



# Your Reliable Partner

Asia's leading one-stop provider of specialised maintenance services





## Your Challenges

Onshore and offshore facilities need to be efficient, reliable and – most importantly – safe. This presents real issues for plant owners and operators facing greater competition, increasingly stringent guidelines governing plant shutdowns as well as a vast array of environmental legislation. Addressing these complex and interrelated challenges means constantly looking for smarter, more cost-effective ways to operate and maintain your facilities without compromising on quality and safety.

CR Asia is a specialised maintenance contractor to the Oil, Gas, Refining, Chemical, Power and other asset-intensive industries. We support owners and operators of onshore and offshore facilities throughout Asia with a comprehensive portfolio of industrial maintenance and shutdown services. Our experts work with you to boost productivity and increase the reliability of complex processes, while minimising plant downtime for planned and unplanned maintenance activities.

## Our Business

CR Asia supports your business with extensive contracting experience in the delivery of catered service packages, 'blind to blind' jobs and turnkey maintenance services during major shutdowns and turnarounds. Our business upholds a culture and track record of integrated management systems that are certified to multiple international standards including:

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

25



years in  
business



4



operational bases  
serving 18 active  
markets



4000<sup>+</sup>



experts



## Our People

While processes, technologies and partnerships are all central to our success, our people are at the heart of our service offering. We employ a large in-house team of over 4,000 highly trained technicians that have garnered a wealth of experience through many years of loyal service. That means you can count on our people to consistently deliver the highest standards of safety, efficiency, productivity and customer satisfaction.



## Our Partners

CR Asia has established long-term alliances with a number of key strategic partners. This collaborative approach ensures our customers always benefit from having access to the most appropriate tools and technologies on any given project. We recognise our industry is constantly evolving. That's why we are continuously looking to expand our network of strategic alliance partners.





# Our Services

When it comes to industrial maintenance and cleaning of onshore and offshore facilities, you need time-efficient, cost-effective, environmentally sound solutions. CR Asia delivers on these requirements by providing specialist services incorporating state-of-the-art technologies and innovations.

We offer a comprehensive portfolio of maintenance services that are grouped into five business lines: Shutdowns & Turnarounds, Mechanical & Plant Maintenance Services, Cleaning Services, Catalyst Services and Pipeline & Process Services. Our experts deliver these services – onshore and offshore – on time and on budget.

Our complete 'blind to blind' solution ensures more streamlined and efficient projects, as we maintain direct, single-source control of all critical path elements. We cater to projects of widely varying scope and complexity, and have the capacity to deliver multiple shutdowns concurrently.

#### Related services:

- Industrial Scaffolding
- Mechanical Services
- Column Modifications & Repairs
- Total Heat Exchanger Maintenance
- Flare Tip Replacements & Repairs
- Cleaning & Decontamination Services
- Mercury Management Services
- Catalyst Handling Services
- Nitrogen Services
- Waste Handling
- Decommissioning Services

Our investment in training, equipment and SMART systems combined with our focus on safety and rigorous planning, preparation and execution of work underpins our track record as a leading provider of mechanical & plant maintenance services. The knowledge and experience gained from each job is channelled into the next generation of solutions.

#### Related services:

- Static Equipment Maintenance
- Rotating Equipment Maintenance
- Specialist Cutting Services
- Online Leak Sealing
- Controlled Bolting
- Reactor Repairs & Maintenance
- Plant Change & Piping Modifications
- In-situ Flange Facing & Machining
- Industrial Scaffolding
- Insulation Services
- Valve Maintenance
- Continuous Plant Maintenance

Our experts meet your demands for shorter change-outs, leaner project teams and superior quality standards for all reactor types with end-to-end solutions that reduce downtime and increase profitability.

#### Related services:

- Catalyst & Adsorbent Handling Services
- Tubular Reactor Services
- Dense Loading
- 'Blind to Blind' Mechanical Services
- Reactor Internals Replacement & Repairs
- Nitrogen Services
- Waste Handling

Recognised as Asia's leading 'one-stop shop' solution provider, our extensive portfolio of cleaning services sets the benchmark in terms of technical, environmental and safety standards.

#### Related services:

- Chemical Cleaning Services
- Mercury Management Services
- Fin Fan Optimisation
- Hydro Jetting Services
- CR Asia Decoking Technology (CDT)
- Decontamination Services
- Waste Handling

## SERVICES FOR ONSHORE AND OFFSHORE FACILITIES

### SHUTDOWNS & TURNAROUNDS

### MECHANICAL & PLANT MAINTENANCE SERVICES

### INDUSTRIAL CLEANING SERVICES

### PIPELINE & PROCESS SERVICES

We clean and inspect virtually all plant vessels, columns, drums and piping systems, both onshore and offshore, with services that can be tailored to requirements.

#### Related services:

- Pre-Commissioning & Commissioning Services
- Nitrogen Services
- Pipeline Cleaning (Chemical & Mechanical)
- Pipeline Flooding
- Pressure Testing
- Dewatering
- Drying
- Purging



YOUR RELIABLE PARTNER

## Pre-Commissioning Services



### YOUR CHALLENGES

Prior to taking any reactor, vessel or piping system into commission, owners and operators of refineries and other processing plants need assurance of safety, quality and reliability. An improperly manufactured or installed pipeline can pose a significant risk to your company, its people and the environment. The best way to establish and maintain prime operational capabilities is to properly prepare and quality assure all essential equipment at the pre-commissioning stage.

### OUR PRE-COMMISSIONING SERVICES

CR Asia offers a comprehensive portfolio of properly engineered, high quality pre-commissioning and commissioning services. Operating under a single project management team to ensure optimal safety, quality and schedule efficiency, we support our clients with detailed

planning, coordination and execution for various scopes of construction completion, pre-commissioning and commissioning activities such as pressure testing, water flushing, air blowing and drying. In addition, our highly experienced, multidisciplinary experts undertake many specialist activities such as chemical cleaning, lube oil flushing, hydro jetting, pneumatic testing, helium / nitrogen leak testing, inspections and other associated actions within the construction environment.

