

## Successful Implementation – Energy Conservation Measure

<b>Measure</b>
Effective compressed air leak control program
<b>Equipment</b>
Compressed air system
<b>Industry / Sector</b>
Automobile
<b>Year of Implementation</b>
Continuously followed from 1995
<b>Cost Benefit Analysis</b>
o Type of Measure: Marginal investment
o Annual Energy Savings: 8.64 lakh kWh
o Actual cost savings: Rs. 30.00 lakh
o Actual cost : Rs. 2 lakh
o Payback: One month
<b>Implementation Highlights</b>
<p>Implementation of the measure has resulted in</p> <ul style="list-style-type: none"> <li>☞ Annual energy savings of 8.64 lakh kWh.</li> <li>☞ Reduction in wear and tear of pneumatic tools.</li> <li>☞ Reduction in maintenance cost .</li> <li>☞ Increased life of pneumatic tools.</li> <li>☞ Steady maintenance of pressure in the line.</li> <li>☞ High awareness among the plant personnel.</li> <li>☞ Operators are highly motivated in controlling the leakage.</li> <li>☞ Actual energy savings resulted in very good support from the top management .</li> <li>☞ Plant has assigned the task of compressed air leakage control as line function.</li> <li>☞ Incentives such as cash, gifts, certificates were devised by the management for the best suggestions from the all level of operators with regard to energy efficiency.</li> </ul>

**Summary**

Effective leakage control program of compressed air leakage has resulted huge energy savings and increased awareness about compressed air leak control

**Background**

A leading automobile unit, which produces two wheelers, has seven large compressors operating with a connected rated output of 7500 cfm. The compressors alone consume about 60 lakh units annually (i.e., about 12 % of total plant power consumption). The compressed air usage before the control of leakage was about 6800 cfm, which is estimated by measuring the individual compressor output and monitoring the loading and unloading time of compressors.

The compressed air is mainly used in pneumatic tools, instruments, control valves. Plant had about 12 production shops. Detailed energy audit was carried out during 1995. During the audit study the compressed air leakage in individual shop was estimated by conducting the trials. The estimated leakage in the system was 1400 cfm, which was about 20% total air consumption.

The major leakage is from the joints, hoses, filters, lubricators and regulators. Detailed survey revealed all specific points of leak sources.

Plant has taken necessary steps to control the leakage.

**Principle**

Leaks are a significant source of wasted energy in a compressed air system, often wasting as much as 20-50% of the compressor's output. Compressed air leaks can also contribute to problems with system operations, including:

- ☞ Fluctuating system pressure, which can cause air tools and other air-operated equipment to function less efficiently, possibly affecting production
- ☞ Excess compressor capacity, resulting in higher than necessary costs decreased service life and increased maintenance of supply equipment (including the compressor package) due to unnecessary cycling and increased run time.
- ☞ Although leaks can occur in any part of the system, the most common problem areas are: couplings, hoses, tubes, fittings, pipe joints, quick disconnects, FRLs (filter, regulator, and lubricator), condensate traps, valves, flanges, packings, thread sealants, and point of use devices.
- ☞ Leakage rates are a function of the supply pressure in an uncontrolled system and increase with higher system pressures. Leakage rates are also proportional to the square of the orifice diameter.

**Suggestions**

- ☰ Fixing leaks once is not enough. Incorporate a leak prevention program into facility's operations. It should include identification and tagging, tracking, repair, verification, and employee involvement.
- ☰ Set a reasonable target for cost-effective leak reduction—5-10% of total system flow is typical for industrial facilities.
- ☰ Once leaks are repaired, re-evaluate your compressed air system supply. Work with a compressed air systems specialist to adjust compressor controls. Also look at alternatives to some compressed air uses. If a compressor can be turned off, benefits include cost savings and a system backup

**Details of techno-economics:**

Particulars	Actual energy savings
Annual Total energy savings, kWh	8.64
Annual Cost savings, Rs. lakh	30.00
Cost of Implementation, Rs. lakh	2.00
Simple payback period, Year	1 month

**Implementation issues**

Reduction in leakage of compressed air initially resulted in a little resistance from operator level in the beginning. After demonstration of benefits of controlling the leakage and spreading awareness and introduction of incentive programs, the control program became a big success.

The plant has taken necessary steps to control the leakage. In addition, the plant personnel have devised a very effective leak control program. A special format was developed through which operators can inform the energy efficiency cell about leakage.

Moreover during lunchtime of the plant, inspection by the energy cell is made to identify leakage sources.

The leak estimation trial is conducted in the plant periodically from 1995 onwards, and also the cost incurred for leak control is tracked.