EPSC Human Performance Work Group:

Collection of Usefull Practises to avoid Human Errors

EPSC working group 2018 – 2020

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THE PROCESS SAFETY NETWORK

EPSC work group ‘Human Performance’

- Started March 2018
- Classification of human error types
- Example incidents from several companies
- **List of ‘Usefull Practices’, collected from several companies**

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Are Human Errors causes of incidents ?

- Historically ‘Human errors’ were seen as causes of incidents
- Today, ‘Human Errors’ **seen as consequences** of deeper ‘root causes’
- **Root causes** can be grounded in
  - the person,
  - the organisation of work,
  - the technical condition of plant and equipment
  - the design of plant and equipment
- Usefull practises to **avoid human error** should therefore target
  - the organisation of work
  - Automation
  - the technical condition of plant and equipment
  - the design of plant and equipment

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Example Incidents

- Participating companies shared typical Process Safety Incidents with human error background

- Statistics from several companies showed human error as the **most frequent cause** of Process Safety Incidents
  - Human & organisational error >> 50% of PSI
  - Asset Integrity, Design issues < 50% of PSI

- Several examples in CSB reports and videos
  - Explosion at Formosa Plastics, 2004
  - Link: https://www.csb.gov/videos/explosion-at-formosa-plastics-illinois/

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CSB video on human error

- Link to Video: https://www.youtube.com/watch?v=fjOfp_3GRb4

Classification of Human Errors

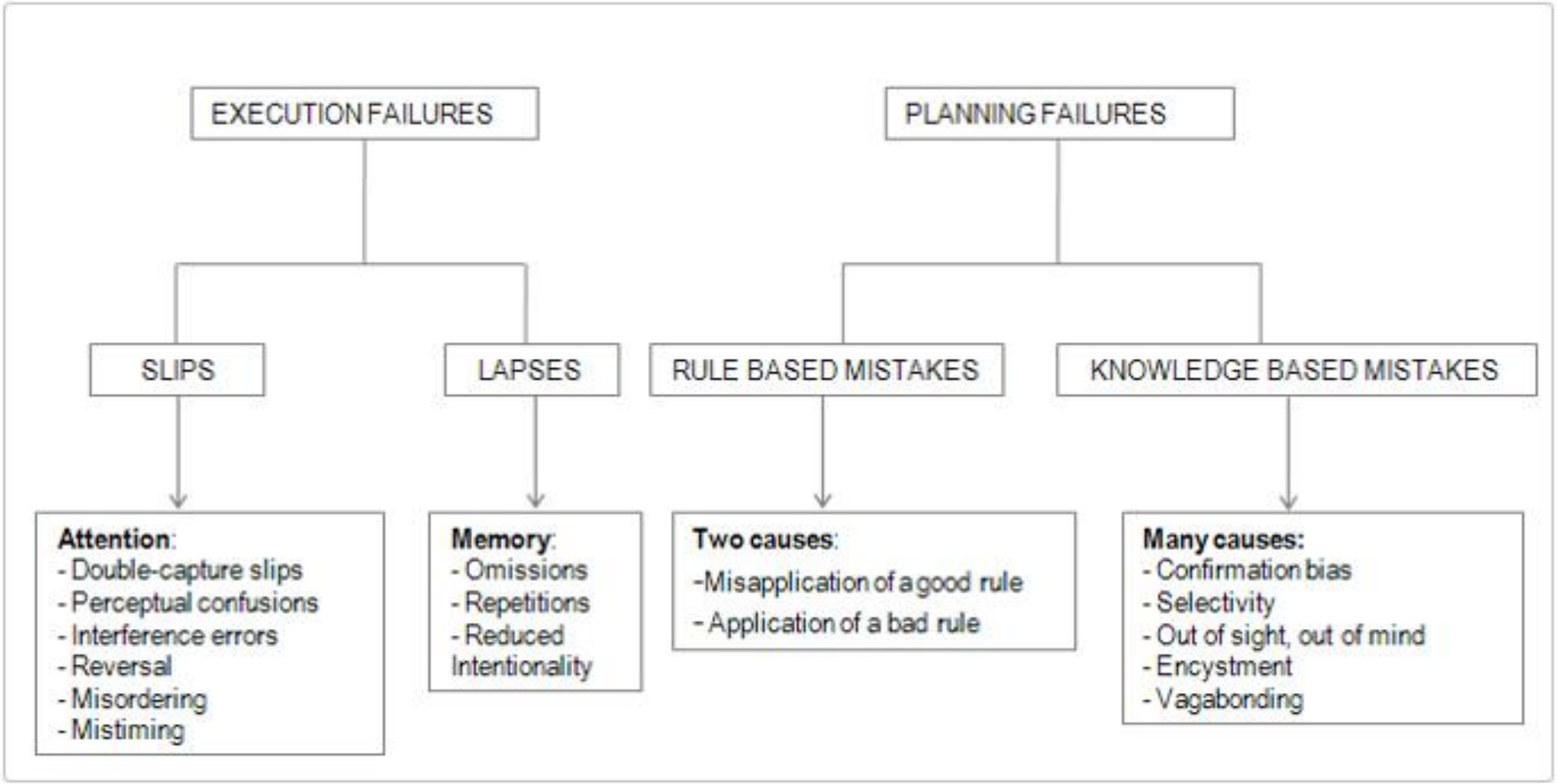

Figure 1: execution and planning failures adapted from Rasmussen

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Classification of Human Errors

- **Slips:** **Execution failure** **related to attention, perception**

  E.g. Pushing the wrong button, opening the wrong flange

- **Lapses:** **Execution failure** **related to memory**

  E.g. Forgetting a step in a checklist

- **Mistakes:** **Planning failure** **related to judgement, knowledge**

  E.g Making a wrong decision, based on limited information, opening the wrong flange

- **Violations:** **Intentional deviation** **related to circumstances, habits**

  E.g. Normalized deviation from procedures

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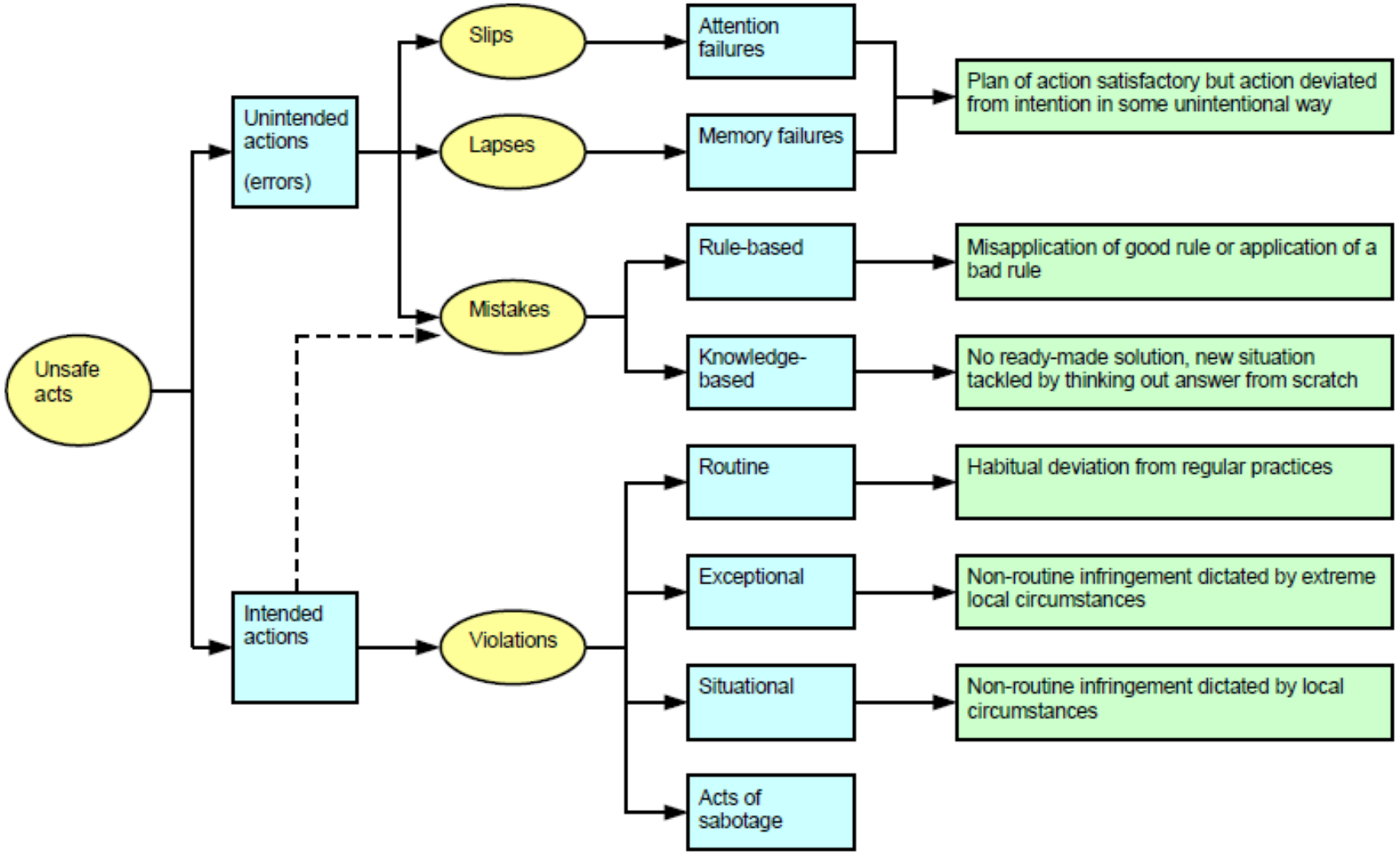
Classification of Human Errors (HSE, UK)