### HOW WE SUPPORT YOUR BUSINESS

Engaging us as your single-source , all-inclusive solutions provider gives you confidence that our highly trained experts are applying their decades of experience to optimise your facility's performance. Our professional personnel take pride in delivering our full range of services to the highest industry standards.

## THE CR ASIA DIFFERENCE

CR Asia's large in-house team of highly trained technicians is subject to regular audits and a stringent safety passport scheme. We invest heavily in the latest equipment and SMART systems to maintain our reputation as the region's leading one-stop provider of specialised maintenance services.

### Innovative equipment and processes

CR Asia does not compromise when it comes to investing in state-of-the-art tools and machinery. As part of our commitment to offering superior service to our clients, we use modern automated equipment that guarantees unrivalled quality, speed and safety in every project. Furthermore, our strategic partnerships augment our in-house offering, enabling us to provide holistic solutions that utilise the most advanced cleaning and maintenance technologies available.

### Exceptional QHSE performance

Safety is the central tenet of every pre-commissioning project we undertake. Our commitment to safety has led to the implementation of our own safety passport system, with all our technicians being accredited through a rigorous in-house training programme. You and your stakeholders can be assured that our work is not only timely and cost-efficient, but safe and reliable too.

### World-class experience

With decades of front-line multidisciplinary experience, CR Asia is uniquely capable of offering a one-stop solution for all your pre-commissioning needs. Our specialists are certified experts, with internationally recognised certifications that cover the detailed operation and maintenance of the units under their care.

## Unrivalled service

Over the years, we've nurtured a strong customer-focused culture that ensures on-time, on-budget delivery for all your planned and unplanned pre-commissioning, commissioning, maintenance and de-commissioning activities. Our commitment to service excellence is backed by our track record of integrated management systems that are certified to multiple international standards.



## OUR SERVICES

### Pre-commissioning of reactors and vessels

- Nitrogen purging of hydrocarbons
- Initial catalyst loading
- Flange management
- Column internals installation
- Cold cutting
- Bolt torqueing and tensioning
- Pneumatic testing
- Air blowing and drying

### Pre-commissioning pipeline cleaning

- Nitrogen / Helium Leak Testing (NHLT)
- Vacuum testing (inside to outside or outside to inside)

- Pressure testing
- Nitrogen preservation
- Hot oil flushing of critical oil piping systems
- Online pipeline maintenance pigging programmes
- Internal pipeline coating
- Pipeline mercury removal / decontamination programmes
- Pipeline descaling and de-rusting
- Pipeline gauging
- Pipeline intelligent pigging
- Pipeline abandonment programmes (special programmes for mercury contamination)
- Special oxygen piping systems

## YOUR BUSINESS BENEFITS

**Benefit from a one-stop solution** – that eliminates the need to manage multiple contractors on-site over the course of your project.

**Ensure high safety standards** – by choosing a partner with a proven commitment to maintaining a safer workplace in both onshore and offshore environments.

**Save time and money** – with a single contractor that supports numerous activities and reduces costs by utilising multi-skilled personnel to perform the full range of jobs you need done.

## CR ASIA IN ACTION

### The challenge

An offshore fabrication company needed a specialist contractor to perform the pre-commissioning of a new subsea pipeline system.

### The solution

CR Asia was chosen to perform the pre-commissioning due to our dedicated commitment to safety. Upon appointment, CR Asia proceeded to perform full pre-commissioning operations, coordinating and supervising the project throughout.

### The outcome

The pre-commissioning process was completed safely and efficiently, with all relevant risks being identified and dealt with and all tasks completed according to schedule.

## CR ASIA – YOUR RELIABLE PARTNER

CR Asia is the leading provider of highly specialised pre-commissioning and maintenance services to the Oil, Gas, Chemical, Power and other heavy industries throughout Asia. As your reliable partner, we provide the safest and most efficient solutions to the maintenance, repair and overhaul challenges facing your business. **To learn more, visit [www.crasia.net](http://www.crasia.net)**



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## Shutdown & Turnaround Services



### YOUR CHALLENGES

Every industrial processing plant must undergo periodic shutdowns and turnarounds to maintain safe operations and optimal production levels while meeting ever-evolving Quality, Health, Safety and Environmental (QHSE) standards. Failing to execute shutdowns and turnarounds safely and efficiently can have a profound impact on your business, its people and the environment. Given the potentially huge losses for every day of downtime, delivering safe shutdowns and turnarounds while minimising both the number and duration of these events is critical.

### OUR SHUTDOWN AND TURNAROUND SERVICES

Shutdowns and turnarounds are the mainstay of CR Asia's business. We adopt a disciplined, multi-phase approach to plan, schedule, staff and execute projects of all sizes to ensure your plant is back up and running quickly, safely, reliably and at optimal efficiency. Our One-Stop Multidiscipline Solution enables us to deliver safe, successful shutdowns and turnarounds throughout the Refining, Petrochemical, Upstream Oil & Gas, Power Generation and other heavy industries.

### HOW WE SUPPORT YOUR BUSINESS

You can engage our experts from the very onset to lead or support detailed project planning, preparation, scope challenges and compilation of work packages. During shutdowns, we mechanically isolate parts that require routine maintenance, allowing the rest of the plant to remain operational while maintenance is carried out. The affected equipment is opened up, cleaned, inspected and repaired before being reinstated, deisolated, and readied to be taken back into the process. For turnarounds, we perform the same scope of maintenance and repair work on a larger scale involving a plant-wide shutdown.

