

POWER GENERATION



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Power Generation

ALE is one of the leading global service providers for the power generation industry. The energy sector has been one of our core businesses since we began, and consequently our power plant lifting and transportation capabilities are well known throughout the industry. We've collaborated with all the major power equipment manufacturers to develop mutually beneficial technology, and to provide a fully integrated 'from-source-to-site' logistical service that takes care of everything from investment and infrastructure to permits and programme. We have vast experience in transporting high-value components such as gas and steam turbines, generators and transformers.

As global demand for power increases, so too does the size and capacity of the power stations that rely on us for heavy lifting and transportation solutions. Using a combination of cranes, trailers, gantry lift systems and four-point hydraulic systems, we are able to move critical items of equipment such as HRSG modules, steam and gas turbines, generators and transformers into position. Meticulous project management and the highly developed skills of our engineers mean we are able to execute these moves with incredible precision and in complete safety.

Our experience means we're familiar with the unique challenges associated with working on-site. We've developed a number of effective strategies to meet the demands of long-term or complex operations carried out during revamps and shutdowns, when time frames and space are often very restricted.

For example, our individually designed lifting systems allow us to engineer schemes which help maintain schedules or minimise auxiliary equipment removal in the event of a shutdown, thereby improving the efficiency of operations.



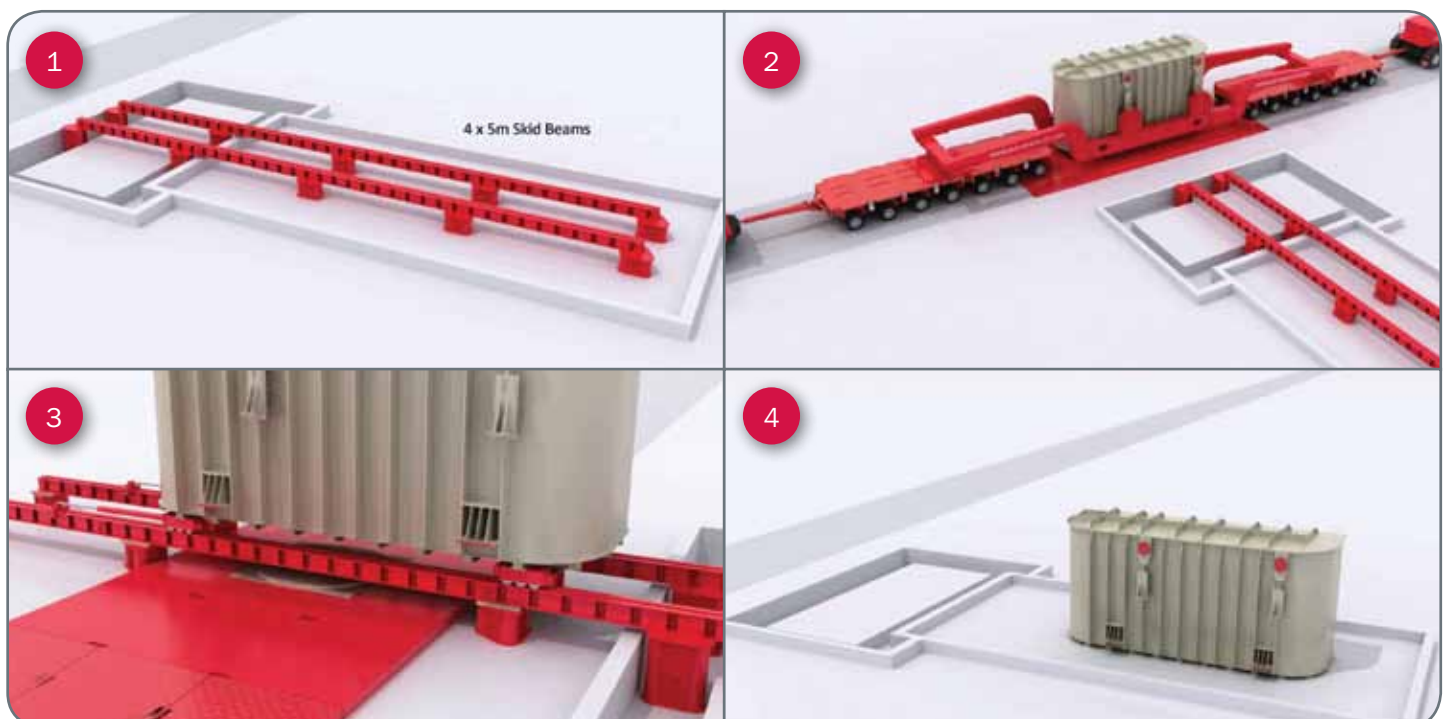
With a pedigree in innovative engineering and an active R&D facility, ALE has always been known for developing new solutions to meet future needs. Over the years we've added to our world-class engineering skills-base through the acquisition of several successful specialist companies, and now we have more than 200 highly qualified engineers working at locations across the globe. This experience means we're well equipped to support the full FEED process, working through complex technical and logistical issues at an early stage to eliminate expensive changes later on.

