



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, CR3 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.), H₂S, Hg, benzene and pyrophoric material for plant shutdown.

HOW WE SUPPORT YOUR BUSINESS

CR3 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 CR3 DIFFERENCE

CR3'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

CR3, 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.

CR3 is a leading provider of energy engineering solutions. Established in 1991, we provide specialised maintenance, plant upgrade, revamp and engineering services with a sharp focus on **Energy Efficiency**, **Engineering Excellence**, and Sustainable **Solutions**.

To learn more, visit CR3.Group

Unrivalled experience

CR3 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, CR3 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 SOLUTIONS

- 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

CR3 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

CR3 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.



Chemical Decontamination Services



YOUR CHALLENGES

Chemical decontamination is the preferred method for removing undesirable and harmful contaminants from process equipment. To maximise efficiencies and eliminate delays in vessel entry and mechanical works, operators want to minimise the time taken to prepare the equipment for both decontaminating and cleaning. Selecting the right chemical decontamination process is governed by a wide variety of factors – safety, effectiveness, treatability of the effluent, disposal options, local availability of chemicals, ability of mechanical support team and cost.

OUR CHEMICAL DECONTAMINATION

CR3 has partnered with Zyme-Flow® Decon Technology for over 15 years to provide the most suitable decontamination solution for your specific requirements. Together, we greatly shorten the time taken to make equipment safe in preparation for periodic maintenance and inspection routines which has a significant impact on reducing the overall duration of turnarounds and shutdowns.

Our chemical decontamination services fall into two categories:

- Organic solvent cleaning process which targets heavy hydrocarbon such as Vacuum Tower Bottom (VTB), Visbreaker (VB) Bottom, Asphalt and heavy tar to minimise post-decontamination cleaning significantly.
- One-step decontamination process or de-gassing for the elimination of residual oil, explosive gases (LEL), hydrogen sulfide (H₂S), benzene and pyrophoric iron sulfide (FeS) for plant maintenance/hot works requirement.

HOW WE SUPPORT YOUR BUSINESS

Our holistic approach includes safety management, mechanical work, engineering, custom-made equipment operated by skilled staff, on-site analysis, integrity management with controlled bolting, leak testing and on-site waste management. We consider all aspects of the chemical decontamination process driven by safety and the environment, quality, scheduling and cost-efficiency.

THE CR3 DIFFERENCE

CR3'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.

Integrated solutions

We have an experienced mechanical team and the expertise to fabricate, supply and proficiently set up mechanical manifolds required in decontamination according to site standards. As the region's leading multidisciplinary service provider, we can manage the entire project ensuring the most comprehensive solutions for our clients.



Innovative chemistries

Our range of products target various contaminants found in process systems. Zyme-Flow's single step Vapor-Phase process eliminates LELs, H₂S, Benzene, pyrophoric FeS as well as Ammonia. For heavy hydrocarbon systems, an organic solvent is used as part of a typical shutdown process to enhance the dissolution of heavy hydrocarbon and significantly reduce the mechanical cleaning duration.

YOUR BUSINESS BENEFITS

Benefit from an integrated solution – that encompasses all mechanical works, engineering, fabrication and on-site modifications in addition to chemical decontamination.

Minimise environmental impact – with industry-leading chemistries and 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 – by minimising manual and mechanical cleaning which has a significant impact on reducing the overall duration of turnarounds and shutdowns.

CR3 is a leading provider of energy engineering solutions. Established in 1991, we provide specialised maintenance, plant upgrade, revamp and engineering services with a sharp focus on **Energy Efficiency**, **Engineering Excellence**, and Sustainable **Solutions**.

To learn more, visit CR3.Group

Exceptional service

CR3 provides the industry's most comprehensive preproject planning services, which include:

- Extensive consultation with refinery personnel and on-site inspection of all equipment and piping
- Detailed procedures, including chemical injection points, tagging, fluid volumes and all necessary preparations
- Comprehensive plan with safety and environmental priority
- Drawing options including marked-up PFD's or Blue beam
- Timeline/schedule
- Decontamination procedure integrated into operation shutdown procedure
- Operator training of decontamination procedure

Stringent QHSE processes

We always pay close attention to handling safety, corrosion rates, process safety, emissions and wastewater treatability. CEFAS and REACH compliant, we meet the most stringent environmental standards.



