



National Aeronautics and
Space Administration



TECHNOLOGY SOLUTION

Electrical and Electronics

Smooth-Walled Feed Horn

A novel feed horn design that provides the capabilities of corrugated feed horns but is easier to manufacture.

NASA Goddard Space Flight Center has developed a smooth-walled feed horn that addresses the fabrication issues inherent in constructing corrugated feed horns. Corrugated feed horns offer excellent beam symmetry, main beam efficiency, and cross-polar response over wide bandwidths. However, these feed horns can be challenging to manufacture. Our technology is a smooth-walled feed horn that approximates the properties of a corrugated feed horn over a finite bandwidth, while being easier to fabricate. The novel feed horn provides diffraction-limited ~ 14 degree FWHM, with low cross polarization.

BENEFITS

- Easy to manufacture
- Wide bandwidth
- Low cross-polarization



THE TECHNOLOGY

The technology is a monotonically-profiled, smooth-walled scalar feed horn optimized between 33 and 45 GHz. The phase center for this horn is near the aperture and is stable in frequency. The feed horns monotonic profile is compatible with machining by progressive plunge milling in which successively more accurate tools are used to realize the feed profile. This technique has been used for individual feeds and is potentially useful for fabricating large arrays of feed horns, such as multimode Winston concentrators, direct-machined smooth-walled conical feed horns, and for dual-mode feed horns.

APPLICATIONS

The technology has several potential applications:

- Commercial feed horn fabrication
- Radar
- Other applications involving transmission of microwaves and higher frequencies

PUBLICATIONS

Patent No: 9373891; 9166297

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