



Safety Alert Isolation of Plant for In Line Inspection

25th May 2011

ILI Inspection

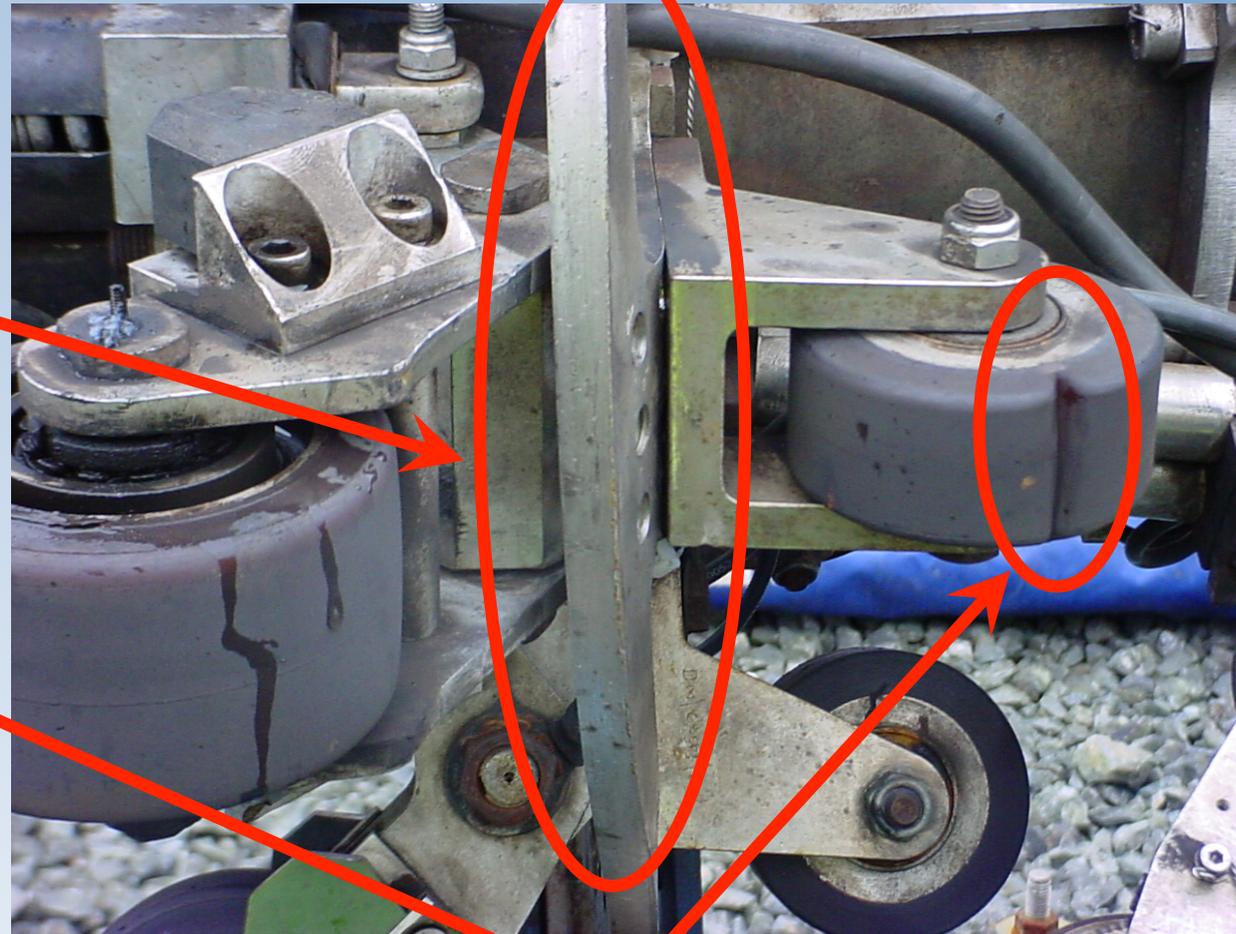


- **610mm pipeline to be inspected using Magnetic Flux Loss inspection tool**
- **Preparatory pigging carried out successfully**
- **MFL In line inspection tool launched then found to be trapped in pigrtap valve at launch site which was found to be 77% open**
- **On removal Inspection tool was slightly damaged**

