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PLAINS TALK

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May/June 2018

Coming Full Circle: Gage Brothers Manufacturing Plant & Office
Strategic Direction Report: Industrial & Manufacturing Design
Building for Workflow: Wilson Trailer
Taking Out (More) Trash: City of Casper Baler Building

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NEXT ISSUE

One of the most important considerations in designing for healthcare facilities is the comfort and confidence of the people inside. In our next edition, we'll talk about how we create environments to help heal.

MECHANICAL ELECTRICAL PLUMBING POWER

AN ENGINEERING SOLUTION CENTER

IN THIS EDITION...

The modern Industrial Revolution hit American shores in the late 19th century, bringing with it a fast-paced shift in manufacturing materials, energy sources and machines. History lesson aside – this cultural change had an incredible impact on engineering. While our field has been around for centuries, suddenly the things we were designing (buildings and infrastructure) played by a new set of rules. Not only did engineers now design to get the doors open on these massive industrial complexes – but the products that were manufactured (from concrete walls to electrical fuses) changed how we spec nearly every other type of building.

Even today, the industrial and manufacturing sector presents engineers with unique challenges. As processes and equipment become more advanced (sometimes it seems like daily), our systems and energy sources have to keep pace. Part of that means having knowledge and experience in the specialized systems that support these vast facilities - but the other (and honestly equally important) piece is a willingness to get to know the business itself. By communicating with owners and learning about their processes and widgets, we're better equipped to create mechanical and electrical designs that help them get the job done.

Welcome New Team Members

Asa Brocar
Drafter
Sioux Falls

Matt McTee
Drafter
Rapid City

Richard Panton
Drafter
Cedar Rapids

Pedro Uztariz
Mechanical Designer
Casper

2018 SD Physical Plant Director's Conference

Earlier this month, West Plains Engineering got the opportunity to join facilities professionals from across the state of South Dakota at the annual Physical Plant Director's Conference - hosted by the SD Office of the State Engineer.

Several members of our staff attended the conference to learn from the speakers and network with colleagues and clients. Notably, our own Todd Weidner, P.E. and Kevin Groves, P.E. presented a 1-hour course on Electrical Assessments.

Additionally, as a lunch sponsor, West Plains got to say a small BBQ "thank you" to our clients for their business throughout the year. Thanks for the hospitality OSE and see you next year!

Cedar Rapids Leadership Transition

West Plains Engineering is pleased to announce a transition in leadership in our Cedar Rapids office. Jeff Reinhart, P.E. is now focused on leading our electrical engineering staff, while we welcome Mike Drahos, P.E. as the new office manager.

Jeff has been the office manager in Cedar Rapids for the past 15 years, but has a passion for getting back to what he loves most about his job – being an engineer and finishing his career in a more technical role. Obviously, as engineers ourselves, we respect and understand that decision. To support him, we brought in Mike, who has more than 25 years of experience in MEP consulting as a mechanical engineer in Iowa and Minnesota, and joins West Plains after running his own construction firm.

Mike Drahos, P.E.
Office Manager
Cedar Rapids

Jeff is currently managing the office throughout the transition until Mike joins us full time in August. Jeff will then focus on leading the electrical engineering staff and expanding our services in complex electrical projects.

We want to thank Jeff for his years of outstanding leadership as a manager. We appreciate his skill and experience as an engineer, and know he'll continue to be a great partner for our clients in Iowa.

