

Operating Heritage Machinery – Heritage Engineering Network

A Fatality in 2018 raised the need to review accepted current practices on historic machinery. This follows presentations to Network meeting over the past year where the key learning points were impressed upon those attending.

Background

An early 20th Century gas oil engine had been mounted on a plinth to drive a machine via a flat belt through an intervening wall. The visitors would see the engine being started and run from the stable door to the room housing the engine whilst a member of staff needed to stand beside the engine, carry out pre-start checks and then swing the engine over whilst the decompression lever was operated. This was seen as standard practice, risk assessed and an operating procedure written and approved stating that only competent persons could undertake the task, with a second person present. Importantly part of the competency assessment was awareness of the hazards present and knowledge of how to prevent them causing harm.

The engine start comprised a large handle which slipped on the end of the flywheel shaft and a pawl engaged the key-way slot. The controls for de-loading the engine and fuel supply were to the side of the flywheel and the engine was cranked over, caught and at that time it appears that the operator jacket was snagged pulling him into contact with the flywheel from which he received fatal head injuries. The second person immediately moved to stop the engine but the reality is that by the time this was done the operator was lying on the floor adjacent with what proved fatal injuries.

The Lessons to be learnt.

When the legal investigation completes later this year, the model lots of people have been using to operate this kind of kit may in all likelihood no longer be considered “suitable”. That model is

- (a) to fence off the public and
- (b) to use operators (staff or volunteers) who are (demonstrably) trained and authorised.

The inquest found that the guarding of historic machinery appears to be inadequate and called upon the Health and Safety Executive to consider issuing specific guidance to owners and operators of such equipment. The HSE believes that the requirements of Provision and Use of Work Equipment regulations are adequate – applying to both historic and new equipment alike.

These Regulations, often abbreviated to PUWER, place duties on people and companies who own, operate or have control over work equipment. PUWER also places responsibilities on businesses and organisations whose employees use work equipment, whether owned by them or not.

PUWER requires that equipment provided for use at work is:

- suitable for the intended use
- safe for use, maintained in a safe condition and inspected to ensure it is correctly installed and does not subsequently deteriorate
- used only by people who have received adequate information, instruction and training
- accompanied by suitable health and safety measures, such as protective devices and controls. These will normally include emergency stop devices, adequate means of isolation from sources of energy, clearly visible markings and warning devices

Given this it behoves members to review their risk control systems and procedures. In this case where the immediate cause of the fatality was entanglement with the moving flywheel, changes (agreed with the investigating authority) were made in the engine house both to the engine itself – provision of a key-operated electric start/kill system and a couple of permanent guards on the crankshaft plus the installation of barriers which manage access of both the public and operators to the engine and the use of a single-key system for access and operations in the engine house. Interestingly, the whole cost of the modifications is relatively small – ca £3.5k.

Obviously application of such measures to physically isolate the operator from moving machinery will vary from installation to installation. The one in question (which was securely installed on its plinth in the engine house and was being run to sort out some minor leaks) used a big crank handle (as original), which obviously got the operators close to rotating parts at a critical point.

It's clear that we will all need to consider how we run our engines and machinery – after all, they are all “big or hot or heavy or dangerous or any combination of the above” and present a wide range of hazards that need appropriate controls to manage the level of risk appropriately.

Some other points which came out of the presentation and discussion, in no particular order and either explicit or implicit were:

1. Make sure your insurance is up to scratch – e.g. there's a barrister involved/retained by the museum – they don't come cheap

2. It was clear that the paperwork managing risk in volunteer activities was honestly thought to be “suitable” – a recently reviewed H&S policy and arrangements backed up with comprehensive risk assessments etc. and up-to-date evidence of training and authorisation, routine inspections etc. The key bit here is that “administrative risk controls” such as operating procedures, though essential, can never be as effective as “engineering controls” or physical isolation of operators from the hazards. People are people, after all, and you can tell them till you’re blue in the face, but they are still human. It’s also important at the risk assessment stage to say “should we be doing this activity at all”. Not doing it = zero risk of harm.. Answering “Yes” is quite acceptable, but it just (!) means that you have to consider the control measures you’re going to use to make the risk acceptable.
3. It was clearly important that a suitably competent “responsible person” was on hand to deal with the immediate incident, and that person was rapidly able to assemble a small crisis team.
4. The whole process of investigation is time and resource consuming over a period of several months. However the fundamental point is that we must all be seeking to reduce the potential for harm from our operations, just carrying on doing what we have done for years is not adequate it must be based upon recent, competent assessment of risk and applying the hierarchy of control.

For those unfamiliar with this term and what it means you can Google it but one of the best explanations currently available on the internet go to:

https://healthandsafety.curtin.edu.au/2011_Hierarchy_of_Controls.pdf

5. One thing which is likely to cause you grief in future is to say “Well we’ve always done it like this and never had any trouble.” The standards of earlier times are clearly no longer acceptable and unfortunately much of the equipment and machinery we restore and operate does not have operator safety ‘built in’ - now we have to justify that risk to the operator(s) and public is managed as low as reasonably practicable (ALARP). This key definition can be Googled or try <http://www.hse.gov.uk/risk/theory/alarp/ glance.htm>

We should add that the organisation involved had a better set of safety arrangements than some, indeed the testing of the engine following restoration was subject to a written test procedure signed off by a Director - who was a practical engineer for 35 years – which represents best practice and not necessarily common practice. Hence why it is believed this incident and the learning from it needs sharing as the bar is raised on managing risk arising from operating historic machinery and current best practice becomes the new common practice.

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Please note that nothing in this paper purports to be legal advice or a definitive report of the incident but is issued with the expectation that others will use the information and observations to reflect on their own practices and consider if they may need to make any changes to their risk management processes.

If any network member feels they would like an independent opinion on their risk assessments/control methods we hope to offer a peer review service so we need to know if you are willing to assist others with such a task or wish to have your approach reviewed by others. In both instances please contact the Network Co-ordinator. hen.coordinator@outlook.com