CARWASH

CAR WORKSHOPS: A SERIOUS GAME APPROACH TO MANAGING WASTE CONSIDERED HAZARDOUS

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CASE STUDIES:

“Waste management in a body paint workshop”

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1. INTRODUCTION

This document describes the processes related to the generation and waste management in a body paint workshop located in Italy. This case study aims at suggesting useful solutions to reduce the waste production and manage the hazardous waste in a correct way. It can be used by companies, professionals, organisations and any interested people to compare the waste management solutions in a body paint workshop.

The company XXX is a body paint workshop located in Fano, Italy. The company counts two partners, 2 administrative employees (1 technician and 1 clerk) and 4 workers. It has an estimated sales volume of 500,000€ per year.

Considering the local market it can be considered a medium company. The company has a particular attention to the reduction of waste produced and the correct waste management. The two partners are constantly in contact with the workers and supervise all the processes related to the production and management of the waste. The administrative employees are in charge for filling in the needed documentation.

2. OBJECTIVE

This document aims at describing the strategies adopted by the company XXX in order to minimise the waste production and the risks for the personnel and the environment. In particular the case study will focus on the technologies and processes adopted for the reduction of waste produced. The waste management, the organisation of the temporary storage and the disposal processes are in line with the standard procedures defined by the National (Italy) and European regulations.

The case study can be used to compare different solutions adopted by the company XXX, considering the specific needs and context.

3. BASIC CONCEPTS

The main environmental and health problems related to the waste production in the body paint shop are connected to some key activities:

- Cleaning of the tools used
- Sanding
- Emissions' filtration (dry or wet systems)
- Storage of paints and solvents
- Mixing of paints
- Sewage treatment
- Waste disposal – data recording
- Waste production (paints, solvents, contaminated packaging, contaminated filters...)
- Separation and recycling
- Waste storage

The hazardous materials used by the workers are mainly paints (primer, undercoat, transparent) and detergents. The paints are divided in solvent based and water based. Usually to paint a car we need three layers: the primer, undercoat and surface paint.
For all the hazardous waste used the safety sheets are required by the company. The hazardous waste is handled following the national and international regulations.

The personnel involved in the handling of hazardous substances have to be informed about the risks connected to certain activities and must receive (and use) the personal protection systems.

4. POLICIES TO MINIMIZE THE GENERATION OF HAZARDOUS WASTE

4.1 Policies to minimize the generation of hazardous waste in production areas:

The body paint workshop produces different waste. Below you can find the most common waste produced:

**Not hazardous waste**

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>acetylene</td>
<td>3. abrasive paste</td>
</tr>
<tr>
<td>2</td>
<td>oxygen</td>
<td>4. opaque paste</td>
</tr>
<tr>
<td>5</td>
<td>not contaminated sanding dust</td>
<td></td>
</tr>
</tbody>
</table>

**Hazardous waste**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Acrylic finisher</td>
<td>6</td>
<td>Winter catalyst</td>
</tr>
<tr>
<td>2</td>
<td>Bodywork paints</td>
<td>7</td>
<td>Colourless binder</td>
</tr>
<tr>
<td>3</td>
<td>Diluents</td>
<td>8</td>
<td>Primer</td>
</tr>
<tr>
<td>4</td>
<td>Stucco</td>
<td>9</td>
<td>Lubrificant spray</td>
</tr>
<tr>
<td>5</td>
<td>Catalyst</td>
<td>10</td>
<td>Paint remover</td>
</tr>
<tr>
<td>11</td>
<td>Degreaser</td>
<td>12</td>
<td>Contaminated sanding dust</td>
</tr>
<tr>
<td>13</td>
<td>Welding smoke</td>
<td>14</td>
<td>Grease</td>
</tr>
</tbody>
</table>

**Paint activities**

The workshop, based on the different surfaces and vehicles use different paints. These are mainly solvent-based and water based paints.

The workshop in the last years has increasingly reduced the use of solvent based paints and today they are used only in a few works. In particular the body paint shop uses bi-component solvent-based paints. These are composed by the paint itself and the hardener. These two elements are mixed together just before their use. One of the main critical factors of this type of paint is that it is difficult to prepare less than 0.5 litres of paint. This means that in case of small areas to paint, the company will have a huge quantity of residue to dispose (and the related costs). In order to reduce the residues (and the costs of disposal) the company has adopted a 2K dosing and mixing system that allows to mix very small quantity of bi-component paint. In this case the company has reduced the waste produced and the costs.

