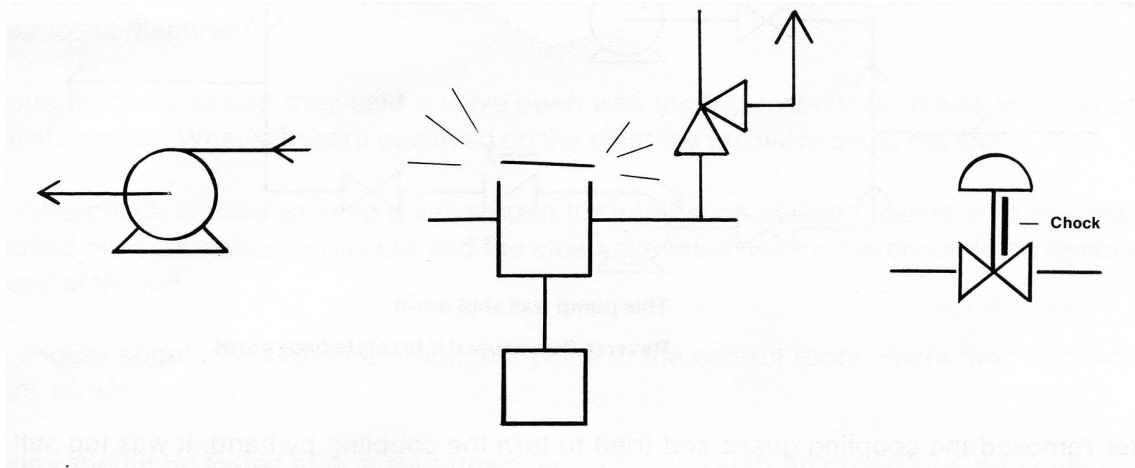


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SOME SIMPLE INCIDENTS



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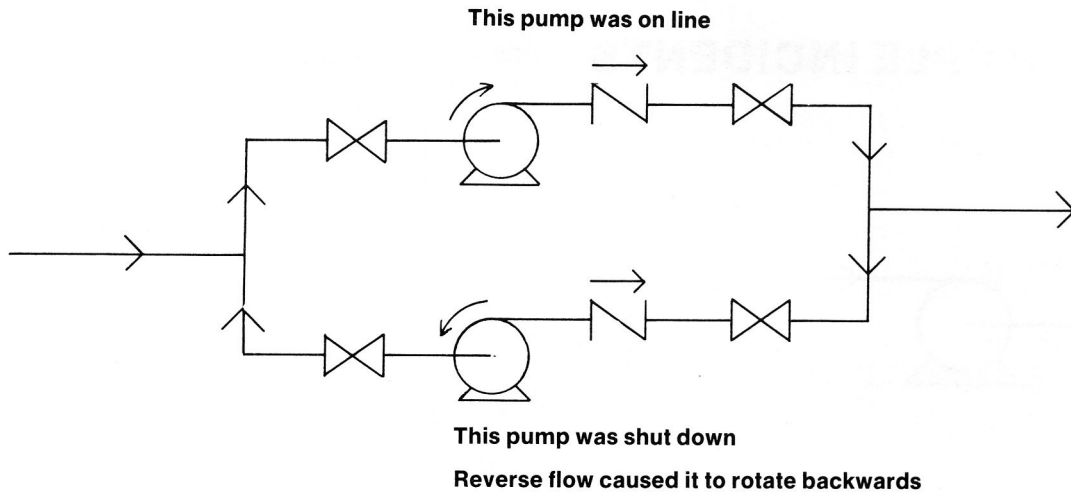


IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

155/1 A PUMP MOVED WHILE UNDER REPAIR

Accidents due to moving machinery are not common on petrochemical plants but one occurred recently.

A pump was shut down and given to maintenance for attention to the gearbox. As the line contained a slurry, the suction and delivery valves were left open to prevent solids settling out near them.



A fitter removed the coupling guard and tried to turn the coupling by hand. It was too stiff. He fitted a ring spanner to one of the coupling nuts and tried again. The coupling started to turn, bruising the fitter's hands. **Back flow through the pump had caused it to rotate.** There was a non-return valve in the line, but it must have been faulty.

