asian paints

Asian Paints Ltd, Kasna Plant (UP)

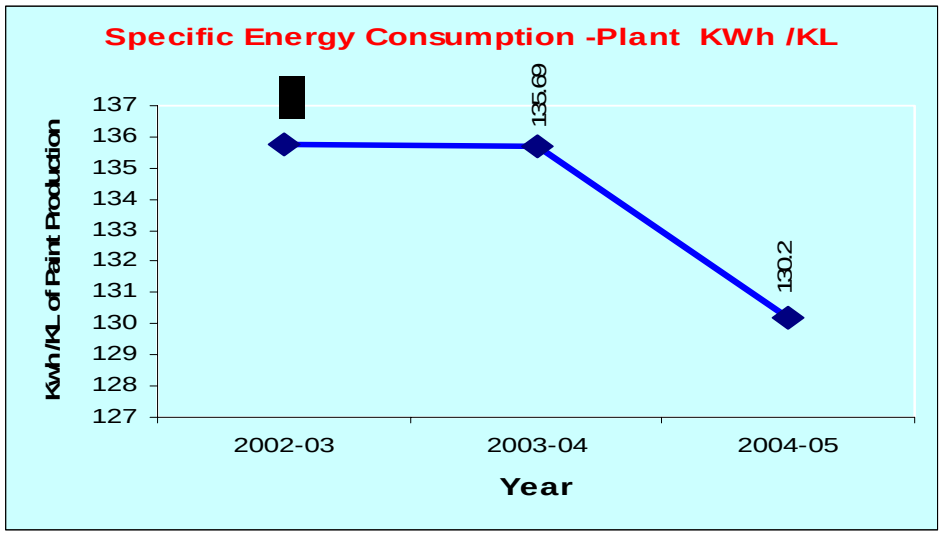
Plant Profile:

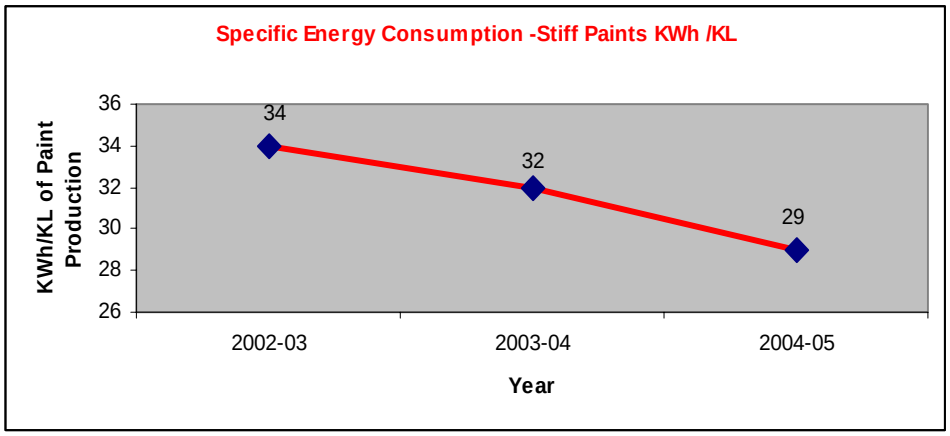
Asian Paints Ltd, Kasna plant is one of the paint manufacturing units of Asian Paints Ltd, a market leader in decorative paints with turnover over **Rs. 2500 Crores**. Kasna plant has installed capacity of 50000 KL per annum & contributes 25 % of the total turnover of the Company.

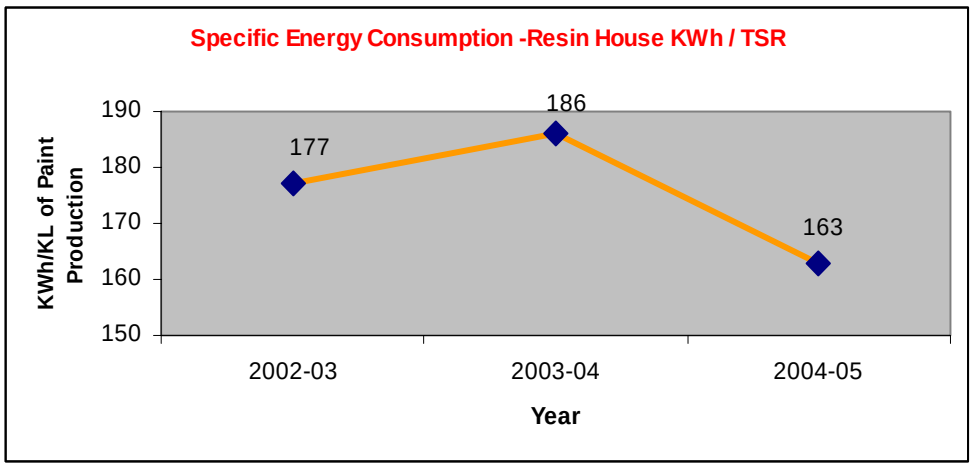
The manufacturing site operates on the principles of "World Class Manufacturing" (WCM), and as part of this philosophy, Environment, Health and Safety are awarded the same importance as Productivity, Quality, Cost or any other facet of WCM.

