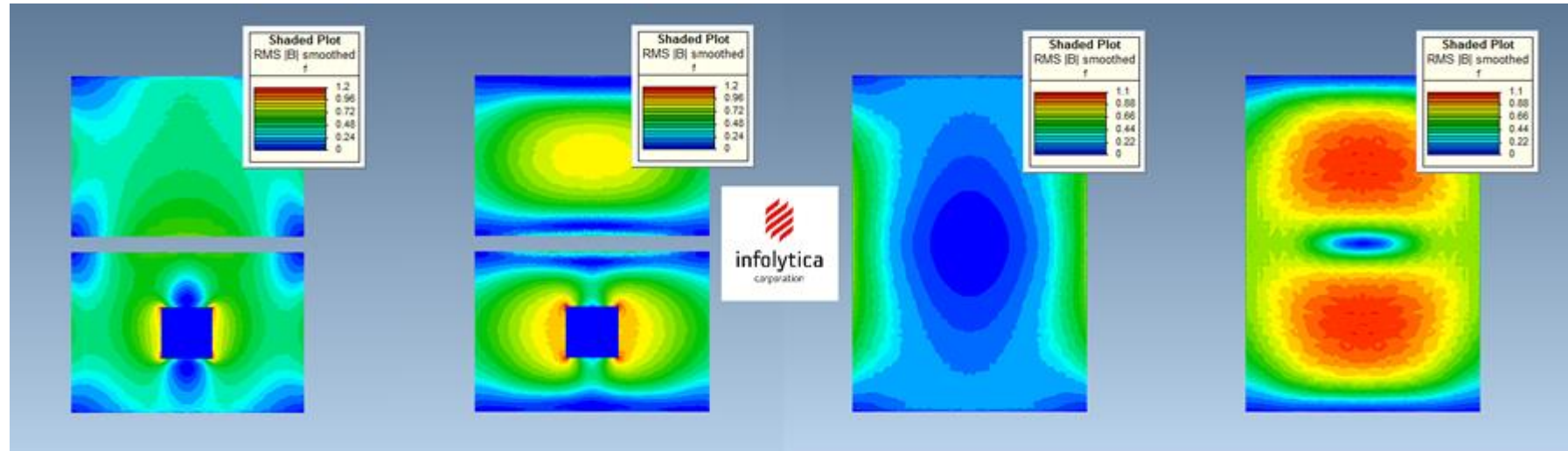
Field Loss in Power Transformer

Shielding can be used to substantially reduce magnetic field strengths outside of a transformer. Considerations, such as its electric properties and geometry, are needed to determine the type of shielding required. Presented here is Simcenter MAGNET's analysis of the first set of configurations from the family of benchmarks involving two exciting coils directed in opposite directions and shielded by magnetic steel plates. The magnetic shield has two configurations; one large magnetic steel plate or two smaller magnetic steel plates, where one of the plates has a rectangular hole. The simulated nonlinear eddy current and hysteresis losses are compared to measured results.

By taking advantage of symmetry present in the geometry, only a quarter model is used in the first configurations and a half model in the second. These simplifications decrease the time required to complete the simulation. The following is based on the Testing Electromagnetic Analysis Methods (T.E.A.M.) problem #21: 3-D Stray Field Loss Model. The benchmark can be found on the International Compumag Society's website.



MAGNETIC FLUX DENSITY IN THE TRANSFORMER

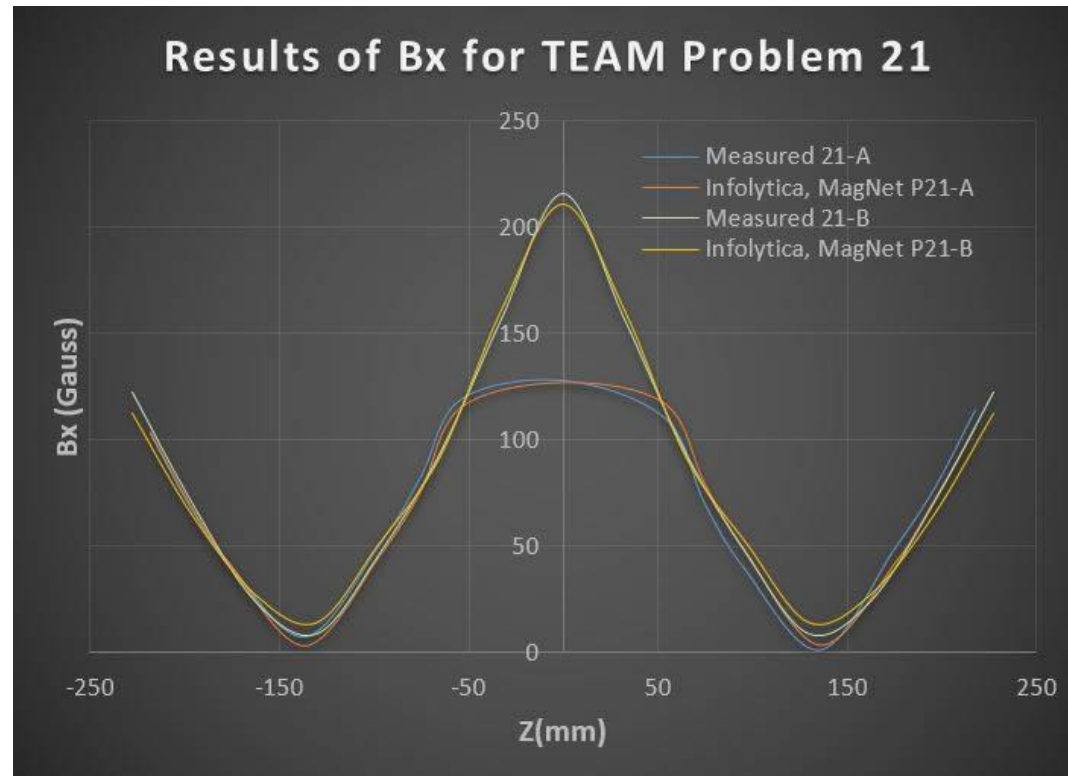


Since the sources powering the transformer are sinusoidal, Simcenter MAGNET's Time Harmonic 3D solver can be used to simulate this model. Shown here are snapshots of the magnetic flux density plots on the front and back sides of the two steel plate configurations.



The integral of the ohmic loss and iron loss fields in Simcenter MAGNET are used to compare to the measured eddy current-hysteresis model of TEAM Problem 21

MAGNETIC FLUX DENSITIES: MEASURED VS. SIMULATION



In addition to measured power loss values, TEAM Problem 21 also presents measured magnetic flux densities along contours off of the surface of the steel plate for both transformer configurations.