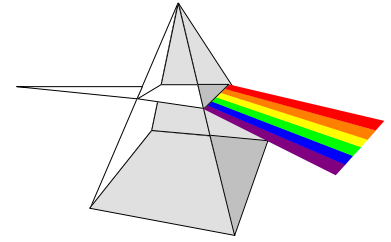




**Illumination  
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## **APPLICATION NOTE: 203**

**A**pplication: Gear Inspection - Presence/Absence of Timing Index Hole and Painted Indicator Marks with respect to Keyway Slot.

**P**roblems:

- 1) Glints from Specular Reflections at Gear Surface
- 2) Poor Contrast of shallow Timing Index Hole
- 3) Poor Contrast of Painted Indicator Marks



CABI at 3200K



DRI at 4200K

### **S**olution:

A simple fiberoptic ringlight, even with polarizer/analyzer attachment, does not give sufficient glare reduction to reliably detect both the shallow index hole and the indicator marks. To make the inspection algorithm simple and robust, a uniformly flat intensity distribution was required on the surfaces of the gear.

Since the surfaces are basically flat and specular, the first choice would be a CABI based device which provides coaxial brightfield illumination structure. The results of this approach can be seen in the first image. The uniformity is excellent but the contrast of the index hole is poor. This is a direct result of the coaxial brightfield structure. The color contrast of the pink paint dots is poor because of the high red content of the Tungsten Halogen lamp (3200K).

To solve this problem, a fiberoptic DRI system was employed. The DRI provides the structure required to ensure good uniformity and create good contrast of the hole. Utilizing a 4200K color temperature lamp significantly increased the contrast ratio of the paint spots. Because of the strong nature of the illumination solution, this application could be solved by a monochrome vision system. However, a color vision system was chosen to facilitate the potential changes in paint color and hue in the future.

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