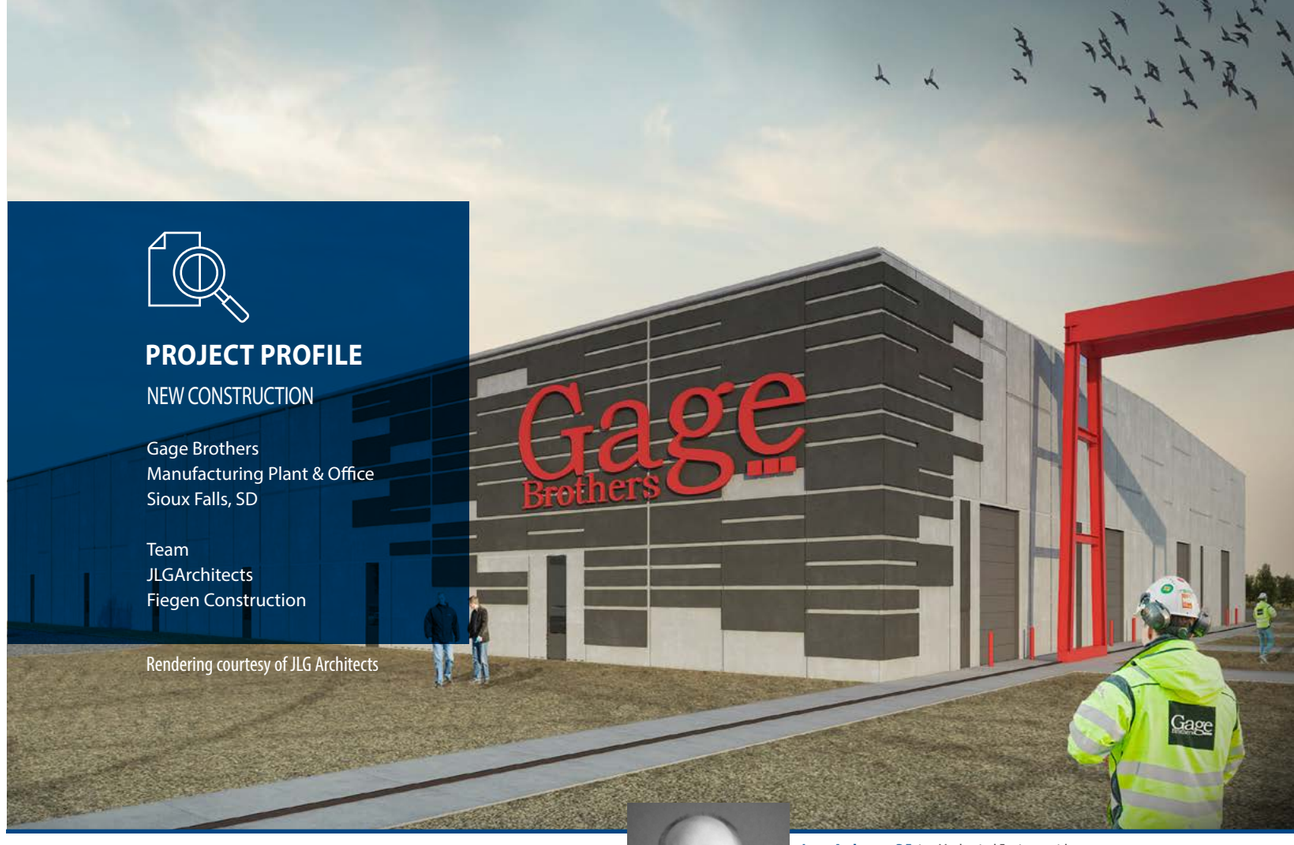
And, of course, Welcome to West Plains Mike!

MARK YOUR CALENDARS!

West Plains is busy planning our Client Appreciation Events company-wide! Details for each will be sent soon, but check out the schedule below and make sure to Save the Date for an event near you.

Cedar Rapids: Thursday, July 26 | 4-7 pm
Cedar Ridge Winery & Distillery
Sioux Falls: Friday, Sept. 28 | 11 am-3pm
WPE Office
***Sioux City:** Thursday, Oct. 18 | 3:30-6 pm
Location TBD
Casper: To Be Determined
Rapid City: To Be Determined

**With so many great partners in the Sioux City area - we're bringing the party to you this year!*



PROJECT PROFILE

NEW CONSTRUCTION

Gage Brothers
Manufacturing Plant & Office
Sioux Falls, SD

Team
JLGArchitects
Fiegen Construction

Rendering courtesy of JLG Architects

Coming Full Circle

The industrial sector plays an important role in an engineer's world. Not only do we design facilities and infrastructure to support industrial manufacturing and storage – these same spaces can produce the construction materials and equipment engineers and architects spec on a daily basis.

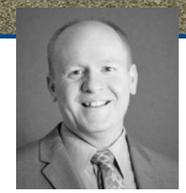
In the case of the new Gage Brother's headquarters, it was a unique combination of both. For more than 100 years, Gage Brothers has manufactured concrete construction materials for the buildings we design. Beginning in 2014, it was time to look at expanding the company's manufacturing plant and office space. Working with JLG Architects and Fiegen Construction, West Plains provided the mechanical and electrical engineering design for the new 230,000 square foot facility, which is currently being constructed on a 45-acre site northwest of Sioux Falls, SD.

At an estimated $17.7 million, the factory includes precast process lines, metal shop, wood shop, office space, breakrooms, training rooms and a concrete batch plant.

This project is particularly interesting on the mechanical side. The heating and ventilation for the factory is provided by roof mounted dedicated outdoor air makeup air units and roof mounted exhaust fans. To help with air quality and excessive humidity, the factory makeup air units are 100 percent outside air and do not return any air. This creates a better working environments for staff. While there is no air conditioning in the factory, supplemental exhaust fans and intake hoods are installed on the roof to move more air in the summer to cool the space. Gas-fired radiant heaters were also provided throughout the factory space to shorten the curing time of the concrete.