Kasna Plant has in-house Captive generation capacity of **2 MVA** which is used as a stand by power source.

Overview of Plant/Sectional Specific Energy Consumption over last 3 years:







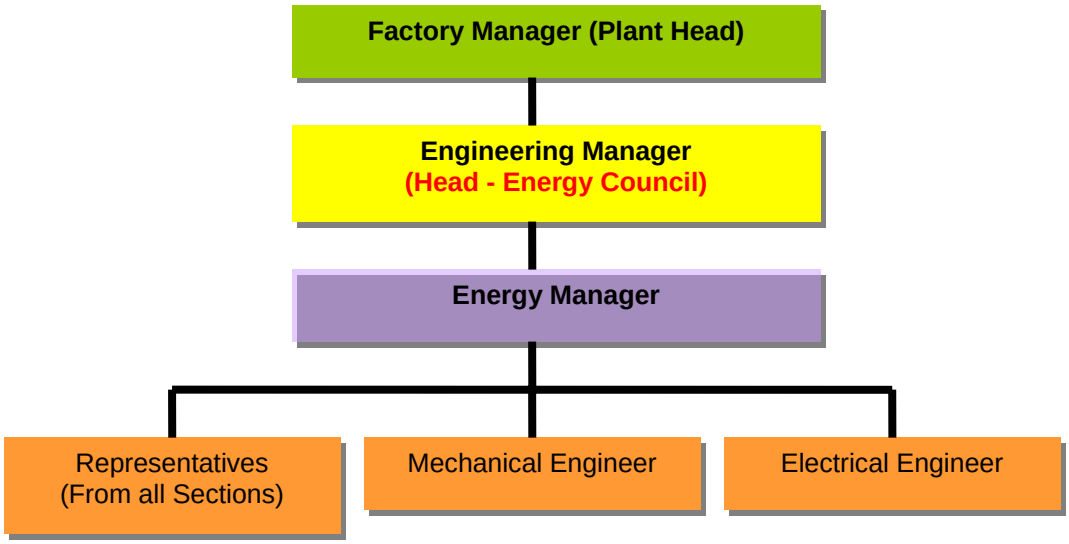
Energy Conservation Commitment Policy and Deployment:

Energy Conservation Cell

The Plant has Energy Conservation Cell named **"Energy *Council*"** headed by Plant Engineering Manager who is assisted by an Energy Manager and supported by representation from each section. This team identifies various energy saving potential in their work areas, brings the proposal to Energy council for detailed discussions and brain storming sessions for finalization and implementation. The team formally meets at the beginning of each month to finalize the action plans for the starting month and share the implementation status of the various action plans decided in previous meetings. Also,

Scheduling of equipment to facilitate optimum utilization of resources is considered in the scope of the Energy Council.
Energy consumption is monitored on a **Daily basis**, under various heads to facilitate identification of potential areas of improvement.
The plant is committed to fine tuning of operations & maintenance continuously to achieve the goal, technology up-gradation with energy efficient process and equipment, and Motivating, Training & encouraging employees to achieve a target reduction of minimum 2% Specific energy consumption every year.

Energy Conservation Cell Structure (Energy Council)



Energy Conservation Achievements:

Asian paints Kasna Plant has implemented many Energy conservation proposals of small, medium & large scale. The unit has taken many Energy conservation measures such as installation of Variable speed drive, Delta star converters, Installation of timers, Replacement of cooling towers; need based operation of cooling tower pumps & many more. During the year 2004-05 with various energy conservation measures, the plant has saved an amount to the tune of **Rs. 22.0 Lacs**.

