Does your mill use open pipes with drilled holes or slits for drying or blow off? If the answer is yes, you probably don’t give them much thought since they are so simple. However, open pipes use high volumes of compressed air – one of the most expensive utilities in your mill – and should be replaced with more efficient technologies.

Using air nozzles, air amplifiers or air knives, instead of open pipes, can reduce air consumption by as much as 92%. (See Figure 1.)

A single operation in a mill using a 4’ (1.2 m) pipe with slits can use more than $350,000 in compressed air annually. A more efficient drying or blow off system can do the same job for just $30,500 – a potential savings of more than $300,000 each year. And, in some operations, the use of compressed air can be eliminated completely by using an air knife package powered by a regenerative blower, bringing the cost of annual operation to about $3,600. (See Figure 2.)

*Operating pressure of 45 psi (3 bar) can be used to achieve comparable impact using air control nozzles. This reduces the total CFM required for operation to 425 (721.8 Nm3/hr) and yields a total annual cost of operation of $24,427 or a savings of $331,854. All costs are in USD.
Ways to Reduce Air Consumption

Payback is quick on new equipment purchases

If you are currently using open pipes, reductions in compressed air consumption can quickly offset the cost of any new equipment purchases. Average payback periods range from 3 to 6 months. If you’re already using air nozzles, be sure to evaluate alternatives such as variable air amplifiers, low flow air knives or air knife/blower packages. You may discover further significant savings can be realized in many operations.

Benefits beyond reduced air consumption

Air nozzles and air knife packages offer benefits in addition to reducing or eliminating the use of compressed air.

- Perceived noise reductions range from 28 to 60% with air nozzles. Additional reductions can be achieved with air knife packages.
- Worker safety is improved.
- More precise, repeatable drying and blow-off.

Air Nozzles: Versatile, Efficient and Suitable for Dozens of Operations

Air nozzles are well suited for use in applications that require pressure and impact. For example, air nozzles are frequently mounted on the sides of machines and prior to NIP showers to create an air barrier to prevent contaminants from entering defined areas. They are also commonly used to blow excess paper build-up and debris into the pit. Air nozzles come in a variety of types, capacities, sizes and materials and are suitable for a wide range of applications throughout the mill.

Air Amplifiers Increase Intensity and Efficiency

Air amplifiers produce a constant, high velocity air stream for spot drying, blow-off and exhaust applications. Efficiency is maximized because additional free air is pulled through the unit along with the compressed air. Air amplifiers deliver higher volumes of air and operate at higher pressures than air nozzles for fast drying and blow-off. (See Figure 3.)

Low Flow Air Knives: Maximum Efficiency in Small Areas

Low flow air knives deliver a high velocity, uniform air flow across the entire length of the knife. Drying and blow-off are fast and efficient and minimal air is used.

Designed for small areas, low flow air knives are typically mounted close to the target. Maximum knife length (or combined length of all knives) is limited to less than 2’ (61 cm). Applications that only require one or two air knives can experience significant operating cost reductions by using low flow models.
Air Knife Packages Powered by Blower Air Can Reduce Operating Costs By 95% or More

Drying and blow-off operations that require velocity and motion in large areas – more than 2’ (61 cm) are well suited to using regenerative blowers and air knives. For example, air knives are often positioned across the width of the paper machine in the dryer section to blow paper and scraps into the pit in the event of a paper break. Using blower air eliminates the need for compressed air and can result in significant reductions in electricity consumption.

Regenerative blowers provide an efficient, heated air source. Heated air is particularly advantageous in applications where steam is present. Heated air is better absorbed compared to compressed air that tends to cause steam to condense and drip. This is especially crucial in the dryer section where little or no water is desired.

Regenerative blowers also offer oil-free operation unlike compressed air systems. Quality problems caused by oil are not an issue with air knife packages.

Another benefit of air knife/regenerative blower packages are their ruggedness and reliability. Maintenance is infrequent and minimal.

Air cannons are often part of an air knife package although are available for stand-alone use with a regenerative blower. Cannons can be easily positioned and produce a high-velocity air stream into holes and crevices and are used to keep areas dust-free. Air cannons can also be used to prevent paper build-up on the sides of machines to significantly reduce the amount of maintenance time required by plant personnel.

Reducing compressed air usage makes sense – economically and environmentally

Pulp, paper and paperboard mills account for approximately 12% of total manufacturing energy use in the United States, making the paper industry the third largest industrial consumer of energy, behind only petroleum and chemicals.

With rising utility costs and increasing demand from consumers for products that are environmentally friendly, it makes sense to look at methods to reduce compressed air usage. Energy-efficient solutions like air nozzles, air amplifiers, air knives and regenerative blowers are not only cost-effective, they typically lead to improved productivity and product quality.

Find a manufacturer of air nozzles and knives to conduct an objective, on-site evaluation of your drying and blow-off operations. This service typically includes a comprehensive audit and a written summary report describing how to achieve reductions in energy consumption. Working with a manufacturer that has a broad product line and a proven track record with paper mills will help ensure you are partnering with a company that has a full range of solutions and the expertise to guide you through small or big changes to your drying and blow-off applications.