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Classification of Human Errors (simplified)

Unconscious, Unintended:
- → Slips
- → Lapses
- → Mistakes

→ Training, Competency
Safer design, Automation

→ **Usefull Practises**

Conscious, Intended:
- → Violations

→ Leadership

In hindsight, most such incidents are easily understood and apparently easy to avoid

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Useful Practises, sorted by Type of Incident or Equipment

- Valve position
- Flange leak
- Avoiding overfills
- Avoiding breaking off small nozzles
- Wrong equipment (opened)
- Avoiding equipments which invite human error
- Wrong material or chemical
- Hose issues
- Plant isolation issues
- Interlock issues
- Loading, unloading
- Organisational practises
- Competency related

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Identify Valve Positions

Problem

Manual valve left in the wrong position after maintenance, start-up, cleaning, etc. can cause incidents

Solution

- Make it easier to spot a valve in wrong position.
  Colour code for manual valve handles, e.g. **green** for normally open and **red** for normally closed
- Tag numbers at manual valve that correspond to procedures and P&ID
- Add a label to the valve in case of a special operation that require a not normal position

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Colour coded and tagged valves (examples):

Normally Open: Green

Normally Closed: Red

Wrong Manual Valve

Valve position

Problem

Operation of the wrong manual valve due to lack of labelling in the field, leading to potential for loss of containment.
Original labels may have not existed or been painted over.

Solution

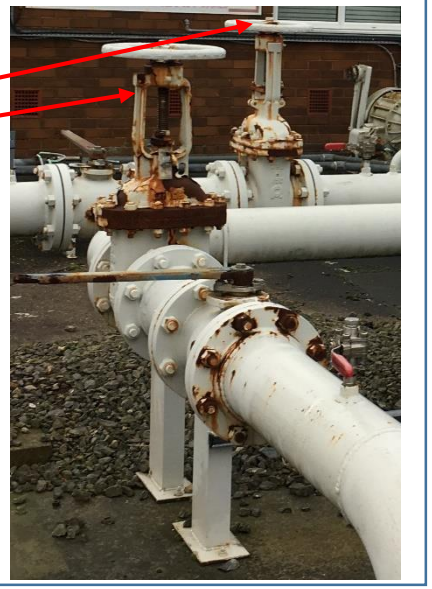
Tag manual valves with visible **labels**;

Use numbers from P&IDs.

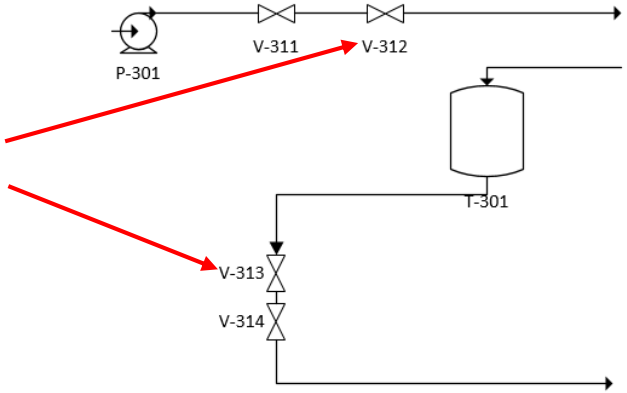
Walk the line, for safety-critical isolations to verify the valve numbers in the field.

Which is the correct valve to close ?

Nothing is labelled/ tagged in the field



Valves are in a similar location but on completely different systems



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Enforcing the right sequence of operation

Problem

A **deviation from the sequence of steps** can result in a hazardous situation.

Solution

Mechanical interlocks can enforce the right sequence of opening/closing valves or other steps. Unique keys are used to only allow the right equipment to be operated in the correct order.

The colour of the key in the cabinet in the control room shows the line-up in the field

Well known suppliers are: Netherlocks, Wermac, Castel lock, Alcatraz

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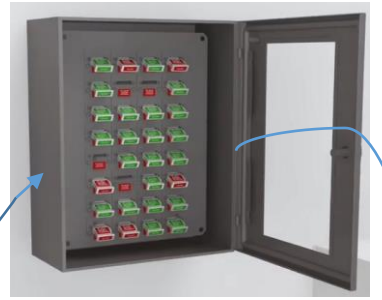
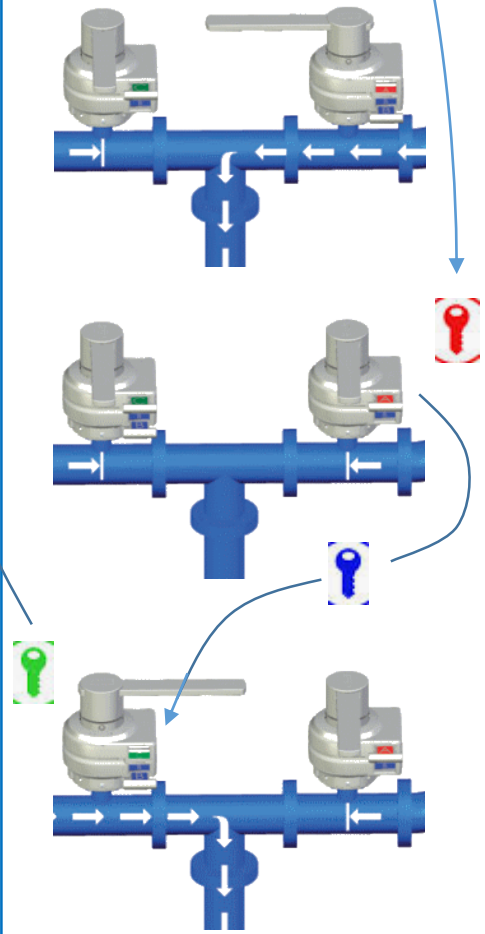
Valve position



Key cabinet in control room with unique keys



Switch over chemical:

Right valve is locked open. The blue key is trapped in the shaft. The left valve is locked closed.

Red key from key cabinet is inserted into the right interlock. Right valve can be closed and then the blue key is released. Valve is now locked closed.

Blue key is inserted in left interlock. Left valve can be opened. Then the **green key** is removed and placed in key cabinet. Valve is locked open.

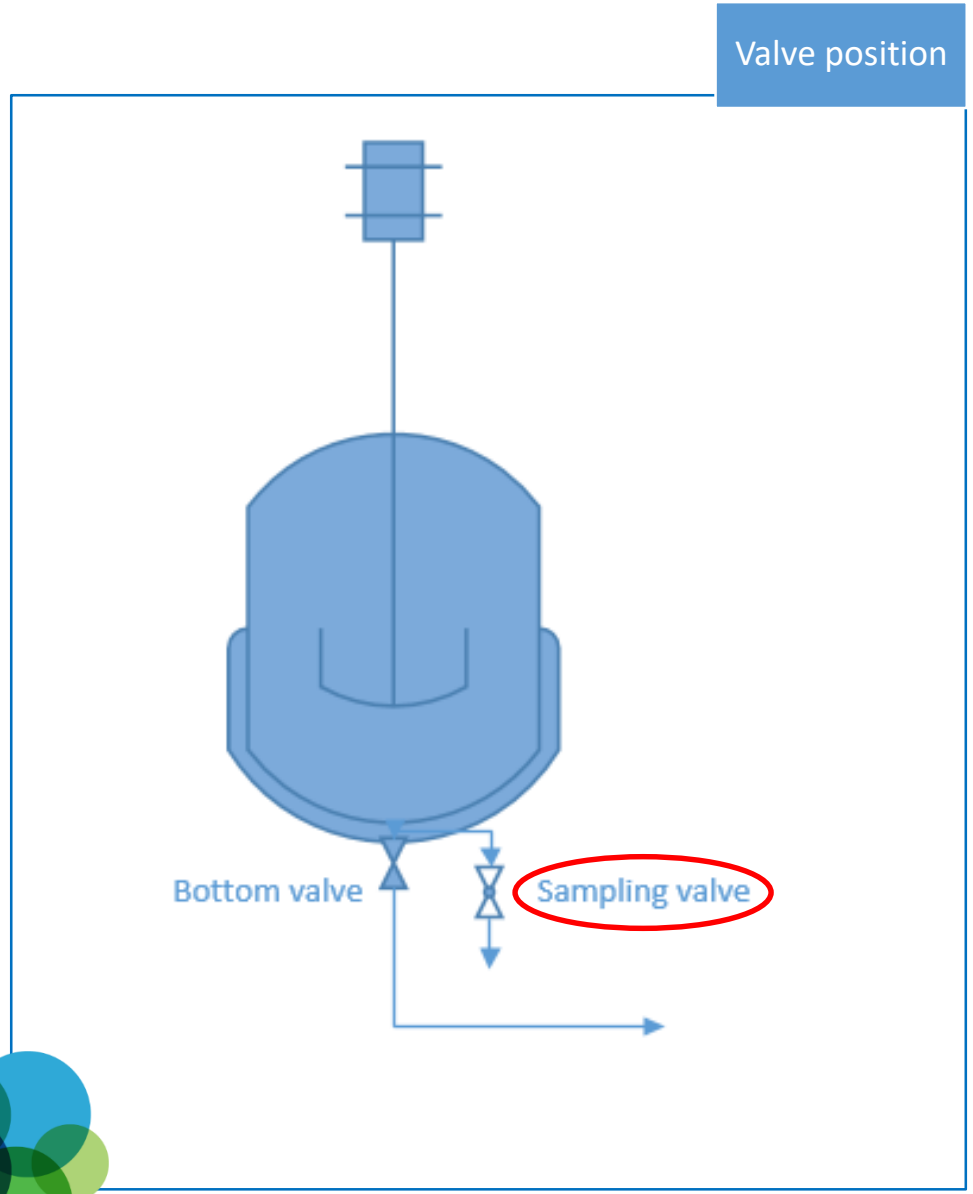
Four Eyes Principle

Problem

A reactor was cleaned before running the next batch. Cleaning step was not completed during the shift (note in shiftbook). **Two valves** (bottom and sampling valve) were left open. Operator on next shift passed by the reactor and **closed only bottom valve** but believed to have closed both. Next batch was started leading to a major spill to the production room floor and process sewer.

