

The plant in Hangzhou, China produces plastic fan blades and fan housings. Electric fan motors are purchased from a third-party and assembled with the plastic parts and sold as a finished product. The China operation is being conducted as a joint venture between Hartman Industries, LLC and a small consortium of Chinese nationals. Hartman Industries, LLC is providing most of the operation's capital, injection molding machinery and expertise. The Chinese partners are supplying labor, interfacing with local vendors, governments and regulatory agencies and providing some capital.

## Receiving Department

The receiving department accepts delivery of raw materials that are shipped to the company by truck. The raw materials, or inputs, are:

1. High-density polyethylene (HDPE) plastic pellets
2. Cardboard
3. Plastic film
4. Packing straw
5. Adhesives
6. Ink
7. Assorted electric fan motors
8. Solvent cleaners
9. Lubricating oils
10. Mold release agents
11. Electricity

The desired product is comprised of inputs sent to the molding department.

The possible byproducts, wastes, or outputs, from this department are:

1. Off-spec raw materials managed as a waste
2. Spilled materials that may cause land and water pollution
3. Wasted energy from lighting, heating, and processing equipment

If possible, off-spec raw materials are returned to the vendor for credit. Otherwise, the material is treated as waste and disposed of by our Chinese partners.

## Molding Department

The plastic fan blades and housings are offered in a limited array of colors. The offered colors are all standardized and that allows us to order pre-dyed HDPE pellets.

The inputs are:

1. HDPE pellets
2. Lubricating oils
3. Solvent cleaners
4. Mold release agents
5. Electricity

The desired product is comprised of molded plastic parts for the trimming department.

The outputs from this department are:

1. Emissions from the molding operation that may cause air pollution
2. Scrap plastic or flashing managed as solid waste
3. Plastic material used to purge the equipment before a color change, managed as solid waste
4. Spent cleaners and mold release agents that may create air pollution from volatile organic compound emissions, managed as hazardous waste
5. Off-spec product managed as solid waste
6. Used oils managed as industrial waste
7. Spent cleaners and mold release agents managed as hazardous waste
8. Wasted energy from lighting, heating, and processing equipment

Scrap plastic, off-spec product and purge material are handled by our Chinese partners.

Chinese workers have been trained in the use and application of cleansing solvents. Cleaning and maintenance of the machines and the collection of excess or waste chemicals is handled by our Chinese partners.

Used oils are handled by our Chinese partners.

## **Trimming Department**

The excess plastic attached to the part is trimmed with a mechanical shearer.

The inputs are:

1. Lubricating oils
2. Solvent cleaners
3. Electricity

The desired product is comprised of finished plastic parts for the assembly department.

The outputs from this department are:

1. Scrap plastic or flashing managed as solid waste
2. Off-spec product managed as solid waste
3. Used oils managed as industrial waste
4. Spent cleaners managed as hazardous waste
5. Wasted energy from lighting, heating, and processing equipment

Scrap plastic and any off-spec product is handled by our Chinese partners.

Chinese workers have been trained in the use and application of cleansing solvents. Cleaning and maintenance of the machines and the collection of excess or waste chemicals is handled by our Chinese partners.

Used oils are handled by our Chinese partners.

## **Assembly Department**

The plastic fan blades are attached to the electric fan motors using mechanical screws. The fan housings are assembled using adhesives, mechanical connectors and/or ultrasonic welding. The fan motors are mounted in the fan casings using mechanical connectors.

The inputs are:

1. Adhesives
2. Electric fan motors
3. Lubricating oils
4. Solvent cleaners
5. Electricity
6. Natural gas

The desired product is comprised of assembled plastic parts for the packaging department.

The outputs from this department are:

1. Emissions from the adhesive that may cause air pollution
2. Off-spec product managed as solid waste
3. Used oils managed as industrial waste
4. Spent cleaners managed as hazardous waste
5. Wasted energy from lighting, heating, and processing equipment

Off-spec products are handled by our Chinese partners.

Chinese workers have been trained in the use and application of cleansing solvents. Cleaning and maintenance of the machines and the collection of excess or waste chemicals is handled by or Chinese partners.

Used oils are handled by our Chinese Partners.

## **Packaging Department**

Appropriately sized cardboard boxes are assembled and bottom flaps are sealed with an applied adhesive. The finished fans are wrapped in plastic film to which heat is applied to shrink the plastic film to conform to the shape of the product. The product is then placed in the box along with packing straw to cushion the product. The top flaps of the box are sealed using an applied adhesive. A bar code identifying the recipient of the product is sprayed onto the box using ink.

The inputs are:

1. Cardboard boxes
2. Plastic film
3. Adhesives
4. Packing straw
5. Ink
6. Lubricating oils
7. Solvent cleaners
8. Electricity

The desired product is comprised of boxed plastic fans for the shipping department.

The outputs from this department are:

1. Emissions from the adhesive that may cause air pollution
2. Dropped packing straw managed as solid waste
3. Spilled ink that may cause pollution
4. Used oils managed as industrial waste
5. Spent cleaners managed as hazardous waste
6. Wasted energy from lighting, heating, and processing equipment
7. Wasted energy from the shrink-wrapping operation

All spilled packing material is collected and placed back in its hopper for use.

Chinese workers have been trained in the use and application of cleansing solvents. Cleaning and maintenance of the machines and the collection of excess or waste chemicals is handled by or Chinese partners.

Used oils are handled by our Chinese partners.

## **Shipping Department**

Boxes received from the packaging department are scanned for a bar code. Using the information from the bar code, a machine sprays the shipping address onto the surface of the box using ink. The box is then routed through a system of conveyor belts that sorts the box by its destination and delivers it to the appropriate section of the loading dock, so it is ready to be loaded onto a third-party commercial carrier.

The inputs are:

1. Ink
2. Lubricating oils
3. Solvent cleaners
4. Electricity

The desired product is comprised of correctly labeled boxes sorted to the appropriate carrier.

The outputs from this department are:

1. Spilled ink that may cause pollution
2. Used oils managed as industrial waste
3. Spent cleaners managed as hazardous waste
4. Wasted energy from lighting, heating, and processing equipment

Chinese workers have been trained in the use and application of cleansing solvents. Cleaning and maintenance of the machines and the collection of excess or waste chemicals is handled by our Chinese partners.

Used oils are handled by our Chinese partners.

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