# PELLA CORPORATION

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## COMPANY BACKGROUND


Pella Corporation is a leader in designing, testing, manufacturing and installing quality windows and doors for new construction, remodeling and replacement applications. The Carroll, Iowa facility primarily manufactures wood windows and patio doors. The plant has grown to nearly 500,000 square feet and currently employs approximately 450 team members. Pella Corporation celebrates its 85th anniversary this year and continues to be committed to incorporating new technologies, increasing productivity and practicing environmental stewardship.

## PROJECT BACKGROUND

A site visit from Pollution Prevention Services engineers determined that there were potential improvements that could be made to the compressed air system at Pella's Carroll operation. A Pollution Prevention intern was assigned the task of performing an energy audit on the system. Inefficiencies in the compressed air supply and demand reduction opportunities were targeted.

## INCENTIVES TO CHANGE

Compressed air is a costly utility for Pella, accounting for nearly 20 percent of annual electrical costs. In a continued effort to conserve natural resources and lower operating costs, maintenance staff's goal is to reduce compressed air costs by $35,000 this year. Partnering with Pollution Prevention Services has ensured that this goal will be reached.


## RESULTS

**Repair Compressed Air Leaks:** A compressed air leak audit was performed on all manufacturing equipment and compressor areas. An ultrasonic leak detector was used to identify 338 leaks accounting for about 30 percent of compressed air capacity. Each leak was given a numbered tag and work orders were entered into the computer system so maintenance staff can repair them when time permits. Fixing these air leaks would save nearly 648,000 kWh of electricity annually.

**Ongoing Leak Detection Program:** A preventative maintenance program can typically reduce compressed air leaks to 10 percent to 15 percent of compressed air capacity. Pella owns an ultrasonic leak detector that maintenance staff can use to find inaudible leaks. A plan has been developed with the help of maintenance staff to split the factory into small zones. At least one zone will be scanned for leaks every two weeks. The goal of this approach is to scan every piece of equipment at least two times each year.

**Recover waste heat of Compressor 5 :** Compressors generate a large amount of heat as they produce compressed air. Much of this heat can easily be recovered and used to offset natural gas heating costs during winter months. Compressor #5 is air cooled so an additional heat exchanger would be unnecessary. Heat recovery efficiencies for air-cooled compressors are typically 80 percent to 90 percent, which would reduce natural gas use by 6,577 therms annually assuming this heat were recovered for 20 weeks each year.

**Modify Inlet Air Location of Compressor 5:** All of the compressors used in the plant currently pull cool intake air from outside, except compressor #5. Cooler intake air allows for a better mass flow rate through the compressor and requires less energy to produce the same compressed air volume. The average temperature for Carroll, Iowa is about 20 degrees cooler than the average temperature inside the plant. Modifying compressor #5 would result in a 4 percent energy reduction for operating the compressor.

**Turn Off One Compressor Second Shift:** Two compressors currently operate at partial load during second shift. These compressors operate more efficiently near 100 percent load than they do at partial load. There is also auxiliary equipment that can be turned off if one of these compressors is shut down on second shift. Shutting down one compressor would still allow ample compressed air supply during second shift while reducing unnecessary energy consumption by 138,237 kWh annually.


**Install Engineered Nozzles:** Several blow-off applications would benefit from the installation of engineered nozzles. These nozzles are designed to amplify compressed air by pulling in ambient air. Installing these nozzles would reduce their compressed air volume use by about 40 percent and would significantly reduce noise pollution.

**Use Cabinet Coolers to Cool Panels:** Compressed air is currently being used to cool at least three electrical panels. This use of costly compressed air could be replaced by electric cabinet coolers. Installing cabinet coolers would reduce the electricity used for cooling these panels and would increase compressed air capacity.

**Install Zero-Loss Drains:** Several timed drains are currently used to remove built up condensate. Timed drains must be set to open longer than necessary to ensure all condensate is removed, which also causes valuable compressed air to be released. Zero-loss drains are considered very reliable and will remove the condensate without wasting compressed air. Replacing all timed drains with zero-loss drains would save approximately $3,100 in wasted compressed air annually.

**CONVENTIONAL AIR POLLUTANTS AND GREEN HOUSE GASES DIVERTED IN STANDARD TONS**

| Total for all sectors | | | | | |
|---|---|---|---|---|---|
| $CO_2$ | $SO_2$ | $CH_4$ | $N_20$ | CFC | PM-10 |
| 761.49 | 4.11 | 37.83 | 0.40 | 9.37 | 0.10 |

| PROJECT | ANNUAL COST SAVINGS | ENVIRONMENTAL RESULTS | STATUS |
|---|---|---|---|
| REPAIR COMPRESSED AIR LEAKS | $29,800 | 647,826 KWH | IN PROGRESS |
| ONGOING LEAK DETECTION PROGRAM | $19,668 | 427,565 KWH | IMPLEMENTED |
| COMPRESSOR 5 UPGRADES | $7,524 | 6,577 THERMS<br>28,819 KWH | RECOMMENDED |
| TURN OFF ONE COMPRESSOR SECOND SHIFT | $6,359 | 138,237 KWH | IN PROGRESS |
| INSTALL ENGINEERED NOZZLES | $5,879 | 127,795 KWH | RECOMMENDED |
| USE ELECTRIC FANS FOR COOLING PANELS | $2,574 | 55,948 KWH | RECOMMENDED |
| INSTALL ZERO-LOSS DRAINS | $3,103 | 67,478 KWH | IN PROGRESS |