Summary of Savings Achieved in 2005-06 through various Energy Conservation Activities:

Energy Conservation Measures - Kasna 2004-05				
S. No.	Section	Load	Actions Taken	Anualised Savings INR (lacs)
1	Resin House	Fixed	Optimization of Cooling Tower Pump Operations in RH	7.70
2	IPU	Fixed	VFD for Blowers of FDV system at IPU	2.50
3	Resin House	Fixed	Optimization of Nitrogen Plant Operation	0.75
4	Monomer TankFarm	Fixed	ON/OFF Controller for Cooling Tower Fans	1.30
5	Utility	Fixed	Optimization of Cooling Tower Operation For Air Compressor	0.50
6	Monomer TankFarm	Fixed	Shutdown of Monomer Chilling Plant during winters	1.25
7	Utility	Fixed	VFD for Air Compressor	0.50
8	Paint House	Fixed	Chilling Plant Interlock	0.25
9	IPU & TB	Fixed	Replacement of GLS light fittings	0.55
10	Stiff	Process	Star Delta Converters for 2T Pugmills	6.09
11	Paint House	Process	Timers for OHM Stirrers	0.53
Total Annualised Savings				21.92

Major Energy Conservation Projects Implemented During the Year 2004-05 have been explained in brief under two heads:

- **Reduction of Fixed Electrical Load.**
- **Reduction of Process Load.**

Reduction of Fixed Electrical Load

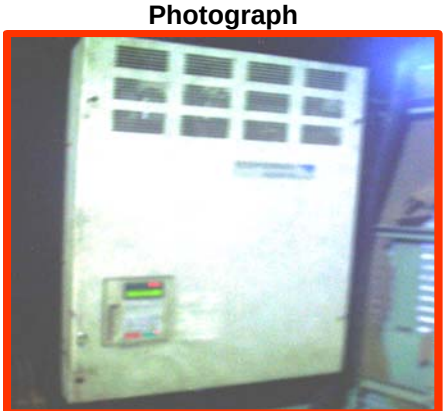
1) *Optimization of Cooling Tower Pump Operations in Resin House*

Previous system	New System
1. Resin House cooling requirements are met through three cooling towers with three pumps each. 2. All three pumps were operated in Each Cooling Tower Irrespective of Cooling requirements at Reactors.	1. Feasibility studies conducted for operation with Two Pumps in each of the cooling tower 2. Studies revealed that one cooling water pump can be stopped for a large part of the day. 3. Running hrs of third cooling water Pump brought down to 6 hrs /Day from existing 24 hrs /Day.

Energy Saving Details	Photograph
Daily Kwh Reduction -600 Units ***Annual Saving - INR 7.7 Lacs.***	***NA***

2) *VFD for Blowers of FDV system at IPU*

Previous system	New System
1. *Force draft ventilation system Blowers (2 no) were driven through Induction motor running on Star Delta starter.* 2. *Blower was run at 576 rpm through V-belt Pulley reduction*	1. An existing 100 HP spare VFD of Kneader machine was identified for speed control of blowers. 2. An innovative idea to control speed of both the blowers through a single VFD is successfully implemented. 3. The speed of the blowers were set to match minimum air changes required.

Energy Saving Details	Photograph
Daily Kwh Reduction -192Units ***Annual Saving - INR 2.5 Lacs.***	

3) *On/OFF Controller for Cooling Tower Fans*

Previous system	New System
1. Fans of Monomer tank farm and IPU cooling towers were run continuously irrespective of the cooling tower sump water temperature. 2. Running of Fans even after achieving desired sump temperature has resulted in waste of energy. 3.	1. On -off controllers are installed on the cooling tower fans at Monomer tank farm & IPU. 2. Fans are automatically switched off after the set sump water temperature is achieved. This has avoided unnecessary running of fans.

Energy Saving Details	Photograph
Daily Kwh Reduction -108 Units ***Annual Saving - INR 1.3 Lacs.***	

4) Optimization of Cooling Tower Operation For Air Compressor

Previous system	New System
1. The existing Cooling tower of Paint House supplies cooling water to Ball mills, Sand mills & Central Air compressors. 2. One cooling water pump of 20 HP rating is run for this purpose. 3. On Sunday / Holiday this pump is run only for Central Air compressors since other process equipment are shut down.	1. Different alternates were studied to arrive at optimal loading. 2. Option of relocation of existing cooling tower of emulsion tank to Central air compressor area is found to be most feasible. 3. A 5 HP pump of this cooling tower is run to support Central air compressor during Sundays / Holidays.

Energy Saving Details	Photograph
Daily Kwh Reduction -160 Units ***Annual Saving - INR 0.5 Lacs.***	

5) Optimization of Nitrogen Plant Operation

Previous system	New System
1. Compressed air demand of Nitrogen plant at resin house was met by a local 20 HP 100 CFM air compressor at RH.	1. Feasibility study of running Nitrogen plant on Central air compressor vis a vis local compressor revealed potential for power saving. 2. Nitrogen Plant is hooked up to Central air compressor leading to reduction in energy consumption at RH.

