

## CASE STUDY

### Surface protection in the Egyptian fabricated metal products manufacturing industry



#### 2.1.5 Case study

##### Background information

The process of surface protection is essential to ensuring the high quality and durability of electrical equipment - the top layer is usually an electrostatic powder coating. Electrostatic powder coating is a common technique used in various branches of fabricated metal products manufacturing industry. It is an effective way of protecting metal surface from deterioration. In Egypt, the major end user sectors for such coatings are domestic appliances and air-conditioners manufacturers as well as the architectural metal finishing market.

##### Introduction

One of the largest Egyptian manufacturers of electric equipment, ABB ARAB, a specialist in high and low voltage equipment, faced high costs in the painting operations. The reasons being the large amount of powder waste, the need for considerable maintenance of equipment and the high quantity of rejects due to poor painting quality. To resolve these issues, the company started to seek solutions with its powder coatings supplier, Akzo Nobel Powder Coatings S.A.E., a multinational and global leader in the field. After several assessments and tests, cost benefit analysis and negotiations, a Chemical Leasing contract was signed in 2008.

##### Key changes and results

Optimization of the process resulted in a more efficient use of chemicals and resources. The consumption of powder coating per product area was reduced, powder waste was taken back for recycling (zero waste was achieved), energy consumption was reduced, and the frequency of maintenance was cut in half. Direct savings were around \$68,000 per year.

##### Unit of payment applied

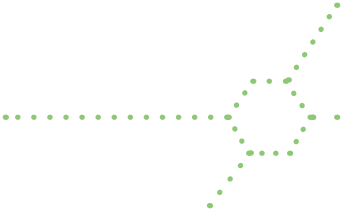
<b>Before Chemical Leasing:</b>	Egyptian pounds (EGP) per kg of powder coating purchased
<b>After Chemical Leasing:</b>	Egyptian pounds (EGP) per m <sup>2</sup> of coated metal surface

##### Technical measures tested and implemented

Line audits on using powder batches in a more efficient way were conducted, as well as data collection on powder loss calculations and input material assessments. Based on trials with modified samples of powder coatings (samples with varying shares of recycling material), modifications of the application process and maintenance procedures were implemented. They enabled an improved use of powder coating including lower consumption and less waste generation. Powder coating waste was taken back for recycling and an optimization of the top coating's thickness was achieved.



## Results achieved

Before Chemical Leasing	After Chemical Leasing
<ul style="list-style-type: none"> <li>• Consumption of 0.2 kg powder coating per square meter of coated articles; amounting to 140 metric tons of powder coatings applied (per year)</li> <li>• 2% rate of reworks and rejects – resulting in high maintenance efforts and two production line stoppages (per month)</li> <li>• High powder losses; 12% of used powder becomes waste (per month)</li> <li>• High energy costs due to application pressure of 2 bars</li> <li>• Environmental and safety issues (e.g. related to the solid waste generated, workplace safety)</li> <li>• Powder coating price – 3.80 Egyptian Pounds (per m2)</li> </ul> 	<p><b>Environmental benefits:</b></p> <ul style="list-style-type: none"> <li>• Closing the loop of powder coating and its waste</li> <li>• Consumption of 0.16 kg powder coating per square meter of coated articles (which is a reduction of 20%)</li> <li>• Less powder losses; quantity of waste reduced to 4 - 5% (per month)</li> <li>• Reduced energy consumption and costs due to 30% lower application pressure</li> </ul> <p><b>Economic benefits:</b></p> <ul style="list-style-type: none"> <li>• Direct savings of around \$68,000</li> <li>• ~ 0% rate of reworks and rejects – only one production line stoppage for maintenance work needed (per month)</li> <li>• Powder coating price - 3.20 Egyptian Pounds (per m2)</li> <li>• Long term business relationship established</li> </ul> <p><b>Social benefits:</b></p> <ul style="list-style-type: none"> <li>• Capacity building of operation staff by sharing know-how</li> <li>• Increased workers safety, environmental awareness</li> <li>• Quality of workplace environment complying with occupational health and safety regulations</li> </ul>