

**Category: #7 Best Building Project—Specialty (Over \$10M)**

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**Project Name: Woodward Industrial Turbomachinery Systems (ITS) Facility**

**Project: \$21,750,000                      Schedule: 6/2014 – 12/2015**

### **Woodward ITS: Building the Workplace of the Future**

Providing the 13.2 kilovolt site utilities, electrical infrastructure, and all technical electrical systems under an extremely aggressive schedule for an aerospace and energy control manufacturing facility might seem like rocket science, but electrical contractor, Dynaletric, was up for the challenge. It took extensive pre-planning, skill and collaboration, but the Dynaletric team stepped up to successfully help design and complete the work for energy control technology manufacturer Woodward, Inc.'s innovative 300,000-square-foot, Industrial Turbomachinery Systems (ITS) facility.

The project, which was completed in January, 2016, is part of Woodward's new 101-acre Lincoln campus headquarters and manufacturing site in Fort Collins, Colorado. Dynaletric was subcontracted to provide electrical for both the ITS facility and the 60,000-square-foot headquarters, which were designed by architectural and engineering firm Ghafari Associates and constructed by general contractor Mortenson Construction.

### **Solutions of Special Projects/Excellence in Project Management**

Dynaletric took on a design-assist role for the ITS project, working with project partners a year before the shovels hit the ground. The need for flexibility was central to the project, requiring ongoing collaboration with all consultants, owner's stakeholders and trade partners to model and analyze the design features that would best meet both current and long-term operations. Since the manufacturing facility is part of the Lincoln campus master plan, significant focus was placed on planning the site utilities that would not only accommodate ITS, but also meet the future expansion of operations throughout the campus.

Dynalectric's scope for the project included all general lighting and power, switchgear and power distribution, backup power systems, lighting controls, telecommunications systems, security, fire alarm, hazardous materials alarm systems, lighting protection, and site lighting. However, the scope wasn't Dynalectric's greatest challenge. The project had an extremely tight, eight-month interior construction schedule, and work started even before the facility's design was complete.

In adapting to the project's evolving needs, the team encountered significant design changes to the structure, layout, space programming and finishes. There were 47 individual design releases throughout the project. Each release contained only drawings that were updated or changed -- a formal, complete set of documents were never issued for construction—so accurate and timely document control was essential to reducing field re-work and schedule impacts. The Dynalectric team worked closely with the engineering team and mechanical contractor to gather information and develop installation and routing methods to mitigate future scope conflicts and maintain the target value, while ensuring the desired flexibility and integrity of the electrical infrastructure.

To accommodate the design changes, a phased approach was adopted. This allowed for 75 percent of the facility (office space, lobbies, majority of the ITS production, central energy plant and test cells) to achieve a partial TCO and turnover December 24, 2015, with the remainder of the building (ITS production support space, north section of the ITS, café and ancillary areas) completed January 29, 2016. While this phased approach enabled Dynalectric to focus on early permit package completion for underground utilities and medium voltage power distribution utilizing 3D CAD coordination well before all interior aspects of the facility were finalized, it also created additional challenges in coordinating with other trades. Through diligent communication, the Dynalectric team was able to collaborate within the tight schedule and still deliver a product that is cutting edge and timely.

### **Construction Innovations**

The ITS building is definitely not your father's manufacturing plant. It was designed to provide spaces where product design teams can integrate within the lab and manufacturing settings. In

addition to accommodating high-tech testing in various environments, the facility houses flexible manufacturing spaces, test cells, a central utility plant, central compressed air plant, central liquid pump plant, shipping and receiving departments, flexible modular office spaces on the production floor, a raised floor, high-end flexible office space including testing labs, and a full service kitchen and café. The facility's diversity reflects an innovative approach to high-performance manufacturing that encourages even closer collaboration between design and operations.

