

# enercase

Ventilation Heat Recovery



Improved  
ventilation  
equals higher  
energy costs?

True

~~X~~ False



**uniongas**

A Spectra Energy Company



Find out how  
ventilation  
heat recovery  
lets you  
“have it all”

## SUMMARY

---

**Air (and energy) loss at ArcelorMittal Dofasco's central shipping facility was equivalent to one truck door being left open continuously. Air movement from the floor upwards added to problems with diesel particulate. A new rooftop installation, featuring heat recovery ventilators and optimal air movement, substantially reduces energy bills and enhances air quality.**

## BACKGROUND

---

ArcelorMittal SA is the world's largest steel maker. In 2006 they purchased Dofasco Inc., including their major flat steel production facility in Hamilton. The mill is a 24/7 operation that ships more than 4.8 million tons of hot and cold rolled steel as well as tinplate to customers world-wide.

ArcelorMittal Dofasco recognizes that quality is the number one concern for its customers. Along with their commitment to product excellence, the company also aims to lead the North American steel industry in the safest conditions for their workers and to ensure the best environmental performance.

Eighty-five percent of ArcelorMittal production is shipped through Central Shipping – a giant warehouse with ten buildings under one roof. The facility spans nearly 11 acres of space with a height of 60 feet. Up to 600 trucks enter and exit the buildings daily, and massive coil transport vehicles constantly deliver product to the facility. Cranes work in the aisles placing coils on storage racks. In these conditions maintaining good air quality and sound energy management are constant challenges.

## CHALLENGE

---

The transporters and trucks are all diesel-fueled. Evacuation and dilution of the diesel fumes to achieve good indoor air quality for crane operators is a key concern. Product quality also depends on controlling both fumes and moisture condensation to prevent marking and damaging the finished steel.

The original heating design featured thirty-six indirect-fired natural gas heaters. Ventilation openings were positioned above the truck doors to bring in makeup air from the top and avoid the lower settling particulates. In practice, air leaks and negative pressure created a "stack effect" that lifted particulate from low to high areas. This resulted in:

- 240,000 cfm of air exhausted to reduce diesel contaminants
- Large heat losses and high utility bills
- Costly and inefficient dust abatement programs
- Product contamination from particulate matter introduced into the building by the stack effect

A project was initiated with Engineering to better understand the effects of exposure to diesel particulate. The project was created and approved through the capital process as a Health and Safety enhancement, yet still demonstrated a return on investment. In 2005, Dofasco's Jim Inglis, Specialist HVAC/R Applications, attended a Union Gas Ventilation Workshop. This provided him ideas to use while working with Paul Harshaw and John Forbes, of Finished Product Shipping, on innovative ways to improve air quality and control humidity. The project began by exploring the minimum technical solutions to the air quality and heat loss condition. Union Gas followed up by providing Energywise program financial support for an engineering study comparing desiccant dehumidification with an exhaust heat recovery option.

In the meantime, facility management had continued to implement improvements to the building envelope and ventilation systems. These included installation of super fast rubber truck doors at entrances and exits, using area fans to channel air toward the central corridor, and regular "scrubbing" of floors. Yet air circulation was still poor; particulate levels continued to raise concerns; and utility bills kept rising.

## SOLUTION

---

ArcelorMittal opted for the customized ventilation and air-to-air heat recovery solution:

- Two systems were deployed – North and South locations
- Custom heat exchangers assembled by Aaon Canada in Burlington reduced the amount of required equipment (and weight)
- New inlet filters to exclude external contaminants from heated air
- Precise control of temperature and humidity was designed and installed by Airon HVAC & Control Ltd of Burlington.

Each heat exchanger moves 60,000 cubic feet of air per minute. The new system extracts conditioned air from high above the vehicle aisles, where diesel emissions have their highest concentrations, delivering it to the exchanger where residual heat is used to pre-heat incoming air. Once the energy is extracted, this air is vented. The fresh heated air is channeled through ducts and exits at a lower level with high velocity through the north and south ends of the complex. This has the effect of 'herding' particulate toward the extraction points in the middle vehicle aisle. It reduces the stack effect and maintains air pressure close to neutral.

The new system was approved as a health and safety measure, but it has performed equally well in delivering energy, environmental and other business benefits.

### BUSINESS BENEFITS

- Annual energy cost savings estimated at \$350,000\*
- Reduces product contamination
- Payback less than three years

### ENVIRONMENTAL & SAFETY BENEFITS

- Vastly improved indoor air quality
- Lower dust and diesel particulate
- Healthier workplace
- Operator comfort
- 44% less greenhouse gases
- Exhaust air is filtered leaving the facility



Ventilation heat recovery can be employed effectively at plants and facilities requiring large quantities of ventilation air for health and safety and/or product quality assurance. These include:

- **Steel plants**
- **Aluminum casting plants**
- **Automotive parts manufacturing plants**
- **Automotive assembly plants**
- **Plastic and rubber products plants**
- **Warehousing of temperature and humidity-sensitive materials**

\* Approximate value of 44% reduction in natural gas consumption based on one year of metered natural gas consumption data compared with the average of the previous six years' data.

## wins&highlights

- ✓ Natural gas consumption reduced by 44%
- ✓ Better indoor air quality for workers
- ✓ Eliminates particulate accumulation damage on product
- ✓ Payback less than three years
- ✓ Union Gas Energywise incentives \$70,000



“This design has provided vital air quality improvements, essential to our employees’ well being.”

**John Forbes**

Coach, Finished Product Shipping  
ArcelorMittal Dofasco



# enercase

Ventilation Heat Recovery

“We gained so much going with this heat recovery design. Other solutions might have met individual needs but they would not have given us such a wide range of business benefits. Energy savings, health and safety, productivity all improved with this solution.”

**Jim Inglis**  
Specialist,  
HVAC/R.  
Applications

## Union Gas – For the profit in conservation

---

Union Gas Project Manager Neil Macfadyen has been working with ArcelorMittal Dofasco’s Hamilton facility for several years, providing ideas, technical assistance and savings verification. Jim Inglis has nothing but praise for the relationship with Union, calling its energy efficiency incentive process “seamless.”

Union Gas provided an incentive of \$10,000 towards the costs of the engineering analysis and feasibility study and an energy efficiency incentive of \$60,000 for installing the heat exchangers.

Union Gas is committed to helping industrial customers make energy efficiency part of their business planning. If you’d like to learn more about our financial support for plant energy audits, feasibility studies and installation of energy efficient equipment, contact your Account Manager, email [energywise@uniongas.com](mailto:energywise@uniongas.com) or visit our web site: [uniongas.com/energywise](http://uniongas.com/energywise).



**uniongas**  
A Spectra Energy Company



**ArcelorMittal**