Before any work is done on a pump, even though the process side is not being opened up, the suction and delivery valves should be closed and locked shut.

To prevent solids settling out in a line which contains a slurry, the line should be flushed out with clean liquid or blown clear with nitrogen.

For other accidents due to reverse flow see Newsletters 144/2, 98/2 & 3, 96/4, 79/2, 9/8, 8/8 and 8/3.

155/2 WRONG VALVE REPLACED - UNUSUAL READINGS IGNORED

The pressure gauge on the third stage of a four stage compressor was reading high, above the set point of the relief valve. The relief valve had not lifted so the operator assumed that the pressure gauge was incorrect, and did nothing.

The third stage temperature was also high and the motor amperage was high but the operator did not appreciate their significance and just entered the figures on the record sheets. The next three shifts did the same. Nobody pointed out the figures to the supervisor and he did not notice them on his rounds.

Finally the third stage valve cover blew off.

It was then found that the fourth stage relief valve had been fitted to the third stage, over a year before. The two valves look alike but have different test pressures stamped on their bodies.

Always question unusual readings. They may be correct. (See Newsletters 140/6, 139/1, 127/1, 124/3, 108/2, 97/9, 65/9, 50/12, 8/2 and 5/1).

When relief valves are removed for overhaul, put a numbered tag on the valve and a similar one on the flange. (See Newsletters 54/2 and 41/9).

155/3 A TRIP FAILED TO OPERATE

In order to sweep out a plant for maintenance it may be necessary to open trip valves. If this cannot be done by Process, for example, because the pressure is low and the valve operates on low pressure, then Instrument Section are asked to open the valve; they usually do this by applying air to the diaphragm.

On one recent occasion they held a valve open with the trip test chock. It was left in when the plant started up. When a hazard occurred on the plant the trip valve could not close.

If a valve chock is used to keep a valve open for a job such as line blowing then this must be specified on a clearance certificate and the clearance must ask for the chock to be removed at the end of the job.

The chocks should be kept in a prominent place in the control room where their absence can clearly be seen.

All trips should be tested after a shut-down, as part of the start up procedure, particularly if the trips have been worked on during the shut-down.

155/4 SOME STORIES FROM ANOTHER COMPANY

1 This first item is somewhat similar to that described in item 155/1 above. Three times within 6 months lines were cleared or cleaned by steaming. There were pumps in the lines. The steam caused the pumps to rotate so quickly that they disintegrated. In one incident a piece hit equipment 10 m above.

2 A screwed plug was stuck in the outlet of a $\frac{3}{4}$ inch valve. To loosen the plug someone heated the valve (in the workshop) with a welding torch. It shattered.

The valve was closed and water was trapped between the valve and the plug.

3 Liquid nitrogen from a nitrogen vaporiser got into the vapour line. The low temperature trip on the vapour line did not operate.

The trip was not tested because it was fitted to rented equipment.

It is now tested by the owners, and the company who rent it witness the test.

Do you have any rented equipment on your plant and, if so, who tests it?

4 A 150 m³ tank (12 m tall by 4 m diameter) was fitted with a 4 inch vent. It was filled with steam and then cold water was added. The tank was sucked in. What size of vent is needed?

Answer 12 in. (6 in. would be sufficient if cooling is through the walls only).