Our holistic approach encompasses every aspect of shutdowns and turnarounds, from beginning to end. To identify opportunities for further improvements, cost savings and best practices, we place particular emphasis on the debriefing stage. Together with our strategic partners, we have access to the necessary resources, equipment, expertise and experience to carry out multiple large-scale projects simultaneously.



## THE CR ASIA DIFFERENCE

CR Asia's large in-house team of highly trained technicians is subject to regular audits and a stringent safety passport scheme. We invest heavily in the latest equipment and SMART systems to maintain our reputation as the region's leading one-stop provider of specialised maintenance services.

### State-of-the-art equipment and processes

We optimise shutdown times through meticulous planning, exceptional programme management, proactive procurement, easy-to-use systems and processes for tracking progress against KPI's, and the deployment of experienced manpower to operate modern automated equipment that is quicker, safer and more efficient. This offering is enhanced by a strong network of technology partners with advanced maintenance solutions to improve quality while setting new safety standards and boosting asset performance.

### Outstanding QHSE performance

CR Asia nurtures highly skilled and motivated teams that are committed to achieving "Pacesetter Performance" for the execution of shutdowns and turnarounds. Our quality and safety track record is maintained by continually investing in structured training programmes, knowledge sharing, new processes and modern, automated equipment that increases productivity while minimising the risk of injury.

### Depth of experience

CR Asia is recognised as the region's leading shutdown and turnaround expert for onshore and offshore projects. Every service we provide is delivered as part of our shutdown and turnaround activities. This means our personnel are

constantly exposed to these types of events. Each year, we perform around 100 shutdowns and turnarounds across the region.

### Exceptional service

As a leading one-stop provider of specialised maintenance and industrial services, we are able to support your project from start to finish by having expert staff on site throughout the entire process. Our 'blind to blind' approach spans every stage, from pre-planning and execution right up until the plant is reactivated. For work scopes outside of our core capabilities such as scaffolding and crane operation, our experts can procure and manage the full range of services via trusted sub-contractors.



## OUR SERVICES

- Specialised mechanical services
- Column and tower internal modifications and repairs
- Heat exchanger services including repairs and retubing
- Catalyst handling and reactor services
- Chemical cleaning and decontamination
- Mercury management and decontamination
- High pressure water jet and industrial cleaning
- Tank cleaning and repairs
- CDT furnace decoking
- Decommissioning and pipeline services
- Nitrogen services
- Offshore maintenance services
- Flare tip replacements and repairs
- Controlled bolting and flange management
- In-situ machining
- Online leak sealing
- Waste handling and vacuum truck services

## YOUR BUSINESS BENEFITS

**Benefit from a one-stop solution** – for planning, scheduling, managing and executing all maintenance activities required during even the largest shutdowns, saving you the expense and hassle of engaging multiple contractors for a single event.

**Save time and money** – by maintaining single-source control of the entire project with a single point of contact for onshore and offshore operators.

**Maintain high safety standards** – by choosing a partner with a proven commitment to superior safety in the workplace.

## CR ASIA IN ACTION

### The challenge

An integrated refinery and petrochemical complex in Asia had to open, clean, inspect and box up over 150 major equipment items in a 30-day window.

### The solution

CR Asia deployed 30 people a year ahead of the turnaround to plan schedules and maximise efficiency. Over 1,200 personnel were mobilised to execute the works.

### The outcome

With zero lost-time incidents and zero medical-time incidents, the shutdown was completed within budget and actually beat the schedule by a few days, achieving significant savings for an extremely satisfied client that now looks forward to a 5-year run before the next major turnaround.

## CR ASIA – YOUR RELIABLE PARTNER

CR Asia is the leading provider of highly specialised pre-commissioning and maintenance services to the Oil, Gas, Chemical, Power and other heavy industries throughout Asia. As your reliable partner, we provide the safest and most efficient solutions to the maintenance, repair and overhaul challenges facing your business. **To learn more, visit [www.crasia.net](http://www.crasia.net)**





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## Mechanical Services



### YOUR CHALLENGES

Faced with increasing competitive pressure, plant owners and operators across a wide range of industries are exploring new ways to reduce the cost of maintaining process equipment while upholding safety, reliability and productivity levels. The latest equipment and technology needs to be introduced to fulfil rising environmental, availability and efficiency requirements. This task demands competent, well-trained personnel who can meet or exceed your Quality, Health, Safety and Environmental (QHSE) expectations in a timely, cost-effective manner. Ageing plants, in particular, should adopt innovative mechanical servicing solutions delivered by a trusted partner to achieve optimum run times between shutdowns while minimising unscheduled maintenance.

### OUR MECHANICAL SERVICING SOLUTIONS

As the region's leading provider of specialised industrial services, CR Asia offers unrivalled expertise in the mechanical servicing sector. With our in-house team of

multidisciplinary specialists across all related work streams, we excel in rising to the challenges set by our clients. The volume of repeat business we enjoy is a testament to our dedication, effort and competence.

### HOW WE SUPPORT YOUR BUSINESS

Our team is ready to support your mechanical servicing needs with fast responses and short lead-times that are the envy of the industry. We can safely deliver your projects on time and on budget by ensuring single-source control enabled by our multi-disciplinary approach and project management capability.

In addition to our comprehensive portfolio of mechanical servicing solutions, we complement our in-house expertise through strategic alliances with other market-leading organisations. CR Asia currently partners with Hydratight (bolting solutions), Conbit (structural design and specialist offshore lifting / installation), Colt (online leak sealing / clamping enclosures) and Hilti (specialist cutting services), among others.

## THE CR ASIA DIFFERENCE

CR Asia's large in-house team of highly trained technicians is subject to regular audits and a stringent safety passport scheme. We invest heavily in the latest equipment and SMART systems to maintain our reputation as the region's leading one-stop provider of specialised maintenance services.

