CONTRACTORS TO THE PETRO-CHEMICAL POWER AND HEAVY INDUSTRIES

Chimney Specialists
Multi Discipline Engineering Services

www.syntex-chimney.com
The Syntex Group with its headquarters based on Teesside, has been providing specialist solutions to the power generation, petrochemical and heavy industries since 1983. Since formation we have evolved into one of the most recognised and respected industrial service providers, with a comprehensive range of services and expertise.

Increased demand led to steady and sustainable growth, resulting in expansion with additional branch offices opening in Asia to meet with demand. Syntex now have a global presence and are able to deliver safe and cost effective solutions worldwide.

Our specialist services include:

- Design, construction and controlled demolition of industrial chimneys.
- Thorough inspection of industrial chimneys, cooling towers and flare stacks.
- Slip form construction of silos, shafts and profiled reinforced concrete structures.
- Inspection and repair of high rise and difficult to access structures.
- Design and provision of temporary access facilities to elevated structures.
- Acid resistant, cast, spray applied and brick linings for chimneys, furnaces and molten storage facilities.
- Concrete repairs to structures.
- Flare stack maintenance, tip changes, guy rope adjustment and verticality checks.
- Application of industrial protective coatings.
- Structural steel and pipe work fabrication, installation and testing.
- Mechanical, materials handling plant and equipment installation.
- Roped access solutions.
- Life line and fall protection netting installation.
- Design, installation and maintenance of lightning protection systems and aircraft warning lights.
HEALTH, SAFETY AND ENVIRONMENT

The health and safety of our employees and of those who come into contact with our operations and products is one of our highest priorities.

Our goal is clear - no accidents, no harm to people and no damage to the environment.

Our HSE Policy has three key commitments:

- Syntex will comply with applicable laws and regulations and other requirements,
- Syntex is committed to continuous improvement, and
- Syntex is committed to minimising environmental impact.

QUALITY ASSURANCE

The Syntex Quality Management System is fully accredited to current ISO standards by Lloyds Register Quality Assurance. It is based around the principles of customer satisfaction, continual improvement and development of a process based Quality Management System.

We ensure that management processes across all operations are subject to continuous improvement, taking into account more creative solutions, utilising internal communications, teamwork and employee’s professionalism, vision and commitment.

SPECIAL ASSOCIATES AND MEMBERSHIPS

Syntex Engineering Services retains membership of the following associations:

- C.I.C.I.N.D (International Committee on Industrial Chimneys)
- C.I.T.B (Construction Industry Training Board)
- E.C.I.A (Engineering Construction Industry Association)
- Refractory Contractors Association
PROJECT MANAGEMENT & ENGINEERING

Syntex Engineering Services Ltd operates with a management team possessed of a wealth of expertise and experience in all aspects of our project activities, including Engineering, Safety and Project Management.

In order to maintain this the company keeps up a continuous training and qualification program ensuring that all management and site personnel are kept up to date with all relevant and required technical, engineering and safety qualifications. This means that Syntex are able to deliver comprehensive and competitive solutions to our Client’s needs.

Syntex Engineering Services Ltd. also recognise the need to be flexible and adapt to different project scenarios in order to satisfy our Client’s requirements. We recognise that in the modern economic climate it is a necessity to reduce asset down time and perform turnaround related tasks in as short a time frame as possible without compromising safety.

As a company we are able to offer skilled and experienced site and office based project management, as well as engineering consultation and assessment work.

PLANNING & DESIGN

Our in house design and planning teams are able to handle all manner of project requirements from complete chimney design and build projects to pipework installation to small scale inspection and maintenance using latest industry software packages.
Syntex offers a comprehensive design & build service for new chimneys conforming to the latest internationally recognised codes and standards.

The expertise offered is derived from extensive knowledge and expertise gained in carrying out many large scale chimney rehabilitation contracts to distressed structures in since the early 1980’s. The lessons learnt by in depth studying failure mechanisms are reflected in the high standards of design that we now achieve.

This is a 130m high reinforced concrete chimney designed & built by Syntex in 20 weeks. The chimney conforms to ACI and CICIND Model codes, British Standards with consideration for local seismic and wind loading conditions.

The photo below is of the “Slip-form” climbing rig used to place and form the chimney reinforced concrete windshield.
Windshields of reinforced chimneys are now continuously cast in-situ using the slipform process. The relatively thin section at upper levels, in some cases being only 125mm thick, demands expertise in shutter design and operation. In addition, close supervision and care in the casting process should be implemented to ensure compaction of the fill to achieve the required density. Codes of Practice and Standards vary worldwide but the majority of new stacks are constructed to International Standards.

The photographs in this section show examples of chimneys built by Syntex at various locations.

Design and construction of a 130m high single flue chimney lined with reinforced interlocking brickwork. The stack serves a float glass plant in the Middle East.

