

Electricals For Mini Paper Plants

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HT Panel

Assuming typically that the electricity would be completely purchased from Electricity Board at a supply of 11 KV, a total requirement of about 1500 KVA would be required. At the starting point there will be a 11 KV to 440 Volts transformer. For the protection on the HT side a Triple pole Gand operated Fuse switch, which trips off when any one of the fuses blows, can be used. This would provide adequate protection against short circuits, although from the view point of sustained overloads of up to 20% this may not provide any protection. This is because after consideration of the magnetising in-rush currents manufacturers normally recommend a Fuse rating of at least 20% higher than the full load current rating of the transformers. In any case, overloads of this nature are infrequent and could be taken care of by the LT circuit breaker. Moreover even with the more sophisticated IDMTL (Inverse Definite Mini-

For the purpose of the analysis of electrical requirements of Mini Paper Plants, the assumption made here is on the basis of a production of 3000 to 6000 Tonnes per annum. Accordingly the connected Horse Power requirement would be in the region of 1200 to 1800 and a demand of about 1500 KVA. While laying out the electricals and choosing the equipment, the prime consideration of such plants would be one of cost. This would necessarily mean that, consistent with the safety of the equipments, one should go in for the simplest arrangement to keep the operation of the plant at a reasonably efficient level.

mum Time Limit) which are used with circuit breakers the relay would start operating only at currents of about 1.3 time the respective current settings. This would mean that simple HRC fuse is at no disadvantage when compared to the relay.

The cost of fuse switch would also be much less than the value of circuit breaker of equivalent rating.

Transformer

The Transformer to be used for conversion of 11 KV to LT voltage of about 440 V will be the usual natural oil cooled Transformer with or without Bucholz relay. In case of operation with Bucholz relay it could be connected to trip the HT fuse switch.

LT Panel

In the Lt side we could have a Breaker with the normal Thermal and Magnetic releases and Earth leakage relay. A Drawout feature is not necessary for a small plant of this nature as when the circuit breaker does need attention the switch on the HT side

could be conveniently switched off.

Even if elimination of the drawout feature does not lead to much cost saving, it would be preferable to do without the same as the isolating contacts could give the same problems.

In a typical mill the Loads could be conveniently grouped under 4 or 5 major Load Centres like—

1. Raw material Preparation and Pulping.
2. Stock preparation and Pump House.
3. Paper Machine Drive and Auxiliaries.
4. Utilities and Services like Steam, Water, Compressed Air & Workshop.
5. Lighting.

There could be some additions to the above depending on the pulping process and the plant layout. We have the choice of having either circuit breakers or HRC switch fuse units. Here again one could make substantial saving in cost by having the switch fuse unit rather than the circuit breakers.

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Motor Control Centres

The Motor Control Centres for paper mill should be of dust and vermin proof, enclosed panels. A choice between Cast Iron Boards and sheet steel MCCS can be made depending on whether there is a lot of dust vapour. A cast iron board would be better if the gasketing is done properly and in place and all the cable entries are properly sealed.

On the basis of spares requirement also cast iron board requires less spares than sheet steel enclosure but the latter has become very popular with the continued improvement and compartmentalisation. At this stage it would be very difficult to generalise which would be a cheaper system.

Motors

In most cases of application the choice of squirrel cage motor will be quite adequate, though there has been an impression that slip ring induction motors are necessary for drives such as compressors, refiners, vacuum pumps etc. It is our experience that in all these cases a squirrel cage induction motor will be

adequate since most manufacturers can offer cages of different designs to give the required starting torques e. g., chipper motors can be started with cage motors of NEMA class D Design (High Resistance Cage).

When the regulation of HT line is adequate Direct-on-line starting of induction motors upto 120 HP should pose no problem. In this connection indigenous contactors are also available upto 315 amps. AC 3 duty. Eliminating slip ring motors and reduced voltage starters would considerably simplify the maintenance man's problem in a paper machine.

Variable Speed Drive Systems

Variable speed drive systems are necessarily required for the following in paper machines:—

1. Main Machine
2. Rewinders
3. Cutters

For the application of the above Drives from the consideration of efficiency, utility, ease of operation, accuracy and range of control and trouble free

maintenance, the Thyristor Controlled Variable Speed DC Drive Systems are recommended. For the main machine, normally for a plant of this size, a line shaft arrangement is provided and the line shaft is driven by the DC motor and associated Thyristor Converter. The system would be a closed loop one and with a Tachogenerator feed-back a speed regulation of less than 1% of base speed can be achieved. The system would be operating on a constant torque mode.

For Rewinders and Cutters a similar drive system of appropriate rating will be used. However, in these cases a Tachogenerator feedback will not be necessary and hence a Back emf feedback will be provided for closed loop operation.

Conclusion

In conclusion the selection of electricals for mini paper plants is an exacting job for which the totality of equipment required should be properly understood. Proper and selective choice of equipment results in an efficient and economical plant.