



# Optimizing Dryer Performance with Sticky Line Indication Systems (SLI Systems) - April 2015

**Has your dryer ever plugged? Then a SLI System will help avoiding this happening again.**

Milk powders with high lactose content such as Non-fat Dry Milk (NDM), Skim Milk Powder (SMP) and lower protein Whey Protein Concentrates (WPC 34) are inherently “sticky” under certain conditions - and sticky powders may lead to plugged up dryers, cyclones and bag houses.

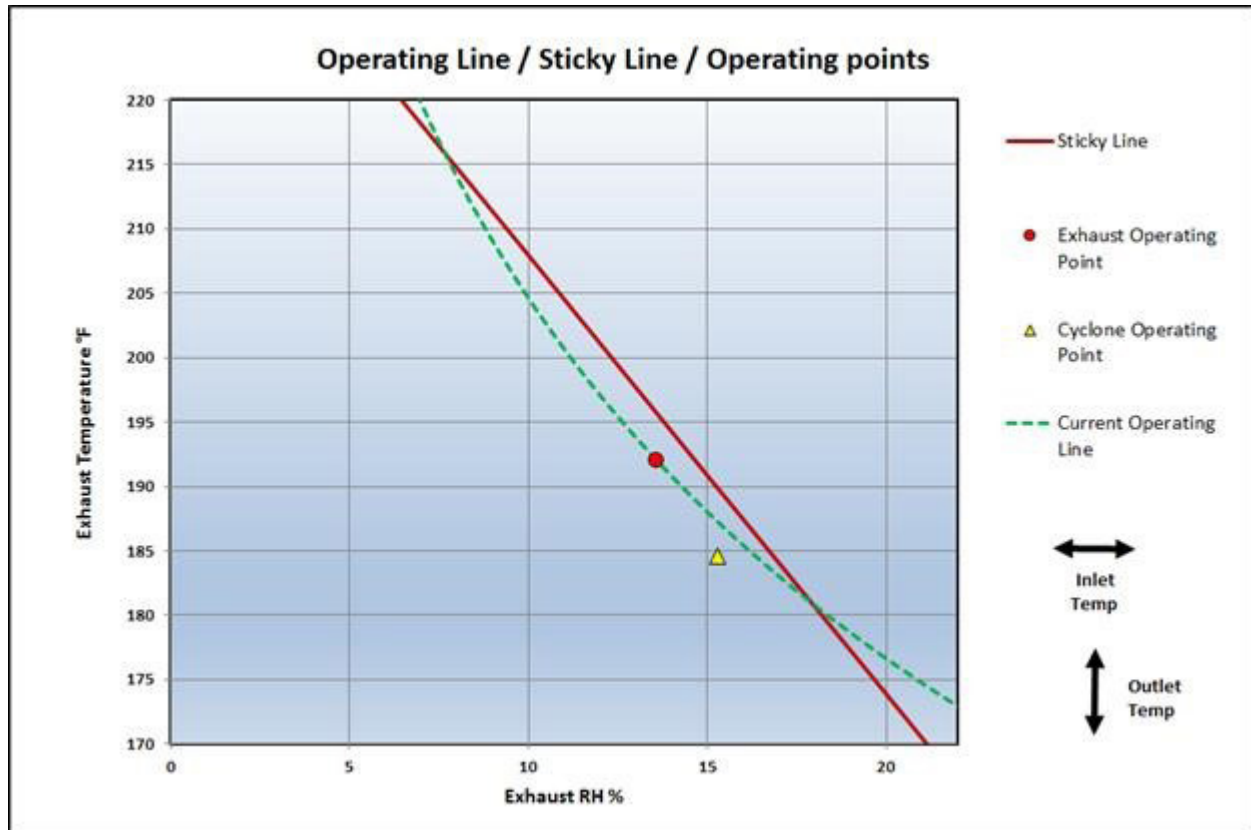
Most crystalline solids such as lactose can exist in two distinct states - glassy and rubbery. The glassy state is rigid, brittle and non-sticky. The rubbery state is pliable and sticky. Changing the temperature and humidity surrounding lactose containing powder particles will change the state of the lactose from one to the other - a phenomena called the “glass transition”.

Drying condition with lower humidity favours the non-sticky, glassy (safe) state whereas higher humidity favours the sticky, rubbery (unsafe) state. Unfortunately, operating the dryer under low humidity conditions also leads to reduced capacity.

Installation of a SLI System allows for optimizing the dryer’s operating conditions - balancing the stickiness vs. capacity while avoiding plugging - by continuously monitoring the factors impacting the humidity within the dryer:

- \* Ambient air temperature and humidity
- \* Combustion moisture
- \* Inlet air flow and temperature
- \* Feed composition, solids and temperature
- \* Secondary drying air flow and temperature

This real time information is processed via algorithms within the dryer's PLC, to arrive at a calculated Operating Point, which is then compared to the current product's Sticky Line (the border between safe and unsafe conditions) and displayed graphically on the HMI screen. Trained operators use the display to guide the Operating Point close (for maximum capacity) to the Sticky Line while staying on the safe side of it.



Instances where a SLI System is especially valuable by providing real time information:

- \* Switching between products with varying lactose content (such as NDM vs SMP)
- \* Production of high lactose / sugar powders (such as infant formula base)
- \* Seasonal weather changes - winter with cold, dry air vs summer with hot, humid air
- \* Daily weather changes - colder, drier mornings vs. warmer, humid afternoons

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