PNEUMATIC TRANSPORTER TROUBLESHOOTING

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ARTICLE TAKEAWAY:

- **Energy moves sand slugs through the pipeline...the longer the pipeline the more energy is used.**

Today's article is about a case study regarding pneumatic transporting troubleshooting of a foundry making large castings and machines are spread out.

Current situation
We have several core machines (located 700 ft from the sand supply silo) which are interlinked by sand lines and supply sand to the hoppers by pinch valves at each machine. We have two sand transporters, in series, cover the entire distance to the core machines. A control panel directs the sand to the core machines, as called for by level probes in the hoppers.

We make large castings which takes a lot of sand, and the machines are spread out because of robots and other primary and auxiliary equipment.

Our challenges
Sand backing up into the filter, check valves and connecting hose for the transfer of sand into the hoppers.

Response
The pneumatic sand transporter system is based on injection of compressed air at the beginning of the transporter piping via a primary air flange. The air pressure required at this point, to overcome the friction of the pipeline plus the energy required to push the sand slugs to one or more receiving bins, is based on the developed length of the pipe run, with a vertical leg in the first third of the pipe run.

When the transporter is shut down because the high level probe in the receiving bin indicates "full," air injection stops and the sand slugs in the vertical pipe section collapse and fill the pipe from the bottom up.

The amount of air injected at the primary air flange is metered so that the velocity of the sand slugs in the pipeline are kept at an optimum value to prevent excessive pipe wear and damage to the sand grains

Since energy is required to push the sand slugs thru the pipeline, the longer the pipeline (developed length) the more energy is used up until a point is reached where the energy of the compressed air is almost all used up and the flow of sand will stop. Most sand transport systems have a reasonable developed length so that the energy supplied by the compressed air injected at the primary air flange is sufficient to meet sand demand of the system.

There are two possible conditions, however, where the energy required to transfer sand by the compressed air injected at the primary air flange cannot meet demand. One such condition is very long pipe runs and the other condition is a vertical rise in the pipe run within the last two thirds of the developed length of the pipe run.

Long Pipe Runs

For very long pipe runs, depending on the tonnage required, an intermediate dropout bin is needed at approx. 350 to 400 feet from the primary transporter and the installation of a secondary transporter to cover the remainder of the developed length.

Vertical Pipe Runs

For a vertical rise, in addition to overcoming the pipe friction and the force required to push the sand slugs along, the supplied energy of the compressed air will have to be sufficient to also raise the settled sand column in the pipe against gravity. The air pressure required to accomplish this depends on the vertical height of the rise and must be added to the overall pressure requirement for the whole system.

In most cases the sum of the air pressure required to push the sand thru the pipeline and the air pressure required to raise the sand in the vertical pipe section is greater than the plant air supply available consistently (80 to 90 psi) and, therefore, requires a secondary air flange, with a normal shop air supply pressure, just ahead of the vertical rise.

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