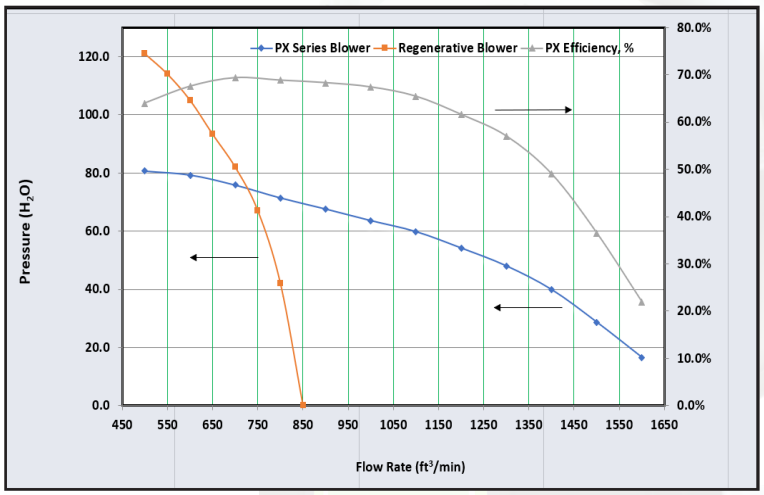
Why Pairing a Paxton Blower to a Paxton Air Knife is Important

In order to maximize system performance and efficiency, Paxton application engineers utilize both blower performance curves and air delivery device resistance curves to properly size a Paxton blower system. Often, an ineffective drying system will have been pieced together without consulting these curves, resulting in an inefficient system with non-optimal airflow.

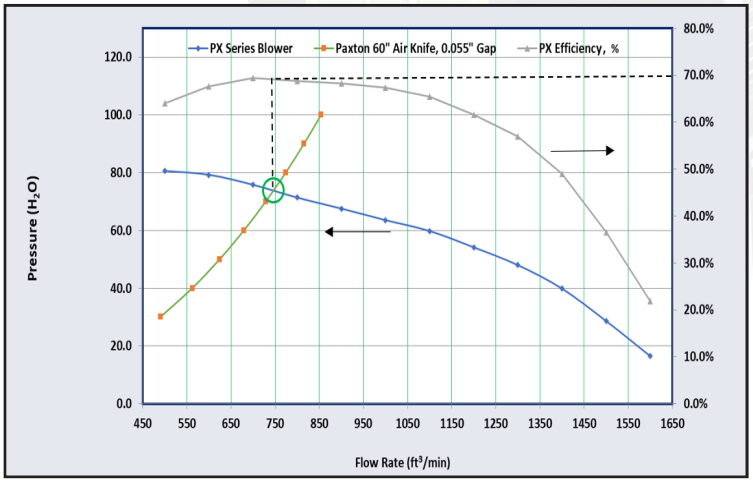
Figure 1: Paxton Blower vs Regenerative Blower



Since the regenerative blower curve is very steep, the efficiency of the blower drops very quickly compared to the PX-series blower curve.

Blower sizing is more limited and complicated for regenerative blowers, because they have a much steeper blower performance curve than a Paxton centrifugal blower, as shown in Figure 1.

Figure 2: Paxton Blower and Paxton Engineered Air Knife Curve



The peak efficiency for this PX-series blower and the Paxton 60" Air Knife, 0.055" Gap, is about 70%, at 750 cfm and 75" H_20

It is necessary to engineer the air knives so that their resistance curve crosses the blower performance curve at the desired flow and pressure and ideally at the highest blower efficiency (See Figure 2).