Our FEED capabilities form a crucial part of the service we offer. ALE has contributed to many high profile projects that have been right at the forefront of global trends in the sector. We are able to adapt to ever-changing industry requirements, evolving safety standards and scope changes as the project gathers definition during the design process, while at the same time providing solutions which are as cost-effective and safe as possible. As a result, we're able to work closely with our clients from an early stage to establish what's required and provide practical engineering advice.

FEED services include:

- Physical route surveys to determine maximum practical equipment weight and dimension information
- Investigation of environmental conditions affecting the heavy lifting and transport discipline
- Road layout and route improvement studies

- Advice on local regulatory issues relating to the movement of large and indivisible loads to the job site
- Equipment lifting and installation studies to determine the most cost and schedule effective methods of sizing and placing equipment
- Design of rigging and lifting equipment
- Outline design of new build site construction jetties
- Selection of optimum shipping methods and identification of suitable vessels or barges
- Logistical studies to ensure that transportation and installation scope support the project schedule
- Design and input to design of transportation support steel and lifting and lashing/securing points
- Assistance in modularisation studies to determine the maximum practical extent man hours can be removed from the job site



Continuous HSQE improvements are a fundamental part of our ‘Smarter, Safer, Stronger’ ethos. Although extremely high, our standards in these four areas are continuously reviewed and refined so we remain at the forefront of the industry. This is overseen by a team of professionally qualified HSQE advisors who are dedicated to developing, implementing and evaluating our global policies.

ALE works to ISO 9001:2008 standards in quality management and ISO 14001:2004 standards in environmental management. Our global HSQE objectives include improving customer satisfaction and competence, and to this end we develop and implement internal training schemes based on our unique equipment, as well as delivering externally built

training courses that ensure adherence to the latest industry standards. We’ve also established Centres of Excellence in each of our service areas to enable experienced staff members to pass on their invaluable knowledge.

Our commitment to quality management, sustainability, professionalism and safety goes a step beyond the usual focus on people and profit. Despite the scale and ambition of the projects we undertake, we’ve succeeded in maintaining safe and healthy working environments in remote and challenging locations around the world. The many local and global HSQE initiatives we’re involved in are intended to help us maintain our excellent quality and safety record.



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► Case study: Staythorpe Power Station, UK

OVERVIEW: ALE's original involvement was to provide an innovative solution to the complex delivery of a four-unit CCGT power station. The project involved river transport, SPMTs and a 28-axle girder frame trailer. ALE were then also asked to change out two transformers using a similar process.

SERVICES REQUIRED: The first stage saw ALE receive four gas turbines, four generators and four transformers – each weighing up to 370te – using SPMTs. These units were stored and then transported down the River Trent by barge. ALE's Lift 'n' Lock system was used to trans-ship the cargo onto a girder frame transporter for a 30-mile road route. It was then trans-shipped to SPMTs for transportation on public roads using a second Lift 'n' Lock system. The final leg of the journey to site was undertaken using SPMTs for installation onto foundations using ALE's modular gantry system.

The second aspect of the project saw ALE complete a similar reverse operation to change out and replace two transformers. These transformers – each weighing 270te – were installed onto foundations using a jacking and skidding operation.



► **Case study:** Gas turbine and generator, Russia

OVERVIEW: ALE successfully installed a gas turbine and a turbine generator at the Nevinnimyskaya power plant, in Russia.

SERVICES REQUIRED: Each load was transported from the lay-down area to the confined installation area by SPMTs. A strand jack system was used to lift the load free of the SPMT and to the required height for skidding. The skidding system transported the load over the foundations and into position for installation, and final adjustments were made using chain blocks.



► **Case study:** Soporcel Power Plant, Portugal

OVERVIEW: ALE undertook the transport and installation of a turbine and generator at Soporcel Plant.

