



REFINERYSOLUTIONS
Evolutionary Maintenance Technologies



A Revolutionary and Innovative **Industrial Cleaning Company**

Hydrokinetics™ | Hydroblasting | Armadillo™ | Tank Cleaning |
Chemical Cleaning | Pipeline Services | Mechanical Services

About Us



Refinery Solutions L.L.C. (RS) began in 2012 to bring the most advance and innovative industrial cleaning maintenance methods and services to the Kingdom of Saudi Arabia.

Refinery Solutions L.L.C. is proud to announce that we have finalized agreements & partnerships to become the sole & exclusive provider of the most advance and modernized industrial cleaning methods and technologies throughout the Middle East & North Africa.

We are a speciality focused industrial cleaning company utilizing patented and proprietary cleaning equipment through our licenses to provide the Middle East and North Africa more safer, practical and efficient methods of cleaning process equipment for the upstream and downstream Industrial facilities throughout the region.

In addition, we will offer a full menu of industrial cleaning applications and methods. While we expand, we will continue & maintain our concept of being a speciality based industrial cleaning company that focuses on safety and technology whilst continuing to provide our clients & customers within the region the most modern, dynamic and safest industrial cleaning methods available.

In the coming months, we will add additional services such as Chemical Cleaning and Tank Cleaning with the same concept and focus geared towards innovative technologies which offer commercial value to our customers.

Our Values

Innovation

To create solutions to critical process fouling issues and provide state of the art methods, technology and services.

Focus on Customer

Attentive to our customers so we can adapt our service to fulfill their requirements.

Solidarity

Align our individual interests for the common good of The Company.

Responsibility

Respectful and aware of the impact in our day to day decisions and how they effect our company, our environment as well as our customers in the pursuit of both of our goals & objectives.

Performance

At every level, we set forth high expectations and we invest to create and provide products & services that give value...not only for our company.....but for our customers also.

Our goal is to become the leader within the region offering the safest, state-of-the-art and newest innovative industrial cleaning techniques and methods in the region.

We provide our clients with a one-stop, cost-effective rapid solutions that are underscored with the crucial objectives of optimizing assets and minimizing operational downtime. With a keen desire to revolutionize the refinery maintenance industry, we are at the frontline of a specialist field offering a wide range of products and services geared toward safety and customer satisfaction.

Our robust and highly-qualified team is able to identify and package solutions for any type of industrial cleaning service within your facility.

Safety and Environment



Environmental Health and Safety Policy Statement Mission Statement

Refinery Solutions is committed to protecting the environment, health, and safety of our employees, customers and the global communities where we operate. We recognize that by integrating sound environmental, health, and safety management practices into all aspects of our business, we can offer innovative products and services while conserving and enhancing resources for future generations. Refinery Solutions strives for continuous improvement in our environmental,

health and safety management systems and in the environmental quality of our products and services. We will endeavour to meet or exceed all applicable environmental, health and safety requirements.

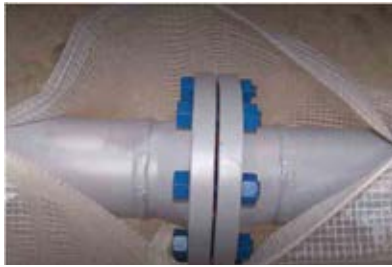
We will continuously evaluate our EHS performance by monitoring ongoing performance results through periodic management reviews. Where laws and regulations do not provide adequate controls, we will adopt our own standards to protect human health and the environment. Advocate the adoption of prudent environmental, health and safety principles and practices by our contractors, vendors, and suppliers. Communicate environmental, health, and safety policies and programs to Refinery Solutions LLC employees and stakeholders. Manage and operate our facilities and job sites to maximize safety, promote energy efficiency, and protect the environment. We strive to offer products and services that are safe in their intended use, conserve energy and materials, and prevent pollution and ensure that all employees are aware of their role and responsibility to fulfil, sustain and help improve Refinery Solutions environmental, health and safety management systems and policy.

Products

Refinery Solutions objective is to ensure we continue to remain at the absolute forefront and the leader in the industrial cleaning and maintenance business. Our leadership is constantly monitoring new products that would add significant value for our customers.



