from Experience

JULY 2006

AIR KNIVES

Better Use of Compressed Air

Whether blowing red skins from peanuts, water from chilled bottles and cans, or oat flakes from bread, air knives are useful and necessary tools for removing particles from the surface of a food product or primary/secondary package. However, the source of the pressurized air may be costing more than is necessary. Take, for example, a beverage can line being dried using four 1/4", 100-psig compressed air lines. Each line consumes approximately 100 cfm per air line for a total of 400 cfm. Using the relationship that 4 cfm requires 1 compressor Hp[1], this compressed air usage translates into an electrical usage of approximately 466,000 KwH per year. However, most air knife applications only require between 50 to 100 inches of water pressure (<5 psig). Therefore, in this case air could be supplied more cost effectively by using a pressure blower instead of an air compressor.

The following table illustrates the economics for replacing compressed air with a high-pressure blower and appropriately designed air knives:

Comparison of Compressed Air to Pressure Blower				
	For (4) Air Knife Openings			
Opening, inches	1/16	1/8	3/16	1/4
Compressed air @ 100 psig free air, cfm	26	104	234	416
Compressor, Hp @ 100 psig	7	26	59	104
KwH used in 6,000 hr/yr	31,300	116,000	264,000	466,000
Blower, Hp @ 5 psig	0.6	2.3	5.1	9.1
KwH used in 6,000 hr/yr	2,600	10,000	23,000	41,000
Annual Savings @ $0.06/KwH, $/yr	**$1,700**	**$6,000**	**$14,000**	**$26,000**
Replacement Cost of new Air Knife Systems using Pressure Blower	$5,000	$5,000	$11,000	$20,000
Simple Payback for Air Knife/Blower, Years	3	0.8	0.8	0.8

To further minimize energy losses while maximizing effectiveness, specify air knives that operate only when the use is required. For example, a simple on-off solenoid valve, interlocked with a sensor or with the on-off switch for the conveyor, can be employed to control the amount of time the air knife is in use.

[1] See the July 2001 *From Experience* for more information.

EXPERIENCE IN BRIEF

Rules of Thumb

Air Knife Information

At 100 psig, ~ 4 cfm = 1 Hp for Compressor.

At 100" water, ~ 42 cfm = 1 Hp for Pressure Blower (71% efficiency)

For Air Knife, 10 cfm per inch of opening at 60 to 100" water pressure.

For Cone Nozzle, 33 cfm per cone at 50 to 70" water pressure.

Continuing Education

Hixson associates regularly participate in continuing professional education events across the country. To learn more about these topics or about other events, e-mail Warren Green at the address below.

Jerry Becher, PE, a Hixson Senior Mechanical Project Engineer recently earned the designation of "Certified Energy Manager" (CEM®) as administered by the Association of Energy Engineers - a widely recognized standard for qualifying energy professionals in both the United States and abroad.

Direct Comments/Questions To:
Warren Green, Manager,
Process Engineering
wgreen@hixson-inc.com
Doug Ferguson, Manager
Manufacturing Engineering
dferguson@hixson-inc.com

For more From Experience, visit Hixson on the Web at
www.hixson-inc.com/processing/fromexperiencefoodprivate.html

Phone (513) 241-1230
Fax (513) 241-1287
www.hixson-inc.com

HIXSON
ARCHITECTURE ENGINEERING INTERIORS