6.1 INTRODUCTION

The inspection of industrial and other types of machinery as an element of maintenance activity is, as outlined in many of the chapters contained in this book, heavily dependent on our visual sense. As human beings we have five senses, which arguably we use not only in everyday life, but also in the specific case of the condition monitoring of machines. We may do this quite unconsciously, as for example when we drive a car. Most experienced drivers do not consciously think about monitoring their vehicle as they are driving it, yet at the first sign of trouble our senses alert us to the fact that something is wrong. Any out of the ordinary noise is picked up by our sense of hearing, undue vibration by our sense of touch, fumes by our senses of smell, taste and vision etc. So although we are not consciously aware of it when driving, we act as a fully integrated condition monitoring system for the vehicle.

When you think about it, this is not that unusual. After all, any vehicle or other type of machine we use in everyday life or industry is a human concept, created by us for our use. Thus you would expect the monitoring and control systems to be designed for, and attuned to, our physiology. In the case of a car, this is evinced by the instrument panel, which is designed for rapid interpretation by our sense of sight. Just a glance reassures us that all is OK. The fact that this is less so in other forms of human transport, not designed by ourselves, is fairly obvious. For example, although we can tame and control a horse for riding, in the case of an average person, our senses are arguably less efficient in diagnosing
the horse's well-being compared to that of our car. A horse does not of course have an instrument panel!

In either case, however, our sense of sight for both monitoring and control is paramount, with the same being true of industrial machinery. Vision in human beings should therefore be recognized as our prime sense and may be defined as:

A sense of perception, within a defined range of the electromagnetic spectrum, which permits humankind to perceive, monitor, operate within, and control a portion of its environment.

The final few words of this definition contain the rub. For although sight is unbelievably important to us as individuals, so that we may operate efficiently within our world, in terms of range and flexibility, it has its disadvantages.

Two of these limitations, which are important from the point of view of monitoring, are of course our inability to:

- resolve objects at long or short ranges with sufficient definition for intelligent interpretation, and without some form of artificial assistance;
- perceive the complete electromagnetic spectrum, without some form of artificial assistance.

Fortunately, our curiosity, intelligence and manufacturing skill have allowed us to develop suitable instrumentation to overcome in large measure both these disabilities, thus permitting us to perceive our environment more completely. Indeed, it is this perception of the environment, or more specifically aspects of it pertaining to machinery well-being, which is the subject of this book. Although here we are mainly concerned with our sense of vision and the means by which we have enhanced nature's gift, it should be noted that the same argument can be made for all our other senses in respect of condition monitoring equipment.

Accordingly, in this chapter we will concern ourselves with the following aspects of commercially available condition monitoring equipment for visual inspection. These are:

The sensing and transforming of a physical feature or characteristic of the machine or equipment under surveillance, into a signal which can be visually interpreted, for clues, symptoms or a direct indication of the system's condition.

In addition, an outline is given in respect of the possible future for visual inspection, in terms of information acquisition, monitoring and display for maintenance.