Energy Saving Details	Photograph
Daily Kwh Reduction -50 Units ***Annual Saving - INR 0.75 Lacs.***	***NA***

Reduction of Process Load:

1) Star Delta Converters for 2T Pugmills/TSD/Sand Mixers

Previous System	New System
1. 2 T Pug mills /TSD /Sand Mixers were run on Star Delta starter. 2. During low load period, these equipment continued to run on delta leading to high power consumption.	1. Star Delta Converters are installed on All 2 T Pug mills /TSD/sand Mixers leading to reduction energy consumption per batch

Energy Saving Details	Photograph
Daily Kwh Reduction -460 Units ***Annual Saving - INR 6 Lacs.***	

2) Timers on Paint House Over-Head stirrers

Previous System	New System
1. Stirrers of OHM run continuously during entire sand milling operation.	1. OHM stirring required intermittently. 2. Sequence timers installed on 4 OHM stirrers. installation on rest of The OHM to be done during 2005-06

Energy Saving Details	Photograph
Daily Kwh Reduction -40 Units ***Annual Saving - INR 0.53 Lacs.***	NA

Other Projects Implemented during 2004-05:

1. Stoppage of idle running of equipment.
2. Thermal insulations provided wherever damaged.
3. Switching off Lights, Fans and ACs by individuals whenever offices are not occupied.
4. Switching off PC monitors.
5. Interlocking of operation of Hot well pumps of Chilling plant with compressor operation.
6. Paint Level based Diaphragm pump operations have helped to reduce air consumption in turn reducing electrical energy consumption.
7. Implemented the **5 S** system (Sort, Set in order, Clean, Standardize & Self Discipline) for good & Clean environment.
8. Kaizen system has been implemented for improvement and 63 Kaizens implemented during the year 2004-05. These also included projects related to Energy Conservation.

Energy Conservation Plans and Targets:

Energy Conservation Projects For the financial Year 2005-6			
SN	**Project Description**	**Investment in Rs Lac**	**Expected Benefits**
1	Air preheater for Thermopacs-3 nos	11.00	5% reduction in fuel consumed on Thermopacs
2	Powder Charging hopper at Top floor for Reactor - REA-K404	2.50	8 % reduction in Reactor cycle time
3	Thermic fluid heater for Thermopac Fuel preheating-2 nos	3.00	Reduction in energy consumption to the tune of of 90 units /batch
4	Energy Audit recommendation Implementation	10.00	Expected reduction in Specific Power consumption is 5 units
5	Separate Air compressor for RH and Monomer tank farm	17.00	Reduction in energy consumption to the tune of of 60 units / day
6	Upgradation of cooling tower CT-K403 at Resin House	6.79	Reduction in cooling cycle time of reacto by 20 minutes.expected savings of 10 units / Batch
7	Upgradation of RH Filtration Pumps - 4 nos	3.00	10 % Reduction in resin filtration time
8	Replacement of Heat Tracing in Medium Tanks	6.00	Reduction in power consumption by 3%
9	Hydrofoil agitators for Medium Tanks-2 nos	3.00	Reduction in connected electrical load by 15 KW
Total Investment		62.29	
Expected benefit in Rs Lac /Annum		30	

Paint Process Description

1.1 Manufacture of Distemper

Distempers are wall finishes, sold in the form of pastes of uniform and smooth consistency. Processing of distempers are carried out in a single stage in pugmixers that have a pair of helical mixers revolving in opposite direction. The powdered raw material together with binder solution and other additive are charged in pugmill. The dispersion is achieved by the shear force and pugging action generated in the pug mill. Shade and other adjustments are carried out in the mill itself and the material is packed on special packing machines suitable for stiff mass.

The process schematics of distemper paint is shown in Fig.

1.2 Manufacturing of Emulsion

Process

The main ingredients in emulsion manufacturing are monomers, initiator, surfactants, antifoaming agents, pH stabilizers, biocides, chain terminators, neutralizers, and digesting/chasing catalyst.

Demineralised water, monomer, surfactant, catalyst are charged into pre- emulsion vessel and stirred well. The vessel is of stainless steel and jacketed with cooling water circulation. The pre-emulsion is prepared before main reactor batch, as pre-emulsion tend to polymerize on storage. In case pre-emulsion needs to be stored for longer duration, the mass needs to be kept cooled. Demineralized water, surfactants and other additives are charged into main reactor with stirring. The emulsion kettle is of stainless steel and is limpeted with 3 coils (bottom, middle and top) with provision of heating with steam and cooling with cooling water. Chilled water is also provided if the mass needs to be cooled rapidly.

The mass is heated upto the reaction temperature of 60^{O}C to 70^{O}C using steam in limpet.