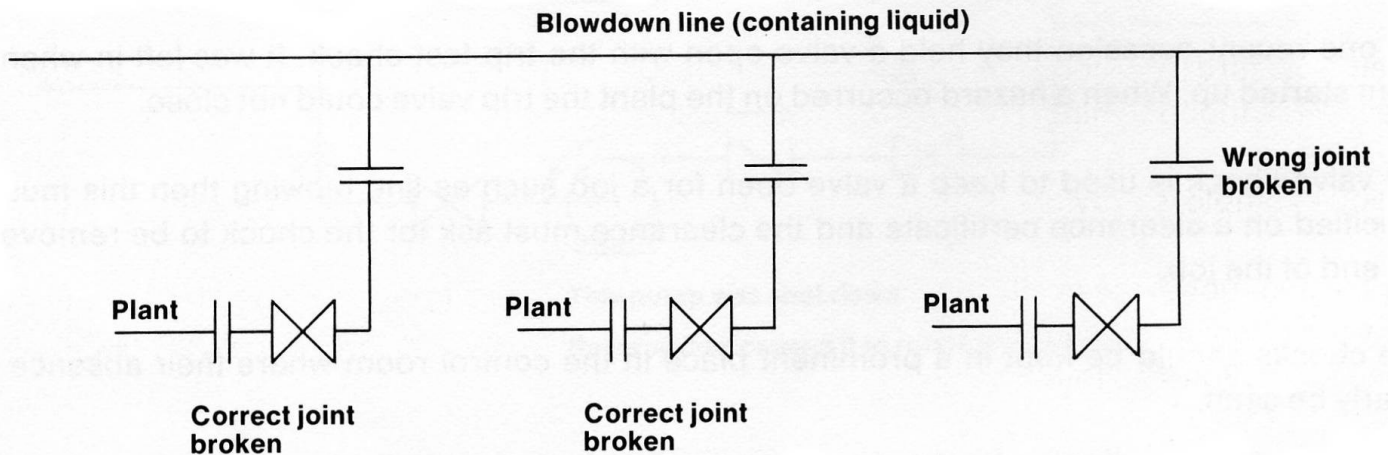
155/5 INSTEAD OF BREAKING AN UNUSUAL JOINT, A MAN BROKE THE USUAL JOINT

The back page of Newsletter 151 showed two joints marked with chalk. A fitter broke the wrong joint — the one with an old chalk mark on it instead of the one with a new chalk mark on it — and was splashed.

The correct joint should, of course, have been marked with a numbered tag.

Some further information on the incident has now become available.

The valve is a blowdown valve and is one of several in a row.



The joints on the blowdown side of the valves are regularly broken and slip-plated, often with the plant on line.

However the plant was shut down and swept out and the job to be done was an unusual one, to break joints on what is usually the live side of the valves.

The fitter broke the correct joints on several valves. He then reverted to his normal practice and broke the joint on the blowdown side of a valve. The blowdown line contained some liquid displaced from the plant and the fitter was splashed.

The incident shows that if a man allows his attention to stray he may do the job he is used to doing instead of the non-routine job he has been asked to do.

The incorrect chalk marks did not help. A tag would have made the error less likely.

155/6 A LOOK BACK AT NEWSLETTER 55 (August 1973)

Different sorts of "ice"

A recent incident shows how accidents can occur because the same word means different things to different people. A nurse wanted some ice to dress a burn. She asked an ambulance driver to fetch some ice from the laboratory. The ambulance driver went to the laboratory and asked an assistant for some ice. Dry ice is used in the laboratory and so the laboratory assistant assumed that dry ice was wanted and gave some to the ambulance driver who took it back to the nurse. The nurse put it in an ice pack and applied it to the patients arm with the result that his injury was made worse.

Dry ice is another word for solid carbon dioxide or "DRIKOLD"; it is much colder than ordinary water ice and is certainly not the stuff to use on burns.

Fire protection of structures

If part of the fire protection on a structure is missing the whole structure is no longer protected and may collapse in a fire. If any of the protection has to be removed it should be replaced without delay. A recent survey of a number of plants in the Division showed that on many structures a foot or two of the fire protection had been removed and not replaced. Sometimes it had been removed for earthing wires to be fitted: sometimes so that equipment could be taken in or out of a structure: sometimes new equipment had been added but the supports had not been protected. What is the position on your plant?

From Engineering News, June 1973.

155/7 THE OBVIOUS SOLUTION TO A PROBLEM MAY NOT BE THE BEST ONE

When a hazard is recognised, we sometimes rush in and spend a lot of money controlling it when a little thought might produce a cheaper solution.

A good example is provided by an article in "Health and Safety at Work," October 1981, p 94.

The carbon monoxide levels in a covered car park were found to be too high. Improvements to the ventilation were suggested. They would have been very expensive. However, a much cheaper solution was found.

The high levels were found to be due to cars driving round and round looking for empty spaces. Traffic lights controlled by traffic counters were installed at the entrance.

