Sustainable Environmental Management at Jai Maruti Gas Cylinders Limited, Gwalior, Madhya Pradesh

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Abstract

Jai Maruti Gas Cylinders Ltd. (JMGCL) or JMC has specialization in the manufacturing of Welded Industrial Gas Cylinders which include Dissolved Acetylene cylinders and they are doing this for a decade. The constant up-gradation of the manufacturing process and the quality system helps JMC to meet the changing Indian and overseas requirements for Welded Gas Cylinders. The present study explored an efficient manufacturing process with the continuous Research and Development activities. By the implementation of sustainable environment and process management, JMC could succeed to face tough competition in the country and has reached high quality level and kept its identity in the country as well as abroad. The main objective of the present study is to showcase the best practices done by a gas cylinder manufacturing company to achieve sustainable environment management through the process of proper technology, research and development.

Key Words:-*Gas, industrial cylinder, environmental management, manufacturing, health hazards*

Introduction

Jai Maruti Gas Cylinders Ltd. (JMGCL) an industrial cylinder manufacturing company, situated in Malanpur industrial area nearly 25 km away from the city of Gwalior. This industry was started in the year 1992. Almost 40 staff members and 100 workers are working here presently. It has two branches –Jai Maruti gas cylinders ltd (JMGCL) and Jai Anjaniya gas cylinders ltd (JMGCL). The head office is located at Harishankar Puram, Gwalior. The plant deals with many gaseous substances which need proper environmental monitoring, health and safety related precautions. JMC has done and doing a great job by proper research and development activities to achieve environmental excellence and sustainable management. Right from handling of raw materials till the end product proper state of art process design is maintained leading to sustainable environment management of the company and socio-economic development of the organization. The present study will try to explore some of the best possible activities towards achieving certification for excellent performance in National and International level.

Materials & Methods

Company Profile

JMC has been doing great job in manufacture of Welded Industrial Gas Cylinders including Dissolved Acetylene cylinders for over two decades. The constant up gradation of the manufacturing process and the quality system helped JMC to meet the changing Indian and overseas requirements for Welded Gas Cylinders. With an efficient manufacturing process with the continuous Research and Development activities, JMC could succeed to face tough competition in the country and has reached high quality level and also kept its identity in the country as well as abroad.

JMC venture into the manufacturing of Welded & Seamless DA Cylinders in the year 1990 and today manufactures the widest range of Industrial Gas cylinders for Acetylene, Ammonia, Chlorine, Sulphur Di Oxide, Ethylene Oxide, Refrigerant Gases, DA cylinders for Marine and lighting purpose and cylinders for several other purposes.

More than 5.0 lacs gas cylinders manufactured by JMC, are in circulation in India and abroad since 1990. JMC make gas cylinders are most common in all units of SAIL,NTPC, RAILWAYS, DEFENCE, NAVY, AIR FORCE, ATOMIC PROJECT, NUCLEAR POWER PROJECTS, PORT TRUSTS, HYDRO POWER PLANTS, PETRO CHEMICALS, ONGC, STATE. GOVTS., WATER & SEWERAGE PLANTS.

In short span of time JMC has achieved and maintained its leadership in the manufacture and marketing of gas cylinders of unsurpassed quality. The company has maintained the highest degree of integrity in customer relations and by constantly improving its products up to the level of customer's satisfaction.

About Plant

Presently JMC offer all types of Welded Industrial Gas Cylinders including DA cylinders (Welded & Seamless) in different sizes and capacities as per the requirement of the customer.

Constituents of Industrial Cylinder

An industrial cylinder consist of –

- Two dish
- One roll
- One foot ring
- One neck ring
- valve

Raw Materials

All raw materials and components used in manufacture by JMC meet stringent specifications. Each has to pass through proper inspection and quality control to ensure compatibility with standards.

Raw materials

- MS sheet (dimensions depending upon the size of the cylinders)
- Welding rod
- Flex
- CCMS wire
- Mig wire
- Paint

JMC production process is a unique combination of highly efficient manufacturing techniques, rigid quality control process and ultra modern machines and equipments. JMC well trained skilled employees are assistant at every step through the production process by experienced quality control inspectors. JMC unique process of welding of cylinders by the combination of submerged Arc and metal inert gas welding using gas mixture of Argon and Carbon Di Oxide produced best quality welded cylinders which are passed through the different stages of inspection and X-Ray's examination (Radiography) to meet the requirements of respective standards. The sequence of tests after stress relieving provides the consistency of quality.

JMC's Acetylene Cylinders are massed with its own formulation and controlled mixing system of its own unique design ensures uniformity and optimum quality of Monolithic Calcium Silicate Mass (Porous Mass) inside the finished cylinders after reaction and drying process. The cylinder after valve fitting with valve are subjected for high degree of vacuuming subsequently filling of Acetone and saturated with gas.