SERVICES REQUIRED: The condenser, steam turbine and steam generator weighed 62te, 176te and 118te respectively. Each was approximately 10 metres long, 4 metres wide and 4 metres high. All were transported 600 metres from the storage area to the turbine building using SPMTs and then lifted to a vertical position under a skidding gantry. HLS700 strand jack lifting units with a 70te capacity were used to lift the modules between 3 and 25 metres. The modules were then skidded to their final installation axis using the gantry, and lowered and fitted onto foundation supports.



► **Case study:** Gas turbine and generator, Ireland

OVERVIEW: During a three-week period ALE installed a gas turbine and gas turbine generator at the Whitegate independent power plant in Ireland.

SERVICES REQUIRED: The transportation of the 277te gas turbine and 300te gas turbine generator was executed using SPMTs. The loads were each lifted from the SPMTs using a skidding gantry with strand jacks on an elevated skidway. After lifting the individual loads the gantry was skidded inside the gas turbine building to lower each load into its final position.



► **Case study:** Moerdijk, The Netherlands

OVERVIEW: ALE successfully installed a gas turbine and generator.

SERVICES REQUIRED: ALE installed the gas turbine and generator weighing 322te and 385te using SPMT trailers to position the pieces under the gantry system. They were then lifted next to the pedestal to the required height by means of a trolley on an elevated skidway with 200te stand jacks. After lifting each piece the trolley was skidded over the pedestal above the installation position. Each piece was lowered to just above the installation position and the required corrections were completed using chain blocks.



► Case study: Installation equipment at Solar 3 plant, Spain

OVERVIEW: ALE has successfully performed the installation of several items at the Solar 3 plant in Spain.

SERVICES REQUIRED: The solar power project involved the installation of two turbines weighing 68te and 35te, a 41te generator with 5te connection neck, and a 26te condenser. The two turbines and the generator were installed using the AC-500 crane. The condenser was skidded to its foundation using the SKS150 system with four 90te skidshoes and two 16te push-pull units. A steel structure with wooden saddles was installed over the skidshoes and the condenser was placed on the wooden saddles using the same AC-500 crane. After the skidding operations, the condenser was positioned on temporary supports until the external pedestal was built, and the jacked down to its definitive position.



► Case study: Transport and installation, Rotterdam, The Netherlands

OVERVIEW: ALE completed the transportation and installation of seven transformers in Rotterdam.

SERVICES REQUIRED: The work was split into four phases to transport and install the seven 198te transformers. The transformers were moved by SPMTs and unloaded next to the installation point on site. A skid system was used to move each of the transformers into position for installation. They were then lowered onto their final foundations using climbing jacks.



► **Case study:** Generator transportation at Wilhelmshaven, Germany

OVERVIEW: ALE successfully transported a 395te generator from port to the new-build Electrabel power plant in Wilhelmshaven, Germany.

SERVICES REQUIRED: The generator was transported on a 12-axle, 4-file SPMT trailer over the main part of the route. Some pedestrian tunnels and pipeline needed to be crossed and so temporary bridges were built prior to the transportation. The SPMT trailers needed to be reconfigured for two bridges on the route from 12-axle/4-file to 24-axle/2-file with a transport frame in order to comply with the allowed axle line load of 20te. The transport frame was designed to ensure that the spine beam moment was within the allowable. The total transport took just three days.



► **Case study:** Heaters and feedwater tank at Wilhelmshaven power plant, Germany



OVERVIEW: ALE completed a series of successful installations of heaters and a feedwater tank at the Wilhelmshaven power plant.

SERVICES REQUIRED: The items were individually positioned onto an elevated skid system from where they were each skidded next to their installation point. Once



the longitudinal skidding operations were completed, each item was jacked up with the use of a hydraulic jacking system. A transversal skid system was then installed to position the heaters above their final foundation, from where they were jacked down by the hydraulic jacking system and installed.

► **Case study:** Port to Power Station, transport and installation, UK

OVERVIEW: ALE performed a number of transportations and installations for West Burton power station.

SERVICES REQUIRED: The 18 items, which comprised steam and gas turbines, generators and transformers, were received at the Port of Hull and barged down the River Trent to a jetty at Cottam Power Station. They were then trans-shipped to a girder frame trailer for the final 6-mile road journey to the station, a route which included narrow country lanes passing through small villages. Once at the site, each piece was trans-shipped back to SPMT, transported through site and installed.



► **Case study:** Transport and installation of boiler modules, Spain

OVERVIEW: ALE carried out the transport and installation of 12 boiler modules at C.T.C.C Cristóbal Colón in Huelva, Spain.