Blast bags



Flange wrap

Services

We excel at providing the resources, the experience and engineering ingenuity to develop unique solutions to execute your cleaning projects.



Hydrokinetics™



Armadillo™



FinFoam™



Hydroblasting



Tank and Vessel
Cleaning



Mechanical Services

BLAST BAG

Safety

- Protects personnel from flying debris and high pressure spray.
- Reduces exposure to chemicals.
- Allows other personnel access to general work area while industrial cleaning is being performed.



Environmentally Friendly

- Contains majority of wastewater and product
- Contains overspray and protects surrounding process equipment, valves, wiring, piping, etc.
- Installation of Blast Bags on open ends of contaminated piping minimizes spills and/or leakage

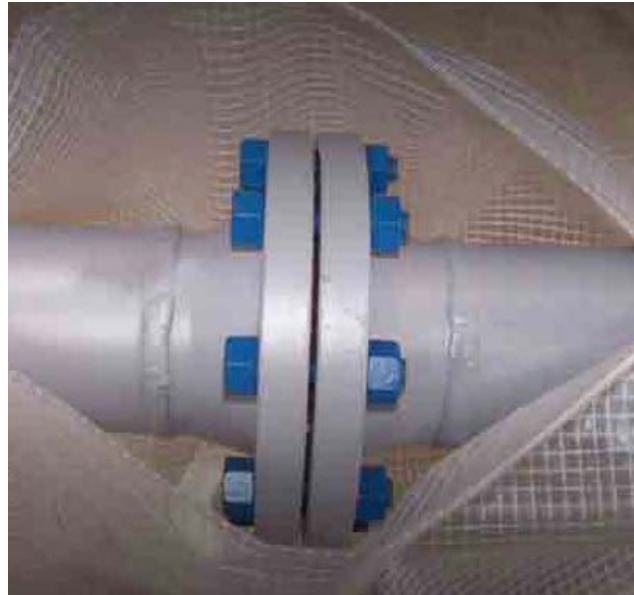
Cost-Efficient

- Saves cost of building/dismantling expensive backdrops, pans, sanded areas, splash shields, slabs, etc.
- Assist in keeping worksite clean - Containment eliminates need for costly cleanup
- Reduces downtime & Reduces barricaded or restricted areas
- Available in various sizes to accommodate just about any exchanger

FLANGE WRAP

Cost-Efficiency

- Easy to use straps and flexibility make for easy disposal.
- Containment eliminates need for costly cleanup.
- Helps to eliminate spills.
- Helps to keep leak from posing an environmental hazard causing extensive clean up cost of area.
Available in various sizes to accommodate all diameters of pipes.



Environmentally Friendly

- Used for line breaking procedures, pipe leaks and line washout
- Contains liquids when making line breaks
- Contains liquids leaking from piping until maintenance can fix or repair
- Allows you to route captured liquids to a containment area of your choice
- Minimizes chemical exposures to hazardous and non-hazardous chemicals for personnel performing line breaking tasks
- Protects valuable equipment and instruments
- Creates less chance for environmental spills

Safety Enhancement

- Minimizes exposures to personnel below
- Reduces exposure to chemicals
- Allows other personnel access to general work area during procedure
- Withstands solvents, caustics, and hydrocarbons

HYDROKINETICS™



Hydrokinetics™ cleaning technology for cleaning the ID of tubes, pipes, lines, etc. is based on the introduction of sonic resonance into the cleaning water stream. The sonic resonance safely transfers to both the tube and/or pipe and the fouling material, resonating at different frequencies, breaking the bond between them. This process will be repeated as needed, until the entire length of tube/pipe is cleaned with the Hydrokinetics™ tool.

In addition, we may use a projectile or plugging device to remove the film like substance from the tube/pipe wall as required. These plugging devices (similar to pipeline pigs) are made of material that will not harm the integrity of the tube/pipe material.

The patented Hydrokinetics™ process is based on ultrasonics or sonic resonance, offering a more efficient, cost effective, ecological, and safer method of clearing fouled pipes and tubes as compared to traditional methods such as Hydro Blasting, Baking, Chemical Cleaning, Drilling or Brushing.

