



CASE STUDY

BUILDING A **ONE-OF-A-KIND CHICKEN HARVESTING FACILITY** FOR BELL & EVANS

Inside the award-winning plant's cutting-edge automation, food safety technology and sustainable design

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CLIENT:
Bell & Evans

FACILITY TYPE:
Food – poultry processing

LOCATION:
Fredericksburg, Pennsylvania

AWARD:
2022 Food Engineering Plant of the Year



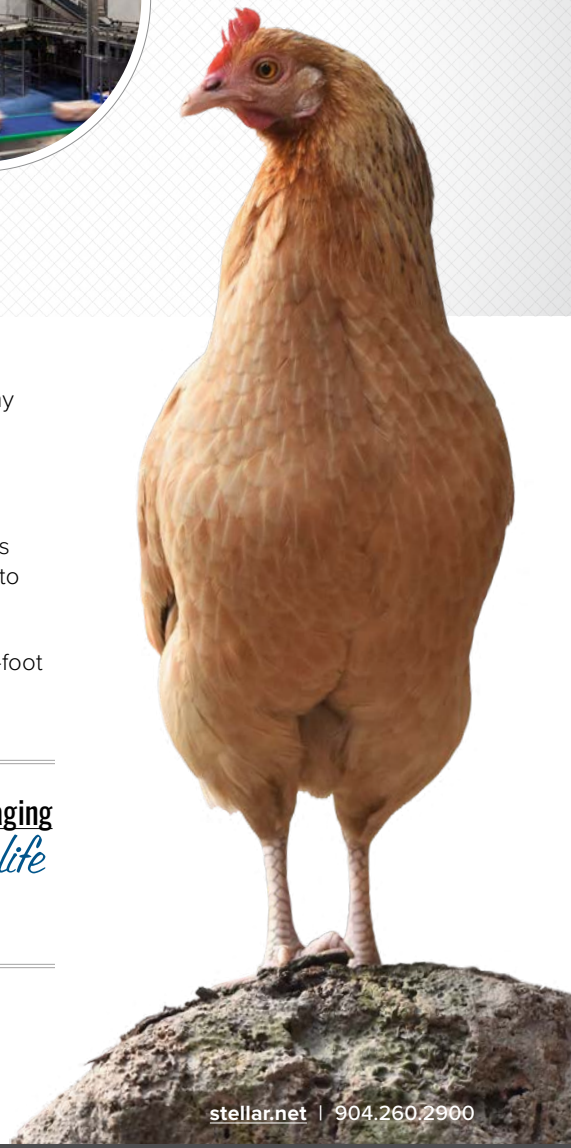
Bell & Evans, a family-owned poultry producer, has based its 125-year legacy as America's oldest branded chicken company on its commitment to serving customers the finest quality poultry products available. In addition to pioneering all-natural, raised-without-antibiotics chicken more than 20 years ago, the company was an early adopter of 100% Air Chill technology and an innovator of freezer-safe recyclable poultry packaging.

Over the last decade, increased demand for antibiotic-free and organic chicken has grown dramatically. To capitalize on this opportunity, the company's leaders recognized they needed to significantly increase production capacity while continuing to focus on food safety, team member safety, product quality and superior animal welfare practices.

Bell & Evans sought the expertise of Stellar's Food & Beverage team to design and build a state-of-the-art, 411,500-square-foot chicken harvesting and processing facility at the Bell & Evans campus in Fredericksburg, Pennsylvania.

