

# **ON THE TECHNICAL FEATURES OF THE ENDOSCOPE**

## **OES modelscope as a case in point**

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Olympus Industrial

The Olympus Optical Company of Japan was formed in 1919, with the introduction of the first generation single lens reflects camera, and soon after with the first microscope.

Since that time, the organisation has developed and is now split into three main divisions: manufacturing and supplying cameras, microscopes and endoscopes. Other smaller specialist divisions exist supplying such products as dictaphones.

Perhaps, rather surprisingly, the endoscope division is the largest part of the organisation. Through a worldwide organisation of four main business centres, Olympus Industrial, the name given to the industrial endoscope division, provides service and support to its customers. Each of the main business centres operates through agents and distributors.

There are many different industries which gain the benefits of saved time and money provided by using endoscopes.

To meet the needs of so many varied industries, there is a need to have a wide range of equipment. This includes light sources, to provide illumination, rigid borescopes, flexible fiberscopes, if views around corners are needed, and the new technology videoscopes. These instruments use the latest CCD technology with a small chip situated in the distal end of the scope, instead of fiberoptic image bundles used in fiberscopes.

Within the building industry field, there exists a wide range of specialist equipment purposely designed for the application. One such scope is called the "OES modelscope". OES stands for the Olympus Endoscopy

## FEATURES AND BENEFITS

### FEATURES

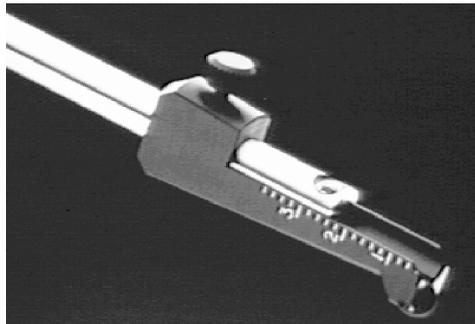
- Minimised-tip to objective lens distance.
- High quality optical image.
- Flat field Image.
- 80° Field of View.
- Variable height accessory.
- Wheel assembly on base of VHA.
- Variable focus.
- Large depth of focus 7mm to infinity
- Optically matched to CCTV adapters.
- Tripod mount.

### BENEFITS

- May be used on models up to 1:500 scale.
- Bright, clear, sharp views obtained.
- No distortion around edge of image.
- True human perspective view.
- Simulates different eye level perspective views of product.
- Easy, smooth movement of modelscope through model.
- Accomodates operator eyesight and relieves eye strain during prolonged periods of viewing.
- Excellent photographic and CCTV pictures.
- Ensures high image quality on monitor.
- For ease and secure attachment to tripod, articulated arm and other clamping systems.

*Figure 1  
The overall specification  
of the OES modelscope.*

*Figure 2  
Endoscope head.*



System and represents a modular system of scopes and accessories launched in 1988, to replace the previous generation of instruments.

Undoubtedly, the most important part of an endoscope is the lens system. The image seen by eye, or on a photograph, depends on the quality of the image collected by the "field lens" or "prism" and is transmitted by a series of relay lenses to the eye piece. Some of the criteria optical designers must consider when designing a new scope are:

- colour
- barrel distortion
- field flatness
- brightness
- size of image
- focusing
- ocular magnification.

Many different types of lenses are used, each type having individual advantages and features. The OES modelscope uses a hybrid lens system. The main advantages are fewer glass/air boundaries, which means the image is improved. In a scope with light guide fibres, the smaller diameter lens system allows room for more fibres, giving a brighter image. The disadvantage is higher cost, however, the disadvantages for other types of lenses including rod lens and thin lenses are increased rigidity and higher cost. Therefore this is why the hybrid lens system is used.

Of significant importance for the modelscope image, however, is the "aspheric bubble" lens at the tip of the scope. Despite having a wide field of view of 80° there is no curvature or optical distortion.

The overall specification of the OES modelscope is presented in figure 1. Two features need to be specifically mentioned; firstly, the height adjuster and secondly the fact that the scope is optically matched to CCTV. The height adjuster provides realistic prospective views on models down to 1/500 scale, and the wheel allows movement easily through models as if walking or driving a car.

As more people use close circuit television these

*Figure 2*  
*Videosystem*



days, the fact that the scope was optically matched, was seen to be very important to maximise the type of view seen on the TV screen.

Standard borescopes and fiberscopes differ in various ways from the modelscope. The main difference is the fact that they have a light guide bundle within the instrument, to carry light from a cold light source through the scope and into the object under inspection. The other main difference is that fiberscopes, being flexible, do not carry their images through a system of lenses, but instead through a coherent fibre bundle. Additionally the end of the scope will articulate to allow views to be seen around corners.

Applications within the building industry, which benefit from standard borescopes and fiberscopes are: air conditioning duct, ancient monuments, beam ends, box girderbridges, bridgebearings, cavity walls, dampcourse, floor voids, joists, roads, sash windows, sewers, tie bars and water mains. Therefore, from initial concepts of new buildings, to the renovations of old, endoscopes are an essential aid no one should be without.