



Toxics Use Reduction Case Study

VOC Reduction at ESP Lock Products, Inc.

Summary

In 1994, ESP Lock Products, Inc. faced serious concerns about the effects of worker exposure to lubricating oils at its manufacturing facility. It also found itself close to exceeding its 12 ton/year permitted limit for volatile organic compound (VOC) emissions. Through two basic changes to its manufacturing process, ESP was able to address both of these concerns and also realize significant cost savings.

In 1997, the company replaced highly volatile lubricating oils used in making key blanks with a non-VOC lubricant derived from vegetable oil. Ultra-low volume misting units were installed to apply the new oil. These two changes completely eliminated 10.9 tons/year of VOC emissions, achieved a net savings of \$20,500/year in materials purchasing cost, significantly limited worker exposure to hazardous chemicals, and freed ESP from air quality and flammable storage compliance requirements.

Background

ESP Lock Products, Inc. specializes in the manufacture of keys, locks and locking systems for cabinets, desks, and other furniture products. Located in Leominster, MA, the company employs 350 people. Key production makes up 65% of the company's business.

The first step in fabricating keys is the key blank production process. ESP manufactures key blanks from various types of brass, using a progressive blanking die pressing operation (see Figure 1). A narrow strip of raw material is fed into the press and cut (or "blanked") into pairs of blank keys. The leftover metal (or "skeleton") is collected and recycled. In order to prevent build-up of brass material on the die, press operators used to continuously flood the die area with a nearly 100% VOC aliphatic hydrocarbon. This lubricating oil would immediately evaporate from the material, leaving the blank keys dry enough to move on to the subsequent milling process. Excess aliphatic hydrocarbon was collected in a drip pan at the base of the press. The key press consumed about 2475 gallons of aliphatic hydrocarbon each year, resulting in 10.9 tons/year of VOC emissions and generating 1,980 gallons of hazardous waste.

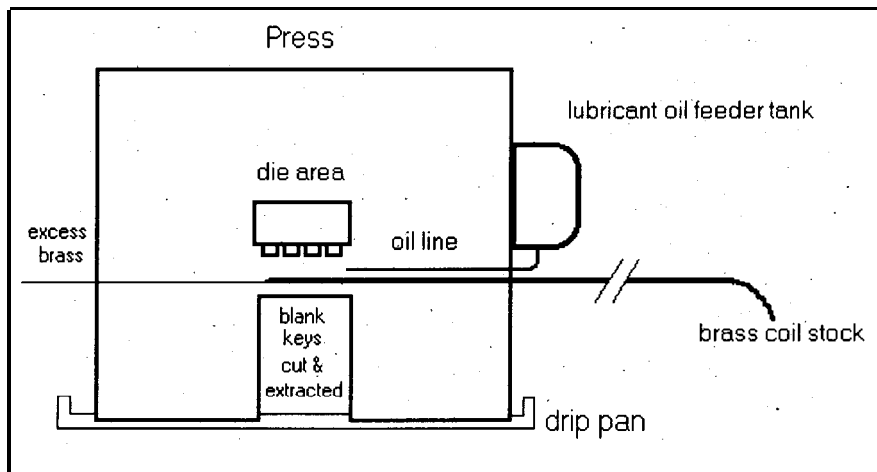


Figure 1

Oldprocess -- The entire die press area is flooded with aliphatic hydrocarbon pumped in through the oil line. Excess spills over into the drip pan at the base of the press.

Toxic Use Reduction

Because they were in close proximity to the die area where aliphatic hydrocarbon was being applied, press operators at ESP were constantly at risk of skin contact (resulting in de-fatting of the skin) and extensive inhalation of vapor. This level of exposure was a major concern for ESP management. In addition, the company was paying nearly \$28,000 a year to purchase and dispose of the aliphatic hydrocarbon, and was also subject to a \$1,100 air permit requirement (paid every third year, as part of permit renewal) and flammable materials storage requirements.

Having attended the Toxics Use Reduction Planner course and several seminars on pollution prevention and solvent use reduction sponsored by the Massachusetts Office of Technical Assistance (OTA), ESP's Environmental Manager elected to pursue options for replacing the aliphatic hydrocarbon with a safer, less toxic alternative. The goals of this research were to:

- limit or eliminate worker exposure to toxics,
- reduce the company's regulatory obligations, and
- reduce material purchase/disposal costs.