Hydrokinetics™ is a multi-velocity based sonic system; whereby an induced sonic shock is used to break the cohesion between the fouling material and the pipe or tube wall.

Hydrokinetics™ is based on slow filling of the tube/pipe via a multi-cylindereed positive displacement pump, and then the release of high velocity fluid into the relatively static fluid in the pipe/tube.

Hydrokinetics™ in most applications:

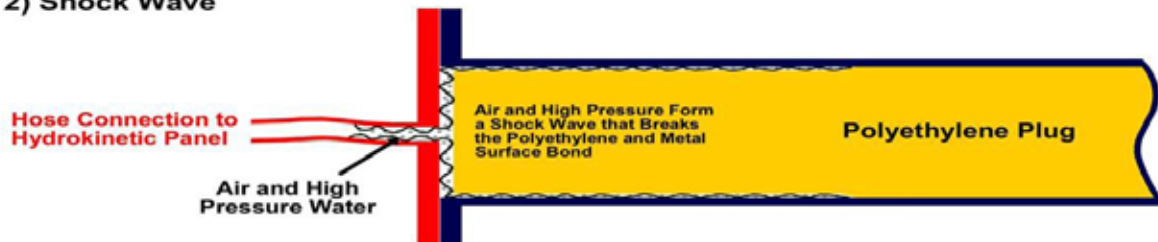
- Safer To Operate Than Conventional Methods
- Cleans Tubes & Pipe Faster
- Environmentally Friendly
- Hands Free Cleaning Method
- More Effective & Efficient Than Conventional Methods

Hydrokinetics™ uses two methods/stages and/or steps to break the scale and metal surface contact – Hydraulic Fracture and a Shock Wave.

1) Hydraulic Fracture



2) Shock Wave



- Most pipes & heat exchangers can be cleaned on site and in place without removal to a cleaning area
- Faster cleaning than conventional methods
- Greatly reduced downtime
- Significant decrease total job costs
- Reduced environmental impact
- Safest of all available cleaning methods

Benefits include

- Operate at lower safer pressures
- Smaller Footprint
- Minimizes Pre & Post Job maintenance work
- Reduced Downtime



This hands free approach was engineered to

- Reduce cost associated with dismantling the pipes.
- Reduce cost associated with removal to the cleaning area.
- Reduce risks encountered by operators.
- Achieve greater consistency in cleaning results.
- Reduce client downtime.
- Reduce crew size necessary to complete tasks.

Over the years, we have successfully removed a wide range of fouling materials from heat exchanger tubes & pipes.....

- Calcium Carbonate
- Polyethylene
- Crude Oil
- Coke
- Black Iron
- Sulphur
- NORM waste
- Polypropylene
- Styrene
- Sulfate
- Asphalt
- Poly-Carbonate
- Latex
- Nylon
- Mill Scale
- Cement
- HDPE
- LDPE
- LLDPE

Refinery Solutions LLC is the exclusive provider of Hydrokinetics™ in the Middle East & North Africa.