Solution

If a safety critical step can only be managed by organizational measures, the four eyes principle has to be applied. Hence double check (two independent persons e.g. operator and shift leader) whether valves are closed / in the right position, before starting a new batch.



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Sampling Design

Problem

Sampling valve being left open

Story

Improve the sampling method (for inline samples or reactor samples).

Solution:
Install a spring loaded valve.

For hazardous materials apply a closed sampling system

Spring loaded valve (dead man valve):

Closed sampling system:

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Fixing Critical Valve Position

Problem

Manual valves with handles are moved into the wrong position by accidental contact

Solution

Avoid handles that can be moved:

- install a valve with a fixing element, so it can not be moved accidentally
- remove the manual valve handle

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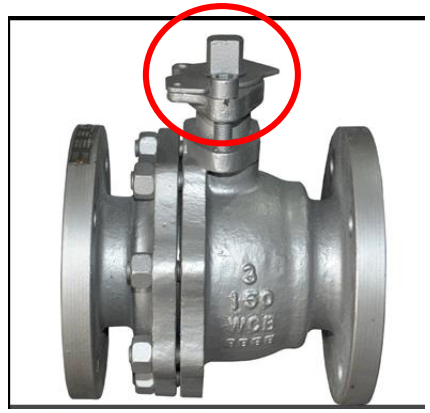
Valve with removed handle:



Valve with fixing element:

Unique Identification

Problem

Wrong manual valves in the field are manupilated by process operators or maintenance craftsmen

Solution

Unique identification of all components in the field and on P&ID.

In example **stainless steel ID** plates are used to prevent wear of inscription.
Example of unique ID: 030-CC02-HV25:

- 030: plant code
- CC02: main equipment code (centrifuge 02)
- HV25: handvalve 25

Valve position

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LOTO to assure valve position

Problem

Especially after repairs, turnarounds and washout or purging procedures, valves are left open, leading to the release of a chemical

Solution

Applying Lock-out /Tag-out (LOTO) system will help to ensure that no valves, openings or devices are left in the incorrect position

Sign-off each item on the LOTO checklist

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Lock-out /Tag-out cards (examples):

Mechanical locks (example):

Manual Valve position recorded by portable device

Problem

Manual valves in the field are in wrong position, e.g. causing release through a left open valve that should be closed.

How to ensure all valves are in correct position and how to record closing or opening ?

Solution

Operator records valve position with ex-proof **portable device**, which identifies the valve by the valve's NFC code (see yellow dot near valve on photo). No batteries needed. Manual valve position is shown on DCS screen.

Also available as fully automated version, where valve communicates its position by wireless FID signal directly. This requires a battery in the yellow button, which must be replaced once per year per valve.

On the portable device, operators can also get information on the desired position of the valve, depending on the situation in the plant (normal operation, vs e.g. lock out/tag out)

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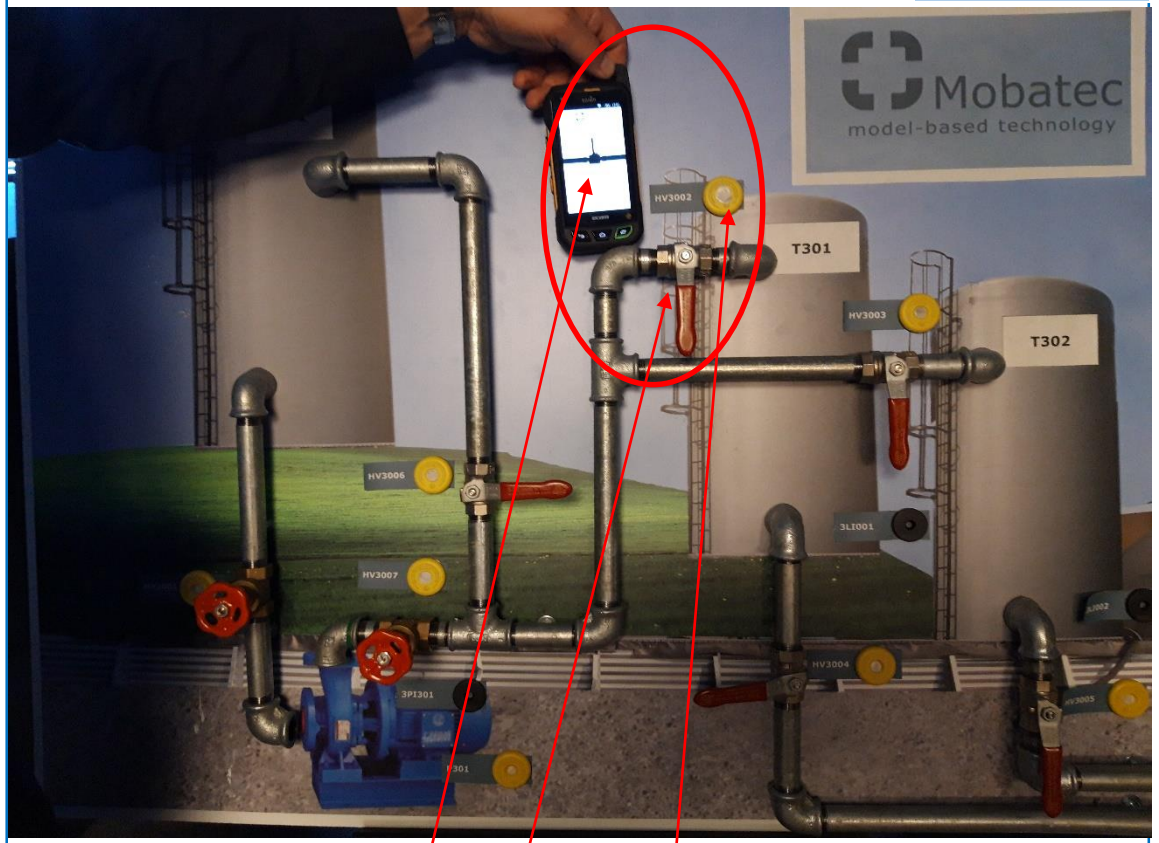
Valve position



Portable device for registration of valve open/close

Wireless FID contact point, Allowing the portable device To identify valve

Manual valve

Useful Practises, sorted by Type of Incident or Equipment

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- Competency related

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Flange 4 step Label

Flange

Topic (problem)

Flanges can leak if certain steps are forgotten or not well executed

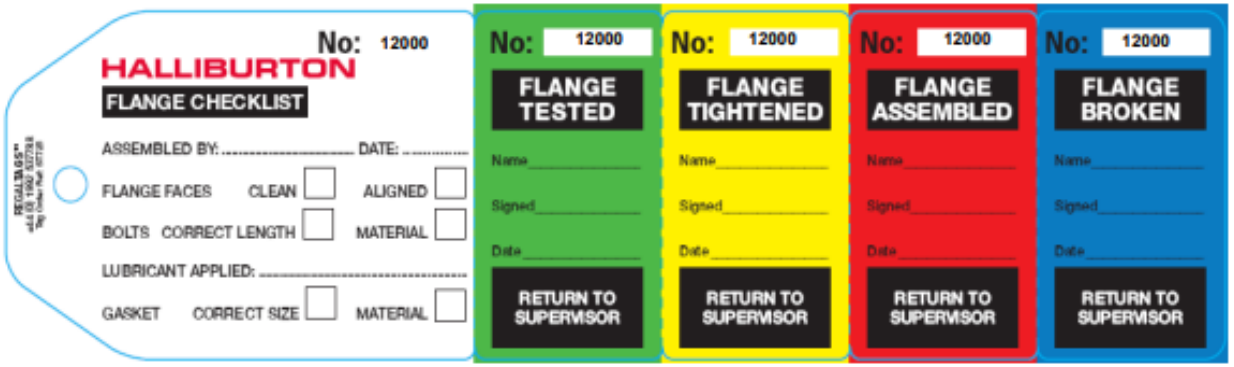
Story

Companies / Contractors use a 3 or **4 folded label** that indicates the critical steps on managing maintenance that involves flange. At each step a part of the label is removed and given back to foreman or to production

Solution: Use a label at flanges that need to be opened, so that the critical **steps can be validated, step by step**. The label is made of strong and water resistant material. Each part can be torn off, after completion and handed to production superision.

