Behaviour of employees before incidents

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INTRODUCTION

Austin Detonator training system and behavior based safety is demonstrated in this paper.

Technical and organizational measures, training, audits, etc. are the usual ways to ensure safety at workplaces. However, the safe behavior of the employees involved is clearly the most important and necessary basis for the processing of explosives.
"SAFETY FIRST" is a basic cornerstone of Austin Powder Safety Policy.

Two important points of the Austin Powder Safety Policy are related to the purpose of this document:

- Every employee must always work, think and act safely and must receive his/her responsibility for safety
- Every manager is responsible for safety of all employees in his/her department.

Recently we focused deeply on the education and training system, as we needed to recruit and train hundreds of new employees (40% of all employees) to behave safely.
Quite the challenge if we take a very low unemployment rate in Czech Republic (about 3%) into consideration.
Austin Detonator, the important company in the Vsetin region, is known to prefer as new employees either the skillful family members or experts in the branch. It is expected family members are more familiar with the company culture before entering Austin.. This pre-knowledge helps to avoid misunderstandings and disappointments despite all expectations.

This paper is mainly focused on safe behaviour associated with handling explosives.

TRAINING

Safety legal requirements

The explosives training programmes are a safety legal requirements required by the Czech Republic regulation. Generally, the employer has the responsibility of ensuring that the employees are properly qualified and in possession of the certificate of competence for their job application. There are two crucial basic qualifications required in the explosive production plant – working with explosives certificate and explosives disposal certificate (known as licence of pyrotechnist)

Working with explosives

The employee must

- be a professional qualified for working with explosives according to the Czech Republic regulation (documented by a Certificate for Working with Explosives when she/he has completed the Training Course Pyrotechnic Materials and by passing the exam).

Every person who

- works with explosives,
- carries out a task in risk assessment and risk prevention at work with explosives,
- carries out and approves the working instructions,

must have a professional qualification for working with explosives.

Training course pyrotechnic material course.
Austin Detonator has developed an excellent training course (6 days, 45 hours) on pyrotechnic materials. This is a very comprehensive training package for new operators tailored to Austin Detonator's needs and operations. The course covers the following areas:

1. Theoretical knowledge concerning the safe handling of explosives and initiation systems.
2. Theoretical knowledge concerning the functions and properties of explosives.
3. The regulations concerning use, handling, transport (both on-site and off-site provisions), storage and destruction of explosives and initiators.
4. Practical knowledge concerning the use and handling of explosives and initiating systems.

The workers finish the course by completing written and oral examinations in front of the company examination board.

Subsequently, employees complete the introductory training at the workplace, where they are acquainted with the instructions for use of the device or machinery, working instruction and work operations.

Safety information for workers

Safety news comes to workers in many different ways, e.g. via:

- Annual company conference conducted by Chief Executive Officer
- Management safety meeting (quarterly) conducted by SHES (Safety Health Environmental and Security) department (part of Integrated Management System department)
- Austin Detonator paper (on a fortnight basis) issued by the Executive Director
- Impuls – Austin Detonator journal (quarterly)
- SHOP FLOOR management meetings (daily)
- Notice board / Sharepoint software (daily)
- Ordinary and extraordinary safety trainings

WORKER'S BEHAVIOUR IN REALITY

Daily working life

Unfortunately, the effectiveness of the training has a rather short-term effect, as after a while the employee falls into the daily routine.
During planned audits, we find that the behaviour of employees is usually exemplary, especially during the presence of a supervisor. This is not surprising. It is natural human behaviour. By analysing accidents and near misses, we find that the error of the human factor often significantly contributes to their occurrence. Good practice - we have verified that the analysis and discussion of the video with employees helps to prevent recurring events. Nevertheless, it is ideal to combine it with technical and machinery measures.

High potential near misses

There are demonstrated the typical behaviour, fortunately leading only to the near miss on the example (video recording) of two serious near misses (spread of the unpressed composition and the mechanical fault during dosing and before pressing). . Measures taken for prevention are often very easy to implement and not expensive compared with possible consequences.