ARMADILLO™

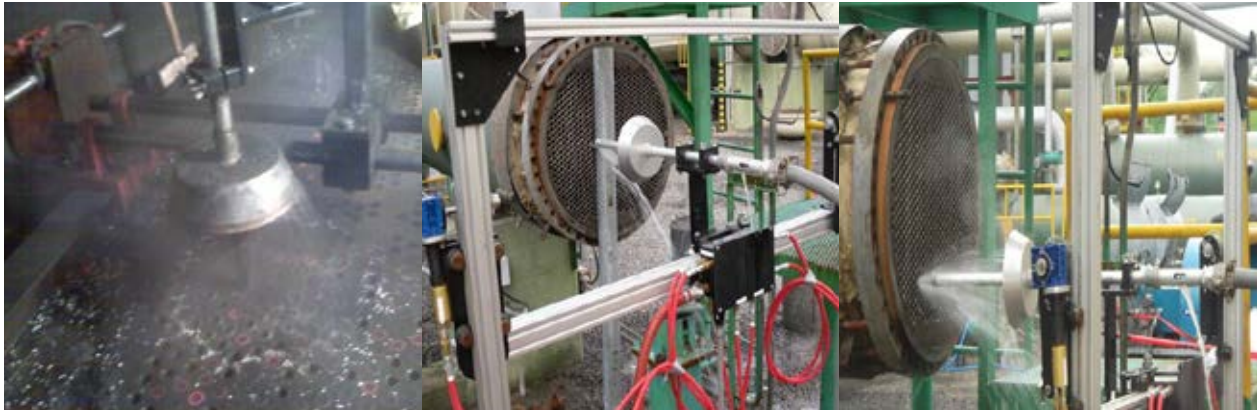


We employ a solution for all industrial cleaning applications and to exceed our customers' expectations, we utilize the latest in rotating hose cleaning technology. This automated process is remotely operated and the entire hose rotates for a uniform, thorough cleaning.

The ARMADILLO™ offers precise rotational speed control from 20 to 350 RPM to meet all material challenges. Tight control over propel and repel speeds of the hose allows the operator to further refine his control to reach optimum cleaning results. This is the only machine on the market that creates a positive rotation of the entire hose, the effect of which assures the very best in ID cleaning

The benefits of this method are as follow

- The operator's remote control of the unit eliminates exposure to the high pressure water stream and allows personnel to operate the equipment at a safe distance.
- The automated systems saves almost 50% of the labor time typically associated with a manual process and also prevents operator fatigue.
- Does not require any additional working area and/or space...there is no need for additional and/or extensive scaffolding to be erected.
- All energy exerted to perform the actual cleaning is mechanical, works at a constant rate providing more consistency and uniform cleaning results.
- Achieves IRIS results with just one pass



- Low fatigue improves the quality AND increases safety
- Technician removed from any exposure to water stream
- Hand operated control box
- Allows operator to operate at a safe distance & keeps operator completely out of the “line of fire”
- Because the hose reels back into the machine, there is no dangerous hose whipping on ground.

Results consistently surpass competing manual methods – hydro and mechanical Exceptional IRIS Results on just one pass!

A wide variety of solutions utilizing the versatility, precision and nozzles of the ARMADILLO™.

Repeated ARMADILLO™ cleaning (year to year) will result in a mirror-like ID finish – Reduced subsequent ID build up.

With adjustable parameters to suit a variety of cleaning situations, this cleaning method can be adaptable to numerous applications.

By adjusting and/or modifying

- Tip Design
- RPM of the tip and Blast Hose
- Propel and Repel of the Blast Hose
- Water Pressure

There are literally hundreds of combinations to suit any consistency of heat exchanger fouling in most cases.



Positive rotation of entire Blast Hose and tip assure consistent thorough Cleaning

With the improved finish From this cleaning, there is actually a reduced subsequent ID build-up..... greatly improving efficiency and lowering costs!

There are several applications and uses for this cleaning methods, some are:

- FinFan Tubes
- Tube & Shell Heat Exchangers
- Pre-Heaters
- Re-Boilers
- Evaporators
- Condensers
- Cooling Tubes
- Separators
- Pipes / Pipelines

Refinery Solutions LLC is the exclusive provider of ARMADILLO™ in the Middle East & North Africa.

FINFOAM™



FinFoaming is a process to clean exterior finned tubed exchangers and boilers. Instead of using high pressure water and/or other liquid means to clean finned tubes. FinFoaming utilizes a low pressure - high volume system that consistently and thoroughly cleans the exterior tubes.

Hydrocarbons and other airborne debris attaches itself to the fins and as the fin tube becomes dirtier, it becomes increasingly noticeable thus reducing efficiency of the exchanger.



The foam is applied directly onto the outer most row of the finned tubes. The concept of using foam is that it will not be susceptible to gravity; rather migrate through the fins and adhere to any obstruction.

