

# Camera Port: A Primer on Design, Manufacture and Installation

## Introduction

A camera port or box is an optional design feature of a water well that provides access to the interior of the well at a depth below the pump bowls. With a camera port permanently attached to the exterior of the casing, a downhole camera can be lowered into the well to inspect the condition of the casing and screen without having to remove the pump bowls, pump column, and wellhead appurtenances. Periodic inspections of the well can be made at any time without having to discontinue pumping operations or incur the cost to pull and reinstall the pump. The camera port can also be used to lower a spinner tool into the well to conduct a flow meter survey while the pump is running.

The design, manufacture, and installation of a camera port require careful attention and proper analysis. This memorandum is intended to introduce the design concept, use, and utility of a camera port in sufficient detail to provide a primer on the subject. A detailed discussion of the design, manufacturing process, and construction methods of a camera port is beyond the scope of this technical memorandum.

## Downhole Logging Tools

**Video Cameras.** Water wells require periodic inspection to assess the condition of the well casing and screen. Most often, this accomplished by lowering a small diameter (e.g., 1.75 to 2-inch O.D.) camera into the well. There are various cameras available. The typical camera consists of a stainless steel housing, on-board light source, and color video camera with the ability to scan sideways in a 360-degree panning view. The length of the camera varies with the model and can range from 2 to 8 feet. The camera is connected to a cable that is attached to a truck-mounted winch. A viewing monitor located in the service truck or van provides real-time video that is recorded for playback.

**Flowmeters.** The spinner flowmeter is a tool that is lowered into the well to record the flow of water into the well through the well screen. Flowmeter tools are comparable in diameter to video cameras and are about 4 to 5 feet in length. The tool records the revolutions of an internal impeller and then transmits electronic data back to a receiver in the service truck or van through a winch-mounted cable. Digitized data are formatted and printed out to show the movement of water into the well at various depths within the screened sections.

## Camera Port Description

The Roscoe Moss Company (RMC) has designed and manufactures on request a camera port and camera tube connection (Figure 1) that can be attached to mild steel, copper-bearing steel, high-strength low-alloy steel, and stainless steel casing. Camera ports can be manufactured in various lengths and are compatible with the video cameras and flowmeters commonly used in the water well industry. The typical camera port consists of a 5 to 8-foot long slot that is cut into the blank casing and then shrouded within a welded steel enclosure (i.e., box) that has several stiffener rings welded to the sides of the box for added support and strength. The 4½-inch O.D. pipe, extending to ground level, is welded to the top of the

camera port. The camera port is manufactured as a modular section of well casing and is installed as a single component in the string of casing. The 4½-inch O.D. pipe is butt-welded together as the casing and screen are lowered into the hole.

### **Design Considerations**

Several important factors should be considered for each camera port to tailor the design for the proposed installation, as follows:

1. The diameter of the borehole and conductor casing should be based on the cross-sectional diameter of the well casing and camera port, and should be of adequate size to accommodate the free installation of other features such as the tremie pipe(s), sounding tube, and gravel feed pipe.
2. The camera port should be installed to an appropriate depth based on the estimated depth of the pump setting.
3. The dimensions of the camera port should be based on the estimated dimensions of the downhole survey tool(s) that are expected to be lowered through it.

### **Installation**

The camera port is delivered to the well site as pre-assembled, modular unit along with the other elements of blank casing and well screen that constitute the final well design. The modular section is manufactured with or without a welding collar, as requested. During construction, the camera port assembly is welded into place as though it were a standard piece of blank casing. Once the camera port section is welded to the string of casing and well screen, the first segment of 4½-inch O.D. pipe is connected to the top of the camera port. Then, as each successive segment of blank casing is installed “above” the camera port, additional 4½-inch O.D. pipe segments are attached until they extend up to ground level (with an appropriate stickup).

When the casing and well screen have been landed and are in place, the gravel pack and grout (if used) can be placed in the annular space. If an annular grout seal is required, proper grouting technique is mandatory because camera port construction reduces the casing collapse characteristics.

### **Summary**

The capability of being able to inspect the downhole condition of an active well without having to pull the pump and pump column is extremely useful. The addition of a camera port to a well design allows the well owner or operator to conduct video surveys or flowmeter testing at any time to assess the production characteristics of a well, even on short notice if needed. The incremental cost increase to add a camera port is minimal and can be paid back quickly by saving the cost to remove and reinstall the pump and pump column to conduct such downhole testing. The cost-benefit of a camera port has prompted many water purveyors to include this assembly as a standard feature for all new wells.

### **References**

*Handbook of Ground Water Development*, 1990, Roscoe Moss Company, John Wiley and Sons, New York, NY