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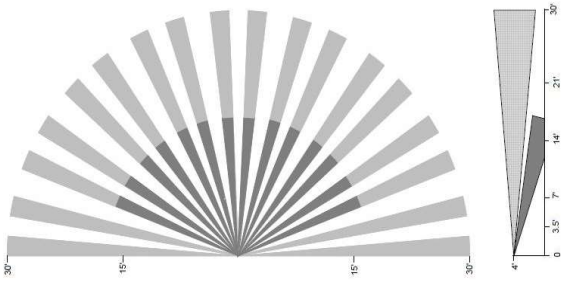
Passive InfraRed (PIR) Fresnel Lenses

Polymer Optics (POL) are a leading supplier of PIR lenses. We offer design, tooling and moulding services, and we have over 20 years of experience in supplying these components. Our lenses are made from High Density Polyethene and can be supplied in many colour variants.

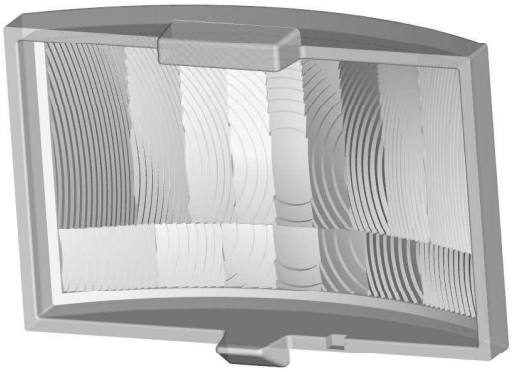
Our lenses are used for security, lighting and automation applications. Most of our lenses are custom designed for specific applications, but we also have a limited number of stock lenses. Our enigneers were involved in the early development of Polyethene Lenses, and pioneered the tooling techniques that were first used to create these lens arrays. We continue to refine our processes and we are now the first manufacturer to introduce free-form Fresnels.

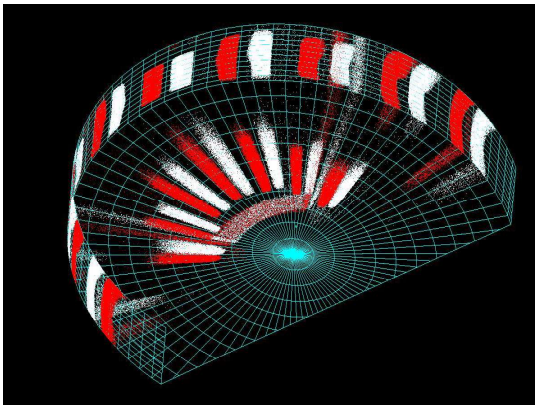
PIR Lens Design

Our engineers use CAD design packages and optical ray-tracing software. We have also written algorithms and macros that are specifically tailored to PIR lens design and analysis.