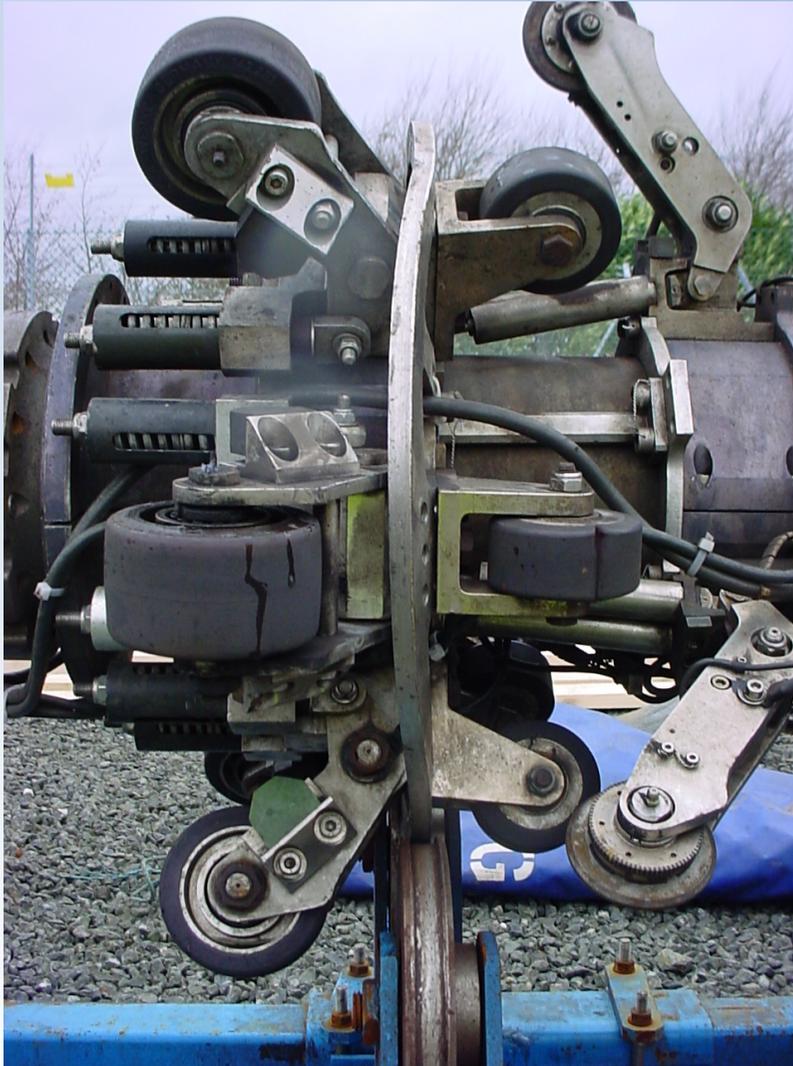
Tool Damage (2nd Module)