Another improvement consists in the use of high-solid paints. High-solid paints are the paints containing at least 65% of solid components (binders, pigments and additives) mixed with a solvent serving as a vehicle. Due to low content of solvent the viscosity of high-solids paints is 3-4 times higher than in conventional solvent-based paints.

The advantages reached using these paints used in combination with K2 dosing system and high pressure pumps for spray guns are:

- Reduction of the toxicity due to low content of VOC (volatile organic compounds).
- Less overspray
- Reduction of fire hazard.
- Low amount of paint is stored, shipped and sprayed for obtaining a coating of a given thickness and area.
- Wide range of the coating thickness may be obtained.
- Fewer spraying operations are required for a coating of a given thickness.

The company reduced the quantity of paint used up to 70%!!

The body paint shop in the last years has adopted High Volume Low Pressure spray guns in order to reduce the overspray produced during the paint procedures. The overspray is a common problem for body paint workshops. High pressure spray guns have an efficiency of 35%. It means that 65% of the paint (and solvent) used do not reach the object to paint and is released in the environment. The overspray must be filtered by the paint booth filtration system and disposed. At the contrary the High Volume Low Pressure spray guns work with a low pressure (0,7 bar) and have an efficiency of 50%.

Most of the works are made using water based paints. This choice produced a massive reduction of solvents used with the same results, in terms of quality, of the solvent-based paints. It is interesting to note that all the main carmakers in Europe are using water-based paints, so in case of body repair the companies must use this type of paint to avoid differences in colors and textures between incompatible paints. The use of water based paints reduces the emissions and the costs for the disposal of the residue. On the other hand the company has updated some of its paint systems with tools which are compatible with water-based paint.

One of the main advantages in terms of costs consist in the fact that the companies are not obliged to install systems to remove solvent emissions. The Italian regulations state that if the amount of solvent emissions do not exceed 250 kg/year the companies are not obliged to install emission removing systems.

The reduction of solvent-based paints affect also health and environment. Considering that about 90% of the solvent's weight evaporates into the atmosphere, the use of solvent-based paints, cause a major environmental impact and risk to the health of operators. For this reason the painting operations must be carried out in confined spaces and sucked, with facilities for the removal of particulate matter (dry or wet) and purifying technologies for the removal of solvents.

**Cleaning activities**

The substances used to clean the paint tools are based on the type of paint.

Usually nitrous thinners are used to clean the tools contaminated with solvent based paints. This type of detergent releases hazardous emissions through its evaporation. The spray guns have to be disassembled before the cleaning operations. This requires a lot of time and work.

In order the amount of thinners wasted, the company has adopted a closed loop cleaning system. The systems clean the detergent used removing the debris and particles. The solvent can be reused and the solid waste disposed as hazardous waste. This process allows to save a lot of thinner and reduce the hazardous waste to dispose.

For the cleaning of the equipment for painting contaminated with water based paints nitrous solvents are not used, but only demineralised water is used. After cleaning the spray gun, the water is mixed with a powdered thickener that captures the paint particles. Only 5% of the entire amount of water is disposed. The water is filtered and reused.

**4.2 Policies to minimize the generation of hazardous waste in storage areas:**

The company organised the storage of the waste produced following the National regulation on waste management (Legislative Decree 152/2006 - *Testo unico ambientale*).
The storage area is placed indoor and it has a waterproof floor; it is separated from the rest of the workshop. The area is well marked with signals. The liquid hazardous waste produced is stored in appropriate containers (proof leak and anti corrosion) placed over a containment basin.

The solid hazardous waste as contaminated packaging or absorbents are stored in dedicated containers.

The containers for the temporary storage are marked with the following information: the name of the waste, the EWC code, the status of the materials and the levels of danger.

In order to minimise the amount of waste in the storage area the waste is removed every 364 days.

4.3 Data recording

The employee in charge of the administrative tasks is responsible for the preparation of the needed loading and unloading documents. The data related to the waste produced is communicated to the responsible person by the supervisor. Within 10 days from the production each waste is registered including different information: date of production, progressive registration number, description of the waste, EWC code and Weight.

When needed (maximum once a year) the waste stored is collected and transported by an authorised company. Within 10 days an unloading registry is filled in including the following information: date of production, progressive registration number, description of the waste, EWC code, weight, the quantity, if it will be disposed or reused, the date and the reference number in the transport sheet.

All the documents are stored in the company and are available in case of request by the authorities.

4.4 Training on waste management

The training on waste management is committed to an external specialised company. The company XXX is involved in continuous training on waste management in order to adapt the activities and processes to the new regulations and innovation of materials.