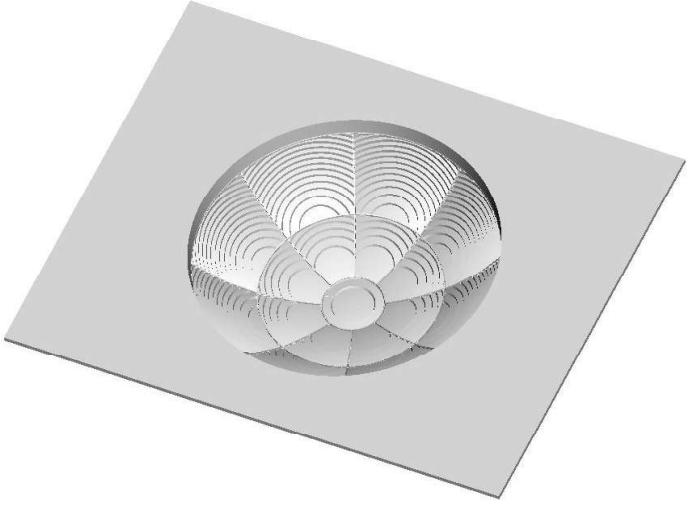


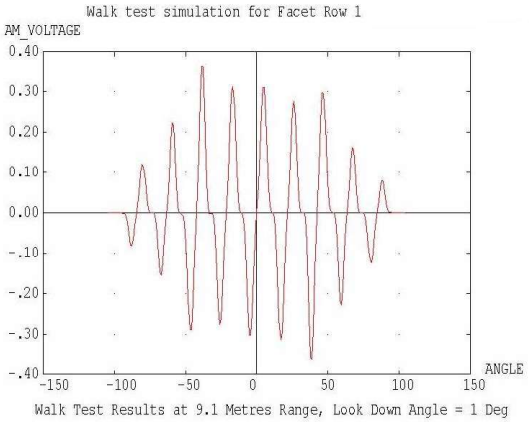
Theoretical zone pattern





Ray-traced zone plot simulation





Ray-traced signal plot simulation

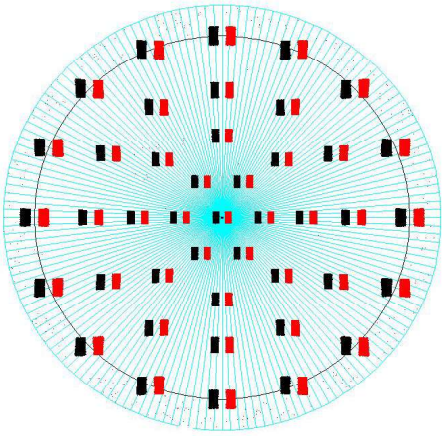
Free-Form PIR lenses

Traditional manufacturing methods for PIR lens arrays involve diamond turning and wire-eroding. Typically, the tooling lead-time is 10-12 weeks, and there is no opportunity to prototype the lenses prior to full tool manufacture.

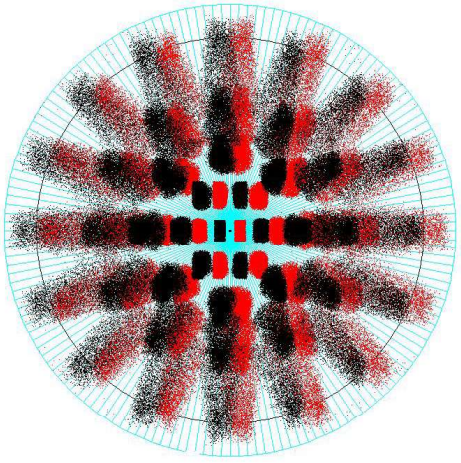
POL have now developed new patented techniques that allow us to use non-symmetrical free-form lens shapes. These new lens profiles give the opportunity to remove optical distortion and to produce flat lenses that have the same optical efficiency as their curved counterparts. The new manufacturing techniques also allow the tooling lead time to be significantly reduced.

Case Study

The dome shaped lens on the right has been designed for optimum performance. It utilises spherical Fresnel lenses, and the ray-traced zone plot shows that the lens produces sharply focused zones, with zero distortion and zero zone overlap.



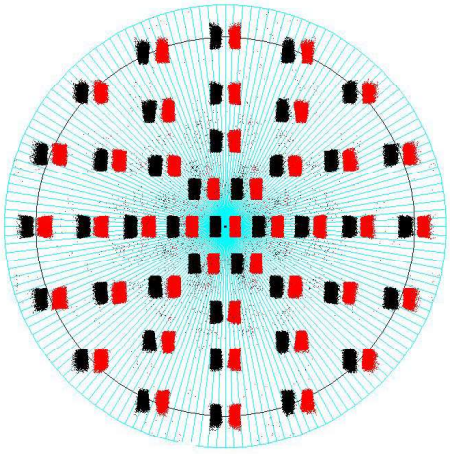
Suppose we were to design a similar lens with a flat profile. Traditional technology dictates that we use circularly symmetric Fresnel facets using diamond turning and wire-eroding tool construction methods. The ray-traced zone plot shows how the outer zones have become unacceptably distorted.



Now however we have developed the software to design Free-form fresnel lenses that give very low distortion. The free-form design on the right has been ray-traced and the plot shows that the zones are once again sharply focused, with very little distortion.

Of course this new design would be worthless if it was not possible to manufacture the new optical surfaces, but POL have developed new manufacturing techniques to machine the lens surfaces.

Additionally, we have the ability to produce fully working prototypes in less than two weeks.



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