SERVICES REQUIRED: ALE completed the transport from Huelva harbour to the C.T.C.C Cristóbal Colón plant using 18 axles of SPMT. The 12 boiler modules were then installed using a bespoke lifting frame and 14 strand jacks.



► **Case study:** Lifting of boiler modules at C.T.C.C Granadilla, Tenerife

OVERVIEW: ALE has completed the erection and positioning of eight modules at C.T.C.C Granadilla in Tenerife.

SERVICES REQUIRED: The eight modules, with a maximum weight of 170te, were lifted using two strand jacks. The strand jacks were installed onto a skidding structure that incorporated a tilting frame at ground level.



► **Case study:** Transportation and lifting of HRSGs, UK

OVERVIEW: ALE completed the transportation, lifting and installation of five complete Heat Recovery Steam Generators (HRSG's) as part of a combined cycle gas turbine project.

SERVICES REQUIRED: ALE utilised SPMTs and the AK912-1 1,200te capacity crane to complete the project. Ground works were kept to a minimum by installing the five HRSG boilers with the AK912-1 from only three fixed positions.





► **Case study:** Mejillones power plant, Chile

OVERVIEW: ALE successfully undertook the installation of two chimneys at the Mejillones power plant in Chile.

SERVICES REQUIRED: In order to install the 85 metre high chimneys each weighing 185te, ALE carried out the manoeuvres using two 45m self-stabilising 'A frame' gantries. Each gantry was provided with a 200te lifting unit and an auxiliary lifting unit for stabilisation and retention. ALE successfully completed the manoeuvre of erecting and positioning each chimney on its foundation within five hours.



► **Case study:** Ship-to-shore unload, Venezuela

OVERVIEW: ALE was responsible for the unloading, transportation and installation of a boiler at the Fertinitro plant in South America.

SERVICES REQUIRED: ALE used 4x10 lines of SPT trailers to transport the boiler 5.5km from the dock to Fertinitro plant. A lifting gantry erected at the plant included a skidding system and four 70te capacity strand lifting units, which raised the boiler over an existing pipe rack and lowered it onto transport platforms to be moved to the installation area.

Once at the installation area the boiler was lowered onto four support points and the 90te skidshoes of the SKS 150 skidding system. The boiler was then skidded to its foundations, jacked using four climbing jacks and finally lowered into position.



► **Case study:** Up righting, lifting and installation of boiler modules, Cali, Colombia

OVERVIEW: ALE has completed the up righting, lifting and installation of 11 boiler modules at the Cartón Power Plant, Cali, Colombia.

SERVICES REQUIRED: For the installation, ALE assembled a skidding system on top of the boiler house frame that was able to move in both directions. Through the use of the skidding system, all 11 boiler modules were installed without the need to disassemble and then reassemble the lifting structure during the project.





► **Case study:** Yanbu Cement Company power house, Jeddah, Saudi Arabia

OVERVIEW: ALE successfully transported and installed diesel engines for the Yanbu Cement Company in Saudi Arabia.

SERVICES REQUIRED: The transportation of the 232te units from the ship in Yanbu Port to the Yanbu Cement Company required SPT trailers. Once at the plant each unit was lifted by a hydraulic gantry that had been erected on a 2.3 metre high steelwork platform on either side of the engine foundation. The units were each lifted off the trailers by the gantry and were continuously monitored using the built in electronic monitoring system. Each unit was then transversed along a skid track and lowered onto its 6.5 metre foundation.



► **Case study:** F2 power station, UAE

OVERVIEW: ALE successfully transported and installed five sets of gas turbines and gas turbine generators for Fujairah F2 power station in UAE.

SERVICES REQUIRED: The load was received from the ship in Fujairah port by ALE and transported to the power station on SPMTs. Once on site, the gas turbines and turbine generators were installed on their foundations using jacking and skidding systems. The steam generators were installed on 5 metre high foundations using a hydraulic gantry system erected in an elevated steel structure.



► **Case study:** Shuweihat S2 IWPP, Abu Dhabi



OVERVIEW: ALE completed the transportation and installation of four sets of GT/GTGs and two sets of steam turbines and generators for Shuweihat S2 IWPP in Abu Dhabi, UAE.

SERVICES REQUIRED: The items arrived at Mina Zayed and were received onto ALE's self-propelled modular

hydraulic trailer. They were then loaded onto the ALE 250 barge and transported to Shuweihat S1 jetty, where they were rolled off and stored at the quay. When they were required, the items were transported to the project site and installed using a hydraulic gantry system, which was set on elevated steel supports due to space constraints between the foundation and building column.