Flange stages: Broken, Assembled, Tightened, Tested

Four folded flange label, attached to flanges before opening. From outside: 1 Broken, 2 Assembled, 3 Tightened at set tension, 4 Leak test performed



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Personalization of Flanges

Flange

Problem

Leaking flanges because **bolts not tightened with the correct torque, or missing**;
or the flange seal face damaged,
or gaskets not suitable or incorrectly installed.

Story

Make the Craftsman, who assembles the flange, **'sign' his work**. Instil sense of responsibility for the correct installation.

Solution:
All flanges get seals or labels with a personal identifier for employee / contractor worker who assembles the flange, and for the person who ensures the tightness of the flange (seal quality). + technical information, e.g. type & material of gasket
Modern version: QR code

Flanges identified by lead seal system:

QR code identification:

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Gasket Display Board

Problem

Use of the **wrong gasket** types or material often leads to inadvertent chemical releases

Solution

Displaying clear plant specific gasket materials and types along with the descriptions and where to use.

Numbers help to validate

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Flange

Gasket board:

Tightness of large flanges

Flange

Problem

Large flanges leaking due to different torques on the bolts

Solution

Use of **bolts with force indicator** or use of **hydraulic torque tensioning tool** during flange assembly.

Tightness test with e.g. nitrogen, gradually increase the nitrogen pressure and perform check with an adequate leak detection substance (e.g. spray) or pressure hold test

Tightness check (examples):

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Leak test before start

Flange

Topic (problem)

Flanges can still leak after being opened and closed. Sometimes also related to a temperature change of the process

Solution:

Perform a leak tight test before allowing hazardous chemicals in a process installation.

Fill the process system with a less hazardous gas (nitrogen or air) and perform a hold test (keep pressure in time) or validate the absence of gas leakage using a spray at flanges and check for gas bubbles.

Helium can also be used to find gas leaks

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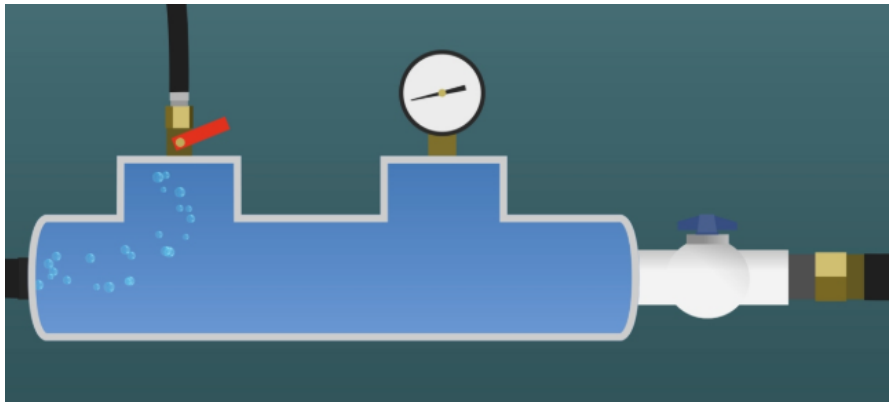
Pressure hold test:



Leak check using foam

Helium leak detector

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Technical overfill protection

Overfill

Problem

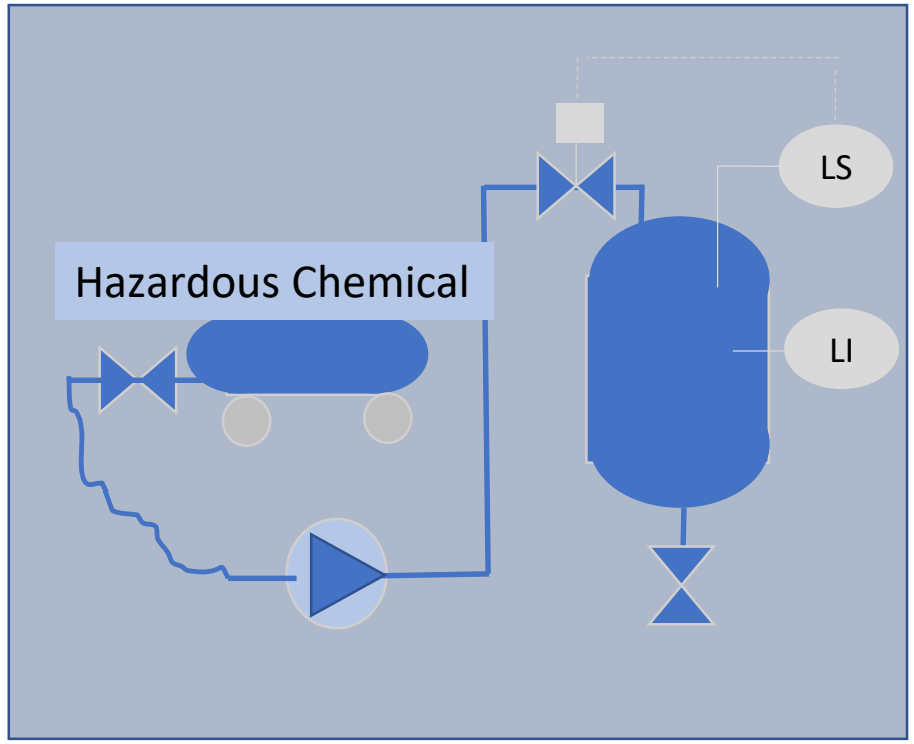
Overflowing tanks or vessels, when filling is manually controlled by operator, without overfill protection.

Hazardous materials handled in tanks without overfill interlock, relying on operator to stop filling at high level

Solution

Tanks with hazardous materials should **have level gauge and high level interlock**, which stops the feed on level high.

High level interlock in adequate reliability class.



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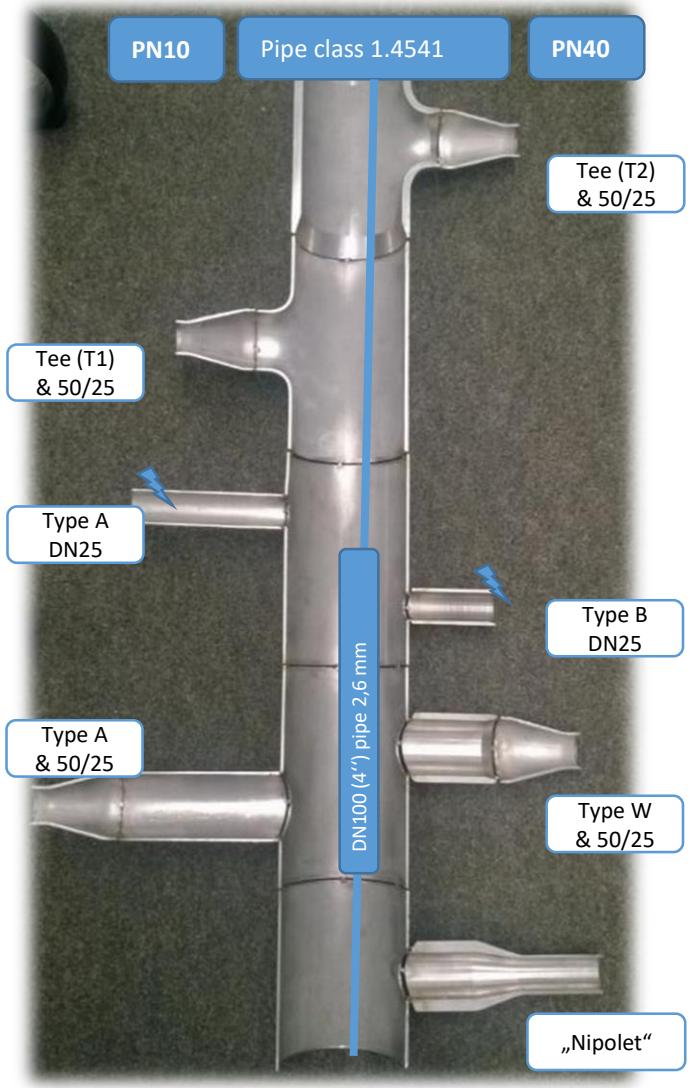
Small nozzles are vulnerable

Problem

Small nozzles on pipes and equipment are potential weak points of a pipe system. Vibrations create fatigue, and impact (stepping on them) can knock them off, leading to releases

Solution

Nozzles ≤ DN25 should be avoided. Use instead a forged T piece DN50 (50mm) with a 50/25 reducer, which increases stiffness and tolerates higher loads. With hazardous materials, also a thicker pipe than minimum requirement is recommended.
In case of potential for vehicle impact, unavoidable small nozzles should be protected by **ram protection** (steel bar etc)



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Avoid working on the wrong equipment

Problem

Many incidents in the industry have occurred because of **field work on the wrong equipment or pipe** such as:

- Working on pump A when pump B was locked out
- Line breaking on the line next to the one that was emptied and flushed

Solution

Instruct contractors and maintenance people **at the worksite** and point out the exact location just before starting the work

Add a **label to identify the exact work location** (pump or flange to be opened)

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Right Location

A&B pump Confusion is probable

Point out equipment in the field

Marker for Line Cutting

Problem

Cutting into the wrong pipe during technical changes, or maintenance work. Avoid consequences of a single human failure.