The plumbing systems are also important to the manufacturing process. There is process piping and equipment in the building, which is supplied with well water from a well drilled on site. There are also hose bibs and compressed air connections spread throughout the manufacturing space. Finally, water coolers are available throughout the plant for employee convenience and care.

To help save water, the process water is cleaned and recycled. This system includes a well pump and well water storage tank, a screw auger for cleaning the process water, pressure booster pump, and a used water storage tank.



Isaac Anderson, P.E. is a Mechanical Engineer with more than a decade of experience in our Sioux Falls office. Isaac was the Lead Mechanical Engineer on the Gage Brothers Manufacturing Plant and Office design.
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Strategic Direction Report

INDUSTRIAL & MANUFACTURING DESIGN

Darrin Tille is 6'4" tall (which surprisingly isn't even our tallest team member) - standing inside a single section of duct work at an industrial manufacturing plant.

WHAT'S INSIDE MATTERS MOST

At first glance, industrial and manufacturing facilities may simply seem like bigger versions of a typical MEP design – but there is so much more than meets the eye.

As engineers, we learn the fundamental principles of design early in our careers. The application of those principles varies by degrees from project to project based on the scope, budget, end user and a host of other factors. But few project types stretch and expand those principles to the level of an industrial and manufacturing facility. That's because what's inside these vast structures, the products stored or manufacturing processes utilized, almost always require a unique environment and systems to support them.

From large storage warehouses, to dog food manufacturers, bio-refineries and trailer factories – each adds it's own special brand of complexity. Frequently, the design team must account for extremes in these space, such as welding fumes, dust/dirt and high heat (just to name a few).

Depending on the industry, the design challenges change slightly. Large warehouses are often concerned with stratification. Manufacturing plants focus on indoor air quality and employee comfort. Food factories, which tend to be the most highly regulated, include all of the above plus added scrutiny toward space temperature, humidity control and emergency power systems, all of which impact the quality of their product.

In the midst of this, is also the unique task of making sure the mechanical and electrical systems of the facility itself can support the specialized production equipment used in the manufacturing process. Not to mention - that it can do so in a potentially hazardous environment.

In this Strategic Direction Report, we'll touch on engineering design considerations for issues that in some way impact nearly all industrial and manufacturing spaces – overcoming spatial challenges, adapting to unique environments, supporting specialty equipment and optimizing safety. We'll also provide several real-life examples of those considerations put into practice to assure products keep rolling off the line, goods are appropriately stored and quality food is available for consumers.

Download the Full Strategic Direction Report

Visit www.westplainsengineering.com/SDR or click on the QR code below to download the FREE full white paper reviewing the evolution of drafting to modeling.

Darrin Tille has been a Mechanical Designer and Project Manager in the Sioux Falls office for more than 10 years. He specializes in designing mechanical systems to support large-scale industrial and manufacturing spaces.
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Todd Weidner is a Principal Electrical Engineer and Manager of the Electrical Specialties Division. Todd has been with West Plains more than 15 years, recently turning his focus to electrical studies and energy audits primarily in support of industrial clients in North Dakota, South Dakota, Wyoming, Iowa and Minnesota. He is based out of our Sioux Falls office.
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PROJECT PROFILE

ADDITION

Wilson Trailer Production Plant
Yankton, SD

Team
W.A. Klinger

BUILDING FOR WORKFLOW

West Plains has supported Wilson Trailer on more than a half dozen renovations and additions to its manufacturing plants over the course of the past decade. With two of it's six company-wide plants located in South Dakota, Wilson has a large industrial presence in this region.

In 2014, our Sioux Falls team worked with Wilson's Yankton plant to provide mechanical and electrical design for a 35,000 square foot addition aimed at not only providing more space, but making that space better fit the manufacturing workflow.

The mechanical design of the project involved providing new roof top units to heat and cool the addition, as well as new units to heat and cool the existing plant. The project also included providing air scrubbing units to keep the air in the plant clear of welding fumes. This is essential to companies like Wilson, that use an extensive welding process to manufacture their products, which heavily impacts worker safety. Prolonged exposure to welding fumes can cause health problems - from infections to an increased risk of lung damage and several types of cancer.

The entire HVAC system, new and existing equipment, is controlled through a state-of-the art building automation system to maximize energy savings, while keeping the plant air clean.

The electrical design of the project required an additional electrical service for the expansion, as well as to feed the new air conditioning loads for the existing building. Production equipment for the new line included both new equipment,and relocated existing equipment for re-working the existing workflow in the plant and making the process more efficient.

