

# Safety

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# NEWSLETTER

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Imperial Chemical Industries PLC  
Petrochemicals and Plastics Division

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## **Our Most Frequent Accidents**

**Materials handling, whether literally by hand or using machines, is our greatest single cause of personal injuries.**

Many of the accidents involve lift trucks. When used for ancillary work in chemical manufacturing units, these trucks are often in continuous use under rough conditions. Wear and tear is much more severe than that experienced in a commercial warehouse. Consequently, more care is needed to select the correct type for the work to be done, to use it carefully, inspect it frequently and maintain it properly. ICI readers may like to consult.

“Code of Practice for the Procurement, Examination and Inspection of Purchased and Hired Fork Trucks”. February, 1980, issued by the Company’s Materials Handling Panel. All readers will find two other booklets useful:-

“Safety in the Stacking of Materials” Health and Safety at Work Booklet No 47 published by Her Majesty’s Stationery Office.

and

“Safety in Working with Lift Trucks” a booklet in the HS(G) series also published by HMSO.

This Safety Newsletter records some incidents which have occurred because the good advice so readily available has not been followed.

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## **A Runaway FLT**

**In an earlier Safety Newsletter (160/4) I described an incident in which a Fork Lift Truck ran away when its battery was reconnected because it had been left in gear with its ignition switch in the ‘on’ position.**

A much more usual cause of trouble is the failure simply to put on the handbrake when the truck is not in use. In a recent accident a truck was parked on a slope with the brake off. The truck subsequently rolled down the slope and rammied a closed door at the entrance to a warehouse. Trucks should not be parked on sloping ground and the handbrake should be carefully maintained and used whenever a truck is parked

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## **An Unexpected Fall**

**Failure to use a handbrake caused another incident which could have had much more serious consequences.**

A Fork Lift Truck was being used to load a trailer parked next to a loading platform. The driver drove his truck, loaded with a pallet on to the trailer platform and deposited his load safely. He then tried to reverse his truck onto the loading platform. However, when he reached the rear edge of the trailer the whole trailer moved forward and the truck fell into the gap created between the trailer and the loading platform. Fortunately the truck landed in the upright position and the driver was not hurt. The brakes of the trailer had not

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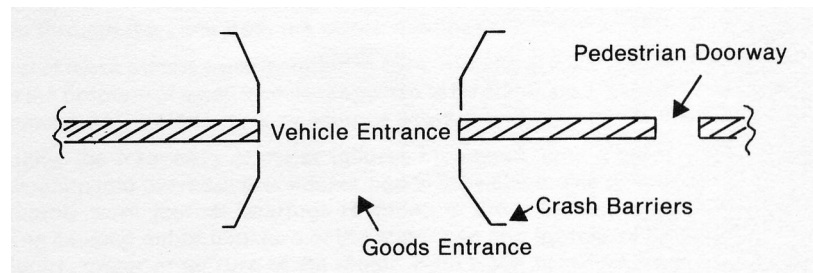
## Crash Barriers

Pathways for trucks and pedestrians are best kept completely separate and free from obstructions.

been properly applied.

Collisions with doors or with door jambs frequently occur. Pedestrians are often injured as they emerge from a doorway and appear unexpectedly in the path of a fork lift truck being driven in the opposite direction.

Pathways should be arranged so that as much chance as possible is given to drivers to see any obstructions in good time. It will help if a separate door can be provided for pedestrians.



So will crash barriers designed to prevent people from 'sliding round' the corner of a doorway. Additionally, the reduction in maintenance costs for damage to the doorways will often more than pay for the cost of installing a barrier.

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## A Leak Leads To a Fire

Neglected electrical equipment sometimes causes a short circuit and a fire.

There are, however, other causes of fires. In a recent incident a fork lift truck caught fire when oil from a failed hydraulic hose was sprayed onto the truck's exhaust pipe.

The fire extinguisher on the truck was empty and so did not work. As a result extinguishers on the trucks are now inspected by the supervisor once a month and replaced every six months. In addition the drivers are reminded that the ICI Code of Practice requires that drivers check the hydraulic system for obvious leaks or cracks at the start of every shift.

Many incidents in chemical plant operation are similar to this one and the preventative measures are also similar.