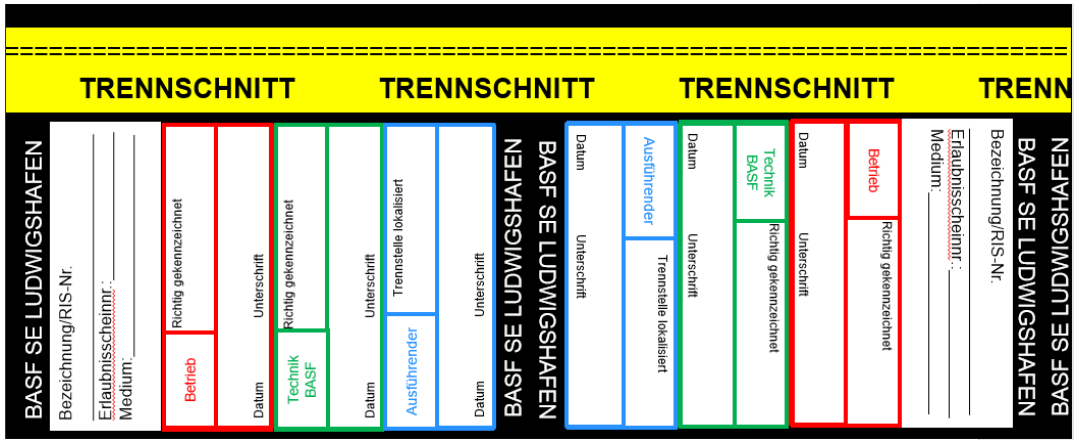
Solution

Before a line cutting task, a risk assessment is needed.
Critical pipe cut location to be marked with adhesive tape.
Note on the tape the work permit number, signature of plant supervisor, date of work.

Right Location

Clearly identified and marked pipeline

Example of an identification adheisve tape



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Avoid confusion of pipelines by indication of normal flow

Problem

Operator makes mistake during line follow up, and may close/open valve in the wrong line, or similar mistake

Solution

All streams are labeled indicating the chemical in the pipe:

- Use Color codes (follow agreed standards)
- Show CLP risk labels
- Indicate ‘normal flow’ direction

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Flow direction

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Removal of gearbox or actuator from valves

Problem

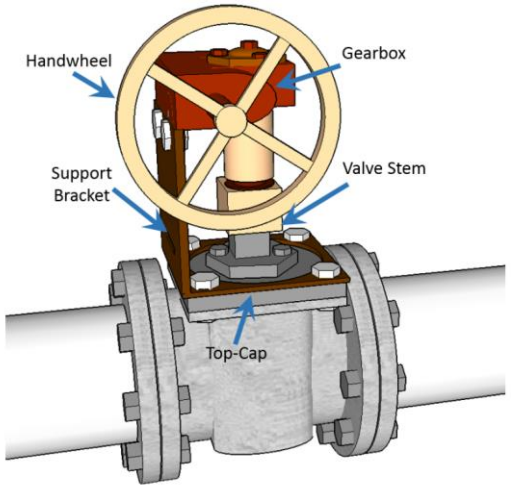
During removal of an inoperable gearbox on a plug valve, the operator mistakenly removed critical bolts securing the pressure-retaining component of the valve. The valve came apart and released the process fluid.

Solution

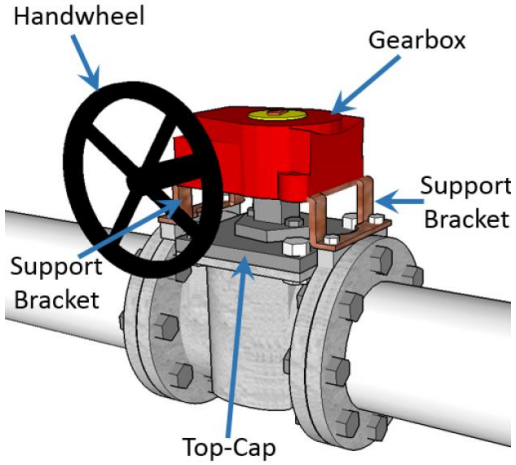
Evaluate human factors associated with equipment design and apply the hierarchy of controls e.g. improve design to mitigate identified hazards

Establish detailed and accurate written procedures and provide training to ensure workers know the hazards and how the plug valve gearbox should be disassembled safely.

Different design



By design, removing the gearbox did not require removing the four vertical bolts that secured the pressure-retaining top-cap



Improved design, showing how gearbox connects to all four dedicated attachment points on the valve flanges that are not pressure-retaining parts.

Reference: CSB see https://www.csb.gov/

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Similar equipment, but very different

Problem

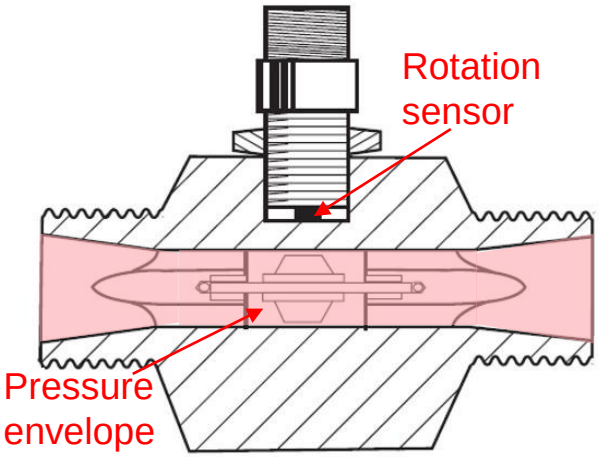
Potential for loss of containment where there are two **similar pieces of equipment but with different pressure envelopes**. One can be safely maintained whilst in service and it might be assumed by staff that this is the case for both items. However, the other **loses containment when similar work is performed**. E.g. Removal of turbine flowmeter rotation sensors (example shown) or valve gearbox bolts (CSB video https://youtu.be/QyIIe5T5beM)

Solution

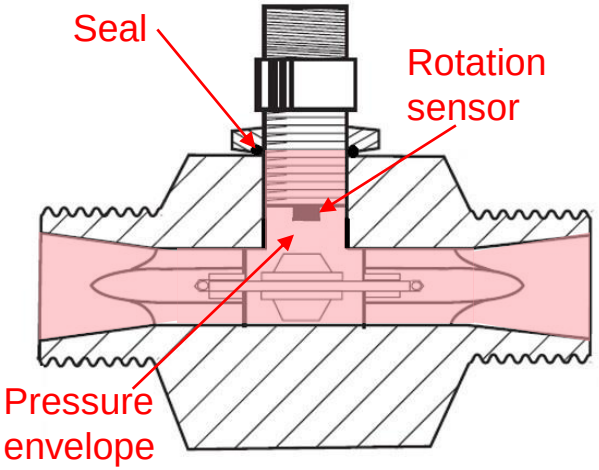
- **Standardise to one design** and ensure the pressure envelope is clearly identified and understood/ documented to prevent future mistakes.
- In case more designs exist, maintenance has to be made aware and special procedures must be established to avoid mistakes
- Field labeling of the hazardous designed equipment can help to make maintenance people aware

Different design

Safe to remove rotation sensor without compromising pressure envelope



Removal of rotation sensor will lead to loss of containment!



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Rupture disk installation

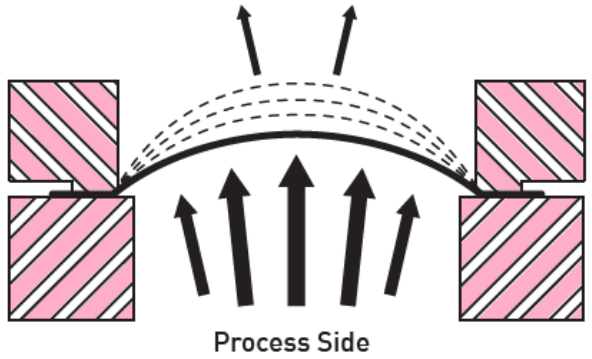
Poka Yoke

Topic (problem)

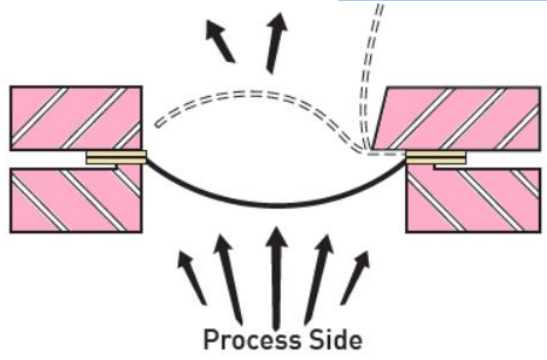
Rupture disks can be of the type "Forward-acting" or "Reverse-acting". Depending on the type, the dome must be placed upwards or downwards. **Installing a rupture disc upside down, is an easy mistake**, that changes the bursting pressure, and may result in tank rupture before the rupture disk breaks.

Solution:

- 1 Use **disk holders that only allow right installation** (Poka Yoke).
- 2 If not available: Always check the flow direction indicator on the rupture disc, and have an independent verification by 4-eye principle to confirm correct installation.