155/8 OTHER MEN'S VIEWS No 27

Every official knows that he will not be criticized for the unrealized benefit, which is often nonvital and subjective anyway, but that he will be criticized for any harm — whether real or imagined and whether foreseeable beforehand or only by hindsight. Industry, of course, does not wish to engage in the unprofitable development of goods or services that it will not eventually be able to market. But if a particular company takes too strict a view of risks, it will be at a competitive disadvantage. Hence, industry tends primarily to concentrate on benefits, although with substantial concern for the risks, whereas regulatory agencies are primarily concerned with risks.

This separation of role — with the pressure for decision at two different points by two different groups using nonidentical criteria — produces a tension that is not wholly bad, but which demonstrably interferes with innovation and with adaptation to changed information or circumstances. Worse yet, inadequate public understanding of these two roles leads also to distrust and suspicion of the whole process...

Furthermore, several people are leading highly congenial and even profitable careers built on assuring the public that these risks are not remote...

Whenever risk has been shown — or sometimes even hinted — we have dropped the substance in favour of some substitute that only appears less risky because it has been less thoroughly investigated. It is only when we are down to our last alternative, as with nitrite, or saccharin, that we regret our profligate ways, and wish we could compare risks, or weigh benefits.

R L Hall, "Food Safety and Risk/Benefit", Research Management, Jan 1981, p 28.

155/9 OIL ON WATER

In January 1880 a spillage of oil from an oil tanker on the River Wear at Sunderland caught fire and several ships were damaged. Several witnesses at the official inquiry said that they did not think it possible to ignite oil when it was floating on water and someone even carried out a demonstration in the courtroom to try to prove this point. However the Judge said that the defendants "*might bring all the chemists in the kingdom, but the fact remained that the liquid was on the water and the fire took place.*"

From Hazardous Cargo Bulletin, March 1981.

Other occasions on which spillages of oil on water caught fire were described in Newsletters 139/5, 110/2 and 53/6.

155/10 UNUSUAL ACCIDENTS No 114

We have heard a lot about the hazards on Canvey Island. Here is another report.

A 35 year-old Canvey Island woman sent her son to the local supermarket to buy a bottle of orange juice. He came back with a litre size bottle of liquid that looked and smelt like orange juice. It also had a picture of an orange on the label but the wording was in German. The woman felt very ill after drinking a glass. It was orange scented bubble bath!

From *Care in the Home*, October 1981, p 20.

Do we get so concerned about hazards that are unlikely to happen, though serious if they do, that we ignore the hazards of everyday life, that really do kill and injure people? About 5000 people are killed every year by accidents in the home but less than 1000 by accidents at work.

For more information on any item in this newsletter please 'phone P.2845 or write to us at Wilton. If you do not see this Newsletter regularly and would like your own copy, please ask us to add your name to the circulation list.

January 1982

An Engineer's Casebook No 55

COOLING TOWER FANS

Fan failures in the "older" cellular cooling towers are rare but do occur with a possible risk to personnel due to flying debris.

Earlier fan blades were laminated timber with a protective skin, and some are still in use. More recently such blades have been replaced in aluminium alloy.

In the case of the wooden blades, damage to their skins allows moisture ingress to the timber laminate, which can cause destruction by rotting the wood around the clamping bolts in the boss, by corroding the clamping bolts, or by making the blade out of balance. Such blades should therefore be inspected regularly to ensure that the skins are intact. Where damage has occurred, provided the wood has not rotted, it should be thoroughly dried, the skin repaired and the fasteners renewed.

The aluminium alloy blades are generally cast from the copper-containing LM2 or LM4 alloys which have particularly poor resistance to atmospheric corrosion, the attack being intergranular. The surfaces of these blades should therefore be protected to prevent such damage, a liquid neoprene coating being recommended. Many of the aluminium alloy blades are threaded into the hub, and if these threads are not protected, corrosion in the joint crevice can occur, causing blade failure. The threads, thread mouths and coupling joints should therefore be sealed, using Denso paste and Denso tape, to prevent the ingress of moisture into the crevice.