PAXTON PRODUCTS

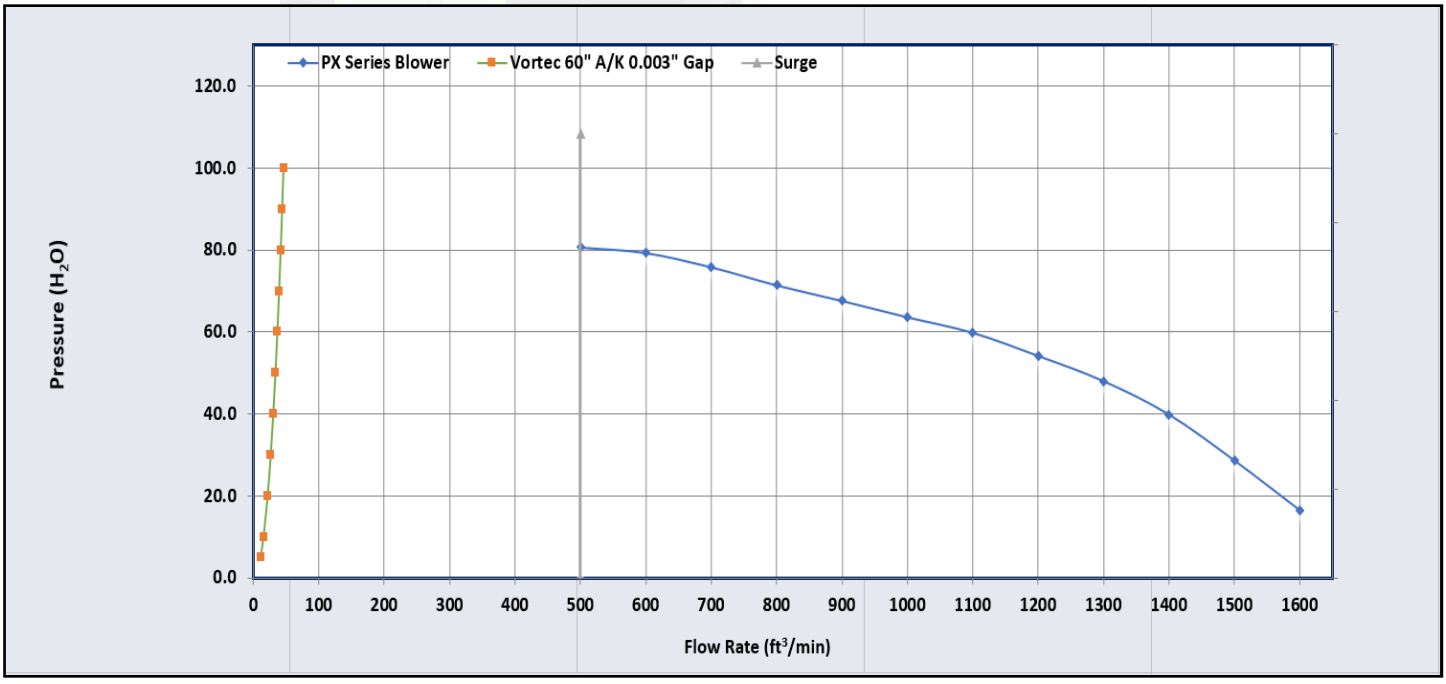
10125 CARVER ROAD, CINCINNATI, OH 45242
1-800-441-7475

SALES@PAXTONPRODUCTS.COM
WWW.PAXTONPRODUCTS.COM

Why Pairing a Paxton Blower to a Paxton Air Knife is Important

In fact, as shown in Figure 3, if not properly engineered the blower performance curve and the air knife resistance curve may not intersect, requiring extrapolation to a high pressure-low flow operating point. This would result in poor performance for blow off and drying. This usually occurs when blowers are purchased from one company and the air knife paired with the blower is purchased from a low-priced alternative or vice versa. This means, to be efficient and effective, you must size the air knife/knives to match up properly with the blower, preferably at its highest efficiency point. If you do not properly size the air knives with the blower, you can end up with blower surge, i.e. a region on the blower performance curve at maximum pressure that results in unstable air flow and can cause the blower to generate excessive heat, aerodynamic vibration and ultimately premature blower failure. Or you could size the system with too much air flow for the motor power size and over-current and fail the motor.