Design and construction of a 150m high single flue chimney with reinforced interlocking brick lining. The stack was built to serve a paper pulp and power generation plant at Surabaya, Indonesia.
CHIMNEY DESIGN AND CONSTRUCTION

A recently completed 220m high chimney serving a power plant in Hong Kong. Works undertaken by Syntex included the installation of 2 No. 6m diameter interlocking brick liners which were completed in less than 3 months. The liners were also insulated with mineral wool and clad with aluminium as works progressed.

2 No. 150m high flue chimneys with interlocking brick linings. The stacks were built to serve an incineration plant in Singapore.
Design and construction of a 160m high single flue chimney lined with reinforced interlocking brickwork. The stack was built to serve a power generation plant at Mojokerto, on the island of Java, Indonesia.

Construction of a 150m high multi-flue chimney serving a power plant in Ratchaburi, Thailand. The internal flues are formed from interlocking acid resistant brickwork.
SILO CONSTRUCTION

Reinforced concrete silos, generally circular on plan, can be founded directly at ground level or alternatively supported on columns to give access beneath. The materials to be stored, either liquid or solid, will dictate the detailed design but the reinforced concrete walls will usually be cast in-situ by the continuous pour slipform method. The illustrations given show a ground level silo designed to store liquid ethylene at sub-zero temperatures being constructed by Syntex in SE Asia.

Ground breaking ceremony in accordance with local customs for a silo construction project at a Taiwan chemical plant. The total project was handled from start to finish by Syntex management and labour force.

Excavation for the foundation works at an early stage of the project.

Installation of reinforcement within the excavation for the silo foundation.

Placing a total of 4,500 cubic metres of concrete in a 24 hour period to complete the foundations.
SILO CONSTRUCTION

Installation of a Syntex slipform rig to form the silo sidewalls.

Slipform works to the sidewalls in progress. Note the groundwork for the second silo in the background.

Completed single silo after the installation of the roof dome.

Total completion of 4 No. silos at 45m diameter and 25m high. The photograph was taken after vertical and horizontal post stressing works and lining of the inner wall with carbon steel. Works were undertaken on behalf of Tractebel for Formosa Plastics.
CHIMNEY AND COOLING TOWER MAINTENANCE

Reinforced concrete structures, particularly those exposed to aggressive atmospheric conditions, require regular inspection to monitor depth of carbonation, evidence of structural cracking, accelerated corrosion of reinforcement and possible delamination of cover to rebars. Cooling tower shells suffer these problems particularly at the outwardly flared part of the profile due to continual saturation. Chimney shells suffer equally internally because of acidic degeneration caused by gas filtration through the lining condensing on the relatively cool inner face of the windshield. The above inherent problems can be monitored and controlled by implementing a regular inspection regime followed up by maintenance, where required, to minimise long term damage to the structure.

Installation of a stainless steel reducing cone complete with closure cravat and integral capping to an existing refinery chimney. The cone was pre-fabricated at ground level and lifted into position using heavy craneage to minimise shut-down time for the works, which were completed over a single weekend. The cone was installed to help accelerate a lazy gas plume which was caused by a reduction in the volume of flue gas passing through the stack.

Installation of temporary access and cladding of damaged windshield at the top of a refinery chimney in the Netherlands. All works were undertaken within the planned outage window of 24 days causing minimum disruptions to the client’s operations.

Closer view of temporary works installed to undertake cladding at the top of the refinery chimney in the Netherlands.
Remedial works to a cooling tower located at a power generating plant in Belgium. The works included concrete repairs to the external face of the shell, UHP water blasting to remove deleterious deposits and the application of a three layer anti-carbonation coating system.

Internal repairs to the above cooling tower. Works undertaken include installation of access, UHP water blasting and application of multi-layer epoxy sealing coat.

Flushing out of cooling tower distribution lines, repairs to leaks, replacement of damaged nozzles and remedial works to packing.
Reconstruction of top 8m of 90m high refinery chimney using dense interlocking concrete blocks and interlocking brickwork. Both brick and blocks are integrally reinforced.

Refurbishment of reinforced concrete windshield to 105m high chimney serving an oil refining plant on Teesside.

New exit stubs built in dense interlocking integrally reinforced concrete blocks at top of 220m high power station chimney.
CHIMNEY LININGS

Interlocking brick lining system, 50mm rockwool insulation and aluminium cladding installed to new 220m high multi-flue chimney serving a power generation plant in Hong Kong.
Flue linings can either be acid-resisting brickwork, stainless, carbon or low alloy steel, reinforced plastic and gunned or cast refractory. The type of lining to be used is primarily governed by the internal service temperature and also the nature of the gases discharged. Movement can occur between the lining and the windshield, often generated by expansion due to temperature fluctuations, wind deflection, or seismic reactions. Irrespective of the lining chosen, careful detailing of the system used to restrain movement is essential. Syntex has considerable experience in the design for new or the repair of all lining systems and will be please to offer this expertise for projects under consideration.

