THE SPARK THAT TAKES LIFE

What happened

In June 2009, there were multiple work injuries at the printing and painting department of a company that produces food packaging. During the transfer of flammable paint a fire broke out that involved four workers.

Who was involved

The accident caused one death from burns, two workers seriously burnt and one worker intoxicated by the paint. The workers involved are:

- an assistant machine operator (printing machine) worker, Moroccan, 31, who died;
- a shift supervisor worker, Italian, 48 years of age with 21 years of work experience who suffered severe burns to his legs and arms;
- a worker, Italian, 43 years of age with 19 years of work experience who suffered severe burns to his legs;
- a printing machine operator worker, Moroccan, 36 years of age, with a 5 years of work experience who suffered intoxication from chemicals

"*I would also like to point out that my colleague (ed. deceased in the incident) was very worried about the situation to which he was exposed for his work on the line, so much so that he had expressed his intention, if financially incentivated, to leave the company; recently the company had foreseen 10 workers to be made redundant to whom some incentives would have been paid.*"

Where and when

The injury occurred in the late morning of a summer day in 2009 at the company's plant located in the province of Alessandria that produces flexible packaging and metal-plastic yarns used in the food sector.

What was being done

In the painting and printing department, a new print reel was positioned on the decoiler at the head of the machine and was then either pulled or pushed along a path that goes through the various printing stages, recognisable by the presence of trays of colour groups.
To do the painting process, the worker assigned to the line had to top up the trays placed alongside the machine with the paint contained in a tank.

At a certain point
The worker lifted the 1000 litre tank with the forklift truck and, then dismounting the forklift, he inserted a connector into the safety valve of the tank (figure 1). During this operation, the valve came out out of its housing, causing a significant spillage of paint.

"*We tried to reinsert the valve and in the meantime the shift supervisor arrived... During these attempts, finding myself in front of the hole in the cistern, I was completely smothered by the paint which was sprayed in a radial pattern... The paint went into my eyes, nose and ears and prevented me from continuing.*"

Figure 1. Detail of the connector and valve

Whilst trying to replace the valve, the paint had covered the operator and three of his colleagues who had come to help in the meantime. To recover the remaining paint, the workers had moved an empty tank underneath the one held up by the forklift.
As one of the workers was moving away to clean off the paint, the area around the tank and the forklift caught fire. The fire hit the three remaining workers who had moved away from the area in different directions. They suffered burns of varying severity based on the quantity of paint that had covered them. The Moroccan worker, who was the first to try and fit the connector on the valve, died a few days after the accident due to the very severe burns suffered.

"*I approached the forklift supporting the cistern at a height of about two metres and I think I climbed on it even if I do not remember. Suddenly, I heard shouting and I felt a strong burning sensation on my feet, then I went to the external meeting point near the office building.*"

"*Meanwhile, my colleague arrived... running toward the forklift that had picked up the broken cistern. Suddenly, I saw a bright flash and felt a great heat, I turned around and saw the colleague getting down from the forklift with his feet burning. He threw himself on the ground and I approached the colleague to put out the flames that covered his feet, but after a few moments I realised that I too had my legs and arms in flames.*"

"While I was running I saw the black smoke come out of the roof from the paint shop. While I was outside the plant's office building I saw a colleague in his underwear going towards an ambulance which had already arrived".

Figure 2. Tank opening without the valve

What was learnt from the investigation

Although the containers were "sealed", handling them turned out to be a very critical operation. During the manual insertion of the connector, the cistern valve came out, causing the paint to pour out. The paint contains 50-75% of butanone, a highly flammable substance whose vapours mixed with air are explosive.

The leaked preparation released hazardous vapours that were deposited on the floor because they are heavier than air, due to the high temperatures that day.

The vapours caught fire due to a spark caused by starting up the forklift that was holding up the tank. The flames spread rapidly hitting three workers.

The first factor causing the accident, from a temporal point of view, was the ejection of the tank valve.

The second was the use of a forklift unsuited to operate with a risk of explosion.

During the manoeuvres that lead to the event, a forklift truck without flameproof characteristics was used, even though some forklifts with ATEX characteristics were available in the plant (and in the department) and even if a company procedure existed that foresaw its use for such an operation.

There was also no procedure (how to do) nor related equipment (with what to do) to effectively contain any significant spills.

Recommendations

The event highlighted some important prevention and protection aspects such as:

- the company and its workers were not ready to face the situation that had resulted from the significant paint spillage. The risk assessment for the formation of explosive gases must consider the most extreme conditions that the quantities of hazardous preparations and their processing may involve. Only in this case can the organisation adopt adequate prevention and protection measures;
- the procedures adopted for the paint transfers were inadequate considering the high frequency with which they occurred and the quantities of paint being processed. Work at high risk, such as the transfer of significant quantities of hazardous preparations, must be carried out in special rooms by dedicated personnel, in order to reduce the risks but also limit the effects of any incidents;
- the choice of the correct equipment, in this case the ATEX forklift truck, must not be left to chance or to the choice of the individual worker, but must follow a coded and verified procedure. Safety procedures, such as that of using the ATEX forklift truck to perform certain operations, must be subjected to checks with a frequency that increases as does the increase in the risk itself;
- the risk deriving from the possible formation of explosive gases, which appears remote and only present in complex technical evaluations, is, on the other hand, often present and analysed only for ordinary work phases. In the supervisory activities performed by the Service operators, observation of the specific risk has become a more frequent activity and is carried out in greater detail.

Key words: occupational injury; fatal injury; accident at work; prevention; fire; burn; paint; forklift truck; chemistry.