"After previously working with Stellar to build our award-winning chicken hatchery and packaging and storage facility, I knew they were *the firm that would bring our vision to life* on the aggressive timeline we desired." — **Scott Sechler**, Owner, Bell & Evans

The new harvesting facility project would position the poultry producer for future growth and go on to be named **one of the food industry's most innovative plants of the year.**



STRATEGIC SOLUTIONS:

1. A premier partner to build for a successful future
2. Cutting-edge 3D design technology
3. Automation & innovative processing
4. Prioritizing food safety
5. Sustainable designs for a healthier planet



1 A PREMIER PARTNER TO BUILD FOR A **SUCCESSFUL FUTURE**

Stellar's multimillion-dollar project scope included architectural design, construction, process engineering, utilities, refrigeration and thermal services. The firm also constructed a nearby offal building to support processing operations. Before the plant's construction could begin in earnest, however, a significant amount of master planning and $5 million worth of earthwork was conducted to prepare the 100-acre site. This also included master planning for a total of two harvest facilities, leaving room for a second to be built in the future behind the new plant.

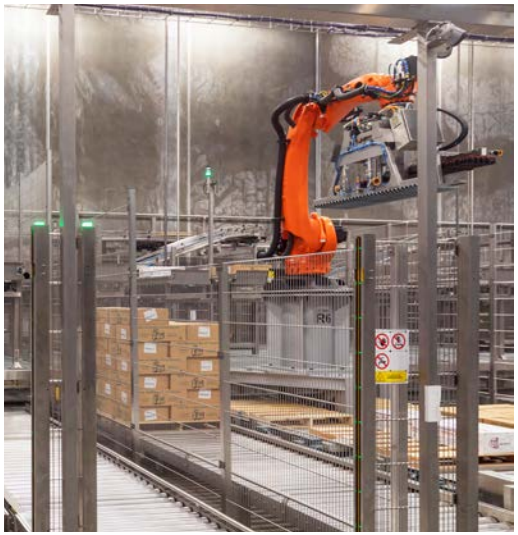
Construction began in March 2020, and despite the onset of the COVID-19 pandemic, the design teams and other crews transitioned seamlessly without schedule sacrifices.



"This project required *an immense level of coordination & communication* between our teams, subcontractors, equipment manufacturers and client representatives. Not only did the pandemic force us to transition to new job site requirements and remote work, but we also designed this facility completely in 3D, including equipment placement. Effectively managing this degree of real-time coordination was key to the project's success." — **Nathan Edwards,** Operations Manager, Food & Beverage, Stellar









2 **CUTTING-EDGE** 3D DESIGN TECHNOLOGY

Stellar's use of 3D-modeling technology proved to be a big advantage, helping accelerate the timeline and, therefore, ROI for Bell & Evans. From pipes to wiring to wall placement, every facet of the design was reviewed within the model to facilitate accurate, real-time collaboration between all project stakeholders. This preemptively eliminated nearly all potential design clashes that could have occurred during construction.

Additionally, the 3D model enabled Stellar to work with the European-based original equipment manufacturer (OEM) in real time without adding travel costs and weeks to the project budget. The model provided a platform for Stellar's construction team members to virtually "walk through" and understand the facility and its functionality before stepping foot on the site.

This allowed them to analyze the design details and proactively point out challenges from a construction viewpoint before they became delays in the field.

The design team implemented **building information modeling (BIM)** software to ensure accurate 3D models were updated each time there was a change in process equipment design. Stellar's use of BIM facilitated efficient coordination with Bell & Evans and OEMs to ensure that all impacts were accounted for.

3 AUTOMATION & INNOVATIVE PROCESSING

Together with Stellar, Bell & Evans set out to build one of the world's most innovative chicken harvesting plants — and they refused to cut corners to get there. Investing in world-class automation and processing technology was a key component of achieving this goal.

The facility's automated processes include:

