

## Applications & Solutions

### Close Fitting Inner Diameter (ID) Inspection



When a borescope is being used to inspect the inside wall of a bore the following considerations are important.

If a view directly at the wall is desired, and the scope is a close fit in the bore, the focus and illumination must be optimized for this condition. A direction of view between  $110^\circ$  and  $70^\circ$  can be used depending on the condition of the wall. The reason for choosing a direction will depend on what is trying to be seen, and the reflectivity of the wall.

#### Polished ID

Highly polished walls are very difficult to view. The polished surface reflects the light away so that almost no light gets reflected back into the scope. When looking at welds that have a flatter finish, the scope will be able to inspect the welded area, but the polished area will be difficult to inspect.

#### Mirror tubes

If intersecting passages are to be viewed, a mirror tube may be the best way to achieve the direction of view. A mirror tube is a close fitting tube that slips over the OD of the scope to position a mirror at the tip of the scope to reflect the image and illumination at  $90^\circ$ . While mirror tubes are very susceptible to dirt, they offer a coaxial lighting effect that helps to view deeply into a passage at right angles to the scope axis.

#### Illumination types for side viewing

Two common types of illumination can be specified in a side viewing scope. The most common is the double prism design in which a prism is used to direct the image and a second prism is used to direct the illumination. The illumination prism is at the tip of the scope while the image prism is adjacent and away from the tip. This can cause problems if the scope must view under an object, or the tip touches the end of a passage before the viewing prism reaches the target. A mirror tube can be used in this case, or reverse illumination (see below) can be used.

Reverse illumination describes a scope in which the positions of the image and illumination positions are reversed. This is only recommended for close focus applications. Reverse illumination allows the use of a prism for directing the image so that the problem of a mirror surface becoming contaminated is eliminated. This is accomplished by having the illumination fiber exit the outer tube before it reaches the tip.

#### Straight view

A straight ahead, or  $0^\circ$  direction of view can also be used to view the walls of a close fitting bore. Sometimes a very wide field of view is used to optimize the view of the wall and minimize the view down the center of the bore. The  $0^\circ$  direction can be used to view the entire ID at once without needing to scan the wall as in the side viewing scopes described above.