- Rear wheel support ring on module bent

- Wheel on this ring had pressure mark on tyre



Impact of Valve Problem



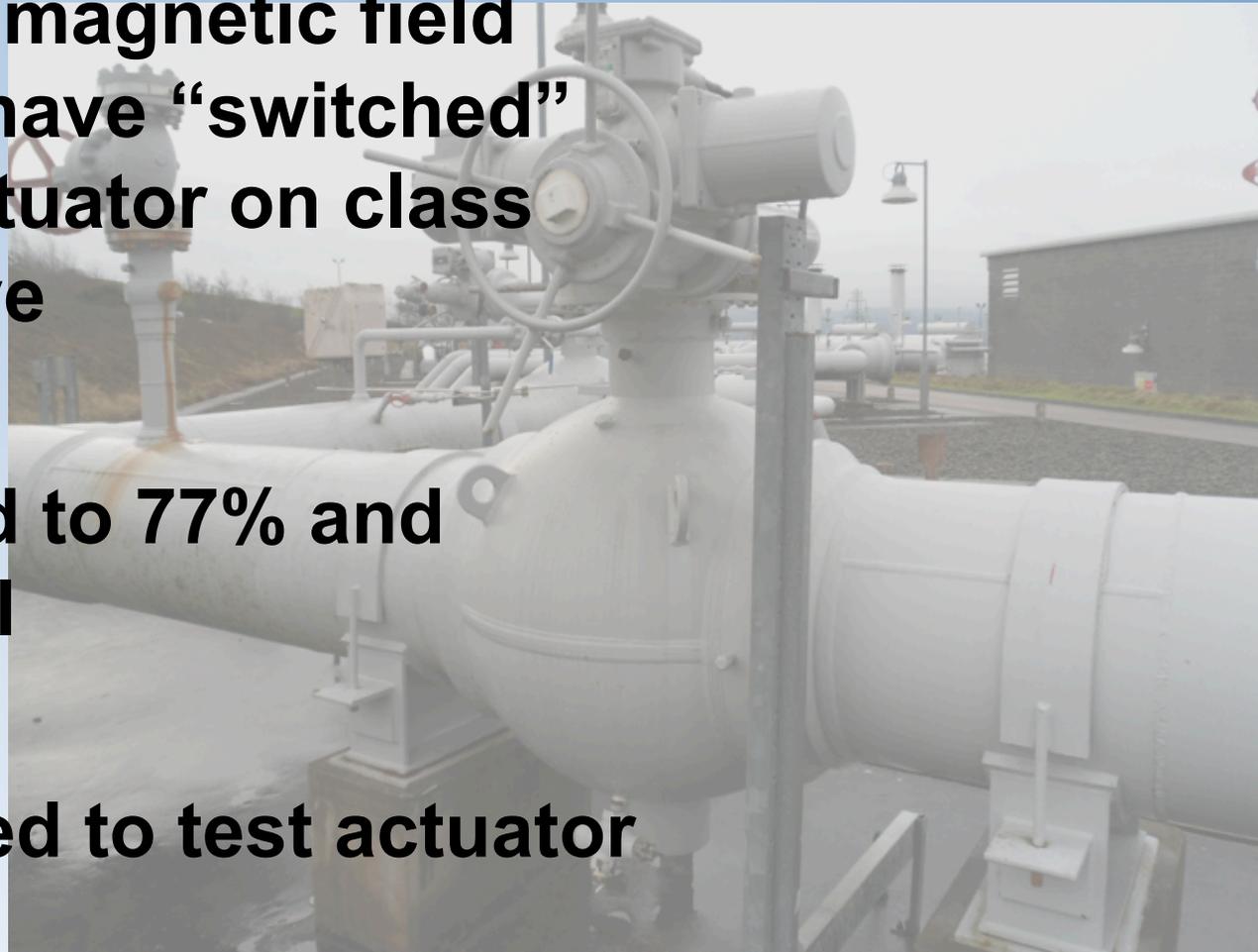
- **As a result of delay the tool battery ran out before end of run**
- **Damage not major but pipeline only partly inspected**
- **Inspection needs to be repeated for complete pipeline inspection data therefore financial impact**

Assessing the problem



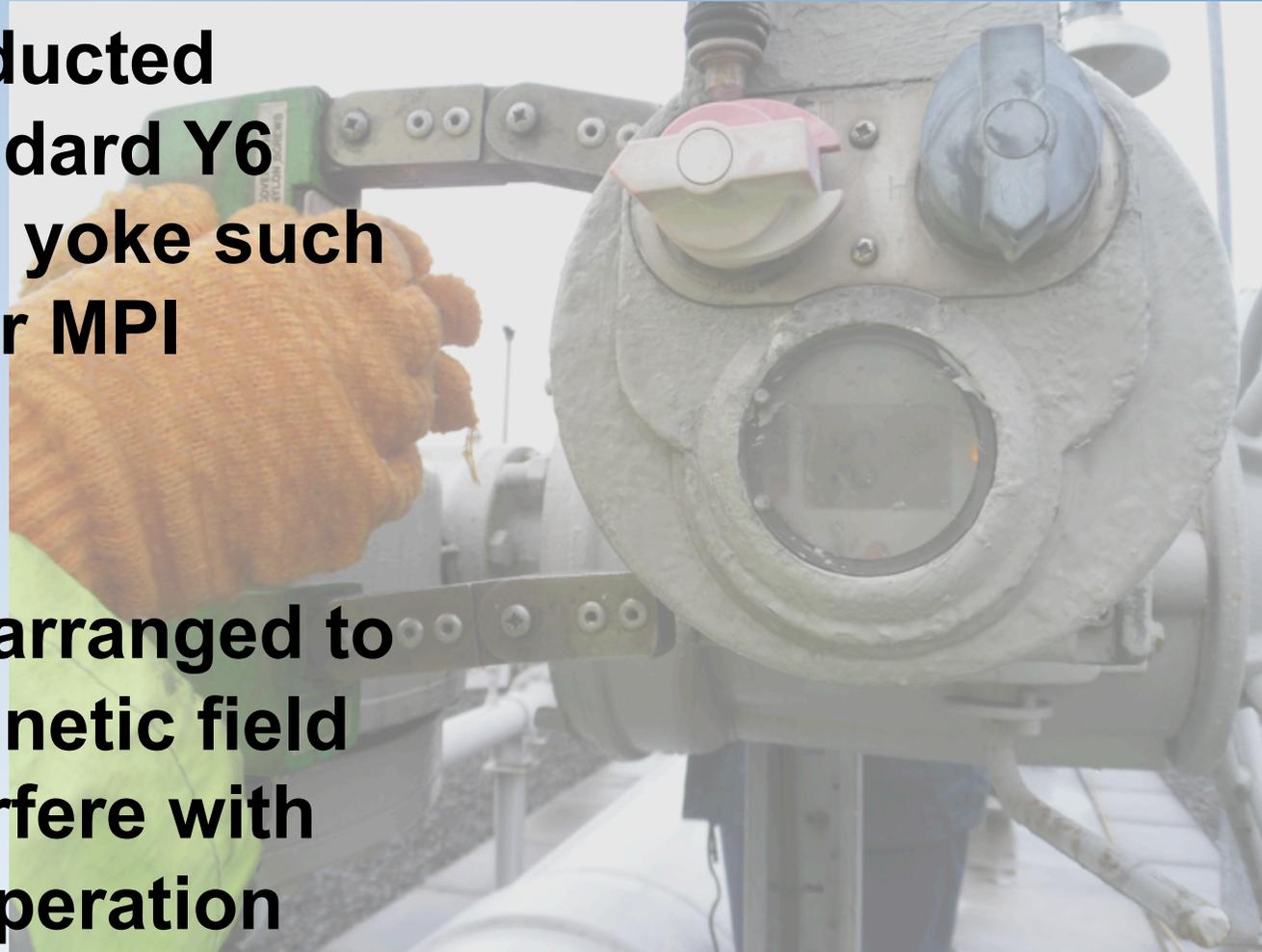
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- **MFL ILI tool magnetic field believed to have “switched” electrical actuator on class 600 ball valve**
- **Valve moved to 77% and arrested tool**
- **Trial arranged to test actuator and valve**