Partner Spotlight

Wilson Trailer

For more than 125 years, Wilson Trailer has built some of the industry's top grain, livestock, flatbed, drop neck and gooseneck livestock trailers. More recently, the company has added a premium line of platform and commodity trailers, both of which still boast the durability and value that has become synonymous with the brand. If you live and work in the Midwest, chances are you, or someone you know, has a Wilson product parked at home. After all, Wilson Trailers is headquartered in Sioux City, IA – and the company has six plants scattered across this region in Iowa, Missouri and South Dakota.

With two plants in our own rural backyard (Yankton & Lennox, SD), West Plains has had the privilege of supporting Wilson Trailer as the company has grown over the past decade. Our team has designed additions to both the Yankton and Lennox facilities (including one in Yankton that is currently being constructed), as well as mechanical upgrades to improve building HVAC and ventilation performance. Key to these designs is always a focus on indoor air quality and systems to mitigate the fumes and dust created by the intense welding process used in manufacturing. Additionally, we account for the heavy electrical load required by not only the welding, but many other pieces of industrial production equipment that keeps trailers rolling off the line – and down the road.

> "By their nature, industrial buildings are typically very dirty. This can be due to a variety of reasons, including welding, dirt on the incoming raw product, or even the manufacturing process itself. In these projects, indoor air quality is important, not only to assure the quality of the end product, but to improve the productivity of the workforce. In fact, poor air quality has been found to have a direct correlation to employee productivity. The better the air quality and work environment, the happier and more productive the workers."

Read more about industrial design by downloading our most recent Strategic Direction Report at www.westplainsengineering.com/SDR.

Designing for Destratification

In facilities like the Wilson Trailer production plant, stratification can occur due to the tall, open area. The warm air naturally tries to gather at the top of the room, often leading to as much as a 10 degree F difference in temperature between the floor and the ceiling. Anyone who has ever done any welding will tell you it's hot work – so addressing stratification becomes even more important.

In most warehouses, a temperature difference between the floor and ceiling of 3 degrees F or less is preferred. This can be accomplished through several different methods based on the specific goals and budget of the project. One option are air destratification fans – very large fans that rotate at low speeds. These units move a lot of air at low velocities so the air is mixed without making occupants feel like they're in a wind tunnel.

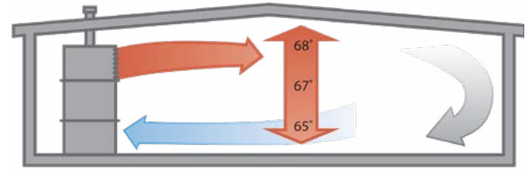

Figure 1: Destratification. Adapted from "AC Series Air Turnover Units" by Industrial Commercial Equipment Manufacturing, Ltd. (ICE). p. 4

Air rotation systems, which were utilized at the Wilson Trailer plant, are another option. These HVAC units, again, move a lot of air at low velocities to assure proper mixing within the space. The sizing of both of these options is entirely dependent on the temperature difference the client is trying to achieve, so open communication between the design team and owner is essential.

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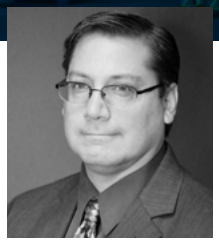
PROJECT PROFILE

EXPANSION

City of Casper Baler Building
Casper, WY

Team
Hein/Bond Architects



Michael Heinrich, P.E. is the Lead Mechanical Engineer in our Rapid City office, and has been with West Plains Engineering since 2000. Michael also frequently works with our Casper team on projects throughout Wyoming.
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TAKING OUT (MORE) TRASH

The City of Casper Baler Building (a facility that compacts and "bales" trash for recycling) was constructed in 1984 with the capacity to process 250 tons of waste a day. Since then, the average per day production has increased to more than 350 tons – making the facility considerably undersized.

West Plains Engineering worked with the City to both improve the existing 13,200 square foot space, as well as add a much-needed 19,500 square foot expansion and a 20,000 square foot Materials Recovery Facility (MRF).

Improvements to the existing facility include a new metal liner panel, roofing, insulation, ventilation and lighting, as well as an odor control system. The new additions consist of an expanded dumping pit, with overhead and main doors, a viewing room and restrooms and a new recycling compactor in the MRF. These new areas will be provided with heating and ventilation, odor control systems, a methane mitigation system, power receptacles, normal and emergency lighting and fire detection and alarm. Two 25kw solar photovoltaic array system were designed to take advantage of renewables and decrease overall energy consumption.

The $7M project is currently under construction by Caspar Building System, and should be ready to serve the City of Casper in 2019.