### Innovative equipment and processes

CR Asia continually invests to secure the latest technologies and equipment. This enables us to support our clients with the most appropriate solutions to address the challenges of operating complex facilities. What's more, we maintain a continuous improvement cycle to satisfy ever-evolving requirements for delivering safer, faster and more efficient results. With each operational success, the experience and knowledge gained is channelled into the next generation of solutions.

### Outstanding QHSE performance

Training and experience go hand in hand wherever CR Asia operates. With bespoke programmes aimed at keeping our technicians ahead of the field, we pride ourselves on delivering a best-in-class performance that continually exceeds our clients' expectations for safety and quality. This commitment to constant improvement is embedded in our management systems, which are certified to international standards including ISO 9001, ISO 14001 and ISO 18001. In addition, our internal project management and KPI systems allow us to deliver projects with an unwavering focus on safety, timeliness and cost.

### Unrivalled experience

CR Asia is one of the only companies who can deliver simultaneous shutdowns in multiple countries. With decades of front-line service delivery experience in projects of widely

varying scope and complexity, we have evolved into a complete one-stop provider of mechanical servicing solutions. The experience gained from supporting clients across a broad range of industries allows us to respond to all issues as and when they appear. As specialists in their respective disciplines, our teams interface seamlessly to make even the most complex project seem relatively straightforward.

### Exceptional service

Our track record of successfully delivering on our commitments reflects both the 'can do' attitude of our management, as well as our rigorous planning, preparation and execution. When you work with CR Asia, you can be confident that you have selected the best partner for your project, regardless of size or value.



## OUR SERVICES

- Static equipment maintenance – vessels & drums, columns & replacement of trays/ internals, heat exchangers incorporating full 'blind' service
- Reactor repairs and maintenance
- In-situ flange facing and machining, bed milling, valve lapping services, etc
- Online leak sealing and pipe wrapping
- Hydraulic bolt tensioning and bolt torqueing, joint integrity programmes
- Cold cutting and weld preparation
- Plant change and piping modifications
- Plant maintenance
- Support services such as pipe cold cutting, hydro & pneumatic testing
- Structural steel, piping fabrication and installation, stainless steel welding (inert and normal atmosphere)
- Diamond wire and diamond saw cutting, as well as Ultra-High Pressure Water Jet (UHPWJ) cutting

## YOUR BUSINESS BENEFITS

**Increase productivity** – by engaging us as your single point of accountability for all critical path elements. This means you are never more than a call away from key resources that can support your business and add value to your bottom line.

**Save time and cost** – through our deep understanding of the issues and our ability to provide high quality international solutions via local resources quickly and cost effectively.

**Access one-stop support** – with a solutions provider that can deliver the full spectrum of services required within the scope of work.

## CR ASIA IN ACTION

### The challenge

A refiner in Southeast Asia needed to revamp an RFCC unit by installing new internals to increase capacity, improve process efficiency and optimise yields.

### The solution

To facilitate the installation, CR Asia employed several advanced cutting techniques to remove the top reactor head (165 tonnes) and cut a 35-tonne door in the regenerator section.

### The outcome

The refractory lining was cut cleanly without damaging the internals. In addition to completing the project safely, quickly and within budget, we saved the client substantial capital expenditure by ensuring the regenerator shell could be re-used.

## CR ASIA – YOUR RELIABLE PARTNER

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## CR Asia Decoking Technology



### YOUR CHALLENGES

A common by-product of industrial plant processes, the build-up of coke and scale in furnace tubings and pipelines is a widespread issue. As these deposits impact operational efficiency, cleaning the tubes thoroughly, quickly and safely the first time, every time, is a key concern. Traditionally, Steam Air Decoking (SAD) has been employed as the preferred cleaning method. There are, however, a number of drawbacks with SAD including the incomplete removal of coke, an increased risk of tube erosion, heat damage, potential fire hazards and environmental issues. SAD also involves longer shutdown times and decreased run lengths.

### OUR DECOKING SOLUTION

These issues can all be resolved with CR Asia Decoking Technology (CDT). Proven to be a safe, efficient and cost-effective cleaning technology, CDT does not require high temperatures, high pressure or toxic chemicals. Instead, water is applied at a low pressure, typically 150 psi, to drive the pigg along the tube so that metal studs can scrape all

the coke and scale loose. By permitting water to flow around the pigg and through the cleaning studs, the loosened deposits are flushed ahead of the pigg and into a collection tank. This process is repeated several times as the size of the pigg is increased incrementally, removing more deposits with each run.

### HOW WE SUPPORT YOUR BUSINESS

A proprietary technology from CR Asia, the region's leading one-stop provider of specialised industrial services, CDT is designed specifically to remove all coke and scale deposits. CDT is typically used to clean furnace tubings and pipelines in Cokers, Cogeneration Units, RDS, VBU, Vacuum Heaters, Naphtha Heaters and Crude Heaters.

To complement our in-house capabilities, we work closely with Intelligent Pigging providers. Our strategic partners support us with ultrasonic technology to check the integrity of the furnace tubings and pipelines. As ultrasonic inspections are only possible when the tubes are completely clean, this approach guarantees all coke and scale is removed.



## THE CR ASIA DIFFERENCE

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### Advanced equipment and technology

CR Asia uses the best piggings in the business. To guarantee fast turnarounds, we ensure a wide range of types and sizes are available onsite. Our experts also have access to multiple single and double pumping units, depending on requirements, to clean two or more furnaces simultaneously. Throughout the cleaning process, a chart recorder reading is used to pinpoint both the pig's location as well as any fouled areas. We also team up with specialist inspection companies to perform intelligent pigging to determine the remaining life of tubes to help optimise operation and maintenance of your furnaces.

### Outstanding QHSE track record

From the start of operations until today, we have never suffered an onsite accident. Our technicians undergo the industry's most rigorous training. By maintaining the highest standards of professionalism, communication and collaboration on every project, we receive consistently high customer satisfaction ratings.