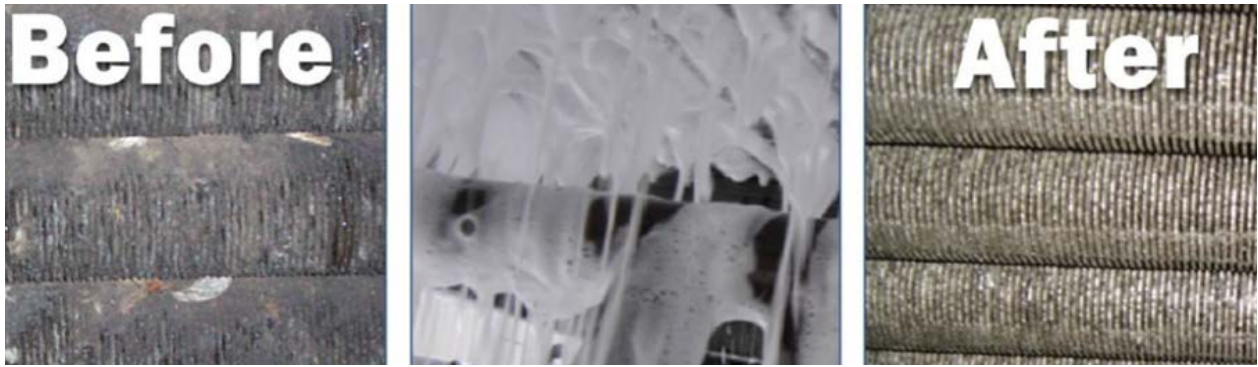
Consequently, the "FIN - FOAMER CONCENTRATE I", remains on the accumulation working to soften & disperse the accumulation away from the fins. The exterior of the fin tubes become fouled and dirty by the fans pulling (induced draft), or pushing (forced draft) dirt and debris onto the finned tubes.



Once the accumulation is softened & loosened with FinFoam's proprietary cleaner, a high volume - low pressure water rinse is used to expel the remaining dirt off the equipment. Unlike in high pressure methods, which can damage the delicate fins...this process causes no damage to the external finned tubes.

"FIN - FOAMER CONCENTRATE I" is environmentally friendly, non-toxic and biodegradable.

The cleaning can be Performed on or off line.



Energy savings can be calculated with astonishing accuracy. When clean heat exchangers perform at their optimal rate, fans can be turned off or reduced to half-power. However the true returns come from increased production capacity.

FinFoam™ cleaning is more effective than hydro blasting, industrial soap, rust remover etc.

The average temperature drop after cleaning is roughly between 20°F to 50°F.

The foam will not damage the fins or the tubes.

FIN-FOAMER CONCENTRATE I does not create significant emulsions, and will not significantly impact effluent plants nor will it adversely impact API oil/water separators.

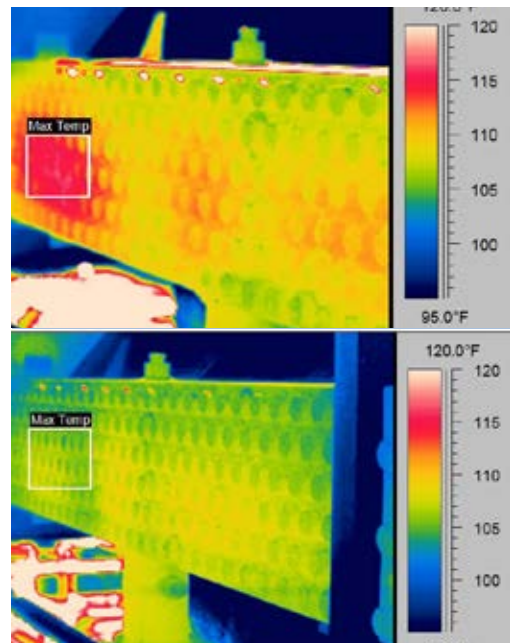
The FinFoam™ reaches the inner tube surfaces, dissolving most organic deposits.

The Foam cleaning is safer since this method does not require entry to the fan cowlings, no confined entry required.

Originally believed to be an internal plugged tube(s) in this location – temperature reading showed a hot spot of 117° F

After completion of the cleaning, a second examination was conducted and results revealed that the area was not plugged as originally believed but had extensive external accumulation on the fins in this area.