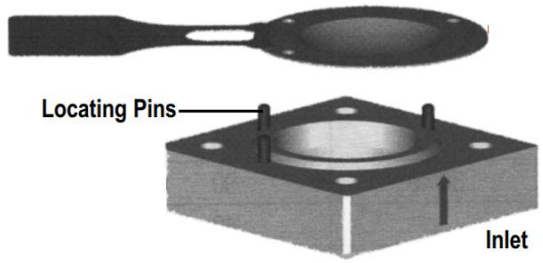


Forward-acting (Tension loaded) type Rupture DisK



Reverse-acting(Compression loaded) Type Rupture Disk

1 Disk holder with locating pins to assure right installation



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Indication of flow direction

Bob van Woezik DSM

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Useful Practises, sorted by Type of Incident or Equipment

- **Valve position**
- **Flange leak**
- **Avoiding overfills**
- **Avoiding breaking off small nozzles**
- **Wrong equipment (opened)**
- **Avoiding equipments which invite human error**

- **Wrong material or chemical**
- **Hose issues**
- **Plant isolation issues**
- **Interlock issues**
- **Loading, unloading**
- **Organisational practises**
- **Competency related**

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Right Chemical

Wrong Chemical

Problem

Wrong chemicals can be dosed to reactors, when identification and storage is poor. This can result in hazardous reactions

Solution

Chemicals in an organization are handled by suppliers, logistic people and operators. Clear storage rules and principles help to avoid errors:
Use different colours for different drums, clear names and identification, separated storage location, a **barcode or QR code** scan for validation

Organized storage of chemical drums helps to avoid that the wrong chemical ends up in the wrong reactor

- Separate storage location
- Product and location well indicated
- Use of different colours
- Name easily related to the use, process & location
- Barcode/QR code scanning before use for validation

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Validate Chemical

Wrong Material

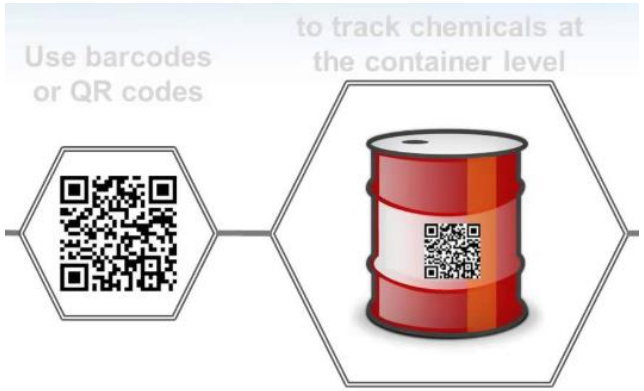
Topic (problem)

When a wrong chemical or a wrong quantity is dosed to a reactor a hazardous reaction can occur

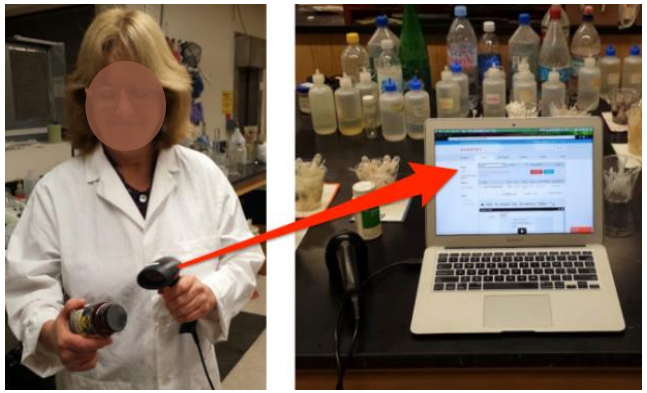
Story (solution)

Label chemicals upon arrival with a barcode. Scan the barcode before adding the chemical to the reactor and validate by the computer that it is the right component

Label chemicals with a bar code upon arrival



Scan when using, to validate the right chemical is used
Also for batch tracability



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- Competency related

EPSC

Use of flexible hoses

Hozes

Topic (problem)

- Hoses can leak from wrong handling, mechanical stress or corrosion damage

Story (Solution)

- Check the condition of a hose before use
- Store hoses well (limit bending)
- Connect hoses well
- Ensure hoses are depressurised when decoupling them. Remaining pressure release can swing the hose dangerously

EPSC

Pipe station with hose connectors minimize hoses for special line-up

Hoses

Problem

Long hoses in the plant can cause a weak point in the line-up amd also cause a trip hazard. When the connection points cannot be seen, wrong line-ups can be made.

Solution

Not-dedicated piping with manual valves can be used with short hose connection to couple pipelines from one part of the plant to another part. Indication on valve location where pipeline is going. Working with information labels to indicate the transferred chemical.

Photo: connection board with from (red) to (blue) location

EPSC

Interlock prevents wrong hose connection

Hoses

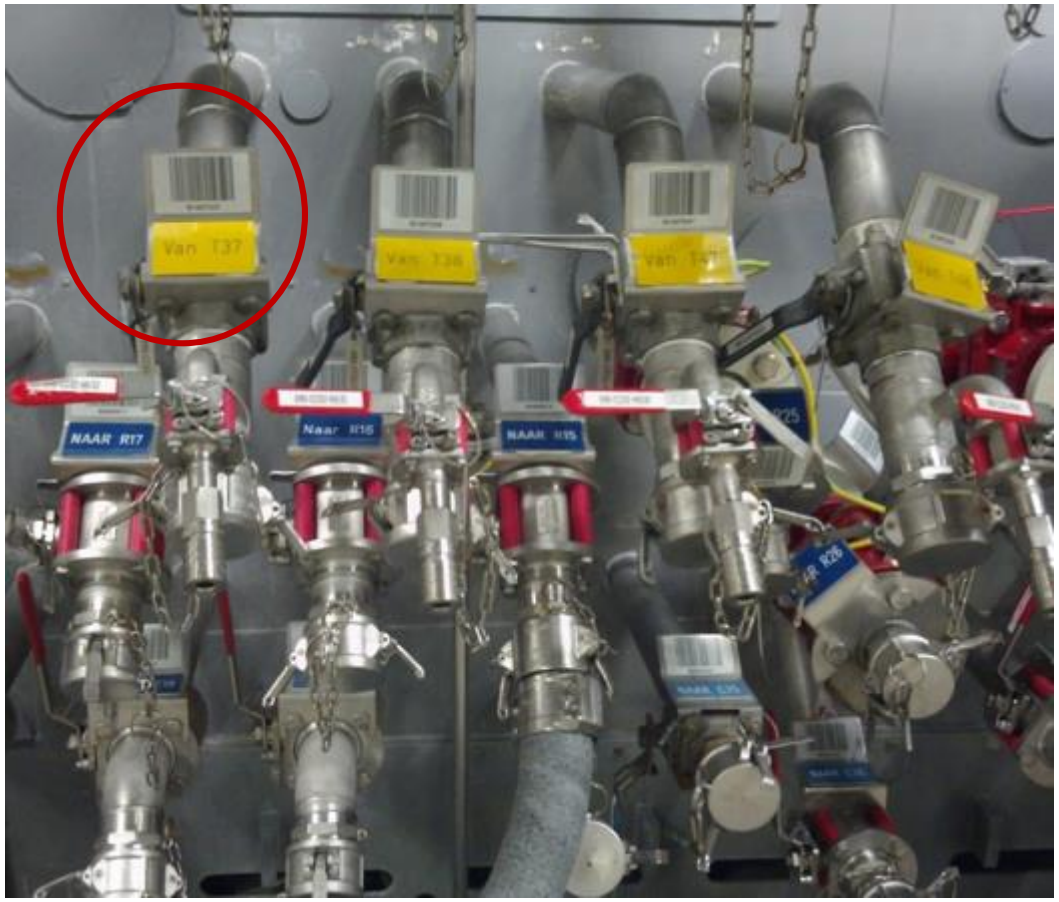
Problem

Complex hose station creates possibility of wrong connection, and getting wrong chemical into the equipment.

Solution

Using barcodes for ‘from’ and ‘to’ valves. When scanning the barcodes the system can confirm the right line-up is made

EPSC



Use barcodes to validate the right line-up is made

Utility connection type

Problem

Operator makes mistake in connecting hose at utility station.

