

Substitution of carcinogenic and neurotoxic solvents used in tanning

Database information

Country: Spain.

Available language: English.

The **sector covered** in this case study is the footwear industry.

Task covered: application of strippers (organic solvents) on the surface of shoes.

Worker groups covered (vulnerable groups): women.

The **purpose of this example of good practice** was to substitute dangerous substances used in manufacturing shoes.

The **target groups** are employers, managers, safety and health representatives, and occupational health physicians.

1 Initiator/organisations involved

A substitution process was initiated in a footwear manufacturing company in a region of Spain with an important footwear manufacturing industry, on request of the safety and health representatives of the company. They involved the labour inspectorate and the trade union safety and health advisor (from ISTAS, the Union Institute of Work Environment and Health).

2 Description of the case

2.1 Introduction/background

Spain is the second-largest footwear-producing country in the European Union after Italy. Footwear manufacturing is one of the main sectors in some regions. The company that implemented the substitution is one of the pioneer footwear companies, producing high-quality footwear with great added value.

Basic footwear components can be made from leather, textile, plastics, metal, rubber and other synthetic compounds. A wide range of hazardous chemicals are used in the various manufacturing steps, such as leather tanning, dyeing, finishing and sole manufacturing. It is important that workers are trained in handling and using dangerous substances to eliminate or reduce the risks of being exposed to these substances. The tanning industry is one of the higher risk sectors with regard to safety and health in the workplace, as leather tanners also deal with heavy machinery. (EU-OSHA, 2016).

Workers in the company reported symptoms such as dizziness, vomiting and headaches. A 25-year-old female worker with no work experience in the sector was applying strippers (organic solvents) to the surface of shoes to achieve an 'aged' effect. Two months later, she suffered an epileptic seizure, with convulsions and loss of consciousness, after 10 hours of continuous work with solvents in a tanning process. She suffered several more epileptic seizures, had to take medication for several years, which prevented pregnancy. She was not allowed to drive a car, to drink alcohol or to be exposed to loud music or disco lights.

The products used by the worker contained organic solvents— hydrocarbons, alcohols and ketones (1-methoxy-2-propanol, n-hexane, cyclohexane, benzene and toluene). Uptake can be by inhalation or through the skin.

After the incident, the rest of the staff stopped working at the tanning station and informed the safety and health representatives about the incident. They contacted the company's statutory health insurance agency and the trade union's regional safety and health and environmental department and asked for its support.

2.2 Aims

The aim of the substitution was to improve the working environment in the enterprise and prevent exposure to carcinogens, irritants and neurotoxic substances.

It was carried out because several workers had been affected by health problems, including, vomiting, dizziness, headaches and epileptic seizures that might have been related to the use of the solvent mixtures.

2.3 What was done and how

The purpose of the intervention was to detect the root causes. A risk assessment was carried out to identify the hazards, evaluate the risks and propose control measures. Following the incident, the managers of the company were cooperative and granted access to company documents, files and workplaces. The investigation of the incident showed that the female worker had worked at the tanning station for two months. Her basic task was the manual application (with a piece of cloth) of solvents to leather pieces to achieve an 'aged' effect. Natural ventilation in the working area was poor and the existing exhaust ventilation did not adequately reduce exposure. It had been modified to speed up the tanning process. Solvents were kept in large open containers, the workers did not have respiratory protection masks and their latex gloves were not appropriate for working with the tanning solvent. The workers had not received adequate training or information about prevention measures.

After the assessment, the trade union expert requested that the company improve the working conditions of the tanners. Further, they made the following recommendations for immediate action:

- Workers should be provided with active carbon masks, nitrile gloves and safety goggles to protect them from exposure.
- A procedure for reporting immediately to supervisors or section managers any air extractor malfunctions should be implemented.

The company's managers introduced substantial modifications to the tanning station and work processes, including:

- substitution of the toxic products (i.e. the tanning solvent);
- replacement of the exhaust ventilation equipment with an unmodified version;
- relocation of the work station to an area with better natural ventilation;
- regular rotation of workers at the tanning station, to avoid anyone working at the station for more than 2 hours a day;
- closed containers with dispensers for the application of solvents;
- mandatory use of nitrile gloves and self-filtering masks.

The trade union experts were actively involved in the substitution of the solvent mixture. The solvent used for tanning contained several hazardous chemicals. The most hazardous substance was benzene, a carcinogen and mutagen that can cause lung damage; toluene entails a risk of harm to an unborn child and may cause drowsiness or dizziness; Cyclohexane may also cause drowsiness and dizziness and it is very toxic to aquatic life, and irritating to the skin; n-Hexane causes skin irritation is suspected of damaging fertility and is ; and may cause drowsiness and dizziness. All solvents are also toxic.

It was proposed to substitute the solvent mixture with acetone, a less hazardous substance. The company implemented the substitution and also decided to order pre-tanned leather to reduce the use of chemicals.

2.4 What was achieved?

The working conditions of the workers in the shoe manufacturing company were substantially improved.

The dangerous substances used for tanning were substituted. The alternative product significantly reduced health and environmental risks. However, it must be mentioned that acetone is a highly flammable (H225, according to its harmonised classification under CLP¹) and irritating chemical (H 319) and may cause dizziness and drowsiness (H 336). It too entails certain risks and adequate preventive measures must be taken when handling it.

The alternative met the company's quality requirements and no further changes to the working process were necessary.

Overall, there has been a substantial improvement of the working environment, resulting from the substitution of the hazardous substances, the improvement of the working procedures, the improvement of the local exhaust ventilation systems (collective measures) and the provision of appropriate personal protective equipment.

This experience helped raise workers' and community members' awareness of the importance of avoiding risks to human health and the environment from toxic substances.

2.5 Problems faced

One challenge was ensuring that incidents that occurred at the tanning station were recognised as resulting in work-related injuries or considered to lead to recognised occupational diseases. The trade union supported the worker who was affected by epileptic seizures in the procedure for recognition of the illness as an occupational disease at the labour court, the responsible national body, but was not able to achieve such recognition.

2.6 Success factors and challenges

2.6.1 A problem-solving approach

On account of the seriousness of the incidents, the company was very cooperative. The trade union's safety and health representatives were actively involved in the substitution, and their intervention supported the improvement of the working conditions.

Consultation of workers

The involvement of workers plays an important role in improving working conditions: all the workers were informed of the process in a series of meetings organised by the union's health and safety representatives. This motivated both managers and workers to become more actively involved in preventive activities.

2.7 Transferability

This case is transferable to footwear companies in which the chemical substances mentioned above are used. The implemented alternative is a substantially safer substance. However, as stated previously, it too entails certain risks and must be handled taking adequate preventive measures.

2.8 Further information

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3 References and resources

EU-OSHA (European Agency for Safety and Health at Work), 2016, 'Leather and tanning', OiRA tool.
Available at: ([https://oiraproject.eu/en/oira-tools?text=&field_country\[256\]=256&sort=alphabetically](https://oiraproject.eu/en/oira-tools?text=&field_country[256]=256&sort=alphabetically))