► **Case study:** Steam turbine generator, Qatar

OVERVIEW: ALE transported a steam turbine generator weighing 230te and installed it at the Mesaieed Power Station in Qatar.

SERVICES REQUIRED: Using jacking towers and a four-point lift system, ALE installed the turbine onto a high-level foundation 12 metres above ground level.





► **Case study:** Stator generator transport, South Africa



OVERVIEW: ALE transported stator generators from Small Craft Harbour, Richards Bay, to two of South Africa's biggest fossil power plants; Medupi Power Station in Limpopo province, 985 kilometres from port and Kusile Station in Mpumalanga province, 650 kilometres from port.

SERVICES REQUIRED: This project involved collaboration between ALE's South African and UK operations as we planned and then exported a large amount of plant, equipment and manpower with less than three months notice door to door. Each 357te generator was transported using two 16-axle, three file conventional bogies, one AL500 frame, three 8x8 FAUNS, a 6x6 Mercedes Benz and two 8x4 Mercedes Benz. The transport involved a 14% incline while travelling through Swaziland, and the Mfolozi Bridge in South Africa had to be propped up to support the weight. Future work on this project will include offloading the generators on site with a four-point lift system, loading and site transport, designing and supplying two custom-built overhead gantry systems and installing all 12 units.



► **Case study:** Installation of turbines and generators, Algeria

OVERVIEW: ALE successfully installed two gas turbine/generator combinations at Shariket Kahraba Berrouaghia in Algeria.

SERVICES REQUIRED: ALE used a skidding gantry with hydraulic strand lift units to install the 310te gas turbine and 218te generator at the gas turbine plant.



► **Case study:** Transportation of a generator, Cape Town harbour

OVERVIEW: ALE was awarded a turnkey project to receive, transport, jack, skid, stage and store a 150te generator in Cape Town harbour, South Africa.

SERVICES REQUIRED: ALE used a medium skid track system to move the generator away from the quay after it had been offloaded from the ship it arrived on. ALE then loaded the generator onto a 14-axle trailer for transportation, using the trailer's hydraulics. The generator was then transported to the ALE yard, where it was offloaded using four 60te self climbing jacks and staged on support stools. ALE then stored the generator for a period of three months, after which time it was loaded and transported to the Sturrock dry dock in Cape Town harbour.

Upon arrival, the generator was offloaded and jacked down according to the client's requirements in order to remove the support bracing underneath. It was then loaded into an FSO module using a heavy-lift crane.



► **Case study:** Transportation of an absorption tower, South Africa

OVERVIEW: ALE won the contract to receive and transport a 184te absorption tower from Richards Bay port to the Omnia Fertilizer plant in Sasolburg.

SERVICES REQUIRED: The tower was received onto 32 axles of conventional trailers; ALE then transported the absorption tower via Swaziland to site. Once on site ALE offloaded the tower onto support stools and beams using the trailer hydraulics.



► **Case study:** Site handling and installation of Stator Generators, South Africa



OVERVIEW: ALE successfully transported and installed six 360te stator generators for the Medupi power station and six stator generators for the Kusike Power Station.

SERVICES REQUIRED: The operation required the generators to be loaded using a custom made four-point lifting gantry system, to enable the transportation with SPMTs and subsequent off loading with the gantry system, ALE then completed the installation to the final position. ALE designed, manufactured and supplied the custom made four-point lifting gantry with a lifting capacity of 400te.





► **Case study:** Nhon Trach 2 CCPP project, Vietnam

OVERVIEW: ALE transported and installed a transformer as part of the Nhon Trach 2 CCPP project in Dong Nai, Vietnam.

SERVICES REQUIRED: ALE received the transformer, weighing 53te, from the delivery vessel onto barges at Tan Thuan port in Ho Chi Minh City. They were then transported by barge to the Nhon Trach 2 site jetty where they were rolled off, moved by trailer to the site, and installed onto their foundations using a skidding system.



► **Case study:** Transportation and ro-ro, Quang Ninh Province, Vietnam

OVERVIEW: ALE completed the transportation and ro-ro operation of ten rotors, ten generators and four transformers from Nha Trang province to Quang Ninh Province.

SERVICES REQUIRED: ALE utilised SPT trailers to receive the 24 pieces at a storage yard in Cam Thinh. The pieces were then transported to Camranh Cement Plant Wharf where they were rolled-on to a barge. Once the barge docked in Quang Ninh Province, the pieces were then rolled-off and transported to the storage yard. The largest piece measured 12m x 3.2m x 5.8m (l x w x h) and weighed 215te and the project was completed within two months.



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