# Preventing Downtime - Part 2

What are the top three causes of downtime caused by a pneumatically-conveyed material handling system? Let's look at reason #2.

Equipment has been added, removed or relocated in the system without having a pneumatic conveying engineer involved

Some companies will hire a local sheet metal or HVAC contractor to add, relocate or remove production equipment without completing engineering design work. Sometimes this approach works; many times it does not. System modifications that are not properly engineered can cause a range of issues from minor jams to catastrophic fires.

NFPA 654 states that "changes to the ductwork of a pneumatic conveyed material handling system conveying combustible dusts must be designed by a qualified engineer" because adding, relocating or removing duct inlets on the system without engineering the changes can result in lower than minimum material conveying velocities in some portions of the ductwork. The result can be trim material drop out in the trunk line duct which accumulates and becomes fuel for a hidden fire hazard in the ductwork near the ceiling which can spread quickly. All it takes is one ember on the leading edge of the pile from a machine spark or loose piece of metal and you can have a facility-wide fire on your hands.

In addition to getting a qualified engineer involved when modifying your existing air conveyed scrap system, the NFPA also recommends an annual inspection of your ductwork for fuel sources.

Electrical costs are also a consideration. The power required to run a blower increases by the ratio of the cube of the shaft speed of the blower. Improperly designed ductwork requires more shaft speed and horsepower to generate the same suction at the furthest inlet. In the Fan Law formula below, P represents power and N represents blower shaft speed (rpm's).

$$\frac{P_1}{P_2} = \left(\frac{N_1}{N_2}\right)^3$$

The problems often start when changes are made to the system's ductwork without a properly engineered design. Suction can be reduced below an acceptable amount at one or more inlets of the system. The company may then have their maintenance staff speed up the blower to attempt to solve the suction problem. For example, if the blower was originally running at 2,000 rpm and maintenance speeds it up to 2,300 rpm, the resulting power cost goes up by 52%. Expected savings are quickly offset by an increased monthly electric bill for the remaining life of the system.

Questions? For more information, give G.F. Puhl a call at 615.230.9500 or email us at sales@gfpuhl.com.