Y-Tec Keylex Mexico (YKM) Automotive Parts Manufacturing Facility

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The Y-Tec Keylex Mexico, S.A. de C.V. (YKM) automotive parts manufacturing and assembly facility was implemented as a design-build project by Kajima|Alberici MX at the Mazda Motor Corporation automotive Supplier Park campus in Guanajuato, Mexico, where YKM manufactures steel structural and suspension components for Mazda.

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Mazda, along with three of their major suppliers, are major investors in Salamanca, in the Mexican state of Guanajuato, where Mazda is developing a large automobile manufacturing Supplier Park campus. This unique approach supports the delivery of automobile components and significantly improves efficiencies in the automotive production process. Once the campus is complete, Mazda will produce Mazda 2 models for South America, with plans to also produce Mazda 3 models for the United States.

As a part of Mazda's Skyactiv approach for better fuel economy and performance, YKM is using higher-strength steel in manufacturing these parts to limit their weight. This results in incremental improvement in performance and fuel economy.

Kajima|Alberici MX is jointly-owned by The Austin Company (a Kajima USA Group company) and Alberici Constructors, Inc. Kajima|Alberici MX provides design, engineering and construction services for the new industrial markets in Mexico. Alberici maintains a 250,000 SF steel fabrication facility on its 60-acre property in Saint Louis, self-performing more than 400,000 shop labor-hours per year.

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Structural Approach

A pre-engineered metal building was selected as the structural approach for the YKM manufacturing facility. This approach was primarily chosen due to the limited local availability of rolled steel shapes in Mexico and need for rapid steel erection based on an accelerated project implementation schedule.

The pre-engineered metal building allowed for clear spans that could be easily tailored to the manufacturing layout and functions. Varying heights and bay spacing were possible for each of the major functional areas, including: presses, welding and assembly, paint, support and offices. Overhead crane requirements in the press area were also easily accommodated. In addition, concentrated utility loads were pre-planned and accounted for with reinforcement within individual bays.

Design and construction for the YKM facility was implemented on an accelerated schedule to meet production requirements. Architectural design and construction documents were completed in the U.S., with oversight provided by the design team for all of the structural and MEP engineering prepared by local Mexican firms. The completed facility, consisting of production space and offices, totals 367,000 SF (33,300 SM).

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Meeting Challenges

The most significant challenge impacting this project involved the aggressive schedule, along with hindering weather and poor soil conditions. Despite these challenges, however, the project was implemented on a fast-track basis and executed, on-time, in 16 months from planning and design through completion and start-up.

The team worked on a highly compressed design schedule to meet an early construction start, holding design reviews with YKM on a regular basis. To meet YKM's design objectives, design and engineering followed international standards, while taking into consideration construction approaches and practices in Mexico. Once the building manufacturing bay requirements were defined, the structural steel design proceeded while the remaining design was underway. Shop drawings were created and reviewed in the same sequence as the proposed erection. Fabrication proceeded even before the final project design was complete.

Considerable portion of the construction needed to be completed during Guanajuato's rainy season. This considerably delayed the site work and concrete foundations; however, the project team quickly responded and made the adjustments necessary to maintain the project schedule.

The Kajima|Alberici MX construction team procured long lead materials early-on. The steel framing system allowed for rapid erection of the facility's structural frame. The steel open web joists were preassembled into bays on the ground, complete with lighting conduits and junction boxes. These preassembled sections were then lifted into place on the main structural members and attached. The exterior cladding used metal roofing and siding, along with translucent roof panels. The roofing was quickly installed, which provided considerable protection from the rain for the concrete floor slab and related work, including multiple deep press pits and foundations. This also allowed the mechanical and electrical work to proceed, despite the weather.

The use of steel was critical for maintaining and improving the schedule after the weather delays.

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A Cohesive Team

The most interesting aspects, in addition to key challenges to overcome, were the logistics of project team members working from three countries – Japan, Mexico and the United States – and managing the project in three languages – all while working under a very tight schedule to meet already-committed production dates. Working through these logistics and aligning the different business cultures and organizational variances became the cornerstones of the project's overall success.

YKM is a Japanese automotive parts manufacturer building their first plant in Mexico to support a major Japanese automobile manufacturer – Mazda. Planning, architectural design and all engineering coordination was provided by The Austin Company out of its Irvine, California, office. Steel framing and cladding design and fabrication was by Ternium out of Monterey, Mexico. Mechanical, Electrical and Plumbing design was by local design-build trade subcontractors.

With three locations and languages involved, communication was critical. While the graphic nature of the construction documents was readily understood by the entire team, language had to be overcome.

Design requirements were obtained in Japanese, translated to English and communicated in Spanish. Contractor's ideas and designs were communicated to the design team in Spanish and some English, then communicated to YKM in Japanese. Construction drawings were dimensioned in metric, with notes in both Spanish and English. Extensive use of drawings and graphics were necessary to ensure the entire team fully understood the design and the design intent.

Web-based meetings were also used to facilitate direct communication, while limiting the need for international travel. As appropriate, face to face meetings augmented web-based meeting tools to allow for participation of out-of-the-country team members.

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Responsive Design

Kajima|Alberici MX's first goal was to be fully responsive to the functional requirements of the facility, providing for initial operating needs, as well as long-term flexibility. Utilities and services within the manufacturing area were carefully planned and routed, with the use of a utility service catwalk system and cable trays to organize these systems. This provides for long-term utility management, as well as an orderly look to the facility.

The majority of the engineering documents were completed using AutoCAD. Three-dimensional BIM modeling, which played a key role in planning, coordinated all disciplines, including structural engineering and congested areas of utility infrastructure, during design and engineering, as well as conveyed design objectives to the installing trade subcontractors.

Project documentation was stored using an online, web-based project documentation system. This allowed for multiple team members in different countries and time zones to access design documentation in real time. The system notified team members with automatic emails when new items were uploaded that affected them.

The mechanical, electrical, process and fire protection systems were designed by the installing contractors; the building structure and siding were designed by a pre-engineered building manufacturer; and the site/civil and foundations/concrete design were by local engineers – all working in Mexico. Austin led regular design progress reviews with YKM in Mexico and Japan.

Aesthetic Appearance

In Mexico, industrial buildings can often be too industrial in their appearance. The YKM facility houses large sheet metal presses, robotic welders, assembly areas, powder coating systems and other processes, which could lead the building down this path. The adjacent administration building includes the employee cafeteria, lockers, medical facilities, product exhibit and administrative offices.

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In spite of its industrial function, considerable design effort was made to provide a facility that was pleasant to work in and contributed to a productive work environment. Specific design features included: skylights throughout the manufacturing area; white painted structural steel and decking within the manufacturing area to provide a light, clean and uplifting work environment; design attention to lunch rooms and break areas; attention to building exterior color selection; and use of Xeriscape rock and cactus gardens to provide a pleasant outdoor environment and minimize water usage.

About The Austin Company

The Austin Company has been serving the manufacturing industry since our founding in 1878. Today, we continue to provide state-of-the-art equipment and facility solutions for manufacturers of a wide range of products.

Austin is experienced and able to handle large and complex facilities and processes, including aerospace and automotive products, chemical processing, and laboratory facilities. Our in-house team of engineers, architects and construction professionals, combined with our consulting services for site location, incentive planning and negotiation, results in capabilities that efficiently and innovatively integrate the facility, process and business requirements.

Every aspect of our services for manufacturing facilities is strategically developed to reduce operating cost, enhance flexibility, provide a safe work environment, and deliver an economical, sustainable and environmentally-responsible solution. Learn more at www.theaustin.com.

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