UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Chemical Leasing

CASE STUDY

Surface protection in the Egyptian sector of fabricated metal products manufacturing

1. Background information

The process of surface protection is essential to ensuring high quality and durability of electrical appliances. It includes metal pre-treatment (degreasing and phosphating), application of cataphoretic and powder top coating. The use of these chemicals may have a considerable adverse impact on the environment and human beings. For this reason, efficient and safe processing needs to be ensured during the entire application of these chemicals.

2. Introduction

One of the largest Egyptian producers of electrical appliances, refrigerators and washing machines faced losses and high costs in its surface pre-treatment and painting operations, mainly due to the production of large amounts of waste and inefficient operational management. In addition, the workers' knowledge of chemicals and risk management was very limited, which also affected the company's overall performance.

To resolve these issues, the company started to seek solutions with its suppliers of pre-treatment chemicals and powder coatings. Following tests and negotiations, a decision was made to go for a Chemical Leasing contract with two suppliers: a) a large producer of powder coatings, who was the leading partner, and b) a producer of chemicals for the surface pre-treatment (who was represented in Egypt by an authorized agent).

3. Key changes and results

A number of measures to optimize pre-treatment and electrostatic powder coating application were jointly introduced in the company. This was combined with a training programme for workers on the correct and efficient application of chemicals. Both measures brought about significant reductions in chemicals and cost per unit produced and also lowered the amount of chemical waste.

3.1 Unit of payment applied

Before Chemical Leasing:	Egyptian pounds (EGP) per kg of chemicals purchased
After Chemical Leasing:	Egyptian pounds (EGP) per washing machine produced

3.2 Technical measures tested and implemented

Several measures were implemented to optimize the use of chemicals: Hazardous chemicals used in pre-treatment were replaced by non-hazardous chemicals without cyanides and nickel content. The application process for powder coatings was improved and the thickness of the powder coating was reduced to an optimum. Waste water from the pre-treatment process was also reused.

3.3 Results achieved

Before Chemical Leasing	After Chemical Leasing (2010 onwards)
• High production costs (costs of pre-treatment, coating and electrostatic powder coating) per washing machine • Percentage of reworks and rejects amounted to 9% • Sludge waste generated during the phosphating process amounted to 0.021 grammes per unit (approx. 6 tons per year) and was deposited at a nearby landfill site • 30 m3 of waste water generated per day • 10% of fine powder waste was dumped • No full compliance with REACH (Registration and Application of Chemicals) or RoHS (Restriction of Hazardous Substances Directive) • Workers had limited knowledge on chemicals and risk management	Environmental benefits: • Hazardous chemicals applied in pre-treatment process were replaced by non-hazardous ones • Elimination of sludge waste • Reduced consumption of chemicals by 15 - 20% • Reuse of wastewater from the pre-treatment process • Recycling of powder coating waste • Full compliance with REACH and RoHS Economic benefits: • Reduction of the total cost per washing machine by 15-20% • Percentage of reworks and rejects reduced to 1.5% Social benefits: • Improved knowledge of workers on chemicals management and chemical risks stemming from a number of trainings