The temperature reading after the cleaning revealed a reading of 104° F Originally believed to be an internal plugged tube(s) in this location – temperature reading showed a hot spot of 117° F

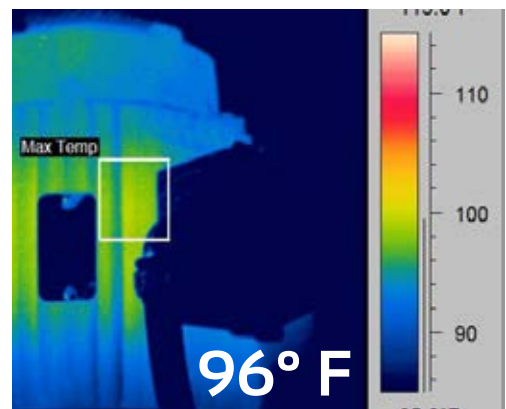
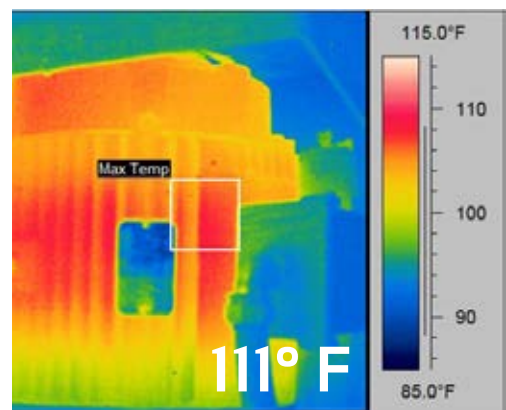


Optimizing Your Return: The FinFoam™ Rate of Exchange

- Improved cooling performance and unit efficiency
- Increased production
- Prolonged unit life
- Reduced maintenance costs
- No production loss with “online” cleaning
- Zero damage to fins
- Removes all debris and corrosive elements
- Foam expands to coat and clean entire surface area
- pH balanced cleaning formula
- Recommended by fin fan manufacturers such as:
 - ✓ Hudson Products USA
 - ✓ Smithco

Results & features

- Increase Efficiency & Reduce Energy
- After performing the foam cleaning process, operations can adjust and/or reduce variable motor settings to exert less energy in the cooling process.
- Innovative, Efficient & Safer Method Of Cleaning Than Traditional Methods
- Refinery Solutions LLC the exclusive provider of FinFoam™ in the Middle East & North Africa



HYDROBLASTING



Hydroblasting is a method of cleaning and/or removing build up & debris from surfaces, tanks and lines with a high pressure water stream. It is a technique which relies entirely on the energy of water striking a surface to achieve its cleaning effect.

The uses of hydroblasting vary from paint & grease removal to pipe, heat exchanger & tank cleaning to log debarking, material cutting & sidewalk/road cleaning.



A pump is used to increase the water pressure. This pressurized water is pumped through a flexible steel braided hose or rigid pipe and discharged through a lance and/or wand which has an orifice at the end (also known as a tip or nozzle).

There are many uses for Hydroblasting throughout the Oil & Gas industry as well as petrochemical and other manufacturing environments.

The terms HYDROBLASTING, WATERBLASTING, HYDROJETTING and WATERJETTING essentially mean the same thing; with all being used to describe the same process.

There is often confusion over the difference between simple pressure water washing and hydroblasting. To clarify the situation, please use the following commonly accepted definitions:

Low Pressure Water Washing: Operates at pressures less than 5,000PSI (345 bar)

High Pressure Water Washing (Blasting and/or Jetting): Operates at pressures between 5,000 - 10,000PSI (345 – 689 bar)

High Pressure Hydroblasting (or Jetting): Operates at pressures between 10,000 – 25,000PSI (689 - 1724 bar)

Ultra High Pressure Hydroblasting (or Jetting): Operates at pressures above 25,000 PSI (1724 bar)

Hydroblasting Services

- Coating removal
- Weld preparation and mill scale removal
- Surface preparation and cleaning
- Polymer removal
- Robotic automated cleaning
- Air pre-heaters
- Decoking
- Boiler deslagging
- Boiler recovery bottoms
- Piping
- Exchangers
- Reactors
- Evaporators
- Condenser tubes
- Water recirculation
- Tanks & Vessels



Abrasive Blasting / Cleaning

Abrasive Blasting Can Be Used For Flue Gas Stream Maintenance. It Is Also Useful In Cleaning, Cement, Walls / Buildings, Tanks, Boiler Tubes, Fans, Or Ductwork For Nondestructive Testing And Examination.

