UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Chemical Leasing

CASE STUDY

Metal parts cleaning in the Serbian automotive supply industry

1. Background information

The cleaning of metal parts is used by many industries, i.e. in the automotive industry and its supply chain, as a part of construction, renovation or repair processes. Cleaning operations rely on the effective and efficient application of a variety of chemicals. For example, the removal of organic oils, greases or loose material on metal surfaces is achieved by applying detergents, solvents or other cleaning agents and compounds. A main challenge for users and suppliers of cleaners is to meet the high standards of both economic performance and environmental quality.

2. Introduction

The Serbian manufacturer FKL produces metal parts such as bearings and cardan shafts for the global car industry. In an effort to make their metal cleaning processes more efficient and safer, the company searched new ways to optimize its consumption of perchloroethylene (PCE), a chlorinated solvent. The company joined hands with the German chemical supplier SAFECHEM Europe GmbH, a DOW subsidiary, and a German manufacturer of high quality metal cleaning machines, PERO AG, to mutually assess the potential for implementing a Chemical Leasing business model for the cleaning operation. Following encouraging results in demonstration testings. Finally, FKL signed a five-year contract with Ravago Chemicals, a local chemicals distributor that closely cooperates with SAFECHEM, in order to fully unleash the Chemical Leasing model in their applications. The illustration below shows all partners and their roles in this arrangement[1]:

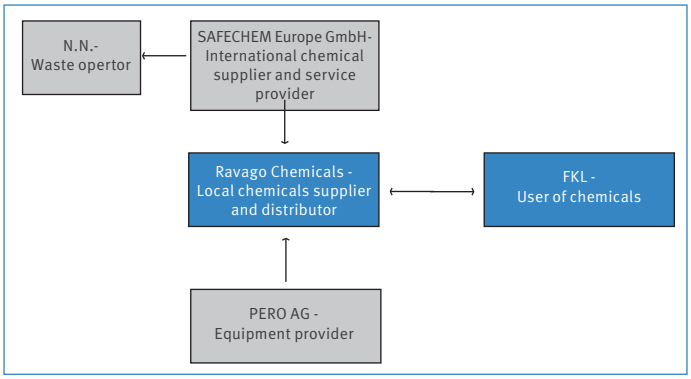

Figure 1: Cooperation scheme for the Serbian Chemical Leasing Arrangement

3. Key changes and results:

Team work and successful on-site testing made it possible to introduce the Chemical Leasing model. Remarkable results were achieved that brought significant economic, environmental and occupational health and safety benefits. The company achieved i.e. financial savings of 100,000 EUR per year thanks to the reduction of solvent used and waste produced. Life cycle and recycling aspects were particularly considered in the Chemical Leasing implementation.

3.1 Unit of payment applied

Before Chemical Leasing:	EUR per liter of solvent
After Chemical Leasing:	EUR per number of working hours (machine working time per month)[2]

1 The partnership model introduced in this particular case corresponds to the Chemical Leasing Model "C", as described in the Guidelines (see Task 5).

2 Machine working time was taken as the unit of payment because it can be easily measured and monitored and because it correlates with the number or surface area of parts cleaned. Basing the unit of payment directly on the surface area of parts cleaned was impossible due to the high variety of sizes and shapes of metal parts and the high variation of impurities that can occur during the process (e.g. depending on the type of oils used).

3.2 Technical measures tested and implemented

The chemicals application was optimized by replacing the PCE dry-cleaning grade with the PCE metal-cleaning grade, which is stabilized against acidification. Standard monitoring procedures of the solvent's parameters were introduced and the acidity of PCE could efficiently be adjusted. In addition, a distillation unit for recovering wasted solvent on site was installed. Hermetically closed containers, compliant with Responsible Care® principles, were used to storage and transport the solvent during the entire cleaning and recycling processes. Process modifications accompanied this innovation and allowed safer hermetic feeding of PCE to the machines.

3.3 Results achieved

Before Chemical Leasing	After Chemical Leasing (2010 onwards)
• Large quantity of hazardous waste produced (25 tons per year) • Waste contained 95% of the solvent • High consumption of solvent (30 t per year) • Solvent was fed into the machines manually • Solvent was emitted to the environment and the working environment • The solvent used in the cleaning machines had to be changed weekly (2 machines/ 300 litres) • Cleaning was a bottleneck in the production • By the end of the working week the quality of cleaning was dropping • Weekly change of solvent caused shortages due to maintenance work • The two cleaning machines were heavily corroded; metal parts (iron and copper) had to be substituted very often • Costs for waste export of about 70,000 EUR	Environmental benefits: • The consumption of PCE was reduced to 5 tons per year • Generation of hazardous waste declined to 1.5 tons per year • Content of the solvent in the waste was reduced to less than 5% • No emission of the solvent to the environment Economic benefits: • Savings of about 100,000 EUR per year • Increased productivity due to shorter cleaning cycles • Consistent quality and significantly lower maintenance costs • Less frequent changes of the solvent resulted in less shortages due to maintenance work • Reliable long-term business partnership was established Social benefits: • No more emissions of the solvent to the working environment • Containers (hermetically closed) with drums were equipped with wheels and much easier and safer to handle Other benefits: • Better and consistent quality of cleaning