

Challenge

Using a single light, detect both very large and very small chamfer edges on a part with highly textured surfaces. The difference between chamfer sizes was an order of magnitude (the larger was approximately 10X the size of the smaller).

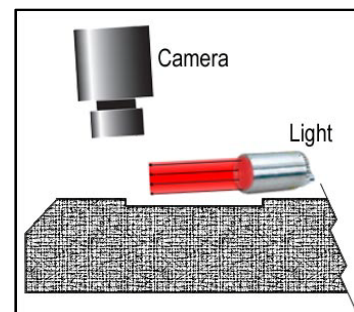
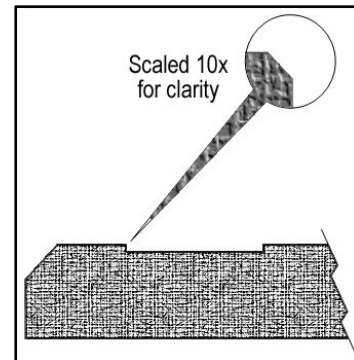
Solution

Collimated lighting (see the [IBF Series](#)) produced excellent high contrast images of both the small and large chamfer edges. While conventional wisdom might indicate that dark field lighting using a standard bar or area light would highlight the features of interest, the bottom edge of the very small chamfer could not be reliably detected using a typical area array.

Working Conditions

The working conditions of the application were:

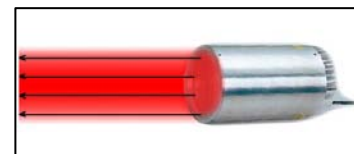
- The *small* chamfer was an order of magnitude smaller than the *large* chamfer
- Part surfaces were textured and not particularly reflective
- The relationship between the camera and part was fixed



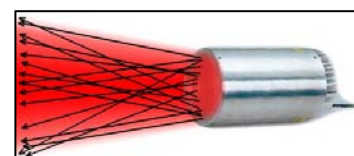
Why It Works

A collimated light's rays are nearly parallel and strike a surface evenly. This enables inspection of fine or shallow features by eliminating divergent light rays which "soften" contrast along the edges.

The edges that were difficult to detect using a light source that radiated outward (diverging rays) came into sharp contrast with collimated light. In this case, overall image quality was improved by simply reducing the effects of diverging light rays.



Nearly Parallel Rays of Collimated Light



Diverging Rays of Non-Collimated Light