Solution

In addition to identification of lines use of **specific hose connectors** for each utility can be installed to avoid that wrong connections can be made

- Avoid adapters
- Principle works as well for other chemicals

Normal Identification

Each (utility) connection is a specific nozzle and needs a specific hose connection

EPSC

Prevent hose leakage through hose testing/certification program

Problem

Hose leakage by failure of the hose, because of

a) Wrong hose, not suited for the material/chemical

b) Wrong hose, not suited for the pressure

c) Hose too old, aging of the hose

Solution

Operator can see from the colour coding (Green ring) whether the hose has been tested. The colour code changes each period (eg year)

Pressure rating is mentioned on the metal ring (10 bar)

Barcode is used by inspection

The colour stripe (red) indicates the product for which the hose can be used

Still visually inspect hoses before using them

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Hose with indication

Useful Practises, sorted by Type of Incident or Equipment

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EPSC

Incomplete Isolation

Plant isolation

Problem

Plant isolation and re-commissioning may cause personal injuries, losses of containment and major accidents

Solution

http://www.hse.gov.uk/pubns/books/hsg253.htm) guides on:

- Hazard Identification
- Risk Assessment and selection of isolation scheme
- Planning and preparation of equipment
- Installation of isolation
- Draining, venting purging and flushing
- Testing and monitoring effectiveness of isolation
- Carrying out the intrusive activity
- Re-instatement of plant

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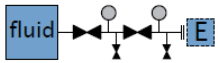
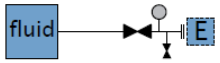
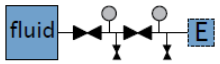
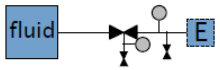
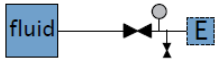
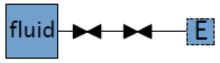
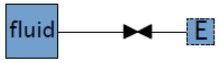
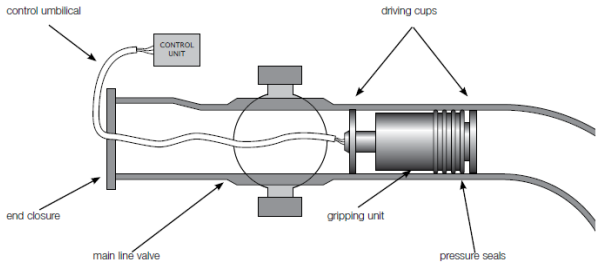
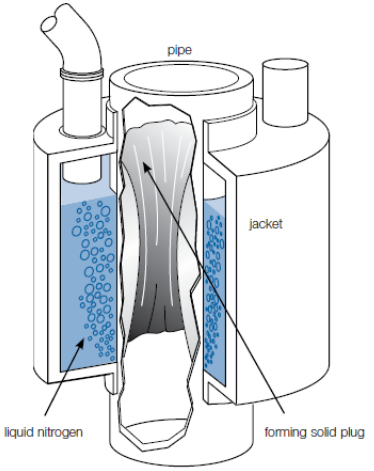
Final isolation methods

Category	Features	Method	Illustrative example
I Positive isolation	Complete separation of the plant/ equipment to be worked on from other parts of the system.	Physical disconnection (eg spool removal)	
	Valved isolation of an appropriate standard is required during the installation of positive isolation.	Double block, bleed and spade	
		Single block and bleed and spade	
II Proved isolation	Valved isolation. Effectiveness of valve closure(s) can be confirmed via vent/ bleed points before intrusive work commences.	Double block and bleed (DBB)	
	Within this isolation category the level of mechanical security is greatest for DBB and lowest for SBB.	Double seals in a single valve body with a bleed in between	
	As a general rule, SBB should not be used with hazardous substances (see paragraph 120).	Single block and bleed (SBB)	
III Non-proved isolation	Valved isolation. No provision to confirm effectiveness of valve closure prior to breaking into system.	Double valve	
	Where possible, double valve isolation should be used rather than single valve.	Single valve	

Pipeline plug



Pipeline freezing



DOW

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Visualization of bypassed SIL interlocks

Interlock

Problem

Sometimes a **SIL rated interlock (Z-switch) is bypassed**, e.g. when tested. Although this is **allowed only with a permit** (and appropriate authorization), it is not always known by everybody.

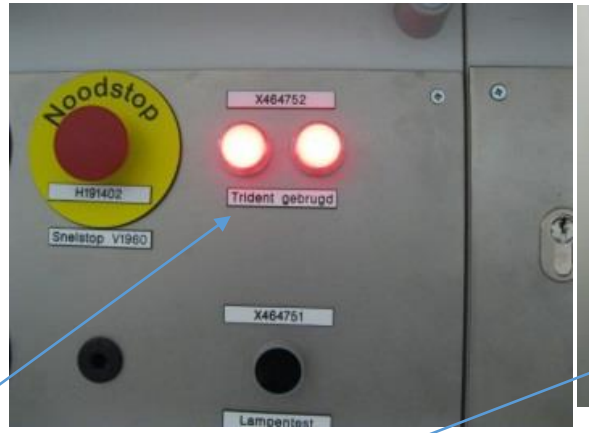
Mistakes can lead to severe accidents, when the interlock is not available on demand, or to spurious shutdowns, with costs associated

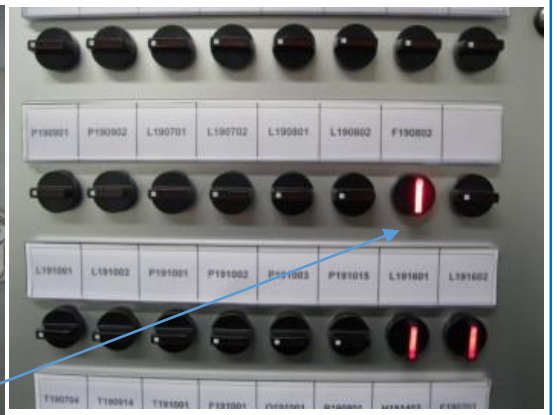
Solution

Visualizing of properly authorized bypass of a SIL rated interlock:

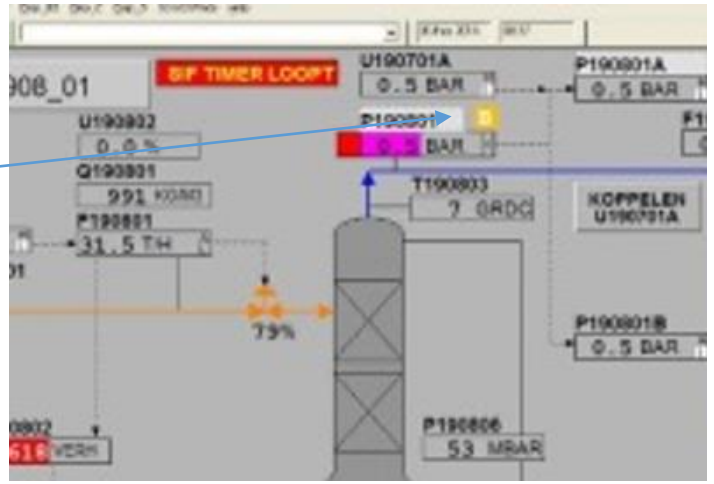
- Lamps in the control room, which light up if an interlock is bypassed.
- Clear information in the switch room (LOTO or special cable color for hardwired systems)
- Visualization on the DCS schematics
- Complete an interlock test preferably before the end of a shift – if not, ensure good shift-handover of the bypassed interlocks

Visualization in the control room:





Visualization on the actual DCS page:
Here: purple is bypassed



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Avoid unintentional bypass of a Safety Function

Interlock

Problem

A polymerization reactor needed to be high pressure cleaned for a repair to the agitator. In order to prevent damage during the cleaning, vulnerable instruments such as the high level probe were removed and suspended outside the vessel. After the repair, the probe was not put back in place and the reactor operated for several weeks without high level interlock until an operator noticed the suspended probe during a field tour.

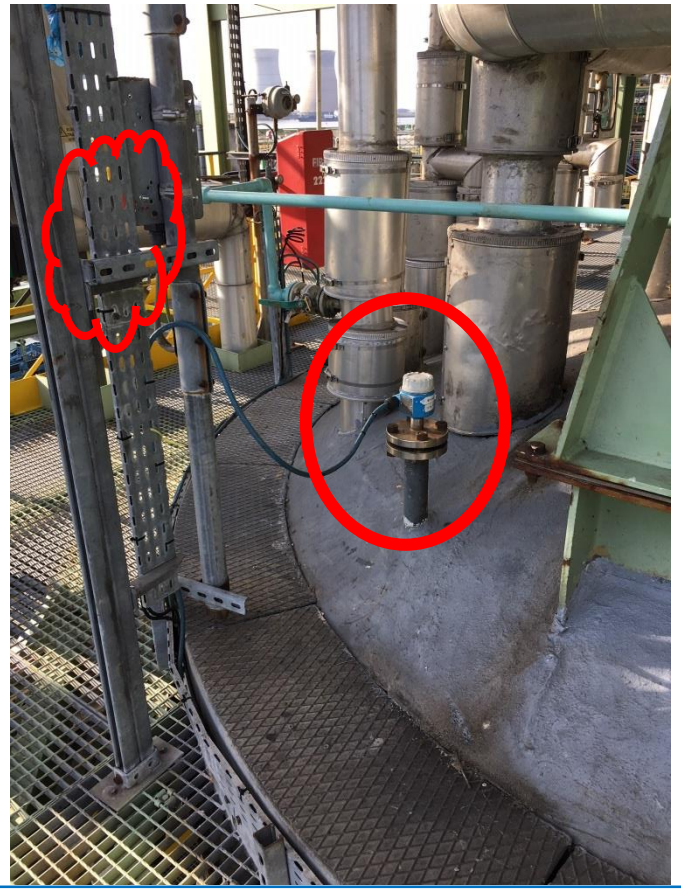
Story

Removal of critical instruments is normally managed by an interlock bypass procedure. However, this is not always applied when risks are not present (vessel emptied and opened, turnover or shutdown situations …)

Solution

- Always use the interlock bypass procedure when critical instruments are removed.
- Disconnect an instrument to ensure it is brought to it's safe state; even when it is not put back in place it will give an unsafe signal.
- Pre Start-up Safety Review (PSSR) or other checklist should be used to validate all safety functions are restored after a project or maintenance work

Validate that all safety functions are reinstalled and work well after maintenance work:
use an Interlock by pass form when safety instrumentation function (SIF) is temporarily out of service



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Protection of Interlocks

Interlock

Problem

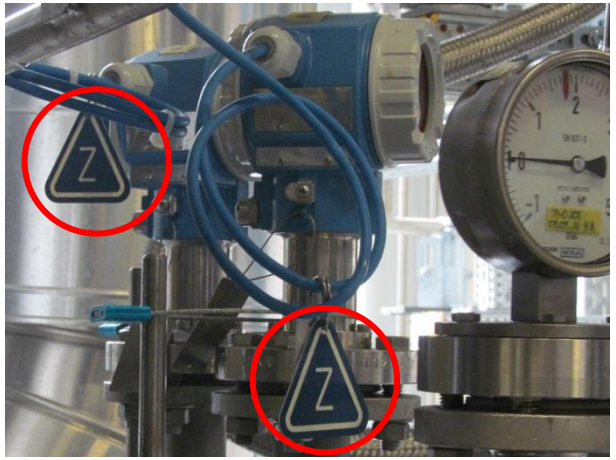
Safety interlocks are sometimes deactivated (unintentionally, or to solve production issues) during operation.

