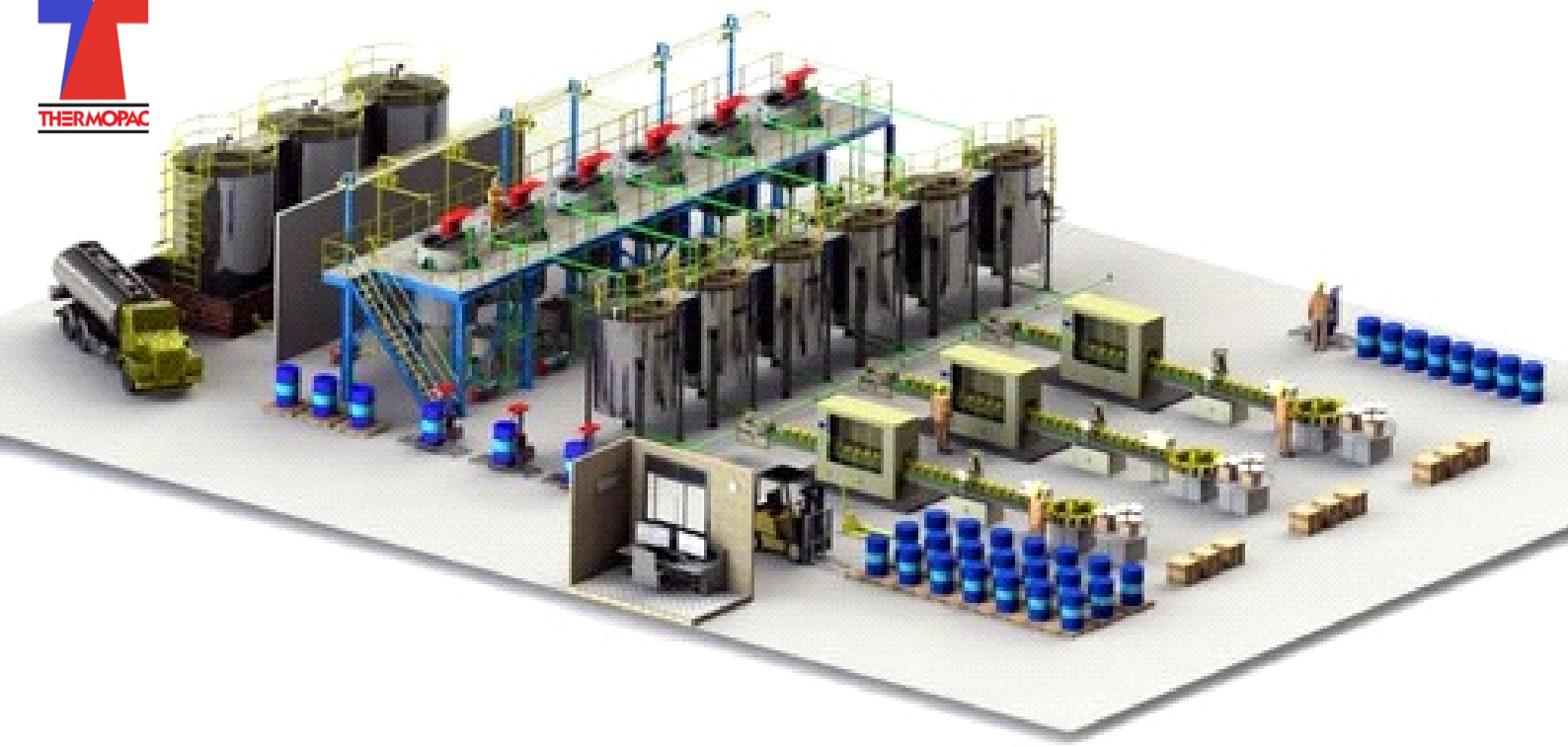

Lube Oil Blending Plant

Brief Process Description:

The process involves mixing and blending of base mineral oils with additives to produce blended lubricating oil. The additives give the oil the desired physical properties. Common additives include high molecular weight polymers and metals.