<u>Near miss No. 1 - Spread of the unpressed composition</u>

Description of near miss:
The operator placed the assembled tray with sleeves with dosed primary and secondary explosives on the transport trolley. She started the automatic cycle with two-hand control,

during which the trolley should be switched on and moved under the press. Powdery explosives should be slightly pressed. However in this case, the trolley was not switched on and moved under the press, and the assembled tray remained unpressed in front of the operator. The operator did not notice this and left the workplace.
She returned to the workplace believing that it was pressed and started dismantling the tray in the standard way. As soon as she removed the first plate, uncompressed powdery primary and secondary explosives were spread on and around the workplace. Fortunately without explosion, even although the explosives are very sensitive to friction. The pyrotechnists in accordance with the special instruction for disposal removed and disposed of the spread explosives.

Causes of incident:
This was the inattention of the operator (she was not concentrating all the pre-incident time because she was distracted by speaking with co-workers) and additionally there was insufficient software securing of the trolley movement mechanism.
Action adopted:

- to add a light signal to the armour in front of the operating position,
- to supplement the PLC device program with the function of lighting the green signal after the end of the production process in the cell (visual management),
- to supplement the PLC device program with conditional ejection of the trolley from the cell after the operator's command,
- to change the PLC device program so that the operator will be forced to keep the active two-hand control for the entire time the cart is inserted into the cell,
- staff training focused on unnecessary speaking and distraction during work

Figure 1
Spread of explosives

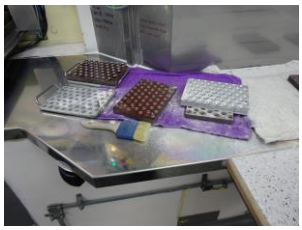

Figure 2
The dismantled tray

<u>Near miss No. 2 - The mechanical fault during dosing and before pressing</u>

Description of near miss:
A collision between the fully loaded PETN hopper of dosing device and the trolley happened due to a mechanical fault. The operator did not know how the serious incident happened during dosing and pressing and tried to force the stuck trolley with two containing two trays by hand.

Cause of incident: mechanical fault and forbidden bad practice to solve this non-standard event.

Action adopted:

- Training of staff to focus on to keep good practice behaviour when something is going wrong
- To install the sensor of the tray end position
- To install CCTV for the operator to see the movement of the trolley during the operation

Figure 1
A collision (hopper vs. tray)

Figure 2
The operator' hand next to the hopper

The investigation of both serious near misses revealed a breach of the OHS principles. Workers were instructed that the repetition of such a situation is unacceptable in the future.

Learning

The easiest and most effective way to prevent incidents is for each employee to respect the following rule:
When working with explosives, every employee is obliged to immediately report to his / her superior any defect that could endanger the safety of work and operation; if he discovers irregularities and suspicious phenomena from the work with explosives, from which the danger of explosion can be inferred, he/she must not continue working with explosives and must leave the endangered area.
This behaviour is crucial and required by the national legislation of the Czech Republic.

It is also fully in line with Austin Powder safety values

- **when we have to make trade-offs between Safety and anything else, we choose to be safe**
- **when we have a conflict between time and being safe, we chose to be safe.**

CONCLUSION

Proper training and behaviour-based safety are essential cornerstones to prevent unwanted events. This is common for the entire explosives industry.

Focus on the quality of training programmes and behaviour-based safety to avoid bad practice behaviour. Good training does not ensure that events do not happen, but we have traced that they reduce the number of such events significantly.

TAKE HOME MESSAGE and followed Austin Powder values:

1. We are responsible for our people, our equipment, our products and services, our regulators, suppliers, and industry peers, and the environment we live in
2. Nothing is more important than for all of us and those around us to go home safe every day

Commented [WU1]: The photos are not really very helpful. Where does the collision actually occur and where is the operator's hand?

Commented [WU2]: Also revealed design flaws.