Pearson BTEC Levels 4 Higher Nationals in Engineering (RQF)

Unit 29: Electro, Pneumatic and Hydraulic Systems

Unit Workbook 4

in a series of 4 for this unit

Learning Outcome 4

Maintenance of Pneumatic and Hydraulic Systems

INTRODUCTION

LO4 Investigate the maintenance of pneumatic and hydraulic systems

Efficiency of systems:

Efficient maintenance: accurate records and procedures to ensure efficiency

Functional inspection, modern techniques to limit production problems, quality control

Testing, efficient procedures to enable component longevity, recommendations

Fault finding, diagnostic techniques, effects of malfunctions, rectification of faults

Contents

Safety, fault-finding and maintenance

Safety

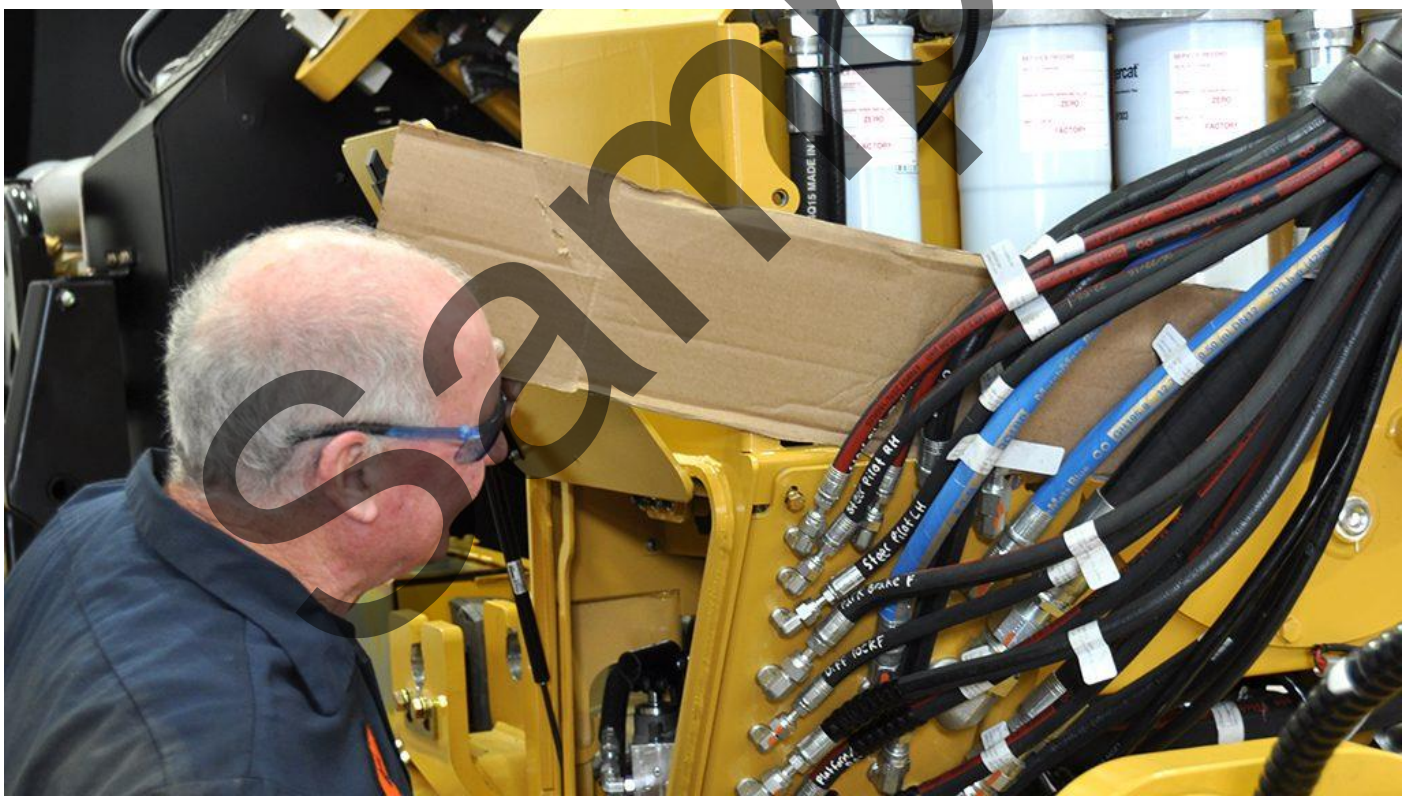
Electrical systems are generally recognised as being potentially lethal, and all organisations must, by law, have procedures for isolation of equipment, permits to work, safety notices and defined safe working practices. Hydraulic and pneumatic systems are no less dangerous; but tend to be approached in a far more carefree manner. High pressure air or oil released suddenly can reach an explosive velocity and can easily maim, blind or kill.

Unexpected movement of components such as cylinders can trap and crush limbs. Spilt hydraulic oil is very slippery, possibly leading to falls and injury. It follows that hydraulic and pneumatic systems should be treated with respect and maintained or repaired under well -defined procedures and safe working practices as rigorous as those applied to electrical equipment.

Some points of note are:

- Before doing anything, think of the implications of what you are about to do, and make sure anyone who could be affected knows of your intentions. Do not rush in, instead, think.
- Anything that can move with changes in pressure as a result of your actions should be mechanically secured or guarded. Particular care should be taken with suspended loads. Remember that fail open valves will turn on when the system is de-pressurised.
- Never disconnect pressurised lines or components. Isolate and lock-off relevant legs or de-pressurise the whole system (depending on the application). Apply safety notices to inhibit operation by other people. Ideally the pump or compressor should be isolated and locked off at its MCC. Ensure accumulators in a hydraulic system are fully blown down. Even then, make the first disconnection circumspectly.

- In hydraulic systems, make prior arrangements to catch oil spillage (from a pipe replacement, say). Have containers, rags and so on, ready and, as far as is possible, keep spillage off the floor. Clean up any spilt oil before leaving.
- Where there is any electrical interface to a pneumatic or hydraulic system (eg, solenoids, pressure switches, limit switches) the control circuits should be isolated, not only to remove the risk of electric shock, but also to reduce the possibility of fire or accidental initiation of some electrical control sequence. Again, think how things interact.
- After the work is completed, leave the area tidy and clean. Ensure people know that things are about to move again. Check there is no one in dangerous areas and sign-off all applied electrical, pneumatic or hydraulic isolation permits to work. Check for leaks and correct operation.
- Many components contain springs under pressure. If released in an uncontrolled manner these can fly out at high speed, causing severe injury. Springs should be released with care. In many cases manufacturers supply special tools to contain the spring and allow gradual and safe decompression.



Most hydraulic or pneumatic faults are caused by dirt. Very small particles nick seals, abrade surfaces, block orifices and cause valve spools to jam. In hydraulic and pneumatic systems cleanliness is next to