Incoming base oils for blending are stored in bulk storage tanks within the tank farm. The base oils are pumped and conveyed through pipes to the blending tanks located inside the blending plant. The components are metered or weighed before they are introduced into the vessels. The measurement of small volume additives is done by means of flow meters, whereas large components as well as solid additives are weighed by means of load cells.

The process is carried out at atmospheric pressure and when required, heat energy is applied to reduce the viscosity of the base oil and additives to ensure effective homogenization.

The time taken for a batch to complete depends on the product specification and the size of the blend. Blending time for a standard batch can vary from one hour to three hours.

Quality checks are carried out at different stages to ensure the quality of the product.

On completion of the process, the products are pumped to the product holding tanks. From these tanks, they are sent to the three product filling areas, viz., small pack filling plant, drum filling plant, and bulk filling station.

Output is based on one shift operation per day, eight hours per shift, five working days per week and fifty-two weeks per year.

Vapors from vents of storage tank sand vapor emission from additive tank heating pass through Hot oil combustion chamber for oxidation,.

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Raw Materials Required:

The raw materials required are base mineral oil and additives. Typically, the blended product contains 90% base oil and 10% additives. The final quality of the blend will depend on the product specification and customer's requirement.

Scope of Thermopac Supply:

Conceptualization and Planning (C&P)

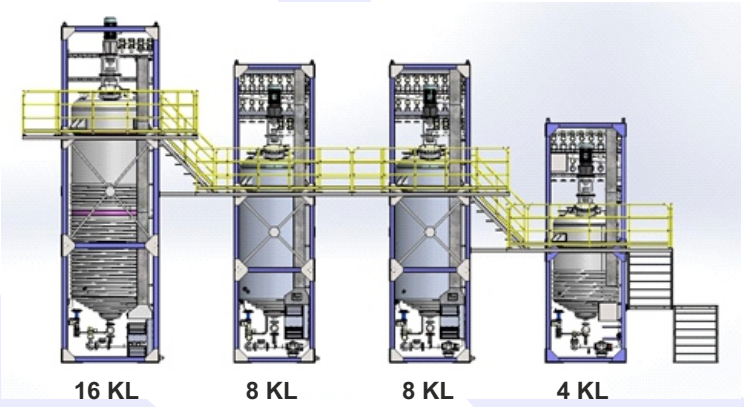
a) Detailed Engineering:

b) Preparation of Layout Drawings

1) Preparation of basic Layout Drawings
2) Blending Area and Barrel Filling Shed
3) Tank age Foundation Drawings
4) Blending Machinery Foundations
5) Pump House and Utility Block
6) Piping Drawing
7) Design of Fire Hydrant System
8) Design of Electrical System

Automated Bending plant:

Automatic Batch Blending Skid Size



Thermopac skid-mounted units comprise the blending tanks.

The skids are pre-wired and are complete with necessary instruments and controllers such as temperature, pressure, flow and level and local junction boxes. All hot surfaces are insulated and cladded wherever required. Input and output piping along with control and one isolation valve wherever required is part of Thermopac supply.

PLC controlled dust proof control panel is supplied for controlling the skids. SCADA system along with pre-programmed desktop computer is a standard supply.

- **Control panel:** Automated blending process with ABB plc and SCADA based controls. Full automation system for the equipped with the ability to regulate heating time, temperature control, mixing rates and flows rates. This system also has the ability to produce receipts, reports and production parameters.
- **Load cells based metering system:** All fully digital load cell based metering system for the raw materials and finished products, equipped with a complete set of flow regulators, programming devices, manifolds, etc.
- **Pumps:** A set of Blending pumps to match the required production capacity.
- **Agitator system:** Every blending kettle is provided with mixing jets and agitator for uniform homogeneous mixing.
- **Self-cleaning system:** Every blending kettle is provided with cleaning line and spraying nozzles.
- **Pipeline and headers:** A complete pipeline headers and control valves in skids to integrate the base oil tank and additive in blending kettles.
- **Heating system:** A complete heating system comprising of a Thermic Oil heating unit, hot oil circulating pump and expansion tank.
- **Electrical fittings and systems:** Skids are pre wired with junction box, cables, and cable trays.

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