### Unrivalled experience

CR Asia has successfully performed more than 300 decoking projects across the region. By cascading this knowledge and

experience internally to our project technicians, we are able to maintain a large pool of pigging operators who are ready to deploy at a moment's notice. MCTN, HPCL, Reliance Industries, IOCL, ExxonMobil, Shell, Petronas, Formosa, PTTGC and Thai Oil are just some of the industry leaders that have contracted our cleaning services.

### Exceptional service

CR Asia offers a complete 'blind to blind' approach that includes all mechanical services. As part of our comprehensive service offering, we also provide technical support and advice along with planning, scheduling and project management. To ensure smooth project delivery, strong working relationships are maintained with all the main inspection companies. Professionalism and service excellence are key aspects of the training regime our technicians undergo. To ensure minimal disruption and downtime, they are also trained to perform regular maintenance on our pigging processing units and are capable of troubleshooting any fault onsite.



## OUR SERVICES

- Furnace / HRSG / pipeline decoking and descaling
- Furnace decoking for refineries
- Pipeline cleaning / descaling
- Checking the integrity of the furnace tubings and pipelines

## YOUR BUSINESS BENEFITS

**Minimise downtime and cost** – compared to SAD, as the CDT solution is proven to be faster and more effective, and is delivered by highly trained, service-oriented experts.

**Benefit from customised solutions** – as CDT works with any pigging system, enabling us to select the pig best suited to your requirements and your facilities.

**Restore operational efficiency** – by completely removing all coke or scale from tubes. By using piggings of various sizes with different stud configurations and ensuring the optimum number of runs, we thoroughly clean tubes with reducers and changing diameters.

**Safeguard your plant and people** – as the CDT system is a safer, quicker and more environmentally friendly cleaning technology.

## CR ASIA IN ACTION

### The challenge

Tubing corrosion in a HRSG Cogen unit was causing frequent emergency shutdowns for bypassing repairs that resulted in significant downtime and huge production losses.

### The solution

The CDT solution virtually eliminated the need for unplanned maintenance.

### The outcome

After comparing our cleaning maintenance cost with the previously lost production, the client identified significant savings and awarded us with 2 x 5-year service contracts.

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## Chemical Cleaning Services



### YOUR CHALLENGES

When physical access is not possible, chemical cleaning is the preferred method for removing undesirable substances from polluted surfaces. Chemical cleaning covers a wide range of applications, from new construction to ongoing maintenance activities. Selecting the right chemical cleaning process is governed by a wide variety of factors – safety, effectiveness, corrosion rate, treatability of the effluent, disposal options, required heat input, local availability of chemicals, availability of the required utilities and cost.

### OUR CHEMICAL CLEANING SERVICES

With unrivalled experience in this field, CR Asia can recommend the most suitable solution for your specific needs. Our chemical cleaning services fall into three categories:

- Process cleaning removes pollutants caused by operating processes such as waterborne scale, excess magnetite, cuprous oxide, polynuclear aromatics, iron sulphide, heavy tar and others.

- Pre-commissioning cleaning prepares newly installed piping and equipment for its intended purpose. This covers the removal of loose and potentially loose matter while retaining the passivation of metal surfaces that require corrosion-resistant properties. As part of this process, we also perform (hot) oil-flushing as well as steam- and air-blowing.
- Decontamination or de-gassing for the elimination of explosive gases (L.E.L.), H<sub>2</sub>S, Hg, benzene and pyrophoric material for plant shutdown.

### HOW WE SUPPORT YOUR BUSINESS

CR Asia offers complete chemical cleaning solutions. Our holistic approach includes safety management, all mechanical work, engineering, custom-made equipment operated by skilled staff, on-site analysis, hydro-jetting, joint integrity management with controlled bolting, leak testing and on-site wastewater treatment. As part of our commitment to service excellence, we take into account all aspects of the chemical cleaning process driven by safety and the environment, quality, scheduling and cost efficiency.

## THE CR ASIA DIFFERENCE

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## Innovative technology

CR Asia, in collaboration with technology partners and suppliers, has developed a number of proprietary products to, for example, combat mercury and polynuclear aromatics. We have also developed water-based products utilising the extraordinary properties of dipentene and amine oxides, amongst others. For pre-commission cleaning of relocated plants, we combine hydrostatic testing of piping and heat exchangers. This cost-saving practice has been successfully applied at relocated EDC/VCM and ammonia plants and refineries.

## Stringent QHSE processes

Every evaluation begins with an unwavering focus on ensuring the safety of people, property and the environment. The choice of chemicals is paramount in this respect. We always pay close attention to handling safety, corrosion rates, process safety, emissions and wastewater treatability.

## YOUR BUSINESS BENEFITS

**Benefit from a holistic approach** – that combines mechanical services with cleaning and testing.

**Minimise environmental impact** – with industry-leading cleaning processes that utilise non-toxic biodegradable chemicals. Our approach minimises emissions and enables wastewater to be treated onsite in accordance with the most stringent environmental standards.

**Save time and costs** – through our in-depth familiarity of all issues related to chemical cleaning and our ability to deploy world-class solutions via local resources quickly and cost effectively.

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## Unrivalled experience

CR Asia offers holistic packages that carry the best practices and experiences gained in one discipline over to the next. Since 1991, we have successfully performed over 1,000 chemical cleaning projects involving power station boilers, heat recovery steam generators, waste heat boilers (Compac Unit), hydraulic & lube oil systems, shell & tube heat exchangers, plate & frame heat exchangers, printed circuit heat exchangers, plate bundle and Texas tower CFE, cooling water jackets & systems, condensers & fin fans, urea strippers, slug catchers and stainless steel systems (ASTM A-380).