It seems fitting, then, that innovation and robust collaboration between the project's design and construction teams were used to create this innovative workspace. To accomplish this, the project was driven by a detailed, ongoing Building Information Modeling (BIM) effort to incorporate design changes, identify and correct construction collision conflicts early in the process, and significantly minimize re-work and schedule impacts. For their part, Dynalectric provided constructability and alternate design reviews in parallel with cost modeling in order to efficiently identify cost-effective solutions. The Dynalectric team also utilized trend logs to track spending in a real time environment to control the budget as the project design progressed.

With more than 200,000 feet of conduit to install and nearly 200 miles of wire and cable to pull in a tight timeframe, Dynalectric pre-fabricated 900 pipe bends/offsets and 10,250 rack, box, lighting, lighting control, grounding, fire alarm, lightning protection, busduct, panelboard, switchgear and transformer assemblies at their facility prior to installing them at the ITS site. The team utilized every efficiency to expedite their work, as electrical systems to the manufacturing plant had to be functioning prior to the project's completion so the plant's compressor skids could be tested and calibrated early on to eliminate production downtime for Woodward.

The data requirements to support ITS production were massive, and one of the last elements designed. Working collaboratively with Woodward IT personnel, Dynalectric's Voice/Data/Video crew coordinated and pulled a total of 450,000 feet of category 6 cable to 2,700 data outlet locations. Over 950 of the data cables were pulled under a raised floor and terminated in modular furniture. The Main Distribution Frame (MDF) fed 12 Independent Distribution Frame (IDF) closets with a total of 8,000 feet each of 25 pair category 6 cable and

24 strand singlemode and multimode fiber optic cable with 1,368 fiber optic LC pigtails fusion spliced. The original seven month duration to complete the data framework was compressed, yet Dynalectric accomplished this with a small, highly efficient crew working the majority of 6,400 hours over a four-month period.

### **Environmental/Safety**

The City of Fort Collins has some of the country's most aggressive Green building codes, which played into the design and installation of the project's mechanical and lighting systems that were designed to LEED Silver Standards. The lighting control system was very challenging, with 146 zones including occupancy sensors throughout the space and daylight control zones at the perimeter of both floors of the office space, café, and throughout the manufacturing floor. There was also a roof mounted 100kW solar PV system spread over eight separate arrays.

As the Woodward campus is bordered on one side by the Cache la Poudre River, special considerations were required during the construction of both the Woodward headquarters building and adjacent manufacturing facility. As always, Dynalectric paid careful attention to job site cleanliness and took extra care to ensure there was no run-off to the river.

With the number of trades on site and the many changes that occurred, Dynalectric was especially proactive about safety, spending up to an average 60 minutes per day, per electrician, on safety measures. To address changes in design, schedule and work flow, the crews prepared and reviewed job task hazard analyses as many as three times each day to ensure each change in activity was carried out both efficiently and safely. A full-time, onsite safety manager had the Dynalectric project team attending daily safety meetings, participating in daily stretch and bend exercises, and adhering to exceptionally tight safety procedures. Ultimately, the effort prevented any serious incidents as Dynalectric crews worked 148,038 total labor hours and suffered one recordable injury with no lost time.

### **Contribution to the Community**

Even with an aggressive schedule and multiple design changes, Dynalectric made it a priority to give back to the community. In spite of tight scheduling, Dynalectric team members made time

to collaborate with Mortenson and Poudre High School to participate in building a Habitat for Humanity home in the Fort Collins area.

The Woodward campus project itself is also contributing to the Fort Collins community. According to estimates, the campus is expected to employ as many as 1,700 workers and generate about \$30 million more property tax revenue than the golf course that previously occupied the site. What's more, the Woodward campus lies within the Poudre River district, which is considered a "catalyst area" for the City's future vision.

Colorado Gov. John Hickenlooper, who participated in the Woodward campus groundbreaking, summarized its significance when he said, "Woodward's headquarter expansion in Fort Collins is a legacy project for this community. The new campus will further revitalize a growing downtown area and provide Woodward access to one of the country's most talented workforces, in one of the state's most beautiful areas, as they grow their operations."







