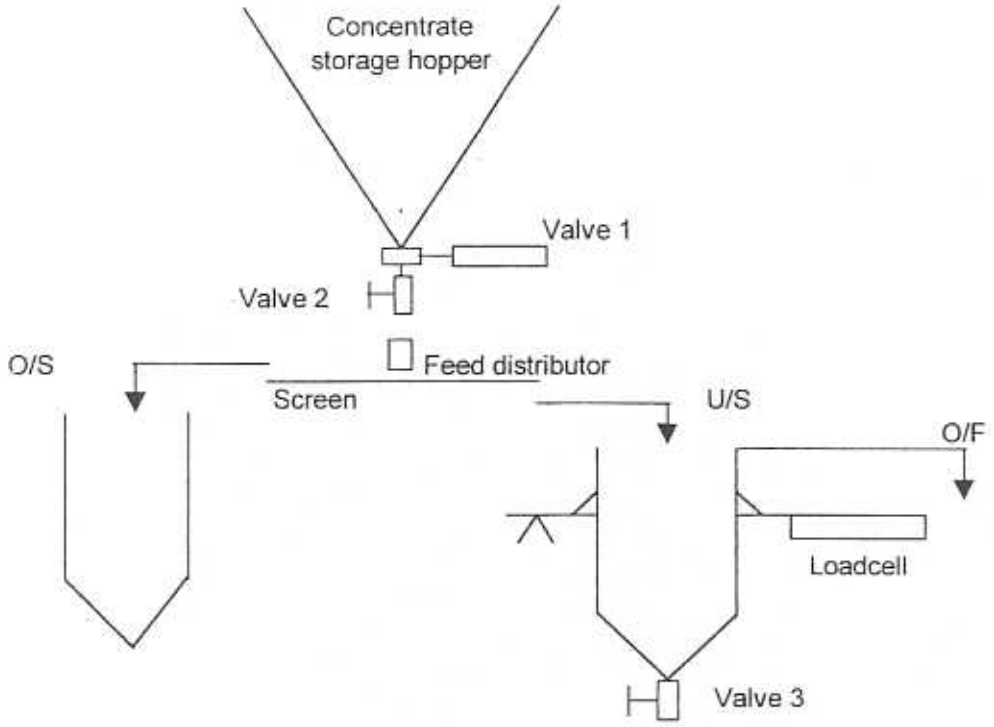
TABLE FEED TONNAGE CONTROL SYSTEM



AIMS: The primary aim of the system is to provide a steady feed tonnage of screen undersize material to the shaking table at a constant feed density.

The secondary aims are:

(1) to prevent the screen from being flooded when the main concentrate storage hopper empties

and (2) to prevent the table feedbox from being flooded when the screen undersize hopper empties.

MODE OF OPERATION:

(1) With the vibrating screen running and the spray water turned on, the air operated knife gate valve (1) is opened by the operator.

(2) The manually operated rubber pinch valve (3) on the screen undersize hopper is shut.

(3) The operator then opens the air operated pinch valve (2) beneath the air operated knife valve (1) on the main concentrate storage hopper. This valve (2) operates on a timer so that it opens for "x" seconds and then shuts for "y" seconds. (Operating in this manner, the valve will open fully for short intervals which will reduce the chances of blockages occurring because of the presence of relatively coarse material.)

(4) The screen undersize discharges into a small hopper (10-15 litre capacity) mounted on a load cell. The level of the solids in the screen undersize hopper will build up until the load detected by the load cell reaches the "high" set point. At this point, valve 2 ceases operation.

(5) The operator now opens the manually operated pinch valve (3) under the screen undersize hopper to achieve the desired flow into the table feedbox.

MODE OF OPERATION: continued...

(6) As the solids in the screen undersize hopper discharge to the table feedbox, the weight on the load cell decreases. When the load reaches the "low" set point, valve 2 begins to operate again.

(7) By keeping the "high" set point and the "low" set point close together, the flow of solids discharging from the screen undersize hopper is kept relatively constant.

(8) The system continues to operate with the operation of the air operated pinch valve being controlled by the load cell.

(9) When the level of the solids in the main concentrate storage hopper drops to a certain level, the air operated knife valve (1) is shut. (This would be controlled by probes or another separate load cell.)

(10) When valve 1 shuts, the operator shuts down the screen and turns off the spray water. As the screen undersize hopper empties, valve 3 is used to control the flow of screen undersize into the table feedbox.

FACTORS AFFECTING SYSTEM PERFORMANCE:

(1) To prevent feed blockages, valve 2 opens fully for a period of "x" seconds. To prevent overloading of the screen, "x" needs to be kept fairly short.

(2) Once valve 2 shuts, it remains shut for "y" seconds before reopening. As with the value for "x", the value of "y" needs to be adjusted to prevent screen overloading.

(3) When the load in the screen undersize hopper reaches the "high" set point, valve 2 ceases to operate until the load has decreased to the "low" set point which occurs after "z" seconds. By adjusting the values of "x" and "y" and setting the high and low set points close together, it should be possible to minimise the disruption to the operation of valve 2. This will minimise the fluctuations in the screen oversize tonnage.

(4) With the feed flow to the screen being intermittent and the spray water flow being constant, the density of the screen undersize product will fluctuate from near zero to say 15% solids. The solids discharging from the screen undersize hopper will discharge at 70-75% solids so excess water will overflow the hopper continuously. (Some of this water could be used to lower the table feed density to the correct level.)

(5) The solids discharging from the screen U/S hopper will collapse from the middle of the hopper and eventually "rat hole" ie the solids in the middle will discharge and the solids against the walls will remain. The result will be that the solids discharge to leave a column of water in the middle. Eventually, this column of water will discharge with a rush. If the system operated in this manner, there would be wild fluctuations in the table feed density and tonnage. This can occur only if the "low" point is set too low. The hopper needs to be designed so that it holds enough settled

FACTORS AFFECTING SYSTEM PERFORMANCE: continued...

solids to prevent this situation from arising.
(When starting the circuit, valve 3 needs to be kept shut until the level of settled solids in the screen U/S hopper rises to a level high enough so that "rat holing" does not occur.)

CIRCUIT DESIGN CONSIDERATIONS:

(1) The air operated knife gate valve needs to be interlocked with the screen so that it can not open with the screen turned off.

(2) The air operated knife valve needs to fail shut eg in the event of a power failure.

(3) Ideally, there should be some safety measure in place in case the air operated pinch valve (2) fails to shut when it is supposed to. This could involve a "high high" alarm level for the screen U/S hopper.

(4) Valve 2 should be interlocked with valve1 so that it operates only if valve1 is open.

(5) The operation of the screen and the flow of spray water could be tied in to the operation of valve1 so that the screen and the spray water flow stop automatically a short time after valve1 shuts.

(6) The circuit could be simplified by using a manual knife gate valve for the Valve 1 duty. This woud have the disadvantage that, in the event of a power failure, neither Valve 1 nor Valve 2 would shut.

(7) The problem with the solids in the screen U/S hopper "rat holing" could be overcome by desigining the hopper with a long small diameter cylindrical section above the valve. The aim would be to use a cylinder a little larger than the "rat hole" diameter so the quantity of solids that could hang up would be minimal.

(8) To minimize friction at the pivot points supporting the screen U/S hopper, the unit could be mounted on springs in preference to using hinges.

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