Installation of a new section of reinforced interlocking acid resistant brickwork to an existing refinery chimney.

Close up view of the interlocking reinforced brickwork showing mineral wool insulation secured to the outer face of the lining.

145m high chimney at a refinery in the Netherlands after installation of new acid resisting interlocking reinforced brickwork lining to the full height.

Installation of carbon steel lining system to 100m high refinery chimney after removal of existing ceramic lining.

Reinforced interlocking acid resisting brick lining system installed to a new 145m high flue paper mill chimney located in Indonesia.
Refactory Works

Construction of 55m long pit designed for storage of molten sulphur. Side walls are coated with vinyl ester insulated with sintered glass block and clad with integrally reinforced acid resistant interlocking brickwork.

Further brickwork installation to sidewalls of sulphur pit.

Completed sulphur pit.
REFRACTORY WORKS

Installation of refractory brickwork to float glass plant.
CHIMNEY DEMOLITION

Syntex Engineering Services Limited has developed and implemented chimney demolition techniques in locations throughout the UK and Europe specifically tailored to suit live plant conditions and minimise disruption to the everyday running of the plant. Concrete cutting techniques using diamond tool systems are used to cut the chimney windshield into cylindrical sections and then lowered by mobile crane to ground level. This method of demolition minimises the likelihood of falling debris during the demolition and also hand-arm vibration associated with prolonged use of impact hammer equipment.

Controlled demolition of 3 No. 90m reinforced concrete chimney on an oil refinery in the Netherlands. All adjacent refining plant and equipment remained live during the course of the works. The chimneys were reduced to programme, safely and to the satisfaction of the client.
CHIMNEY DEMOLITION

Controlled demolition of a 45m high reinforced concrete chimney at the Freeman Hospital, Newcastle, England using diamond wire sawing techniques.

The chimney was cut into 15 No. Sections ranging between 2.5m and 4.5m high, weighing between 20 and 40 tonnes, dictated by the lifting capacity of a 225t mobile crane. It was possible to make three cuts in one 12 hour working day. (Cutting rate of 6sq.m/hr).
Flare tips replaced during major plant shutdown, each tip weighing 8.5 tonnes.
STEEL CHIMNEYS AND FLARE STACKS

Structural steel chimneys and flare stacks require regular inspection and maintenance, particularly where sited within industrial areas and exposed to aggressive corrosive atmospheric conditions. For freestanding units N.D.T. thickness tests of the platework and inspection of any lining system is advisable. Inspection of guyed units should also include measurement of guy rope tensions along with close examination of rope condition and any lubricants or dressings previously applied. Careful attention should be paid to any bolted or welded joints within the height of the stack and the integrity of any protective paintwork should be assessed and upgraded if necessary. The requirement for an effective anti-corrosion system is particularly important where the supporting structure is constructed of potentially more vulnerable open lattice steelwork.

Erection of the second section of lattice support frame for the vent flare stack located at the UK chemical plant.

Erection of the final section of vent flare stack support lattice and installation of the stack riser sections.
STEEL CHIMNEYS AND FLARE STACKS

130m high steel boiler stack installed in Shah Alam, Malaysia, as a complete design, supply and erect package.

Erection of 60m high boiler stack supplied on a design, fabrication and erect basis for Malaysian client.

Removal and replacement of a flare tip to a 90m high twin flare stack located on a hydrocarbon cracker plant in the North East of England. On completion of the works to the tip all guy rope tensions were adjusted to within 10% of the design loadings and were lubricated with a rope dressing.
STEEL CHIMNEYS AND FLARE STACKS

Cleaning of grammar phone flare tip mating flange face and placement of new spiral wound gasket in readiness for the fitting of the replacement flare tip.

Checking and adjustment of flare stack retaining guy wires using a Fulmer Tensiometer device. This work is carried out in conjunction with an assessment of the flare stack verticality to conform to current British standards.

Installation of lifting equipment and hoisting of a Zohn Zinc Replacement flare tip weighing 8 tonnes.
ROPED ACCESS

Syntex Engineering Services Limited has amongst its office and site based staff, master steeplejacks and qualified abseiling technicians. Using our special access skills we are able to offer the broadest range of elevated work services, providing quick and safe access to all manner of elevated work sites.

Non Destructive Testing of 4 No. hot blast stoves at Redcar Blast Furnace. The primary aim was to locate areas of stress corrosion cracking. The findings of this inspection ultimately led to extensive overplating of the stoves.

Installation of new unistrut and thermocouple cables to a 60m high flare stack during a 14 day shutdown window.