Site Trials

- **Tests conducted using standard Y6 inspection yoke such as used for MPI inspection**
- **Site trials arranged to test if magnetic field could interfere with actuator operation**



Site Trial Results



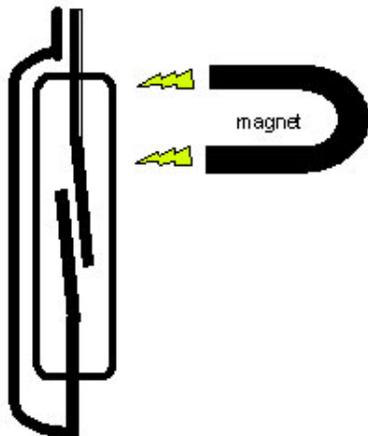
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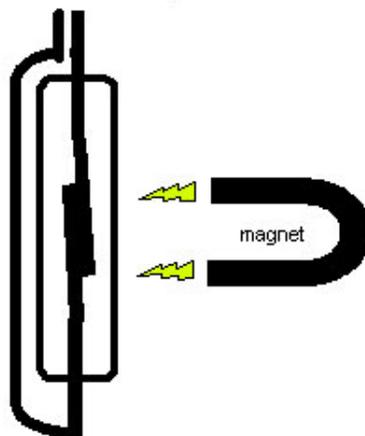
Reed Switches

- Reed (Magnetic) switches in actuator switch gear
- When switch is rotated bar magnet in knob passes over switch situated behind casing
- Reed switch is closed by magnetic field and actuator energised

