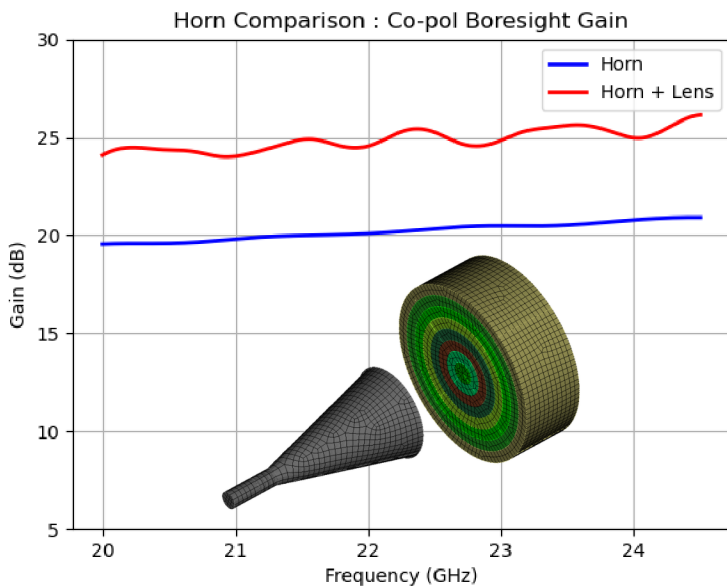


Case Study: 3D-Printed Cylindrical GRIN Lens

Gradient Index (GRIN) lenses provide a low cost option to enhance the gain and control the radiation pattern for an antenna. Using Nullspace EM, engineers simulated a cylindrical GRIN lens to provide a 5 dB gain enhancement for a conical horn antenna delivering an overall reduction of the size of the antenna compared to a standard conical horn of equivalent gain. Fortify leveraged their unique digital manufacturing workflow to produce the novel lens structure.



Why Simulate?

- Luneberg lenses use equation-based specification of the permittivity profile.
- Lens performance must be analyzed and optimized to deliver desired outcome.
- With Fortify's Flux series of printers, novel permittivity profiles can be generated using Nullspace EM's simulation process.
- Nullspace EM provides users with powerful accuracy and speed of simulation for generating complex, novel lens designs.

Why Additive Manufacturing?

- GRIN lens structures offer gain enhancement, beam control, and enhanced steering capability in a more compact form factor
- Historically, GRIN lenses were not practical due to multi-step subtractive manufacturing processes, limiting control of the graded permittivity.
- With Fortify's unique process, GRIN lenses can be fabricated through a straightforward digital manufacturing translation process.

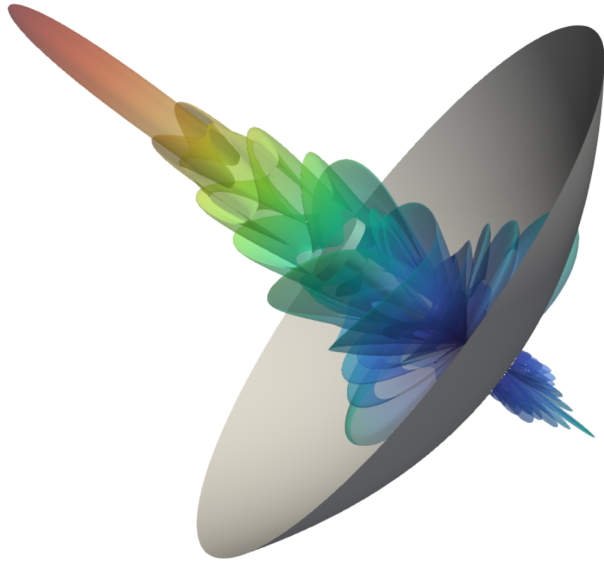


About Nullspace

Nullspace delivers engineering simulation software for electromagnetic applications.

Our customers develop sophisticated products for RF and quantum computing applications across defense, aerospace, and automotive industries.

The proprietary solvers for Nullspace tools utilize multi-CPU and multi-GPU acceleration and have been rigorously tested on real-world antenna, microwave, scattering, and ion-trap design problems for the last 10+ years.



About Fortify

Fortify is a full-stack materials science and additive manufacturing company based in Boston, MA.

Its innovative Digital Composite Manufacturing (DCM) platform enables the production of complex structures with unique mechanical, electrical, thermal, and electromagnetic properties, revolutionizing the way advanced materials are developed and manufactured. For more information, visit www.3dfortify.com.