Application of protective coatings to 10 No. bioethanol fermentation tanks.

Execution of covermeter and carbonation survey on a 60m high redundant cooling tower.
ROPED ACCESS

The design of temporary works to give safe access to elevated levels demands experience and knowledge of the risks involved in working under these conditions. It is imperative that personnel employed at both the design stages and preplanning have acquired these skills. The workforce employed should have received adequate training in all aspects of working under these difficult and potentially dangerous circumstances at approved training establishments and supervisors should also have had similar training and detailed knowledge of the limitations of the equipment used.
INDUSTRIAL HIGH LEVEL PAINTING

3 No. multi-flue chimneys located at a power generation plant in Singapore after completion or repair works to the concrete and application of a protective coating system.

Degreasing and painting of dockside cranes.

Painting in progress to 120m high single flue chimney.
Steel and reinforced concrete structures, particularly where located in industrial areas, require regular inspection and maintenance. Concrete surfaces may require the application of protective or decorative coatings. These should be designed to resist the penetration of air or rainwater borne pollutants, which would reduce the inherent alkalinity of the concrete and accelerate corrosion of the reinforcement. Similarly carbon structural steelwork must be waterproofed to prevent corrosion. The preparation and specification for both new and repainting works requires careful and expert consideration to achieve satisfactory results that may include provision for pressure washing or grit blasting. Syntax offer their considerable experience in providing safe access to elevated working locations and their expertise in the specification for works of this nature.
FALL ARREST SYSTEMS INSTALLATION

Installation of fall arrest netting prior to the removal of roof sheeting. The roof sheeting removal was to facilitate the replacement of rotary kiln driers during a plant shutdown on a dolomite quarry.

Retro-fitting of “Glide-Loc” fall arrest rail to an existing caged access ladders on an oil refinery in Singapore.

Installation of fall arrest netting to a new portal frame warehouse structure using a combination of roped access and mobile elevated working platforms.
MULTI DISCIPLINE MECHANICAL ENGINEERING
Bulk Storage and Conveyor Systems Installation

The following photographs illustrate the construction sequence of 4 No. grain storage silos on the largest bioethanol production facility in the UK. Each silo has a diameter of 24m and a height of 29m. All 4 silos were erected simultaneously using manual chain jacks. The erection was completed ahead of programme in 15 weeks and included installation of associated catwalk structures and central elevator tower.

Controlled erection of bulk grain silos.

Assembly and erection of high level walkways.

Pre-assembly of steel structure prior to execution of a complex lift for positioning.

Final assembly and hand over prior to installation of mechanical handling equipment.
MULTI DISCIPLINE MECHANICAL ENGINEERING
Bulk Storage and Conveyor Systems Installation

Initial positioning and pre-assembly of chain conveyors.

Final assembly of chain conveyors and pre-tensioning of chains.

Installation and tensioning of chains to grain intake conveyors.

Full installation of bucket elevators including belt alignment and tensioning.
MULTI DISCIPLINE MECHANICAL ENGINEERING
Materials Processing Equipment Installation

Syntex have gained a wealth of experience and expertise in the installation of product conveyance and processing equipment. This includes but is not limited to chain and screw conveyors, bucket elevators, grain cleaning, milling and mashing, by-product pelleting and drying equipment. Dust extraction and explosion suppression equipment installations are also areas that we can assist with.

Installation of grain handling, milling and mashing equipment within enclosed structures.

Installation of site run and pre-fabricated ductwork around installed grain mechanical handling equipment.

Positioning and installation of heavy equipment and dust extraction equipment.

Maintenance of good housekeeping ensures a safe working environment.
MULTI DISCIPLINE MECHANICAL ENGINEERING
Materials Processing Equipment Installation

Installation of high capacity dust extraction and handling equipment.

Positioning and alignment of extraction fans and motors.

Positioning and installation of weigh bridges.

Installation of flow measurement and grid magnet devices.
MULTI DISCIPLINE MECHANICAL ENGINEERING
Pipe Work, Instrumentation & Vessell Installation

The following are examples of work undertaken by Syntex that includes fabrication and installation of carbon steel and stainless steel non-pressurised and pressurised pipelines, in-line instrumentation, valves and bulk storage vessels. The majority of this work has and is performed by directly employed tradesmen. We can carry out welding to both ASME and BS EN standards and satisfy the requirements of the Pressure Equipment Directive.
MULTI DISCIPLINE MECHANICAL ENGINEERING
Pipe Work, Instrumentation & Vessell Installation

Installation of high pressure underground gas pipeline and pressure reduction equipment.

Erection of pre-fabricated elevated silos, including support steelwork and access.

Site run pipework and instrumentation/control systems.

Installation of high pressure air systems and instrumentation.

Installation of pre-fabricated pipework in difficult to access areas.