## Exceptional service

As the region's leading multidisciplinary service provider, CR Asia knows the complete production process better than anyone. We also understand the challenges our customers face. So, for example, when we take up a platformer unit, our solution encompasses catalyst handling, cleaning of air preheaters, cleaning of combined feed/effluent heat exchanger and cleaning of fin fans.



## OUR SERVICES

- Pre-commissioning cleaning in the power and process industries combined with oil-flushing
- Chemical cleaning of power station and utility boilers  
Plant decontamination (de-gassing)
- Mercury decontamination
- Chemical cleaning of all types of heat exchangers
- Slug catcher cleaning and servicing

## CR ASIA IN ACTION

### The challenge

A refiner in Southeast Asia was experiencing an unacceptably high Hot Approach Temperature (HAT) of the Combined Feed / Effluent Heat Exchanger in the platformer unit. The lack of efficiency appeared to be caused primarily by polynuclear aromatics and magnetite.

### The solution

CR Asia applied a multistep chemical cleaning process that involved the circulation of various aqueous chemical mixtures, ensuring a positive pressure at the feed side at all times.

### The outcome

The HAT dropped from 54°C to 40°C with a total cleaning time of less than four shifts.





YOUR RELIABLE PARTNER

## Fin Fan Optimisation Services



### YOUR CHALLENGES

Air cooled heat exchangers (ACHE) are used extensively throughout the Oil, Gas, Refining, Chemical, Power and other heavy industries. As a potentially critical component of your production process, ACHE performance is essential. Under the motto 'We Deliver Cooling Capacity', CR Asia's comprehensive portfolio of maintenance, cleaning and advisory services supports your production processes by delivering sustained or enhanced ACHE performance.

### OUR FIN FAN OPTIMISATION SERVICES

Various factors can influence cooling capacity, with cleaning being just one of many potential solutions to improve ACHE performance. For this reason, our cleaning solutions are performed together with an elaborate monitoring programme that enables us to investigate the full spectrum of possible causes for reduced efficiency. We also provide monitoring and data analyses to document efficiency gains by measuring the air velocity, plenum pressure differential, temperature and energy consumption before and after cleaning.

### HOW WE SUPPORT YOUR BUSINESS

As part of our comprehensive consultative approach, we investigate all possible issues associated with ACHE efficiency including hot air recirculation; the condition of the plenum; fan performance; energy consumption of the fan drive; vibration and noise levels, etc. Once the situation has been fully assessed, our experts propose the necessary corrective actions to resolve all issues.

To restore ACHE cooling capacity, we clean the inside as well as the external tube surface. Depending on your specific requirements, CR Asia employs a range of methods such as foam cleaning, mechanised hydro-jetting and soda blasting (dry-cleaning) for the external surface. We carry out internal tube cleaning by high-pressure water jetting using automated techniques such as tube lancing equipment (TLE). TLE cleaning with flexible lances and rotating nozzles is suitable for narrow platforms so that extensive scaffolding is not required. Chemical cleaning can be used to remove H<sub>2</sub>S, FeS and/or sticky pollutants that present challenges for hydro-jetting applications. Both methods enable us to achieve an optimal result in the shortest possible time while maintaining the highest safety standards.

## THE CR ASIA DIFFERENCE

CR Asia's large in-house team of highly trained technicians is subject to regular audits and a stringent safety passport scheme. We invest heavily in the latest equipment and SMART systems to maintain our reputation as the region's leading one-stop provider of specialised maintenance services.



### Innovative technology

We use TLE techniques to clean tube interiors safely and efficiently. For the external tube surface, soda blasting (dry cleaning) is performed online in 95 per cent of all cases. Working in cooperation with our technology partner, MCO Team B.V. from the Netherlands, new solutions are developed for those interested in permanent cleaning installations and online continuous performance monitoring.

### Stringent QHSE processes

CR Asia has a proven ability to restore cooling capacity to original design levels through online cleaning alone, using non-hazardous, environmentally friendly sodium

bicarbonate, which is also used as a food ingredient in baking powder. Naturally, all local laws and regulations pertaining to the blasting process are adhered to.

### Unrivalled experience

Based on our extensive experience, we recognise that approximately 85 per cent of all heat transfer issues at ACHE arise from fouling of the outer surface of the tubes, where debris accumulates on and in between the fins. By using foam cleaning, mechanised hydro-jetting or (online) soda blasting (dry cleaning), we can confidently offer the best solution for 'Delivering Cooling Capacity'.

### Exceptional service

To ensure minimal downtime, the majority of our cleaning services are performed online and our team is capable of cleaning some 70m<sup>2</sup> per shift. We check all aspects of fin fan performance to ensure cooling capacity is delivered. By providing consultancy and monitoring support together with an array of cleaning options, CR Asia offers a comprehensive service package.



## OUR SERVICES

- Cleaning of the external tube surface by foam cleaning, mechanised hydro-jetting or soda blasting (dry cleaning)
- Online cleaning of the external tube surface for the majority of ACHE
- Cleaning of the internal tube surface with semi-automated lancing equipment (TLE technique)
- Monitoring and troubleshooting for performance enhancement

## YOUR BUSINESS BENEFITS

**Gain certainty** – by relying on tried and tested maintenance, cleaning and advisory services from CR Asia. We have an impressive track record of delivering sustained or enhanced ACHE performance over the course of hundreds of successful projects.

**Increase efficiency** – with fin fan optimisation services that provide excellent results and a high return on investment. Our comprehensive portfolio of online ACHE cleaning and monitoring services can help to minimise downtime from unplanned maintenance activities.

**Minimise environmental impact** – with our non-hazardous, environmentally friendly solutions. Beyond ensuring all relevant laws and regulations are adhered to, our experts can help you reduce your carbon footprint.

## CR ASIA IN ACTION

### The challenge

A refiner in Southeast Asia was being forced to perform frequent flaring due to reduced efficiency of the iC5 Fin-Fan Overhead Condensers.