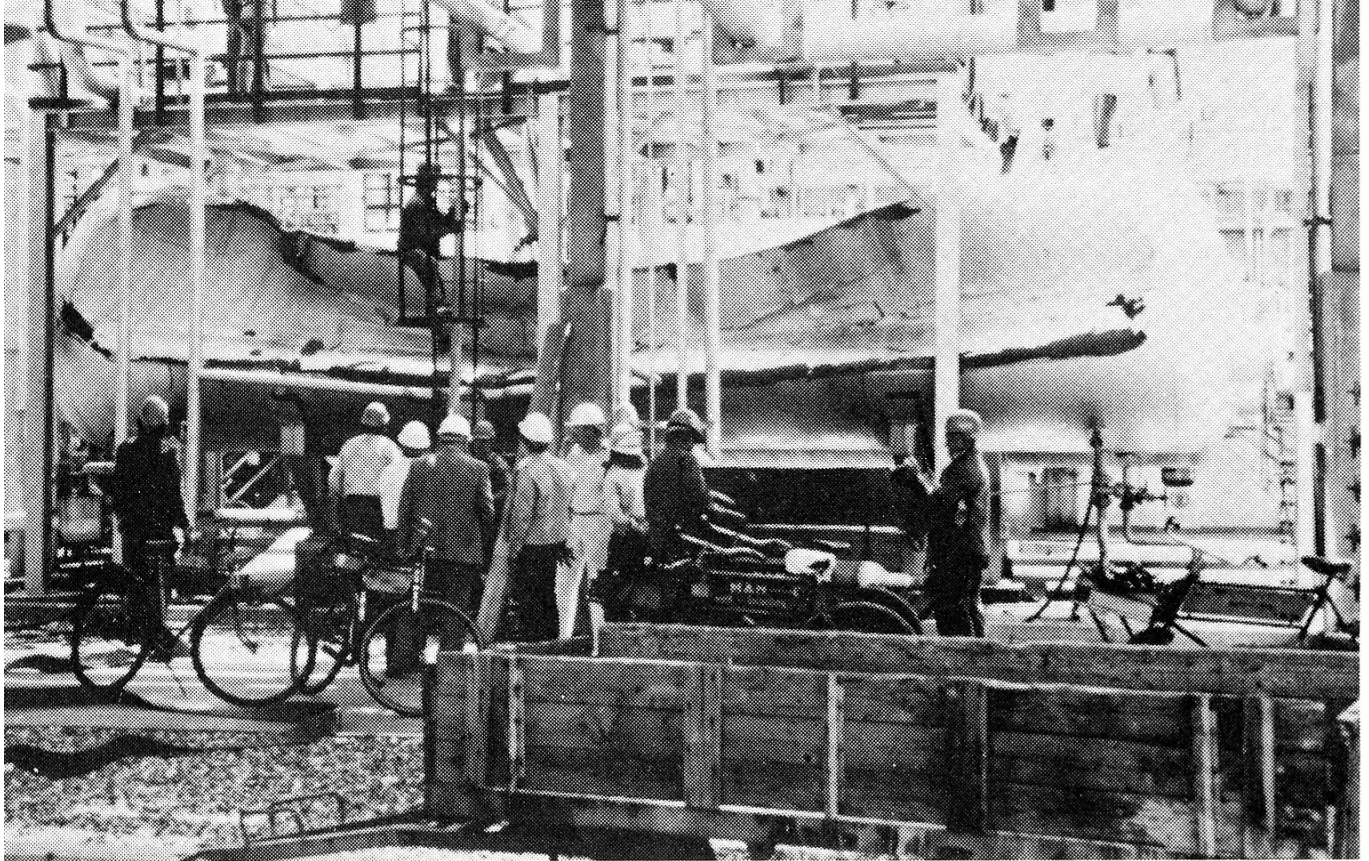
The fasteners used in all these assemblies are generally carbon steel and, if unprotected, corrode in the humid atmosphere. The corrosion loosens the fastener and eventually they fail by corrosion fatigue, freeing the component which may wreck the fan assembly. Protection of all the carbon steel components in these cells by coating with Denso paste is recommended.

A Pennington

HOW TO SQUASH A PRESSURE VESSEL

Earlier Newsletters have described many ways of sucking in low pressure storage tanks.

The photograph shows a pressure vessel — actually a blow down drum — which was sucked in. It belonged to another Company.



The vessel was out of service and isolated. The drain line was removed and a steam lance inserted. The condensate ran out through the drain line.

The steam was isolated and *45 minutes later* the drain valve was closed. Fifteen minutes later the vessel collapsed.

Forty-five minutes was not long enough for all the steam to condense.