The Environmental Manager and a team of company supervisors, production managers and operators worked together to test and evaluate several alternatives to aliphatic hydrocarbon. After roughly two years of research and one year of testing, ESP chose to replace the aliphatic hydrocarbon with a less toxic, non-VOC vegetable oil. The company also installed new misting units to apply the oil directly onto the die (see Figure 2). The new configuration generally requires only 4 drops/minute of oil to maintain adequate lubrication, all of which is entirely consumed during the blanking process. As a result, the keys are virtually dry when they exit the press, and no waste oil is generated. ESP has determined that the vegetable oil protects the die

from brass build-up better than the aliphatic hydrocarbon, and is adaptable to all types of brass used for producing keys.

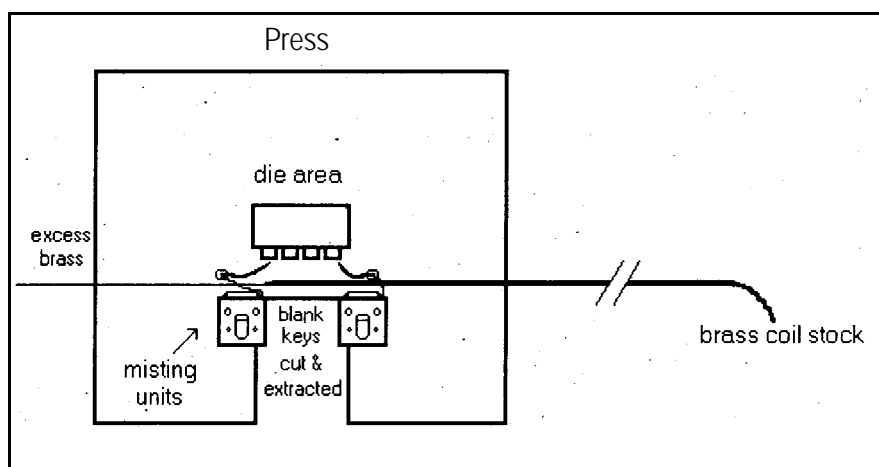


Figure 2

New-Process -- Misting units apply the vegetable oil directly to the die via adjustable hoses. All of the oil is consumed during the process.

The total cost to ESP, not including the employee time spent researching and testing the various types of lubricants, was \$3,600 for purchase and installation of the misting unit. Some worker retraining was also necessary, since press operators were accustomed to seeing lubricant completely coating the brass and the die. A chart was developed to clarify how many drops per minute each type of key blank material requires.

Results

Reductions achieved: By switching to the vegetable oil and employing an ultra-low volume misting unit, ESP was able to eliminate both air emissions and hazardous byproducts from this process. Total reductions in VOC emissions, were 10.9 tons/year. Hazardous waste generation was reduced by 1,980 gallons/year.

Economics: The significant reductions in materials- used and waste generated translated into considerable cost savings for ESP. Although the cost per 55-gallon drum of vegetable oil is \$2,000, as opposed to \$500/drum for aliphatic hydrocarbon, the total number of drums required has dropped from roughly 45 drums/year to about 1 drum/year, for a net savings of around \$20,500/year. The company has also saved over \$5,400/year on hazardous waste fees, since the misting unit generates no waste oil.

In terms of regulatory fees, ESP was able to qualify for an exemption from air permitting requirements, which prior to the TUR changes had cost the company \$1,100 every three years. The changes also allowed ESP to increase production levels without triggering additional regulatory requirements. Very little increase in production would have been possible otherwise,

without exceeding the facility's 12 ton/year limit and forcing ESP to submit a major source compliance plan application (with a fee of \$11,250 every three years).

Other benefits: In addition to the cost savings, ESP's switch to a non-toxic lubricant' dramatically improved worker conditions by eliminating both air emissions and worker exposure to toxics during the key blanking operation. The entire work area around the key blanking die press is considerably cleaner and less hazardous than prior to the TUR change. Thanks to extensive testing at the front end and careful worker retraining, ESP has enjoyed positive performance results with the vegetable oil and misting unit.

*This case study is one in a series prepared by the Office of Technical Assistance (OTA), a branch of the Massachusetts Executive Office of Environmental Affairs. OTA's mission to assist industry in reducing the use of toxic chemicals and/or the generation of toxic manufacturing byproducts. Mention of any particular equipment or proprietary technology does not represent an endorsement of these products by the Commonwealth of Massachusetts. This information is available in alternate formats upon request. OTA's confidential nonregulatory services are available at no charge to Massachusetts businesses and institutions that use toxics. For further information about this or other case studies, or about OTA's technical assistance services, contact: Office of Technical Assistance, 100 Cambridge Street, Room 2109, Boston, Massachusetts 02202. Phone #(617) 727-3260. Fax #(617) 727-3827
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