### The solution

CR Asia carried out online cleaning of the tube exterior by soda blasting in seven day-shifts.

### The outcome

Following cleaning, a 136 per cent improvement in average airflow was measured. This resulted in an increase of 4.1 MW and an iC5 reflux increase of 55 m<sup>3</sup>/hour.

## CR ASIA – YOUR RELIABLE PARTNER

CR Asia is the leading provider of highly specialised pre-commissioning and maintenance services to the Oil, Gas, Chemical, Power and other heavy industries throughout Asia. As your reliable partner, we provide the safest and most efficient solutions to the maintenance, repair and overhaul challenges facing your business. **To learn more, visit [www.crasia.net](http://www.crasia.net)**



YOUR RELIABLE PARTNER

## Mercury Management Services



### YOUR CHALLENGES

Mercury is a naturally occurring by-product of hydrocarbon processing that potentially affects all stages of production. Its presence complicates shutdowns and turnarounds by contributing to the contamination, embrittlement and corrosion of process equipment. Mercury also presents significant Quality, Health, Safety and Environmental (QHSE) challenges during routine maintenance, repair and overhaul activities, and when handling process fluids and waste materials. To minimise these risks, a detailed understanding of rigorous safety precautions and proper handling procedures is essential.

### OUR MERCURY MANAGEMENT SOLUTIONS

CR Asia has established an enviable reputation as the leading provider of mercury management solutions to the Hydrocarbon Processing industries. To further strengthen and complement our own in-house mercury management service offering, we have formed partnerships to provide mercury mapping studies including sampling and analytical services, comprehensive decontamination validation techniques and cradle-to-grave solutions for mercury

removal adsorbents. In addition, CR Asia has existing relationships with a number of licensed disposal facilities to ensure the safe handling and disposal of waste materials.

### HOW WE SUPPORT YOUR BUSINESS

Your operations can benefit from our extensive knowledge and experience in the development and application of advanced techniques for the assessment, monitoring and removal of mercury. Our comprehensive range of mercury management solutions extends to all parts of the value chain within the Oil and Gas industry, from exploration and production through to processing, transmission and distribution.

CR Asia and its partners represent one of the world's top mercury technology and decontamination providers. Our collective know-how draws on over 25 years of industry experience. Together, CR Asia and its partners are able to offer specialised equipment, chemistries and methods for QHSE monitoring and mercury decontamination of hydrocarbon processing systems (vessels, columns, drums, pipelines, tanks and valves made from carbon, stainless steel or other materials susceptible to mercury contamination).



## THE CR ASIA DIFFERENCE

CR Asia's large in-house team of highly trained technicians is subject to regular audits and a stringent safety passport scheme. We invest heavily in the latest equipment and SMART systems to maintain our reputation as the region's leading one-stop provider of specialised maintenance services.

### State-of-the-art processes and equipment

Utilising advanced methods and specialised equipment, we sample and analyse mercury in hydrocarbon process streams, including natural gas, natural gas liquids, refinery fuel gas and olefins. Our technology and equipment measures and analyses mercury in hydrocarbon process streams with detection limits well below 1 nanogram/Sm<sup>3</sup>.

### Outstanding QHSE performance

We work closely with clients to develop and implement various workplace QHSE monitoring plans. In addition, we provide mercury awareness training to our clients' operations and maintenance personnel (practical, field and emergency response).

Our clients also benefit from accredited and licensed mercury waste disposal, complete with Chain of Custody documentation. Working with certified and accredited disposal companies, our experts provide safe and transparent disposal options that meet all local regulations and environmental requirements. When it comes to removing hazardous mercury waste from offshore production platforms, we strive to ensure safety and timeliness to support efficient shutdowns and turnarounds.

### Unrivalled experience

CR Asia has successfully completed thousands of mercury management projects. In addition, rigorous training

programmes keep our experts up to date with the latest technological developments, safety practices and industry regulations.

### Exceptional service

Our customer-focused culture ensures on-time, on-budget delivery for all your planned and unplanned maintenance activities. This commitment to service excellence is backed by our track record of integrated management systems that is certified to multiple international standards.



## OUR SERVICES

- Mercury chemical cleaning and decontamination (process systems & equipment) including sludge removal
- Mercury mapping and sampling
- Pipeline chemical pigging, flushing and decontamination
- Mercury area and personnel occupational exposure monitoring
- Mercury scale, sludge, waste minimisation and management
- Hg sampling and analysis of process streams using advanced sampling and analytical techniques
- Hg natural gas / process stream / NGLs sampling, analysis and mapping
- Hg mass balance and mass flux studies for pipelines systems, process platforms, natural gas plants, NGL plants, LNG process trains and refineries
- Plant shutdown monitoring (steam-out, purging, vessel opening)
- Production platform mercury decontamination
- Cryo-separation equipment inspection, modelling
- Hg absorption bed catalyst removal / replacement
- Pipeline abandonment programmes (special programmes for mercury contamination)

## YOUR BUSINESS BENEFITS

**Save time and costs** – based on our ability to quickly assess the most appropriate solution for each application, as well as our proprietary technology that rapidly and effectively removes mercury contamination from processes and equipment.

**Minimise risk** – by working with a partner that can reduce mercury to extremely low levels in order to meet the most stringent international specifications to protect your plant, people and the environment.

**Increase efficiency** – through our deep understanding of the issues and our ability to provide high quality international solutions via local resources quickly and cost effectively, thereby enhancing the reliability and productivity of your operations.

## CR ASIA IN ACTION

### The challenge

A refiner in Southeast Asia registered mercury contamination in a 2km, 6-inch carbon steel pipeline connecting storage spheres to a downstream plant.

### The solution

CR Asia completely removed the mercury by flushing the pipeline with an aqueous mixture of readily available chemicals. After cleaning, the mixture containing dissolved mercury was treated by calcium embedding for safe disposal.

