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If you think finding and repairing leaks is the first step in controlling your compressed air costs, think again.

Much has been written about the significant cost of supplying air leaks—an inevitable part of any compressed air system. Most owners and operators are usually unaware that without a carefully designed and well-maintained compressor control strategy, a leak-repair program may not maximize their savings.

MYTH: Compressed air is free.
FACT: Compressed air is usually your most expensive utility. It takes 8 hp of electricity to produce 1 hp worth of work with compressed air.

MYTH: Leaks don't really amount to much.
FACT: In many plants, compressed air leaks may represent the single largest consumption. Plants with no effective compressed air leak management program lose, on average, 30% to 50% of their compressed air production to leaks.

MYTH: The system may be leaking some air, but it doesn't cost much.
FACT: An air system with 200 hp of air compressor power typically has the equivalent of about 60 hp in leaks. At $.10 per kWh, this costs over $44,000/year in wasted electrical energy.

MYTH: Fixing leaks does not save money.
FACT: Upper management doesn't always recognize the true cost of not repairing air leaks. Knowing the high cost of compressed air, why wouldn't every facility with a compressed air piping system implement continuous leak identification and repair program? Here's one reason why…

A recent meeting was held with the CEO and CFO of a large multi-plant facility to discuss a continuing corporate compressed air support program. The CFO was adamant about not wanting to discuss a leak repair program.

The reason for the CFO's reluctance: 15 years before, he had come away from a workshop on the cost of compressed air, eager to support the repair of all air leaks in his plants. He hired an outside contractor who identified 3600 cfm of leaks in a 7500 cfm system—*leaks with a value of 675 kW.* At the power rate of $.085 kWh, this type of leakage represented a potential cost savings of $500,000/year or $40,000+ per month.

In retrospect, the approximate $25,000 investment in the contractor's fee and required repair work seemed quite reasonable. Yet, after all was said and done, the total reduction in the plants' electric bill came to less than $500 per month. No wonder the CFO concluded that fixing leaks as a continuing program doesn't pay off.

Why this happens
Equivalent flow and cost…
By consulting the orifice chart in Table I—*and knowing a compressed air system uses about 20 kW input per 100 cfm output* —we can estimate that the annual cost of producing the equivalent of a ¼" leak, assuming 8760 operating hours per year, is $18,220 at an energy rate of 10 cents per kWh.

Table I. Leak sizing from a standard orifice flow chart (Cv=1.0)

Estimating the Volume of Compressed Air per Leak

	1/64"	1/32"	1/16"	1/8"	1/4"	3/8"
70 psi	.300	1.20	4.79	19.2	76.7	173
80 psi	.335	1.34	5.36	21.4	85.7	193
90 psi	.370	1.48	5.92	23.8	94.8	213
100 psi	.406	1.62	6.49	26.0	104	234
125 psi	.494	1.98	7.90	31.6	126	284

Table II. Key Air System Characteristics — Current System*

Type Capacity Control	2-Step 40-second blow down	Throttled inlet 40-second blow down	Variable speed 40-second blow down	Variable displacement 40-second blow down
Total air available (acfm)	1,000 (3 gal/cfm effective storage)	1,000	1,000	1,000
Avg. System Flow (acfm) at 85% load	850	850	850	850
Avg. System Pressure (psig)	95	95	95	95
Input Electric Power (kW)	170.7	168.9	154.9	154.9
Operating Hrs. of Air System (hrs/yr)	8,760	8,760	8,760	8,760
Specific Power (acfm/kW)	4.98	5.03	5.49	5.49
Electric Cost for Air/Unit of Flow ($/acfm/yr)	$175.92	$174.06	$159.63	$159.63
Electric Cost for Air/Unit of Pressure ($/psig/yr)	$747.66	$739.78	$678.46	$678.46
Annual Electric Cost for Compressed Air	$149,533/yr	$147,956/yr	$135,692/yr	$135,692/yr

** Based on a blended electric rate of $0.10 kWh and 8760 hrs/yr*

Table III. Compressor Use Profile — Current System

Compressor Mfg/Model		Full Load		Actual Elec Demand		Actual Air Flow	
		kW	Acfm	%kW	kW	%	Acfm
1	200 hp, SS, RS Lub. 2-step	176	1000	76	133.8	50	500
2	200 hp, SS, RS Lub. Mod	176	1000	80	140.8	50	500
3	200 hp, SS, RS Lub. VSD	176	1000	51	89.8	50	500
4	200 hp, SS, RS Lub. VD	176	1000	69	119	50	500

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New Web-Based Training Offering Lets You Upgrade Your Compressed Air Knowledge

Join the CAC on November 9 for an especially cost-effective session of Fundamentals of Compressed Air Systems WE (Web edition). Led by experienced CAC instructors, this online version of the organization's popular live program offering uses an interactive format that lets the instructor diagram examples, give pop quizzes and answer students' questions in real time. Enrollment is limited to 25 participants. Visit www.compressedairchallenge.org to access online registration or find more details about the training.

If you have additional questions about this November Web-based session and/or other CAC training, please email info@compressedairchallenge.org .

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