The pre-emulsion from pre-emulsion vessel is added into the reactor with a controlled flow rate and the rate of addition is maintained through metering pump and is normally done in 3-5 hrs time. The polymerization reaction is exothermic, the heat of reaction is removed and the temperature is maintained by circulating cooling water in the limpet of the reactor. The batch is digested for 45 to 60 minutes at the reaction temperature of around 78^{O}C for completing the polymerization. Temperature is maintained by circulating steam or cooling water as required.

After checking the characterization the mass is cooled in the reactor or transferred to the led-down vessel and cooled to around 55^{O}C. The cooled emulsion is filtered through bucket filter with nylon elements to remove particles and then transferred through diaphragm pump to storage vessel.

During pre-emulsion charging, monomer vapour generated due to heat of polymerization, is condensed in horizontal condenser provided above the reactor and is collected in the separator below the condenser.

1.3.3 Manufacturing of Alkyd Resins

Alkyd Resins

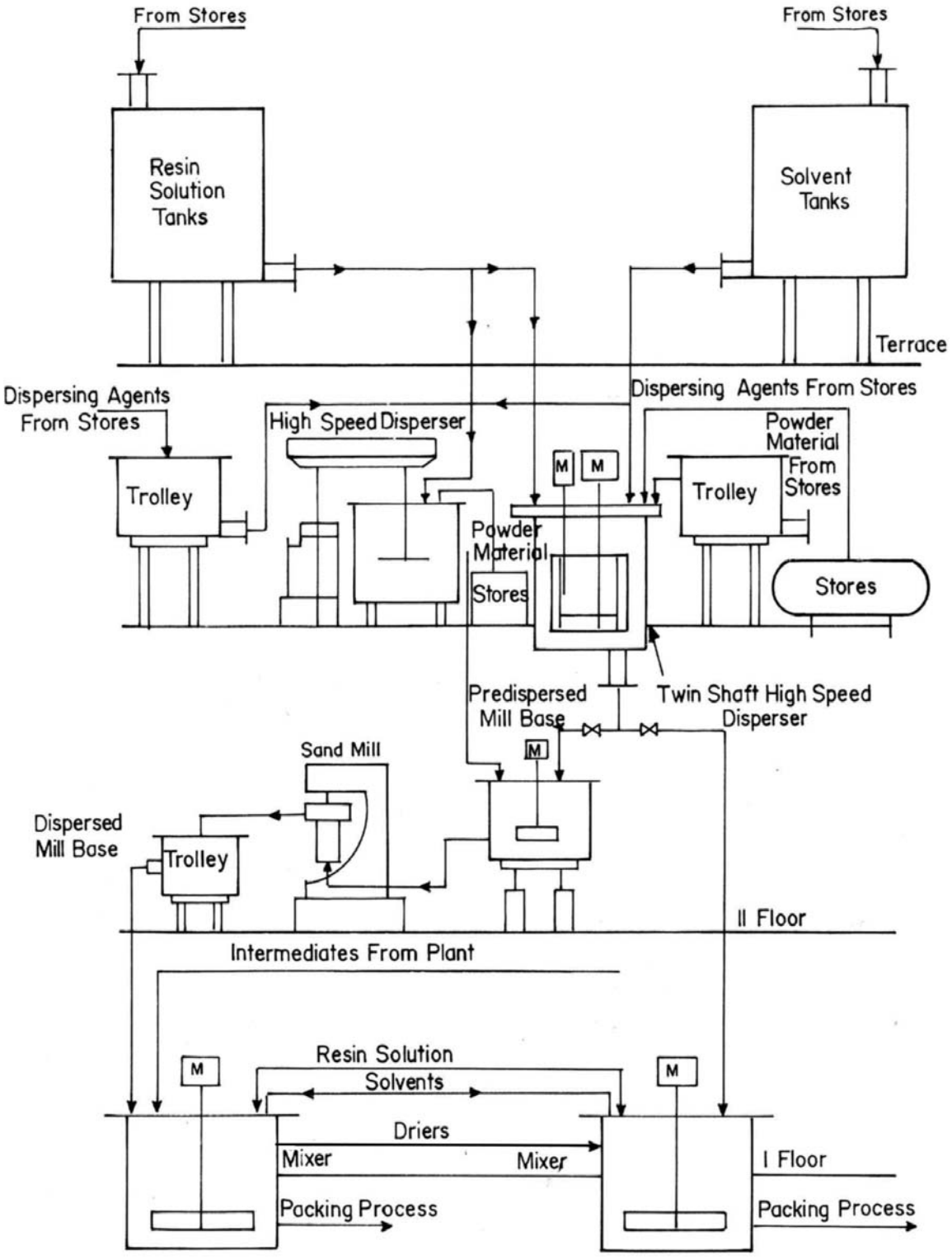
Alkyds are the reaction products of polyhydroxylic and polycarboxylic substances alongwith vegetable oil or fatty acid. Polyesters formulated on saturated components are referred to as oil-free alkyds.