### The outcome

Within 3 weeks, we maintained the downstream plant's integrity, safeguarding the operator against massive potential damages and lost production.

## CR ASIA – YOUR RELIABLE PARTNER

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YOUR RELIABLE PARTNER

## Catalyst Handling Services



### YOUR CHALLENGES

Owners and operators of refineries and petrochemical plants need to ensure the highest levels of safety and efficiency when charging and discharging reactors. This is a critical job that requires highly skilled contractors, especially for complex or high-risk change-outs. For example, pyrophoric catalysts require specific handling techniques under inert (nitrogen) atmospheres. Catalyst vendors frequently recommend using specialist contractors to ensure materials are handled appropriately and to safeguard their performance guarantees. Over the years, CR Asia has developed excellent working relationships with all major catalyst vendors.

### OUR CATALYST HANDLING SERVICES

CR Asia has a long history of providing superior services for the unloading and loading of catalyst for both fixed-bed and tubular reactors throughout Asia. Our services support

catalyst handling on all reactor types, including mechanical work on internals for removal and re-installation if required.

### HOW WE SUPPORT YOUR BUSINESS

CR Asia adopts a 'blind to blind' approach that minimises cost and downtime for your business. Depending on the type of reactor, catalyst or process involved, our experts customise a solution to your needs by applying different methods for unloading and loading your reactors.

In addition to providing highly trained, service-oriented personnel, we support your business with a complete range of advanced equipment including specially manufactured vacuum units, filters, cyclones, screening machines and de-dusting equipment for all catalyst handling applications. In accordance with our commitment to service excellence, we are continually developing and assessing improved technologies and processes for inert and non-inert entries, and non-entry catalyst handling.

## THE CR ASIA DIFFERENCE

CR Asia's large in-house team of highly trained technicians is subject to regular audits and a stringent safety passport scheme. We invest heavily in the latest equipment and SMART systems to maintain our reputation as the region's leading one-stop provider of specialised maintenance services.

### Innovative equipment and techniques

CR Asia utilises leading-edge equipment such as the dustless mobile Hurricane combined vacuum, filter cyclone units and Mourik 8000 CFM vacuum units, and Edelhoff filtration systems. Our clients also benefit from state-of-the-art catalyst loading technologies developed by our sister company, Mourik, such as the Uniloader™, MIDC and CleanCat™ loading systems. In addition, we are a licensed service provider for the dense loading technologies from UOP, Petroval, Crealyst and Unidense™.

### Outstanding QHSE performance

We pride ourselves on maintaining an unblemished track record for quality and safety. CR Asia has helmet solutions in place for inert entry. As part of our safety passport system, every technician is accredited under our confined space training course and is specifically trained in all aspects of catalyst handling and reactor services in both normal and inert atmosphere conditions. Whilst on site, our technicians will readily produce their training records for verification upon request.

### Unrivalled experience

With a 25-year track record of successful project delivery and certification letters in place with all major catalyst vendors, CR Asia is regarded as the region's foremost catalyst handling expert. Our teams possess a wealth of experience when it comes to complex jobs involving Parex, FCC and CCR units. The term contracts we have with the likes of Shell, ExxonMobil and ConocoPhillips are testament

to our competence and professionalism.

### Exceptional service

Choosing us as your single source to perform the full scope of catalyst handling services – isolating and opening the reactor, emptying and re-loading contents, closing the reactor and de-blinding or de-isolating it to save on standby time – ensures streamlined project delivery with simplified management and administration.



## OUR SERVICES

- Inert entry (N<sub>2</sub>) – for catalyst unloading / reloading as well as other applications
- Dense loading – Densicat technology under license from Petroval (Total)
- Dense loading – Calydens technology under license from Crealyst
- Dense loading – technology under license from UOP (USA)
- Unidense – loading technology for reformer tubes under license from Unidense Technology GmbH
- Catalyst screening – under inert and normal atmosphere conditions
- Reactor internals – removal, reinstatement, video inspection, repair, modification, upgrade and passivation
- Reformers (furnace) – total service including tube changing / welding and uniform loading
- Reformers / Platformers – catalyst change-out and mechanical work
- Ammonia converters – total service including basket changes
- CCR – total service including centre pipe and scallop removal, repair, welding and replacement
- ARHDM & RDS – hydro-drilling technology for coked / fused reactors
- HCU – total service including repair, soda ash washing, welding and dense loading
- Parex – Molex – Olex chambers – adsorbent change-out and mechanical work
- Tubular reactors – catalyst change-out, tube cleaning & Dp measurement
- FCC – catalyst vacuuming and coke removal

## YOUR BUSINESS BENEFITS

**Benefit from a one-stop solution** – that encompasses all mechanical and repair work in addition to unloading and re-loading the catalysts in all types of reactors.

**Maintain high safety standards** – by choosing a partner with a proven commitment to ensuring a safer workplace, both onshore and offshore, in normal and inert atmosphere conditions.

**Save time and money** – with an experienced catalyst handling expert that can support your operations through a comprehensive 'blind to blind' approach.

## CR ASIA – YOUR RELIABLE PARTNER

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## CR ASIA IN ACTION

### The challenge

A refiner needed to change its Parex adsorbent at the end of its useful life to boost production efficiencies and improve yields.

### The solution

Having performed over 25 Parex re-loads throughout the region, CR Asia replaced the adsorbent and all reactor internals within 27 days, setting a new record.

### The outcome

The client generated significant savings by putting the unit back in service earlier compared with typical re-load durations.





## CR Asia – Your Reliable Partner

CR Asia is the leading provider of highly specialised pre-commissioning and comprehensive maintenance services to the Oil, Gas, Chemical, Power and other heavy industries throughout Asia. As your reliable partner, we provide the safest and most efficient solutions to the maintenance, repair and overhaul challenges facing your business.

### Contact us today to learn more

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