Solution

- Make Safety interlocks visible e.g.: label in the field, on documents, P+IDs and DCS-screens.
- Avoid easy bypassing by technical means, e.g. key cards or passwords for DCS-systems or locks at operation panels.
- You can only work on the safety interlocks with a specific authorization like a Permit to Work

Key card to protect access to SIS

Labeling of Safety Interlock Instrumentation



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Useful Practises, sorted by Type of Incident or Equipment

- Valve position
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Road Tanker Movement

Topic (problem)

Road Tanker Movement caused by Human failure during transfer & transfer hose fails with loss of containment of hazardous material

Story (Solution)

Prevention

1. Drive away protection devices such as interlocked barriers with warning signage at drivers eyeline
2. Vehicle brake interlocks, using vehicle air or plant air supplies
3. Wheel Chocks
   - Simple proprietary device
   - Manual key interlock device
   - Complex Interlocked device
4. Remove & lock away the ignition key from the driver
5. Remove the driver to safe location while transfer taking place
6. Interlocks that close transfer valves if vehicle moves
   - Chain linked quarter turn manual valve to local ground anchor
   - Use positive earth device if flammables are used, to stop transfer when earth connection fails (make earth connection shorter than transfer material hose)
   - If padding gas used, make padding gas hose shorter than material transfer hose , so it breaks first and transfer stops (useful for top of tanker transfers)
7. Safe Break Couplings (SBC)

Mitigation

8. Gross flow protection device in road tanker

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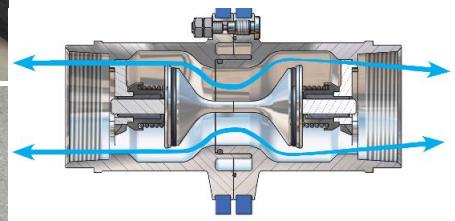
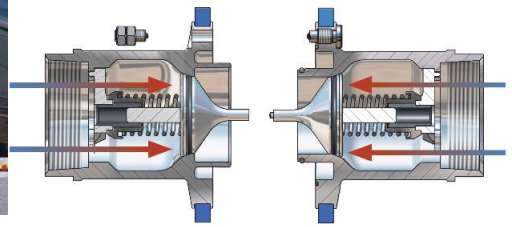


SBCoupling before emergency disconnect

The safety break-away valve consists of two halves, each with a valve that has a o-ring seal.



SBCoupling after emergency disconnect

When the SBCouplings separate, it allows the valves to close. The two valves closes rapidly, minimizing exposure to personnel and the environment.

Rail Car Movement

Topic (problem)

Road Tanker moved during transfer & transfer hose fails with release of hazardous material

Story (Solution)

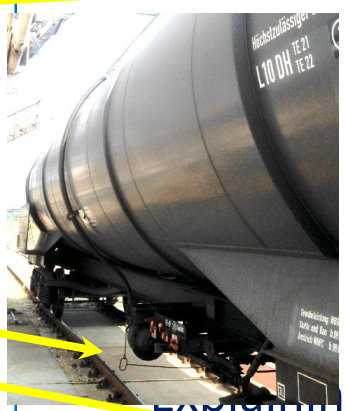
Protection

1. Positive verification that rail car manual brakes are activated
2. Wheel Chocks
3. Controls on rail operation on the same rail track during active unloading/loading of rail cars
4. Mechanical interlocks that close transfer valves if vehicle moves
5. Dry break couplings

Mitigation

6. Gross flow protection device in rail car

The gate can be locked into position when material transfer operations on rail cars



A chain connected to local ground anchor can be attached to ring & if rail car moves – outlet valve will close

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Job cycle check to avoid Normalization of Deviation

Organizational

Problem

Operators may deviate from an operating procedure if the described task is difficult to execute, inefficient or because operators do not understand/know the critical steps in a procedure.

A deviation from the procedure, perceived as an improvement, can become normal practice without a formal review.

This is also known as normalization of deviation.

Solution

To avoid “normalization of deviation”, a Job Cycle Check (JCC) can help

- Define Safety Critical Tasks in operations and review the procedures periodically
- Observe employee while doing the task and identify if he/she follows the procedure in detail and give feedback
- Update behavior or the procedure as needed, so the work will be done in line with the procedure

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Organizational

Shift Handover

Problem

Shift handover seen as a burden before going home. When information is not passed on well, it can result in a hazardous operation by the next shift

Story

Shift leader can drive a good shift handover by facilitating the process and by asking questions related to performance, risk scenarios, and personal interest.

Solution

Have face to face handover at the location: panel or field or shift office

Have a logbook or electronic system that states deviations.

At shift office: discuss ongoing work, work permit status

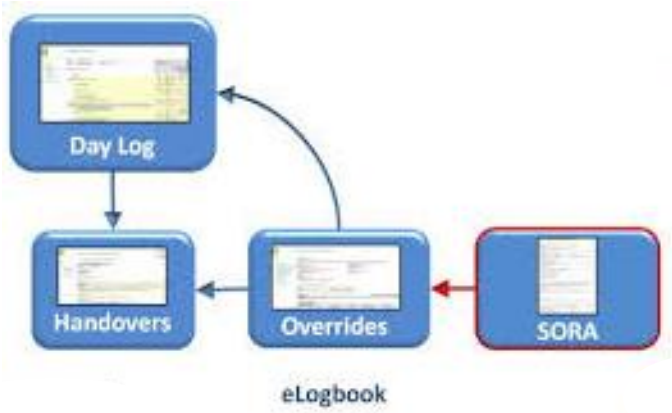
At Panel: discuss emergency alarms, bypasses, special line-ups

In the field: discuss the line-ups and ongoing work

As shift leader validate that proper handover was done

Face to face handover
At location
Supported by information in a logbook

Use of electronic tools



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Process Safety Training

Problem

Training of staff in process safety is obviously a prerequisite for safe operation of units. However, different training needs must be defined depending on the role (job) and the hierarchy level.

Story

Company internal training of process safety should impart basic knowledge, company regulations and best practices/fundamentals on hierarchy and functional levels.

Solution

Design interactive, lifely trainings with photos and videos closely related to the daily work of participants in different levels. Have initial trainings and regular refreshers. This can be executed in form of web-based-trainings. Use the “train the trainer” concept for roll-out of f2f trainings.

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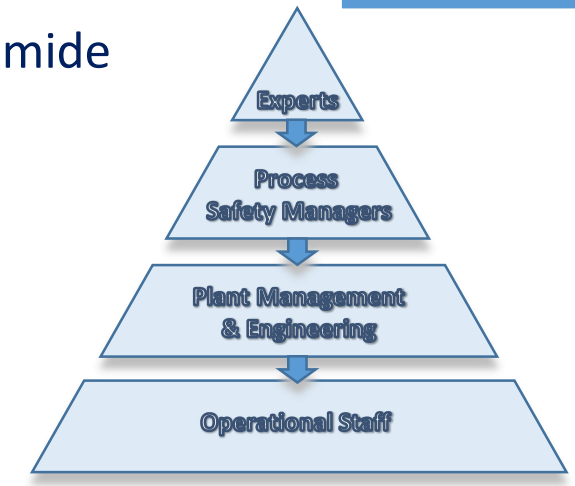
Competency

Train the trainer pyramide



Customized training acc. to a training matrix

	Basics/Fun-damentals	Regulations	Best Practices	PHA
Process Safety Manager		X		X
Plant Managem.	X	X	X	X
Operators	X		X	

Process Safety Culture

Competency

Problem

If the process safety culture is not strong, people might not feel motivated to execute all safety details strictly and have the tendency to take short cuts

Story

Strong Leadership is important. This has to be created by Management. It must result in the perception that employees feel, and really belief that management find safety a first priority. It is about caring and helping people, not about blaming them.

Solution

Leaders must show themselves in the field

Leaders must understand the hazards and be able to discuss them

During a discussion in the field leaders can show their true passion for safety and help to solve issues of employees and contractor

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Safety discussion in the field

Show passion and care
Understand issues
Help to solve

Practises described by the EPSC working group
Additional ones remain welcome
Use the template
Send to: office@EPSC.be

Title – the aspect (Template)

Category

Problem

Telling the issue to be solved

Solution

Telling how the issue can be solved / explaining the best practice

Explaining foto 1

Explaining foto 2

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