

Valmet

Technical Paper Series

Air Flotation Dryer Tuning

Executive Summary

One easy way to save thousands of dollars a year and increase profits is to tune your air dryer and associated systems. Over time, they fall into a state of disrepair and inefficient operation. This paper will discuss a few ways to restore the dryers to their original performance such as: alignment, nozzle cleaning, system balancing and burner service.

Alignment is a key element in maximizing dryer performance and efficiency. Being too close or too far away will adversely affect drying performance and increase energy costs. Plugged or damaged dryer nozzles will effect drying in the same way. System and dryer balancing is a little more complex, however has the same results. Proper balancing reduces energy costs, increasing profitability. Regular burner service can offer a significant return on investment.

Save thousands each month in natural gas costs while improving sheet runnability and operating efficiency

Air dryer tuning offers significant opportunities to reduce cost and improve profitability. Over time, air dryers and their associated systems can become neglected and fall into a state of disrepair and/or inefficient operation. A few simple steps can restore the dryers to original performance, saving tens of thousands of dollars annually. Typical payback (ROI) on dryer tuning is in the order of a few months.

Dryer tuning may include several opportunities such as:

- Dryer alignment (**Figure 1**)
- Nozzle cleaning
- System and dryer balancing (system optimization & runnability improvements)
- Burner service

Alignment

Alignment is a key element in maximizing dryer performance and efficiency. With proper alignment the sheet to nozzle gap is optimized to insure proper web floatation and impingement drying. A common tendency is to "increase the sheet to dryer gap" when runnability or drying problems occur. The problem is that this action exponentially affects drying effectiveness, resulting in poor drying performance, poor sheet runnability and increased operating costs.

Figure 2 illustrates a typical deterioration in drying as the result of excessive web to nozzle gap.

Conversely, being too close to the web can also adversely affect drying performance by allowing insufficient impingement development. Proper nozzle to web clearance is essential for optimum performance, sheet quality, energy utilization and runnability.

Nozzles

Dryer nozzles (air bars) are at the heart of the impingement dryers. As the nozzles become plugged (**Figure 3**) or damaged, dryer performance will suffer. It is imperative that the nozzles be maintained as close as possible to their original condition in order to maintain runnability and sheet drying.

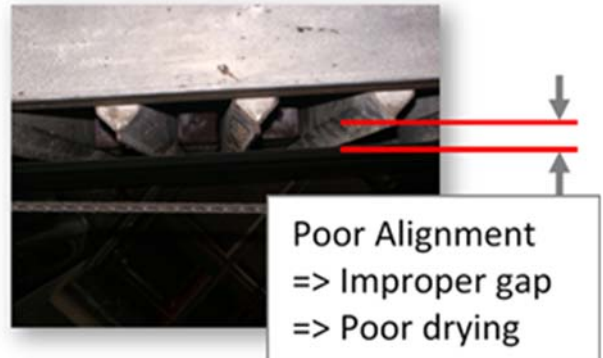


Figure 1. Typical air bar to web alignment

Typical Evaporation Rate Curve vs. Gap to Web Impingement Nozzles

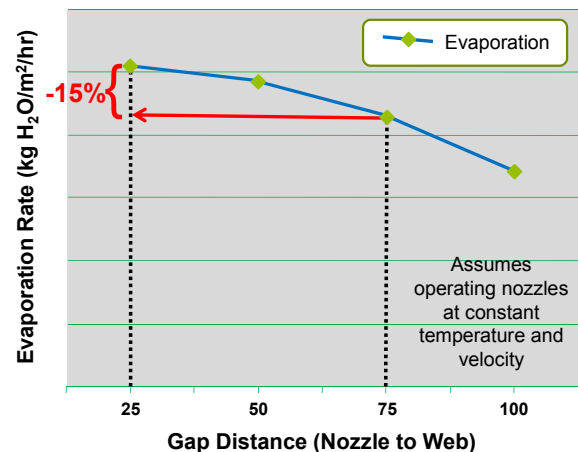


Figure 2. Typical gap effect



Figure 3. Typical bars and return screens

System and Dryer Balancing

Proper system balancing is critical to dryer performance and energy efficiency. Proper balancing includes adjusting the supply, return exhaust and combustion air systems in order to achieve proper air distribution and energy utilization.