- **Live receiving** – The automated live receiving transport system eliminates the need for noisy, jolting fork trucks. It minimizes human touchpoints, increases team member safety and reduces physiological stress experienced by the birds upon arrival. After they are humanely rendered unconscious via slow-induction anesthesia (SIA), the chickens are harvested.
- **Bird grading & tracking** – Once the birds are plucked, they pass through a series of cameras programmed to spot certain variables in the raw, whole chickens and flag them to be removed from the line for human inspection. The system also tracks which farm each bird originated from, improving traceability and aiding Bell & Evans in evaluating and improving individual grower performance.
- **Byproduct vacuum system** – In the plant's harvest area, a waste vacuum system automatically collects and transports byproduct material to the nearby company-owned rendering facility for disposal or to be sold as-is to pet food facilities for future processing. The system eliminates the need to manually transport the material, thereby improving the facility's cleanliness and efficiency.
- **Chemical delivery** – Organic-certified cleaning solutions are automatically piped to various distribution points throughout the facility. The system monitors electronic signals within the conduits and regulates control valves to ensure proper delivery with no human contact.
- **Deboning & x-ray bone detection** – Once the raw, whole birds enter the cut-up and debone area, they undergo automated dark meat deboning, which further reduces team member touchpoints and improves food safety. All of the boneless, skinless white and dark meat passes through X-ray bone detection equipment originally designed for the fish industry to identify even the smallest bones.
- **Case delivery** – An empty case delivery system efficiently places bulk packing stations around the cut-up room. The technology is not typically found in similar facilities due to the expense of implementing the length of conveyance required. This system streamlines Bell & Evans' packaging process and eliminates manual case delivery.
- **Packaging** – The thick tunnels, dock equipment and dock are outfitted with all the necessary infrastructure to support the use of automated guided vehicles (AGVs). Eleven robots automatically pack and palletize products in the warehouse, eliminating human interaction. The innovative design includes space for robots to be added, so the facility can operate as ergonomically and efficiently as possible.



In addition, the processing lines have the capability to run at a rate not yet approved by the United States Department of Agriculture (USDA). Once approved, the facility is equipped to run at even higher speeds while maintaining a priority focus on food and team member safety, product quality and animal welfare.

4 PRIORITIZING **FOOD SAFETY**

The Stellar team engineered every facet of the harvesting plant to create the most sanitary environment possible. As a result, the facility surpasses USDA standards. Special attention was paid to surface selection and layout to accommodate ease of cleaning and maintaining a food-safe environment:



- **Intelligent Reporting, Inspection & Selection (IRIS) System** – The IRIS system uses cameras to identify specific poultry diseases, potential contaminants or safety concerns on the birds themselves. Like the grading system, IRIS aids traceability by tracking each bird to the farm it came from and allowing plant personnel to retrieve digital images of specific birds from any of the IRIS cameras. It's also the first of its kind to be installed on a poultry processing line in the U.S.
- **Stainless steel surfaces** – A gold standard of cleanliness and durability, stainless steel surfaces are nonporous, making for quick and easy sanitizing after use.
- **Acid brick flooring** – While more expensive than other finishes, this flooring material was selected for longevity and holds up well to the frequent cleaning and temperature fluctuations in the processing areas. Sloped flooring and strategically placed drains hasten drying after washdowns.
- **Welded equipment infrastructure** – Equipment infrastructure is welded to stainless steel plates embedded directly into the precast concrete walls. By eliminating nuts and bolts, Stellar's designers mitigated the risk of moisture collection or bacteria growth in hard-to-reach areas.
- **Cooled interstitial space** – The entire facility has a climate-controlled interstitial space for utility infrastructure. This creates a thermos bottle effect, per se, and provides energy savings for the building's refrigerated spaces.
- **Second-floor mezzanine** – Above it all, an overlook provides an observation point for managers, executives and visitors to provide visibility of operations around the facility without introducing outside contaminants, increasing food safety risks or needing to change clothes or scrub out.
- **UV lighting** – Months before the COVID-19 pandemic increased public awareness of the antimicrobial properties of ultra-violet (UV) lighting, Bell & Evans owner Scott Sechler requested them in the facility's rooftop makeup air units (RMAUs) to prevent bacterial growth and kill airborne viruses. Bell & Evans has utilized this technology in its other facilities for several years.





5 SUSTAINABLE DESIGNS FOR A HEALTHIER PLANET

Sustainability was a top priority in all aspects of the plant's design. In fact, Bell & Evans received the first green loan in U.S. poultry from Rabobank for its new harvesting facility. Even when a building isn't trying to meet a certification requirement or score card, Stellar always maximizes sustainability where possible.