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## Another Unexpected Fall

A fork lift truck was being used to stuff an ISO container. As the truck reversed out the driver heard a clattering noise

An investigation of the dock leveller showed that a fulcrum pin had dropped out of the lip operating mechanism, allowing the lip to collapse sufficiently to become detached from the container.

The fulcrum pins were each secured by a grub screw. Split pins would have been better and modifications were made. It was noted that the lip of the dock leveller tended to lift by a couple of inches. It therefore received a shock each time a

**which he assumed was caused by the truck hitting the raised lip of the dock leveller. He continued to reverse. As the truck moved on to the leveller it fell about one foot.**

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## **Temporary Obstructions**

**People get used to doing things as a matter of habit, and this applies to fork lift truck drivers as to everyone else. They are not always prepared for avoiding unexpected temporary obstructions.**

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## **Unusual Accident No 118: Flames In a Confined Space**

**To retain the interest of those readers who are bored by fork lift trucks, here is an account of a totally different sort of accident.**

## **An Engineer's Case Book No 70 GLANDLESS PUMPS**

truck was reversed over it. The correct counter balance is difficult because the leveller can easily be made too heavy to handle if insufficient is used. Requirements for different purposes are clearly in conflict. An ideal solution may be impossible and regular careful inspection for possible damage will still be needed.

Two of the most common obstructions are packages left in thoroughfares and scaffolding obstructing or partially obstructing the usual path. Many people do not realise how manoeuvrable fork lift trucks are and they do not realise that they are causing serious obstruction by their own actions.

On one plant some scaffolding was erected to support an overhead steam pipe and provide access for maintenance work. Overhead clearance was carefully attended to but half-way down the structure one scaffold pole was left protruding into a thoroughfare. Some packages on a pallet being carried by a lift truck struck the scaffold pole and were damaged. Fortunately no person was hurt and the load on the truck did not collapse. An obvious hazard had been taken care of but the small obstruction had not been noticed or had been thought to be negligible

Four young people were sitting in a car gazing out to sea near the beach at a local resort. One decided to light a cigarette. First he had to refill his cigarette lighter and to do so he used a canister of lighter fuel which he had in the car. When he struck a light there was a flash and a bang and four shocked people jumped out of the car. Two were sufficiently badly burned to need attention at a local hospital.

Fumes of lighter fuel had created a flammable atmosphere in the confined space in the car and a source of ignition, when used, produced the inevitable consequences!

Glandless or "canned" pumps are used when any leakage of process fluid cannot be tolerated because of toxic, flammable or smell hazards. These pumps have no gland or mechanical seal on the rotating shaft to retain the process fluid within the pump casing, but have the complete rotating assembly including the electric motor rotor and stator enclosed within thin walled cans of Nimonic 75 material. The electrical energy to rotate the pump passes through the

cans from the stator windings.

Several of these pumps were installed in 1974, running at 2,900 rpm on duties where the problem of smell from leakage had to be eliminated, and gave very little mechanical trouble for a number of years.

Gradually, the frequency of major failures increased, until a fundamental investigation into overhaul procedures had to take place. The type of failure was mainly worn journal bearings resulting in the rotor and stator cans touching causing either puncture of the stator can and ingress of liquid into the electric motor or seizure of the motor. Both types of failure resulted in expensive and time-consuming pump and motor overhauls.

Initial attempts were made to predict the point at which failure occurred by using a hand held vibration monitor but no correlation appeared to exist between pump failure and vibration amplitude. Close examination of the wear rings, and shaft spacer sleeves from a failed pump revealed wear on only one side suggesting there were out-of-balance forces acting. These forces would produce much greater loads on the carbon journal bearing bushes, causing excessive wear and premature failure. At the first opportunity, a multi-stage rotor and a full set of impellers were sent for balancing and, as predicted, the out-of-balance forces were substantial.

Generally, at pump overhauls, the impellers were re-used, usually after the wear rings had been replaced, and were not re-balanced before re-fitting. The rotor, if undamaged, was refitted to the pump after new journals had been fitted and again this item was generally not re-balanced. If the rotor required a new can, it was sent back to the manufacturers for fitting and, unless specified in the order, was not re-balanced. It was therefore not surprising that the frequency of pump failures increased as the pumps became older and the rotating elements became worn and out of balance.

Since then, all rotors and impellers have been balanced at overhauls and pump outage has dramatically reduced.

J N Aitchinson

August 1983