OUR SOLUTIONS

DECONTAMINATION

- Chemical decontamination of hydrocarbons and pyrophoric material
- Specialised flushing of heavy hydrocarbon bottom circuits
- Online heat exchanger chemical cleaning
- Reactor cleaning
- Waste management
- Lab analysis of contaminants and chemical treatments

MECHANICAL SERVICES

- Engineering and fabrication
- On-site modification and set-up
- Joint integrity management
- Specialised equipment

CR3 IN ACTION

The challenge

A refiner in Thailand required extensive decontamination works as well as waste management of the effluent to ensure an efficient handover for maintenance works during a large revamp and turnaround event.

The solution

CR3 supported the entire project from engineering and planning to site preparation and set up of decontamination drainage manifold for waste management and execution.

The outcome

Our comprehensive approach saved significant time, minimised mechanical cleaning and met all the KPI's for LELs, H₂S, Benzene and eliminated any pyrophoric events ahead of schedule.

Leading one-stop provider of specialised maintenance services

CR3 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.

Our Solutions

We offer a comprehensive portfolio of maintenance services that are grouped into six business lines. 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 can deliver multiple shutdowns concurrently.

Related services:

- Static & Rotating Equipment Maintenance
- 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
- Insulation Services
- Valve Maintenance
- Storage Tank Cleaning & 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

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

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.

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
- Storage Tank Cleaning & Maintenance

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
- CR3 Decoking Technology (CDT)
- Decontamination Services
- Waste Handling

We deliver projects safely, on time and on budget by ensuring single-source control through our multi-disciplinary approach and project management capability.

Related services:

- Process Revamps, Rejuvenations & Retrofits
- Construction & Constructability Reviews
- Engineering, Procurement & Commissioning Services
- Operations & Maintenance
- Dismantling, Demolishing & Removal of Equipment
- Fabrication of structural, Carbon Steels & Pipe Systems
- Fabrication of Stainless Steels & Special Alloys
- Installation of Large Equipment & Pipe Systems
- Welding
- Hot & Cold Cutting
- Scaffolding & Insulation



CR3 is a leading provider of energy engineering solutions. Established in 1991, we provide specialised maintenance, plant upgrade, revamp and engineering services with a sharp focus on **Energy** Efficiency, **Engineering** Excellence, and Sustainable **Solutions**.

Contact us today to learn more

CR3 Group

17th Floor, Unit 1706
Two Pacific Place Building
142 Sukhumvit Road
Klongtoey, Bangkok 10110, Thailand
Tel: +66-2-653-3913-5
Fax: +66-2-653-3916
Email: cr3g@cr3.group

CR3 Thailand

15/1 Moo 3, Bankoh - Mabkha Road
Mabkha, Nikompattana
Rayong 21180, Thailand
Tel: +66-38-698-399
Fax: +66-38-698-398
Email: cr3t@cr3.group

CR3 Malaysia

P.T. 6068, Teluk Kalong Industrial Area
24000 Kemaman
Terengganu Darul Iman, Malaysia
Tel: +60-9-863-2325 to 26
Fax: +60-9-863-2328
Email: cr3m@cr3.group

CR3 Singapore

156 Gul Circle
Singapore 629613
Tel: +65-6268-0255
Fax: +65-6268-3369
Email: cr3s@cr3.group

CR3 (India) Private Limited

601, 6th Floor, Building No. 9, Gigaplex
Plot No. IT-5, Airoli West, MIDC
TTC Industrial Area
Navi Mumbai 400708, India
Tel: +91-22-6288-1000
Email: cr3i@cr3.group

CR3 Middle East

Musaffah, M19
Plot #1 DSV Solutions
Abu Dhabi, UAE
PO Box 132569
Tel: +971-2-583-4228
Email: cr3me@cr3.group

Or visit **CR3.Group**