reed switch in "open" position

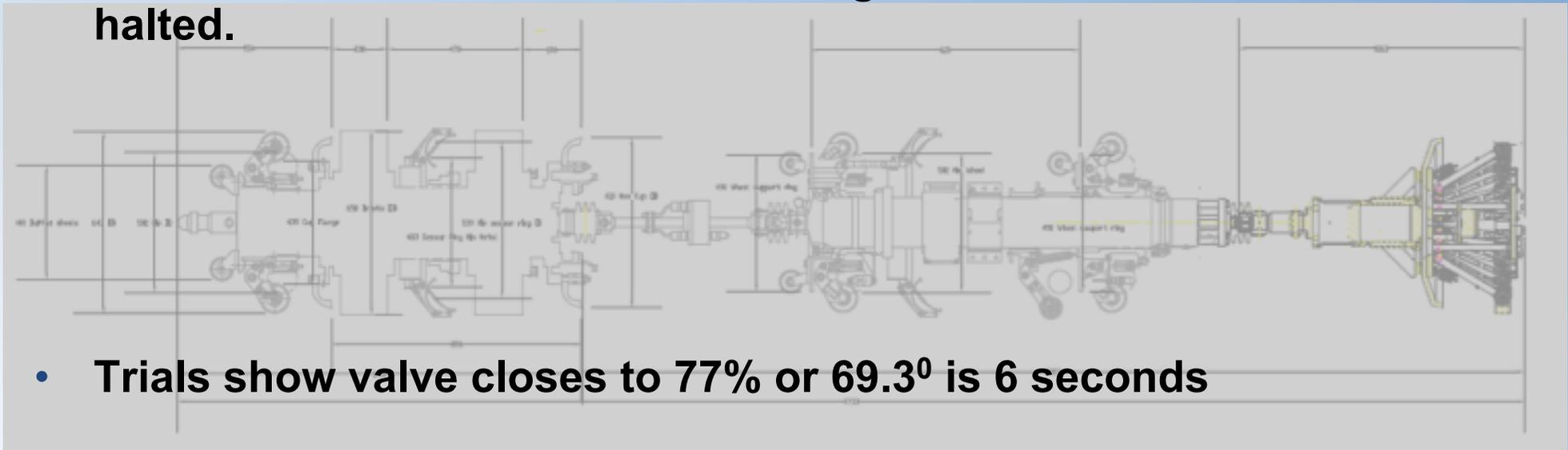


reed switch in "closed" position



Assessment After Trials

- The ILI tool had travelled 9.2 metres at a speed of 0.5 m/s
- Tool travelled about 2.5 metres though the ball valve then halted.



- Trials show valve closes to 77% or 69.3° in 6 seconds
- At 0.5 m/s tool would travel from a position where the magnets were in the valve to final position in 5 to 6 seconds

Assessment After Trials (2)



- **When valve is 77% open internal bore between ball and the pipe wall is 454mm (fully open it would be 584.6mm)**
- **Damaged mounting ring was 490mm diameter and could not have passed through the valve at 77% open**
- **A duplicate mounting ring of 490mm diameter is located 615mm in front of damaged mounting and passed without damage**
- **Front unit guide wheels have minimum dimension 502mm and would be damaged if they had passed 454mm**
- **This verifies valve was not at 77% open at commencement**

Actuator Standards



- **Actuator conforms with Electromagnetic Compatibility Directive (EMC) as per 89/336/EEC as amended by 92/31/EEC**
- **Manufacturers data states ensures ‘Immunity to emissions of electromagnetic energy’.**
- **Tested to standard for industrial equipment**
- **level of protection specified in standard but not 100% protection**

HSG 253 - Safe Isolation of Plant and Equipment



- **Provides guidance on safe isolation of plant to prevent loss of containment and ensure safety of personnel**
- **SGN standard T/PM/TR/17 is based on this.**
- **Designed to prevent loss of containment. need to ensure rigorously applied even during short isolation such as pig loading and during MPI works**
- **Must consider electromagnetic energy a risk.**
- **Note requirement to “positively secure”**
- **Does not directly apply to locking valves open during ILI but this is equally important as damage can result**

Safety Alert Issued



Safety & Engineering Bulletin SGN/SEB/628

In accordance with T/PM/TR/17 Section 3.2 “Security of Points of Isolation”, ensure that the following has been carried out and recorded in a Non Routine Procedure prior to work taking place:

Where an electrically actuated valve is used as the method of isolation, then the principle should be to switch/lock off the valve, followed by removal of motive power and finally testing for non operation.

A thumbnail image of the Safety & Engineering Bulletin SGN/SEB/628 document. The document is titled "Safety & Engineering Bulletin No. SGN/SEB/628" and is addressed to "Pipeline Asset Managers and Operational Staff". It features a prominent "SAFETY ALERT" heading in a red box. The subject is "Inadvertent operation of valve actuators by electromagnetic interference". Below the heading is a photograph of industrial valve actuators. The document includes a "Background" section describing an incident where a Rotork electric actuator moved a ball valve during an On Line Inspection run. It also includes a "Recommended Action" section detailing steps to prevent such incidents, such as switching/locking off the valve and testing for non-operation. The document is issued by Ross Armstrong, Eng Policy Manager, on 23 May 2011, and is Page 1 of 2.

Further Risks Identified



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- **Consider proximity of PIG loading vehicle during loading & unloading of PIG in relation to the electrically operated isolation valve, to reduce the risk of electro magnetic interference.**
- **Consider other sources of magnetic/electromagnetic interference (eg during MPI inspection of plant) and their potential consequences when carrying out all valve operations.**
- **Where an actuator and gearbox unit includes a mechanical device for selecting Actuator, Manual or Neutral (a clutch), then the Manual or Neutral position should always be selected and an appropriate locking device fitted.**
- **Where this method is used and power is not isolated to the actuator, then it should be proven by trial operation that the electrical switch will not move the valve (even if the actuator operates electrically).**