

# CNH INDUSTRIAL AMERICA, LLC



**JENNI KRONEMAN**  
Major: Mechanical Engineering  
Iowa State University

## COMPANY PROFILE

CNH Industrial was formed in 2013, following the merger of Fiat Industrial and CNH Global N.V. CNH Industrial designs, manufactures and sells the world's leading machines for agriculture, construction, commercial and specialty vehicles as well as engines for this equipment and for marine and power generation applications. The company has more than 64,000 employees, 66 manufacturing plants, and 54 research and development centers worldwide.

The Burlington, Iowa, plant employs more than 400 people and manufactures dozers, tractor loader backhoes, tractor loaders, rough terrain forklifts, and three types of combine headers – corn, draper, and auger. CNH Industrial's commitment to sustainability is a long-term priority and a fundamental aspect of the day to day activities of its employees, its supply chain, and its logistic and manufacturing processes.

## PROJECT BACKGROUND

The 2019 project at CNH Industrial was to research and quantify upgrades to the exhaust fans and make-up air units in a high use production building that would reduce energy usage. This data was then used to develop a schedule to implement the improvements in all buildings on-site and prioritized to maximize savings. The intern also completed an inventory of light fixtures used in each building and recommended appropriate efficiency upgrades for the work area. Similar to the exhaust fan project, an implementation plan was developed and prioritized to maximize energy and cost savings.

## INCENTIVES TO CHANGE

CNH Industrial uses a program called World Class Manufacturing (WCM) which provides guidance for continuous improvement of operations. The goal of WCM is to eliminate all waste within the company including: time, material, operating and production waste, and utilities. The Burlington plant is also certified to ISO 50001 which provides another framework for energy improvements. In addition to achieving environmental goals, energy reduction projects offer opportunities to save money.

## RESULTS

**Exhaust Fan Timers – Building 52:** Observations of the exhaust systems throughout the plant revealed most exhaust system equipment was running continuously. Building 52 was selected to be the priority for analysis based on its large number of welding stations. Welding produces fumes which need to be removed to maintain air quality. Building 52 has a relatively large number of exhaust fans compared to other buildings. The recommendation is to place controls on the exhaust equipment which would be integrated into the

Facilities Computer. Once the installation is complete, the equipment would be programmed with an automatic on/off schedule to coincide with times operators are working in the area. This proposed schedule could reduce the annual run time of the exhaust systems by 50 percent.

The most direct benefit of this project would be electricity savings. When the fans automatically shut off overnight and on weekends, no additional electricity would be consumed. Another cost saving and environmental benefit is a reduction in natural gas usage. Through the colder months while the exhaust fans are running, warm air is continuously pulled from the building. During production hours, this is necessary because of welding fumes. However, during the off-shift hours, the fans pull heat out unnecessarily, causing excess natural gas to be consumed to maintain the building's set point. The controls would also allow for monitoring of the status of equipment, air temperature, and carbon monoxide levels from one centralized location. This would assist CNH Industrial in ensuring the air quality meets safety standards at all times for the operators.



**Exhaust Fan Timers Expansion:** After quantifying projected savings for Building 52, the intern investigated the exhaust fan systems in the other buildings at the Burlington plant. The intern took inventory of the fans, and calculated electricity and natural gas losses of the exhaust systems and makeup air units of each building. Prioritizing buildings with the highest savings potential, CNH Industrial has a clear implementation plan that will reduce energy usage and improve air quality across the plant while maximizing cost savings.

For each step of this implementation plan, CNH Industrial would need to install the controls and integrate the additional fans and scheduling into the Facilities Computer.

**HID Replacement:** CNH Industrial had previously replaced the majority of the high intensity discharge (HID) fixtures used in the plant. The goal was to save energy and decrease the fire risk from the heat produced by HID's. The previous projects were a success, so the intern took an inventory of the remaining HID's in use at the plant. Data logger equipment was used to obtain accurate run time information for each group of lights. This data was then used to project the energy and cost savings of replacing existing HID's with light emitting diode (LED) fixtures and occupancy sensors.

LED's use less than half the wattage of HID's and produce significantly less heat. In addition to the significant energy savings, LED's do not require regular ongoing maintenance. LED fixtures are also programmable so that CNH Industrial can customize the occupancy, dimming, and daylight harvesting parameters of each fixture. The occupancy sensors could further reduce energy usage by turning off or dimming the lights when no one is in the area.

**Lighting Expansion:** Multiple buildings contain fluorescent fixtures or LED's without occupancy sensors. For all these buildings, the intern took inventory of the lighting types and run hours. From this data, the intern also developed a prioritized implementation plan to upgrade the remaining lighting at the plant. Once the expansions are complete, all buildings will contain LED lights and occupancy sensors. With



standardized LED lighting, maintenance could alleviate storage of multiple lamps and ballasts for maintenance and repairs.

The buildings with fluorescent fixtures would experience energy savings from a lower wattage fixture and shorter run times. The areas with existing LED's already have low wattage fixtures, but the run times would be shortened by the addition of an occupancy sensor.

To implement each step of the lighting upgrade plan, fixtures and LED's would need to be purchased and the installation scheduled.

| PROJECT                          | ANNUAL COST SAVINGS | ENVIRONMENTAL RESULTS         | STATUS      |
|----------------------------------|---------------------|-------------------------------|-------------|
| Exhaust Fan Timers — Building 52 | \$51,280            | 481,756 kWh<br>29,516 therms  | In Progress |
| Exhaust Fan Timers Expansion     | \$60,660            | 463,810 kWh<br>122,149 therms | Recommended |
| HID Replacement                  | \$9,954             | 117,109 kWh                   | Recommended |
| Lighting Expansion               | \$194,856           | 2,292,424 kWh                 | Recommended |

