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Health and safety in magnetic particle inspection

15.1 INTRODUCTION

Any human activity involves accounting for health and safety of both oneself and others. Many laws are set out and enforced to ensure that our actions do not damage our neighbours, in the widest sense of that word, and ourselves. Every activity is covered by general considerations and those which are specific to the task in hand. There is also very great current public awareness of laws governing the safety of the environment, and these are discussed in Chapter 16.

The chemicals which are used in magnetic particle inspection do not present serious hazard and, generally, have been known and used for many years. Obviously, it is possible that some chemical which has been used widely and freely for decades may, through the ever more efficient monitoring of the actual and possible short and long-term effects, become known to have or be suspected of having unpleasant long-term effects.

Monitoring systems which cover chemicals which may or may not be used in industrial and domestic products have operated for a surprising number of years and the sinister effects of a number of chemicals over a long period are usually found efficiently. When a previously ‘non-hazardous’ chemical is found to carry some risk the prudent course of action is for that risk to be assessed thoroughly. The alternatives must be assessed: they may be of greater or different hazard, in which case they should be rejected or they may offer no known hazard, in which case substitution may be straightforward. Substitution may not be as simple as it may seem since the replacement chemical may not have been used industrially before. In this case the accumulated experience of long-term effects does not exist and a decision must be made whether to continue with the use of the existing chemical with proper labelling and management or to use a substitute of unknown long-term effect. The decision as to which route to take will, of course, take account of the type and level of hazard
which is discovered in the existing raw material. All chemicals must be treated with respect as all of them can in certain circumstances be hazardous. An example is oxygen. The air in the earth's atmosphere contains 20% oxygen and without it we and most of the living things on earth would die. If this proportion of oxygen were increased to around 50% of the atmosphere this life-supporting gas would kill us and probably all other living things on the planet. It is extremely important that the use and management of chemicals is decided on a positive basis which accounts for the data available at the time. Decisions must be reviewed regularly to take account of new information.

The control and labelling of chemical products and the control of their use in the workplace are covered by regulations which have legal force in most countries. Such regulations are publicly available and are under continuous review; it is always advisable to check that the current edition is in use before any decision is taken.

Regulations exist for the control of equipment also. Electricity is used in most applications of magnetic particle inspection and the amperages delivered to workpieces appear alarmingly high; however, voltages are low. There is, too, the aspect that most magnetic particle inspection is by the wet method in many countries, with the term wet applying to either oil-based or water-based carrier fluids. The combination of either liquid and current electricity spells trouble in most minds; however, for more than 50 years the process has worked safely. Some standards require that the wet working part of magnetic particle inspection is physically separated from the electrical or electronic parts.

Some equipment involves clamping of components: the mechanism may be mechanical by some spring-loaded device, or it may be pneumatic. In either case operators must take care that their hands do not get trapped. It must be remembered too that some components which are tested by the process are heavy and if they are handled inadequately they become a hazard themselves with great potential for harm should they fall on someone; even a 15 kg (30 lb) shaft falling on to the back of a hand from 15 cm (6 inches) will cause at least severe discomfort and probably some broken bones.

Intervention in the internal electrical and electronic components of a magnetic particle inspection unit by anyone other than qualified and approved people must be forbidden. Similarly, interference with any automatic equipment by unqualified personnel must be prevented.

15.2 CHEMICAL ASPECTS OF HEALTH AND SAFETY

The chemicals involved in the application of magnetic particle inspection include: