



# Towers



## SAE Towers is one of the world's largest producers of steel lattice towers for high-voltage power transmission.

With more than double the market share of our closest competitor, we are the leader in the Americas. Our two state-of-the-art manufacturing facilities—located in Monterrey, Mexico and Belo Horizonte, Brazil—serve the Americas with 100,000 tons of annual production capacity. As part of KEC International, we have access to 174,000 tons of additional capacity available from three plants in India.

We are the industry's most complete in-house resource for transmission structures and related services. Our in-house design, detailing, prototyping, testing, manufacturing and supply capabilities give us unmatched ability to provide your Optimized Transmission Structure Solution.

Our integrated design and manufacturing technology streamlines the work flow from CAD/CAM shop drawings to CNC-driven fabrication, resulting in accelerated cycle time, higher quality levels and increased production rates to meet today's fast growing demand. Before any tower components go into production, a complete prototype is made and assembled to carefully check for proper fit. As the largest purchaser of steel angles for lattice towers in the Americas, we have established key global relationships with the top raw material suppliers, including US steel mills, improving supply chain integrity and on-time delivery.

Cost-efficient, weight-optimized, constructible and field-fit—our towers stand above the rest.

### Industry-Leading In-House Tower Design Capability and Experience

State-of-the-art design technology systems coupled with the most experienced in-house staff of engineers in the Americas means that your design work will be done right, on time and with an eye toward quality, reliability and constructability. We utilize the latest versions of PLS-CADD, PLS-POLE, TOWER, AutoCAD, bocad and other CAD software.

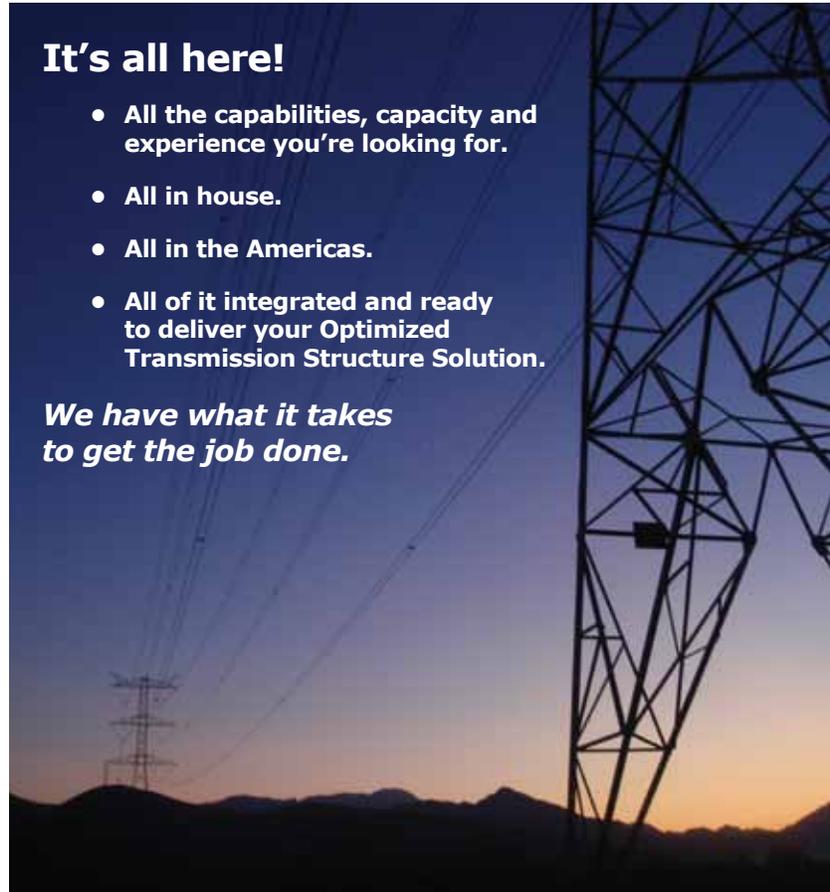
Our engineers understand today's construction methods and design accordingly. They have the tools, training and experience to generate designs that consider the full scope and complexity of your project requirements:

- Size
- Terrain
- Phase configuration
- Structural variation
- Voltage range
- Line and foundation designs
- Weather conditions
- Tower maintenance and accessibility
- Electrical clearance assessment
- Tower body geometry

### It's all here!

- All the capabilities, capacity and experience you're looking for.
- All in house.
- All in the Americas.
- All of it integrated and ready to deliver your Optimized Transmission Structure Solution.

*We have what it takes to get the job done.*



### Line Design Expertise

We also offer a broad array of in-house line design services, including the following:

- Plan and profile development
- Structure spotting
- Load criteria
- Sag and tension
- Structure optimization
- Structure design, detailing, prototyping and full-scale testing
- Foundation design

### Tower Testing

We have tested more than 600 towers at our testing station in Brazil generating reliable results for our customers. We perform full-scale prototype testing on a wide variety of structures. With three additional testing stations in India, including one capable of testing towers up to 1,200 kV, we lead the world in tower-testing capabilities.

Quality. Reliability. Timely Delivery.



## Manufacturing Quality and Capacity

High levels of output and reliability result from our quality-driven processes at our transmission structure manufacturing plants located in Monterrey, Mexico and Belo Horizonte, Brazil. These facilities encompass approximately 475,000 square feet and are capable of producing in excess of 100,000 tons annually. Both plants conform to AISC fabricating procedures and have achieved several coveted quality, safety and environmental certifications.

### Our plants in the Americas have earned the following certifications:

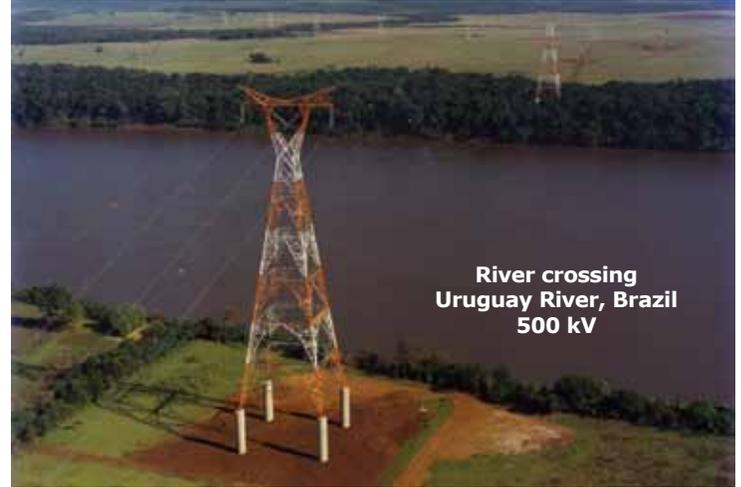
- Quality Management Systems - ISO 9001
- Environmental Management Systems ISO 14001
- Occupational Health & Safety Management Systems - OHSAS 18001

ISO 9001  
ISO 14001  
OHSAS 18001  
BUREAU VERITAS  
Certification



Additional sales, engineering design and customer service operations are located at corporate headquarters in Houston, Texas.

Now that we are part of KEC International, we have access to an additional 174,000 tons of production capacity from plants



located at Nagpur, Jabalpur and Jaipur in India. With more than 274,000 tons of combined production capacity, we are one of the largest tower manufacturing companies in the world.

Our plants in India manufacture transmission towers, telecom towers and substation structures. They are certified to deliver world-class quality: ISO 9001, ISO 14001 and OHSAS 18001.

### Monterrey, Mexico



Our steel tower and pole manufacturing plant in Mexico is located within easy access of US markets in Monterrey, Nuevo Leon, approximately 120 miles south of Laredo, Texas. The 15-acre site includes 98,200 square feet of production space plus 6,500 square feet of engineering and administrative offices. A yard encompassing 84,200 square feet is dedicated to the pre-assembly and quality assurance of prototypes. The Monterrey facility is capable of producing 35,000 tons of lattice towers annually and has full access to global and US steel suppliers, allowing for ready availability of both structural angles and plate conforming to ASTM A36, ASTM A572, ASTM A588 and ASTM A871 specifications as well as other special grades as required.

Modern manufacturing processes include eight CNC angle punch machines, two CNC angle drill lines along with four CNC plate machines, four light-duty punch machines, one 1,500-ton press brake, three 250-ton vertical presses, plasma and oxy cutters, milling machines, plate shears and submerged arc welding equipment.

Hot-dip galvanizing is carried out in house in one of the most modern facilities in North America. The main kettle measures 5 feet (w) x 8 feet (d) x 41 feet (l) and is supported by eight pickling tanks, one flux, one rinse, one quench and three dulling and deglaring tanks.

### Belo Horizonte, Brazil



Our manufacturing plant in Brazil is located near Belo Horizonte in Betim, Minas Gerais. The site covers 35 acres and features 377,000 square feet of production space plus 29,100 square feet of engineering and administrative offices. Pre-assembly and quality assurance of prototypes is performed in a dedicated yard measuring 42,000 square feet. The Belo Horizonte plant is capable of producing 65,000 tons of lattice transmission towers. It was specifically designed employing a U-shaped production process flow in order to maximize efficiency and shorten total cycle time.

The plant utilizes 14 CNC angle punch lines, six CNC plate machines, aluminum casting equipment, radial drilling, mechanical presses, oxy cutters and semi-automatic hot-dip galvanizing systems including dulling and deglaring tanks. The facility pioneered the application of a unique galvanizing process that utilizes a continuous conveyor to advance the material through a long narrow kettle.

Our transmission line hardware is developed and produced at the Belo Horizonte facility. Adjacent to this plant, we operate our full-scale tower testing station, the largest in the Americas.

## All Tower Types and Configurations

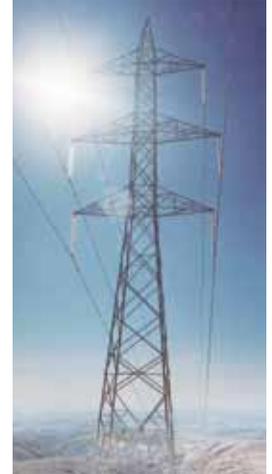
We produce guyed and self-supporting delta and flat towers for single, double and multiple circuit configurations ranging in voltages from 69 kV to 765 kV. Drawing on an extensive database of tower designs going back more than 40 years, we are able to expertly design and manufacture towers for all terrains, environments and operating conditions. Our expertise covers the full range of tower types, including tangent and running angle suspension, strain and dead end towers. We are the go-to provider in the Americas for difficult river crossings and other complex challenges. All of our tower structures are optimized for weight efficiency and constructability in order to minimize total in-place cost.



*Horizontal, 500 kV*



*Crossrope suspension, 500 kV*



*Vertical, 230 kV, double circuit*



*Internal compact delta, 500 kV*



*Delta, 500 kV*



*Horizontal, river crossing, 500 kV*



*Vertical, 400 kV, double circuit*



*Vertical dead end, 500/230 kV, double circuit*



*Horizontal guyed V, 500 kV*

## Tower Dulling Capabilities



We have the ability to produce galvanized and dulled tower steel according to your unique needs. Dulling—also known as shading or deglaring—entails the application of consistent shading to the tower steel utilizing our state of the art proprietary formula and processes, which retain all the properties of galvanization. We can supply a wide variety of consistently shaded towers as defined by your reflectivity range requirements. Some examples are shown above.



### Experience

SAE Towers' predecessor companies have been manufacturing transmission towers and building transmission lines since 1926, when it all started with the original SAE in Lecco, Italy. These companies have made an indelible mark on the industry, through the years having supplied towers that carried over 320,000 circuit miles of transmission lines, more than enough to circle the globe twelve times over.

Today's SAE Towers was spun off from ABB, Ltd.'s steel lattice tower manufacturing divisions that had operations and personnel in the United States, Mexico and Brazil.

In 2010, SAE Towers became part of KEC International Limited, a highly respected public company with more than 60 years of experience in turnkey construction of power lines and a track record of having successfully executed transmission tower projects in 45 countries. KEC is a listed company on major Indian stock exchanges and has annual revenues of approximately \$1 billion (US).

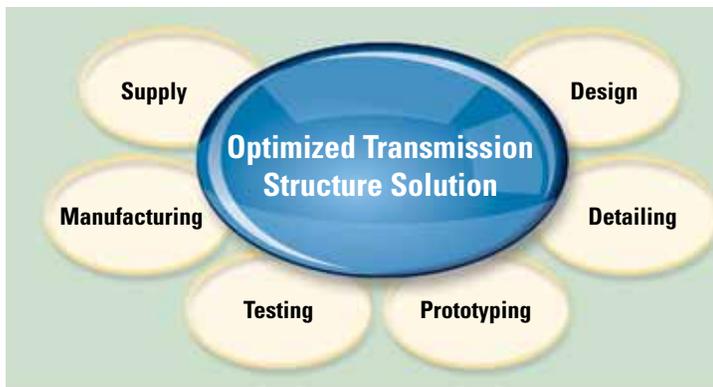
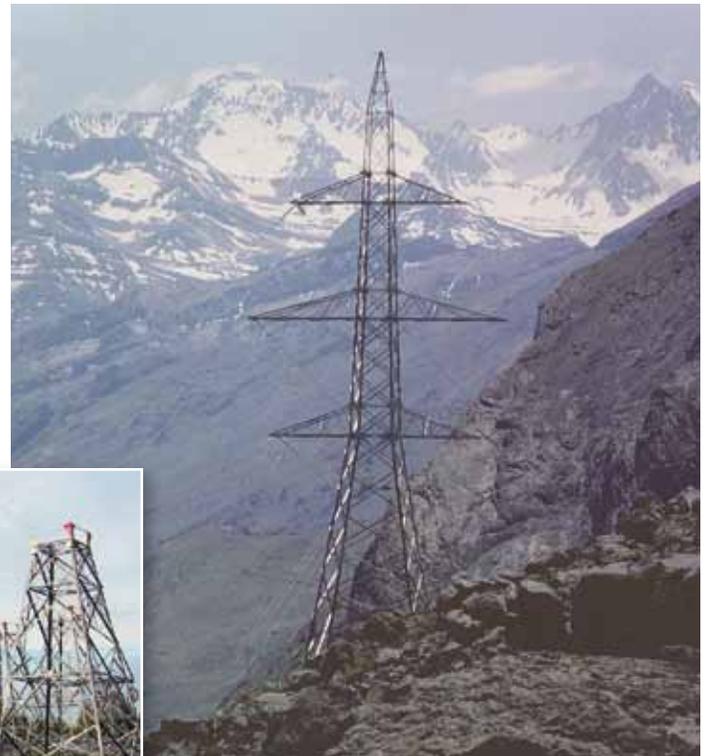
Drawing on the industry's preeminent combination of capability, capacity and experience, we are determined to continue the tradition of excellence that began with the original SAE back in 1926.

Big or small, simple or complex—we make it easier for you to get your transmission tower project done on time and on budget. Our Optimized Transmission Structure Solution is your gateway to field-fit constructability, cost effectiveness, weight efficiency, shorter and simpler transaction cycles, improved live-line maintainability and long-term reliability.



### Emergency Storm Restoration

When storms and other natural disaster create outages, SAE Towers has the capability to respond to your most urgent requirements with our Fast Factory Emergency Supply service. We understand your critical restoration time requirements and will respond to your needs in a matter of weeks—not months.



### SAE Towers

The largest steel lattice producer in the Americas providing Optimized Transmission Structure Solutions through world-class in-house capabilities.

- *Field-Fit Constructability*
- *Cost Effectiveness*
- *Weight Efficiency*
- *Shorter/Simpler Transaction Cycles*
- *Improved Live Line Maintainability*
- *Long Term Reliability*

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