Resins are manufactured in reaction vessels by polymerisation of oils, polyoils and polyacids in the presence of catalyst and certain additives for removal of water of reaction. The reaction is monitored by checking temperature, viscosity, acid value and % solids. The time required for main reaction varies from 18 to 48 hrs.

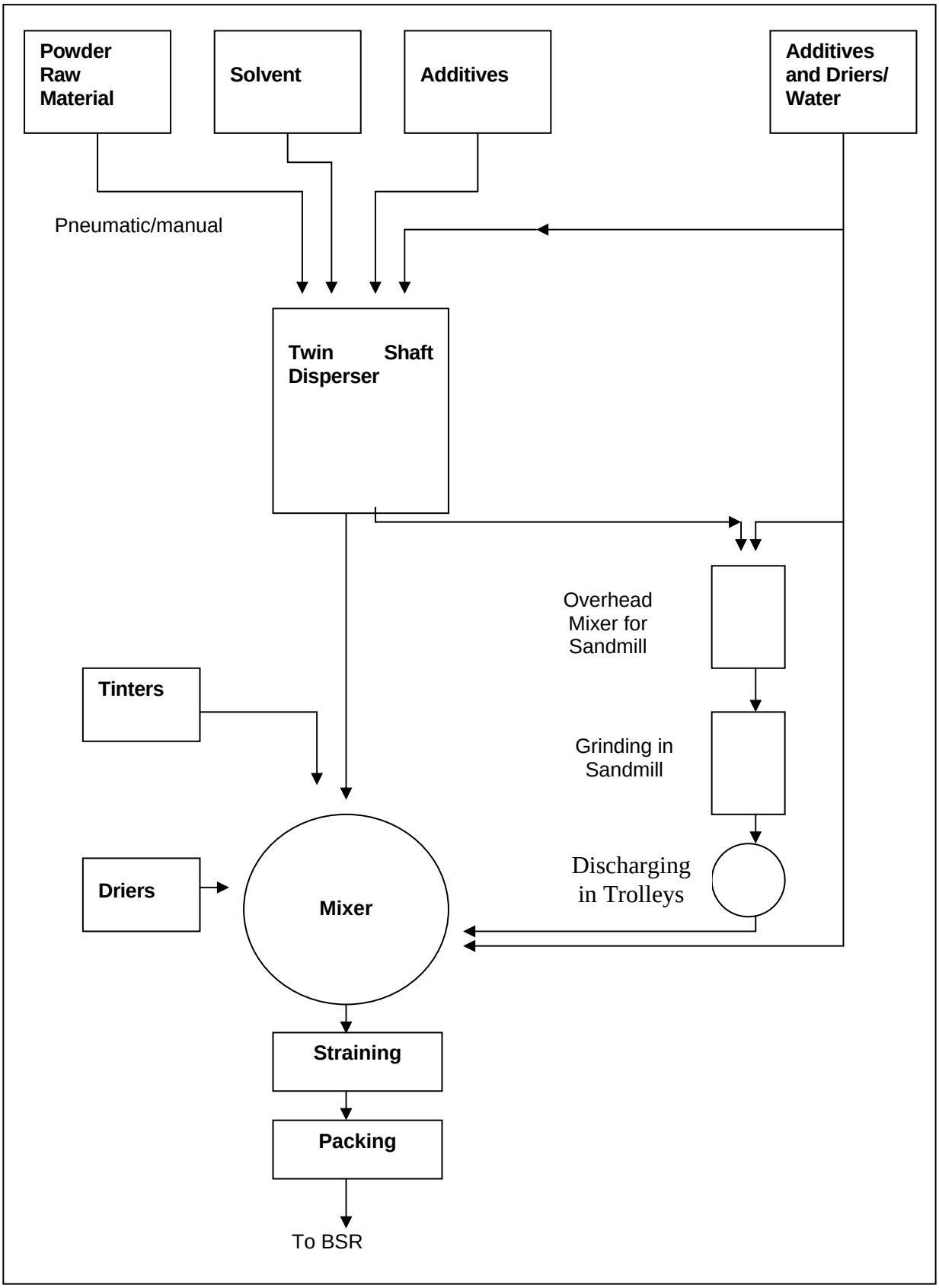
Measured quantity of oil is charged in thermic fluid heated reaction kettle and heated to 205-232^{O}C under inert atmosphere. To the heated oil, measured quantity of polyalcohol is added at about 250-260^{O}C. Now the catalyst is added to the reaction mass and temperature is maintained for