Common system balancing problems include:

- Over pressurization of dryers (over supplying / improper recirculation) resulting in:
 - dryers "spilling" into machine room and over-heating room (safety/comfort issue)
 - poor energy performance
 - poor runnability (sheet flutter, dragging)
- Poorly balanced exhaust leading to inefficient dryer operation and high operating (energy) costs
- Under supplying nozzles (low impingement velocities), resulting in:
 - higher supply air temperatures (high energy costs)
 - insufficient drying, potentially limiting capacity and production
 - potential dragging of sheet, leading to quality issues

Proper system optimization provides overall tuning of the dryer system(s) to maximize performance and reduce energy. Improved runnability maintains sheet quality while maximizing production and machine profitability.

Burner service

Air dryer systems consume a great deal of energy. It is imperative that the burners operate as efficiently as possible. Proper burner setup and adjustment is essential to insure correct, efficient and safe firing of the dryer burner(s). Regular maintenance and adjustment of the combustion air and burner firing is therefore critical and should be undertaken on a regular, scheduled basis. Simple tuning of the burner(s) can offer a significant return on the investment (ROI).

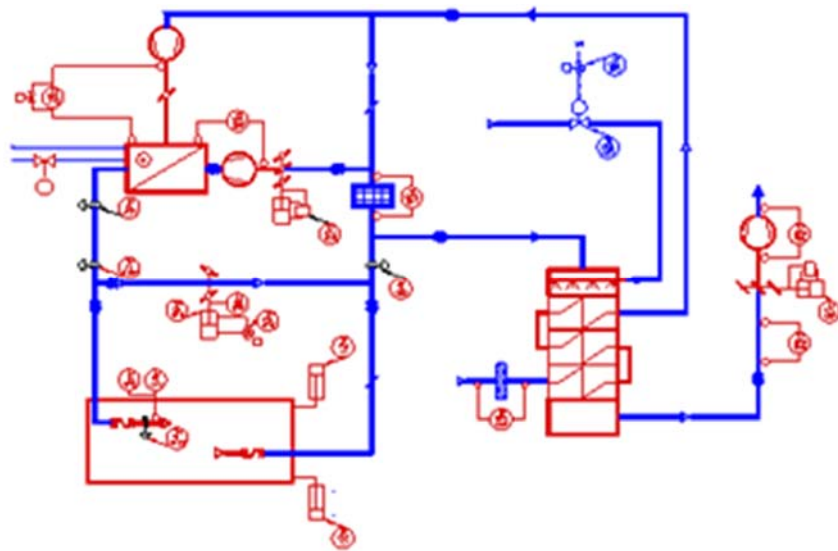


Figure 4. Typical dryer air system

Summary

In today's market, it is essential that systems run as efficiently and productively as possible. Air dryer tuning is a simple, low cost investment that offers significant opportunities to reduce cost and improve profitability.

Typical expected benefits include:

- Improved runnability (machine efficiency and increased production)
- Energy savings
- Improved sheet quality (reduced marking, more even drying)
- Increased profitability

Payback on dryer tuning services is typically in the order of a few months. Generally, air dryer tuning can be completed during regular scheduled maintenance downs (8-12 hours/dryer) depending on the extent of service.

Please contact Valmet Service to see how your business can benefit, and realize significant savings in reduced energy costs, increased production and improved machine performance.

This white paper combines technical information obtained from Valmet personnel and published Valmet articles and papers.

Valmet provides competitive technologies and services to the pulp, energy and paper industries. Valmet's pulp, paper and power professionals specialize in processes, machinery, equipment, services, paper machine clothing and filter fabrics. Our offering and experience cover the entire process life cycle including new production lines, rebuilds and services.

We are committed to moving our customers' performance forward.