The special feature of JMC porous Mass is chemical stability, no effect against mechanical impact due to high crushing strength of mass, maintaining the porosity of mass between **90-92%**, high degree of permeability along with the retention of Acetone during discharge of gas. Such porous mass has capacity to absorb heat of solution as well as resist decomposition of acetylene gas under pressure.

Machines and Procedures

The plants at JMGCL consist of –

1. SHARING MACHINE – This machine is used to divide the MS sheet into long and small parts.(according to the size of cylinder)
2. Rolling machine – this machine is used to roll the divided sheet (done through sharing machine) into cylindrical shape.
3. Hydraulic press- this is used to give the shape of dish to the sheet.
4. Welding machine – there are three types of welding :
   - Mig welding – used for longitudinal purpose
   - Summarzedarc welding – for making circumference to join the one roll and two dishes together to a form of cylinder.
   - Manual arc welding – used to make foot ring to give support.
   - Bung welding- used to make the neck ring.
5. Oil furnace – this is used to normalize the cylinder by heating the cylinder at 750 degree Celsius.
6. Shot blasting- main purpose of this machine is to clean the surface of the cylinder.
7. Valve fitting –this is used to fit the valves in the cylinders.
8. Hydrostat test – it is used to test check the leakages in cylinders.
9. Zinc coating, primer , and final paint on cylinder.

Through the above procedure an industrial cylinder is manufactured.

Identification

To identify various kinds of industrial cylinder different chromes are given.

- Yellow - Chlorine cylinders
- Brown - Dissolved acetylene
- Green / yellow - Sulphur dioxide
- Grey / violet - Freon cylinders

Products

- Ammonia Cylinders
- Chlorine Cylinders
- Dissolved Acetylene Cylinders (Welded & Seamless)
- Refrigerant Gas Cylinders
- Ammonia VP Ring Cylinders

Finished Goods

All cylinders are subjected for shot blasting followed by Zinc metalizing and painting by electrostatic spray painting with their color code. All cylinders are punched in accordance with their specification and finally certified by Bureau of Indian Standards.

Result & Observation

JMGCL manufactures industrial cylinder and the process involved in making these cylinders cause many environmental hazards. Many heavy types of machinery are installed in the factory like sharing machine, oil furnace, shot blasting etc.

The present study have found that, those machineries cause mainly two kind of pollution namely-

- AIR POLLUTION
- NOISE POLLUTION

During site visit it was analyzed that environmental pollution was mainly caused by the following machines –

OIL FURNACE

It is used for the stress relieving of the cylinder. The main component used in this machine is LDO ie. Light diesel oil. This is done for the heat treatment of the cylinders. Four burners are started at the same time and the cylinders are heated at about 750 degree Celsius. Then the cylinders are subjected to slow cooling. All this process leads to the emission of carbon mono oxide.

The main Source of air pollution in JMGCL is the "point source". These are the sources which add pollutants to the air from particular point. Here the main source is "CHIMNEY". The height of this chimney is approx. 26.48 feet above the ground.

ROLLING MACHINE /HYDRAULIC PRESS/ MIG WELDING MACHINE

These machine are involved in the process of manufacturing industrial cylinder and while doing so the produce huge sound around the factory. This leads to noise pollution.

Conclusion

Interaction with People

During the present study the authors interacted with the workers and staff members of the industry and in this way they came to know about all the raw materials, methods, machineries, procedure of manufacturing cylinders and various other information required for our research work. The interaction also helped the author to identify specific environmental issues generated inside the factory premises.

After the present study the following conclusions could be derived.

Impact of the pollution generated by the machines on surroundings

As discussed earlier the level of air and noise pollution is moderate. And due to this there can be adverse affect on the health of the workers they face occupational health problems like –

- Headache
- Hypertension
- Heart related problem
- Hearing problem
- Insomnia
- Breathing problem

The company has already taken up measures to control the adverse effect of pollution on their health. As it is known that, when the workers will be safe then only the company can grow and develop.

Control Measures Taken by JMGCL

- In order to control the level of air pollution the company has developed three well maintained gardens. So that these trees can take up polluted air and gases like CO_2 and provide fresh air.
- In order to control the noise pollution workers are provided with ear protection aids such as
- Ear muffs.
- Proper lubrication is done to the machine.
- Maintenance of machines time to time.

During the study it was also found that, JMC is committed to a policy of total quality in all aspects of their operations. Their further objective is to achieve product leadership as well as customer satisfaction in domestic and export markets, by supplying Gas Cylinders of national and international standards. They believe to create an environment of total quality management by involving our trained technicians for continuous improvement and technology up gradation.

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