Abrasive Blasting Is Widely Used For Surface Preparation Of Metal Or Concrete Surfaces Before Painting, Coating, And / Or Welding.

To Meet Project-specific Needs, Refinery Solutions LLC Selects And Uses Mostly Water Soluble Abrasive Media, Grit Size, And Air Pressure.

Automation

Though not a requirement, we aim to be the benchmark in the industry offering “hands free” innovative automated industrial cleaning technologies to our customers thus eliminating the need for our operators to physically manage any high pressure hoses.

From large and enormous exchangers to small ones, whether vertical or horizontal, small tubes or large, we believe we utilize the safest, fastest and most reliable automated exchanger & pipe cleaning solutions in the Middle East and North Africa.

To become safer and more efficient in the Hydroblasting industry. We hope through technology and innovation these methods will quickly make manual hydroblasting a thing of the past.

Utilizing High Pressure Water Blasting equipment that moves the operator out of the line of fire, out of harms way, as well as taking the cleaning tool out of the hands of the individual all make for safer operationswhy not let intelligent equipment and not the person be exposed to the hazards and risk associated with High Pressure Water Blasting. This enables all of us to reach our target of ZERO.

Enhanced speeds, more power, reliable equipment, greater operator safety and comfort – these are the benefits that improve job efficiency and reduce overall project costs.



Tank & Vessel Cleaning



Refinery Solutions employs advanced cleaning methods & technologies, and equipment to clean any tank - any size.

We provide aboveground storage tank cleaning and degassing of industrial tanks before inspection, repair or product changeover.

We work with our clients to meet stringent government regulations pertaining to emission reductions, waste minimization, and required inspection / repair intervals.

Ensuring safe operation, compliance, process efficiency and operating at the highest level of safety every step of the way.

Refinery Solutions has the specialized expertise, advanced technology, safety record and the industry experience to provide a comprehensive solution with a single point of responsibility.

Refinery Solutions can help you service and manage all aspects of virtually any type of tank, including but not limited to: crude, fuel and slop oil, asphalt, wastewater, gasoline, sour water, benzene etc.

Mechanical Services



Having listened to our customers we have recently established a mechanical division complementing our existing service portfolio. Refinery Solutions is able to execute industrial cleaning projects from blind to de-blind. The division is spearheaded by experienced personnel capable of executing bolting, rigging, pipe fitting, vessel and man way entry amongst other mechanical activities. We utilise the latest most advanced and proprietary bolting tools and methods to execute projects safely, efficiently and in a timely manner meeting and exceeding your critical path requirements.

The division is responsible for blinding/de-blinding of industrial heat exchangers and pipes, opening and closing of heat exchangers and pipes and pressure testing. We endeavour to partner with market leading technology providers selected on our core criteria of significant reduction in downtime and safest of all available methods bodes well for our customers.

Our new mechanical division offers the following services

On Site Engineering

- Flange Facing
- Pipe Cutting
- Bevelling
- Milling

Controlled Bolting

- Hydraulic Bolt Tensioning
- Hydraulic Bolt Torquing

We take pride in our safety program, the quality of service we provide our customers, and our commitment to completing each and every project in a safe manner & in a timely fashion.

We look forward to becoming your industrial cleaning provider.



**We choose to offer a
commercially quantifiable
reduction in downtime and
total maintenance cost**

Refinery Solutions LLC

Jubail Industrial City

Workshop Nos. 1, 2 & 3
Abu Sayed Industrial Area
Dhahran-Jubail Highway
Jubail Industrial City, Jubail
Kingdom of Saudi Arabia

T +966 920 008 812
F +966 12 661 6702

Yanbu Industrial City

Units 7/8 Red Sea Industrial Estate
Phase One
Yanbu Industrial City
Yanbu Al Bahr
Kingdom of Saudi Arabia

T +966 14 391 2494
F +966 14 391 2495

info@refinerysolutions.com
www.refinerysolutions.com

