HOW TO START MANUFACTURING INDUSTRIES

PAINT AND VARNISH MANUFACTURING PLANT

Paints and varnishes are materials for the protection of hard surfaces (metal, wood, building materials) against negative atmospheric, climatic and other influences and for the aesthetic finishing of these surfaces. Their uses are numerous and varied in many branches of industry.

The composition and chemical and physical properties of paints and varnishes depend on the purpose for which they are intended. Thus, there are paints resistant to atmospheric agents, high temperatures, chemical agents, etc.

The natural start in the manufacture of paints and varnishes is the establishment of a manufacturing plant for simpler types of products, while paints and varnishes used in the metal and wood manufacturing industries come later, at which point preparations can begin for the manufacture of synthetic and water emulsion resins.

The present technology covers the first manufacturing stage only, i.e. the manufacture of paints used in building construction and alkyd paints for anti-corrosive protection of metal structures. The manufacturing process at this first stage is relatively simple, and the initial investment is considerably smaller than in other chemical industries.

The plant building is planned and built from the beginning for an output that is larger than the first stage. However, the equipment is initially installed only for the economically profitable first-stage production of 3,000 tons annually in a single shift. Later, additional equipment can be installed to increase the production capacity to 10,000 tons annually in the final stage of the project.

PROCESS DESCRIPTION

The basic technological production process involves mixing of the various raw materials, using mixers mainly of the disperser type, and dispersing pigments and extenders in the binder solution using mainly machines of the sand mill type, if the product has to be coloured. Finishing is carried out in tanks with mixers and involves adding the remaining liquid raw

This information has been prepared for UNIDO by the Institute for Developing Countries, Yugoslavia. Inquiries should be addressed to: IPCT/II/PROM, Registry file No. ID/562/12, UNIDO, P.O. Box 300, A-1400 Vienna, Austria.

materials to the batch and adjusting the quality by adding small quantities of raw materials and semi-finished products.

Transparent products (lacquers, varnishes), which do not contain pigments, involve the following processes: dissolution of film-forming components, adding and mixing of other liquid components, quality improvement, quality control, filtering, packing.

Pigment products (paints, enamels) involve the following processes: dissolution of film-forming components, premixing of the film-forming solution with pigments, dispersion, mixing of other liquid components, quality improvement, quality control, filtering, packing.

The liquid raw materials (resin solutions, organic solvents, additives) are stored in drums, while some of the most important ones are stored in tanks outside the plant building. Powdered raw materials (pigments, extenders) are in paper bags and are stored in closed warehouses or storerooms.

The equipment is universal, so that almost all types of organic coatings can be made on one production line. Since the solvents are inflammable and the mixture of their vapours with air is explosive, all the production equipment is specially constructed so as to be safe; firefighting installations are built into the plant.

In the manufacture of paints and varnishes a batch system of production is used.

PRODUCTION CAPACITY

Item	First stage tons/year
Water emulsion paints	1,500
White alkyd paints	600
Coloured alkyd paints and primers	600
Facade paints based on acrylic resins in organic solvents	100
Thinners	100

Basis: 8 hours/day, 280 days/year

REQUIRED MACHINERY AND EQUIPMENT

Item	No.
Dissolvers	2
Wall mixers	2
Pearl mills	2
Mixing tanks	10

Scales	5
Filling equipment	2 sets
Pumps	5
Movable vessels	20

Other equipment: transport vehicles, fire-fighting equipment, ventilation or heating (depending on the climate), electrical equipment, tubes and fittings, maintenance equipment, laboratory equipment.

FOB price of machinery and equipment: approx. US dollars 800,000 (1984)

REQUIRED RAW MATERIALS (first stage)

Item	tons/year
Emulsion resins, 50%	400
Alkyd resins, 70%	500
Acrylic resins, 50%	40
Pigments, white	330
Pigments, coloured	70
Extenders	560
Additives	50
Solvents	400
Water	250

REQUIRED MANPOWER (for two shifts)

35 operators are needed for the annual production capacity of 3,000 tons.

Qualification	No.
Engineers	2
Technicians	3
Skilled workers	25
Unskilled workers	10
TOTAL:	40

REQUIRED UTILITIES

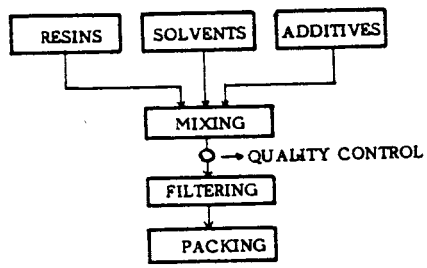
Electric power	100 kWh/ton of product
Cooling water	1-3 tons/ton of product

REQUIRED AREA FOR PLANT SITE

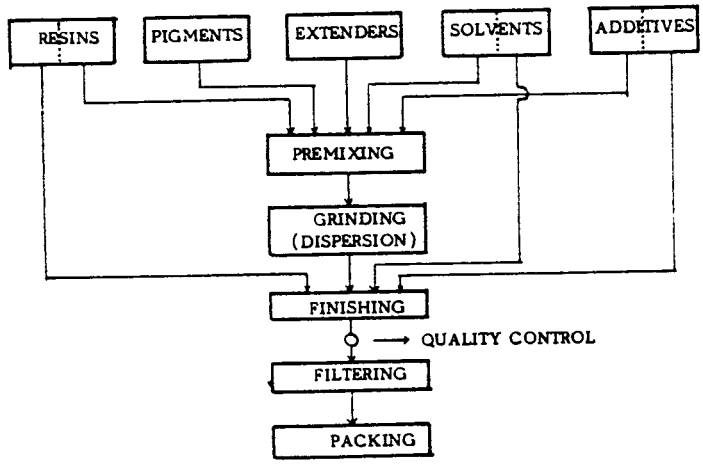
Production area	500 m^2 (final stage)
Storage space, raw materials, and packing	500 m^2 (first stage)
Storage for finished products	300 m^2 (first stage)
Dressing rooms	200 m^2 (first stage)
Laboratory	120 m^2 (first stage)
Office space	as required.

VARNISHES, PAINTS AND ENAMELS PRODUCTION BLOCK DIAGRAM

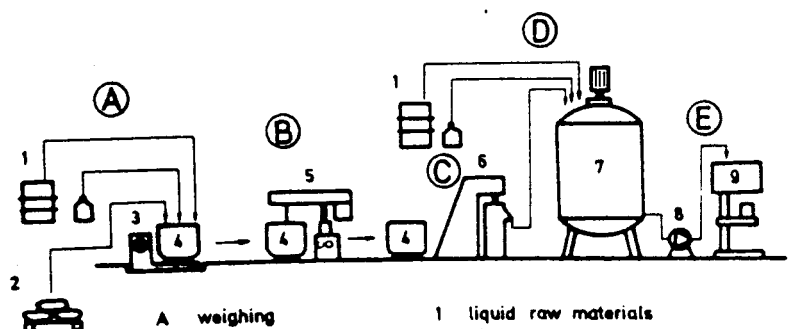
VARNISHES



PAINTS, ENAMELS



PRODUCTION OF ALKYD AND INDUSTRIAL PAINTS SCHEME OF BASIC PRODUCTION PROCESS



A weighing
B premixing
C grinding
D finishing and tinting
E filling and packaging

1 liquid raw materials
2 pigments
3 scales
4 movable vessel
5 disperser
6 pearl mill
7 mixing tank for finalization
8 pump
9 filling machine