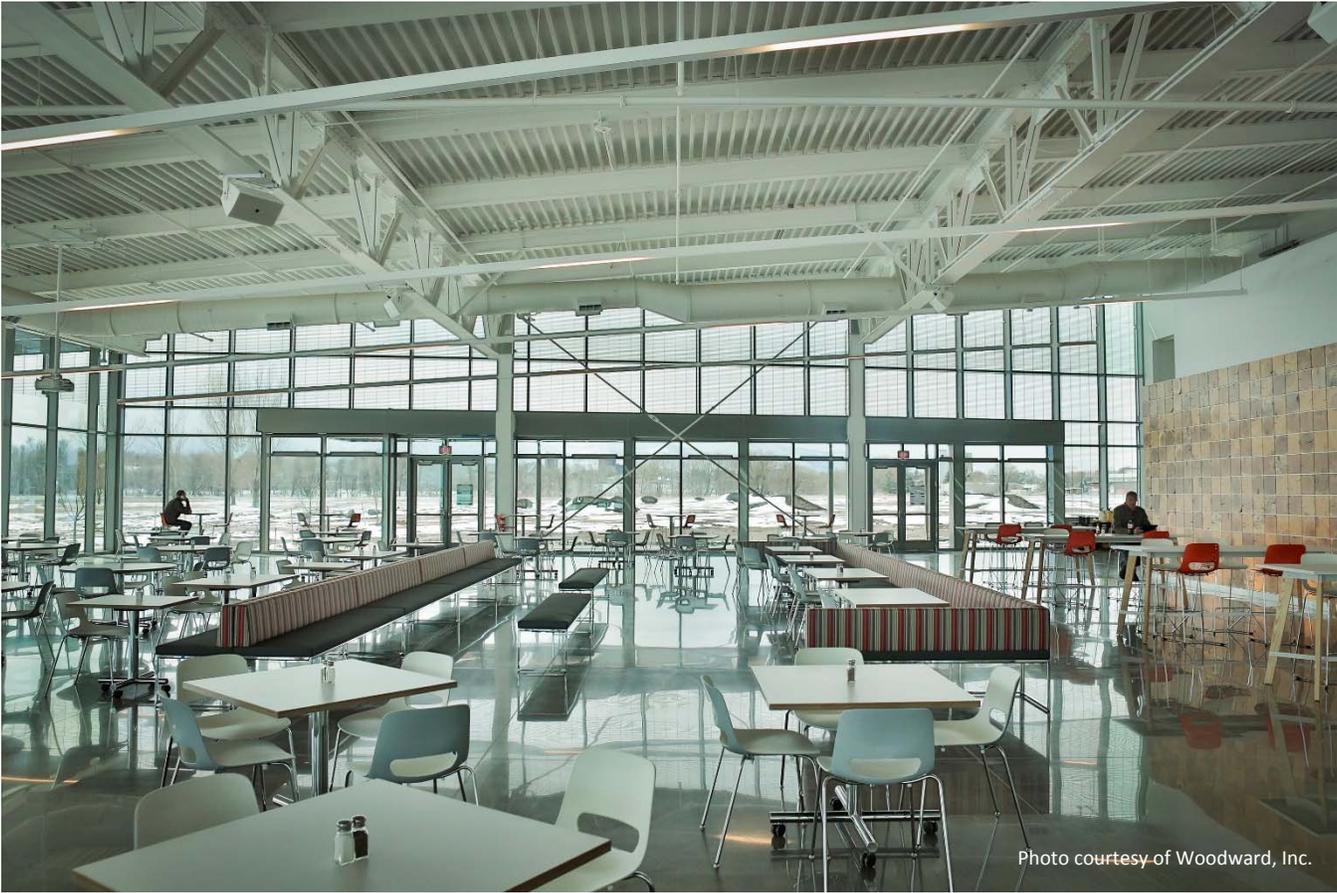


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