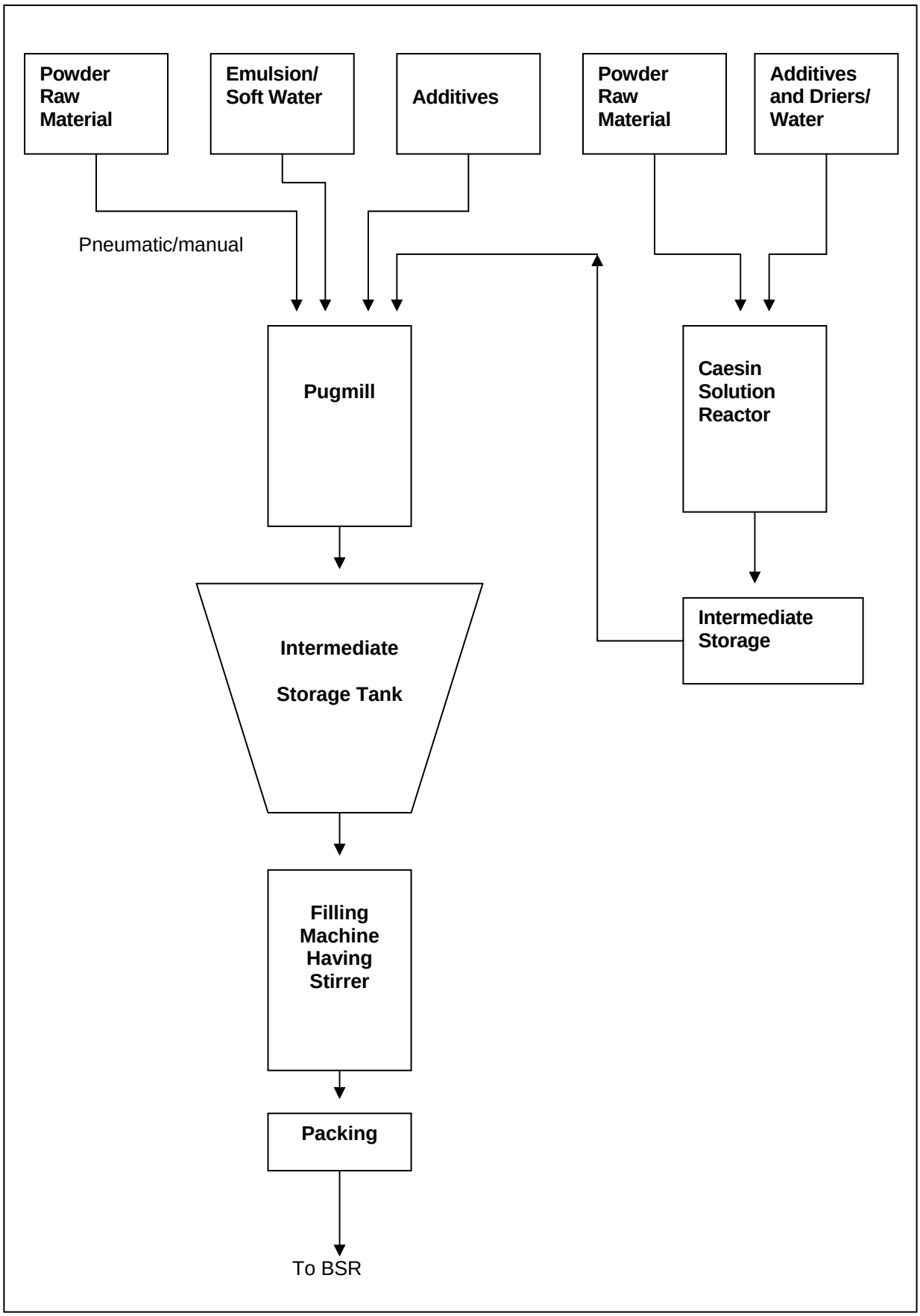
30 to 60 minutes till desired constants are reached. The remaining polyalcohol is now added to the reaction mass. The product is cooled to 175-205^{O}C for the addition of polyacid and then the temperature is raised to about 250-260^{O}C and maintained for few hours till the desired constants are attained. After attaining the final constants, the resin is cooled to 175-235^{O}C and discharged to thinning tanks. Here resin is blended with solvents to the required % solids.