Figure 3: Paxton Blower Curve and Compressed Air Knife Curve

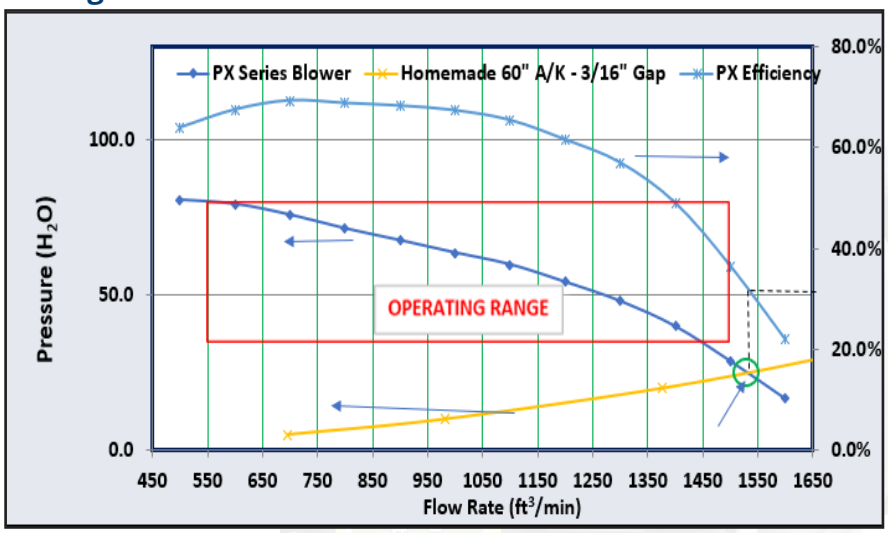


A surge will cause unstable air flow and the blower can overheat.

Why Pairing a Paxton Blower to a Paxton Air Knife is Important

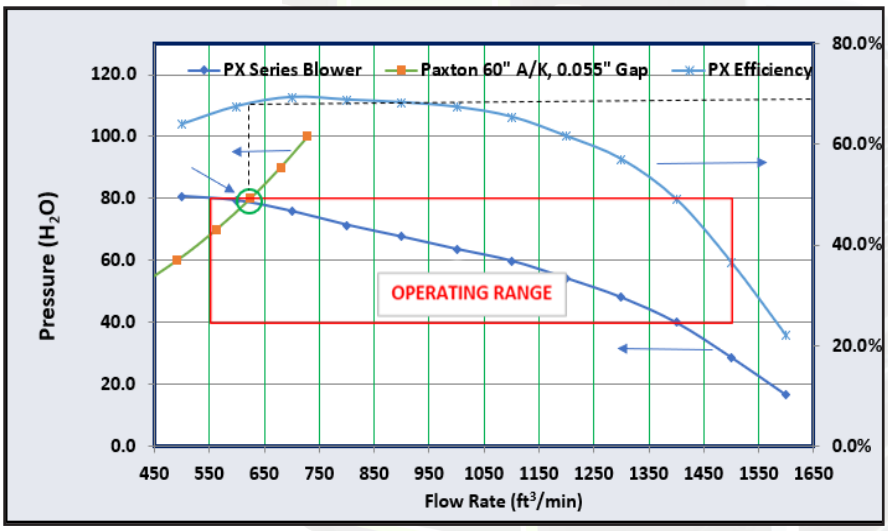
Further, the blower's operating range (see RED box in the figures 4 & 5) is 550 CFM to 1400 CFM at 80" H2O to 40" H2O respectively. Figure 4 shows a non-engineered air knife that is 60" long with a 3/16" gap, with its resistance curve in yellow. If this knife is paired with the Paxton blower, it results in an operating point of 1475 CFM at 25" H2O (see GREEN circle). This point falls outside of the operating range of the blower. Operating at this point will result low back pressure and an underperforming system, with the blower only about 32% efficient.

Figure 4: Paxton Blower with Non-Paxton Air Knife



The Paxton blower paired with the Homemade air knife curve is outside of the suggested operating range.

Figure 5: Paxton Blower with Paxton Air Knife



The Paxton blower and the Paxton air knife fit inside the suggested operating range.

Figure 5 shows (in green) an engineered Paxton air knife, that is also 60" long, but has a standard gap of 0.055 inches. The resistance curve for this air knife crosses the blower curve within the operating range and provides a blower efficiency of nearly 70%. This example demonstrates how blower efficiency can drop precipitously when the wrong air knife is paired with the blower.

Paxton's application engineers, having a combined 75+ years of air system design experience, will work with the given information of airflow rate and pressure in order to provide the most efficient solution which will greatly exceed the drying and blow off performance of an ad hoc system. Once the Paxton team arrives at the necessary solution for a particular application, they will properly size an air knife/knives with a blower that will operate at peak efficiency (about 70%) as shown in Figure 5.

PAXTON PRODUCTS

10125 CARVER ROAD, CINCINNATI, OH 45242
1-800-441-7475

SALES@PAXTONPRODUCTS.COM
WWW.PAXTONPRODUCTS.COM