Throughout the facility, Stellar specified low-VOC (volatile organic compounds) and highly recyclable products, as well as energy-efficient LED lighting. Additionally, 55% of the plant's heat requirements (in BTUs) are recycled from waste heat.



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WATER CONSERVATION

As with past facilities, energy conservation was at the forefront of the design, because according to Bell & Evans, it's simply the right thing to do. The company partnered with Stellar to identify the best areas to strategically conserve and recycle water. As a result, the facility **redirects 40% of its potable water usage to reconditioned systems** throughout the facility.

Inedible portions of the chicken flow through a trench from the evisceration room to the offal building, which was also designed and built by Stellar. It then passes through two meat screens in a continuous loop of washout water, which is then pumped through a wastewater facility to be recycled as washdown water for the harvesting area.

100% AIR CHILL PROCESSING

Bell & Evans' 100% Air Chill method not only saves millions of gallons of water per year but also makes for a tastier, higher-quality product. Chicken can absorb up to 12% of its weight in added chlorinated water, which is commonly used in conventional cooling systems. (That water then "weeps" out of the meat and is trapped within the "diaper" found at the bottom of most fresh chicken packaging.) The new facility **conserves a total of 400,000 gallons of water per day** between air-chilling and the utilization of reconditioned water.

NATURAL REFRIGERATION

Stellar designed and installed a **sustainable ammonia refrigeration system** with stainless steel piping to serve the facility's temperature-controlled processing and cold storage areas. Unlike typical facilities that use carbon steel piping that can rust under the insulation and lead to potentially hazardous ammonia leaks, specifying stainless steel guarantees this piping will last many lifetimes.

HEAT RECOVERY SYSTEM

Building the processing plant in close proximity to the company's rendering plant allowed Bell & Evans to take advantage of its potential waste heat. **The company is recovering over 10 MMBTUs per hour to produce more than 75% of the facility's hot water needs.** Capturing this waste heat allows Bell & Evans to reduce its overall carbon footprint.



THE RESULT:

DELIVERING AHEAD OF SCHEDULE WITH A TRUE DESIGN-BUILD APPROACH

Stellar designed the facility in five phases. When Stellar site personnel started constructing the third phase, the architects and engineers were still in the process of designing the remainder of the facility. One of the main advantages of the design-build method is that construction can begin while decisions are still in progress for later phases, resulting in an earlier completion and ROI.

"Our strategy was a prime example of expediting a project timeline by using the design-build process. The phases were designed to provide precast vendors and joist manufacturers enough information to begin manufacturing components, while our teams worked through the remaining details," said Edwards.

The methodology was especially important given the material scarcity and supply chain delays fueled by the COVID-19 pandemic, which was starting to unfold as the project got underway.

"When the pandemic hit, we all put our hands in and said, 'We are never going to say that COVID slowed the project down, and we are never going to use it as an excuse,'" said Mike Bracrella, Chief Operating Officer, Bell & Evans. **"Not once did Stellar blame the pandemic for work delays or supply issues. Their team adapted, overcame and kept the project moving forward."**

Despite the circumstances, **the facility was completed nearly six weeks ahead of schedule.** In fact, Bell & Evans' main financier said this was the only project the bank had invested in that remained on schedule throughout the pandemic.



The new facility enables Bell & Evans to **double production capacity** over the next several years, allowing it to continue serving its current customer base while filling in geographical gaps between established markets.



"We've found that Bell & Evans customers are incredibly brand loyal, and it's because they recognize that a true commitment to quality yields an unparalleled product. This facility is no different: *It features the best of the best in technology, innovation, employee welfare & sustainability* because our customers and employees deserve no less. This is just the latest chapter in our never-ending story of challenging the status quo and leading our industry forward."

— **Mike Bracrella,** Chief Operating Officer, Bell & Evans