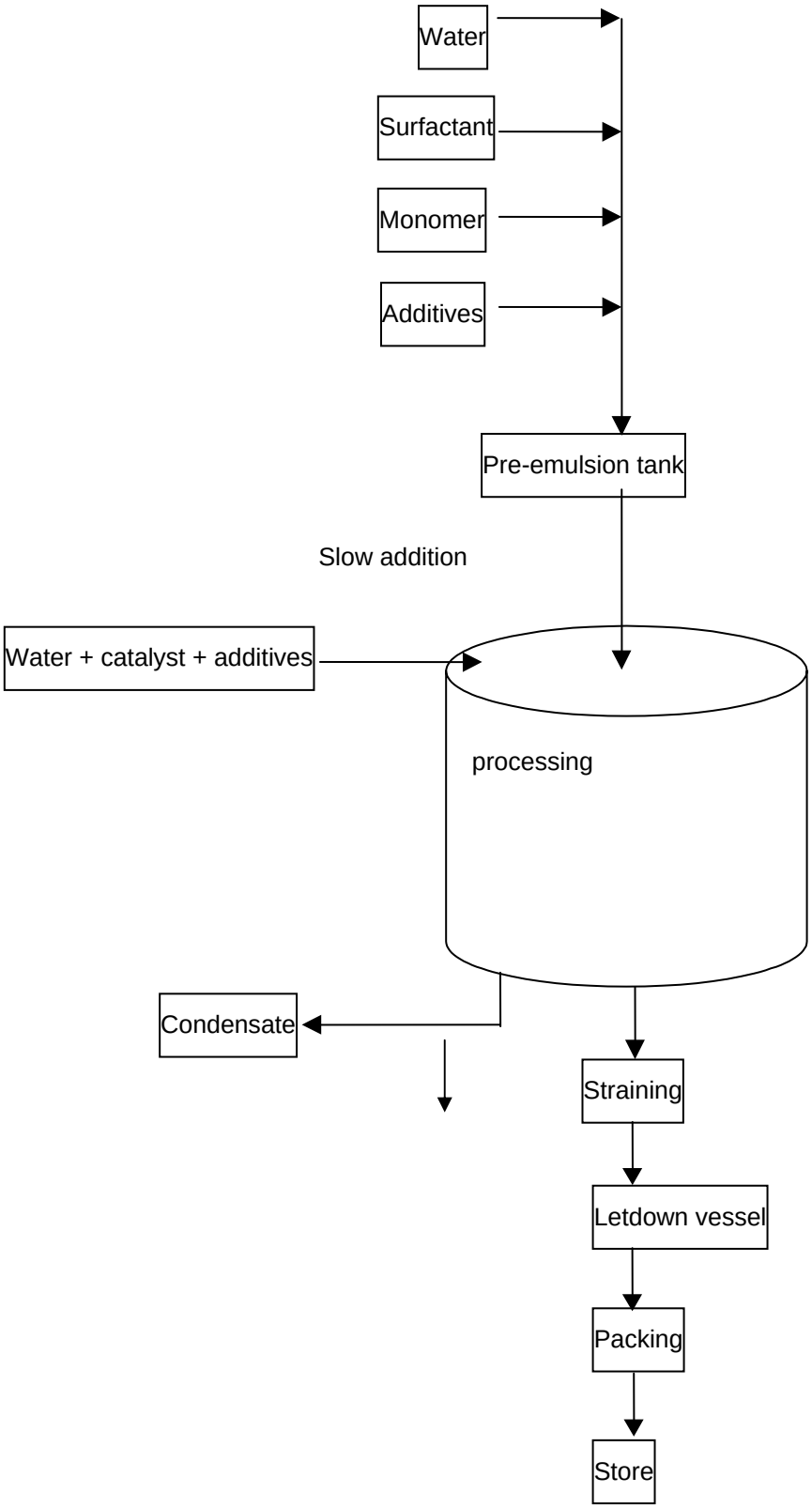
The thinned resin is filtered through a filter machine and then pumped to storage tanks for further use in paints. The acrylic and amino resin are manufactured with different raw materials with control. Parameters ensures manufacturing of the these resins. The process facilities are similar to alkyd resins.



Flow Diagram for Enamels and Primers in Sand Mills/Twin Shaft High Speed, Disperser Unit


Powder Raw Material
Solvent
Additives
Additives and Driers/ Water
Pneumatic/manual
Twin Shaft Disperser
Overhead Mixer for Sandmill
Tinters
Grinding in Sandmill
Driers
Mixer
Discharging in Trolleys
Straining
Packing
To BSR


Powder Raw Material
Emulsion/ Soft Water
Additives
Powder Raw Material
Additives and Driers/ Water
Pneumatic/manual
Pugmill
Caesin Solution Reactor
Intermediate Storage Tank
Intermediate Storage
Filling Machine Having Stirrer
Packing
To BSR



Flow Diagram for Emulsion Process